Elora Sands Subdivision

Preliminary Stormwater Management Report

Project Location:
Township of Centre Wellington, Ontario

Prepared for:
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MTE File No.: 62018-001

Engineers, Scientists, Surveyors.

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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Cachet Developments (Elora) Inc. to prepare the following Preliminary Stormwater Management Report in support of a Zoning By-Law Amendment (ZBA) and Draft Plan of Subdivision application.

The lands that comprise the ZBA and Draft Plan of Subdivision application are known as the Elora Sands (formerly Gibson Farm). The Elora Sands (referred to hereafter as the Subject Lands) are located at 7581 Sideroad 15, in the Township of Centre Wellington, and are approximately 39.8ha. The Subject Lands are generally bounded by Sideroad 15 to the north, Gerrie Road to the east, the Keating agricultural lands to the south, and Irvine Street to the west. The Nichol Municipal Drain No. 1 (ND) flows generally in an east to west orientation through the northern portion of the Subject Lands. Refer to **Figure 1.1**.

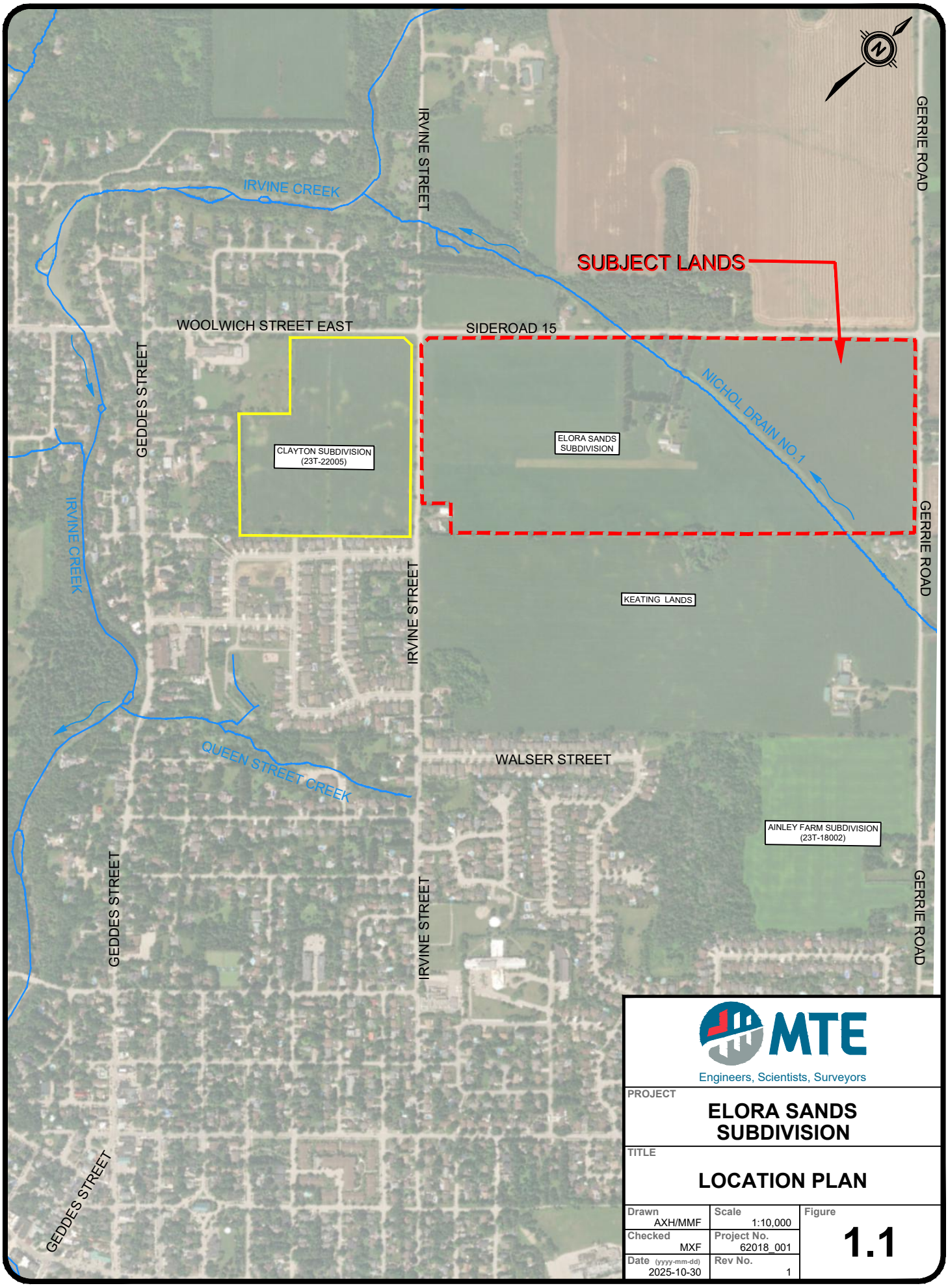
The Subject Lands are currently subject to active official plan amendment applications to redesignate the property from 'Prime Agricultural' to 'Primary Urban Centres' and "Core Greenlands' under the County of Wellington Official Plan, and to 'Residential' and 'Core Greenlands' within the 'Modified Urban Boundary' under the Township Official Plans.

Following the applications for Official Plan Amendments to the Township and County, Cachet is proposing to develop the Subject Lands for residential uses. The proposed development plans include a residential subdivision with a mix of single detached, street-oriented townhouse units, a seniors housing facility, park blocks, a sanitary pumping station block, SWM blocks and municipal rights-of-way. Refer to the Draft Plan of Subdivision prepared by Malone Given Parsons Ltd. (MGP), dated August 27, 2025, in **Appendix A** for more details.

Further west of Irvine Street is the Clayton Subdivision (23T-22005, also owned by Cachet). The Clayton Subdivision was recently Draft Plan Approved at the Ontario Land Tribunal (OLT). The approved Stormwater Management (SWM) strategy for the Clayton Subdivision locates the proposed SWM facility on the Subject Lands, with the intention of fully integrating the SWM strategy for both properties.

This report has been prepared to present the stormwater management quality, quantity and water balance measures that are proposed to be provided for the development. This report should be read in conjunction with the following reports/information:

- *Elora Sands Subdivision – Functional Servicing Report, MTE Consultants Inc. (November 2025).*
- *Elora Sands - Environmental Impact Study, Beacon Environmental (November 2025).*
- *Proposed Residential Development Clayton and Elora Sands - Supplemental Groundwater Data, Soil-Mat (September 2025).*
- *Nichol Drain and Queen Street Creek - Preliminary Fluvial Geomorphological Assessment, GEO Morphix (October 2025).*



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ELORA SANDS SUBDIVISION

TITLE
LOCATION PLAN

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1.2 Background Information

1.2.1 Nichol Drain Subwatershed Study

A subwatershed study for the Nichol Drain (ND) was undertaken by the Township and is detailed in the *Nichol Drain Subwatershed Study* (NDSS) prepared by Aquafor Beech Limited et al (October 2008). Based on the NDSS, the drainage area of the subwatershed encompasses an area of approximately 767ha, mostly of agricultural lands. The NDSS identified the ND as being a coldwater watercourse downstream of Sideroad 15 (without coldwater fish species) and a warmwater system upstream of Sideroad 15. However, the Grand River Conservation Authority's (GRCA) GRIN mapping shows the entire reach of the ND as being a warmwater system.

The ND is an open channel type municipal drain that starts adjacent to Beatty Line, at its most upstream point. The channel flows west approximately 4km and discharges to Irvine Creek immediately west of Irvine Street, which in-turn discharges to the Grand River just downstream of the Village of Elora.

The NDSS recommended terracing of the overbanks adjacent to the channel to improve floodplain connectivity. The updates to the floodplain (i.e. terracing) were implemented into the Draft Plan and are documented within the *Elora Sands Subdivision - Floodplain Assessment* (November 2025) appended in **Appendix J**.

1.2.2 Other Studies

As part of the Boundary Expansion OPA application, a *Preliminary Stormwater Management Strategy Report* (March 2025) was prepared by MTE that provided a SWM strategy and a subwatershed study update incorporating development of the boundary expansion lands, as the previous NDSS did not contemplate any development beyond developments within Fergus.

1.3 Purpose of Study

The purpose of this study is to develop a SWM strategy for the proposed development satisfying criteria established by the Township of Centre Wellington, the County of Wellington (County), the Grand River Conservation Authority (GRCA), and the Ministry of the Environment, Conservation and Parks (MECP – formerly MOE), taking into consideration the previous studies, municipal standards, and MECP guidelines in accordance with the recommendations of the NDSS.

1.4 Objectives

The objective of this stormwater management report is to ensure that the proposed development includes the necessary controls to protect the hydrology and water quality of the receiving water systems. The plan will ensure that the proposed Plan of Subdivision provides the necessary blocks and corridors for stormwater management measures to be implemented. The primary objectives of this study are as follows:

- Document criteria for the management of stormwater runoff from the subject lands.
- Recommend a comprehensive plan for controlling the quality and quantity of storm water runoff from the subject lands.
- Recommend a strategy to provide erosion protection for the ND.

- Recommend a strategy to provide thermal mitigation for storm water discharged to the ND.
- Prepare preliminary designs for the recommended stormwater management infrastructure.

2.0 EXISTING CONDITIONS

2.1 Topographical Information

As previously discussed, the subject lands consist of approximately 39.8ha, of which portions of the lands are undevelopable as they are within the ND floodplain. The Subject Lands are generally bounded by Sideroad 15 to the north, Gerrie Road to the east, Keating agricultural lands to the south, and Irvine Street to the west. The Subject Lands are currently used for interim agricultural purposes.

MTE conducted a detailed topographical survey of the subject lands in 2022. The existing topography of the Subject Lands are shown on **MTE Drawing 62018-001-EC1.1**. A topographical survey for the Clayton Subdivision was completed by JD Barnes (formerly Black, Shoemaker, Robinson & Donaldson Limited) in the Fall of 2021, as part of its Draft Plan of Subdivision application.

The Subject Lands generally consist of moderately sloped topography with slopes typically ranging from 1.0% to 16.5%. Existing elevations within the lands range from approximately 400.8m in the ND to 420.5m at the north corner of the property.

A topographical ridge is present near the southwest corner of the Subject Lands, generally parallel to the ND, which extends into the adjacent Keating lands to the south. The ridge has a general elevation of 414.0m to 415.0m within the Subject Lands.

Under pre-development conditions, the lands north of the topographical ridge, approximately 93% of the Subject Lands (37.3ha), have surface runoff draining to the ND, which in-turn drains to Irvine Creek. This is split between the lands north and south of the ND with the lands north of ND draining from north to south; and the lands south of the ND draining from south to north. The remaining 7% of the Subject Lands (2.7ha) located in the southwest corner and south of the ridge, drain towards a wetland located in the southwest corner of the Keating lands, adjacent to Irvine Street. The wetland and Irvine Street drain to the Queen Street Creek (QSC) which also discharges to Irvine Creek.

2.2 Geotechnical and Hydrogeological Information

In 2021, Soil-Mat Engineers & Consultants Ltd. (Soil-Mat) conducted initial geotechnical and hydrogeological investigations for the Subject Lands and the Clayton Subdivision, with several updates provided since then.

The fieldwork for the investigations included: 15 boreholes for the Subject Lands (of which 9 included a monitoring well), and 13 boreholes for the Clayton Subdivision (of which 10 included monitoring wells). The boreholes were advanced to depths ranging between 2.1m to 8.2m. Based on the results of the detailed investigations, the subsurface stratigraphy for the Subject Lands is generally described as topsoil underlain by sandy silt, silty sand till, and clayey sandy silt till deposits, with generally trace amounts of gravel.

The hydrogeological assessments included groundwater level readings for all monitoring wells based on continuous monitoring, generally measured from October 2021 to May 2023, and from March to May 2025. A groundwater contour plan representative of the seasonal high groundwater levels was also provided. The most recent hydrogeological assessment update based on the latest groundwater monitoring is summarized in the September 2025 report.

Based on the groundwater level readings recorded by Soil-Mat, groundwater levels generally rise and fall with the topography. Groundwater flow is interpreted as having a high point located near the topographical ridge and generally mimics the surface water flow direction.

Based on the findings in the NDSS and the hydrogeological assessment by Soil-Mat, generally groundwater contributes to the ND as shallow interflow and baseflow.

The relevant geotechnical and hydrogeological reports can be found in **Appendix E**.

2.3 Source Water Protection and GRCA Mapping

The Subject Lands are within a Wellhead Protection Area (WHPA) and a Significant Groundwater Recharge Area (SGRA) as defined by the Source Water Protection Plan Mapping, as illustrated in **Appendix E**. A majority of the lands have a WHPA classification of WHPA-C, while a very small portion of the Subject Lands in the southwestern corner have a classification of WHPA-B and the eastern portion of the lands have a classification of WHPA-D. The majority of the Subject Lands are within a wellhead vulnerability score of 6 with a very small portion in the southwest corner having a vulnerability score of 8 and the eastern portion of the lands with a vulnerability of 4. There is an existing municipal drinking water supply well located on Aqua Street approximately 900m south of the Subject Lands.

The intrinsic vulnerability for the SGRA is characterised as moderate (generally having a vulnerability score of 4), generally indicative of shallow groundwater flow towards Irvine Creek west of the Subject Lands.

As part of the Hydrogeological Considerations, Terra-Dynamics Inc. conducted a Source Water Protection Due Diligence Review of the Subject Lands and Keating Lands dated March 2025 as part of the boundary expansion OPA application. The management strategies proposed for mitigation of impacts for quality and quantity to WHPAs and SGRAs by Terra-Dynamics aligns with the stormwater management strategies and servicing proposed in this Preliminary SWM Report and the Functional Servicing Report. Refer to **Appendix E and F** for details.

2.4 Pre-Development Conditions

The majority of the Subject Lands drain to the ND, which in turn drains to Irvine Creek. A small portion located in the southeast corner drains to the Queen Street Creek wetland which outlets to the Queen Street Creek, which in turn drains to Irvine Creek. The pre-development catchment areas are illustrated in **Figure 2.1.**

2.4.1 Drainage Areas to Nichol Drain No. 1

Catchments 622

This catchment area consists of agricultural lands to the north of the ND within this Subject Lands. The drainage flows overland to the ND in the pre-development condition. These catchments contain a total area of 9.69ha.

Catchment 624, 628 and 629

These catchment areas consist of agricultural lands to the south of the ND within the Subject Lands. The drainage from these areas flows overland to the ND. These catchments contain a total area of 20.76ha.

Catchment 625

This catchment consists of agricultural lands within the Clayton Subdivision Lands. In the pre-development condition these lands drain overland to a series of ditches which convey the flows to the ND. These catchments contain a total area of 6.72ha.

Catchment 626

This catchment consists of portions of Irvine Street, Woolwich Street, and Sideroad 15. The rights-of-way drain to roadside ditches which convey flows to the ND. This catchment contains a total area of 1.06ha.

Catchment 627

This catchment consists of the Nichol Drain No. 1 floodplain. This catchment contains a total area of 9.39ha.

Catchment 621 and 623

These catchments consist of external agricultural lands. These areas drain overland to the ND. Catchment 623 drains overland through the subject lands in the pre-development condition. These catchments contain a total area of 11.72ha

2.4.2 Drainage Areas to Queen Street Creek

The Queen Street Creek (QSC) flows through urban, residential lots southwest of the Subject Lands, with an outlet to Irvine Creek west of Geddes Street. The QSC drainage area is almost entirely built out except for the southwest corner of the Subject Lands and a portion of the Keating Lands to the south. This drainage area within the Subject Lands drains overland to a wetland along Irvine Street, before discharging to the QSC.

Catchment 704

This catchment consists of agricultural lands in the southwest corner of the Subject Lands. These lands drain overland to the QSC wetland and ultimately the QSC. This catchment contains a total area of 2.74ha.

Catchment 709

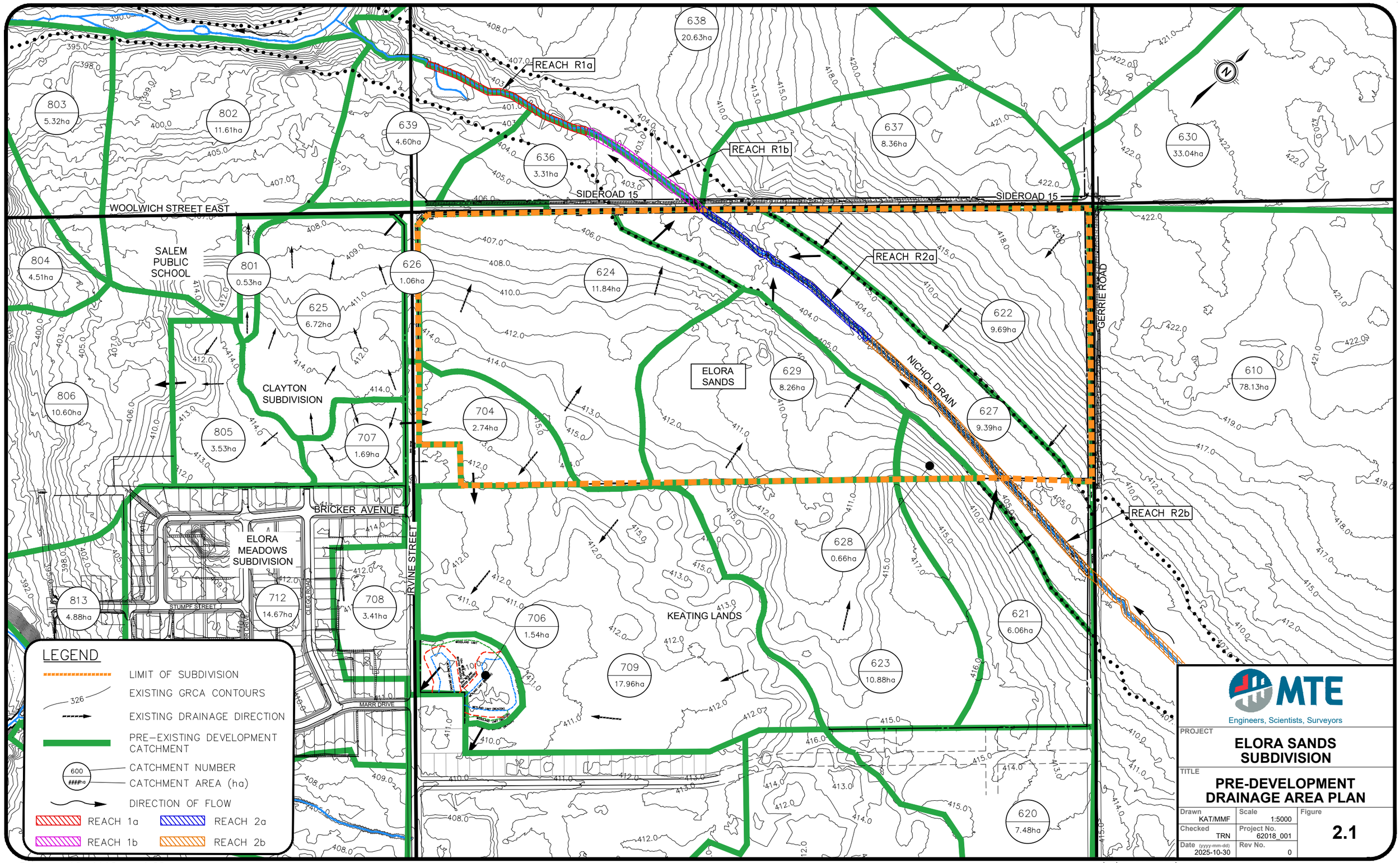
This catchment consists of external agricultural lands. These lands drain overland to QSC wetland and ultimately the QSC. This catchment contains a total area of 18.51ha.

An event based hydrologic model was created for the Subject Lands using the Visual OTTHYMO (VO) modelling software. Storm runoff flows were simulated for the 25mm (4-hour), 2-year through 100-year, and Regional design storms. **Table 2.1** below provides a summary of the pre-development flows rates towards the Subject Lands' outlets.

Table 2.1 – Pre-Development Peak Flows (m^3/s)

Storm Event	To QSC Wetland	To Nichol Drain No. 1 between Gerrie Rd. and Sideroad 15
25mm Storm	0.084	0.289
2-Year Storm	0.224	0.776
5-Year Storm	0.397	1.396
10-Year Storm	0.507	1.796
25-Year Storm	0.676	2.410
50-Year Storm	0.813	2.907
100-Year Storm	0.959	3.439
Regional Storm	2.544	8.287

A summary of pre-development conditions and catchment parameters are provided in **Appendix B**. The drainage areas within this analysis are summarized in the following sections.



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2.4.3 Nichol Drain No. 1 Subwatershed Hydrologic Model

A detailed hydrologic model was prepared as part of the Nichol Drain Subwatershed Study, using the SWMHYMO modelling platform. A hydrologic analysis of the entire Nichol Drain No. 1 subwatershed was completed to assess potential impacts by applying residential land uses over future urban planned areas. Refer to **Figure 2.2** for the existing conditions drainage area plan as modelled in the *Nichol Drain Subwatershed Study,* Aquafor Beech (2008).

The existing conditions model, as prepared in the Subwatershed Study, was updated to a current conditions model. This model was developed with reference to the following reports:

- *Environmental Implementation Report – North West Fergus Secondary Plan Area, RJ Burnside (2013).*
- *Preliminary Servicing & Stormwater Management Report – Ainley Farm Subdivision, GM BluePlan (2019).*

In areas where development has occurred, drainage areas and catchment parameters were updated with the detailed information available. Drainage areas were also updated with reference to the topography of the subwatershed. The catchments within the figure were used to establish the baseline conditions within the drain, prior to more recent development occurring. Refer to **Figure 2.3** for the current conditions drainage area plan which documents the upstream areas that have been approved for development following the NDSS.

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IRVINE CREEK

NICHOL DRAIN

WOOLWICH STREET EAST

SIDEROAD 15

SALEM PUBLIC SCHOOL

CLAYTON SUBDIVISION

ELORA SANDS

GERRIE ROAD

BEATTY LINE

HIGHWAY 6

ELORA MEADOWS SUBDIVISION

KEATING LANDS

IRVINE STREET

AINLEY FARM SUBDIVISION

EX. BONAIRE HIGHLANDS SUBDIVISION (MODELED AS POST DEVELOPMENT)

EX.STORYBROOK SUBDIVISION (MODELED AS POST DEVELOPMENT)

QUEEN STREET CREEK

COLBORNE STREET

GRAND RIVER

803	5.32ha
802	11.61ha
639	4.60ha
636	3.25ha
638	20.63ha
637	8.36ha
630	33.04ha
804	4.51ha
801	0.53ha
626	1.06ha
624	11.84ha
625	6.72ha
622	9.69ha
806	10.60ha
805	3.53ha
704	2.74ha
629	8.26ha
628	0.66ha
627	9.39ha
707	1.69ha
610	78.13ha
510	91.44ha
100	136.98ha
813	4.88ha
712	14.67ha
708	3.41ha
706	1.54ha
709	17.96ha
623	10.88ha
621	6.08ha
714	1.54ha
711	5.75ha
620	4.41ha
710	17.91ha
200	27.50ha
300	17.14ha
516	10.78ha
400	82.86ha
511	55.52ha
515	5.01ha
520	108.36ha
513	6.68ha
512	27.13ha
518	6.44ha
517	2.14ha

LEGEND

- EXISTING GRCA CONTOURS (526)
- EXISTING DRAINAGE DIRECTION
- PRE-EXISTING DEVELOPMENT CATCHMENT
- 805 / 3.53ha — CATCHMENT NUMBER / CATCHMENT AREA (ha)
- LIMIT OF SUBDIVISION
- REACH 1a
- REACH 1b
- REACH 2a
- REACH 2b
- AGRICULTURAL
- OPEN SPACE
- EXTERNAL DEVELOPMENT
- BUILT BOUNDARY
- SUBJECT LANDS

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ELORA SANDS SUBDIVISION

TITLE
EXISTING CONDITIONS NICHOL DRAIN CATCHMENTS

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Figure **2.2**

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IRVINE CREEK
NICHOL DRAIN
WOOLWICH STREET EAST
SIDEROAD 15
SALEM PUBLIC SCHOOL
CLAYTON SUBDIVISION
ELORA SANDS
GERRIE ROAD
BEATTY LINE
HIGHWAY 6
ELORA MEADOWS SUBDIVISION
KEATING LANDS
IRVINE STREET
AINLEY FARM SUBDIVISION
EX. BONAIRE HIGHLANDS SUBDIVISION (MODELED AS POST DEVELOPMENT)
EX.STORYBROOK SUBDIVISION (MODELED AS POST DEVELOPMENT)
QUEEN STREET CREEK
COLBORNE STREET
GRAND RIVER

803 5.32ha	802 11.61ha	639 4.60ha	636 3.25ha
638 20.63ha	637 8.36ha	630 33.04ha	804 4.51ha
801 0.53ha	626 1.06ha	624 11.84ha	622 9.69ha
625 6.72ha	510 91.44ha	100 136.98ha	806 10.60ha
610 78.13ha	629 8.26ha	628 0.66ha	627 9.39ha
805 3.53ha	707 1.69ha	704 2.74ha	813 4.88ha
708 3.41ha	712 14.67ha	706 1.54ha	621 6.08ha
709 17.96ha	623 10.88ha	200 27.50ha	714 1.54ha
711 5.75ha	620 4.41ha	710 17.91ha	516 10.78ha
300 17.14ha	511 55.52ha	400 82.86ha	515 5.01ha
520 108.36ha	513 6.68ha	512 27.13ha	518 6.44ha
517 2.14ha			

LEGEND

- EXISTING GRCA CONTOURS (326)
- EXISTING DRAINAGE DIRECTION
- PRE-EXISTING DEVELOPMENT CATCHMENT
- 200 / 27.50ha — CATCHMENT NUMBER / CATCHMENT AREA (ha)
- LIMIT OF SUBDIVISION
- REACH 1a
- REACH 1b
- REACH 2a
- REACH 2b
- AGRICULTURAL
- OPEN SPACE
- EXTERNAL DEVELOPMENT
- BUILT BOUNDARY
- SUBJECT LANDS

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PROJECT
ELORA SANDS SUBDIVISION

TITLE
CURRENT CONDITIONS NICHOL DRAIN CATCHMENTS

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Figure **2.3**

3.0 STORMWATER MANAGEMENT CRITERA

New developments are required to provide stormwater management in accordance with provincial and municipal policies. Relevant documents have been referenced in the design of the stormwater management plan for the subject site; including:

- Stormwater Management Planning and Design Manual (MOE, 2003).
- GRCA Policies for the Administration of Ontario Regulation 41/24 (GRCA, 2024).
- Nichol Drain Subwatershed Study - Phase 1 Existing Conditions - Final Report (Aquafor Beech, 2008).
- Township of Centre Wellington Development Manual (2024).

Based on the above policies and relevant documents, background reports, agency requirements, and site-specific considerations, the following SWM criteria have been established for this study area:

- **Water Quality** – Provide an Enhanced (MOE, 2003) level of stormwater quality treatment prior to discharge to the ND.
- **Water Quantity** – Control post-development peak flows to pre-development levels for the 2-year through 100-year storm events.
- **Instream Erosion Control** – Provide erosion control by maintaining existing flow duration characteristics.
- **Thermal Mitigation** – Provide temperature mitigation measures prior to discharge to the receiving systems, in the form of best management practices.
- **Water Balance - Infiltration** – Maintain or exceed pre-development groundwater volume inputs established within the NDSS through active and/or passive infiltration measures.
- **Water Balance - Surface Water Runoff** – Maintain or exceed pre-development surface water volume inputs into significant environmental features.

3.1 Water Quality

The NDSS required that an *Enhanced Level* of water quality control be provided to protect the potential coldwater fish habitat of the ND. The requirements for this level of quality control are established in Table 3.2 of the *Stormwater Management Planning and Design Manual* (MOE, 2003).

3.2 Quantity Control to ND

Table 3.1 below documents the pre-development peak flows from the Subject Lands.

Table 3.1 – Summary of Pre-Development Flows

	25mm-4hr	2yr	5yr	10yr	25yr	50yr	100yr
Flows to Nichol Drain No. 1 (m^3/s)							
Flows to ND from Northeast							
622	0.052	0.141	0.254	0.328	0.441	0.532	0.629
Flows to ND from Southwest							
624-626 & 628-629	0.136	0.329	0.435	0.755	1.012	1.221	1.444
External Flows to ND							
621, 623 & 627	0.134	0.377	0.690	0.894	1.209	1.464	1.736
Total Flows to ND	**0.289**	**0.776**	**1.396**	**1.796**	**2.410**	**2.907**	**3.439**
Flows to Queen St. Creek Wetland (m^3/s)							
Flows to QSC Wetland							
704	0.016	0.046	0.083	0.107	0.144	0.174	0.206
External Flows to QSC Wetland							
709	0.074	0.074	0.195	0.346	0.442	0.589	0.707
Total Flows to QSC Wetland	**0.084**	**0.224**	**0.397**	**0.507**	**0.676**	**0.813**	**0.959**

*Note the sums may not add up algebraically. They are based on the timing and sum of hydrographs taken directly from Visual OTTHYMO.

3.3 Instream Erosion Control

The NDSS documented that the reaches of the ND upstream of Sideroad 15 were stable and reaches downstream of Sideroad 15 were moderately stable with no existing erosion sites in need of remedial action. The NDSS also concluded that erosion stress should be minimized as a result of hydrologic changes. Management strategies implemented within the watershed for erosion have been through the extended detention of the 25mm storm event runoff volume over a 24 to 48 hour period. It should be noted that erosion control for the Northwest Fergus Secondary Plan Area was provided utilizing this same strategy.

A *Fluvial Geomorphology Assessment and Erosion Mitigation Analysis* was completed by GEO Morphix. This study assessed 2 sensitive reaches, described as Reaches R1a and R2a. Reach R2a is located within the Subject Lands upstream of Sideroad 15, and Reach R1a is located downstream of Sideroad 15. **Table 3.2** illustrates the erosion threshold results for Reaches R1a and R2a.

Table 3.2 – Erosion Thresholds

Channel Parameter	Reach R1a		Reach R2a	
	Bed	Bank	Bed	Bank
Critical Discharge (m^3/s)	1.216	0.369	0.485	0.793
Limiting Erosion Threshold (m^3/s)	**0.369**		**0.485**	

3.4 Thermal Mitigation

The NDSS specifies that the ND should be considered a coldwater stream from a stormwater management perspective. The proposed Stormwater Management facility designs should incorporate best management practices to mitigate thermal impacts to the ND.

3.5 Water Balance

The NDSS has two recommendations in respect to water balance within the ND subwatershed.

- Maintain water balance associated with small wetland features.
- Maintain water balance over entire development site to support local groundwater discharge to the ND.

4.0 PROPOSED DEVELOPMENT

4.1 Proposed Area Grading

Preliminary area grading plans illustrating road and property grades are shown on **Figure 4.1**. Further details are provided in the drawings enclosed in the *Elora Sand Subdivision – Functional Servicing Report* (MTE, November 2025). The grading design for the Subject Lands was controlled by many factors which include servicing constraints, matching existing and proposed boundary grades around the perimeter of the property while respecting existing natural features (established buffers), ensuring major storm event overland flows are directed towards the proposed road right-of-way where applicable, or towards the proposed SWM facilities, as well as minimizing the importation of fill material for the overall development.

4.2 Floodplain Terracing

As recommended in the NDSS, the ND will be regraded to establish a riparian corridor of 30m on each side of the existing stream channel. The implementation of terracing was recommended to “improve floodplain connectivity” and allow for “the development of natural forms and functions within the corridor”. The study recommended beginning the terracing 0.1m above the invert of the channel; however, it was determined that the defined channel will retain its full depth to ensure that most minor storm events are contained within the existing channel. The floodplain is then graded at 1% before tying into the regional floodplain elevation with a 4:1 embankment.

Refer to *Elora Sands Subdivision - Floodplain Assessment* (November 2025) included in **Appendix J**.

4.3 Post-Development Conditions

The proposed development is comprised primarily of residential land use with a park block, open space blocks, and stormwater management blocks. Two stormwater management facilities (SWMFs) are proposed in the Draft Plan. The facilities have been designed to meet criteria described in **Section 3** of this report. The location of the proposed SWMFs along with the contributing drainage areas is illustrated in **Figure 4.2**. Minor system runoff from all the contributing areas will be conveyed by the proposed storm sewer system to the SWMFs. Excess runoff from major storms will flow overland to the SWMF via the proposed rights-of-ways and designed overland flow routes.

Storm drainage from the portion of the Subject Lands southwest of the ND, along with external drainage from the Clayton Subdivision to the west and a portion of Sideroad 15 will drain to a proposed wet pond SWM Facility located adjacent to Sideroad 15 and the ND. This facility, referred to as SWMF1, will discharge to the ND.

The remainder of the Subject Lands (northeast of the ND), and some external drainage from Sideroad 15 will drain to a proposed wet pond SWM Facility located adjacent to Sideroad 15 to the north of the ND. This facility, referred to as SWMF2, will also discharge to the ND.

Water balance to the QSC wetland will be met by a combination of inputs from the rear yards and roofs of lots in the southwest corner of the Subject Lands.

The post-development catchments are detailed in **Figure 4.2**, and the post-development parameters for modelling have been included in **Appendix B**. The following sections describe the drainage areas within the analysis.

4.3.1 Drainage Areas to SWMF1

Catchments 624, 624.1 and 625

These catchment areas consist of residential areas within the Subject Lands, residential areas within the Clayton Subdivision, and the SWMF block containing SWMF1. The drainage is collected via the proposed storm sewers and municipal rights-of-way and directed to the proposed SWMF1, before ultimately outletting to the ND. These catchments contain a total area of 23.61ha.

Catchments 9625 and 9624

These catchment areas consist of roofs areas within catchments 624 and 625. The roof drainage is directed to lot-level infiltration galleries sized for the 25mm event. Surplus is collected via the proposed storm sewers and municipal rights-of-way and directed to the proposed SWMF1, before ultimately outletting to the ND. These catchments contain a total area of 8.23ha.

Catchments 628 and 629

These catchments consist of rear yards and a portion of Irvine Street. The drainage is collected via the proposed storm sewers and urbanized rights-of-way and directed to the proposed SWMF1, before ultimately outletting to the ND. These catchments contain a total area of 0.82ha.

Catchments 633 and 634

These catchments consist of portions of Sideroad 15. The drainage is collected via the proposed storm sewers and urbanized rights-of-way and directed to the proposed SWMF1, before ultimately outletting to the ND. These catchments contain a total area of 0.52ha.

4.3.2 Drainage Areas to SWMF2

Catchments 622 and 622.1

These catchment areas consist of residential areas within the Subject Lands, a portion of the park block, the SPS block and the SWMF block containing SWMF2. The drainage is collected via the proposed storm sewers and municipal rights-of-way and directed to the proposed SWMF2, before ultimately outletting to the ND. These catchments contain a total area of 6.34ha.

Catchment 9622

This catchment area consists of roofs areas within catchments 622. The roof drainage is directed to lot-level infiltration galleries sized for the 25mm event. Surplus is collected via the proposed storm sewers and municipal rights-of-way and directed to the proposed SWMF2, before ultimately outletting to the ND. These catchments contain a total area of 2.01ha.

Catchments 631

This catchment consists of portions of Sideroad 15. The drainage is collected via the proposed storm sewers and urbanized rights-of-way and directed to the proposed SWMF2, before ultimately outletting to the ND. These catchments contain a total area of 0.50ha.

4.3.3 Drainage Area to Site Level SWMF

Catchment 626

This catchment consists of Block 431. This block is proposed to be a seniors housing facility development. The site will have site level stormwater management controls implemented. This catchment consists of 1.07ha.

4.3.4 Uncontrolled Drainage Areas to Nichol Drain No. 1

Catchment 621

This catchment consists of agricultural lands. Drainage is directed overland to the ND. This catchment contains a total area of 6.08ha.

Catchment 623

This catchment consists of agricultural lands which previously drained through the Subject Lands. Drainage is collected via a ditch inlet and outletted to the ND upstream of the Subject Lands. This catchment contains a total area of 11.20ha.

Catchment 627

This catchment consists of the ND floodplain between Gerrie Road and Sideroad 15, backyards backing onto the floodplain, and a park block south of the ND. Drainage is directed overland to the ND. This catchment contains a total area of 11.30ha.

Catchment 632

This catchment consists of a portion of Sideroad 15. The drainage is collected via a proposed storm sewer and directed to OGSs on either side of the ND. Major drainage is collected via the urbanized R-O-Ws and directed to the ND. This catchment contains a total area of 0.54ha

4.3.5 Uncontrolled Drainage Areas to Queen Street Creek

Catchment 704

This catchment consists of rear yards and roofs in the southwestern corner of the Subject Lands. This drainage is directed overland to the QSC wetland. This catchment contains a total area of 0.40ha.

Catchment 709

This catchment consists of agricultural lands to the south of the Subject Lands. This drainage is directed overland to the QSC wetland. This catchment contains a total area of 18.51ha.

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WOOLWICH STREET EAST

SIDEROAD 15

SIDEROAD 15

CLAYTON SUBDIVISION

IRVINE STREET

GERRIE ROAD

BRICKER AVENUE

SWMF1

SWMF1

SWMF2

STREET A

STREET A

STREET A

STREET A

STREET C

STREET C

STREET D

STREET D

STREET E

STREET E

STREET F

STREET F

STREET G

STREET H

STREET H

STREET H

STREET J

STREET B

STREET B

NICHOL DRAIN

BLOCK 429
Pumping Station
0.32 ha

BLOCK 423
PARK
.44 ha

BLOCK 424
SENIORS
.37 ha

BLK 432
Future Road
0.06 ha

BLK 433
Future Road
0.06 ha

PERMISSION TO GRADE FROM THE NEIGHBOURING PROPERTY MUST BE SECURED PRIOR TO ANY GRADING

KEATING LANDS

10m WOODLAND BUFFER

WOODLAND LIMIT

LEGEND

- LIMIT OF DEVELOPMENT
- PROPOSED FLOODPLAIN LIMIT
- SITE BOUNDARY
- PROPOSED CONTOURS
- GRCA EXISTING CONTOURS
- (224.35) PROPOSED ELEVATION
- LP LOW POINT
- HP HIGH POINT
- OVERLAND FLOW ROUTE (MAJOR STORM)
- EXISTING DIRECTION OF DRAINAGE

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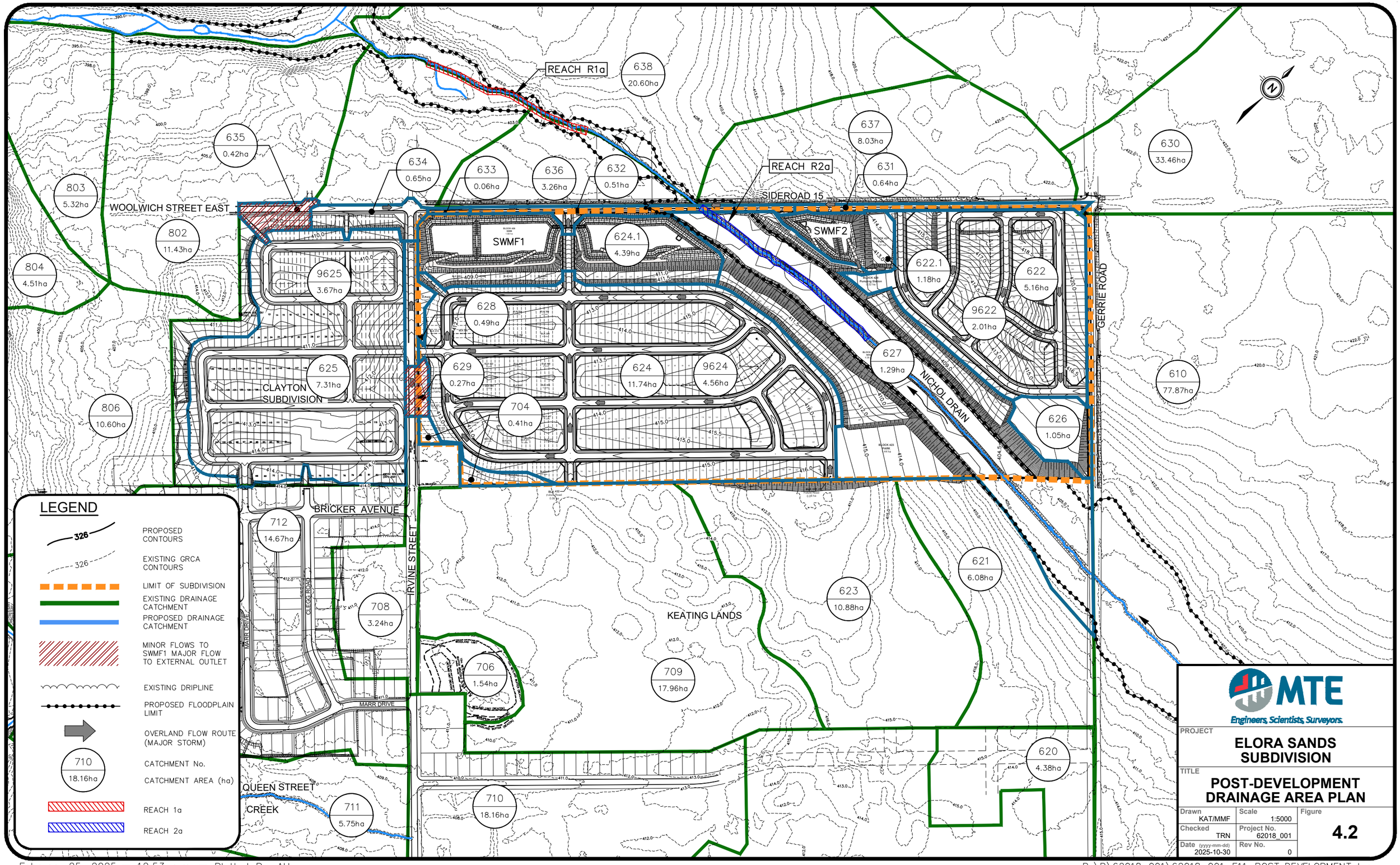
PROJECT
ELORA SANDS SUBDIVISION

TITLE
PRELIMINARY ROAD GRADE PLAN

Drawn	Scale	Figure
KAT/MMF	1:3000	4.1
Checked: AFF	Project No.: 62018_001	
Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

Plot Date: November 4, 2025 - 3:16 PM



MTE
Engineers, Scientists, Surveyors.

PROJECT
ELORA SANDS SUBDIVISION

TITLE
POST-DEVELOPMENT DRAINAGE AREA PLAN

Drawn	KAT/MMF	Scale	1:5000
Checked	TRN	Project No.	62018_001
Date (yyyy-mm-dd)	2025-10-30	Rev No.	0

Figure **4.2**

February 25, 2025 — 12:53 p.m. — Plotted By: AHewson

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5.0 STORMWATER MANAGEMENT DESIGN

5.1 Event Based Hydrologic Modelling

An existing conditions hydrologic model was developed for this Stormwater Management assessment, based on existing topography, land uses, hydrogeological characteristics, and pre-development conditions, using the Visual OTTHYMO (VO) modelling platform. The existing conditions model was then updated to reflect proposed conditions and stormwater management strategies for the study area to create a proposed hydrologic model. Refer to **Figure 4.2** for the proposed conditions drainage area plan. This model was used to assess the following events:

- Quality storm event (25mm depth, 4-hour Chicago distribution).
- 2, 5, 10, 25, 50, and 100-year return period rainfall events (3-hour Chicago distribution derived from the Fergus Shand Dam Intensity-Duration-Frequency (IDF) parameters).
- Regional storm event (212mm depth, last 12 hours of Hurricane Hazel using AMC III conditions).

The IDF parameters, hydrologic parameters, and model output files for each of the pre- and post-development catchment areas are provided in **Appendix B**.

5.2 Continuous Hydrologic Modelling

As previously noted, the NDSS developed an existing conditions model for the Nichol Drain subwatershed using the SWMHYMO modeling platform. This model was first converted to the VO modelling platform and then updated to reflect current conditions within the Nichol Drain subwatershed. The current conditions model was further refined to reflect proposed conditions and stormwater management strategies in the study area to create a proposed hydrologic model.

Existing conditions reflected pre-development conditions presented in the NDSS with refined catchments in the areas where development has occurred, based on information from their respective SWM reports. Drainage areas within the analysis are displayed in **Figure 2.2**. The current conditions model updates include adding in approved developments that have occurred within the ND subwatershed, and are illustrated in **Figure 2.3**. The proposed conditions model considers the Subject Lands and the Clayton Subdivision lands as developed. All three continuous model scenarios were modelled using the following data set:

- 55-year (1950-2005) meteorological data set derived from the Fergus Shand Dam station.

The hydrologic parameters and model outputs for each of the existing, current and proposed models are provided in **Appendix B**. Further discussion is provided in **Section 5.7.**

5.3 Stormwater Management Facilities

5.3.1 SWMF1

As discussed above, SWMF1 will service the southwestern portion of the Subject Lands. The total contribution area to SWMF1 is 33.18ha. This facility has been designed as a wet pond with a permanent pool depth of 1.5m. SWMF1 will drain to the ND on the downstream side of Sideroad 15.

5.3.2 SWMF2

SWMF2 will service the northern portion of the Subject Lands. The total contribution area to the East SWMF is 8.85ha. This facility has been designed as a wet pond with a permanent pool depth of 1.5m. SWMF2 will drain to the ND on the upstream side of Sideroad 15.

5.3.3 Block 431 SWMF

Block 431 is proposed to be a seniors housing facility development. At the site plan level, a stormwater management strategy will be required to provide quality and quantity control for the site development runoff.

5.4 Water Quality

The proposed SWM facilities have been designed as wet ponds. The wet pond facility will incorporate a sediment forebay, which offer benefits of dilution and settling of sediment. A planting scheme will be prepared that carefully selects plant species and their location in and around the basins to stabilize banks, mitigate temperate increases, deter waterfowl from nesting within the area, and provide aesthetics and safety benefits.

The forebay design is based on classic particle settling and flow dispersion equations as presented in the MOE's 2003 *Stormwater Management Planning and Design Manual*. The methodology presented in that document suggests that the design flow for the forebay should be taken as the peak outflow from the facility. A forebay is typically designed to treat minor storm flows. Therefore, the main pond will essentially be empty (or at its permanent pool level) and there will be no mass of water at the outlet of the forebay that would control the flow through the forebay to the main pond's discharge rate.

This being the case, the design of the forebay should be based on the notion that the flow into the forebay equals the flow through the forebay, which equals the flow out of the forebay. In using this approach, the recommended settling velocity of 0.0003m/s (from MOE 2003) results in extremely large and unachievable forebay lengths. Therefore, the forebay is designed to satisfy the following four conditions:

- Settling length based on a settling velocity of 0.0003m/s using the main pond peak discharge for the 25mm event (as per MOE 2003).
- Settling length based on a settling velocity of 0.0055m/s using the forebay inflow/outflow for the 25mm event.
- Dispersion length such that, based on flow and depth of water, the velocity through the forebay is less than 0.5m/s.
- Velocity based on flow divided by cross sectional area is less than 0.15m/s to prevent scouring.

The 2003 MOE document suggests that the clean-out frequency for a stormwater management facility be based on the sediment loading within the entire pond, however, it is recommended that the clean-out frequency be based on the loadings within the forebay only. While this typically results in more frequent clean-out, it is restricted to the forebay area only and avoids disturbance of the main wet pond cell. The clean-out frequency for the proposed SWM facility can be found in the forebay design calculations in **Appendix B**.

5.4.1 SWMF1

The proposed SWMF1 will service a total drainage area of 33.18ha. An Enhanced Level of water quality control (based on a wet pond design using a calculated imperviousness of 64%) requires a storage volume of 210m^3/ha. Of this volume, all but 40m^3/ha represents the permanent pool requirement. Considering this, a permanent pool volume of 5,640m^3 is required.

The proposed SWMF design characteristics are summarized in **Table 5.1**. Refer to **Appendix B** for the design calculations for the sediment forebay as well as the main pond drawdown calculations for the 40m^3/ha extended detention and the 25mm storm event storage. Refer to **Figures 5.1 to 5.3** for details of the proposed SWMF.

Table 5.1 – Design Characteristics – West SWMF1

General	Facility Characteristics
Stormwater Management Facility Type	Wet pond
Required MOE Water Quality Protection	Level 1 (Enhanced)
Total Contributing Area	33.18ha
Imperviousness	64%
Bottom Elevation (of main facility)	402.50m
Storage	
Unit Area Storage Volume Requirements as per SWMMP (MOE 2003)	210.0m^3/ha
Required Total Volume	6,967m^3
Permanent Pool	
Required Permanent Pool Volume	5,640m^3
Permanent Pool Volume Provided	21,133m^3
Permanent Pool Elevation	404.00m
Extended Detention	
Minimum Required Volume (40 m^3/ha)	1,327m^3
Extended Detention Elevation (40 m^3/ha)	404.08m
25mm Storm Event	
Approximate Drawdown Time	53.2hr
Ponding Elevation	404.15m
Peak Release Rate	0.038m^3/s
Forebay	
Required Forebay Length	45.5m
Actual Forebay Length	65.8m
Permanent Pool Elevation	404.00m
Bottom Elevation	402.50m
Outlet Controls	
Reverse Slope Outlet Pipe to Control Manhole	
Orifice Dimensions/Elevation (Extended Detention)	300mmx150mm / 404.00m
Overflow Weir Width/Elevation	1.8m / 404.45m
Emergency Weir Crest	20.0m
Emergency Weir Elevation	405.70m

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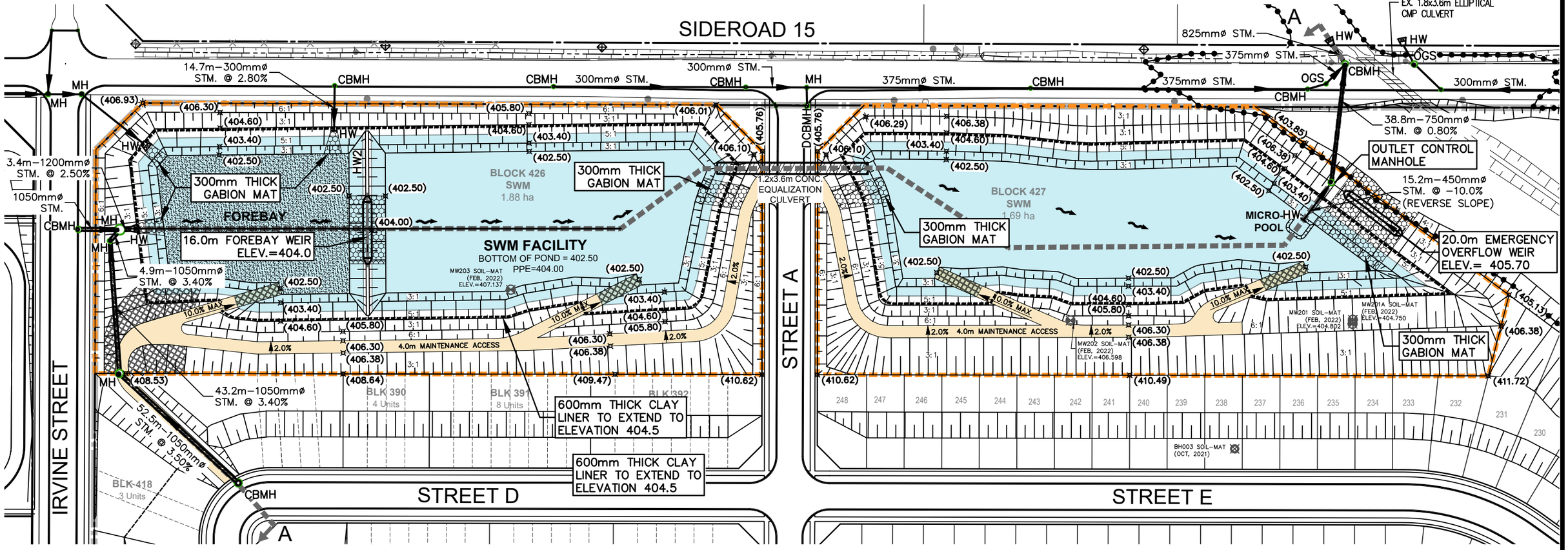

LEGEND

- SWM BLOCK BOUNDARY
- PROPOSED FLOODPLAIN LIMIT
- (405.70) PROPOSED SPOT ELEVATIONS
- 3:1 PROPOSED EMBANKMENT
- 300mm GRANULAR 'B'
- ARTICULATED CONCRETE BLOCK
- GABION MAT
- PERMANENT POOL ELEV=404.00
- ACCESS ROAD

SWM FACILITY PLAN VIEW

SCALE H-1:1250

NOTE:
THIS FIGURE TO BE READ IN CONJUNCTION WITH FIGURE 5.2 AND 5.3

MTE Engineers, Scientists, Surveyors.

PROJECT
ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 1

Drawn: KAT	Scale: 1:1250	Figure: 5.1
Checked: TRN	Project No.: 62018_001	
Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

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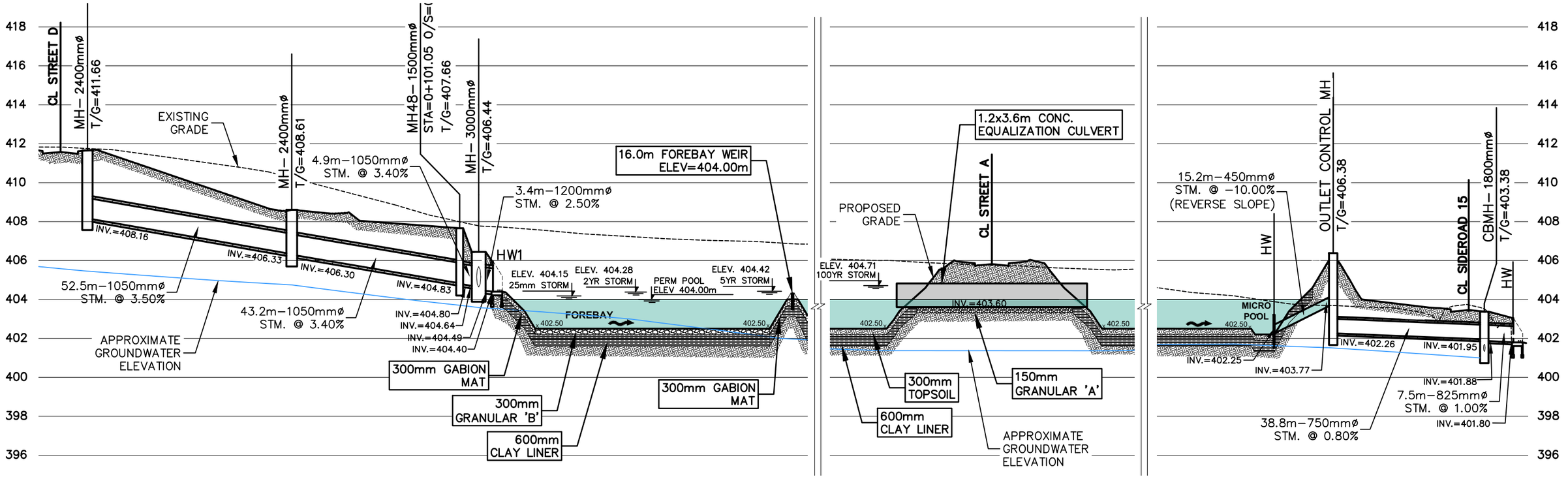

SWM FACILITY - SECTION A-A

SCALE H 1:1000 V 1:200

MAXIMUM PONDING LEVELS	
PERMANENT POOL	404.00
25mm/4hr STORM	404.15
2YR STORM	404.28
5YR STORM	404.42
10YR STORM	404.50
25YR STORM	404.59
50YR STORM	404.65
100YR STORM	404.71

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PROJECT
ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 1 SECTION VIEW

Drawn	Scale	Figure
KAT	AS NOTED	**5.2**
Checked: TRN	Project No.: 62018_001	
Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

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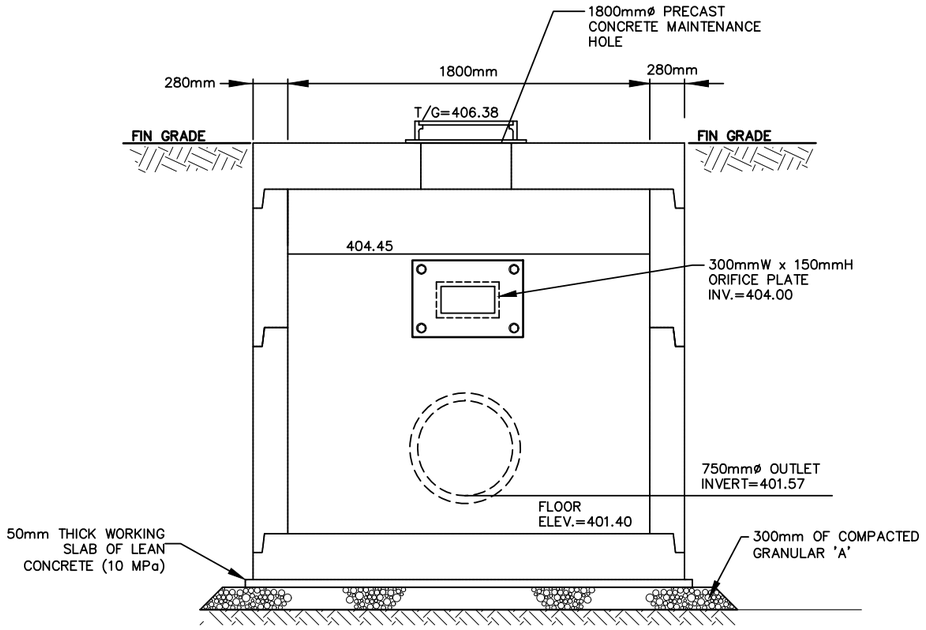
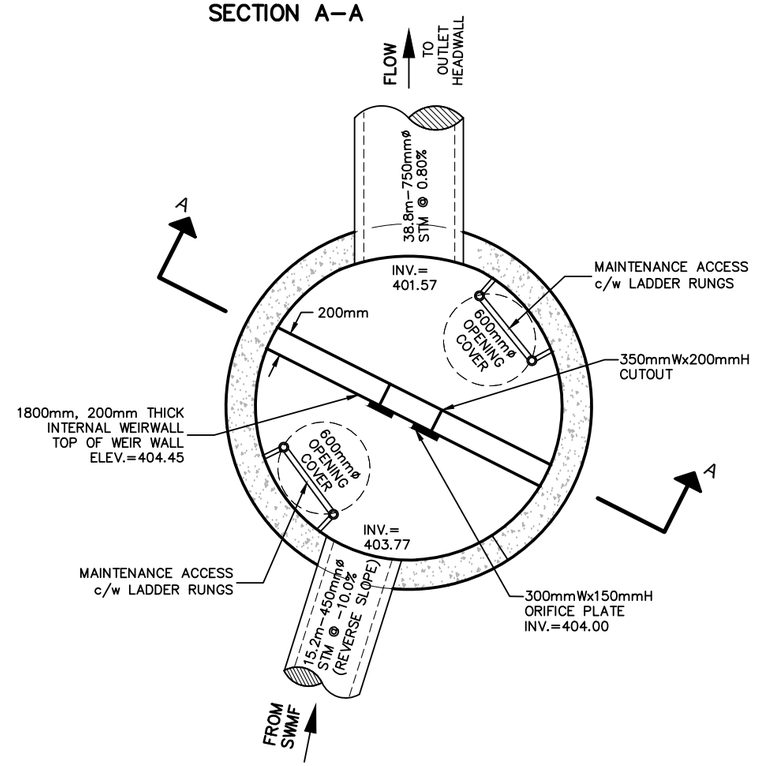


SECTION A–A



OUTLET CONTROL STRUCTURE

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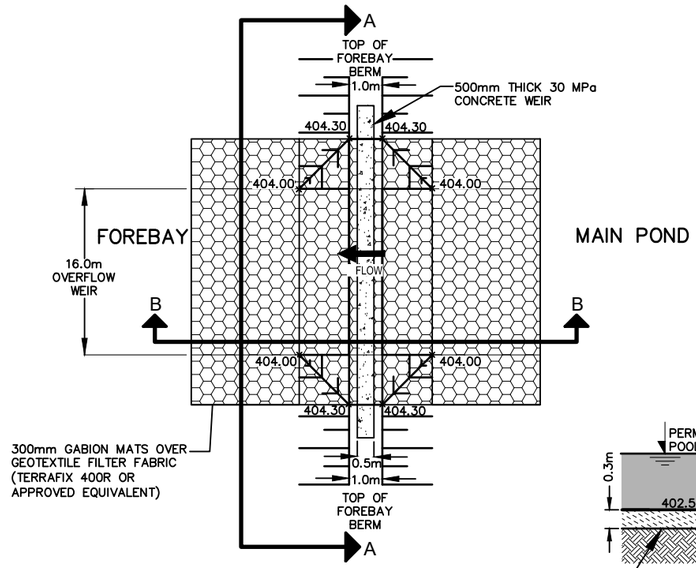
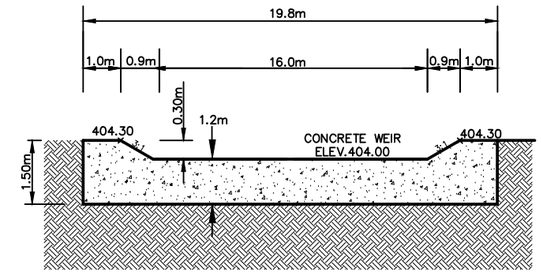
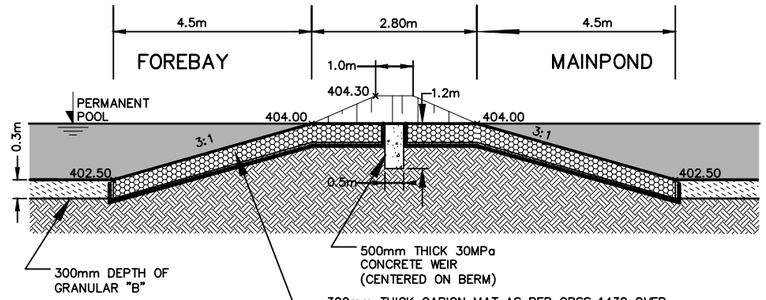


PLAN VIEW

N.T.S.



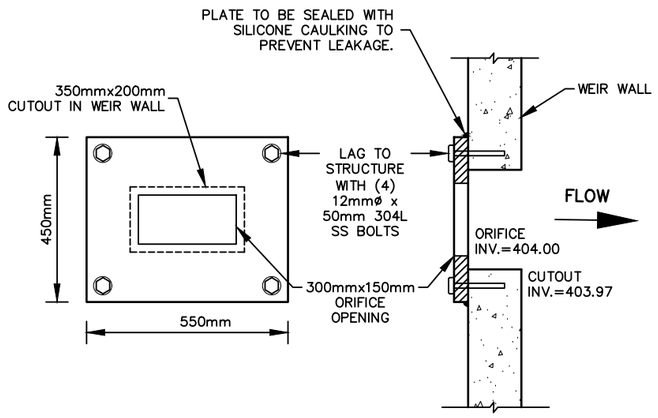
SECTION A–A



SECTION B–B

FOREBAY WEIR

N.T.S.



ORIFICE PLATE DETAIL

N.T.S.

MTE
Engineers, Scientists, Surveyors.

PROJECT
ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 1 DETAILS

Drawn	Scale	Figure
KAT	AS NOTED	5.3
Checked: TRN	Project No.: 62018_001	
Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

Plot Date: November 4, 2025 – 2:52 PM

5.4.2 SWMF2

The proposed SWMF2 will service a total drainage area of 8.85ha. An Enhanced Level of water quality control (based on a wet pond design using a calculated imperviousness of 63.33%) requires a storage volume of 209m^3/ha. Of this volume, all but 40m^3/ha represents the permanent pool requirement. Considering this, a permanent pool volume of 1,500m^3 is required. The permanent pool volume provided is 2,966m^3.

Appendix B contains design calculations for the sediment forebay as well as the main pond drawdown calculations for the 40m^3/ha extended detention and the 25mm storm event storage. Orifice sizes can be adjusted at the time of final design to optimize the predicted drawdown durations as required.

Table 5.2 – Design Characteristics – East SWMF2

General	Facility Characteristics
Stormwater Management Facility Type	Wet pond
Required MOE Water Quality Protection	Level 1 (Enhanced)
Total Contributing Area	8.85ha
Imperviousness	63.33%
Bottom Elevation (of main facility)	403.50m
Storage	
Unit Area Storage Volume Requirements as per SWMMP (MOE 2003)	209.4m^3/ha
Required Total Volume	1,854m^3
Permanent Pool	
Required Permanent Pool Volume	1,500m^3
Permanent Pool Volume Provided	2,966m^3
Permanent Pool Elevation	405.00m
Extended Detention	
Minimum Required Volume (40 m^3/ha)	354.0m^3
Extended Detention Elevation (40 m^3/ha)	405.11m
25mm Storm Event	
Approximate Drawdown Time	50.2hr
Ponding Elevation	405.23m
Peak Release Rate	0.014m^3/s
Forebay	
Required Forebay Length	16.1m
Actual Forebay Length	40.8m
Permanent Pool Elevation	405.00m
Bottom Elevation	403.50m
Outlet Controls	
Reverse Slope Outlet Pipe to Control Manhole	
Orifice Diameter/Elevation (Extended Detention)	125mm/405.00m
Overflow Weir Width/Elevation	1.8m L
Emergency Weir Crest	10.0m
Emergency Weir Elevation	407m

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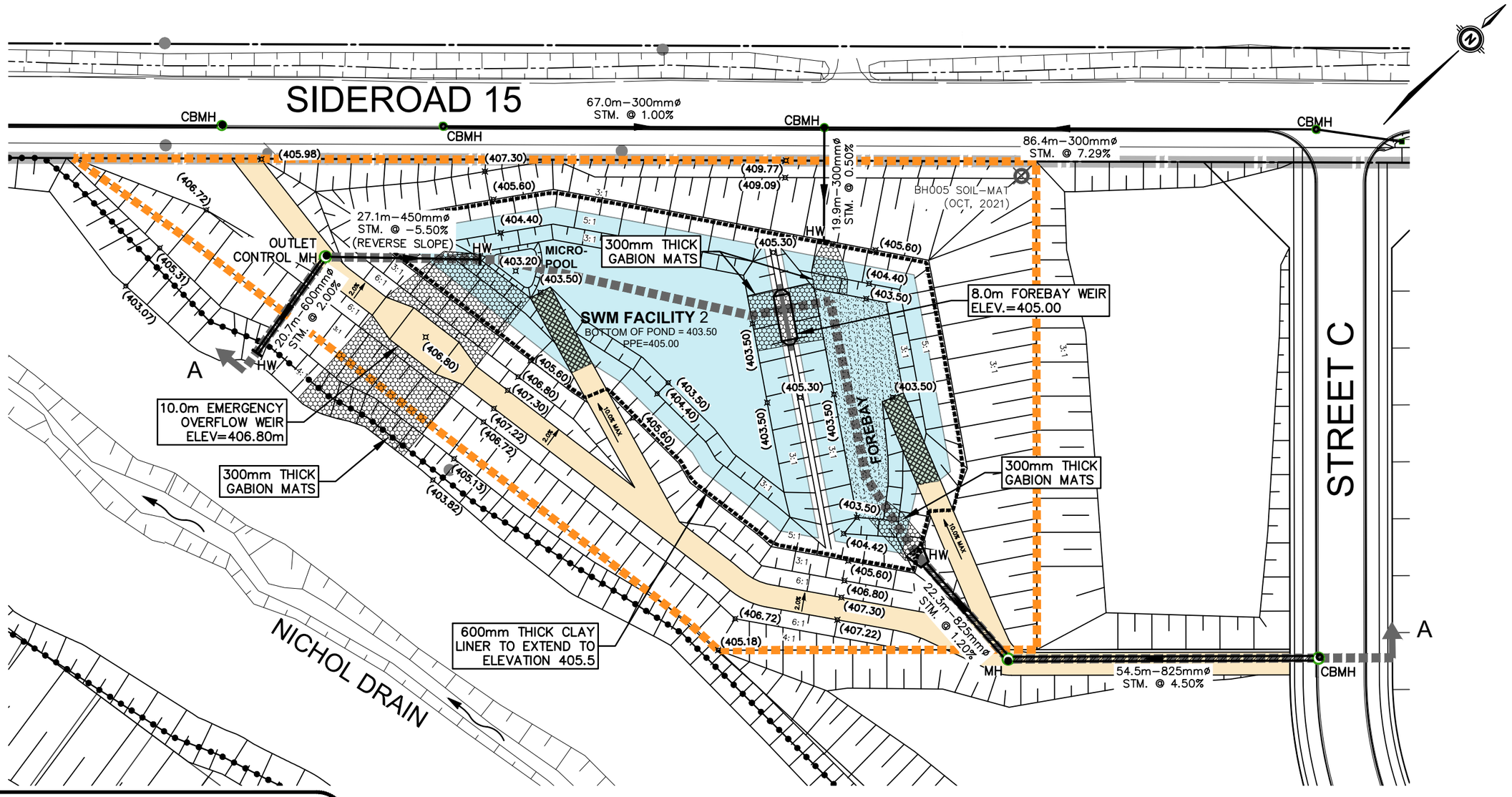

LEGEND

- SWM BLOCK BOUNDARY
- PROPOSED FLOODLINE LIMIT
- (405.70) PROPOSED SPOT ELEVATIONS
- 3:1 PROPOSED EMBANKMENT
- 300mm GRANULAR 'B'
- ARTICULATED CONCRETE BLOCK
- GABION MAT
- PERMANENT POOL ELEV=405.00
- ACCESS ROAD

SWM FACILITY PLAN VIEW

SCALE H–1:750

NOTE:
THIS FIGURE TO BE READ IN CONJUNCTION WITH FIGURE 5.5 AND 5.6

MTE Engineers, Scientists, Surveyors.

PROJECT
ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 2

Drawn	Scale	Figure
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Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

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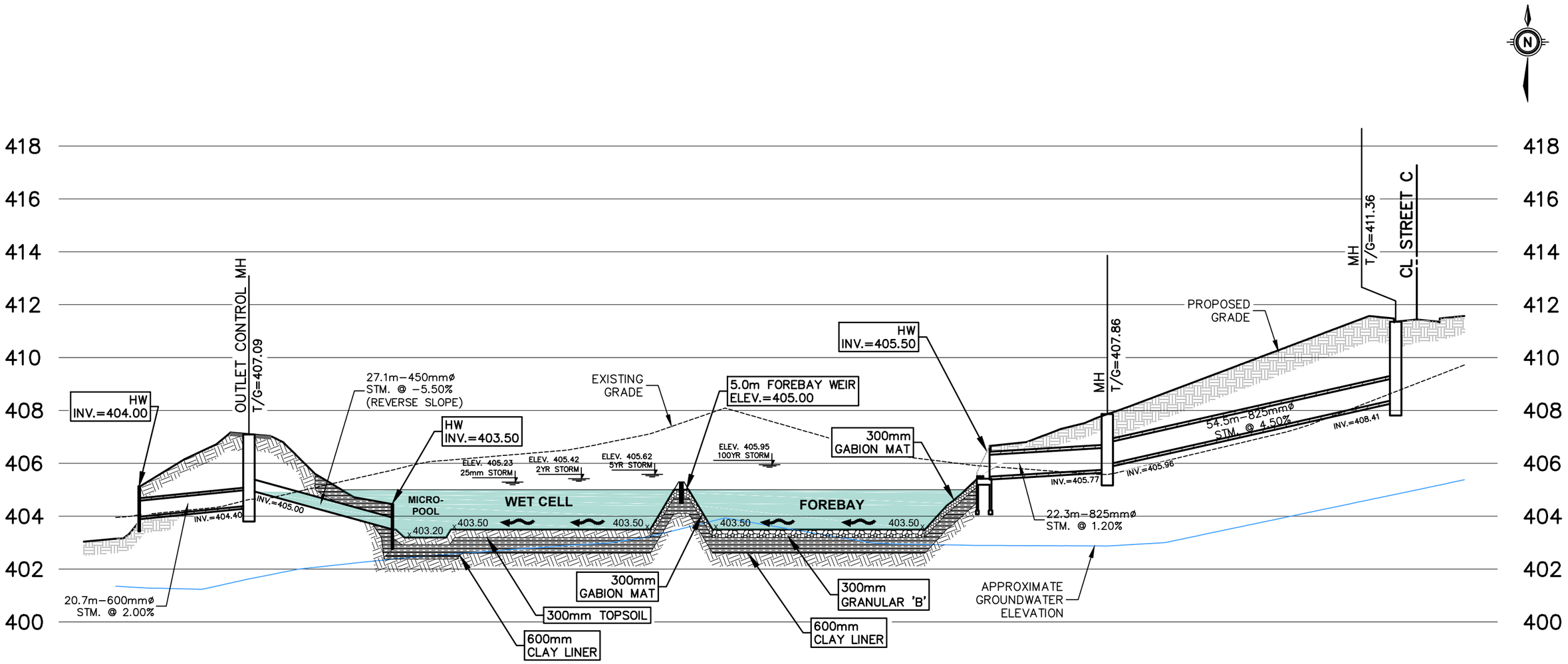

MAXIMUM PONDING LEVELS	
PERMANENT POOL	405.00
25mm/4hr STORM	405.23
2YR STORM	405.42
5YR STORM	405.62
10YR STORM	405.72
25YR STORM	405.82
50YR STORM	405.89
100YR STORM	405.95

SWM FACILITY - SECTION A-A

SCALE H 1:750 V 1:150

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ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 2 SECTION VIEW

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Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

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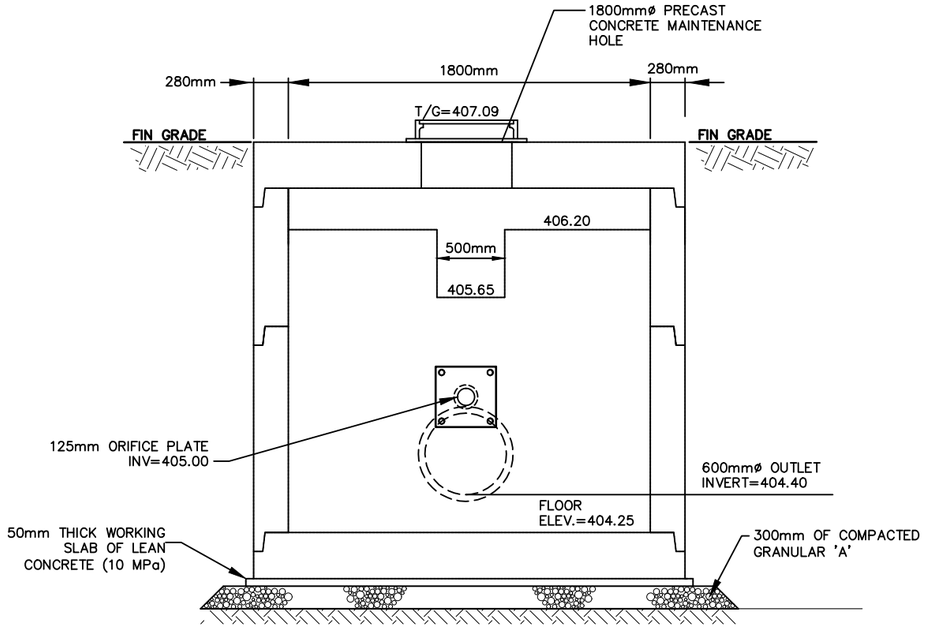
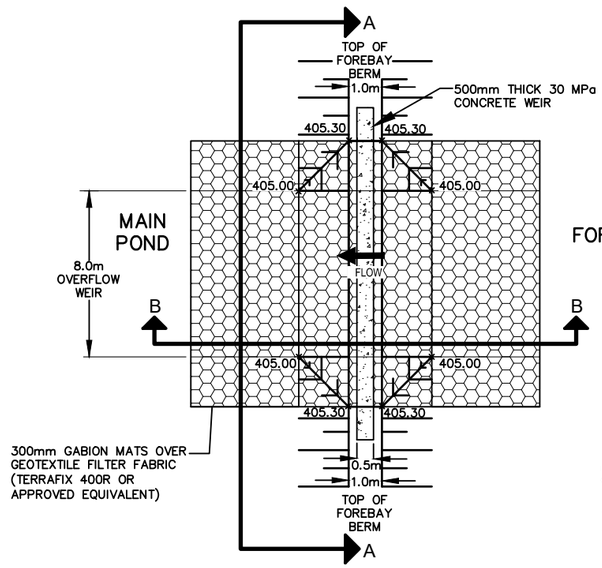


SECTION A–A



PLAN VIEW
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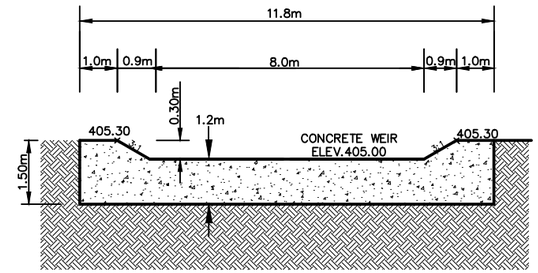

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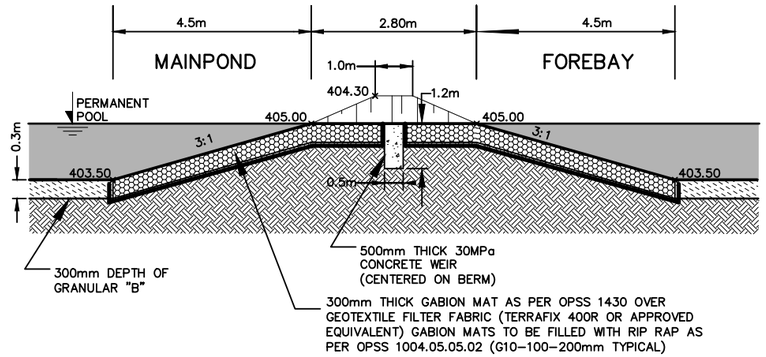

SECTION B–B

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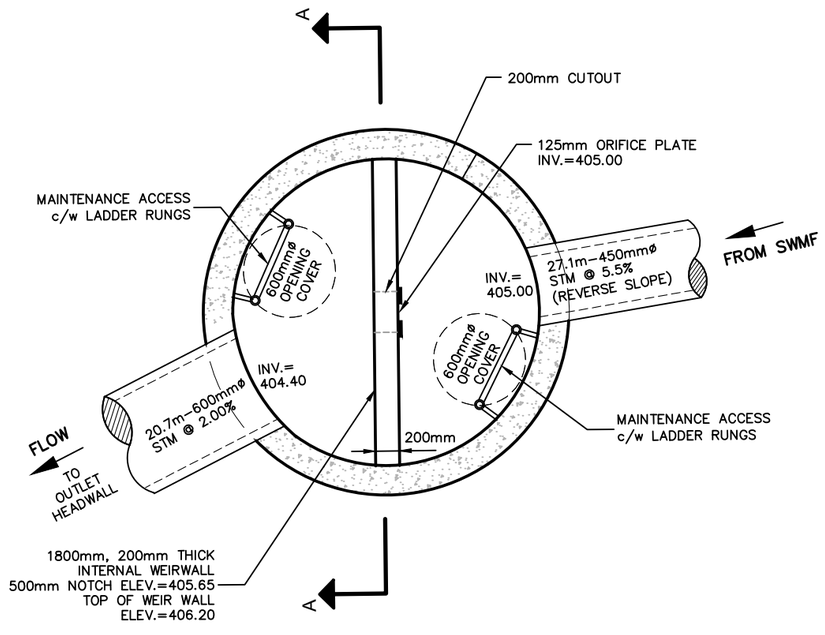

OUTLET CONTROL STRUCTURE
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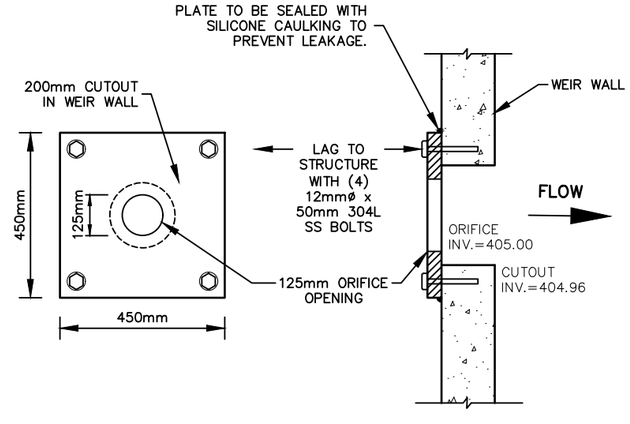

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PROJECT
ELORA SANDS SUBDIVISION

TITLE
SWM FACILITY 2 DETAILS

Drawn	Scale	Figure
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Date (yyyy-mm-dd) 2025-10-30	Rev No. 0	

5.5 Water Quantity

Flows from all storm events will be conveyed to the stormwater management facilities by a combination of storm sewer and overland flow routes (rights-of-way). The post-development Visual OTTHYMO design event modelling is included in **Appendix D**. As described in **Section 3**, the post-development flows are required to be controlled to pre-development levels for the 2-year through 100-year storm events. A comparison of peak flows in the pre-development and post-development conditions at the outlets is provided in **Table 5.3** below. The flows presented are the total flows from the proposed SWMFs, uncontrolled discharge and runoff from external areas.

Table 5.3 – Overall Pre- and Post-Development Peak Flows to Outlets (m^3/s)

Event	To QSC Wetland		To Nichol Drain No. 1 between Gerrie Rd. and Sideroad 15	
	Pre	Post	Pre	Post
2 Year	0.224	0.200	0.776	0.575
5 Year	0.397	0.354	1.396	1.016
10 Year	0.507	0.451	1.796	1.303
25 Year	0.676	0.600	2.410	1.734
50 Year	0.813	0.720	2.907	2.079
100 Year	0.959	0.848	3.439	2.444
Regional	2.544	2.257	8.287	7.450

5.5.1 SWMF 1

Discharge from the proposed SWMF1 will be controlled via a multi-staged outlet located in a 1800mm diameter manhole structure proposed within the wet pond cell. Flows will discharge to the ND via a 750mm diameter outlet storm sewer which will combined with storm sewers along Sideroad 15 and outlet on the downstream side of the existing culvert under Sideroad 15.

In the event of a blockage in the storm sewer, an emergency overflow weir is provided which allows discharge to spill onto the ND floodplain. A summary of the peak flows and associated maximum ponding elevations from the SWMF1 and a comparison of pre-development to post-development discharge into the ND is provided in **Table 5.4** below.

Table 5.4 – Summary of SWMF1 Peak Flows and Maximum Ponding Elevations

Storm Event	SWM Facility 1			Total Flows to Nichol Drain (m^3/s)	Maximum Allowable Flows to Nichol Drain (m^3/s)
	Peak Outflow from SWMF (m^3/s)	Maximum Ponding Volume (m^3)	Maximum Ponding Elevation (m)		
25mm-4hr	0.038	2,535	404.15	0.038	0.136
2-Year	0.070	4,898	404.28	0.070	0.329
5-Year	0.098	7,612	404.42	0.098	0.435
10-Year	0.130	9,088	404.50	0.130	0.755
25-Year	0.248	10,908	404.59	0.248	1.012
50-Year	0.355	12,150	404.65	0.355	1.221
100-Year	0.462	13,296	404.71	0.462	1.444
Regional	2.98	30,295	405.49	2.980	3.585

5.5.2 SWMF 2

Discharge from the proposed SWMF2 will be controlled via a multi-staged outlet located in a 1800mm diameter manhole structure proposed within the wet pond cell. Flows will discharge to the ND via a 450mm diameter outlet storm sewer which will outlet on the upstream side of Sideroad 15.

In the event of a blockage in the storm sewer, an emergency overflow weir is provided which allows discharge to spill onto the ND floodplain. A summary of the peak flows and associated maximum ponding elevations from SWMF2 and a comparison of pre-development to post-development discharge into the ND is provided in **Table 5.5** below.

Table 5.5 – Summary of SWMF2 Peak Flows and Maximum Ponding Elevations

Storm Event	SWM Facility 2			Total Flows to Nichol Drain (m^3/s)	Maximum Allowable Flows to Nichol Drain (m^3/s)
	Peak Outflow from SWMF (m^3/s)	Maximum Ponding Volume (m^3)	Maximum Ponding Elevation (m)		
25mm-4hr	0.014	727	405.23	0.019	0.052
2-Year	0.020	1,402	405.42	0.031	0.141
5-Year	0.026	2,155	405.62	0.046	0.254
10-Year	0.039	2,544	405.72	0.061	0.328
25-Year	0.083	2,993	405.82	0.109	0.441
50-Year	0.117	3,277	405.89	0.148	0.532
100-Year	0.153	3,530	405.95	0.189	0.629
Regional	1.060	6,259	406.55	1.168	1.295

5.6 Thermal Mitigation

Urbanization within any watershed will cause temperature increases in storm water runoff, picking up stored heat from asphalt and other impervious surfaces. Mitigation measures are required for cold-water creeks by implementing lot-level infiltration and end-of-pipe SWMF management of runoff from high frequency precipitation events prior to discharge to the receiving watercourse.

Since most of the annual rainfall occurs in high frequency storm events, as a best management practice the 25mm storm event was chosen for thermal mitigation as this event accounts for the majority of annual precipitation.

The following mitigation measures (lot level infiltration, bottom draws, and landscaping) have been proposed for the subject lands and will mitigate changes to the thermal regime downstream of Sideroad 15 in the ND.

5.6.1 Lot-Level Infiltration

The majority of the storm water runoff that is generated at the lot-level via roofs, will be effectively disconnected from the ND during all rain events up to a 25mm depth through the proposed lot-level infiltration galleries.

5.6.2 SWMF Bottom Draw Outlet

The outlet configuration of the SWMF will incorporate a reverse-sloped bottom draw pipe which will draw the coldest water from the bottom of the SWMF and discharge to the ND.

5.6.3 Landscape Design of the SWMF

A landscape design for the proposed SWMF will be completed during the final design stage of the development. The primary aspect of the landscape design is to address thermal mitigation and aesthetics with secondary aspects being, erosion protection, long term bank stability, and to limit pedestrian access into the permanent pool components. The facility will be designed in accordance with the Township's stormwater management policies and guidelines for aesthetics, landscaping, and safety of stormwater management facilities.

5.7 Water Balance

5.7.1 Subwatershed Scale Water Balance

The ND subwatershed was assessed under three conditions as discussed in **Section 5.2**. The proposed conditions drainage areas are documented in **Figure 5.7**.

Annual precipitation for the subject lands was estimated to be approximately 921mm/year, based on data set curated for the Fergus Shand Dam station between 1950 and 2005. **Table 5.6** summarizes the annual average water balance for the ND subwatershed in a similar manner to the NDSS based on continuous modelling.

Table 5.6 – Average Annual Water Balance for Nichol Drain Subwatershed

Water Budget Component (mm/year)	Pre-Development of Storybrook/Ainley/Subject Lands (Existing Conditions)	Post-Development of Storybrook and Ainley (Current Conditions)	Post-Development of Subject Lands and Clayton (Proposed Conditions)
Precipitation	921	921	921
Evapotranspiration	497	471	460
Water Surplus by difference	**424**	**450**	**461**
Storage	4	6	6
Infiltration	186	181[1]	188[1]
Runoff	234	263	267

1. Storybrook development proposed at-source infiltration, however the modelling did not reflect these LIDs.

Refer to **Appendix G** for the detailed water balance assessment.

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IRVINE CREEK

WOOLWICH STREET EAST

SIDEROAD 15

NICHOL DRAIN

GERRIE ROAD

BEATTY LINE

HIGHWAY 6

IRVINE STREET

QUEEN STREET CREEK

COLBORNE STREET

GRAND RIVER

638 20.60ha
639 4.45ha
803 5.32ha
802 11.43ha
634 0.65ha
636 3.26ha
632 0.51ha
637 8.03ha
631 0.64ha
630 32.90ha
635 0.42ha
633 0.06ha
624.1 4.39ha
622.1 1.18ha
9622 2.01ha
804 4.51ha
9625 3.67ha
628 0.49ha
624 11.74ha
622 5.16ha
625 7.31ha
704 0.41ha
627 11.20ha
610 77.87ha
806 10.60ha
629 0.27ha
9624 4.56ha
626 1.05ha
510 91.44ha
100 136.98ha
709 17.96ha
621 6.08ha
708 3.24ha
813 4.88ha
712 14.67ha
623 10.88ha
706 1.54ha
620 4.38ha
714 1.54ha
711 5.75ha
710 18.16ha
516 10.78ha
200 27.50ha
300 17.14ha
511 55.52ha
520 108.36ha
515 5.01ha
400 82.86ha
513 6.68ha
512 27.13ha
518 6.44ha
517 2.14ha

LEGEND

- EXISTING GRCA CONTOURS
- EXISTING DRAINAGE DIRECTION
- PRE-EXISTING DEVELOPMENT CATCHMENT
- CATCHMENT NUMBER
- CATCHMENT AREA (ha)
- LIMIT OF SUBDIVISION
- REACH 1a
- REACH 1b
- REACH 2a
- REACH 2b
- AGRICULTURAL
- OPEN SPACE
- EXTERNAL DEVELOPMENT
- BUILT BOUNDARY
- SUBJECT LANDS

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TITLE
PROPOSED CONDITIONS NICHOL DRAIN CATCHMENTS

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Date (yyyy-mm-dd) 2025-10-30	Rev No. 0		

5.7.2 Overall Surface Water Flow Inputs to the Nichol Drain

Under post-development conditions, the water inputs to the ND are comprised of four components: the controlled surface discharge from the SWMFs, the external surface runoff from the Keating Lands, surface discharge from the Ainley Subdivision and the surface flows from all upstream lands in the subwatershed. Refer to **Table 5.7** for a summary of the annual surface water volume inputs to the Nichol Drain.

Table 5.7 – Summary of Annual Surface Water Volume Inputs to the Nichol Drain

General		Annual Volume (m^3/year)
Existing Conditions Surface Flow to ND	Surface Flow to ND (Drainage Areas 620-627 – 72.38ha)	165,559[1]
	Surface Flow to ND from upstream drainage areas (excluding Drainage Areas 620-627 upstream of SR15 – 655.79ha)	1,548,403 [2]
	Total Surface Flow at SR15 [1+2]	**1,713,962 [Existing]**
Current Conditions Surface Flow to ND	Surface Flow from Ainley Subdivision (Drainage Area 620 – 4.15ha)	20,991 [3]
	Surface Flow from Subject Lands and External Agricultural Lands (Drainage Areas 621-627 – 64.90ha)	148,193 [4]
	Surface Flow to ND from upstream drainage areas (excluding Drainage Areas 620-627 upstream of SR15 – 656.47ha)	1,772,077 [5]
	Total [3+4+5]	**1,941,261 [Current]**
Increased Surface Flow to ND [Current-Existing]		227,299 [7]
Percentage of Increase [7/Existing]		13.3%
Proposed Conditions Surface Flow to ND	Controlled Discharge from SWMF1 and 2 (Elora Sands and Clayton – 43.10ha)	170,682 [8]
	External runoff and Uncontrolled Runoff (Catchments 621, 623, 627 & 632 – 29.12ha)	70,442[9]
	External Runoff (Ainley Subdivision – 4.15ha)	20,991 [10]
	Total [8+9+10]	**262,115** [11]
	Surface Flow to ND from upstream drainage areas (excluding Drainage Areas 620-627 upstream of SR15 – 656.47ha)	1,772,077 [12]
	Total [11+12]	**2,034,192 [Proposed]**
Increased Surface Flow to ND [Proposed–Current]		**92,931** [13]
Percentage of Increase [13/Current]		**4.8%**
Increased Surface Flow to ND [Proposed–Existing]		**320,231** [14]
Percentage of Increase [14/Existing]		**18.7%**

5.7.3 Surface Water Balance to the Queen Street Creek Wetland

Given the criteria described in Section 3.0, an objective of the proposed stormwater management plan is to maintain surface water volume inputs into the QSC wetland.

As shown in **Figure 2.2**, **Figure 2.3**, and **Figure 5.7** the drainage areas to the QSC wetland include catchments 704 and 709. In the proposed condition, drainage area 704 is reduced due to grading constraints. **Table 5.8** below summarises existing conditions and proposed conditions surface water volume contributions to the QSC wetland.

Table 5.8 – Surface Water Volumes to QSC Wetland

General		Annual Volume (m^3/year)
Existing Conditions	Surface Water Volume from External Areas (Catchment 709 – 18.51ha)	41,295 [1]
	Surface Water Volume from Subject Lands (Catchment 704 – 2.74ha)	5,121 [2]
	Total [1+2]	**47,407 [3]**
Proposed Conditions	Surface Water Volume from External Areas (Catchments 709 – 18.51ha)	41,295 [4]
	Surface Water Volume from Subject Lands (Catchments 704 – 0.40ha)	1,842 [2]
	Total [4+2]	**43,137 [5]**
	Change in Surface Volume [5-3]	-4,270 [6]
Percent Change from Greenfield to Current [6/3]		**-9%**

1. Precipitation and temperatures from a 1950-2005 data set compiled by Dr. Schroeter for Shand Dam climate station. PET determined from 1991-2010 climate normals using T&M process and then inputted into VO as maximum ET.

The surface water runoff volume deficit will occur during the interim conditions where the Keating Lands are undeveloped. Through the process of developing the Keating Lands the pre-development annual surface water volume to the QSC wetlands could be met.

Refer to **Appendix G** for a graphical comparison in monthly surface water inputs to the QSC wetland under existing and proposed conditions.

5.7.4 Groundwater Water Balance

During urban development, the conversion of pervious, vegetated areas to impervious surfaces leads to a decrease in evapotranspiration and infiltration volumes and an increase in runoff volumes. Refer to **Table 5.9** below for a summary of annual groundwater water balance volumes for the Subject Lands.

Table 5.9 – Summary of Annual Groundwater Water Balance Volumes

General		Annual Volume (m^3/year)
Current Conditions	Passive Infiltration (43.64ha)	80,733
	Total	**80,733**
Proposed Conditions	Passive Infiltration (43.64ha)	56,456
	Enhanced Infiltration (Lot-Level)	47,049
	Total	**103,505**
Percent Increase		**28.2%**

The strategy identified for the Subject Lands to maintain groundwater water balance is to provide at-source lot-level active infiltration. The hydrologic model was used to predict the average annual groundwater balance volume as a result of infiltration measures being incorporated. As shown in **Table 5.9**, implementation of the proposed infiltration measures results in an annual average infiltration volume of 103,505m^3, which exceeds the current conditions value of 80,733m^3. The contributions from the lot-level galleries will ensure that the ND continues to receive groundwater baseflow, mitigating thermal impacts as a result of the subject lands.

6.0 EROSION ASSESSMENT

A *Fluvial Geomorphology Assessment and Erosion Mitigation Analysis* was prepared by GEO Morphix, dated October 2025. This analysis provides a background review and desktop assessment of the Nichol Drain. Sensitive reach delineation was completed by GEO Morphix during field investigations. Within the Subject Lands, 2 reaches were delineated along the Nichol Drain. Reach R2b initiates upstream of Gerrie Road and ends approximately midway through the Subject Lands. Reach R2a begins at the downstream extent of Reach R2b and flows to Sideroad 15. Reach R1a is located upstream of Irvine Street.

Utilizing flow data from the three continuous simulations at the downstream end of the reaches, erosion exceedance hours and effective work were assessed. Effective work refers to the volume of water which moves through the drain at a flow rate above the erosion thresholds. This parameter quantifies the magnitude of exceedances, rather than just the duration. Refer to **Table 6.1** below for a summary of the results.

Table 6.1 – Erosion Analysis Results

Parameter	Reach R1a			Reach R2a		
Limiting Erosion Threshold (m^3/s)	0.369			0.485		
Condition	**Existing**	**Current**	**Proposed**	**Existing**	**Current**	**Proposed**
Erosion Hours (hr/year)	254.8	282.7	284.8	201.4	219.5	219.1
Percent Change	-	10.9%	0.7%	-	9.0%	-0.2%
Effective Work (m^3/year)	1,638,211	1,683,561	1,653,822	1,429,003	1,473,109	1,438,120
Percent Change	-	2.8%	-1.8%	-	3.1%	-2.4%

Based on the completed erosion analysis, both erosion hours and effective work increased from existing conditions to current conditions for both reaches. Reach R1a saw an increase of 10.9% in hours of exceedance and a 2.8% increase in effective work. Reach R2a experienced an increase of 9.0% in hours of exceedance and a 3.1% increase in effective work. From current conditions to proposed conditions the drain will see an increase in hours of exceedance within Reach 1a (0.7%), but a decrease in effective work (1.8%). Reach 2a sees a decrease in both hours of exceedance (0.2%) and effective work (2.4%). Overall, erosion impacts on the drain resulting from the Subject Lands have been mitigated.

7.0 NICHOL DRAIN NO. 1 FLOODPLAIN MAPPING UPDATE

Hydraulic modeling of the ND was completed as part of the NDSS utilizing the U.S. Army Corps of Engineers HEC-RAS modeling platform. The hydraulic model was initially developed by Aquafor Beech in 2008. The model was modified for the North West Fergus Secondary Plan Area in 2013 to incorporate terracing of the floodplain within the secondary plan area.

MTE has further updated the hydraulic model of the ND, based on detailed site topographical survey information and proposed terracing cross-sections within the floodplain that cuts through the Subject Lands. The results of the modelling have delineated a new floodplain within the Subject Lands and downstream of Sideroad 15. As such, the proposed Draft Plan of Subdivision has been prepared considering the updated flood elevations and terraced floodplain.

More details of the updated hydraulic model and floodplain map are provided in **Appendix J**.

8.0 MONITORING PROGRAM

A comprehensive monitoring program has been developed which outlines the requirements of the **During-Development Stage** for the Elora Sands Subdivision. The developer is responsible for monitoring during the development process, including 3 stages:

- Pre-Construction Monitoring
- During-Construction Monitoring
- Post-Construction Monitoring

8.1 Pre-Construction Monitoring

This portion of the monitoring is intended to establish detailed site background conditions and baseline data. This information will facilitate comparison with conditions during and post-construction, and allow for an evaluation of mitigative measures, if necessary. Refer to **Figures 8.1** and **8.2** for an illustration of the monitoring program locations. A summary outlining the monitoring program is provided in **Appendix I**. The pre-construction monitoring includes the following parameters:

- **Groundwater** – monitoring includes water levels (continuous via datalogger and manual readings 4x per year) and annual general chemistry.

  Groundwater quality sampling from select monitoring locations for general chemistry to occur annually (i.e. major anions, cations, nutrients, metals, pH, e-coli).

- **Surface water** – surface water monitoring in the Nichol Drain No. 1 includes grab samples taken 8 times a year on a seasonal basis, analysed for chlorides, nitrates, total phosphorous, and TSS. Surface water quality sampling will follow significant storm events (>15mm). Continuous temperature monitoring will occur at two locations within the ND.

8.2 During-Construction Monitoring

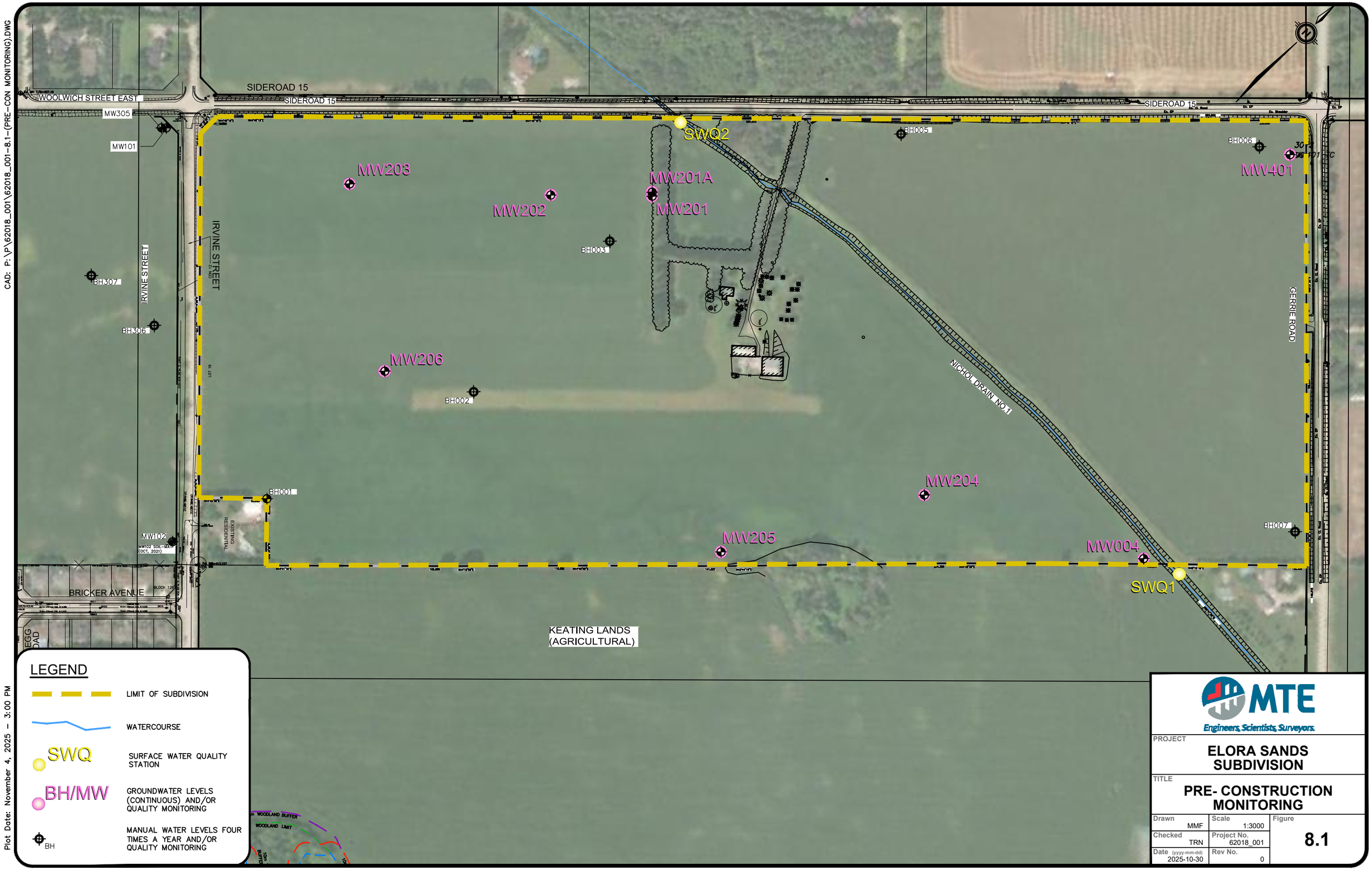
This stage will begin at the commencement of subdivision area grading and continue until 95% build-out of the subdivision. The purpose of the during-construction monitoring is to ensure that the stormwater management measures are functioning as intended, and to monitor the effectiveness of erosion and sediment control measures. The during-construction monitoring period will include all the components of the pre-construction period, with the addition of the following:

- **Stormwater Management Facilities**
    - Water quality monitoring at the inlet and outlet of the pond for TSS to occur seasonally following a significant storm event (typically larger than 15mm).
    - Continuous temperature monitoring logger to be installed at the forebay and outlet structure of the SWMF.
    - Standard inspection of vegetation, structures, and general operation of hydraulic controls (observations of drawdown) within the stormwater management facility.
- **Erosion and Sediment Control** – per ESC plans

8.3 Post-Construction Monitoring

This period of monitoring will begin following 95% build-out of the subdivision (buildings are constructed, lots are sodded/landscaped, and open spaces are stabilized). The purpose of this stage of monitoring is to ensure that the SWMFs continue to operate as designed. The post-construction monitoring period will extend for a 2-year period. Monitoring during this stage will include all components from the pre-construction and during-construction monitoring program.

It is recommended that, following completion of the developer's portion of the post-construction monitoring program and assumption of the SWMF by the Township, the Township continues with a post-construction inspection and maintenance program to ensure the long-term effectiveness of the proposed SWMFs.



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PROJECT
ELORA SANDS SUBDIVISION

TITLE
PRE- CONSTRUCTION MONITORING

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WOOLWICH STREET EAST

SIDEROAD 15

SIDEROAD 15

MW305

MW101

WQ1

SWQ2

WQ2

MW201A

MW202

MW201

WQ4

BH003

WQ3

BLOCK 424
Park
0.37 ha

BLOCK 429
Pumping Station
0.32 ha

IRVINE STREET

BH307

BH306

CLAYTON
SUBDIVISION

GERRIE ROAD

BLOCK 428
NHS
4.36 ha

NICHOL DRAIN NO.1

BLOCK 431
SENIORS
1.37 ha

BH001

MW204

BLOCK 423
PARK
1.44 ha

BH007

MW102

MW004

SWQ1

BLK 432
Future Road
0.06 ha

BLK 433
Future Road
0.06 ha

KEATING LANDS
(AGRICULTURAL)

LEGEND

- LIMIT OF SUBDIVISION
- WATERCOURSE
- PROPOSED FLOODPLAIN LIMIT
- SWQ — SURFACE WATER QUALITY STATION
- BH/MW — GROUNDWATER LEVELS AND TEMPERATURE (CONTINUOUS) AND/OR QUALITY MONITORING
- WQ — SWMF WATER QUALITY STATION
- BH — MANUAL WATER LEVELS FOUR TIMES A YEAR AND/OR QUALITY MONITORING

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PROJECT
ELORA SANDS SUBDIVISION

TITLE
DURING/POST- CONSTRUCTION MONITORING

Drawn	Scale	Figure
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TRN	62018_001	
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9.0 EROSION AND SEDIMENT CONTROL MEASURES

Precautions shall be taken during all stages of construction to limit erosion and sedimentation. The final details of the erosion and sediment control plan will follow the *Erosion and Sediment Control Guide for Urban Construction* (STEP, 2019) document and will be provided during final design. The plan will illustrate the erosion and sediment control measures to be implemented during construction, which will limit impacts associated with development.

The recommended construction sequence for erosion and sediment control measures shall be as follows:

- Placement of all sediment control fencing where required.
- Stripping and strategic placement of topsoil stockpiles. Placement of sediment control fencing around all stockpile areas.
- Construction of temporary sediment control ponds, which will serve as sedimentation basins for the site during construction.
- Construction of temporary swales to direct runoff to sedimentation basins, with rock check dams as required to control velocities.
- Re-vegetation of completed areas as soon as possible after construction, including those areas not slated for construction within 30 days.

Where rock check dams are proposed to promote sedimentation and reduce velocities, clean aggregate is to be placed perpendicular to the direction of flow in the swale, with a small volume of excavation on the upstream side to provide storage for accumulated sediment.

Sediment control fencing will consist of filter fabric attached to page wire fencing and sealed at ground level. It will be installed at the perimeter of the work areas and intermittently on sloped areas where required. Sediment control fencing will be placed around all topsoil stockpiles.

Storage consistent with the GRCA's requirement of 125m^3/ha of live and dead storage respectively (total 250m^3/ha), will be provided. This storage will be provided to ensure that suspended material will have ample time to settle out. In addition, the sediment basin will be sized with sufficient capacity to allow flows to pass without breaching. Once the active construction and grading activities have been completed, the sedimentation basins can be cleaned out.

Access to topsoil or fill storage areas will be located on the upstream side of storage piles. This practice will ensure continuity of the sediment control fencing in the downslope direction; which is most vulnerable to erosion and sediment deposition. Furthermore, topsoil and hydroseed will be placed on all exposed areas following the completion of grading activities.

It is recommended that during construction, monitoring and inspection of the erosion and sediment controls be conducted to ensure the satisfactory performance of these measures. Reporting of the inspection and monitoring results should be distributed to the Township of Centre Wellington and the GRCA. If it is found that the erosion and sediment control measures are not working adequately, they shall be augmented to the satisfaction of the Township and the GRCA, based on field decisions.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The main findings of this report for the subject lands are:

1. The stormwater management strategy outlined within this report will provide the appropriate levels of quality, quantity, erosion, and water balance controls to meet the objectives of the *Nichol Drain Subwatershed Study* (Aquafor Beech Limited, October 2008).
2. *Enhanced* quality control of stormwater runoff can be provided by the proposed stormwater management strategy through the implementation of SWMFs which include a forebay, and a wet pond cell.
3. Quantity control targets for post-development peak flows rates attenuation to pre-development levels that are directed to the Nichol Drain can be achieved in the proposed SWMFs for all storm events up to and including the 100-year event.
4. The erosion mitigation assessment completed indicates that instream erosion will not be exacerbated in the receiving Nichol Drain under post-development conditions.
5. The SWMFs will be designed with measures to mitigate thermal impacts to the Nichol Drain.
6. Infiltration (both active and passive) on the Subject Lands will provide an enhancement to the groundwater balance.
7. The stormwater management strategy outlined within this report, will provide appropriate level of quality, quantity and risk mitigation to adequately address the requirements of source water protection outlined in the Source Water Protection Due Diligence Review by Terra-Dynamics Inc

The findings of this report, and the above conclusions, lead to the following recommendations:

1. Upon completion of detailed design, SWMFs be constructed to provide control of stormwater as described in Sections 4.0 and 5.0 of this report.
2. The preliminary design and modelling of the proposed stormwater management measures for the development be reviewed and re-confirmed at the time of final design.
3. Erosion and sediment controls be implemented during construction as described in Section 9.0 of this report.
4. A monitoring program be updated for the Final SWM report at final design.

All of which is respectfully submitted,

MTE Consultants Inc.



Garett Korber, P.Eng.
Water Resources Engineer
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Jeff Martens, P.Eng.
Vice President
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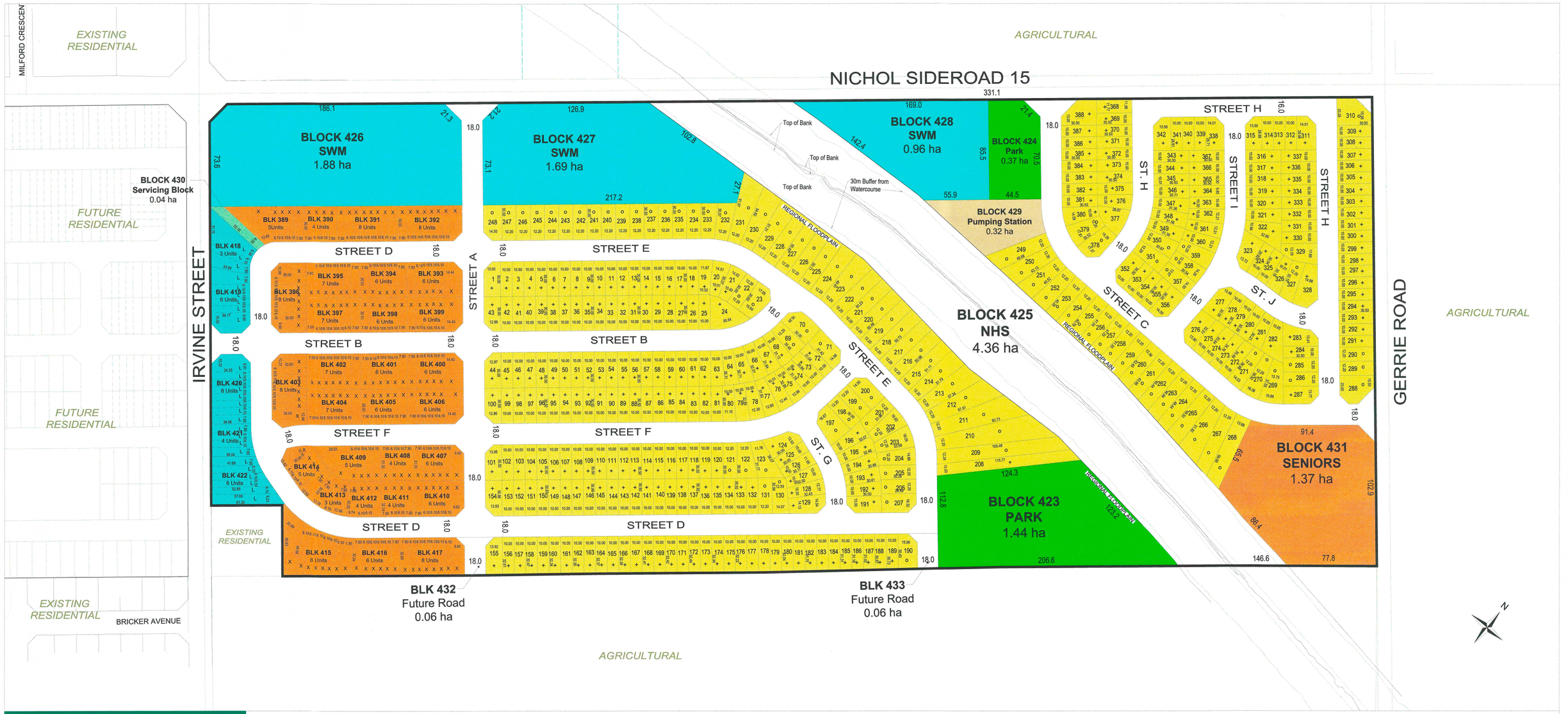
https://mte85.sharepoint.com/sites/62018_001/Shared Documents/03- Reports/MTE Reports/SWM/62018_001_rpt_2025-11-04_SWM.docx

Appendix A

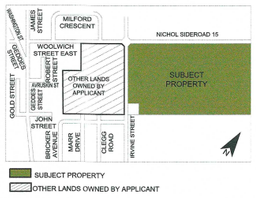
Draft Plan of Subdivision



DRAFT PLAN OF SUBDIVISION

Part of Lot 16,
Concession 11
Township of Centre Wellington
Country of Wellington

KEY PLAN



SCHEDULE OF LAND USE

LOT/ BLOCK No.	LAND USE			UNITS	AREA (ha)
1-388	Single Detached	12.2m Lots	o	100	14.89
		10.0m Lots	+	288	
389-417	Street Townhouses 6.10m Min.		x	176	3.98
415-422	Rear Access Towns 6.10m Min.		L	27	0.78
423-424	Park				1.81
425	Natural Heritage System				4.36
426-428	Storm Water Management				4.53
429	Pumping Station				0.32
430	Servicing Block				0.04
431	Seniors Block				1.37
432-433	Future Road				0.03
Roads	Streets A-J 18.0m R.O.W.		4013		7.73
Totals			4013	591	39.84

OWNER'S AUTHORIZATION

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Township of Centre Wellington.

CACHET DEVELOPMENTS (ELORA) INC.

September 12, 2025
Date

SURVEYOR'S CERTIFICATE

I hereby certify that the boundaries of the lands to be subdivided as shown on this Plan and their relationship to the adjacent lands are accurately and correctly shown.

SEPT. 12, 2025
Date

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT, CHAPTER P.13(R.S.O. 1990).

(a),(e),(f),(g),(j),(l) - As shown of the Draft Plan.
(b),(c) - As shown on the Draft and Key Plan.
(d) - Land to be used in accordance with the Schedule of Land Use.
(i) - Soil is silt and clay loam.
(h),(k) - Full municipal services to be provided.

Prepared For:

CACHET DEVELOPMENTS (ELORA) INC.

MGP File No.: 22-3192
Date: August 27, 2025

Date	Revision	By

MGP Malone Given Parsons.
140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
905 513 0170 | mgp.ca

Ontario Land Tribunal
Tribunal ontarien de l'aménagement du territoire

ISSUE DATE: May 22, 2025 **CASE NO(S).:** OLT-24-001157

PROCEEDING COMMENCED UNDER subsection 34(11) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended

Applicant and Appellant:	Cachet Developments (Elora) Inc.
Subject:	Application to amend the Zoning By-law – Refusal or neglect to make a decision
Description:	To permit the development of 152 single-detached dwellings, 117 street townhouse dwellings
Reference Number:	RZ014/22
Property Address:	75 Woolwich Street East
Municipality/UT:	Centre Wellington/ Wellington
OLT Case No.:	OLT-24-001157
OLT Lead Case No.:	OLT-24-001157
OLT Case Name:	Cachet Developments (Elora) Inc. v. Wellington (County)

PROCEEDING COMMENCED UNDER subsection 51(34) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended

Applicant and Appellant:	Cachet Developments (Elora) Inc.
Subject:	Proposed Plan of Subdivision – Failure of Approval Authority to make a decision
Description:	To permit the development of 152 single-detached dwellings, 117 street townhouse dwellings
Reference Number:	23T- 22005
Property Address:	75 Woolwich Street East
Municipality/UT:	Centre Wellington/ Wellington
OLT Case No.:	OLT-24-001158
OLT Lead Case No.:	OLT-24-001157

Heard: May 15, 2025 by video hearing

APPEARANCES:

Parties	**Counsel**
Cachet Developments (Elora) Inc.	Sarah Kagan Ira T. Kagan Kristie Stitt *(in absentia)*
Township of Centre Wellington	Eric Davis
County of Wellington	Peter Pickfield Colin Leger *(in absentia)*
Upper Grand District School Board	Brad Teichman Justine Reyes *(in absentia)*

DECISION DELIVERED BY KURTIS SMITH AND ORDER OF THE TRIBUNAL

INTRODUCTION

[1] Following the First Case Management Conference ("CMC") held on January 24, 2025, the parties reached a full settlement, executing Minutes of Settlement (Exhibit 6). Therefore, the parties requested that this hearing event be converted to an uncontested settlement hearing and release the previously scheduled 10-day merit hearing.

[2] Cachet Developments (Elora) Inc. ("Applicant") proposes to develop the 12.5 hectare ("ha") lands municipally known as 75 Woolwich Street East in the Municipality of Centre Wellington ("Township"), in the County of Wellington ("County"). The Applicant applied for a Zoning Bylaw Amendment ("ZBA") and filed a Draft Plan of Subdivision application ("DPS") in 2022 to facilitate the development, and on November 14, 2024, the Applicant filed appeals of non-decision.

[3] The revised proposed development now sought will see the construction of 269 dwelling units comprised of 152 single detached and 117 townhouse dwellings, a 0.63 ha open space park (“Park”), two walkway blocks, a service block, an overland flow block, and public streets as shown in **Attachment 2**.

[4] The two walkway blocks enable pedestrians to travel to and from the (1) Park to the existing residential development to the south and (2) the adjacent Salem Public School which, is part of the Upper Grand District School Board (“UGDSB”).

[5] The Tribunal, based on Matthew Cory’s *Curriculum Vitae* and Acknowledgement of Experts Duty, qualified Mr. Cory to provide opinion evidence in the area of land use planning.

EVIDENCE & FINDINGS

[6] Mr. Cory provided the Tribunal with a fulsome written opinion evidence (Exhibit 1) and focused oral evidence at the hearing. His evidence found that the revised proposed development has regard for Provincial Interest under s. 2 of the *Planning Act* (“Act”), is consistent with the Provincial Planning Statement 2024 (“PPS”) and conforms with the Wellington County Official Plan (“WCOP”) and the Township of Centre Wellington Official Plan (“Township OP”). Furthermore, that the DPS has regard for matters listed in S. 41(24) of the Act and that the conditions of draft plan approval are “typical, standard, and fair” and therefore are appropriate.

[7] The above-mentioned planning documents effecting the ZBA and DPS have several common themes and are implemented by the applications including:

- Appropriate and desirable urban design including window streets and enhanced street presence along Woolwich Street E by providing rear access townhouses.

- Contributes to diversifying the range and mix of housing by providing townhouses and single detached lot size options.

- Supports active transportation through the installation of sidewalks on both sides of the street, walkways that connects to the existing neighbourhood, local public school and proposed Park.

- Optimizes existing municipal infrastructure as the lands are fully serviced and are planned to be developed at a higher density than the surrounding land uses.

- Protects natural features by including an environmental easement along the west side of the Lands to protect the existing tree canopy and providing overflow land blocks to ensure proper lot grading and drainage control plans.

[8] On the uncontested evidence of Mr. Cory the Tribunal finds that the revised ZBA have due regard for matters of Provincial Interest in s. 2 of the Act, is consistent with the PPS, conforms with the WCOP and Township OP and that the conditions of DPS has regard for the criteria of s. 51 (24) of the Act and that the revised conditions are reasonable.

ORDER

[9] **THE TRIBUNAL ORDERS THAT** the Zoning By-law Amendment appeal is allowed in part, and By-law No. 2009-045, as amended, is hereby amended as set out in **Attachment 1** to this Order. The Tribunal authorizes the municipal clerk of the Township of Centre Wellington to assign a number to this by-law for record keeping purposes;

[10] **AND FURTHER THE TRIBUNAL ORDERS THAT** the draft Plan of Subdivision appeal is allowed in part and the draft plan as attached as **Attachment 2** is approved, subject to the fulfillment of the conditions set out in **Attachment 3** to this Order;

[11] **AND THE TRIBUNAL ORDERS THAT** pursuant to subsection 51(56.1) of the Planning Act, the County of Wellington shall have the authority to clear the conditions of draft plan approval and to administer final approval of the plan of subdivision for the purposes of subsection 51(58) of the Act. In the event that there are any difficulties implementing any of the conditions of draft plan approval, or if any changes are required to be made to the draft plan, the Tribunal may be spoken to.

"Kurtis Smith"

KURTIS SMITH
MEMBER

ATTACHMENT 1

The Corporation Of The Township Of Centre Wellington
By-Law 2025 - XX

A by-law to amend the Township of Centre Wellington Zoning By-law 2009-045, as amended, to change the zoning of certain lands from "FD" to "R2.52.5", "R3.52.6", "R3.52.7" and "OS".

WHEREAS the Council of the Corporation of the Township of Centre Wellington deems it desirable to amend By-law No. 2009-045, as amended, pursuant to Section 34 of the Planning Act, R.S.O.1990;

Now therefore the council of the corporation of the Township of Centre Wellington hereby enacts as follows:

1. Schedule "A" Map 52 to By-law No. 2009-045 is hereby amended in accordance with the attached Schedule "A" which forms part of this By-law

2. By adding the following subsection to Section 15 – Exceptions

Exception No.	Zone	Special Provisions
15.52.5	R2.52.5	Notwithstanding any provision in this By-law to the contrary, on lands zoned R2.52.5 the provisions of the R2 zone shall apply except for the following special regulation: a) Minimum Front Yard: 4.5m to habitable portion of the dwelling; 6m to the garage door b) Minimum Exterior Side Yard: 3.5m to habitable portion of the dwelling; 6m to the garage door c) Minimum Rear Yard: 7m d) The driveway width shall not exceed 60% of the lot width to a maximum driveway width of 7.0m e) The outside walls of an attached garage shall not exceed 60% of the lot width

3. By adding the following subsection to Section 15 – Exceptions

Exception No.	Zone	Special Provisions
15.52.6	R3.52.6	Notwithstanding any provision in this By-law to the contrary, on lands zoned R3.52.6 the provisions of the R3 zone shall apply except for the following special regulation: a) Minimum Lot Area: 180m^2 b) Minimum Front Yard: 4.5m to habitable portion of the dwelling; 6m to the garage door c) Minimum Exterior Side Yard: 3.5m to habitable portion of the dwelling; 6m to the garage door d) Minimum Rear Yard: 6.5m e) Maximum number of attached dwelling units in a row: 8 f) Minimum Landscaped Open Space: Not Applicable

4. By adding the following subsection to Section 15 – Exceptions

Exception No.	Zone	Special Provisions
15.52.7	R3.52.7	Notwithstanding any provision in this By-law to the contrary, on lands zoned R3.52.7 the provisions of the R3 zone shall apply except for the following special regulation: a) Minimum Lot Area: 180m^2 b) Minimum Front Yard: 3.5m to habitable portion of the dwelling; 6m to the garage door c) Minimum Exterior Side Yard: 3.5m to habitable portion of the dwelling; 6m to the garage door d) Minimum Rear Yard: 3.0m e) Maximum building height: 3 storeys but not greater than 11.5 metres f) Maximum number of attached dwelling units in a row: 8 g) Minimum Landscaped Open Space: Not Applicable For the purposes of this zone, the front property line shall be deemed to be the property line on the southern part of the lot. The rear property line shall be along Woolwich Street.

5. All other applicable provisions of By-law No. 2009-045 shall continue to apply to the lands affected by this amendment

6. This by-law shall come into effect on the date of final enactment by the Council pursuant to Section 34 of the Planning Act, R.S.O., 1990.

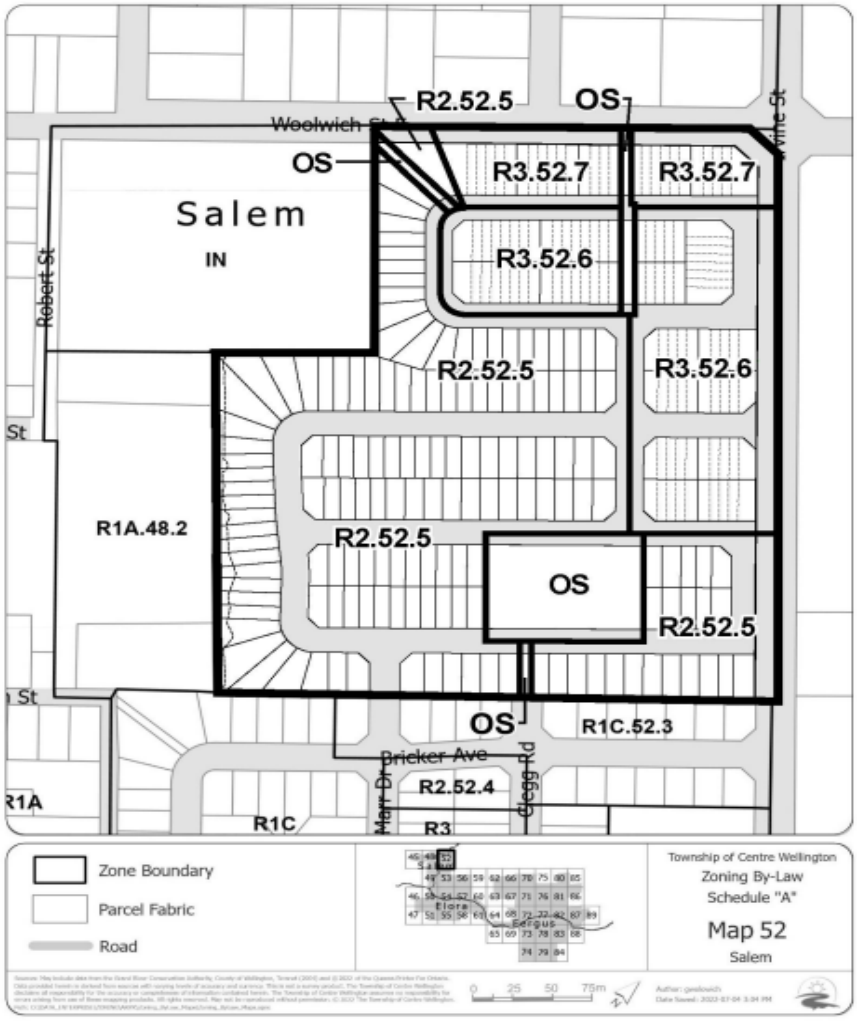
READ A FIRST AND SECOND TIME THIS xxth DAY OF {MONTH}, 2025.

Mayor Shawn Watters	Municipal Clerk – Kerri O'Kane

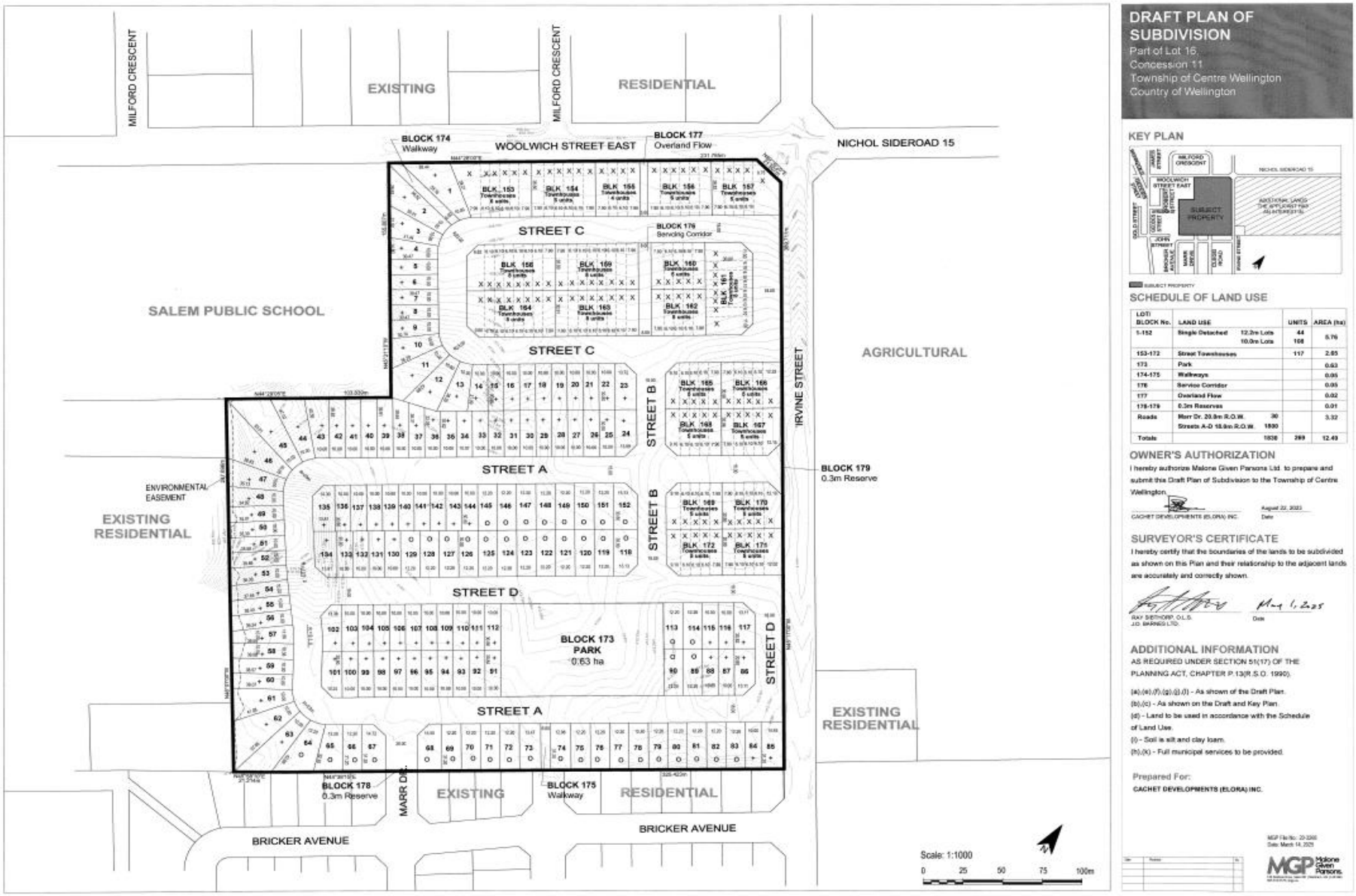
READ A THIRD TIME AND PASSED THIS xxth DAY OF {MONTH}, 2025.

Mayor Shawn Watters	Municipal Clerk – Kerri O'Kane

TOWNSHIP OF CENTRE WELLINGTON
Schedule "A"
BY-LAW NO. 2025-XX
An Amendment to By-law No. 2009-045



ATTACHMENT 2



DRAFT PLAN OF SUBDIVISION

Part of Lot 16,
Concession 11
Township of Centre Wellington
Country of Wellington

KEY PLAN

SUBJECT PROPERTY

SCHEDULE OF LAND USE

LOT/ BLOCK No.	LAND USE		UNITS	AREA (ha)
1-152	Single Detached	12.2m Lots	44	5.76
		10.0m Lots	108	
153-172	Street Townhouses		117	2.85
173	Park			0.63
174-175	Walkways			0.05
176	Service Corridor			0.05
177	Overland Flow			0.02
178-179	0.3m Reserves			0.01
Roads	Marr Dr. 20.0m R.O.W.	30		3.32
	Streets A-D 18.0m R.O.W.	1500		
Totals		1838	269	12.49

OWNER'S AUTHORIZATION

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Township of Centre Wellington.

CACHET DEVELOPMENTS (ELORA) INC. — August 22, 2023
Date

SURVEYOR'S CERTIFICATE

I hereby certify that the boundaries of the lands to be subdivided as shown on this Plan and their relationship to the adjacent lands are accurately and correctly shown.

RAY SIETHOFF, O.L.S.
J.D. BARNES LTD. — May 1, 2025
Date

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT, CHAPTER P.13(R.S.O. 1990).

(a),(e),(f),(g),(j),(l) - As shown of the Draft Plan.
(b),(c) - As shown on the Draft and Key Plan.
(d) - Land to be used in accordance with the Schedule of Land Use.
(i) - Soil is silt and clay loam.
(h),(k) - Full municipal services to be provided.

Prepared For:
CACHET DEVELOPMENTS (ELORA) INC.

MGP File No. 22-3265
Date: March 14, 2023

MGP Malone Given Parsons

ATTACHMENT 3

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

Township of Centre Wellington

1. THAT the plan proposed for registration for any phase within the subdivision shall be reviewed and accepted by the Township of Centre Wellington prior to the County of Wellington's granting final approval.
2. THAT the road allowances included in this draft plan shall be shown and dedicated as public highways.
3. THAT the street(s) shall be named to the satisfaction of the Township of Centre Wellington and such new street names shall not be duplicates of street names elsewhere in the County of Wellington.
4. THAT any dead ends and open sides of road allowances created by this draft plan shall be terminated in 0.3 metre reserves to be conveyed to, and held in trust by the Township of Centre Wellington.
5. THAT prior to final approval by the County of Wellington, the County of Wellington is to be advised by the Township of Centre Wellington that appropriate zoning is in effect for this proposed subdivision.
6. THAT the Owner agrees to satisfy the requirements of the Township of Centre Wellington in reference to parkland dedication by conveying Block 173 at time of registration of the first phase.
7. THAT the Owner agrees in writing to satisfy all the requirements, financial and otherwise, of the Township of Centre Wellington including but not limited to the provision of roads and the installation of services and drainage, the planting and preservation of trees, and the provision of fencing.
8. THAT such easements and/or agreements as may be required for servicing, access, utility or drainage purposes shall be granted to the appropriate authority.
9. THAT the Subdivision Agreement between the Owner and the Township of Centre Wellington contains phasing arrangements acceptable to the Township of Centre Wellington.
10. That the developer shall prepare and implement a construction traffic access and control plan for all phases of servicing and building construction to the satisfaction of the Township. All damage repair or maintenance required to surrounding streets as a result of such traffic shall be at the developer's cost.

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

11. THAT the Subdivision Agreement between the Owner and the Township of Centre Wellington be registered against the lands to which it applies, and that a copy of that Subdivision Agreement as registered in the Land Registry Office be filed with the County of Wellington.

12. THAT prior to final approval by the County of Wellington or any construction or grading on the subject property, the Owner or its agent shall submit the following plans or reports to the Township of Centre Wellington for review and approval:

    a) lot grading and drainage control plans that show the limits of all grading, including existing and proposed site grades and drainage;

    b) a storm servicing plan showing the layout of the storm sewer system;

    c) a Final Stormwater Management Report and Plans in accordance with the Stormwater Management Practices Planning and Design Manual (Ministry of the Environment, 2003) and the Nichol Drain No. 1 Subwatershed Study. The report shall identify a stormwater management pond that is appropriately designed to accommodate only the subject development, include an assessment of the impacts on off-site watercourses and municipal drains, and show how the infiltration function will be protected or maintained;

    d) erosion and sedimentation control plans in accordance with the Grand River Conservation Authority's Guidelines for sediment and erosion control which show how exposed soils, sediments, and eroded materials will be retained on site during all phases of construction. Plans should include maintenance requirements for all employed devices;

    e) a Baseline Hydrogeology and Impact Assessment report that provides the following:

        i) An assessment of groundwater level monitoring data from on-site monitoring wells which shall include data collected over four full consecutive seasons. The report shall, based on the observed seasonal fluctuation in groundwater levels, provide a predicted “high” groundwater elevation across the site as well as a recommended high groundwater elevation on a lot by lot basis. The recommended high groundwater elevation for each lot is intended to ensure adequate vertical separation from the underside of the proposed footing elevation to the seasonal high groundwater elevation at a given lot.

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

ii) Provision that proposed lot grading plans for the development shall provide a minimum 0.3 m separation on all lots. If the minimum vertical separation cannot be met, foundation excavations are to be inspected by a Geotechnical Engineer prior to footing/foundation construction to confirm soil conditions match expected geotechnical/hydrogeological conditions. Inspection report to be provided to the Township of Centre Wellington Building Department as soon as possible (not later than commencement of framing).

iii) Provision that a geotechnical engineer will observe the open excavation for all buildings prior to backfilling. If layers of high permeability material in excess of 600 mm are encountered in the excavation the basement dewatering system will be designed to accommodate the potential for greater than expected basement dewatering. This system will be designed to suit the maximum basement dewatering rate and will be submitted to the Township for their review and comment.

iv) Shall identify any potential impacts to the quality or quantity of water in existing private wells in proximity to the site that may be impacted by the development; and, if deemed necessary, incorporate a recommended protocol for a private well monitoring and mitigation program to be approved by the Township prior to its implementation.

f) An Environmental Implementation Report or other documentation satisfactory to the Township showing how the recommendations and mitigation measures from the Environmental Impact Study, with any necessary updates, will be implemented and addressed.

13. THAT the Owner in the Subdivision Agreement between the Owner and the Township of Centre Wellington shall agree in writing in a form acceptable to the Township of Centre Wellington:

a) To undertake all works according to the plans and reports approved under condition no. 12 above;

b) To construct, install and maintain erosion and sediment control facilities, satisfactory to the Township's Consulting Engineer, prior to any grading or construction on the subdivision lands in accordance with a plan that has been submitted to and approved by the Township's Consulting Engineer.

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

Furthermore, the developer's engineer shall provide a qualified environmental inspector, satisfactory to the Township's Consulting Engineer, to inspect the site during all phases of development and construction including grading, servicing, and building construction. The environmental inspector shall monitor and inspect the erosion and sediment control measures and procedures and compliance with the approved plans on a weekly or more frequent basis if required. The environmental inspector shall report on his or her findings to the Township's Consulting Engineer on a monthly or more frequent basis;

c) To maintain all storm water management facilities in good repair and operating order throughout all phases of construction until final acceptance of services has been granted by the Township of Centre Wellington;

d) To erect a subdivision sign on the property containing the following information:

i) identifying all proposed uses within the draft approved plan of subdivision

ii) identifying off street parking restrictions to be imposed by the Township upon final acceptance of the subdivision

iii) illustrating the location of proposed sidewalks, public walkways, trails, fences and community mailbox locations

14. THAT the Owner enter into a Service Financing Agreement between the Owner and the Township of Centre Wellington which contains provisions satisfactory to the Township of Centre Wellington to ensure the construction and financing of all external services which are necessary to provide appropriate levels of service to this plan of subdivision. Without limiting the generality of the foregoing, such Service Financing Agreement shall require the developer to finance, in whole or in part, the following:

a) Reconstruction of Irvine Street to an urban section on the development frontage (west side only);

b) Reconstruction of Woolwich Street East to an urban section on the development frontage (south side)

c) Construction and maintenance of the proposed external storm water management facilities include all works and facilities and outlet improvements appurtenant thereto, and addressing conveyance of the

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

storm water management works and facilities to the Township upon certification to the satisfaction of the Township

15. THAT the developer pays the cost of supplying and erecting street name and traffic control signs in the subdivision, to the satisfaction of the Township.

16. THAT any domestic wells and boreholes drilled for hydrogeological or geotechnical investigations within the limits of the draft plan of subdivision be properly abandoned in accordance with the Ministry of Environment Regulations and Guidelines to the satisfaction of the Townships' Director of Infrastructure.

17. THAT the developer shall include in the Subdivision Agreement and insert in all agreements of purchase and sale or lease for each dwelling in the subdivision – *"The lands adjacent this subdivision are being utilized for normal agricultural operations that may result in noise, dust, odour and other potential nuisances associated with livestock or agricultural uses. These normal agricultural practices may occasionally affect the living environment of residents in close proximity to agricultural operations."*

18. THAT the Subdivision Agreement between the Owner and the Township of Centre Wellington shall contain provisions whereby the Owner shall make satisfactory arrangements with the appropriate providers for the provision of permanent and/or temporary hydro, telephone, natural gas, and cable television services to this plan.

19. THAT the Owner in the Subdivision Agreement between the Owner and the Township of Centre Wellington shall agree in writing in a form acceptable to the Township of Centre Wellington that the proposed tree removal compensation plantings are incorporated into a Landscape or Planting Plan, in accordance with the findings and recommendations in the Arborist Report. This plan should propose the use of native species suitable to the subject property and surrounding area, whose selection has been informed by the natural inventory work completed on the property.

20. THAT, prior to final approval, additional details of the proposed tree protection fencing (TPF) around Tree Protection Zones (TPZ) be provided with the Tree Inventory and Protection Plan and implement the recommendations in the Arborist Report. TPF should be installed along the limit of grading and limit of construction to protect retained trees, as well as any adjacent natural features. TPF locations should be included in the TIPP and detailed design drawings. It is recommended that the TPF be combined with the Erosion and Sediment Control (ESC) fence where suitable and be comprised of geotextile woven heavy-duty silt fencing with paige-wire backing. The TPF/ESC fencing will ensure that the proposed site grading does not result in erosion or sedimentation impacts to trees or other natural features to be retained. The fencing

should follow the Ontario Provincial Standard for "heavy-duty silt fencing" (OPSD 219.130) and is anticipated to effectively protect trees to be retained throughout the site grading and development period.

Bell Canada/Telecommunication

21. THAT the Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada/telecommunication provider to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada/telecommunication provider.

22. THAT the Owner agrees that should any conflict arise with existing Bell Canada/telecommunication provider facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.

23. THAT prior to final approval, the Owner/Developer shall provide written confirmation from an authorized service provider that communication/telecommunication facilities will be provided within the proposed development to enable at a minimum the delivery of communication/telecommunication services for emergency management services (i.e. 9-1-1 Emergency) in accordance with CRTC requirements.

Canada Post

24. THAT the owner/developer comply with the following conditions to the satisfaction of Canada Post:

- The owner/developer will consult with Canada Post to determine suitable permanent locations for the placement of Community Mailboxes and to indicate these locations on appropriate servicing plans.

- The Builder/Owner/Developer will confirm to Canada Post that the final secured permanent locations for the Community Mailboxes will not be in conflict with any other utility; including hydro transformers, bell pedestals, cable pedestals, flush to grade communication vaults, landscaping enhancements (tree planting) and bus pads.

- The owner/developer will install concrete pads at each of the Community Mailbox locations as well as any required walkways across the boulevard and any required

curb depressions for wheelchair access as per Canada Post's concrete pad specification drawings.

- The owner/developer will agree to prepare and maintain an area of compacted gravel to Canada Post's specifications to serve as a temporary Community Mailbox location. This location will be in a safe area away from construction activity in order that Community Mailboxes may be installed to service addresses that have occupied prior to the pouring of the permanent mailbox pads. This area will be required to be prepared a minimum of 30 days prior to the date of first occupancy.

- The owner/developer will communicate to Canada Post the excavation date for the first foundation (or first phase) as well as the expected date of first occupancy.

- The owner/developer agrees, prior to offering any of the residential units for sale, to place a "Display Map" on the wall of the sales office in a place readily available to the public which indicates the location of all Canada Post Community Mailbox site locations, as approved by Canada Post and the Township of Centre Wellington.

- The owner/developer agrees to include in all offers of purchase and sale a statement, which advises the prospective new home purchaser that mail delivery will be from a designated Community Mailbox, and to include the exact locations (list of lot #s) of each of these Community Mailbox locations; and further, advise any affected homeowners of any established easements granted to Canada Post.

- The owner/developer will be responsible for officially notifying the purchasers of the exact Community Mailbox locations prior to the closing of any home sales with specific clauses in the Purchase offer, on which the homeowners do a sign off.

Enbridge

25. THAT the owner/developer provide to Enbridge the necessary easements and/or agreements required by Enbridge for the provision of gas services for this project, in a form satisfactory to Enbridge.

Grand River Conservation Authority

26. THAT Prior to any grading or construction on the site and prior to registration of the

plan, the owners or their agents submit the following plans and reports to the satisfaction of the Grand River Conservation Authority:

a) A Final Stormwater Management Report in accordance with the 2003 Ministry of Environment Report entitled, "Stormwater Management Practices Planning and Design Manual" and in keeping with the "Clayton Subdivision" Preliminary Stormwater Management Report (Revised November 2024, MTE Consultants Inc.)

b) Detailed Lot Grading and Drainage Plans showing existing and proposed grades.

c) An Erosion and Siltation Control Plan in accordance with the Grand River Conservation Authority's Guidelines for sediment and erosion control, indicating the means whereby erosion will be minimized and silt maintained on-site throughout all phases of grading and construction.

d) The submission and approval of a Development, Interference with Wetlands and Alterations to Shorelines and Watercourses permit under Ontario Regulation 150/06 for any proposed works within the regulated area.

Wellington Source Water Protection

27. THAT prior to final approval that the following be addressed to the satisfaction of the Township's Risk Management Official:

a) A salt management plan be prepared and required to be implemented during construction;

b) A liquid fuel handling/storage and spill response procedure be prepared and implemented for liquid fuel handling and storage during construction; and

c) Confirmation of any existing or proposed *transport pathways* on the subject property.

Upper Grand District School Board

28. THAT the owner/developer comply with the following conditions to the satisfaction of the Upper Grand District School Board:

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County, Township and Agency Draft Conditions

- That Education Development Charges shall be collected prior to the issuance of a building permit(s).

- That the developer shall agree, upon registration of the plan, to provide the Upper Grand District School Board with a digital file of the plan of subdivision in either ArcGIS (shapefile or geodatabase) format or DXF format using a projected geographic coordinate system, containing the parcel fabric and street network.

- That the developer shall provide safe and appropriate pedestrian connections from the proposed subdivision to the existing school to the satisfaction of the UGDSB and the municipality.

- That, prior to final approval of the plan, the Developer shall provide sidewalk connections from the proposed subdivision to the existing terminus along the school's frontage at no cost to the Upper Grand District School Board.

- That the developer shall agree in the subdivision agreement that adequate sidewalks, lighting and snow removal (on sidewalks and walkways) will be provided to allow children to walk safely to school or to a designated bus pickup point.

- That the developer provide a revised Traffic Report analyzing existing and proposed pedestrian movements and traffic calming measures required for the safety and protection of children prior to granting final approval of the subdivision.

- That the developer and the Upper Grand District School Board reach an agreement regarding the supply and erection of a sign (at the developer's expense and according to the Board's specifications) affixed to the permanent development sign advising prospective residents that students may be directed to schools outside the area.

- That the developer shall provide detailed engineering design for the proposed subdivision development prior to final approval of any phase or stage of the subdivision, to ensure the grading of the lands have no negative impact on the existing school.

- That the Developer agrees in the subdivision agreement that all grading works and surface stabilization on lands adjacent to UGDSB property, and on UGDSB property, is to be completed in the first phase of the subdivision.

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

- That prior to final approval of any phase or stage of the subdivision, the developer provides detailed grading and drainage plans to ensure that existing drainage patterns are maintained on UGDSB property and any works related to drainage outlets on the adjacent lands are to be completed in the first phase of the development. If it isn't feasible for permanent infrastructure to be installed, temporary drainage structures are to be provided to UGDSB's satisfaction.

- That the Developer shall agree in the subdivision agreement to install a 1.8 m galvanized chain link fence along the entire perimeter of the Salem Public School site at no cost to the Board.

- That prior to final approval of any phase or stage of the subdivision, the Developer shall enter into an agreement with the Upper Grand District School Board to monitor both quality and water supply volume in the existing Salem Public School well for a period of at least two years after the completion of all construction and remediate any negative impacts at no cost to the Board.

- That prior to final approval of any phase or stage of the subdivision, the Developer shall provide a Tree Management Plan to the satisfaction of the UGDSB.

- That the developer shall agree in the subdivision agreement to advise all purchasers of residential units and/or renters of same, by inserting the following clause in all offers of Purchase and Sale/Lease:

  "*In order to limit liability, public school buses operated by the Service de transport de Wellington-Dufferin Student Transportation Services (STWDSTS), or its assigns or successors, will not travel on privately owned or maintained right-of-ways to pick up students, and potential busing students will be required to meet the bus at a congregated bus pick-up point.*"

- That the developer shall agree in the subdivision agreement to advise all purchasers of residential units and/or renters of same, by inserting the following clause in all offers of Purchase and Sale/Lease, until such time as a permanent school is assigned:

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

"*Whereas the Upper Grand District School Board has designated this subdivision as a Development Area for the purposes of school accommodation, and despite the best efforts of the Upper Grand District School Board, sufficient accommodation may not be available for all anticipated students from the area, you are hereby notified that students may be accommodated in temporary facilities and/or bussed to a school outside the area, and further, that students may in future have to be transferred* to another school."

- That the Developer shall agree in the subdivision agreement to advise all purchasers of the residential units and/or renters of same, by inserting the following clause in all offers of Purchase and Sale/Lease:

"*The Purchasers/Occupants agree and understand that there is an existing elementary school in this area along with outdoor playing and study areas and parking lot and that there may be noise during and outside of the normal school hours throughout the year. Additionally, there may be increased traffic during the pick-up and drop-off times and during school events, outside of normal school hours. By purchasing this real estate, you acknowledge and accept any/all potential conflicts.*"

Wellington Catholic School Board

29. THAT the owner/developer comply with the following conditions to the satisfaction of the Wellington Catholic School Board:

- The Developer and the Wellington Catholic School Board shall reach an agreement regarding the supply and erection of signage, at the developer's expense, affixed to the subdivision sign advising potential Separate School supporters of the location of schools serving the area and the current practice of busing students outside the immediate area should schools in the area be at capacity.

- That prior to the registration of all or any portion of the plan, the Wellington Catholic District School Board shall advise the County in writing how their conditions have been satisfied.

- Education Development Charges shall be collected prior to the issuance of building permits.

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Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

- Circulation of phasing plans, revisions to the number or type of units proposed, or any other substantial changes to the circulated application is requested.

General County Conditions

30. THAT the Owner shall provide to the County of Wellington an AUTOCAD "dwg" digital file of the final plan to be registered.

31. THAT the Owner have prepared by an Ontario Land Surveyor a final plan in accordance with the Surveys Act, and with the Registry Act or the Land Titles Act, as the case may be and have provided that plan (being 2 mylars and 4 white prints) to the Director of Planning and Development for the County of Wellington prior to the lapsing date.

32. THAT the Owner's surveyor shall provide to the County of Wellington a written undertaking to provide to the County of Wellington a mylar, 2 white prints and electronic version of the final plan of subdivision as registered in the Land Titles Office for Wellington (No. 61) should such documents not be forwarded to the County of Wellington by the local Land Registrar's office after registration of the plan.

33. THAT if final approval is not given to this draft plan of subdivision No. 23T-22005 within three years of this draft approval, and if no extensions to draft approval have been granted, draft approval shall lapse. If the Owner wishes to request an extension to draft approval, a written explanation, together with a resolution of support from the Council for the Township of Centre Wellington must be received by the Director of Planning for the County of Wellington prior to the lapsing date of DATE.

34. THAT prior to final approval the County of Wellington is to be advised in writing by the Township of Centre Wellington how conditions 1 to 20 have been satisfied.

35. THAT prior to final approval the County of Wellington is to be advised in writing by Bell/telecommunication provider how conditions 21 to 23 has been satisfied.

36. THAT prior to final approval the County of Wellington is to be advised in writing by Canada Post how condition 24 has been satisfied.

37. THAT prior to final approval the County of Wellington is to be advised in writing by Enbridge Gas how condition 25 has been satisfied.

OLT Case #OLT-24-001158

Draft Plan – 23T-22005 Clayton Subdivision
County, Township and Agency Draft Conditions

38.THAT prior to final approval the County of Wellington is to be advised in writing by Grand River Conservation Authority how condition 26 has been satisfied.

39.THAT prior to final approval the County of Wellington is to be advised in writing by Wellington Source Water Protection how condition 27 has satisfied.

40. THAT prior to final approval the County of Wellington is to be advised in writing by Upper Grand District School Board how conditions 28 has been satisfied.

41.THAT prior to final approval the County of Wellington is to be advised in writing by Wellington Catholic District School Board how conditions 29 has been satisfied.

42.THAT prior to final approval by the County of Wellington, the Owner remit to the County of Wellington the applicable final approval fee which is in effect at the time of presentation of the final plan for final approval.

NOTES to DRAFT APPROVAL

1. It is the applicant's responsibility to fulfill the conditions of draft approval and to ensure that the required clearance letters are forwarded by the appropriate agencies to the County of Wellington.

2. Clearances are required from the following agencies:

   Township of Centre Wellington
   Enbridge Gas
   Bell/Telecommunication Provider
   Upper Grand District School Board
   Grand River Conservation Authority
   Canada Post
   Wellington Source Water Protection
   Wellington Catholic District School Board

   If the agency condition relates to a condition(s) in the subdivision agreement, a copy of the subdivision agreement should be sent to them. This will expedite the clearance of the final plan.

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County, Township and Agency Draft Conditions

3. The costs of any relocations or revisions to Hydro facilities which are necessary to accommodate this subdivision will be borne by the developer.

4. An electrical distribution line operating at below 50,000 volts might be located within the area affected by this development or abutting this development. Section 186 - Proximity - of the Regulations for Construction Projects in the *Occupational Health and Safety Act*, requires that no object be brought closer than 3 metres (10 feet) to the energized conductor. It is the proponent's responsibility to be aware, and to make all personnel on site aware, that all equipment and personnel must come no closer than the distance specified in the Act. They should also be aware that the electrical conductors can raise and lower without warning, depending on the electrical demand placed on the line. Warning signs should be posted on the wood poles supporting the conductors stating "*DANGER - Overhead Electrical Wires*" in all locations where personnel and construction vehicles might come in close proximity to the conductors.

5. The Owner is advised to contact Bell Canada at planninganddevelopment@bell.ca during the detailed utility design stage to confirm the provision of communication/telecommunication infrastructure needed to service the development.

6. It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that not such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.

7. If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

8. The final plan approved by the County of Wellington must be registered within 30 days of final approval or the County of Wellington may withdraw its approval under subsection 51(59) of the Planning Act, R.S.O. 1990 as amended.

9. The Developer is hereby advised that prior to commencing any work within the Plan, the Developer must confirm that sufficient wire-line communication/telecommunication infrastructure is currently available within the proposed development to provide communication/ telecommunication service to the proposed development. In the event that such infrastructure is not available, the Developer is hereby advised that the Developer may be required to pay for the connection to and/or extension of the existing communication/telecommunication

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infrastructure, the Developer shall be required to demonstrate to the municipality that sufficient alternative communication/telecommunication facilities are available within the proposed development to enable, at a minimum, the effective delivery of communication/telecommunication services for emergency management services (i.e. 911 Emergency).

10. Payment of clearance letter fees may be required from the clearing agencies before the clearance letter is issued. Please contact the appropriate agency for information in this matter

.

11. NOTE: Pursuant to the Clean Water Act, a Section 59 Notice and Risk Management Plan are not required for this proposal. If the nature of the development changes, Notices may apply and a Risk Management Plan may be required.

TOWNSHIP OF CENTRE WELLINGTON
NOTICE OF COMPLETE APPLICATION REGARDING
A PROPOSED OFFICIAL PLAN AMENDMENT

TAKE NOTICE that the Township of Centre Wellington has received a complete application for approval of an official plan amendment pursuant to Section 17 of the Planning Act, R.S.O. 1990. The Township's file number for this application is **OP003-2025.** The subject land is known municipally as 6574 Gerrie Road and 7581 Sideroad 15 in Elora as shown on the key map below.

Purpose and Effect
The purpose of the proposed official plan amendment is to bring land into the Elora/Salem Urban Centre and redesignate the lands to Residential and Core Greenlands. The effect of the amendment is to redesignate the lands for future residential development.

A related application has been filed to the County of Wellington at amend the County Official Plan (**File OP-2025-06**)

Notice of Passing
If you wish to be notified of the decision of the Township of Centre Wellington in respect of the proposed official plan amendment, you must make a written request to the Clerk of the Township of Centre Wellington, 1 MacDonald Square, Elora, Ontario, N0B 1S0.

If the official plan amendment is adopted, it will be forwarded to the County of Wellington for approval. If you wish to be notified of the decision of the Corporation of the County of Wellington in respect of the proposed official plan amendment, you must make a written request to the Director, Planning and Development Department, County of Wellington, 74 Woolwich Street, Guelph, Ontario, N1H 3T9.

Appeal Rights
TAKE NOTICE that if a person or public body would otherwise have an ability to appeal the decision of the County of Wellington to the Ontario Land Tribunal (OLT) but the person or public body does not make oral submissions at a public meeting or make written submissions to the Township of Centre Wellington before the official plan amendment is adopted, the person or public body is not entitled to appeal the decision.

AND TAKE NOTICE that if a person or public body does not make oral submissions at a public meeting, or make written submissions to the Township of Centre Wellington before the proposed official plan amendment is adopted, the person or public body may not be added as a party to the hearing of an appeal before the Ontario Land Tribunal (OLT) unless, in the opinion of the Tribunal, there are reasonable grounds to add the person or pubic body as a party.

Additional Information
For more information about this matter, including information about preserving your appeal rights, contact Chantalle Pellizzari, Supervisor of Development Administration at the contact information provided below.

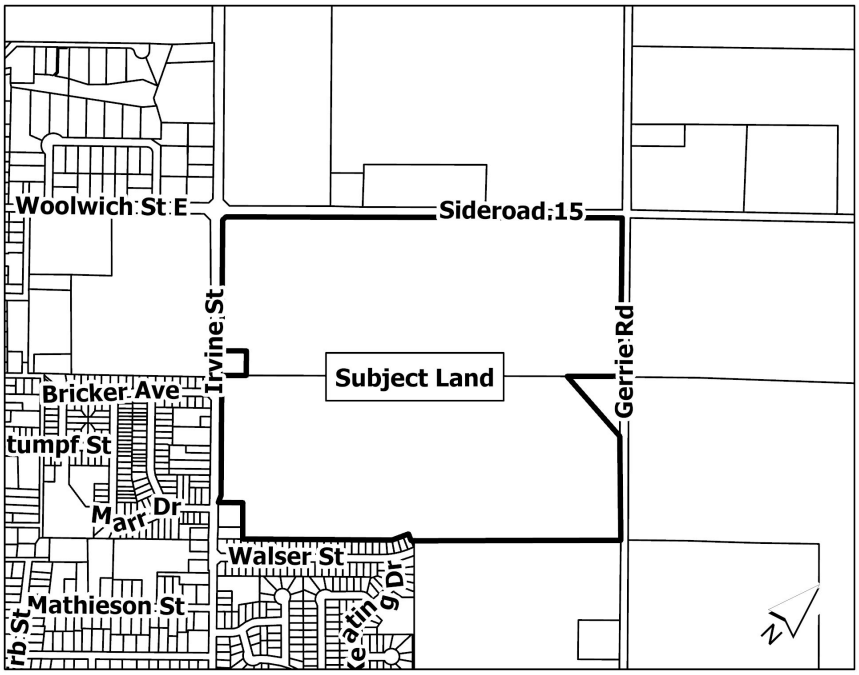
- By Phone at 519-846-9691 x241
- By Email at cpellizzari@centrewellington.ca

Comments on this application should be submitted by **May 30, 2025** and can be submitted to the Municipal Clerk (contact information below).

Details of this application can be viewed on the Township website at:
https://www.centrewellington.ca/currentapplications/

Notice of Collection of Personal Information
Personal information is being collected in order to gather feedback and communicate with interested parties regarding this development proposal. Information provided or presented at a public meeting is considered a public record and may be posted on the City's website or made public upon request.

This information is collected under the authority of the Planning Act, R.S.O. 1990, c. P.13. Questions about this collection should be directed to the Clerk's Office at 519-846-9691 or clerks@centrewellington.ca



Dated at the Township of Centre Wellington this 29th day of April, 2025.

Kerri O'Kane, Municipal Clerk
Township of Centre Wellington
1 MacDonald Square
Elora, Ontario
N0B 1S0
Phone: (519) 846-9691
Fax: (519) 846-2074
Email: kokane@centrewellington.ca

Appendix B

Hydrologic Parameters & SWM Design Sheets

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\62018-001 SWM Facility Design Sheet.xlsx

HYDROLOGIC PARAMETERS
Pre-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number Pervious (AMC II)	SCS Curve Number Pervious (AMC III)	SCS Curve Number Impervious	Percent Impervious	Land Use
	(ha)	*(%)*	*(m)*				*(%)*	
Areas Draining to Nichol Drain								
621	6.08	7	170	70	84	98	0	External Agriculture
622	9.69	6	350	70	84	98	0	Agriculture
623	11.2	2	400	70	84	98	0	External Agriculture
624	11.84	3	570	70	84	98	0	Agriculture
625	6.72	4	330	70	84	98	0	Agriculture
626	1.06	3.2	210	70	84	98	60	External Roadway
627	9.39	3.5	50	70	84	98	0	Nichol Drain Floodplain
628	0.66	10	110	70	84	98	0	Agriculture
629	8.26	4.5	320	70	84	98	0	Agriculture
Total	**64.90**						**0.98**	
Areas Draining to Irvine Creek								
704	2.74	3	140	70	84	98	0	Agriculture
709	18.51	3	300	70	84	98	0	External Agriculture
Total	**21.25**						**0.00**	

Post-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number Pervious (AMC II)	SCS Curve Number Pervious (AMC III)	SCS Curve Number Impervious	Percent Impervious	Land Use
	(ha)	*(%)*	*(m)*				*(%)*	
To SWMF2								
622	5.16	5	185	70	84	98	50	Non-roofs
9622	2.01	5	20	70	84	98	100	Roofs
622.1	1.18	5	88	70	84	98	50	SWMF and SPS
631	0.5	1	58	70	84	98	85	External Road
Total	**8.85**						**63.33**	
Retirement Block								
626	1.07	5	85	70	84	98	80	Residential
Total	**1.07**						**80.00**	
To SWMF1								
624	11.74	1	280	70	84	98	50	Non-roofs
9624	4.56	5	20	70	84	98	100	Roofs
624.1	4.56	5	174	70	84	98	50	SWMF
625	7.31	2.5	221	70	84	98	50	Non-roofs
9625	3.67	5	20	70	84	98	100	Roofs
628	0.53	2	59	70	84	98	75	Rearyards and roads
629	0.29	2	44	70	84	98	75	Rearyards and roads
633	0.07	1	22	70	84	98	85	External roadway
634	0.45	1	55	70	84	98	85	External roadway
Total	**33.18**						**63.57**	
Uncontrolled to ND								
621	6.08	7	170	70	84	98	0	External Agriculture
623	11.2	2	400	70	84	98	0	External Agriculture
627	11.3	5	50	70	84	98	0	ND Floodplain
632	0.54	1	60	70	84	98	85	External Roadway
Total	**29.12**						**1.58**	
Uncontrolled to QSC								
704	0.4	2.5	20	70	84	98	50	Residential
709	18.51	3	300	70	84	98	0	External Agriculture
Total	**18.91**						**1.06**	

IDF PARAMETERS
Fergus Shand Dam

Frequency (Years)	a	b	c	Comment
25mm (4hr)	263	0.0268	0.6820	Converted from 2-year
2	415	0.0268	0.6820	
5	545	0.0206	0.6860	
10	627	0.0136	0.6865	
25	746	0.0851	0.6915	
50	820	0.0100	0.6908	
100	901	0.0426	0.6917	

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number:	62018-001
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File:	Q:\62018_001\SWM\62018-001 SWM Facility Design Sheet.xlsx

SWMF1

Step 1: Choose Level of Water Quality Control

Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility

Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha)	Imperviousness (%)
33.18	63.57

Interpolated Storage Volume Requirement (m^3/ha)

210.00

Permanent Pool Required (m^3)

5640.49

Extended Detention Volume Required (m^3)

1327.20

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
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File: Q:\62018_001\SWM\62018-001 SWM Facility Design Sheet.xlsx

SWMF1 STAGE-STORAGE RELATIONSHIP

Stage	Active Depth	Forebay			Main Pond			Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume						
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	m^3	*m*		*m*
402.50		2633	0	0	9,091.11	0	0						402.50
402.60		2697	267	267	9,311.32	920	920						402.60
402.70		2762	273	539	9,526.00	942	1862						402.70
402.80		2828	280	819	9,742.12	963	2825						402.80
402.90		2895	286	1105	9,959.61	985	3810						402.90
403.00		2962	293	1398	10,178.43	1007	4817						403.00
403.10		3031	300	1698	10,398.57	1029	5846						403.10
403.20		3099	306	2004	10,620.04	1051	6897						403.20
403.30		3169	313	2318	10,842.95	1073	7970						403.30
403.40		3239	320	2638	11,069.71	1096	9066						403.40
403.50		3344	329	2967	11,424.84	1125	10191						403.50
403.60		3451	340	3307	11,783.93	1160	11351						403.60
403.70		3559	351	3657	12,147.51	1197	12548						403.70
403.80		3670	361	4019	12,514.42	1233	13781						403.80
403.90		3781	373	4392	12,885.00	1270	15051						403.90
404.00		3895	384	4775	13,259.19	1307	16358			0		Permanent Pool	404.00
404.00	0.00		0	4775	17,320.15	0	16358	21133	0				404.00
404.10	0.10		0	4775	17,779.09	1755	18113	22888	1755	1327	404.08	MOE Extended Detention	404.10
404.20	0.20		0	4775	18,242.66	1801	19914	24689	3556	2535	404.15	25mm Event	404.20
404.30	0.30		0	4775	18,710.54	1848	21762	26537	5404				404.30
404.40	0.40		0	4775	19,183.00	1895	23656	28432	7298	4898	404.28	1:2 Year Event	404.40
404.50	0.50		0	4775	19,659.89	1942	25598	30374	9241	7612	404.42	1:5 Year Event	404.50
404.60	0.60		0	4775	20,139.04	1990	27588	32364	11230	9088	404.50	1:10 Year Event	404.60
404.70	0.70		0	4775	20,464.20	2030	29619	34394	13261	10908	404.59	1:25 Year Event	404.70
404.80	0.80		0	4775	20,788.84	2063	31681	36457	15323	12150	404.65	1:50 Year Event	404.80
404.90	0.90		0	4775	21,115.19	2095	33776	38552	17418	13296	404.71	1:100 Year Event	404.90
405.00	1.00		0	4775	21,443.47	2128	35904	40680	19546				405.00
405.10	1.10		0	4775	21,773.54	2161	38065	42841	21707				405.10
405.20	1.20		0	4775	22,105.48	2194	40259	45035	23901				405.20
405.30	1.30		0	4775	22,449.86	2228	42487	47262	26129				405.30
405.40	1.40		0	4775	22,806.13	2263	44750	49525	28392				405.40
405.50	1.50		0	4775	23,167.86	2299	47048	51824	30690	30295	405.49	Regional	405.50
405.60	1.60		0	4775	23,534.04	2335	49384	54159	33026				405.60
405.70	1.70		0	4775		1177	50560	55336	34202				405.70
405.80	1.80		0	4775		0	50560	55336	34202				405.80
405.90	1.90		0	4775		0	50560	55336	34202				405.90
406.00	2.00		0	4775		0	50560	55336	34202			Freeboard	406.00

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\62018-001 SWM Facility Design Sheet.xlsx

Orifice Calculations

$Q_o=C_d*A_o*(2*g*H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.80	0.80	0.63
Invert (m)	404.00	500.00	500.00
Width (m)	0.300	0.000	0.000
Diameter/Height (m)	0.150	1.500	1.950
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3*C_d*(2g)^{1/2}*L*H_w^{3/2} + 8/15*C_d*(2g)^{1/2}*\tan\theta*H_w^{5/2}$

C_d	0.50	0.50
Invert (m)	404.45	500.00
Length (m)	1.800	
Side Slope (H:V)	0	1
Side Slope (rad)	0.000	0.785

SWMF1 STAGE-DISCHARGE RELATIONSHIP

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow		Average Discharge	Increment Volume	Increment Dewatering Time
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow							
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s		m^3/s	m^3	*hours*
404.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000		0.0119	1755	41.02
404.10	1755	0.03	0.05	0.0238	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0238		0.0401	1801	12.48
404.20	3556	0.05	0.13	0.0564	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0564		0.0660	1848	7.78
404.30	5404	0.05	0.23	0.0756	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0756		0.0833	1895	6.32
404.40	7298	0.05	0.33	0.0909	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0909		0.1123	1942	4.80
404.50	9241	0.05	0.43	0.1040	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0297	0.0000	0.1337		0.2018	1990	2.74
404.60	11230	0.05	0.53	0.1155	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1544	0.0000	0.2699		0.3641	2030	1.55
404.70	13261	0.05	0.63	0.1261	0.00	0.00	0.0000	0.00	0.00	0.0000	0.3322	0.0000	0.4583		0.5722	2063	1.00
404.80	15323	0.05	0.73	0.1358	0.00	0.00	0.0000	0.00	0.00	0.0000	0.5503	0.0000	0.6861		0.8166	2095	0.71
404.90	17418	0.05	0.83	0.1448	0.00	0.00	0.0000	0.00	0.00	0.0000	0.8023	0.0000	0.9471		1.0923	2128	0.54
405.00	19546	0.05	0.93	0.1534	0.00	0.00	0.0000	0.00	0.00	0.0000	1.0840	0.0000	1.2374		1.3958	2161	0.43
405.10	21707	0.05	1.03	0.1614	0.00	0.00	0.0000	0.00	0.00	0.0000	1.3927	0.0000	1.5542		1.7248	2194	0.35
405.20	23901	0.05	1.13	0.1691	0.00	0.00	0.0000	0.00	0.00	0.0000	1.7262	0.0000	1.8953		2.0773	2228	0.30
405.30	26129	0.05	1.23	0.1765	0.00	0.00	0.0000	0.00	0.00	0.0000	2.0827	0.0000	2.2592		2.4518	2263	0.26
405.40	28392	0.05	1.33	0.1836	0.00	0.00	0.0000	0.00	0.00	0.0000	2.4609	0.0000	2.6444		2.8471	2299	0.22
405.50	30690	0.05	1.43	0.1904	0.00	0.00	0.0000	0.00	0.00	0.0000	2.8595	0.0000	3.0498		3.2621	2335	0.20
405.60	33026	0.05	1.53	0.1969	0.00	0.00	0.0000	0.00	0.00	0.0000	3.2775	0.0000	3.4745		3.6960	1177	0.09

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\62018-001 SWM Facility Design Sheet.xlsx

SWMF1 FOREBAY DESIGN CALCULATIONS

MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	4.268	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	1.751	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)	0.038	m^3/s

Forebay Characteristics

b =	41.6	*m*	bottom width
y =	1.5	*m*	depth
z =	4	:1	side slope
w =	47.6	*m*	average width
R =	1.32	*m*	hydraulic radius
A =	71.4	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay *(m^3/s)*
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	1.75	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	0.14		length-to-width ratio
L =	6.7	*m*	required settling length
L =	*6.7*	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.038	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.05		length-to-width ratio
L =	2.6	*m*	required settling length
L =	*2.6*	*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	4.27	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	45.5	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**45.5**	***m***	**design length**
r =	0.96		design length-to-width ratio (typical minimum of 2.0)

NOTE: LENGTH TO WIDTH RATIO IS LESS THAN THE TYPICAL MINIMUM

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.060**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	16	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**4.34**	***m^3/s***	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	4775	m^3
Estimated TSS removal efficiency	80%	
Impervious level	70%	
Estimated annual sediment loading	2.8	m^3/ha
Contributing area	33.75	*ha*
Annual sediment volume	76	m^3/yr
Cleanout frequency for 33% volume reduction	**20.8**	***years***

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	16358	m^3
Estimated TSS removal efficiency	30%	
Impervious level	70%	
Estimated annual sediment loading	2.8	m^3/ha
Contributing area	33.75	*ha*
Annual sediment volume	28	m^3/yr
Cleanout frequency for 33% volume reduction	**190.4**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

PROJECT NAME

STORMWATER MANAGEMENT

City, Ontario

Project Number: 62018-001
Date: September 8, 2025
Design By: TRN
File: Q:\62018_001\SWM\62018-001 Draw-Down Calculation (Stage Discharge)_Rev3.xlsx

SWMF1 STAGE DISCHARGE DRAWDOWN CALCULATION

Stage	Elevation *m*	Discharge m^3/s	Volume m^3	Comments
1	404.000	0.0000	0.0	
2	404.100	0.0238	1755.0	
3	404.200	0.0564	3556.0	
4	404.300	0.0756	5403.7	
5	404.400	0.0909	7298.4	
6	404.500	0.1040	9240.5	
7	404.600	0.1155	11230.5	
	404.700	0.1261	13260.6	
1	404.800	0.1358	15323.3	
2	404.900	0.1448	17418.5	
3	405.000	0.1534	19546.4	
4	405.100	0.1614	21707.3	
5	405.200	0.1691	23901.2	
6	405.300	0.1765	26129.0	
7	405.400	0.1836	28391.8	
8	405.500	0.1904	30690.5	
9	405.600	0.1969	33025.6	

h_1 =	404.150	*m*	starting elevation
h_2 =	404.000	*m*	bottom elevation
V =	2535	m^3	starting volume
t =	5.0	*min*	time step

Drawdown Time = 53.17 *hrs*

10 *mm* remaining
184.2 m^3 remaining

Remaining after:	m^3	*mm*
12 *hrs*	1378	78
24 *hrs*	766	44
36 *hrs*	426	24
48 *hrs*	237	14
72 *hrs*	74	4

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

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SWMF2

Step 1: Choose Level of Water Quality Control
Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility
Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha)	Imperviousness (%)
8.85	63.33

Interpolated Storage Volume Requirement (m^3/ha)
209.44

Permanent Pool Required (m^3)
1499.51

Extended Detention Volume Required (m^3)
354.00

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

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SWMF2 STAGE-STORAGE RELATIONSHIP

Stage	Active Depth	Forebay			Main Pond			Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume						
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	m^3	*m*		*m*
403.50		369	0	0	865.21	0	0						403.50
403.60		402	39	39	916.11	89	89						403.60
403.70		436	42	80	968.14	94	183						403.70
403.80		471	45	126	1,021.17	99	283						403.80
403.90		507	49	175	1,075.18	105	388						403.90
404.00		543	52	227	1,130.19	110	498						404.00
404.10		580	56	283	1,186.20	116	614						404.10
404.20		618	60	343	1,243.20	121	735						404.20
404.30		657	64	407	1,301.19	127	862						404.30
404.40		697	68	475	1,360.14	133	995						404.40
404.50		750	72	547	1,446.90	140	1136						404.50
404.60		805	78	625	1,535.68	149	1285						404.60
404.70		861	83	708	1,626.49	158	1443						404.70
404.80		919	89	797	1,719.31	167	1610						404.80
404.90		979	95	892	1,814.15	177	1787						404.90
405.00		1040	101	993	1911	186	1973			0		Permanent Pool	405.00
405.00	0.00		0	993	3,097.03	0	1973	2966	0				405.00
405.10	0.10		0	993	3,229.41	316	2290	3283	316	354	405.12	Extended Detention	405.10
405.20	0.20		0	993	3,364.62	330	2619	3612	646				405.20
405.30	0.30		0	993	3,502.19	343	2963	3956	989	727	405.23	25mm Event	405.30
405.40	0.40		0	993	3,642.70	357	3320	4313	1347				405.40
405.50	0.50		0	993	3,785.82	371	3691	4684	1718				405.50
405.60	0.60		0	993	3,933.01	386	4077	5070	2104	1402	405.42	1:2 Year Event	405.60
405.70	0.70		0	993	4,028.68	398	4475	5468	2502	2155	405.62	1:5 Year Event	405.70
405.80	0.80		0	993	4,125.17	408	4883	5876	2910	2544	405.72	1:10 Year Event	405.80
405.90	0.90		0	993	4,222.33	417	5300	6293	3327	2993	405.82	1:25 Year Event	405.90
406.00	1.00		0	993	4,320.09	427	5727	6721	3754	3277	405.89	1:50 Year Event	406.00
406.10	1.10		0	993	4,418.40	437	6164	7158	4191	3530	405.95	1:100 Year Event	406.10
406.20	1.20		0	993	4,517.45	447	6611	7604	4638				406.20
406.30	1.30		0	993	4,617.05	457	7068	8061	5095				406.30
406.40	1.40		0	993	4,717.30	467	7535	8528	5561				406.40
406.50	1.50		0	993	4,818.15	477	8011	9005	6038				406.50
406.60	1.60		0	993	4,919.63	487	8498	9491	6525	6259	406.55	Regional	406.60
406.70	1.70		0	993	5,021.86	497	8995	9989	7022				406.70
406.80	1.80		0	993	5,124.69	507	9503	10496	7529				406.80
406.90	1.90		0	993	5,260.01	519	10022	11015	8049				406.90
407.00	2.00		0	993	5,397.98	533	10555	11548	8582				407.00
407.10	2.10		0	993	5,538.49	547	11102	12095	9128				407.10
407.20	2.20		0	993	5,681.63	561	11663	12656	9689				407.20
407.30	2.30		0	993	5,843.00	576	12239	13232	10266			Freeboard	407.30

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	405.00	500.00	500.00
Width (m)	0.000	0.000	0.000
Diameter/Height (m)	0.125	0.500	0.200
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H_w^{5/2}$

C_d	0.50	0.50
Invert (m)	405.65	406.20
Length (m)	0.500	1.300
Side Slope (H:V)	0	0
Side Slope (rad)	0.000	0.000

SWMF2 STAGE-DISCHARGE RELATIONSHIP

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow		Average Discharge	Increment Volume	Increment Dewatering Time
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow							
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s		m^3/s	m^3	*hours*
405.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000		0.0033	316	26.76
405.10	316	0.01	0.05	0.0066	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0066		0.0096	330	9.51
405.20	646	0.01	0.14	0.0127	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0127		0.0147	343	6.49
405.30	989	0.01	0.24	0.0167	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0167		0.0183	357	5.43
405.40	1347	0.01	0.34	0.0199	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0199		0.0213	371	4.85
405.50	1718	0.01	0.44	0.0227	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0227		0.0239	386	4.49
405.60	2104	0.01	0.54	0.0251	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0251		0.0304	398	3.64
405.70	2502	0.01	0.64	0.0273	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0083	0.0000	0.0356		0.0539	408	2.10
405.80	2910	0.01	0.74	0.0294	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0429	0.0000	0.0723		0.0980	417	1.18
405.90	3327	0.01	0.84	0.0313	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0923	0.0000	0.1236		0.1548	427	0.77
406.00	3754	0.01	0.94	0.0332	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1529	0.0000	0.1860		0.2219	437	0.55
406.10	4191	0.01	1.04	0.0349	0.00	0.00	0.0000	0.00	0.00	0.0000	0.2229	0.0000	0.2577		0.2977	447	0.42
406.20	4638	0.01	1.14	0.0365	0.00	0.00	0.0000	0.00	0.00	0.0000	0.3011	0.0000	0.3376		0.4117	457	0.31
406.30	5095	0.01	1.24	0.0381	0.00	0.00	0.0000	0.00	0.00	0.0000	0.3869	0.0607	0.4857		0.5882	467	0.22
406.40	5561	0.01	1.34	0.0396	0.00	0.00	0.0000	0.00	0.00	0.0000	0.4795	0.1717	0.6908		0.8129	477	0.16
406.50	6038	0.01	1.44	0.0411	0.00	0.00	0.0000	0.00	0.00	0.0000	0.5785	0.3154	0.9350		1.0733	487	0.13
406.60	6525	0.01	1.54	0.0425	0.00	0.00	0.0000	0.00	0.00	0.0000	0.6836	0.4856	1.2116		1.3642	497	0.10
406.70	7022	0.01	1.64	0.0438	0.00	0.00	0.0000	0.00	0.00	0.0000	0.7943	0.6786	1.5167		1.6822	507	0.08
406.80	7529	0.01	1.74	0.0451	0.00	0.00	0.0000	0.00	0.00	0.0000	0.9104	0.8921	1.8476		2.0250	519	0.07
406.90	8049	0.01	1.84	0.0464	0.00	0.00	0.0000	0.00	0.00	0.0000	1.0317	1.1241	2.2023		2.3907	533	0.06
407.00	8582	0.01	1.94	0.0477	0.00	0.00	0.0000	0.00	0.00	0.0000	1.1580	1.3734	2.5791		2.7779	547	0.05
407.10	9128	0.01	2.04	0.0489	0.00	0.00	0.0000	0.00	0.00	0.0000	1.2890	1.6388	2.9767		3.1854	561	0.05
407.20	9689	0.01	2.14	0.0501	0.00	0.00	0.0000	0.00	0.00	0.0000	1.4246	1.9194	3.3941				

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
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SWMF2 FOREBAY DESIGN CALCULATIONS

MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	1.508	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	0.630	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)	0.014	m^3/s

Forebay Characteristics

b =	12.0	*m*	bottom width
y =	1.5	*m*	depth
z =	4	:1	side slope
w =	18.0	*m*	average width
R =	1.11	*m*	hydraulic radius
A =	27.0	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay *(m^3/s)*
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	0.63	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	0.35		length-to-width ratio
L =	6.3	*m*	required settling length
L =	*6.3*	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.014	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.14		length-to-width ratio
L =	2.6	*m*	required settling length
L =	*2.6*	*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	1.51	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	16.1	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**16.1**	***m***	**design length**
r =	0.89		design length-to-width ratio (typical minimum of 2.0)

NOTE: LENGTH TO WIDTH RATIO IS LESS THAN THE TYPICAL MINIMUM

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.056**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	8	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**2.17**	***m^3/s***	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	993	m^3
Estimated TSS removal efficiency	80%	
Impervious level	70%	
Estimated annual sediment loading	2.8	m^3/ha
Contributing area	8.53	*ha*
Annual sediment volume	19	m^3/yr
Cleanout frequency for 33% volume reduction	**17.2**	***years***

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	1973	m^3
Estimated TSS removal efficiency	30%	
Impervious level	70%	
Estimated annual sediment loading	2.8	m^3/ha
Contributing area	8.53	*ha*
Annual sediment volume	7	m^3/yr
Cleanout frequency for 33% volume reduction	**90.9**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

PROJECT NAME

STORMWATER MANAGEMENT

City, Ontario

Project Number: 62018-001
Date: September 8, 2025
Design By: TRN
File: Q:\62018_001\SWM\62018-001 Draw-Down Calculation (Stage Discharge)_Rev3.xlsx

SWMF2 STAGE DISCHARGE DRAWDOWN CALCULATION

Stage	Elevation *m*	Discharge m^3/s	Volume m^3	Comments
1	405.000	0.0000	0.0	
2	405.100	0.0066	316.3	
3	405.200	0.0127	646.0	
4	405.300	0.0167	989.4	
5	405.400	0.0199	1346.6	
6	405.500	0.0227	1718.0	
7	405.600	0.0251	2104.0	
	405.700	0.0319	2502.1	
1	405.800	0.0673	2909.8	
2	405.900	0.1282	3327.1	
3	406.000	0.2045	3754.2	
4	406.100	0.2813	4191.2	
5	406.200	0.3366	4638.0	
6	406.300	0.4874	5094.7	
7	406.400	0.7704	5561.4	
8	406.500	1.1933	6038.2	
9	406.600	1.7709	6525.1	

h_1 =	405.230	*m*	starting elevation
h_2 =	405.000	*m*	bottom elevation
V =	727	m^3	starting volume
t =	5.0	*min*	time step

Drawdown Time = 50.17 *hrs*

5 *mm* remaining
17.3 m^3 remaining

Remaining after:	m^3	*mm*
12 *hrs*	303	96
24 *hrs*	123	39
36 *hrs*	50	16
48 *hrs*	20	6
72 *hrs*	4	1

Appendix C

Existing Conditions Modelling

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================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\8fb0d3c8-4caf-4a1d-
86ec-a0925d775da8\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\8fb0d3c8-4caf-4a1d-
86ec-a0925d775da8\scena


DATE: 10/06/2025                          TIME: 08:57:16

USER:


COMMENTS: _____


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  **************************************************
  ** SIMULATION : 100-Year                        **
  **************************************************

-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 901.000
| Ptotal= 74.43 mm |                          B=   0.043
-------------------                          C=   0.692
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    8.21 |  0.75   28.54 |  1.50   17.70 |  2.25   10.07
                0.08    8.78 |  0.83   52.95 |  1.58   16.16 |  2.33    9.66
                0.17    9.46 |  0.92  294.24 |  1.67   14.92 |  2.42    9.29
                0.25   10.28 |  1.00   64.96 |  1.75   13.88 |  2.50    8.95
                0.33   11.31 |  1.08   40.99 |  1.83   13.01 |  2.58    8.64
                0.42   12.62 |  1.17   31.31 |  1.92   12.26 |  2.67    8.35
                0.50   14.39 |  1.25   25.82 |  2.00   11.60 |  2.75    8.09
                0.58   16.91 |  1.33   22.22 |  2.08   11.03 |  2.83    7.85
                0.67   20.91 |  1.42   19.65 |  2.17   10.52 |  2.92    7.62


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-------------------
| CALIB            |
| NASHYD   (  0624)|   Area    (ha)=  11.84   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.48

     Unit Hyd Qpeak  (cms)=   0.942

     PEAK FLOW       (cms)=   0.563 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  27.035
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0628)|   Area    (ha)=   0.66   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.180

     PEAK FLOW       (cms)=   0.071 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  26.833
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.361

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0629)|   Area    (ha)=   8.26   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.32

     Unit Hyd Qpeak  (cms)=   0.986

     PEAK FLOW       (cms)=   0.513 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  27.028
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

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| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0624):    11.84   0.563     1.58    27.03
     + ID2= 2 (  0628):     0.66   0.071     1.08    26.83
       ==================================================
       ID = 3 (  0002):    12.50   0.585     1.58    27.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------


-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    12.50   0.585     1.58    27.02
     + ID2= 2 (  0629):     8.26   0.513     1.33    27.03
       ==================================================
       ID = 1 (  0002):    20.76   1.062     1.42    27.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0625)|   Area    (ha)=   6.72   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   0.778

     PEAK FLOW       (cms)=   0.408 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  27.029
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

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```
| ROUTE CHN(  4625)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  0.00        414.20        0.0360      Main Channel
                  4.30        412.70        0.0360      Main Channel
                  8.60        414.20        0.0360      Main Channel

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
       (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
      0.08   412.78    .108E+02       0.0          0.24      42.13
      0.16   412.86    .434E+02       0.0          0.38      26.54
      0.24   412.94    .976E+02       0.1          0.50      20.26
      0.32   413.02    .174E+03       0.2          0.61      16.72
      0.39   413.09    .271E+03       0.3          0.70      14.41
      0.47   413.17    .390E+03       0.5          0.79      12.76
      0.55   413.25    .532E+03       0.8          0.88      11.51
      0.63   413.33    .694E+03       1.1          0.96      10.53
      0.71   413.41    .879E+03       1.5          1.04       9.74
      0.79   413.49    .108E+04       2.0          1.11       9.08
      0.87   413.57    .131E+04       2.6          1.19       8.52
      0.95   413.65    .156E+04       3.2          1.26       8.04
      1.03   413.73    .183E+04       4.0          1.33       7.62
      1.11   413.81    .213E+04       4.9          1.39       7.25
      1.18   413.88    .244E+04       5.9          1.46       6.93
      1.26   413.96    .278E+04       7.0          1.52       6.64
      1.34   414.04    .313E+04       8.2          1.59       6.37
      1.42   414.12    .351E+04       9.5          1.65       6.13
      1.50   414.20    .392E+04      11.0          1.71       5.92

                                <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0625)    6.72     0.41    1.33  27.03      0.43      0.74
   OUTFLOW: ID= 1 (  4625)    6.72     0.35    1.58  27.00      0.41      0.72


--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0626)|   Area    (ha)=   1.06
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.64         0.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.20         2.00
     Length            (m)=      84.06        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
      0.017    8.21 | 0.767   28.54 | 1.517   17.70 |  2.27   10.07
      0.033    8.21 | 0.783   28.54 | 1.533   17.70 |  2.28   10.07
      0.050    8.21 | 0.800   28.54 | 1.550   17.70 |  2.30   10.07
      0.067    8.21 | 0.817   28.54 | 1.567   17.70 |  2.32   10.07
      0.083    8.21 | 0.833   28.54 | 1.583   17.70 |  2.33   10.07
      0.100    8.78 | 0.850   52.95 | 1.600   16.16 |  2.35    9.66
      0.117    8.78 | 0.867   52.95 | 1.617   16.16 |  2.37    9.66
      0.133    8.78 | 0.883   52.95 | 1.633   16.16 |  2.38    9.66
      0.150    8.78 | 0.900   52.95 | 1.650   16.16 |  2.40    9.66
      0.167    8.78 | 0.917   52.95 | 1.667   16.16 |  2.42    9.66
      0.183    9.46 | 0.933  294.23 | 1.683   14.92 |  2.43    9.29
      0.200    9.46 | 0.950  294.24 | 1.700   14.92 |  2.45    9.29
      0.217    9.46 | 0.967  294.24 | 1.717   14.92 |  2.47    9.29
      0.233    9.46 | 0.983  294.24 | 1.733   14.92 |  2.48    9.29
      0.250    9.46 | 1.000  294.24 | 1.750   14.92 |  2.50    9.29
      0.267   10.28 | 1.017   64.96 | 1.767   13.88 |  2.52    8.95
      0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
      0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
      0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
      0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
      0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
      0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
      0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
      0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
      0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
      0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
      0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
      0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
      0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
      0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
      0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
      0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
      0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
      0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
      0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
      0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
      0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
      0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
      0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
      0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
      0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
      0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
      0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
      0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
      0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

   Max.Eff.Inten.(mm/hr)=     294.24        91.78
             over (min)         5.00         3.00
   Storage Coeff.  (min)=       1.05 (ii)    2.88 (ii)
   Unit Hyd. Tpeak (min)=       5.00         3.00
   Unit Hyd. peak  (cms)=       0.47         0.39
                                                        *TOTALS*
   PEAK FLOW       (cms)=       0.39         0.13          0.525 (iii)
   TIME TO PEAK    (hrs)=       1.02         1.02          1.02
   RUNOFF VOLUME    (mm)=      73.43        31.49         52.46
   TOTAL RAINFALL   (mm)=      74.43        74.43         74.43
   RUNOFF COEFFICIENT   =       0.99         0.42          0.70


     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  4625):     6.72   0.348     1.58    27.00
     + ID2= 2 (  0626):     1.06   0.525     1.02    52.46
       ================================================
       ID = 3 (  0003):     7.78   0.540     1.02    30.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):    20.76   1.062     1.42    27.03
     + ID2= 2 (  0003):     7.78   0.540     1.02    30.46
       ================================================
       ID = 3 (  0004):    28.54   1.444     1.50    27.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234

     PEAK FLOW       (cms)=   0.629 (i)
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     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  27.026
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

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--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   1.010 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  26.834
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.361

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.517 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=  26.985
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.547 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  27.034
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.517     1.17    26.98
     + ID2= 2 (  0623):    11.20   0.547     1.58    27.03
       ================================================
       ID = 3 (  0006):    17.28   0.904     1.33    27.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.904     1.33    27.02
     + ID2= 2 (  0627):     9.39   1.010     1.08    26.83
       ================================================
       ID = 1 (  0006):    26.67   1.736     1.17    26.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   1.444     1.50    27.96
     + ID2= 2 (  0006):    26.67   1.736     1.17    26.95
       ================================================
       ID = 3 (  0005):    55.21   2.815     1.25    27.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   2.815     1.25    27.47
     + ID2= 2 (  0622):     9.69   0.629     1.33    27.03
       ================================================
       ID = 1 (  0005):    64.90   3.439     1.33    27.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.206 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  27.011
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.834 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  27.035
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     2.74   0.206     1.25    27.01
     + ID2= 2 (  0709):    18.51   0.834     1.67    27.04
       ================================================
       ID = 3 (  0008):    21.25   0.959     1.58    27.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 FINISH
================================================================================================================

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```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V  V   I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\a84a390c-04c3-4448-add4-d5bee003c077\scena
Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\a84a390c-04c3-4448-add4-d5bee003c077\scena

DATE: 10/06/2025 TIME: 08:57:15

USER:

COMMENTS: _____

****
** SIMULATION : 10-Year **
****

| CHICAGO STORM | Ptotal= 53.36 mm |

IDF curve parameters: A= 627.000
B= 0.014
C= 0.686
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.99	0.75	20.57	1.50	12.82	2.25	7.33
0.08	6.40	0.83	37.86	1.58	11.72	2.33	7.03
0.17	6.89	0.92	207.47	1.67	10.82	2.42	6.77
0.25	7.49	1.00	46.32	1.75	10.08	2.50	6.52
0.33	8.22	1.08	29.43	1.83	9.45	2.58	6.30
0.42	9.17	1.17	22.55	1.92	8.91	2.67	6.09
0.50	10.44	1.25	18.64	2.00	8.44	2.75	5.90
0.58	12.26	1.33	16.06	2.08	8.03	2.83	5.73
0.67	15.13	1.42	14.22	2.17	7.66	2.92	5.56

CALIB	NASHYD (0624)	ID= 1 DT= 5.0 min

Area (ha)= 11.84 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.48

Unit Hyd Qpeak (cms)= 0.942

PEAK FLOW (cms)= 0.297 (i)
TIME TO PEAK (hrs)= 1.583
RUNOFF VOLUME (mm)= 14.872
TOTAL RAINFALL (mm)= 53.355
RUNOFF COEFFICIENT = 0.279

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

CALIB	NASHYD (0628)	ID= 1 DT= 5.0 min

Area (ha)= 0.66 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.14

Unit Hyd Qpeak (cms)= 0.180

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 1.083
RUNOFF VOLUME (mm)= 14.761
TOTAL RAINFALL (mm)= 53.355
RUNOFF COEFFICIENT = 0.277

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

CALIB	NASHYD (0629)	ID= 1 DT= 5.0 min

Area (ha)= 8.26 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

Unit Hyd Qpeak (cms)= 0.986

PEAK FLOW (cms)= 0.267 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 14.869
TOTAL RAINFALL (mm)= 53.355
RUNOFF COEFFICIENT = 0.279

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

ADD HYD (0002)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0624):		11.84	0.297	1.58	14.87
	+ ID2= 2 (0628):		0.66	0.036	1.08	14.76
	ID = 3 (0002):		12.50	0.309	1.58	14.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0002)	3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 3 (0002):		12.50	0.309	1.58	14.87
	+ ID2= 2 (0629):		8.26	0.267	1.33	14.87
	ID = 1 (0002):		20.76	0.557	1.50	14.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	NASHYD (0625)	ID= 1 DT= 5.0 min

Area (ha)= 6.72 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.33

Unit Hyd Qpeak (cms)= 0.778

PEAK FLOW (cms)= 0.213 (i)
TIME TO PEAK (hrs)= 1.417
RUNOFF VOLUME (mm)= 14.869
TOTAL RAINFALL (mm)= 53.355
RUNOFF COEFFICIENT = 0.279

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

ROUTE CHN (4625)

```
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        414.20        0.0360      Main Channel
                   4.30        412.70        0.0360      Main Channel
                   8.60        414.20        0.0360      Main Channel

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.08   412.78    .108E+02       0.0         0.24      42.13
       0.16   412.86    .434E+02       0.0         0.38      26.54
       0.24   412.94    .976E+02       0.1         0.50      20.26
       0.32   413.02    .174E+03       0.2         0.61      16.72
       0.39   413.09    .271E+03       0.3         0.70      14.41
       0.47   413.17    .390E+03       0.5         0.79      12.76
       0.55   413.25    .532E+03       0.8         0.88      11.51
       0.63   413.33    .694E+03       1.1         0.96      10.53
       0.71   413.41    .879E+03       1.5         1.04       9.74
       0.79   413.49    .108E+04       2.0         1.11       9.08
       0.87   413.57    .131E+04       2.6         1.19       8.52
       0.95   413.65    .156E+04       3.2         1.26       8.04
       1.03   413.73    .183E+04       4.0         1.33       7.62
       1.11   413.81    .213E+04       4.9         1.39       7.25
       1.18   413.88    .244E+04       5.9         1.46       6.93
       1.26   413.96    .278E+04       7.0         1.52       6.64
       1.34   414.04    .313E+04       8.2         1.59       6.37
       1.42   414.12    .351E+04       9.5         1.65       6.13
       1.50   414.20    .392E+04      11.0         1.71       5.92

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0625)   6.72    0.21    1.42  14.87      0.34      0.63
   OUTFLOW: ID= 1 (  4625)   6.72    0.18    1.67  14.83      0.32      0.61


--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0626)|   Area    (ha)=   1.06
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.64         0.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.20         2.00
     Length            (m)=      84.06        10.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
               0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
               0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
               0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
               0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
               0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
               0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
               0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
               0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
               0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
               0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
               0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
               0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
               0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
               0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
               0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
               0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
               0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
               0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
               0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
               0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
               0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
               0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
               0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
               0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
               0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
               0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
               0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
               0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
               0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
               0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
               0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
               0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
               0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
               0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
               0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
               0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
               0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
               0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
               0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
               0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
               0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
               0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
               0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
               0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

     Max.Eff.Inten.(mm/hr)=     207.47        49.16
               over (min)        5.00         4.00
     Storage Coeff.  (min)=       1.21 (ii)    3.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00         4.00
     Unit Hyd. peak  (cms)=       0.45         0.32
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.06          0.331 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.03          1.02
     RUNOFF VOLUME    (mm)=      52.36        17.85         35.10
     TOTAL RAINFALL   (mm)=      53.36        53.36         53.36
     RUNOFF COEFFICIENT   =       0.98         0.33          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  4625):     6.72   0.177     1.67    14.83
      + ID2= 2 (  0626):     1.06   0.331     1.02    35.10
        ==========================================================
        ID = 3 (  0003):     7.78   0.337     1.02    17.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    20.76   0.557     1.50    14.87
      + ID2= 2 (  0003):     7.78   0.337     1.02    17.59
        ==========================================================
        ID = 3 (  0004):    28.54   0.755     1.50    15.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234

     PEAK FLOW       (cms)=   0.328 (i)
     TIME TO PEAK    (hrs)=   1.333
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```
     RUNOFF VOLUME    (mm)=  14.867
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   0.515 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  14.762
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.277

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.265 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=  14.845
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.278

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.289 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  14.872
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.265     1.17    14.84
     + ID2= 2 (  0623):    11.20   0.289     1.58    14.87
       ================================================
       ID = 3 (  0006):    17.28   0.472     1.33    14.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.472     1.33    14.86
     + ID2= 2 (  0627):     9.39   0.515     1.08    14.76
       ================================================
       ID = 1 (  0006):    26.67   0.894     1.17    14.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   0.755     1.50    15.61
     + ID2= 2 (  0006):    26.67   0.894     1.17    14.83
       ================================================
       ID = 3 (  0005):    55.21   1.468     1.33    15.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   1.468     1.33    15.23
     + ID2= 2 (  0622):     9.69   0.328     1.33    14.87
       ================================================
       ID = 1 (  0005):    64.90   1.796     1.33    15.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.107 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  14.859
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.278

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.442 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  14.872
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     2.74   0.107     1.25    14.86
     + ID2= 2 (  0709):    18.51   0.442     1.67    14.87
       ================================================
       ID = 3 (  0008):    21.25   0.507     1.58    14.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
```

```
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\c43af8a2-e073-40a1-
9392-87612b3f6b57\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\c43af8a2-e073-40a1-
9392-87612b3f6b57\scena


DATE: 10/06/2025                          TIME: 08:57:15

USER:



COMMENTS: _____


--------------------------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 25mm Event                   **
  **********************************************

-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 263.000
| Ptotal= 25.04 mm |                          B=   0.027
-------------------                          C=   0.682
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    2.10 |  1.00    6.53 |  2.00    4.68 |  3.00    2.64
               0.08    2.20 |  1.08    8.86 |  2.08    4.36 |  3.08    2.56
               0.17    2.31 |  1.17   16.26 |  2.17    4.09 |  3.17    2.48
               0.25    2.45 |  1.25   87.43 |  2.25    3.85 |  3.25    2.41
               0.33    2.60 |  1.33   19.89 |  2.33    3.65 |  3.33    2.35
               0.42    2.78 |  1.42   12.66 |  2.42    3.47 |  3.42    2.29
               0.50    2.99 |  1.50    9.71 |  2.50    3.32 |  3.50    2.23
               0.58    3.24 |  1.58    8.03 |  2.58    3.17 |  3.58    2.17
               0.67    3.56 |  1.67    6.93 |  2.67    3.05 |  3.67    2.12
               0.75    3.97 |  1.75    6.14 |  2.75    2.93 |  3.75    2.07
               0.83    4.51 |  1.83    5.54 |  2.83    2.83 |  3.83    2.03
               0.92    5.29 |  1.92    5.06 |  2.92    2.73 |  3.92    1.99


--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0624)|   Area    (ha)=  11.84   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.48

     Unit Hyd Qpeak  (cms)=   0.942

     PEAK FLOW       (cms)=   0.049 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   3.115
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0628)|   Area    (ha)=   0.66   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.180

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.092
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.123

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0629)|   Area    (ha)=   8.26   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.32

     Unit Hyd Qpeak  (cms)=   0.986

     PEAK FLOW       (cms)=   0.043 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   3.115
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0624):    11.84   0.049     2.00     3.12
     + ID2= 2 (  0628):     0.66   0.005     1.50     3.09
       ================================================
       ID = 3 (  0002):    12.50   0.051     2.00     3.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    12.50   0.051     2.00     3.11
     + ID2= 2 (  0629):     8.26   0.043     1.75     3.11
       ================================================
       ID = 1 (  0002):    20.76   0.091     1.92     3.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0625)|   Area    (ha)=   6.72   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   0.778

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   3.115
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
-------------------
| ROUTE CHN(  4625)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
```

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	414.20	0.0360	Main Channel
4.30	412.70	0.0360	Main Channel
8.60	414.20	0.0360	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.08	412.78	.108E+02	0.0	0.24	42.13
0.16	412.86	.434E+02	0.0	0.38	26.54
0.24	412.94	.976E+02	0.1	0.50	20.26
0.32	413.02	.174E+03	0.2	0.61	16.72
0.39	413.09	.271E+03	0.3	0.70	14.41
0.47	413.17	.390E+03	0.5	0.79	12.76
0.55	413.25	.532E+03	0.8	0.88	11.51
0.63	413.33	.694E+03	1.1	0.96	10.53
0.71	413.41	.879E+03	1.5	1.04	9.74
0.79	413.49	.108E+04	2.0	1.11	9.08
0.87	413.57	.131E+04	2.6	1.19	8.52
0.95	413.65	.156E+04	3.2	1.26	8.04
1.03	413.73	.183E+04	4.0	1.33	7.62
1.11	413.81	.213E+04	4.9	1.39	7.25
1.18	413.88	.244E+04	5.9	1.46	6.93
1.26	413.96	.278E+04	7.0	1.52	6.64
1.34	414.04	.313E+04	8.2	1.59	6.37
1.42	414.12	.351E+04	9.5	1.65	6.13
1.50	414.20	.392E+04	11.0	1.71	5.92

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0625)	6.72	0.03	1.75	3.11	0.17	0.39
OUTFLOW: ID= 1 (4625)	6.72	0.03	2.17	3.08	0.15	0.36

CALIB		
STANDHYD (0626)	Area (ha)= 1.06	
ID= 1 DT= 1.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.64	0.42
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	3.20	2.00
Length	(m)=	84.06	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Max.Eff.Inten.(mm/hr)=	87.43	8.58	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.71 (ii)	4.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.40	0.24	
			TOTALS
PEAK FLOW (cms)=	0.11	0.01	0.114 (iii)
TIME TO PEAK (hrs)=	1.35	1.40	1.35
RUNOFF VOLUME (mm)=	24.04	4.09	14.06
TOTAL RAINFALL (mm)=	25.04	25.04	25.04
RUNOFF COEFFICIENT =	0.96	0.16	0.56

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (4625):	6.72	0.026	2.17	3.08
+ ID2= 2 (0626):	1.06	0.114	1.35	14.06
ID = 3 (0003):	7.78	0.114	1.35	4.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0004)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0002):	20.76	0.091	1.92	3.11
+ ID2= 2 (0003):	7.78	0.114	1.35	4.58
ID = 3 (0004):	28.54	0.136	1.37	3.51

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234

     PEAK FLOW       (cms)=   0.052 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   3.114
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   0.075 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.092
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.123

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   3.110
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   3.115
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.041     1.58     3.11
     + ID2= 2 (  0623):    11.20   0.048     2.00     3.12
       ====================================================
       ID = 3 (  0006):    17.28   0.076     1.75     3.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.076     1.75     3.11
     + ID2= 2 (  0627):     9.39   0.075     1.50     3.09
       ====================================================
       ID = 1 (  0006):    26.67   0.134     1.50     3.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   0.136     1.37     3.51
     + ID2= 2 (  0006):    26.67   0.134     1.50     3.11
       ====================================================
       ID = 3 (  0005):    55.21   0.237     1.75     3.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   0.237     1.75     3.32
     + ID2= 2 (  0622):     9.69   0.052     1.75     3.11
       ====================================================
       ID = 1 (  0005):    64.90   0.289     1.75     3.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.113
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.074 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=   3.116
     TOTAL RAINFALL   (mm)=  25.040
     RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0704):     2.74   0.016     1.67     3.11
      + ID2= 2 (  0709):    18.51   0.074     2.08     3.12
        ================================================
        ID = 3 (  0008):    21.25   0.084     2.00     3.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
===============================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\374a1dda-8bc9-44bb-
998b-1b1679e5fc59\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\374a1dda-8bc9-44bb-
998b-1b1679e5fc59\scena


DATE: 10/06/2025                          TIME: 08:57:15

USER:


COMMENTS: _____


---------------------------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 25-Year                      **
  **********************************************

-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 746.000
| Ptotal= 61.68 mm |                          B=   0.085
-------------------                          C=   0.692
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.81 |  0.75   23.72 |  1.50   14.69 |  2.25    8.35
                0.08    7.29 |  0.83   44.17 |  1.58   13.42 |  2.33    8.01
                0.17    7.85 |  0.92  242.29 |  1.67   12.38 |  2.42    7.70
                0.25    8.53 |  1.00   54.27 |  1.75   11.52 |  2.50    7.42
                0.33    9.38 |  1.08   34.12 |  1.83   10.80 |  2.58    7.17
                0.42   10.47 |  1.17   26.03 |  1.92   10.17 |  2.67    6.93
                0.50   11.94 |  1.25   21.45 |  2.00    9.63 |  2.75    6.71
                0.58   14.04 |  1.33   18.45 |  2.08    9.15 |  2.83    6.51
                0.67   17.37 |  1.42   16.31 |  2.17    8.73 |  2.92    6.32


-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0624)|   Area    (ha)=  11.84   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.48

     Unit Hyd Qpeak  (cms)=   0.942

     PEAK FLOW       (cms)=   0.396 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  19.405
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0628)|   Area    (ha)=   0.66   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.180

     PEAK FLOW       (cms)=   0.049 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  19.260
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.312

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0629)|   Area    (ha)=   8.26   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.32

     Unit Hyd Qpeak  (cms)=   0.986

     PEAK FLOW       (cms)=   0.359 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  19.400
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0624):    11.84   0.396     1.58    19.40
      + ID2= 2 (  0628):     0.66   0.049     1.08    19.26
        ================================================
        ID = 3 (  0002):    12.50   0.412     1.58    19.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    12.50   0.412     1.58    19.40
      + ID2= 2 (  0629):     8.26   0.359     1.33    19.40
        ================================================
        ID = 1 (  0002):    20.76   0.745     1.42    19.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0625)|   Area    (ha)=   6.72   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   0.778

     PEAK FLOW       (cms)=   0.285 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  19.401
```

```
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  4625)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        414.20        0.0360      Main Channel
                   4.30        412.70        0.0360      Main Channel
                   8.60        414.20        0.0360      Main Channel

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.08   412.78    .108E+02       0.0          0.24      42.13
       0.16   412.86    .434E+02       0.0          0.38      26.54
       0.24   412.94    .976E+02       0.1          0.50      20.26
       0.32   413.02    .174E+03       0.2          0.61      16.72
       0.39   413.09    .271E+03       0.3          0.70      14.41
       0.47   413.17    .390E+03       0.5          0.79      12.76
       0.55   413.25    .532E+03       0.8          0.88      11.51
       0.63   413.33    .694E+03       1.1          0.96      10.53
       0.71   413.41    .879E+03       1.5          1.04       9.74
       0.79   413.49    .108E+04       2.0          1.11       9.08
       0.87   413.57    .131E+04       2.6          1.19       8.52
       0.95   413.65    .156E+04       3.2          1.26       8.04
       1.03   413.73    .183E+04       4.0          1.33       7.62
       1.11   413.81    .213E+04       4.9          1.39       7.25
       1.18   413.88    .244E+04       5.9          1.46       6.93
       1.26   413.96    .278E+04       7.0          1.52       6.64
       1.34   414.04    .313E+04       8.2          1.59       6.37
       1.42   414.12    .351E+04       9.5          1.65       6.13
       1.50   414.20    .392E+04      11.0          1.71       5.92

                                 <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0625)    6.72     0.29    1.42  19.40      0.38      0.68
   OUTFLOW: ID= 1 (  4625)    6.72     0.24    1.58  19.37      0.35      0.65


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.06
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.64         0.42
     Dep. Storage     (mm)=        1.00         5.00
     Average Slope     (%)=        3.20         2.00
     Length            (m)=       84.06        10.00
     Mannings n           =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    6.81 | 0.767   23.72 | 1.517   14.69 |  2.27    8.35
               0.033    6.81 | 0.783   23.72 | 1.533   14.69 |  2.28    8.35
               0.050    6.81 | 0.800   23.72 | 1.550   14.69 |  2.30    8.35
               0.067    6.81 | 0.817   23.72 | 1.567   14.69 |  2.32    8.35
               0.083    6.81 | 0.833   23.72 | 1.583   14.69 |  2.33    8.35
               0.100    7.29 | 0.850   44.17 | 1.600   13.42 |  2.35    8.01
               0.117    7.29 | 0.867   44.17 | 1.617   13.42 |  2.37    8.01
               0.133    7.29 | 0.883   44.17 | 1.633   13.42 |  2.38    8.01
               0.150    7.29 | 0.900   44.17 | 1.650   13.42 |  2.40    8.01
               0.167    7.29 | 0.917   44.17 | 1.667   13.42 |  2.42    8.01
               0.183    7.85 | 0.933  242.29 | 1.683   12.38 |  2.43    7.70
               0.200    7.85 | 0.950  242.29 | 1.700   12.38 |  2.45    7.70
               0.217    7.85 | 0.967  242.29 | 1.717   12.38 |  2.47    7.70
               0.233    7.85 | 0.983  242.29 | 1.733   12.38 |  2.48    7.70
               0.250    7.85 | 1.000  242.29 | 1.750   12.38 |  2.50    7.70
               0.267    8.53 | 1.017   54.28 | 1.767   11.52 |  2.52    7.42
               0.283    8.53 | 1.033   54.27 | 1.783   11.52 |  2.53    7.42
               0.300    8.53 | 1.050   54.27 | 1.800   11.52 |  2.55    7.42
               0.317    8.53 | 1.067   54.27 | 1.817   11.52 |  2.57    7.42
               0.333    8.53 | 1.083   54.27 | 1.833   11.52 |  2.58    7.42
               0.350    9.38 | 1.100   34.12 | 1.850   10.80 |  2.60    7.17
               0.367    9.38 | 1.117   34.12 | 1.867   10.80 |  2.62    7.17
               0.383    9.38 | 1.133   34.12 | 1.883   10.80 |  2.63    7.17
               0.400    9.38 | 1.150   34.12 | 1.900   10.80 |  2.65    7.17
               0.417    9.38 | 1.167   34.12 | 1.917   10.80 |  2.67    7.17
               0.433   10.47 | 1.183   26.03 | 1.933   10.17 |  2.68    6.93
               0.450   10.47 | 1.200   26.03 | 1.950   10.17 |  2.70    6.93
               0.467   10.47 | 1.217   26.03 | 1.967   10.17 |  2.72    6.93
               0.483   10.47 | 1.233   26.03 | 1.983   10.17 |  2.73    6.93
               0.500   10.47 | 1.250   26.03 | 2.000   10.17 |  2.75    6.93
               0.517   11.94 | 1.267   21.45 | 2.017    9.63 |  2.77    6.71
               0.533   11.94 | 1.283   21.45 | 2.033    9.63 |  2.78    6.71
               0.550   11.94 | 1.300   21.45 | 2.050    9.63 |  2.80    6.71
               0.567   11.94 | 1.317   21.45 | 2.067    9.63 |  2.82    6.71
               0.583   11.94 | 1.333   21.45 | 2.083    9.63 |  2.83    6.71
               0.600   14.04 | 1.350   18.45 | 2.100    9.15 |  2.85    6.51
               0.617   14.04 | 1.367   18.45 | 2.117    9.15 |  2.87    6.51
               0.633   14.04 | 1.383   18.45 | 2.133    9.15 |  2.88    6.51
               0.650   14.04 | 1.400   18.45 | 2.150    9.15 |  2.90    6.51
               0.667   14.04 | 1.417   18.45 | 2.167    9.15 |  2.92    6.51
               0.683   17.37 | 1.433   16.31 | 2.183    8.73 |  2.93    6.32
               0.700   17.37 | 1.450   16.31 | 2.200    8.73 |  2.95    6.32
               0.717   17.37 | 1.467   16.31 | 2.217    8.73 |  2.97    6.32
               0.733   17.37 | 1.483   16.31 | 2.233    8.73 |  2.98    6.32
               0.750   17.37 | 1.500   16.31 | 2.250    8.73 |  3.00    6.32

    Max.Eff.Inten.(mm/hr)=     242.29        65.29
              over (min)        5.00         4.00
    Storage Coeff.  (min)=       1.14 (ii)    3.11 (ii)
    Unit Hyd. Tpeak (min)=       5.00         4.00
    Unit Hyd. peak  (cms)=       0.46         0.33
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.32         0.09          0.402 (iii)
    TIME TO PEAK    (hrs)=       1.02         1.03          1.02
    RUNOFF VOLUME    (mm)=      60.68        22.98         41.83
    TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
    RUNOFF COEFFICIENT   =       0.98         0.37          0.68

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  4625):     6.72   0.238     1.58    19.37
      + ID2= 2 (  0626):     1.06   0.402     1.02    41.83
        ========================================================
        ID = 3 (  0003):     7.78   0.411     1.02    22.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    20.76   0.745     1.42    19.40
      + ID2= 2 (  0003):     7.78   0.411     1.02    22.42
        ========================================================
        ID = 3 (  0004):    28.54   1.012     1.50    20.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234

     PEAK FLOW       (cms)=   0.441 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  19.398
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   0.699 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  19.260
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.312

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.359 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=  19.369
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.314

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.385 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  19.404
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.359     1.17    19.37
     + ID2= 2 (  0623):    11.20   0.385     1.58    19.40
       ================================================
       ID = 3 (  0006):    17.28   0.634     1.33    19.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.634     1.33    19.39
     + ID2= 2 (  0627):     9.39   0.699     1.08    19.26
       ================================================
       ID = 1 (  0006):    26.67   1.209     1.17    19.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   1.012     1.50    20.22
     + ID2= 2 (  0006):    26.67   1.209     1.17    19.35
       ================================================
       ID = 3 (  0005):    55.21   1.970     1.33    19.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   1.970     1.33    19.80
     + ID2= 2 (  0622):     9.69   0.441     1.33    19.40
       ================================================
       ID = 1 (  0005):    64.90   2.410     1.33    19.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.144 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  19.388
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.314

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.589 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  19.405
     TOTAL RAINFALL   (mm)=  61.678
     RUNOFF COEFFICIENT   =   0.315

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

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     2.74   0.144     1.25    19.39
     + ID2= 2 (  0709):    18.51   0.589     1.67    19.40
       ================================================
       ID = 3 (  0008):    21.25   0.676     1.58    19.40
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------
=================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\b5e711fb-3471-4117-
8c90-3c7ad9da9d80\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\b5e711fb-3471-4117-
8c90-3c7ad9da9d80\scena


DATE: 10/06/2025                          TIME: 08:57:14

USER:


COMMENTS: _____


-------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 2-Year                        **
  ************************************************

-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 415.000
| Ptotal= 36.05 mm |                          B=   0.027
-------------------                          C=   0.682
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.10 |  0.75   13.98 |  1.50    8.73 |  2.25    5.01
                0.08    4.38 |  0.83   25.67 |  1.58    7.99 |  2.33    4.81
                0.17    4.71 |  0.92  137.96 |  1.67    7.38 |  2.42    4.63
                0.25    5.12 |  1.00   31.39 |  1.75    6.88 |  2.50    4.46
                0.33    5.62 |  1.08   19.97 |  1.83    6.45 |  2.58    4.31
                0.42    6.26 |  1.17   15.32 |  1.92    6.08 |  2.67    4.17
                0.50    7.12 |  1.25   12.67 |  2.00    5.76 |  2.75    4.04
                0.58    8.35 |  1.33   10.93 |  2.08    5.48 |  2.83    3.92
                0.67   10.30 |  1.42    9.68 |  2.17    5.23 |  2.92    3.81


---------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0624)|   Area    (ha)=  11.84   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.48

     Unit Hyd Qpeak  (cms)=   0.942

     PEAK FLOW       (cms)=   0.131 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   6.892
     TOTAL RAINFALL   (mm)=  36.054
     RUNOFF COEFFICIENT   =   0.191

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

---------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0628)|   Area    (ha)=   0.66   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.180

     PEAK FLOW       (cms)=   0.015 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=   6.841
     TOTAL RAINFALL   (mm)=  36.054
     RUNOFF COEFFICIENT   =   0.190

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

---------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0629)|   Area    (ha)=   8.26   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.32

     Unit Hyd Qpeak  (cms)=   0.986

     PEAK FLOW       (cms)=   0.116 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=   6.891
     TOTAL RAINFALL   (mm)=  36.054
     RUNOFF COEFFICIENT   =   0.191

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

---------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0624):    11.84   0.131     1.67     6.89
     + ID2= 2 (  0628):     0.66   0.015     1.08     6.84
       ================================================
       ID = 3 (  0002):    12.50   0.136     1.67     6.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    12.50   0.136     1.67     6.89
     + ID2= 2 (  0629):     8.26   0.116     1.42     6.89
       ================================================
       ID = 1 (  0002):    20.76   0.244     1.50     6.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0625)|   Area    (ha)=   6.72   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.33

     Unit Hyd Qpeak  (cms)=   0.778

     PEAK FLOW       (cms)=   0.093 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=   6.891
     TOTAL RAINFALL   (mm)=  36.054
     RUNOFF COEFFICIENT   =   0.191

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

```
--------------------------------------------------------------------------------
-------------------
| ROUTE CHN(  4625)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  0.00        414.20        0.0360      Main Channel
                  4.30        412.70        0.0360      Main Channel
                  8.60        414.20        0.0360      Main Channel

     <-------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.08   412.78    .108E+02       0.0          0.24      42.13
       0.16   412.86    .434E+02       0.0          0.38      26.54
       0.24   412.94    .976E+02       0.1          0.50      20.26
       0.32   413.02    .174E+03       0.2          0.61      16.72
       0.39   413.09    .271E+03       0.3          0.70      14.41
       0.47   413.17    .390E+03       0.5          0.79      12.76
       0.55   413.25    .532E+03       0.8          0.88      11.51
       0.63   413.33    .694E+03       1.1          0.96      10.53
       0.71   413.41    .879E+03       1.5          1.04       9.74
       0.79   413.49    .108E+04       2.0          1.11       9.08
       0.87   413.57    .131E+04       2.6          1.19       8.52
       0.95   413.65    .156E+04       3.2          1.26       8.04
       1.03   413.73    .183E+04       4.0          1.33       7.62
       1.11   413.81    .213E+04       4.9          1.39       7.25
       1.18   413.88    .244E+04       5.9          1.46       6.93
       1.26   413.96    .278E+04       7.0          1.52       6.64
       1.34   414.04    .313E+04       8.2          1.59       6.37
       1.42   414.12    .351E+04       9.5          1.65       6.13
       1.50   414.20    .392E+04      11.0          1.71       5.92

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0625)    6.72     0.09    1.42   6.89      0.25      0.51
   OUTFLOW: ID= 1 (  4625)    6.72     0.07    1.75   6.86      0.23      0.48


--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0626)|   Area    (ha)=   1.06
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.64         0.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.20         2.00
     Length            (m)=      84.06        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    4.10 | 0.767   13.98 | 1.517    8.73 |  2.27    5.01
     0.033    4.10 | 0.783   13.98 | 1.533    8.73 |  2.28    5.01
     0.050    4.10 | 0.800   13.98 | 1.550    8.73 |  2.30    5.01
     0.067    4.10 | 0.817   13.98 | 1.567    8.73 |  2.32    5.01
     0.083    4.10 | 0.833   13.98 | 1.583    8.73 |  2.33    5.01
     0.100    4.38 | 0.850   25.66 | 1.600    7.99 |  2.35    4.81
     0.117    4.38 | 0.867   25.67 | 1.617    7.99 |  2.37    4.81
     0.133    4.38 | 0.883   25.67 | 1.633    7.99 |  2.38    4.81
     0.150    4.38 | 0.900   25.67 | 1.650    7.99 |  2.40    4.81
     0.167    4.38 | 0.917   25.67 | 1.667    7.99 |  2.42    4.81
     0.183    4.71 | 0.933  137.96 | 1.683    7.38 |  2.43    4.63
     0.200    4.71 | 0.950  137.96 | 1.700    7.38 |  2.45    4.63
     0.217    4.71 | 0.967  137.96 | 1.717    7.38 |  2.47    4.63
     0.233    4.71 | 0.983  137.96 | 1.733    7.38 |  2.48    4.63
     0.250    4.71 | 1.000  137.96 | 1.750    7.38 |  2.50    4.63
     0.267    5.12 | 1.017   31.39 | 1.767    6.88 |  2.52    4.46
     0.283    5.12 | 1.033   31.39 | 1.783    6.88 |  2.53    4.46
     0.300    5.12 | 1.050   31.39 | 1.800    6.88 |  2.55    4.46
     0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
     0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
     0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
     0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
     0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
     0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
     0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
     0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
     0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
     0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
     0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
     0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
     0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
     0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
     0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
     0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
     0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
     0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
     0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
     0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
     0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
     0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
     0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
     0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
     0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
     0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
     0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

   Max.Eff.Inten.(mm/hr)=     137.96        22.01
             over (min)          5.00         4.00
   Storage Coeff.  (min)=       1.43 (ii)    3.90 (ii)
   Unit Hyd. Tpeak (min)=       5.00         4.00
   Unit Hyd. peak  (cms)=       0.43         0.29
                                                      *TOTALS*
   PEAK FLOW       (cms)=       0.17         0.03          0.199 (iii)
   TIME TO PEAK    (hrs)=       1.02         1.03           1.02
   RUNOFF VOLUME    (mm)=      35.05         8.62          21.84
   TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
   RUNOFF COEFFICIENT   =       0.97         0.24           0.61


     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  4625):     6.72   0.073     1.75     6.86
      + ID2= 2 (  0626):     1.06   0.199     1.02    21.84
        ==========================================================
        ID = 3 (  0003):     7.78   0.201     1.02     8.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    20.76   0.244     1.50     6.89
      + ID2= 2 (  0003):     7.78   0.201     1.02     8.90
        ==========================================================
        ID = 3 (  0004):    28.54   0.329     1.58     7.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234
```

```
     PEAK FLOW      (cms)=   0.141 (i)
     TIME TO PEAK   (hrs)=   1.333
     RUNOFF VOLUME   (mm)=   6.890
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.191

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW      (cms)=   0.213 (i)
     TIME TO PEAK   (hrs)=   1.083
     RUNOFF VOLUME   (mm)=   6.841
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.190

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW      (cms)=   0.111 (i)
     TIME TO PEAK   (hrs)=   1.167
     RUNOFF VOLUME   (mm)=   6.880
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.191

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW      (cms)=   0.126 (i)
     TIME TO PEAK   (hrs)=   1.583
     RUNOFF VOLUME   (mm)=   6.892
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.191

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

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.111     1.17     6.88
     + ID2= 2 (  0623):    11.20   0.126     1.58     6.89
       ================================================
       ID = 3 (  0006):    17.28   0.204     1.42     6.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.204     1.42     6.89
     + ID2= 2 (  0627):     9.39   0.213     1.08     6.84
       ================================================
       ID = 1 (  0006):    26.67   0.377     1.17     6.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   0.329     1.58     7.44
     + ID2= 2 (  0006):    26.67   0.377     1.17     6.87
       ================================================
       ID = 3 (  0005):    55.21   0.636     1.33     7.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   0.636     1.33     7.16
     + ID2= 2 (  0622):     9.69   0.141     1.33     6.89
       ================================================
       ID = 1 (  0005):    64.90   0.776     1.33     7.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW      (cms)=   0.046 (i)
     TIME TO PEAK   (hrs)=   1.250
     RUNOFF VOLUME   (mm)=   6.886
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.191

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW      (cms)=   0.195 (i)
     TIME TO PEAK   (hrs)=   1.750
     RUNOFF VOLUME   (mm)=   6.892
     TOTAL RAINFALL  (mm)=  36.054
     RUNOFF COEFFICIENT  =   0.191

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

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     2.74   0.046     1.25     6.89
     + ID2= 2 (  0709):    18.51   0.195     1.75     6.89
       ================================================
       ID = 3 (  0008):    21.25   0.224     1.67     6.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
```

```
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V  V   I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\955cf1c2-17f8-407f-8675-197e9cb51560\scena
Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\955cf1c2-17f8-407f-8675-197e9cb51560\scena

DATE: 10/06/2025 TIME: 08:57:16

USER:

COMMENTS: _____

****
** SIMULATION : 50-Year **
****

| CHICAGO STORM | Ptotal= 68.06 mm |

IDF curve parameters: A= 820.000
B= 0.010
C= 0.691
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	7.53	0.75	26.08	1.50	16.20	2.25	9.22
0.08	8.05	0.83	48.18	1.58	14.79	2.33	8.85
0.17	8.67	0.92	269.38	1.67	13.66	2.42	8.51
0.25	9.42	1.00	59.02	1.75	12.71	2.50	8.20
0.33	10.36	1.08	37.39	1.83	11.91	2.58	7.92
0.42	11.56	1.17	28.59	1.92	11.23	2.67	7.66
0.50	13.17	1.25	23.60	2.00	10.63	2.75	7.42
0.58	15.48	1.33	20.32	2.08	10.11	2.83	7.19
0.67	19.13	1.42	17.97	2.17	9.64	2.92	6.99

CALIB	NASHYD (0624)	ID= 1 DT= 5.0 min

Area (ha)= 11.84 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.48

Unit Hyd Qpeak (cms)= 0.942

PEAK FLOW (cms)= 0.477 (i)
TIME TO PEAK (hrs)= 1.583
RUNOFF VOLUME (mm)= 23.131
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.340

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

CALIB	NASHYD (0628)	ID= 1 DT= 5.0 min

Area (ha)= 0.66 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.14

Unit Hyd Qpeak (cms)= 0.180

PEAK FLOW (cms)= 0.060 (i)
TIME TO PEAK (hrs)= 1.083
RUNOFF VOLUME (mm)= 22.958
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.337

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

CALIB	NASHYD (0629)	ID= 1 DT= 5.0 min

Area (ha)= 8.26 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

Unit Hyd Qpeak (cms)= 0.986

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 23.125
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.340

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

ADD HYD (0002)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0624):		11.84	0.477	1.58	23.13
+	ID2= 2 (0628):		0.66	0.060	1.08	22.96
	ID = 3 (0002):		12.50	0.496	1.58	23.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0002)	3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 3 (0002):		12.50	0.496	1.58	23.12
+	ID2= 2 (0629):		8.26	0.434	1.33	23.13
	ID = 1 (0002):		20.76	0.898	1.42	23.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	NASHYD (0625)	ID= 1 DT= 5.0 min

Area (ha)= 6.72 Curve Number (CN)= 70.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.33

Unit Hyd Qpeak (cms)= 0.778

PEAK FLOW (cms)= 0.345 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 23.126
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.340

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

| ROUTE CHN(4625) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

```
            <------ DATA FOR SECTION (   1.1) ------>
            Distance      Elevation       Manning
                0.00        414.20        0.0360      Main Channel
                4.30        412.70        0.0360      Main Channel
                8.60        414.20        0.0360      Main Channel

     <---------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
       (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
      0.08   412.78    .108E+02       0.0          0.24      42.13
      0.16   412.86    .434E+02       0.0          0.38      26.54
      0.24   412.94    .976E+02       0.1          0.50      20.26
      0.32   413.02    .174E+03       0.2          0.61      16.72
      0.39   413.09    .271E+03       0.3          0.70      14.41
      0.47   413.17    .390E+03       0.5          0.79      12.76
      0.55   413.25    .532E+03       0.8          0.88      11.51
      0.63   413.33    .694E+03       1.1          0.96      10.53
      0.71   413.41    .879E+03       1.5          1.04       9.74
      0.79   413.49    .108E+04       2.0          1.11       9.08
      0.87   413.57    .131E+04       2.6          1.19       8.52
      0.95   413.65    .156E+04       3.2          1.26       8.04
      1.03   413.73    .183E+04       4.0          1.33       7.62
      1.11   413.81    .213E+04       4.9          1.39       7.25
      1.18   413.88    .244E+04       5.9          1.46       6.93
      1.26   413.96    .278E+04       7.0          1.52       6.64
      1.34   414.04    .313E+04       8.2          1.59       6.37
      1.42   414.12    .351E+04       9.5          1.65       6.13
      1.50   414.20    .392E+04      11.0          1.71       5.92

                                <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0625)   6.72    0.34    1.33  23.13      0.41      0.71
   OUTFLOW: ID= 1 (  4625)   6.72    0.29    1.58  23.09      0.38      0.68


--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0626)|   Area    (ha)=   1.06
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.64          0.42
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       3.20          2.00
     Length            (m)=      84.06         10.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
      0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
      0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
      0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
      0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
      0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
      0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
      0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
      0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
      0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
      0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
      0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
      0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
      0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
      0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
      0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
      0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
      0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
      0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
      0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
      0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
      0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
      0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
      0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
      0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
      0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
      0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
      0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
      0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
      0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
      0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
      0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
      0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
      0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
      0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
      0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
      0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
      0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
      0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
      0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
      0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
      0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
      0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
      0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
      0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
      0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

    Max.Eff.Inten.(mm/hr)=     269.38        78.30
              over (min)         5.00         3.00
    Storage Coeff.  (min)=       1.09 (ii)    2.98 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.46         0.38
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.36         0.11          0.469 (iii)
    TIME TO PEAK    (hrs)=       1.02         1.02            1.02
    RUNOFF VOLUME    (mm)=      67.06        27.15           47.11
    TOTAL RAINFALL   (mm)=      68.06        68.06           68.06
    RUNOFF COEFFICIENT   =       0.99         0.40            0.69


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  4625):     6.72   0.292     1.58    23.09
     + ID2= 2 (  0626):     1.06   0.469     1.02    47.11
       ================================================
       ID = 3 (  0003):     7.78   0.481     1.02    26.36

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):    20.76   0.898     1.42    23.12
     + ID2= 2 (  0003):     7.78   0.481     1.02    26.36
       ================================================
       ID = 3 (  0004):    28.54   1.221     1.50    24.01

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD   (  0622)|   Area    (ha)=   9.69   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.30

     Unit Hyd Qpeak  (cms)=   1.234

     PEAK FLOW       (cms)=   0.532 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  23.123
     TOTAL RAINFALL   (mm)=  68.062
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```
     RUNOFF COEFFICIENT   =   0.340

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   0.851 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  22.959
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.337

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.436 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=  23.088
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.339

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.463 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  23.130
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.340

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):    6.08   0.436     1.17    23.09
     + ID2= 2 (  0623):   11.20   0.463     1.58    23.13
       ================================================
       ID = 3 (  0006):   17.28   0.765     1.33    23.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):   17.28   0.765     1.33    23.12
     + ID2= 2 (  0627):    9.39   0.851     1.08    22.96
       ================================================
       ID = 1 (  0006):   26.67   1.464     1.17    23.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):   28.54   1.221     1.50    24.01
     + ID2= 2 (  0006):   26.67   1.464     1.17    23.06
       ================================================
       ID = 3 (  0005):   55.21   2.376     1.25    23.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):   55.21   2.376     1.25    23.55
     + ID2= 2 (  0622):    9.69   0.532     1.33    23.12
       ================================================
       ID = 1 (  0005):   64.90   2.907     1.33    23.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.174 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  23.110
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.340

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.707 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  23.131
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.340

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):    2.74   0.174     1.25    23.11
     + ID2= 2 (  0709):   18.51   0.707     1.67    23.13
       ================================================
       ID = 3 (  0008):   21.25   0.813     1.58    23.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL
```

```
        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M  M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\e23af8e4-603f-4fa5-9f16-390b55fed6f7\scena
Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\e23af8e4-603f-4fa5-9f16-390b55fed6f7\scena

DATE: 10/06/2025 TIME: 08:57:15

USER:

COMMENTS: _____

****
** SIMULATION : 5-Year **
****

| CHICAGO STORM | IDF curve parameters: A= 545.000
| Ptotal= 47.35 mm | B= 0.027
| C= 0.682

used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.38	0.75	18.36	1.50	11.47	2.25	6.58
0.08	5.75	0.83	33.70	1.58	10.49	2.33	6.31
0.17	6.19	0.92	181.18	1.67	9.69	2.42	6.07
0.25	6.72	1.00	41.22	1.75	9.03	2.50	5.86
0.33	7.38	1.08	26.23	1.83	8.47	2.58	5.66
0.42	8.22	1.17	20.12	1.92	7.99	2.67	5.47
0.50	9.35	1.25	16.64	2.00	7.57	2.75	5.30
0.58	10.97	1.33	14.35	2.08	7.20	2.83	5.15
0.67	13.52	1.42	12.71	2.17	6.87	2.92	5.00

CALIB	
NASHYD (0624)	Area (ha)= 11.84 Curve Number (CN)= 70.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.48

Unit Hyd Qpeak (cms)= 0.942

PEAK FLOW (cms)= 0.232 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 11.860
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

CALIB	
NASHYD (0628)	Area (ha)= 0.66 Curve Number (CN)= 70.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.14

Unit Hyd Qpeak (cms)= 0.180

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 1.083
RUNOFF VOLUME (mm)= 11.771
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.249

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

CALIB	
NASHYD (0629)	Area (ha)= 8.26 Curve Number (CN)= 70.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.32

Unit Hyd Qpeak (cms)= 0.986

PEAK FLOW (cms)= 0.207 (i)
TIME TO PEAK (hrs)= 1.417
RUNOFF VOLUME (mm)= 11.857
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

ADD HYD (0002)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0624):	11.84	0.232	1.67	11.86
+ ID2= 2 (0628):	0.66	0.028	1.08	11.77
ID = 3 (0002):	12.50	0.242	1.58	11.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0002)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0002):	12.50	0.242	1.58	11.86
+ ID2= 2 (0629):	8.26	0.207	1.42	11.86
ID = 1 (0002):	20.76	0.435	1.50	11.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
NASHYD (0625)	Area (ha)= 6.72 Curve Number (CN)= 70.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.33

Unit Hyd Qpeak (cms)= 0.778

PEAK FLOW (cms)= 0.166 (i)
TIME TO PEAK (hrs)= 1.417
RUNOFF VOLUME (mm)= 11.857
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

ROUTE CHN(4625)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	414.20	0.0360	Main Channel
4.30	412.70	0.0360	Main Channel
8.60	414.20	0.0360	Main Channel

<-------------------- TRAVEL TIME TABLE ---------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.08	412.78	.108E+02	0.0	0.24	42.13
0.16	412.86	.434E+02	0.0	0.38	26.54
0.24	412.94	.976E+02	0.1	0.50	20.26
0.32	413.02	.174E+03	0.2	0.61	16.72
0.39	413.09	.271E+03	0.3	0.70	14.41
0.47	413.17	.390E+03	0.5	0.79	12.76
0.55	413.25	.532E+03	0.8	0.88	11.51
0.63	413.33	.694E+03	1.1	0.96	10.53
0.71	413.41	.879E+03	1.5	1.04	9.74
0.79	413.49	.108E+04	2.0	1.11	9.08
0.87	413.57	.131E+04	2.6	1.19	8.52
0.95	413.65	.156E+04	3.2	1.26	8.04
1.03	413.73	.183E+04	4.0	1.33	7.62
1.11	413.81	.213E+04	4.9	1.39	7.25
1.18	413.88	.244E+04	5.9	1.46	6.93
1.26	413.96	.278E+04	7.0	1.52	6.64
1.34	414.04	.313E+04	8.2	1.59	6.37
1.42	414.12	.351E+04	9.5	1.65	6.13
1.50	414.20	.392E+04	11.0	1.71	5.92

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0625)	6.72	0.17	1.42	11.86	0.31	0.60
OUTFLOW: ID= 1 (4625)	6.72	0.13	1.67	11.82	0.28	0.56

CALIB
STANDHYD (0626) | Area (ha)= 1.06
ID= 1 DT= 1.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.64	0.42
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	3.20	2.00
Length	(m)=	84.06	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

			TOTALS
Max.Eff.Inten.(mm/hr)=	181.18	38.46	
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.28 (ii)	3.50 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.44	0.31	
PEAK FLOW (cms)=	0.23	0.05	0.280 (iii)
TIME TO PEAK (hrs)=	1.02	1.03	1.02
RUNOFF VOLUME (mm)=	46.35	14.41	30.38
TOTAL RAINFALL (mm)=	47.35	47.35	47.35
RUNOFF COEFFICIENT =	0.98	0.30	0.64

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (4625):	6.72	0.134	1.67	11.82
+ ID2= 2 (0626):	1.06	0.280	1.02	30.38
ID = 3 (0003):	7.78	0.284	1.02	14.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0004)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0002):	20.76	0.435	1.50	11.86
+ ID2= 2 (0003):	7.78	0.284	1.02	14.35
ID = 3 (0004):	28.54	0.588	1.50	12.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0622) | Area (ha)= 9.69 Curve Number (CN)= 70.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.30

Unit Hyd Qpeak (cms)= 1.234

PEAK FLOW (cms)= 0.254 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 11.856
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

```
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=   9.39   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   2.562

     PEAK FLOW       (cms)=   0.395 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  11.772
     TOTAL RAINFALL   (mm)=  47.349
     RUNOFF COEFFICIENT   =   0.249

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   1.161

     PEAK FLOW       (cms)=   0.204 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=  11.838
     TOTAL RAINFALL   (mm)=  47.349
     RUNOFF COEFFICIENT   =   0.250

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0623)|   Area    (ha)=  11.20   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.226 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  11.860
     TOTAL RAINFALL   (mm)=  47.349
     RUNOFF COEFFICIENT   =   0.250

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.204     1.17    11.84
     + ID2= 2 (  0623):    11.20   0.226     1.58    11.86
       ================================================
       ID = 3 (  0006):    17.28   0.367     1.33    11.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0006):    17.28   0.367     1.33    11.85
     + ID2= 2 (  0627):     9.39   0.395     1.08    11.77
       ================================================
       ID = 1 (  0006):    26.67   0.690     1.17    11.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    28.54   0.588     1.50    12.54
     + ID2= 2 (  0006):    26.67   0.690     1.17    11.82
       ================================================
       ID = 3 (  0005):    55.21   1.142     1.33    12.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    55.21   1.142     1.33    12.19
     + ID2= 2 (  0622):     9.69   0.254     1.33    11.86
       ================================================
       ID = 1 (  0005):    64.90   1.396     1.33    12.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0704)|   Area    (ha)=   2.74   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

     Unit Hyd Qpeak  (cms)=   0.436

     PEAK FLOW       (cms)=   0.083 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  11.849
     TOTAL RAINFALL   (mm)=  47.349
     RUNOFF COEFFICIENT   =   0.250

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.346 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  11.860
     TOTAL RAINFALL   (mm)=  47.349
     RUNOFF COEFFICIENT   =   0.250

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

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     2.74   0.083     1.25    11.85
     + ID2= 2 (  0709):    18.51   0.346     1.67    11.86
       ================================================
       ID = 3 (  0008):    21.25   0.397     1.58    11.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

Appendix D

Proposed Conditions Modelling

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==========================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V  V   I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\8fb0d3c8-4caf-4a1d-
86ec-a0925d775da8\scena


DATE: 10/06/2025                          TIME: 09:03:26

USER:



COMMENTS: _____________________________________________________


------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 100-Year                      **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 901.000
| Ptotal= 74.43 mm |                          B=   0.043
--------------------                          C=   0.692
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    8.21 |  0.75   28.54 |  1.50   17.70 |  2.25   10.07
                0.08    8.78 |  0.83   52.95 |  1.58   16.16 |  2.33    9.66
                0.17    9.46 |  0.92  294.24 |  1.67   14.92 |  2.42    9.29
                0.25   10.28 |  1.00   64.96 |  1.75   13.88 |  2.50    8.95
                0.33   11.31 |  1.08   40.99 |  1.83   13.01 |  2.58    8.64
                0.42   12.62 |  1.17   31.31 |  1.92   12.26 |  2.67    8.35
                0.50   14.39 |  1.25   25.82 |  2.00   11.60 |  2.75    8.09
                0.58   16.91 |  1.33   22.22 |  2.08   11.03 |  2.83    7.85
                0.67   20.91 |  1.42   19.65 |  2.17   10.52 |  2.92    7.62


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| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number   (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    8.21 | 0.767   28.54 | 1.517   17.70 |  2.27   10.07
               0.033    8.21 | 0.783   28.54 | 1.533   17.70 |  2.28   10.07
               0.050    8.21 | 0.800   28.54 | 1.550   17.70 |  2.30   10.07
               0.067    8.21 | 0.817   28.54 | 1.567   17.70 |  2.32   10.07
               0.083    8.21 | 0.833   28.54 | 1.583   17.70 |  2.33   10.07
               0.100    8.78 | 0.850   52.95 | 1.600   16.16 |  2.35    9.66
               0.117    8.78 | 0.867   52.95 | 1.617   16.16 |  2.37    9.66
               0.133    8.78 | 0.883   52.95 | 1.633   16.16 |  2.38    9.66
               0.150    8.78 | 0.900   52.95 | 1.650   16.16 |  2.40    9.66
               0.167    8.78 | 0.917   52.95 | 1.667   16.16 |  2.42    9.66
               0.183    9.46 | 0.933  294.23 | 1.683   14.92 |  2.43    9.29
               0.200    9.46 | 0.950  294.24 | 1.700   14.92 |  2.45    9.29
               0.217    9.46 | 0.967  294.24 | 1.717   14.92 |  2.47    9.29
               0.233    9.46 | 0.983  294.24 | 1.733   14.92 |  2.48    9.29
               0.250    9.46 | 1.000  294.24 | 1.750   14.92 |  2.50    9.29
               0.267   10.28 | 1.017   64.96 | 1.767   13.88 |  2.52    8.95
               0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
               0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
               0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
               0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
               0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
               0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
               0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
               0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
               0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
               0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
               0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
               0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
               0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
               0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
               0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
               0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
               0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
               0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
               0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
               0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
               0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
               0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
               0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
               0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
               0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
               0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
               0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
               0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
               0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

    Unit Hyd Qpeak  (cms)=   3.083

    PEAK FLOW       (cms)=   1.503 (i)
    TIME TO PEAK    (hrs)=   1.133
    RUNOFF VOLUME    (mm)=  32.212
    TOTAL RAINFALL   (mm)=  74.427
    RUNOFF COEFFICIENT   =   0.433

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

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| CALIB            |
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| NASHYD (0621)| Area (ha)= 6.08 Curve Number (CN)= 70.0
|ID= 1 DT= 1.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62
0.733	20.91	1.483	19.65	2.233	10.52	2.98	7.62
0.750	20.91	1.500	19.65	2.250	10.52	3.00	7.62

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.519 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 27.036
TOTAL RAINFALL (mm)= 74.427
RUNOFF COEFFICIENT = 0.363

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

| CALIB |
| NASHYD (0623)| Area (ha)= 11.20 Curve Number (CN)= 70.0
|ID= 1 DT= 1.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62
0.733	20.91	1.483	19.65	2.233	10.52	2.98	7.62
0.750	20.91	1.500	19.65	2.250	10.52	3.00	7.62

Unit Hyd Qpeak (cms)= 0.930

PEAK FLOW (cms)= 0.549 (i)
TIME TO PEAK (hrs)= 1.583
RUNOFF VOLUME (mm)= 27.036
TOTAL RAINFALL (mm)= 74.427
RUNOFF COEFFICIENT = 0.363

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

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--------------------
| CALIB            |
| STANDHYD (  0632)|   Area    (ha)=   0.54
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.43         0.11
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      60.00        10.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62
0.733	20.91	1.483	19.65	2.233	10.52	2.98	7.62
0.750	20.91	1.500	19.65	2.250	10.52	3.00	7.62

```
     Max.Eff.Inten.(mm/hr)=     294.24       161.67
               over (min)        5.00         3.00
     Storage Coeff.  (min)=      1.22 (ii)    2.39 (ii)
     Unit Hyd. Tpeak (min)=      5.00         3.00
     Unit Hyd. peak  (cms)=      0.45         0.43
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.25         0.06          0.318 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.02          1.02
     RUNOFF VOLUME    (mm)=     73.43        38.29         61.13
     TOTAL RAINFALL   (mm)=     74.43        74.43         74.43
     RUNOFF COEFFICIENT   =      0.99         0.51          0.82

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0621):     6.08   0.519     1.22    27.04
      + ID2= 2 (  0623):    11.20   0.549     1.58    27.04
        ==========================================================
        ID = 3 (  0050):    17.28   0.908     1.35    27.04

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0050)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0050):    17.28   0.908     1.35    27.04
      + ID2= 2 (  0627):    11.30   1.503     1.13    32.21
        ==========================================================
        ID = 1 (  0050):    28.58   2.212     1.17    29.08

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0050):    28.58   2.212     1.17    29.08
      + ID2= 2 (  0632):     0.54   0.318     1.02    61.13
        ==========================================================
        ID = 3 (  0050):    29.12   2.275     1.17    29.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  6221)|   Area    (ha)=   1.18
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.59         0.59
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=      88.69        20.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24        98.28
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.54 (ii)    4.19 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
```

```
     Unit Hyd. peak  (cms)=       0.33         0.24
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.18          0.505 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      73.43        32.28          46.68
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.43           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n             =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24       102.68
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.59 (ii)    5.37 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.63         0.57          1.918 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      73.43        32.79          49.05
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.44           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n             =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24       199.91
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.91 (ii)    1.65 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.06          0.347 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      73.43        40.94          63.68
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.55           0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  9622)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     115.76       173.97
     Mannings n             =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    8.21 | 0.767   28.54 | 1.517   17.70 |  2.27   10.07
     0.033    8.21 | 0.783   28.54 | 1.533   17.70 |  2.28   10.07
     0.050    8.21 | 0.800   28.54 | 1.550   17.70 |  2.30   10.07
     0.067    8.21 | 0.817   28.54 | 1.567   17.70 |  2.32   10.07
     0.083    8.21 | 0.833   28.54 | 1.583   17.70 |  2.33   10.07
     0.100    8.78 | 0.850   52.95 | 1.600   16.16 |  2.35    9.66
     0.117    8.78 | 0.867   52.95 | 1.617   16.16 |  2.37    9.66
     0.133    8.78 | 0.883   52.95 | 1.633   16.16 |  2.38    9.66
     0.150    8.78 | 0.900   52.95 | 1.650   16.16 |  2.40    9.66
     0.167    8.78 | 0.917   52.95 | 1.667   16.16 |  2.42    9.66
     0.183    9.46 | 0.933  294.23 | 1.683   14.92 |  2.43    9.29
     0.200    9.46 | 0.950  294.24 | 1.700   14.92 |  2.45    9.29
     0.217    9.46 | 0.967  294.24 | 1.717   14.92 |  2.47    9.29
     0.233    9.46 | 0.983  294.24 | 1.733   14.92 |  2.48    9.29
     0.250    9.46 | 1.000  294.24 | 1.750   14.92 |  2.50    9.29
     0.267   10.28 | 1.017   64.96 | 1.767   13.88 |  2.52    8.95
     0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
     0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
     0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
     0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
     0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
     0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
     0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
     0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
     0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
     0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
     0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
     0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
     0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
     0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
     0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
     0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
     0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
     0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
     0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
```

```
              0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
              0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
              0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
              0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
              0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
              0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
              0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
              0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
              0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
              0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

     Max.Eff.Inten.(mm/hr)=     294.24       179.60
               over (min)         5.00         2.00
     Storage Coeff.  (min)=       1.81 (ii)    1.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00         2.00
     Unit Hyd. peak  (cms)=       0.39         0.58
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.34         0.00          1.341 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.00           1.02
     RUNOFF VOLUME    (mm)=      73.43        73.43          73.43
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.99           0.99


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  = 100.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0054)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=1256.25   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 502.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)          (mm)
      INFLOW:ID= 2     2.01         1.341             1.02         73.44
    OVERFLOW:ID= 3     2.01         1.324             1.03         47.46

               Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow             )=       35.38
               Time to reach Max storage              (Hr)=        1.02
               Volume of water for drawdown in LID (cu.m.)=      486.83
               Volume of maximum water storage     (cu.m.)=      502.50
               Calculated Drawdown Time               (Hr)=       75.98

  --------------------------
  | Junction Command(0056) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0054)    2.01     1.32    1.03    47.46
  OUTFLOW: ID= 2(  0056)    2.01     1.32    1.03    47.46

  --------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
```

```
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0056):     2.01   1.324     1.03    47.46
     + ID2= 2 (  0622):     5.16   1.918     1.00    49.05
       ========================================================
       ID = 3 (  0004):     7.17   2.872     1.03    48.60

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     7.17   2.872     1.03    48.60
     + ID2= 2 (  6221):     1.18   0.505     1.00    46.68
       ========================================================
       ID = 1 (  0004):     8.35   3.251     1.03    48.33

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     8.35   3.251     1.03    48.33
     + ID2= 2 (  0631):     0.50   0.347     1.00    63.68
       ========================================================
       ID = 3 (  0004):     8.85   3.493     1.03    49.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.1860      0.3754
                          0.0066      0.0316   |    0.2577      0.4191
                          0.0127      0.0646   |    0.3376      0.4638
                          0.0167      0.0989   |    0.4857      0.5095
                          0.0199      0.1347   |    0.6908      0.5561
                          0.0227      0.1718   |    0.9350      0.6038
                          0.0251      0.2104   |    1.2116      0.6525
                          0.0356      0.2502   |    1.5167      0.7022
                          0.0723      0.2910   |    1.8476      0.7529
                          0.1236      0.3327   |    2.2023      0.8049

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0004)     8.850     3.493      1.03      49.20
   OUTFLOW: ID= 1 (  0014)     8.850     0.153      3.02      42.61

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.39
                  TIME SHIFT OF PEAK FLOW         (min)=119.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3530

--------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
```

```
     Length           (m)=      84.46        40.00
     Mannings n         =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24       161.67
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.14 (ii)    3.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.25
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.11         0.675 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      73.43        38.29         61.13
     TOTAL RAINFALL   (mm)=      74.43        74.43         74.43
     RUNOFF COEFFICIENT   =       0.99         0.51          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.675      1.00      61.13
   OUTFLOW: ID= 1 (  0015)     1.070      0.055      1.50      60.46

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.15
                  TIME SHIFT OF PEAK FLOW          (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0392

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0014):     8.85   0.153     3.02    42.61
     + ID2= 2 (  0015):     1.07   0.055     1.50    60.46
       ================================================
       ID = 3 (  0057):     9.92   0.189     2.77    44.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24        98.28
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.32 (ii)    4.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.30         0.22
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.18         0.63         1.811 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      73.43        32.28         46.68
     TOTAL RAINFALL   (mm)=      74.43        74.43         74.43
     RUNOFF COEFFICIENT   =       0.99         0.43          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24        98.28
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.67 (ii)    6.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.82         0.76         2.213 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      73.43        32.28         46.68
     TOTAL RAINFALL   (mm)=      74.43        74.43         74.43
     RUNOFF COEFFICIENT   =       0.99         0.43          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n          =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62
0.733	20.91	1.483	19.65	2.233	10.52	2.98	7.62
0.750	20.91	1.500	19.65	2.250	10.52	3.00	7.62

Max.Eff.Inten.(mm/hr)=	294.24	179.60	
over (min)	5.00	3.00	
Storage Coeff. (min)=	2.32 (ii)	2.41 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.35	0.43	
			TOTALS
PEAK FLOW (cms)=	2.87	0.00	2.870 (iii)
TIME TO PEAK (hrs)=	1.03	1.00	1.03
RUNOFF VOLUME (mm)=	73.43	73.43	73.43
TOTAL RAINFALL (mm)=	74.43	74.43	74.43
RUNOFF COEFFICIENT =	0.99	0.99	0.99

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 100.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0011)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 1.0 MIN | STORAGE LAYER:

Length (m)=2850.00 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.00 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 78.43 Available Storage (cu.m.)=1140.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	4.56	2.870	1.03	73.43
OVERFLOW:ID= 3	4.56	2.866	1.03	47.45

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 35.38
Time to reach Max storage (Hr)= 1.02
Volume of water for drawdown in LID (cu.m.)= 1138.28
Volume of maximum water storage (cu.m.)= 1140.00
Calculated Drawdown Time (Hr)= 78.30

Junction Command(0012)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0011)	4.56	2.87	1.03	47.45
OUTFLOW: ID= 2(0012)	4.56	2.87	1.03	47.45

CALIB	
STANDHYD (9625)	Area (ha)= 3.67
ID= 1 DT= 1.0 min	Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.67	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	156.42	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95

```
                0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
                0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
                0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
                0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
                0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
                0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
                0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
                0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
                0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
                0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
                0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
                0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
                0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
                0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
                0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
                0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
                0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
                0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
                0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
                0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
                0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
                0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
                0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
                0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
                0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
                0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
                0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
                0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
                0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

     Max.Eff.Inten.(mm/hr)=     294.24       111.83
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       2.17 (ii)    2.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.36         0.43
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.34         0.00          2.342 (iii)
     TIME TO PEAK    (hrs)=       1.03         1.02           1.03
     RUNOFF VOLUME    (mm)=      73.43        45.17          73.40
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.61           0.99


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----------------
|SOAKAWAY(  0009)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=2293.75   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level    (m)=   0.00
                   Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                   Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 917.50

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0051

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)         (mm)
       INFLOW:ID= 2     3.67         2.342             1.03        73.40
     OVERFLOW:ID= 3     3.67         2.339             1.03        47.42

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
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```
                      If RVout= (Overflow             )=       35.39
              Time to reach Max storage              (Hr)=        1.02
              Volume of water for drawdown in LID (cu.m.)=      916.01
              Volume of maximum water storage     (cu.m.)=      917.50
              Calculated Drawdown Time               (Hr)=       78.30

  -------------------------
  | Junction Command(0010) |
  -------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0009)    3.67     2.34     1.03    47.42
  OUTFLOW: ID= 2(  0010)    3.67     2.34     1.03    47.42

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0624)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.87         5.87
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     279.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24        98.28
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.34 (ii)    6.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.03         1.25          3.671 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      73.43        32.28          46.68
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.43           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     3.67   2.339     1.03    47.42
     + ID2= 2 (  0012):     4.56   2.866     1.03    47.45
       ================================================
       ID = 3 (  0002):     8.23   5.205     1.03    47.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):     8.23   5.205     1.03    47.43
     + ID2= 2 (  0624):    11.74   3.671     1.00    46.68
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        ================================================
        ID = 1 (  0002):    19.97   8.314     1.03    46.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    19.97   8.314     1.03    46.99
      + ID2= 2 (  6241):     4.56   1.811     1.00    46.68
        ================================================
        ID = 3 (  0002):    24.53   9.722     1.03    46.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    24.53   9.722     1.03    46.93
      + ID2= 2 (  0625):     7.31   2.213     1.00    46.68
        ================================================
        ID = 1 (  0002):    31.84  11.623     1.03    46.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    8.21 | 0.767   28.54 | 1.517   17.70 |  2.27   10.07
     0.033    8.21 | 0.783   28.54 | 1.533   17.70 |  2.28   10.07
     0.050    8.21 | 0.800   28.54 | 1.550   17.70 |  2.30   10.07
     0.067    8.21 | 0.817   28.54 | 1.567   17.70 |  2.32   10.07
     0.083    8.21 | 0.833   28.54 | 1.583   17.70 |  2.33   10.07
     0.100    8.78 | 0.850   52.95 | 1.600   16.16 |  2.35    9.66
     0.117    8.78 | 0.867   52.95 | 1.617   16.16 |  2.37    9.66
     0.133    8.78 | 0.883   52.95 | 1.633   16.16 |  2.38    9.66
     0.150    8.78 | 0.900   52.95 | 1.650   16.16 |  2.40    9.66
     0.167    8.78 | 0.917   52.95 | 1.667   16.16 |  2.42    9.66
     0.183    9.46 | 0.933  294.23 | 1.683   14.92 |  2.43    9.29
     0.200    9.46 | 0.950  294.24 | 1.700   14.92 |  2.45    9.29
     0.217    9.46 | 0.967  294.24 | 1.717   14.92 |  2.47    9.29
     0.233    9.46 | 0.983  294.24 | 1.733   14.92 |  2.48    9.29
     0.250    9.46 | 1.000  294.24 | 1.750   14.92 |  2.50    9.29
     0.267   10.28 | 1.017   64.96 | 1.767   13.88 |  2.52    8.95
     0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
     0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
     0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
     0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
     0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
     0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
     0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
     0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
     0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
     0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
     0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
     0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
     0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
     0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
     0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
     0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
     0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
     0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
     0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
     0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
     0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
     0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
     0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
     0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
     0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
     0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
     0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
     0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
     0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

    Max.Eff.Inten.(mm/hr)=     294.24       161.67
              over (min)        5.00         3.00
    Storage Coeff.  (min)=      1.01 (ii)    2.18 (ii)
    Unit Hyd. Tpeak (min)=      5.00         3.00
    Unit Hyd. peak  (cms)=      0.47         0.46
                                                        *TOTALS*
    PEAK FLOW       (cms)=      0.14         0.04          0.175 (iii)
    TIME TO PEAK    (hrs)=      1.02         1.02           1.02
    RUNOFF VOLUME    (mm)=     73.43        38.29          61.13
    TOTAL RAINFALL   (mm)=     74.43        74.43          74.43
    RUNOFF COEFFICIENT   =      0.99         0.51           0.82


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------       (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.29      0.18      1.02   61.13
     ================================================
     MAJOR SYS.(ID= 2):   0.03      0.08      1.02   61.13
     MINOR SYS.(ID= 3):   0.26      0.10      0.98   61.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| STANDHYD (  0628)|   Area    (ha)=   0.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.45         0.08
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
```

Length	(m)=	59.44	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62
0.733	20.91	1.483	19.65	2.233	10.52	2.98	7.62
0.750	20.91	1.500	19.65	2.250	10.52	3.00	7.62

Max.Eff.Inten.(mm/hr)=	294.24	199.91		
over (min)	5.00	3.00		
Storage Coeff. (min)=	1.21 (ii)	2.22 (ii)		
Unit Hyd. Tpeak (min)=	5.00	3.00		
Unit Hyd. peak (cms)=	0.45	0.45		
			TOTALS	
PEAK FLOW (cms)=	0.27	0.06	0.328 (iii)	
TIME TO PEAK (hrs)=	1.02	1.02	1.02	
RUNOFF VOLUME (mm)=	73.43	40.94	63.68	
TOTAL RAINFALL (mm)=	74.43	74.43	74.43	
RUNOFF COEFFICIENT =	0.99	0.55	0.86	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

STANDHYD (0633) | Area (ha)= 0.07

ID= 1 DT= 1.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.06	0.01
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	21.60	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	8.21	0.767	28.54	1.517	17.70	2.27	10.07
0.033	8.21	0.783	28.54	1.533	17.70	2.28	10.07
0.050	8.21	0.800	28.54	1.550	17.70	2.30	10.07
0.067	8.21	0.817	28.54	1.567	17.70	2.32	10.07
0.083	8.21	0.833	28.54	1.583	17.70	2.33	10.07
0.100	8.78	0.850	52.95	1.600	16.16	2.35	9.66
0.117	8.78	0.867	52.95	1.617	16.16	2.37	9.66
0.133	8.78	0.883	52.95	1.633	16.16	2.38	9.66
0.150	8.78	0.900	52.95	1.650	16.16	2.40	9.66
0.167	8.78	0.917	52.95	1.667	16.16	2.42	9.66
0.183	9.46	0.933	294.23	1.683	14.92	2.43	9.29
0.200	9.46	0.950	294.24	1.700	14.92	2.45	9.29
0.217	9.46	0.967	294.24	1.717	14.92	2.47	9.29
0.233	9.46	0.983	294.24	1.733	14.92	2.48	9.29
0.250	9.46	1.000	294.24	1.750	14.92	2.50	9.29
0.267	10.28	1.017	64.96	1.767	13.88	2.52	8.95
0.283	10.28	1.033	64.96	1.783	13.88	2.53	8.95
0.300	10.28	1.050	64.96	1.800	13.88	2.55	8.95
0.317	10.28	1.067	64.96	1.817	13.88	2.57	8.95
0.333	10.28	1.083	64.96	1.833	13.88	2.58	8.95
0.350	11.31	1.100	40.99	1.850	13.01	2.60	8.64
0.367	11.31	1.117	40.99	1.867	13.01	2.62	8.64
0.383	11.31	1.133	40.99	1.883	13.01	2.63	8.64
0.400	11.31	1.150	40.99	1.900	13.01	2.65	8.64
0.417	11.31	1.167	40.99	1.917	13.01	2.67	8.64
0.433	12.62	1.183	31.31	1.933	12.26	2.68	8.35
0.450	12.62	1.200	31.31	1.950	12.26	2.70	8.35
0.467	12.62	1.217	31.31	1.967	12.26	2.72	8.35
0.483	12.62	1.233	31.31	1.983	12.26	2.73	8.35
0.500	12.62	1.250	31.31	2.000	12.26	2.75	8.35
0.517	14.39	1.267	25.82	2.017	11.60	2.77	8.09
0.533	14.39	1.283	25.82	2.033	11.60	2.78	8.09
0.550	14.39	1.300	25.82	2.050	11.60	2.80	8.09
0.567	14.39	1.317	25.82	2.067	11.60	2.82	8.09
0.583	14.39	1.333	25.82	2.083	11.60	2.83	8.09
0.600	16.91	1.350	22.22	2.100	11.03	2.85	7.85
0.617	16.91	1.367	22.22	2.117	11.03	2.87	7.85
0.633	16.91	1.383	22.22	2.133	11.03	2.88	7.85
0.650	16.91	1.400	22.22	2.150	11.03	2.90	7.85
0.667	16.91	1.417	22.22	2.167	11.03	2.92	7.85
0.683	20.91	1.433	19.65	2.183	10.52	2.93	7.62
0.700	20.91	1.450	19.65	2.200	10.52	2.95	7.62
0.717	20.91	1.467	19.65	2.217	10.52	2.97	7.62

```
               0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
               0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

     Max.Eff.Inten.(mm/hr)=     294.24       161.67
               over (min)        5.00         2.00
     Storage Coeff.  (min)=       0.66 (ii)    1.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00         2.00
     Unit Hyd. peak  (cms)=       0.52         0.59
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.01          0.044 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.00           1.00
     RUNOFF VOLUME    (mm)=      73.43        38.29          61.12
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.51           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     294.24       161.67
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.16 (ii)    2.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.30
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.06          0.293 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      73.43        38.29          61.13
     TOTAL RAINFALL   (mm)=      74.43        74.43          74.43
     RUNOFF COEFFICIENT   =       0.99         0.51           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):     0.26   0.099     0.98    61.13
      + ID2= 2 (  0628):     0.53   0.328     1.02    63.68
        ==========================================================
        ID = 3 (  0001):     0.79   0.427     1.02    62.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0001):     0.79   0.427     1.02    62.83
      + ID2= 2 (  0633):     0.07   0.044     1.00    61.12
        ==========================================================
        ID = 1 (  0001):     0.86   0.471     1.02    62.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     0.86   0.471     1.02    62.70
      + ID2= 2 (  0634):     0.45   0.293     1.00    61.13
        ==========================================================
        ID = 3 (  0001):     1.31   0.745     1.00    62.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     1.31   0.745     1.00    62.15
      + ID2= 2 (  0002):    31.84  11.623     1.03    46.88
        ==========================================================
        ID = 3 (  0003):    33.15  12.277     1.03    47.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.9471      1.7418
                           0.0238      0.1755   |    1.2374      1.9546
                           0.0564      0.3556   |    1.5542      2.1707
                           0.0756      0.5404   |    1.8953      2.3901
                           0.0909      0.7298   |    2.2592      2.6129
                           0.1337      0.9241   |    2.6444      2.8392
                           0.2699      1.1230   |    3.0498      3.0690
                           0.4583      1.3261   |    3.4745      3.3026
                           0.6861      1.5323   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0003)     33.152    12.277      1.03      47.48
  OUTFLOW: ID= 1 (  0013)     33.152     0.462      3.03      40.08

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.76
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.3296

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-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    33.15   0.462     3.03    40.08
```

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      + ID2= 2 (  0050):    29.12   2.275     1.17    29.68
        ====================================================
        ID = 3 (  0005):    62.27   2.369     1.17    35.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    62.27   2.369     1.17    35.22
      + ID2= 2 (  0057):     9.92   0.189     2.77    44.53
        ====================================================
        ID = 1 (  0005):    72.19   2.444     1.17    36.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.834 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  27.035
     TOTAL RAINFALL   (mm)=  74.427
     RUNOFF COEFFICIENT   =   0.363

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

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-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.20         0.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      51.64        20.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
  0.017    8.21 | 0.767   28.54 | 1.517   17.70 |  2.27   10.07
  0.033    8.21 | 0.783   28.54 | 1.533   17.70 |  2.28   10.07
  0.050    8.21 | 0.800   28.54 | 1.550   17.70 |  2.30   10.07
  0.067    8.21 | 0.817   28.54 | 1.567   17.70 |  2.32   10.07
  0.083    8.21 | 0.833   28.54 | 1.583   17.70 |  2.33   10.07
  0.100    8.78 | 0.850   52.95 | 1.600   16.16 |  2.35    9.66
  0.117    8.78 | 0.867   52.95 | 1.617   16.16 |  2.37    9.66
  0.133    8.78 | 0.883   52.95 | 1.633   16.16 |  2.38    9.66
  0.150    8.78 | 0.900   52.95 | 1.650   16.16 |  2.40    9.66
  0.167    8.78 | 0.917   52.95 | 1.667   16.16 |  2.42    9.66
  0.183    9.46 | 0.933  294.23 | 1.683   14.92 |  2.43    9.29
  0.200    9.46 | 0.950  294.24 | 1.700   14.92 |  2.45    9.29
  0.217    9.46 | 0.967  294.24 | 1.717   14.92 |  2.47    9.29
  0.233    9.46 | 0.983  294.24 | 1.733   14.92 |  2.48    9.29
  0.250    9.46 | 1.000  294.24 | 1.750   14.92 |  2.50    9.29
  0.267   10.28 | 1.017   64.96 | 1.767   13.88 |  2.52    8.95
  0.283   10.28 | 1.033   64.96 | 1.783   13.88 |  2.53    8.95
  0.300   10.28 | 1.050   64.96 | 1.800   13.88 |  2.55    8.95
  0.317   10.28 | 1.067   64.96 | 1.817   13.88 |  2.57    8.95
  0.333   10.28 | 1.083   64.96 | 1.833   13.88 |  2.58    8.95
  0.350   11.31 | 1.100   40.99 | 1.850   13.01 |  2.60    8.64
  0.367   11.31 | 1.117   40.99 | 1.867   13.01 |  2.62    8.64
  0.383   11.31 | 1.133   40.99 | 1.883   13.01 |  2.63    8.64
  0.400   11.31 | 1.150   40.99 | 1.900   13.01 |  2.65    8.64
  0.417   11.31 | 1.167   40.99 | 1.917   13.01 |  2.67    8.64
  0.433   12.62 | 1.183   31.31 | 1.933   12.26 |  2.68    8.35
  0.450   12.62 | 1.200   31.31 | 1.950   12.26 |  2.70    8.35
  0.467   12.62 | 1.217   31.31 | 1.967   12.26 |  2.72    8.35
  0.483   12.62 | 1.233   31.31 | 1.983   12.26 |  2.73    8.35
  0.500   12.62 | 1.250   31.31 | 2.000   12.26 |  2.75    8.35
  0.517   14.39 | 1.267   25.82 | 2.017   11.60 |  2.77    8.09
  0.533   14.39 | 1.283   25.82 | 2.033   11.60 |  2.78    8.09
  0.550   14.39 | 1.300   25.82 | 2.050   11.60 |  2.80    8.09
  0.567   14.39 | 1.317   25.82 | 2.067   11.60 |  2.82    8.09
  0.583   14.39 | 1.333   25.82 | 2.083   11.60 |  2.83    8.09
  0.600   16.91 | 1.350   22.22 | 2.100   11.03 |  2.85    7.85
  0.617   16.91 | 1.367   22.22 | 2.117   11.03 |  2.87    7.85
  0.633   16.91 | 1.383   22.22 | 2.133   11.03 |  2.88    7.85
  0.650   16.91 | 1.400   22.22 | 2.150   11.03 |  2.90    7.85
  0.667   16.91 | 1.417   22.22 | 2.167   11.03 |  2.92    7.85
  0.683   20.91 | 1.433   19.65 | 2.183   10.52 |  2.93    7.62
  0.700   20.91 | 1.450   19.65 | 2.200   10.52 |  2.95    7.62
  0.717   20.91 | 1.467   19.65 | 2.217   10.52 |  2.97    7.62
  0.733   20.91 | 1.483   19.65 | 2.233   10.52 |  2.98    7.62
  0.750   20.91 | 1.500   19.65 | 2.250   10.52 |  3.00    7.62

     Max.Eff.Inten.(mm/hr)=     294.24        98.28
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.12 (ii)    4.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.46         0.25
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.05          0.148 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.05          1.03
     RUNOFF VOLUME    (mm)=      73.43        32.28         46.68
     TOTAL RAINFALL   (mm)=      74.43        74.43         74.43
     RUNOFF COEFFICIENT   =       0.99         0.43          0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0704):     0.40   0.148     1.03    46.68
      + ID2= 2 (  0709):    18.51   0.834     1.67    27.04
        ====================================================
        ID = 3 (  0051):    18.91   0.848     1.67    27.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 FINISH
================================================================================================================


================================================================================================================
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\a84a390c-04c3-4448-
add4-d5bee003c077\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\a84a390c-04c3-4448-
add4-d5bee003c077\scena


DATE: 10/06/2025                          TIME: 09:03:23

USER:



COMMENTS: _____


--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 10-Year                       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 627.000
| Ptotal= 53.36 mm |                          B=   0.014
--------------------                          C=   0.686
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    5.99 |  0.75   20.57 |  1.50   12.82 |  2.25    7.33
                0.08    6.40 |  0.83   37.86 |  1.58   11.72 |  2.33    7.03
                0.17    6.89 |  0.92  207.47 |  1.67   10.82 |  2.42    6.77
                0.25    7.49 |  1.00   46.32 |  1.75   10.08 |  2.50    6.52
                0.33    8.22 |  1.08   29.43 |  1.83    9.45 |  2.58    6.30
                0.42    9.17 |  1.17   22.55 |  1.92    8.91 |  2.67    6.09
                0.50   10.44 |  1.25   18.64 |  2.00    8.44 |  2.75    5.90
                0.58   12.26 |  1.33   16.06 |  2.08    8.03 |  2.83    5.73
                0.67   15.13 |  1.42   14.22 |  2.17    7.66 |  2.92    5.56


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number   (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
               0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
               0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
               0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
               0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
               0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
               0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
               0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
               0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
               0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
               0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
               0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
               0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
               0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
               0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
               0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
               0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
               0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
               0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
               0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
               0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
               0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
               0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
               0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
               0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
               0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
               0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
               0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
               0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
               0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
               0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
               0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
               0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
               0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
               0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
               0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
               0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
               0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
               0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
               0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
               0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
               0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
               0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
               0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
               0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

    Unit Hyd Qpeak  (cms)=   3.083

    PEAK FLOW       (cms)=   0.791 (i)
    TIME TO PEAK    (hrs)=   1.133
    RUNOFF VOLUME    (mm)=  18.187
    TOTAL RAINFALL   (mm)=  53.355
    RUNOFF COEFFICIENT   =   0.341

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

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--------------------
| CALIB            |
| NASHYD   (  0621)|   Area    (ha)=   6.08   Curve Number   (CN)= 70.0
```

|ID= 1 DT= 1.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
---|---|---|

```
| CALIB           |
| STANDHYD (  0632)|   Area    (ha)=   0.54
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.43         0.11
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      60.00        10.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
    0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
    0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
    0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
    0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
    0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
    0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
    0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
    0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
    0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
    0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
    0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
    0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
    0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
    0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
    0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
    0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
    0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
    0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
    0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
    0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
    0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
    0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
    0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
    0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
    0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
    0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
    0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
    0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
    0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
    0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
    0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
    0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
    0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
    0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
    0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
    0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
    0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
    0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
    0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
    0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
    0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
    0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
    0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
    0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
    0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

     Max.Eff.Inten.(mm/hr)=     207.47        90.90
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       1.40 (ii)    2.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.43         0.40


                                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.03          0.209 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.02           1.02
     RUNOFF VOLUME    (mm)=      52.36        22.63          41.95
     TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
     RUNOFF COEFFICIENT   =       0.98         0.42           0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0621):     6.08   0.268     1.23    14.87
     + ID2= 2 (  0623):    11.20   0.290     1.62    14.87
       ==================================================
       ID = 3 (  0050):    17.28   0.474     1.37    14.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0050)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0050):    17.28   0.474     1.37    14.87
     + ID2= 2 (  0627):    11.30   0.791     1.13    18.19
       ==================================================
       ID = 1 (  0050):    28.58   1.157     1.18    16.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0050):    28.58   1.157     1.18    16.18
     + ID2= 2 (  0632):     0.54   0.209     1.02    41.95
       ==================================================
       ID = 3 (  0050):    29.12   1.200     1.17    16.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  6221)|   Area    (ha)=   1.18
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.59         0.59
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=      88.69        20.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        52.95
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.78 (ii)    4.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.22
```

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                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.09          0.314 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      52.36        18.40          30.28
     TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
     RUNOFF COEFFICIENT   =       0.98         0.34           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        55.53
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.82 (ii)    6.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.13         0.28          1.268 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      52.36        18.75          32.19
     TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
     RUNOFF COEFFICIENT   =       0.98         0.35           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47       114.42
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.04 (ii)    1.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.03          0.235 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      52.36        24.56          44.02
     TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
     RUNOFF COEFFICIENT   =       0.98         0.46           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  9622)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     115.76       173.97
     Mannings n            =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
         0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
         0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
         0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
         0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
         0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
         0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
         0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
         0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
         0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
         0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
         0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
         0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
         0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
         0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
         0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
         0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
         0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
         0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
         0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
         0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
         0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
         0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
         0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
         0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
         0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
         0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
         0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
         0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
         0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
         0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
         0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
         0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
         0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
         0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
         0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
         0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
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                0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
                0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
                0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
                0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
                0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
                0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
                0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
                0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
                0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

    Max.Eff.Inten.(mm/hr)=     207.47       126.90
              over (min)         5.00         3.00
    Storage Coeff.  (min)=       2.08 (ii)    2.19 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.37         0.46
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.91         0.00          0.913 (iii)
    TIME TO PEAK    (hrs)=       1.03         1.00           1.03
    RUNOFF VOLUME    (mm)=      52.36        52.36          52.35
    TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
    RUNOFF COEFFICIENT   =       0.98         0.98           0.98


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  = 100.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0054)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=1256.25   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 502.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
       INFLOW:ID= 2    2.01         0.913             1.03        52.37
      OVERFLOW:ID= 3   2.01         0.542             1.08        26.40

               Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow             )=       49.59
               Time to reach Max storage              (Hr)=        1.07
               Volume of water for drawdown in LID (cu.m.)=      487.93
               Volume of maximum water storage     (cu.m.)=      502.50
               Calculated Drawdown Time               (Hr)=       76.15

  -------------------------
  | Junction Command(0056) |
  -------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0054)   2.01     0.54    1.08    26.40
  OUTFLOW: ID= 2(  0056)   2.01     0.54    1.08    26.40

  --------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0056):     2.01   0.542     1.08    26.40
     + ID2= 2 (  0622):     5.16   1.268     1.00    32.19
       ================================================
       ID = 3 (  0004):     7.17   1.268     1.00    30.57

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     7.17   1.268     1.00    30.57
     + ID2= 2 (  6221):     1.18   0.314     1.00    30.28
       ================================================
       ID = 1 (  0004):     8.35   1.582     1.00    30.53

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     8.35   1.582     1.00    30.53
     + ID2= 2 (  0631):     0.50   0.235     1.00    44.02
       ================================================
       ID = 3 (  0004):     8.85   1.816     1.00    31.29

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.1860      0.3754
                          0.0066      0.0316   |    0.2577      0.4191
                          0.0127      0.0646   |    0.3376      0.4638
                          0.0167      0.0989   |    0.4857      0.5095
                          0.0199      0.1347   |    0.6908      0.5561
                          0.0227      0.1718   |    0.9350      0.6038
                          0.0251      0.2104   |    1.2116      0.6525
                          0.0356      0.2502   |    1.5167      0.7022
                          0.0723      0.2910   |    1.8476      0.7529
                          0.1236      0.3327   |    2.2023      0.8049

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 2 (  0004)     8.850      1.816      1.00      31.29
    OUTFLOW: ID= 1 (  0014)     8.850      0.039      3.08      26.13

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.17
                    TIME SHIFT OF PEAK FLOW         (min)=125.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.2544

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       0.86         0.21
      Dep. Storage     (mm)=       1.00         5.00
      Average Slope     (%)=       2.50         2.50
      Length            (m)=      84.46        40.00
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     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        90.90
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.31 (ii)    4.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.23
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.06       0.452 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00        1.00
     RUNOFF VOLUME    (mm)=      52.36        22.63       41.95
     TOTAL RAINFALL   (mm)=      53.36        53.36       53.36
     RUNOFF COEFFICIENT   =       0.98         0.42        0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.452      1.00       41.95
   OUTFLOW: ID= 1 (  0015)     1.070      0.029      1.75       41.28

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.47
                  TIME SHIFT OF PEAK FLOW         (min)= 45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0289

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-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0014):     8.85   0.039     3.08    26.13
      + ID2= 2 (  0015):     1.07   0.029     1.75    41.28
        ====================================================
        ID = 3 (  0057):     9.92   0.061     3.05    27.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        52.95
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.66 (ii)    5.71 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.80         0.28       0.940 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08        1.00
     RUNOFF VOLUME    (mm)=      52.36        18.40       30.28
     TOTAL RAINFALL   (mm)=      53.36        53.36       53.36
     RUNOFF COEFFICIENT   =       0.98         0.34        0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        52.95
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       3.07 (ii)    7.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.23         0.38       1.420 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08        1.00
     RUNOFF VOLUME    (mm)=      52.36        18.40       30.28
     TOTAL RAINFALL   (mm)=      53.36        53.36       53.36
     RUNOFF COEFFICIENT   =       0.98         0.34        0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n           =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	5.99	0.767	20.57	1.517	12.82	2.27	7.33
0.033	5.99	0.783	20.57	1.533	12.82	2.28	7.33
0.050	5.99	0.800	20.57	1.550	12.82	2.30	7.33
0.067	5.99	0.817	20.57	1.567	12.82	2.32	7.33
0.083	5.99	0.833	20.57	1.583	12.82	2.33	7.33
0.100	6.40	0.850	37.86	1.600	11.72	2.35	7.03
0.117	6.40	0.867	37.86	1.617	11.72	2.37	7.03
0.133	6.40	0.883	37.86	1.633	11.72	2.38	7.03
0.150	6.40	0.900	37.86	1.650	11.72	2.40	7.03
0.167	6.40	0.917	37.86	1.667	11.72	2.42	7.03
0.183	6.89	0.933	207.47	1.683	10.82	2.43	6.77
0.200	6.89	0.950	207.47	1.700	10.82	2.45	6.77
0.217	6.89	0.967	207.47	1.717	10.82	2.47	6.77
0.233	6.89	0.983	207.47	1.733	10.82	2.48	6.77
0.250	6.89	1.000	207.47	1.750	10.82	2.50	6.77
0.267	7.49	1.017	46.33	1.767	10.08	2.52	6.52
0.283	7.49	1.033	46.32	1.783	10.08	2.53	6.52
0.300	7.49	1.050	46.32	1.800	10.08	2.55	6.52
0.317	7.49	1.067	46.32	1.817	10.08	2.57	6.52
0.333	7.49	1.083	46.32	1.833	10.08	2.58	6.52
0.350	8.22	1.100	29.43	1.850	9.45	2.60	6.30
0.367	8.22	1.117	29.43	1.867	9.45	2.62	6.30
0.383	8.22	1.133	29.43	1.883	9.45	2.63	6.30
0.400	8.22	1.150	29.43	1.900	9.45	2.65	6.30
0.417	8.22	1.167	29.43	1.917	9.45	2.67	6.30
0.433	9.17	1.183	22.55	1.933	8.91	2.68	6.09
0.450	9.17	1.200	22.55	1.950	8.91	2.70	6.09
0.467	9.17	1.217	22.55	1.967	8.91	2.72	6.09
0.483	9.17	1.233	22.55	1.983	8.91	2.73	6.09
0.500	9.17	1.250	22.55	2.000	8.91	2.75	6.09
0.517	10.44	1.267	18.64	2.017	8.44	2.77	5.90
0.533	10.44	1.283	18.64	2.033	8.44	2.78	5.90
0.550	10.44	1.300	18.64	2.050	8.44	2.80	5.90
0.567	10.44	1.317	18.64	2.067	8.44	2.82	5.90
0.583	10.44	1.333	18.64	2.083	8.44	2.83	5.90
0.600	12.26	1.350	16.06	2.100	8.03	2.85	5.73
0.617	12.26	1.367	16.06	2.117	8.03	2.87	5.73
0.633	12.26	1.383	16.06	2.133	8.03	2.88	5.73
0.650	12.26	1.400	16.06	2.150	8.03	2.90	5.73
0.667	12.26	1.417	16.06	2.167	8.03	2.92	5.73
0.683	15.13	1.433	14.22	2.183	7.66	2.93	5.56
0.700	15.13	1.450	14.22	2.200	7.66	2.95	5.56
0.717	15.13	1.467	14.22	2.217	7.66	2.97	5.56
0.733	15.13	1.483	14.22	2.233	7.66	2.98	5.56
0.750	15.13	1.500	14.22	2.250	7.66	3.00	5.56

Max.Eff.Inten.(mm/hr)=	207.47	126.90	
over (min)	5.00	3.00	
Storage Coeff. (min)=	2.66 (ii)	2.77 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.33	0.40	
			TOTALS
PEAK FLOW (cms)=	1.95	0.00	1.957 (iii)
TIME TO PEAK (hrs)=	1.03	1.02	1.03
RUNOFF VOLUME (mm)=	52.36	52.36	52.36
TOTAL RAINFALL (mm)=	53.36	53.36	53.36
RUNOFF COEFFICIENT =	0.98	0.98	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 100.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0011)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 1.0 MIN | STORAGE LAYER:

Length	(m)=2850.00	Height	(m)= 1.00
Porosity	= 0.40	Initial Water Level	(m)= 0.00
Width	(m)= 1.00	Min. Drawdown	(hr)= 24.00
Max. Drawdown	(hr)= 78.43	Available Storage	(cu.m.)=1140.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	4.56	1.957	1.03	52.36
OVERFLOW:ID= 3	4.56	1.070	1.10	26.39

Volume Reduction Rate[(RVin-RVout)/RVin](%):		
If RVout= (Overflow)	=	49.60
Time to reach Max storage	(Hr)=	1.08
Volume of water for drawdown in LID	(cu.m.)=	1137.92
Volume of maximum water storage	(cu.m.)=	1140.00
Calculated Drawdown Time	(Hr)=	78.28

Junction Command(0012)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0011)	4.56	1.07	1.10	26.39
OUTFLOW: ID= 2(0012)	4.56	1.07	1.10	26.39

CALIB
STANDHYD (9625)| Area (ha)= 3.67
ID= 1 DT= 1.0 min	Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.67	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	156.42	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.99	0.767	20.57	1.517	12.82	2.27	7.33
0.033	5.99	0.783	20.57	1.533	12.82	2.28	7.33
0.050	5.99	0.800	20.57	1.550	12.82	2.30	7.33
0.067	5.99	0.817	20.57	1.567	12.82	2.32	7.33
0.083	5.99	0.833	20.57	1.583	12.82	2.33	7.33
0.100	6.40	0.850	37.86	1.600	11.72	2.35	7.03
0.117	6.40	0.867	37.86	1.617	11.72	2.37	7.03
0.133	6.40	0.883	37.86	1.633	11.72	2.38	7.03
0.150	6.40	0.900	37.86	1.650	11.72	2.40	7.03
0.167	6.40	0.917	37.86	1.667	11.72	2.42	7.03
0.183	6.89	0.933	207.47	1.683	10.82	2.43	6.77
0.200	6.89	0.950	207.47	1.700	10.82	2.45	6.77
0.217	6.89	0.967	207.47	1.717	10.82	2.47	6.77
0.233	6.89	0.983	207.47	1.733	10.82	2.48	6.77
0.250	6.89	1.000	207.47	1.750	10.82	2.50	6.77
0.267	7.49	1.017	46.33	1.767	10.08	2.52	6.52
0.283	7.49	1.033	46.32	1.783	10.08	2.53	6.52

```
              0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
              0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
              0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
              0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
              0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
              0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
              0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
              0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
              0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
              0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
              0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
              0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
              0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
              0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
              0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
              0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
              0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
              0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
              0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
              0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
              0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
              0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
              0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
              0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
              0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
              0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
              0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
              0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

    Max.Eff.Inten.(mm/hr)=     207.47        66.07
              over (min)         5.00         3.00
    Storage Coeff.  (min)=       2.50 (ii)    2.83 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.34         0.39
                                                      *TOTALS*
    PEAK FLOW       (cms)=       1.60         0.00          1.601 (iii)
    TIME TO PEAK    (hrs)=       1.03         1.02           1.03
    RUNOFF VOLUME    (mm)=      52.35        27.81          52.33
    TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
    RUNOFF COEFFICIENT   =       0.98         0.52           0.98


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0009)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2293.75   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 917.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     3.67         1.601             1.03        52.33
    OVERFLOW:ID= 3     3.67         0.842             1.10        26.36

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow            )=       49.62

              Time to reach Max storage              (Hr)=        1.08
              Volume of water for drawdown in LID (cu.m.)=      915.72
              Volume of maximum water storage     (cu.m.)=      917.50
              Calculated Drawdown Time               (Hr)=       78.27

  -------------------------
  | Junction Command(0010) |
  -------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0009)    3.67     0.84    1.10    26.36
  OUTFLOW: ID= 2(  0010)    3.67     0.84    1.10    26.36

  --------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0624)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.87          5.87
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       2.50          2.50
    Length            (m)=     279.76         30.00
    Mannings n           =      0.013         0.250

    Max.Eff.Inten.(mm/hr)=     207.47         52.95
              over (min)         5.00         10.00
    Storage Coeff.  (min)=       2.69 (ii)    7.47 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.29          0.13
                                                      *TOTALS*
    PEAK FLOW       (cms)=       2.06          0.62          2.370 (iii)
    TIME TO PEAK    (hrs)=       1.00          1.08           1.00
    RUNOFF VOLUME    (mm)=      52.36         18.40          30.28
    TOTAL RAINFALL   (mm)=      53.36         53.36          53.36
    RUNOFF COEFFICIENT   =       0.98          0.34           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     3.67   0.842     1.10    26.36
     + ID2= 2 (  0012):     4.56   1.070     1.10    26.39
       ================================================
       ID = 3 (  0002):     8.23   1.912     1.10    26.38

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):     8.23   1.912     1.10    26.38
     + ID2= 2 (  0624):    11.74   2.370     1.00    30.28
       ================================================
```

```
        ID = 1 (  0002):    19.97   3.202     1.10    28.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    19.97   3.202     1.10    28.67
      + ID2= 2 (  6241):     4.56   0.940     1.00    30.28
        =====================================================
        ID = 3 (  0002):    24.53   3.731     1.10    28.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    24.53   3.731     1.10    28.97
      + ID2= 2 (  0625):     7.31   1.420     1.00    30.28
        =====================================================
        ID = 1 (  0002):    31.84   4.730     1.00    29.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
 0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
 0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
 0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
 0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
 0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
 0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
 0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
 0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
 0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
 0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
 0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
 0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
 0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
 0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
 0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
 0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
 0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
 0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
 0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
 0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
 0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
 0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
 0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
 0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
 0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
 0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
 0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
 0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
 0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
 0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
 0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
 0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
 0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
 0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
 0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
 0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
 0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
 0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
 0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
 0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
 0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
 0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
 0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
 0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

    Max.Eff.Inten.(mm/hr)=     207.47        90.90
              over (min)        5.00         3.00
    Storage Coeff.  (min)=       1.17 (ii)    2.50 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.45         0.42
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.10         0.02          0.116 (iii)
    TIME TO PEAK    (hrs)=       1.02         1.02           1.02
    RUNOFF VOLUME    (mm)=      52.36        22.63          41.95
    TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
    RUNOFF COEFFICIENT   =       0.98         0.42           0.79


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-------------------
| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------       (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.29      0.12      1.02   41.95
     ====================================================
     MAJOR SYS.(ID= 2):   0.01      0.02      1.02   41.95
     MINOR SYS.(ID= 3):   0.28      0.10      1.00   41.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0628)|   Area    (ha)=   0.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.45         0.08
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      59.44        10.00
```

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.99	0.767	20.57	1.517	12.82	2.27	7.33
0.033	5.99	0.783	20.57	1.533	12.82	2.28	7.33
0.050	5.99	0.800	20.57	1.550	12.82	2.30	7.33
0.067	5.99	0.817	20.57	1.567	12.82	2.32	7.33
0.083	5.99	0.833	20.57	1.583	12.82	2.33	7.33
0.100	6.40	0.850	37.86	1.600	11.72	2.35	7.03
0.117	6.40	0.867	37.86	1.617	11.72	2.37	7.03
0.133	6.40	0.883	37.86	1.633	11.72	2.38	7.03
0.150	6.40	0.900	37.86	1.650	11.72	2.40	7.03
0.167	6.40	0.917	37.86	1.667	11.72	2.42	7.03
0.183	6.89	0.933	207.47	1.683	10.82	2.43	6.77
0.200	6.89	0.950	207.47	1.700	10.82	2.45	6.77
0.217	6.89	0.967	207.47	1.717	10.82	2.47	6.77
0.233	6.89	0.983	207.47	1.733	10.82	2.48	6.77
0.250	6.89	1.000	207.47	1.750	10.82	2.50	6.77
0.267	7.49	1.017	46.33	1.767	10.08	2.52	6.52
0.283	7.49	1.033	46.32	1.783	10.08	2.53	6.52
0.300	7.49	1.050	46.32	1.800	10.08	2.55	6.52
0.317	7.49	1.067	46.32	1.817	10.08	2.57	6.52
0.333	7.49	1.083	46.32	1.833	10.08	2.58	6.52
0.350	8.22	1.100	29.43	1.850	9.45	2.60	6.30
0.367	8.22	1.117	29.43	1.867	9.45	2.62	6.30
0.383	8.22	1.133	29.43	1.883	9.45	2.63	6.30
0.400	8.22	1.150	29.43	1.900	9.45	2.65	6.30
0.417	8.22	1.167	29.43	1.917	9.45	2.67	6.30
0.433	9.17	1.183	22.55	1.933	8.91	2.68	6.09
0.450	9.17	1.200	22.55	1.950	8.91	2.70	6.09
0.467	9.17	1.217	22.55	1.967	8.91	2.72	6.09
0.483	9.17	1.233	22.55	1.983	8.91	2.73	6.09
0.500	9.17	1.250	22.55	2.000	8.91	2.75	6.09
0.517	10.44	1.267	18.64	2.017	8.44	2.77	5.90
0.533	10.44	1.283	18.64	2.033	8.44	2.78	5.90
0.550	10.44	1.300	18.64	2.050	8.44	2.80	5.90
0.567	10.44	1.317	18.64	2.067	8.44	2.82	5.90
0.583	10.44	1.333	18.64	2.083	8.44	2.83	5.90
0.600	12.26	1.350	16.06	2.100	8.03	2.85	5.73
0.617	12.26	1.367	16.06	2.117	8.03	2.87	5.73
0.633	12.26	1.383	16.06	2.133	8.03	2.88	5.73
0.650	12.26	1.400	16.06	2.150	8.03	2.90	5.73
0.667	12.26	1.417	16.06	2.167	8.03	2.92	5.73
0.683	15.13	1.433	14.22	2.183	7.66	2.93	5.56
0.700	15.13	1.450	14.22	2.200	7.66	2.95	5.56
0.717	15.13	1.467	14.22	2.217	7.66	2.97	5.56
0.733	15.13	1.483	14.22	2.233	7.66	2.98	5.56
0.750	15.13	1.500	14.22	2.250	7.66	3.00	5.56

Max.Eff.Inten.(mm/hr)=	207.47	114.42	
over (min)	5.00	3.00	
Storage Coeff. (min)=	1.40 (ii)	2.56 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.43	0.42	
			TOTALS
PEAK FLOW (cms)=	0.18	0.03	0.217 (iii)
TIME TO PEAK (hrs)=	1.02	1.02	1.02
RUNOFF VOLUME (mm)=	52.36	24.56	44.02
TOTAL RAINFALL (mm)=	53.36	53.36	53.36
RUNOFF COEFFICIENT =	0.98	0.46	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0633)	Area (ha)=	0.07	
ID= 1 DT= 1.0 min	Total Imp(%)=	80.00	Dir. Conn.(%)= 65.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.06	0.01
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	21.60	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.99	0.767	20.57	1.517	12.82	2.27	7.33
0.033	5.99	0.783	20.57	1.533	12.82	2.28	7.33
0.050	5.99	0.800	20.57	1.550	12.82	2.30	7.33
0.067	5.99	0.817	20.57	1.567	12.82	2.32	7.33
0.083	5.99	0.833	20.57	1.583	12.82	2.33	7.33
0.100	6.40	0.850	37.86	1.600	11.72	2.35	7.03
0.117	6.40	0.867	37.86	1.617	11.72	2.37	7.03
0.133	6.40	0.883	37.86	1.633	11.72	2.38	7.03
0.150	6.40	0.900	37.86	1.650	11.72	2.40	7.03
0.167	6.40	0.917	37.86	1.667	11.72	2.42	7.03
0.183	6.89	0.933	207.47	1.683	10.82	2.43	6.77
0.200	6.89	0.950	207.47	1.700	10.82	2.45	6.77
0.217	6.89	0.967	207.47	1.717	10.82	2.47	6.77
0.233	6.89	0.983	207.47	1.733	10.82	2.48	6.77
0.250	6.89	1.000	207.47	1.750	10.82	2.50	6.77
0.267	7.49	1.017	46.33	1.767	10.08	2.52	6.52
0.283	7.49	1.033	46.32	1.783	10.08	2.53	6.52
0.300	7.49	1.050	46.32	1.800	10.08	2.55	6.52
0.317	7.49	1.067	46.32	1.817	10.08	2.57	6.52
0.333	7.49	1.083	46.32	1.833	10.08	2.58	6.52
0.350	8.22	1.100	29.43	1.850	9.45	2.60	6.30
0.367	8.22	1.117	29.43	1.867	9.45	2.62	6.30
0.383	8.22	1.133	29.43	1.883	9.45	2.63	6.30
0.400	8.22	1.150	29.43	1.900	9.45	2.65	6.30
0.417	8.22	1.167	29.43	1.917	9.45	2.67	6.30
0.433	9.17	1.183	22.55	1.933	8.91	2.68	6.09
0.450	9.17	1.200	22.55	1.950	8.91	2.70	6.09
0.467	9.17	1.217	22.55	1.967	8.91	2.72	6.09
0.483	9.17	1.233	22.55	1.983	8.91	2.73	6.09
0.500	9.17	1.250	22.55	2.000	8.91	2.75	6.09
0.517	10.44	1.267	18.64	2.017	8.44	2.77	5.90
0.533	10.44	1.283	18.64	2.033	8.44	2.78	5.90
0.550	10.44	1.300	18.64	2.050	8.44	2.80	5.90
0.567	10.44	1.317	18.64	2.067	8.44	2.82	5.90
0.583	10.44	1.333	18.64	2.083	8.44	2.83	5.90
0.600	12.26	1.350	16.06	2.100	8.03	2.85	5.73
0.617	12.26	1.367	16.06	2.117	8.03	2.87	5.73
0.633	12.26	1.383	16.06	2.133	8.03	2.88	5.73
0.650	12.26	1.400	16.06	2.150	8.03	2.90	5.73
0.667	12.26	1.417	16.06	2.167	8.03	2.92	5.73
0.683	15.13	1.433	14.22	2.183	7.66	2.93	5.56
0.700	15.13	1.450	14.22	2.200	7.66	2.95	5.56
0.717	15.13	1.467	14.22	2.217	7.66	2.97	5.56
0.733	15.13	1.483	14.22	2.233	7.66	2.98	5.56

```
                0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

     Max.Eff.Inten.(mm/hr)=     207.47        90.90
               over (min)         5.00         3.00
     Storage Coeff.  (min)=       0.76 (ii)    2.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.50         0.47
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.029 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.02          1.02
     RUNOFF VOLUME    (mm)=      52.36        22.63         41.94
     TOTAL RAINFALL   (mm)=      53.36        53.36         53.36
     RUNOFF COEFFICIENT   =       0.98         0.42          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     207.47        90.90
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.33 (ii)    2.67 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.29
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.03          0.195 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      52.36        22.63         41.95
     TOTAL RAINFALL   (mm)=      53.36        53.36         53.36
     RUNOFF COEFFICIENT   =       0.98         0.42          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.28   0.099     1.00    41.95
     + ID2= 2 (  0628):     0.53   0.217     1.02    44.02
       ================================================
       ID = 3 (  0001):     0.81   0.316     1.02    43.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.81   0.316     1.02    43.29
     + ID2= 2 (  0633):     0.07   0.029     1.02    41.94
       ================================================
       ID = 1 (  0001):     0.88   0.346     1.02    43.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.88   0.346     1.02    43.19
     + ID2= 2 (  0634):     0.45   0.195     1.00    41.95
       ================================================
       ID = 3 (  0001):     1.33   0.525     1.00    42.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.33   0.525     1.00    42.76
     + ID2= 2 (  0002):    31.84   4.730     1.00    29.27
       ================================================
       ID = 3 (  0003):    33.17   5.254     1.00    29.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.9471      1.7418
                          0.0238      0.1755  |    1.2374      1.9546
                          0.0564      0.3556  |    1.5542      2.1707
                          0.0756      0.5404  |    1.8953      2.3901
                          0.0909      0.7298  |    2.2592      2.6129
                          0.1337      0.9241  |    2.6444      2.8392
                          0.2699      1.1230  |    3.0498      3.0690
                          0.4583      1.3261  |    3.4745      3.3026
                          0.6861      1.5323  |    0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    33.175     5.254      1.00      29.81
   OUTFLOW: ID= 1 (  0013)    33.175     0.130      3.12      24.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.48
                  TIME SHIFT OF PEAK FLOW         (min)=127.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.9088

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-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    33.17   0.130     3.12    24.02
     + ID2= 2 (  0050):    29.12   1.200     1.17    16.66
```

```
        ==================================================
        ID = 3 (  0005):    62.29   1.263     1.17    20.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    62.29   1.263     1.17    20.58
      + ID2= 2 (  0057):     9.92   0.061     3.05    27.77
        ==================================================
        ID = 1 (  0005):    72.21   1.303     1.18    21.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.442 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  14.872
     TOTAL RAINFALL   (mm)=  53.355
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.20         0.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      51.64        20.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    5.99 | 0.767   20.57 | 1.517   12.82 |  2.27    7.33
 0.033    5.99 | 0.783   20.57 | 1.533   12.82 |  2.28    7.33
 0.050    5.99 | 0.800   20.57 | 1.550   12.82 |  2.30    7.33
 0.067    5.99 | 0.817   20.57 | 1.567   12.82 |  2.32    7.33
 0.083    5.99 | 0.833   20.57 | 1.583   12.82 |  2.33    7.33
 0.100    6.40 | 0.850   37.86 | 1.600   11.72 |  2.35    7.03
 0.117    6.40 | 0.867   37.86 | 1.617   11.72 |  2.37    7.03
 0.133    6.40 | 0.883   37.86 | 1.633   11.72 |  2.38    7.03
 0.150    6.40 | 0.900   37.86 | 1.650   11.72 |  2.40    7.03
 0.167    6.40 | 0.917   37.86 | 1.667   11.72 |  2.42    7.03
 0.183    6.89 | 0.933  207.47 | 1.683   10.82 |  2.43    6.77
 0.200    6.89 | 0.950  207.47 | 1.700   10.82 |  2.45    6.77
 0.217    6.89 | 0.967  207.47 | 1.717   10.82 |  2.47    6.77
 0.233    6.89 | 0.983  207.47 | 1.733   10.82 |  2.48    6.77
 0.250    6.89 | 1.000  207.47 | 1.750   10.82 |  2.50    6.77
 0.267    7.49 | 1.017   46.33 | 1.767   10.08 |  2.52    6.52
 0.283    7.49 | 1.033   46.32 | 1.783   10.08 |  2.53    6.52
 0.300    7.49 | 1.050   46.32 | 1.800   10.08 |  2.55    6.52
 0.317    7.49 | 1.067   46.32 | 1.817   10.08 |  2.57    6.52
 0.333    7.49 | 1.083   46.32 | 1.833   10.08 |  2.58    6.52
 0.350    8.22 | 1.100   29.43 | 1.850    9.45 |  2.60    6.30
 0.367    8.22 | 1.117   29.43 | 1.867    9.45 |  2.62    6.30
 0.383    8.22 | 1.133   29.43 | 1.883    9.45 |  2.63    6.30
 0.400    8.22 | 1.150   29.43 | 1.900    9.45 |  2.65    6.30
 0.417    8.22 | 1.167   29.43 | 1.917    9.45 |  2.67    6.30
 0.433    9.17 | 1.183   22.55 | 1.933    8.91 |  2.68    6.09
 0.450    9.17 | 1.200   22.55 | 1.950    8.91 |  2.70    6.09
 0.467    9.17 | 1.217   22.55 | 1.967    8.91 |  2.72    6.09
 0.483    9.17 | 1.233   22.55 | 1.983    8.91 |  2.73    6.09
 0.500    9.17 | 1.250   22.55 | 2.000    8.91 |  2.75    6.09
 0.517   10.44 | 1.267   18.64 | 2.017    8.44 |  2.77    5.90
 0.533   10.44 | 1.283   18.64 | 2.033    8.44 |  2.78    5.90
 0.550   10.44 | 1.300   18.64 | 2.050    8.44 |  2.80    5.90
 0.567   10.44 | 1.317   18.64 | 2.067    8.44 |  2.82    5.90
 0.583   10.44 | 1.333   18.64 | 2.083    8.44 |  2.83    5.90
 0.600   12.26 | 1.350   16.06 | 2.100    8.03 |  2.85    5.73
 0.617   12.26 | 1.367   16.06 | 2.117    8.03 |  2.87    5.73
 0.633   12.26 | 1.383   16.06 | 2.133    8.03 |  2.88    5.73
 0.650   12.26 | 1.400   16.06 | 2.150    8.03 |  2.90    5.73
 0.667   12.26 | 1.417   16.06 | 2.167    8.03 |  2.92    5.73
 0.683   15.13 | 1.433   14.22 | 2.183    7.66 |  2.93    5.56
 0.700   15.13 | 1.450   14.22 | 2.200    7.66 |  2.95    5.56
 0.717   15.13 | 1.467   14.22 | 2.217    7.66 |  2.97    5.56
 0.733   15.13 | 1.483   14.22 | 2.233    7.66 |  2.98    5.56
 0.750   15.13 | 1.500   14.22 | 2.250    7.66 |  3.00    5.56

     Max.Eff.Inten.(mm/hr)=     207.47        52.95
               over (min)        5.00         6.00
     Storage Coeff.  (min)=       1.28 (ii)    5.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00         6.00
     Unit Hyd. peak  (cms)=       0.44         0.21
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.03          0.090 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.07           1.03
     RUNOFF VOLUME    (mm)=      52.36        18.40          30.27
     TOTAL RAINFALL   (mm)=      53.36        53.36          53.36
     RUNOFF COEFFICIENT   =       0.98         0.34           0.57

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0704):     0.40   0.090     1.03    30.27
      + ID2= 2 (  0709):    18.51   0.442     1.67    14.87
        ==================================================
        ID = 3 (  0051):    18.91   0.451     1.67    15.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
```

```
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\c43af8a2-e073-40a1-
9392-87612b3f6b57\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\c43af8a2-e073-40a1-
9392-87612b3f6b57\scena


DATE: 10/06/2025                          TIME: 09:03:24

USER:



COMMENTS: _____________________________________________________


-------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 25mm Event                   **
  ***********************************************

-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 263.000
| Ptotal= 25.04 mm |                          B=   0.027
-------------------                          C=   0.682
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.10 |  1.00    6.53 |  2.00    4.68 |  3.00    2.64
                0.08    2.20 |  1.08    8.86 |  2.08    4.36 |  3.08    2.56
                0.17    2.31 |  1.17   16.26 |  2.17    4.09 |  3.17    2.48
                0.25    2.45 |  1.25   87.43 |  2.25    3.85 |  3.25    2.41
                0.33    2.60 |  1.33   19.89 |  2.33    3.65 |  3.33    2.35
                0.42    2.78 |  1.42   12.66 |  2.42    3.47 |  3.42    2.29
                0.50    2.99 |  1.50    9.71 |  2.50    3.32 |  3.50    2.23
                0.58    3.24 |  1.58    8.03 |  2.58    3.17 |  3.58    2.17
                0.67    3.56 |  1.67    6.93 |  2.67    3.05 |  3.67    2.12
                0.75    3.97 |  1.75    6.14 |  2.75    2.93 |  3.75    2.07
                0.83    4.51 |  1.83    5.54 |  2.83    2.83 |  3.83    2.03
                0.92    5.29 |  1.92    5.06 |  2.92    2.73 |  3.92    1.99


--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number   (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14
```

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Unit Hyd Qpeak (cms)= 3.083

PEAK FLOW (cms)= 0.124 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 4.006
TOTAL RAINFALL (mm)= 25.040
RUNOFF COEFFICIENT = 0.160

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

CALIB								
NASHYD (0621)	Area (ha)= 6.08	Curve Number (CN)= 70.0						
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00						
	U.H. Tp(hrs)= 0.20							

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.041 (i)
TIME TO PEAK (hrs)= 1.600
RUNOFF VOLUME (mm)= 3.116
TOTAL RAINFALL (mm)= 25.040
RUNOFF COEFFICIENT = 0.124

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

CALIB								
NASHYD (0623)	Area (ha)= 11.20	Curve Number (CN)= 70.0						
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00						
	U.H. Tp(hrs)= 0.46							

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29

0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Unit Hyd Qpeak (cms)= 0.930

PEAK FLOW (cms)= 0.048 (i)
TIME TO PEAK (hrs)= 2.033
RUNOFF VOLUME (mm)= 3.116
TOTAL RAINFALL (mm)= 25.040
RUNOFF COEFFICIENT = 0.124

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

CALIB	
STANDHYD (0632)	Area (ha)= 0.54
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.43	0.11
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	60.00	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Max.Eff.Inten.(mm/hr)=	87.43	18.63	
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.98 (ii)	3.88 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.38	0.29	
			TOTALS
PEAK FLOW (cms)=	0.07	0.01	0.074 (iii)
TIME TO PEAK (hrs)=	1.35	1.37	1.37
RUNOFF VOLUME (mm)=	24.04	5.83	17.66
TOTAL RAINFALL (mm)=	25.04	25.04	25.04
RUNOFF COEFFICIENT =	0.96	0.23	0.71

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

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      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0621):     6.08   0.041     1.60     3.12
      + ID2= 2 (  0623):    11.20   0.048     2.03     3.12
        ====================================================
        ID = 3 (  0050):    17.28   0.076     1.80     3.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0050)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0050):    17.28   0.076     1.80     3.12
      + ID2= 2 (  0627):    11.30   0.124     1.50     4.01
        ====================================================
        ID = 1 (  0050):    28.58   0.181     1.55     3.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0050):    28.58   0.181     1.55     3.47
      + ID2= 2 (  0632):     0.54   0.074     1.37    17.66
        ====================================================
        ID = 3 (  0050):    29.12   0.197     1.52     3.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6221)|   Area    (ha)=   1.18
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.59         0.59
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=      88.69        20.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43         9.45
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.51 (ii)    6.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01          0.094 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      24.04         4.28          11.19
     TOTAL RAINFALL   (mm)=      25.04        25.04          25.04
     RUNOFF COEFFICIENT   =       0.96         0.17           0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43         6.80
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.58 (ii)   18.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.44         0.02          0.446 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67           1.33
     RUNOFF VOLUME    (mm)=      24.04         4.40          12.26
     TOTAL RAINFALL   (mm)=      25.04        25.04          25.04
     RUNOFF COEFFICIENT   =       0.96         0.18           0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43        24.73
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.47 (ii)    2.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.29
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.01          0.089 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      24.04         6.60          18.81
     TOTAL RAINFALL   (mm)=      25.04        25.04          25.04
     RUNOFF COEFFICIENT   =       0.96         0.26           0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (9622)	Area (ha)= 2.01
ID= 1 DT= 1.0 min	Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.01	0.00
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	5.00
Length (m)=	115.76	173.97
Mannings n =	0.013	0.013

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

			TOTALS
Max.Eff.Inten.(mm/hr)=	87.43	53.66	
over (min)	5.00	4.00	
Storage Coeff. (min)=	2.94 (ii)	3.09 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.31	0.33	
PEAK FLOW (cms)=	0.35	0.00	0.354 (iii)
TIME TO PEAK (hrs)=	1.37	1.35	1.37
RUNOFF VOLUME (mm)=	24.04	24.04	24.04
TOTAL RAINFALL (mm)=	25.04	25.04	25.04
RUNOFF COEFFICIENT =	0.96	0.96	0.96

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 100.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

SOAKAWAY(0054)	UNDERDRAIN: OFF
IN= 2--> OUT= 3	
DT= 1.0 MIN	STORAGE LAYER:
	Length (m)=1256.25 Height (m)= 1.00
	Porosity = 0.40 Initial Water Level (m)= 0.00
	Width (m)= 1.00 Min. Drawdown (hr)= 24.00
	Max. Drawdown (hr)= 78.43 Available Storage (cu.m.)= 502.50
	NATIVE SOIL LAYER:
	Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	2.01	0.354	1.37	24.04
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.13
Volume of water for drawdown in LID (cu.m.)= 453.34
Volume of maximum water storage (cu.m.)= 459.28
Calculated Drawdown Time (Hr)= 70.75

Junction Command(0056)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0054)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0056)	0.00	0.00	0.00	0.00

```
  ------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0056 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0004 = HYDROGRAPH 0622
       ID1= 1 (  0056):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0622):     5.16   0.446     1.33    12.26
       ==================================================
       ID = 3 (  0004):     5.16   0.446     1.33    12.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     5.16   0.446     1.33    12.26
     + ID2= 2 (  6221):     1.18   0.094     1.33    11.19
       ==================================================
       ID = 1 (  0004):     6.34   0.540     1.33    12.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     6.34   0.540     1.33    12.06
     + ID2= 2 (  0631):     0.50   0.089     1.33    18.81
       ==================================================
       ID = 3 (  0004):     6.84   0.630     1.33    12.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.1860      0.3754
                          0.0066      0.0316  |    0.2577      0.4191
                          0.0127      0.0646  |    0.3376      0.4638
                          0.0167      0.0989  |    0.4857      0.5095
                          0.0199      0.1347  |    0.6908      0.5561
                          0.0227      0.1718  |    0.9350      0.6038
                          0.0251      0.2104  |    1.2116      0.6525
                          0.0356      0.2502  |    1.5167      0.7022
                          0.0723      0.2910  |    1.8476      0.7529
                          0.1236      0.3327  |    2.2023      0.8049

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0004)     6.840      0.630      1.33      12.55
   OUTFLOW: ID= 1 (  0014)     6.840      0.014      4.07      11.31

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.17
                  TIME SHIFT OF PEAK FLOW         (min)=164.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0727

     **** WARNING : HYDROGRAPH WAS CUT. CHECK VOLUME.
------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      84.46        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43        18.63
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.85 (ii)    6.20 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.01          0.164 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      24.04         5.83          17.66
     TOTAL RAINFALL   (mm)=      25.04        25.04          25.04
     RUNOFF COEFFICIENT   =       0.96         0.23           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.0820      0.0500
                          0.0070      0.0200  |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.164      1.33      17.66
   OUTFLOW: ID= 1 (  0015)     1.070      0.005      3.83      16.99

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.05
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0143

------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0014):     6.84   0.014     4.07    11.31
     + ID2= 2 (  0015):     1.07   0.005     3.83    16.99
       ==================================================
       ID = 3 (  0057):     7.91   0.019     4.03    12.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
```

```
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43         9.45
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.76 (ii)    8.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.04         0.319 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      24.04         4.28         11.20
     TOTAL RAINFALL   (mm)=      25.04        25.04         25.04
     RUNOFF COEFFICIENT   =       0.96         0.17          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43         6.41
               over (min)        5.00        25.00
     Storage Coeff.  (min)=       4.34 (ii)   21.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.23         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.46         0.03         0.460 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      24.04         4.28         11.19
     TOTAL RAINFALL   (mm)=      25.04        25.04         25.04
     RUNOFF COEFFICIENT   =       0.96         0.17          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n           =      0.013        0.013

     NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99

```
                1.000    5.29 | 2.000    5.06 | 3.000    2.73 |  4.00    1.99

     Max.Eff.Inten.(mm/hr)=      87.43        53.66
               over (min)        5.00         4.00
     Storage Coeff.  (min)=      3.76 (ii)    3.91 (ii)
     Unit Hyd. Tpeak (min)=      5.00         4.00
     Unit Hyd. peak  (cms)=      0.27         0.29
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.74         0.00          0.741 (iii)
     TIME TO PEAK    (hrs)=      1.37         1.37          1.37
     RUNOFF VOLUME    (mm)=     24.04        24.04         24.04
     TOTAL RAINFALL   (mm)=     25.04        25.04         25.04
     RUNOFF COEFFICIENT   =      0.96         0.96          0.96


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  = 100.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
|SOAKAWAY(  0011)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2850.00   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level   (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)=1140.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
         INFLOW:ID= 2     4.56         0.741             1.37        24.04
       OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

                Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow            )=      100.00
                Time to reach Max storage             (Hr)=       4.15
                Volume of water for drawdown in LID (cu.m.)=     1038.67
                Volume of maximum water storage     (cu.m.)=     1041.43
                Calculated Drawdown Time              (Hr)=       71.45

  --------------------------
  | Junction Command(0012) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0011)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  9625)|   Area    (ha)=   3.67
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.67         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     156.42        40.00
     Mannings n           =      0.013        0.250
```

```
NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017    2.10 | 1.017    6.53 | 2.017    4.68 |  3.02    2.64
0.033    2.10 | 1.033    6.53 | 2.033    4.68 |  3.03    2.64
0.050    2.10 | 1.050    6.53 | 2.050    4.68 |  3.05    2.64
0.067    2.10 | 1.067    6.53 | 2.067    4.68 |  3.07    2.64
0.083    2.10 | 1.083    6.53 | 2.083    4.68 |  3.08    2.64
0.100    2.20 | 1.100    8.86 | 2.100    4.36 |  3.10    2.56
0.117    2.20 | 1.117    8.86 | 2.117    4.36 |  3.12    2.56
0.133    2.20 | 1.133    8.86 | 2.133    4.36 |  3.13    2.56
0.150    2.20 | 1.150    8.86 | 2.150    4.36 |  3.15    2.56
0.167    2.20 | 1.167    8.86 | 2.167    4.36 |  3.17    2.56
0.183    2.31 | 1.183   16.26 | 2.183    4.09 |  3.18    2.48
0.200    2.31 | 1.200   16.26 | 2.200    4.09 |  3.20    2.48
0.217    2.31 | 1.217   16.26 | 2.217    4.09 |  3.22    2.48
0.233    2.31 | 1.233   16.26 | 2.233    4.09 |  3.23    2.48
0.250    2.31 | 1.250   16.26 | 2.250    4.09 |  3.25    2.48
0.267    2.45 | 1.267   87.43 | 2.267    3.85 |  3.27    2.41
0.283    2.45 | 1.283   87.43 | 2.283    3.85 |  3.28    2.41
0.300    2.45 | 1.300   87.43 | 2.300    3.85 |  3.30    2.41
0.317    2.45 | 1.317   87.43 | 2.317    3.85 |  3.32    2.41
0.333    2.45 | 1.333   87.43 | 2.333    3.85 |  3.33    2.41
0.350    2.60 | 1.350   19.89 | 2.350    3.65 |  3.35    2.35
0.367    2.60 | 1.367   19.89 | 2.367    3.65 |  3.37    2.35
0.383    2.60 | 1.383   19.89 | 2.383    3.65 |  3.38    2.35
0.400    2.60 | 1.400   19.89 | 2.400    3.65 |  3.40    2.35
0.417    2.60 | 1.417   19.89 | 2.417    3.65 |  3.42    2.35
0.433    2.78 | 1.433   12.66 | 2.433    3.47 |  3.43    2.29
0.450    2.78 | 1.450   12.66 | 2.450    3.47 |  3.45    2.29
0.467    2.78 | 1.467   12.66 | 2.467    3.47 |  3.47    2.29
0.483    2.78 | 1.483   12.66 | 2.483    3.47 |  3.48    2.29
0.500    2.78 | 1.500   12.66 | 2.500    3.47 |  3.50    2.29
0.517    2.99 | 1.517    9.71 | 2.517    3.32 |  3.52    2.23
0.533    2.99 | 1.533    9.71 | 2.533    3.32 |  3.53    2.23
0.550    2.99 | 1.550    9.71 | 2.550    3.32 |  3.55    2.23
0.567    2.99 | 1.567    9.71 | 2.567    3.32 |  3.57    2.23
0.583    2.99 | 1.583    9.71 | 2.583    3.32 |  3.58    2.23
0.600    3.24 | 1.600    8.03 | 2.600    3.17 |  3.60    2.17
0.617    3.24 | 1.617    8.03 | 2.617    3.17 |  3.62    2.17
0.633    3.24 | 1.633    8.03 | 2.633    3.17 |  3.63    2.17
0.650    3.24 | 1.650    8.03 | 2.650    3.17 |  3.65    2.17
0.667    3.24 | 1.667    8.03 | 2.667    3.17 |  3.67    2.17
0.683    3.56 | 1.683    6.93 | 2.683    3.05 |  3.68    2.12
0.700    3.56 | 1.700    6.93 | 2.700    3.05 |  3.70    2.12
0.717    3.56 | 1.717    6.93 | 2.717    3.05 |  3.72    2.12
0.733    3.56 | 1.733    6.93 | 2.733    3.05 |  3.73    2.12
0.750    3.56 | 1.750    6.93 | 2.750    3.05 |  3.75    2.12
0.767    3.97 | 1.767    6.14 | 2.767    2.93 |  3.77    2.07
0.783    3.97 | 1.783    6.14 | 2.783    2.93 |  3.78    2.07
0.800    3.97 | 1.800    6.14 | 2.800    2.93 |  3.80    2.07
0.817    3.97 | 1.817    6.14 | 2.817    2.93 |  3.82    2.07
0.833    3.97 | 1.833    6.14 | 2.833    2.93 |  3.83    2.07
0.850    4.51 | 1.850    5.54 | 2.850    2.83 |  3.85    2.03
0.867    4.51 | 1.867    5.54 | 2.867    2.83 |  3.87    2.03
0.883    4.51 | 1.883    5.54 | 2.883    2.83 |  3.88    2.03
0.900    4.51 | 1.900    5.54 | 2.900    2.83 |  3.90    2.03
0.917    4.51 | 1.917    5.54 | 2.917    2.83 |  3.92    2.03
0.933    5.29 | 1.933    5.06 | 2.933    2.73 |  3.93    1.99
0.950    5.29 | 1.950    5.06 | 2.950    2.73 |  3.95    1.99
0.967    5.29 | 1.967    5.06 | 2.967    2.73 |  3.97    1.99
0.983    5.29 | 1.983    5.06 | 2.983    2.73 |  3.98    1.99
1.000    5.29 | 2.000    5.06 | 3.000    2.73 |  4.00    1.99

Max.Eff.Inten.(mm/hr)=      87.43        15.87
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```
               over (min)        5.00         4.00
     Storage Coeff.  (min)=       3.53 (ii)    4.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00         4.00
     Unit Hyd. peak  (cms)=       0.28         0.28
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.00         0.610 (iii)
     TIME TO PEAK    (hrs)=       1.37         1.37          1.37
     RUNOFF VOLUME    (mm)=      24.04         8.11         24.02
     TOTAL RAINFALL   (mm)=      25.04        25.04         25.04
     RUNOFF COEFFICIENT   =       0.96         0.32          0.96


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-----------------
|SOAKAWAY(  0009)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=2293.75   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level   (m)=   0.00
                   Width           (m)=   1.00   Min. Drawdown        (hr)=  24.00
                   Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 917.50

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0051

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)         (mm)
        INFLOW:ID= 2     3.67         0.610             1.37        24.02
     OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow            )=      100.00
               Time to reach Max storage              (Hr)=       4.15
               Volume of water for drawdown in LID (cu.m.)=      835.37
               Volume of maximum water storage     (cu.m.)=      837.70
               Calculated Drawdown Time               (Hr)=       71.40

  -------------------------
  | Junction Command(0010) |
  -------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0009)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0010)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0624)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.87         5.87
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     279.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43         6.41
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       3.80 (ii)   20.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.25         0.05
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.77         0.06          0.781 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75           1.33
     RUNOFF VOLUME    (mm)=      24.04         4.28          11.20
     TOTAL RAINFALL   (mm)=      25.04        25.04          25.04
     RUNOFF COEFFICIENT   =       0.96         0.17           0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0010 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0002 <ID= 3> IS ALSO DRY
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-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0002 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0002 = HYDROGRAPH 0624
       ID1= 3 (  0002):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0624):    11.74   0.781     1.33    11.20
       ==================================================
       ID = 1 (  0002):    11.74   0.781     1.33    11.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):    11.74   0.781     1.33    11.20
     + ID2= 2 (  6241):     4.56   0.319     1.33    11.20
       ==================================================
       ID = 3 (  0002):    16.30   1.100     1.33    11.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    16.30   1.100     1.33    11.20
     + ID2= 2 (  0625):     7.31   0.460     1.33    11.19
       ==================================================
       ID = 1 (  0002):    23.61   1.561     1.33    11.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0629)|   Area    (ha)=   0.29
```

|ID= 1 DT= 1.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.23	0.06
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	43.97	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

			TOTALS
Max.Eff.Inten.(mm/hr)=	87.43	18.63	
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.65 (ii)	3.54 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.40	0.31	
PEAK FLOW (cms)=	0.04	0.00	0.041 (iii)
TIME TO PEAK (hrs)=	1.35	1.37	1.35
RUNOFF VOLUME (mm)=	24.04	5.83	17.66
TOTAL RAINFALL (mm)=	25.04	25.04	25.04
RUNOFF COEFFICIENT =	0.96	0.23	0.71

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0006)					
Inlet Cap.= 0.099					
#of Inlets= 1					
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
TOTAL HYD.(ID= 1):	0.29	0.04	1.35	17.66	
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00	
MINOR SYS.(ID= 3):	0.29	0.04	1.35	17.66	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (0628)|	Area (ha)= 0.53
ID= 1 DT= 1.0 min	Total Imp(%)= 85.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.45	0.08
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	59.44	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56

0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12
0.767	3.97	1.767	6.14	2.767	2.93	3.77	2.07
0.783	3.97	1.783	6.14	2.783	2.93	3.78	2.07
0.800	3.97	1.800	6.14	2.800	2.93	3.80	2.07
0.817	3.97	1.817	6.14	2.817	2.93	3.82	2.07
0.833	3.97	1.833	6.14	2.833	2.93	3.83	2.07
0.850	4.51	1.850	5.54	2.850	2.83	3.85	2.03
0.867	4.51	1.867	5.54	2.867	2.83	3.87	2.03
0.883	4.51	1.883	5.54	2.883	2.83	3.88	2.03
0.900	4.51	1.900	5.54	2.900	2.83	3.90	2.03
0.917	4.51	1.917	5.54	2.917	2.83	3.92	2.03
0.933	5.29	1.933	5.06	2.933	2.73	3.93	1.99
0.950	5.29	1.950	5.06	2.950	2.73	3.95	1.99
0.967	5.29	1.967	5.06	2.967	2.73	3.97	1.99
0.983	5.29	1.983	5.06	2.983	2.73	3.98	1.99
1.000	5.29	2.000	5.06	3.000	2.73	4.00	1.99

Max.Eff.Inten.(mm/hr)=		87.43	24.73	
over (min)		5.00	4.00	
Storage Coeff. (min)=		1.97 (ii)	3.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	4.00	
Unit Hyd. peak (cms)=		0.38	0.30	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.01	0.078 (iii)
TIME TO PEAK	(hrs)=	1.35	1.37	1.37
RUNOFF VOLUME	(mm)=	24.04	6.60	18.81
TOTAL RAINFALL	(mm)=	25.04	25.04	25.04
RUNOFF COEFFICIENT	=	0.96	0.26	0.75

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0633)	Area	(ha)=	0.07
ID= 1 DT= 1.0 min	Total Imp(%)=	80.00	Dir. Conn.(%)= 65.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.06	0.01
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	21.60	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.10	1.017	6.53	2.017	4.68	3.02	2.64
0.033	2.10	1.033	6.53	2.033	4.68	3.03	2.64
0.050	2.10	1.050	6.53	2.050	4.68	3.05	2.64
0.067	2.10	1.067	6.53	2.067	4.68	3.07	2.64
0.083	2.10	1.083	6.53	2.083	4.68	3.08	2.64
0.100	2.20	1.100	8.86	2.100	4.36	3.10	2.56
0.117	2.20	1.117	8.86	2.117	4.36	3.12	2.56
0.133	2.20	1.133	8.86	2.133	4.36	3.13	2.56
0.150	2.20	1.150	8.86	2.150	4.36	3.15	2.56
0.167	2.20	1.167	8.86	2.167	4.36	3.17	2.56
0.183	2.31	1.183	16.26	2.183	4.09	3.18	2.48
0.200	2.31	1.200	16.26	2.200	4.09	3.20	2.48
0.217	2.31	1.217	16.26	2.217	4.09	3.22	2.48
0.233	2.31	1.233	16.26	2.233	4.09	3.23	2.48
0.250	2.31	1.250	16.26	2.250	4.09	3.25	2.48
0.267	2.45	1.267	87.43	2.267	3.85	3.27	2.41
0.283	2.45	1.283	87.43	2.283	3.85	3.28	2.41
0.300	2.45	1.300	87.43	2.300	3.85	3.30	2.41
0.317	2.45	1.317	87.43	2.317	3.85	3.32	2.41
0.333	2.45	1.333	87.43	2.333	3.85	3.33	2.41
0.350	2.60	1.350	19.89	2.350	3.65	3.35	2.35
0.367	2.60	1.367	19.89	2.367	3.65	3.37	2.35
0.383	2.60	1.383	19.89	2.383	3.65	3.38	2.35
0.400	2.60	1.400	19.89	2.400	3.65	3.40	2.35
0.417	2.60	1.417	19.89	2.417	3.65	3.42	2.35
0.433	2.78	1.433	12.66	2.433	3.47	3.43	2.29
0.450	2.78	1.450	12.66	2.450	3.47	3.45	2.29
0.467	2.78	1.467	12.66	2.467	3.47	3.47	2.29
0.483	2.78	1.483	12.66	2.483	3.47	3.48	2.29
0.500	2.78	1.500	12.66	2.500	3.47	3.50	2.29
0.517	2.99	1.517	9.71	2.517	3.32	3.52	2.23
0.533	2.99	1.533	9.71	2.533	3.32	3.53	2.23
0.550	2.99	1.550	9.71	2.550	3.32	3.55	2.23
0.567	2.99	1.567	9.71	2.567	3.32	3.57	2.23
0.583	2.99	1.583	9.71	2.583	3.32	3.58	2.23
0.600	3.24	1.600	8.03	2.600	3.17	3.60	2.17
0.617	3.24	1.617	8.03	2.617	3.17	3.62	2.17
0.633	3.24	1.633	8.03	2.633	3.17	3.63	2.17
0.650	3.24	1.650	8.03	2.650	3.17	3.65	2.17
0.667	3.24	1.667	8.03	2.667	3.17	3.67	2.17
0.683	3.56	1.683	6.93	2.683	3.05	3.68	2.12
0.700	3.56	1.700	6.93	2.700	3.05	3.70	2.12
0.717	3.56	1.717	6.93	2.717	3.05	3.72	2.12
0.733	3.56	1.733	6.93	2.733	3.05	3.73	2.12
0.750	3.56	1.750	6.93	2.750	3.05	3.75	2.12

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               0.767    3.97 | 1.767    6.14 | 2.767    2.93 |  3.77    2.07
               0.783    3.97 | 1.783    6.14 | 2.783    2.93 |  3.78    2.07
               0.800    3.97 | 1.800    6.14 | 2.800    2.93 |  3.80    2.07
               0.817    3.97 | 1.817    6.14 | 2.817    2.93 |  3.82    2.07
               0.833    3.97 | 1.833    6.14 | 2.833    2.93 |  3.83    2.07
               0.850    4.51 | 1.850    5.54 | 2.850    2.83 |  3.85    2.03
               0.867    4.51 | 1.867    5.54 | 2.867    2.83 |  3.87    2.03
               0.883    4.51 | 1.883    5.54 | 2.883    2.83 |  3.88    2.03
               0.900    4.51 | 1.900    5.54 | 2.900    2.83 |  3.90    2.03
               0.917    4.51 | 1.917    5.54 | 2.917    2.83 |  3.92    2.03
               0.933    5.29 | 1.933    5.06 | 2.933    2.73 |  3.93    1.99
               0.950    5.29 | 1.950    5.06 | 2.950    2.73 |  3.95    1.99
               0.967    5.29 | 1.967    5.06 | 2.967    2.73 |  3.97    1.99
               0.983    5.29 | 1.983    5.06 | 2.983    2.73 |  3.98    1.99
               1.000    5.29 | 2.000    5.06 | 3.000    2.73 |  4.00    1.99

     Max.Eff.Inten.(mm/hr)=      87.43        18.63
               over (min)        5.00         3.00
     Storage Coeff.  (min)=      1.07 (ii)    2.97 (ii)
     Unit Hyd. Tpeak (min)=      5.00         3.00
     Unit Hyd. peak  (cms)=      0.47         0.38
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.00         0.011 (iii)
     TIME TO PEAK    (hrs)=      1.35         1.35          1.35
     RUNOFF VOLUME    (mm)=     24.04         5.83         17.66
     TOTAL RAINFALL   (mm)=     25.04        25.04         25.04
     RUNOFF COEFFICIENT   =      0.96         0.23          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.36         0.09
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.50
     Length            (m)=     54.77        10.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      87.43        18.63
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.88 (ii)    3.77 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.32         0.25
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.07         0.01         0.072 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=     24.04         5.83         17.66
     TOTAL RAINFALL   (mm)=     25.04        25.04         25.04
     RUNOFF COEFFICIENT   =      0.96         0.23          0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.29   0.041     1.35    17.66
     + ID2= 2 (  0628):     0.53   0.078     1.37    18.81
       ====================================================
       ID = 3 (  0001):     0.82   0.119     1.35    18.40

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.82   0.119     1.35    18.40
     + ID2= 2 (  0633):     0.07   0.011     1.35    17.66
       ====================================================
       ID = 1 (  0001):     0.89   0.130     1.35    18.34

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.89   0.130     1.35    18.34
     + ID2= 2 (  0634):     0.45   0.072     1.33    17.66
       ====================================================
       ID = 3 (  0001):     1.34   0.192     1.35    18.11

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.34   0.192     1.35    18.11
     + ID2= 2 (  0002):    23.61   1.561     1.33    11.20
       ====================================================
       ID = 3 (  0003):    24.95   1.751     1.33    11.57

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.9471      1.7418
                          0.0238      0.1755  |    1.2374      1.9546
                          0.0564      0.3556  |    1.5542      2.1707
                          0.0756      0.5404  |    1.8953      2.3901
                          0.0909      0.7298  |    2.2592      2.6129
                          0.1337      0.9241  |    2.6444      2.8392
                          0.2699      1.1230  |    3.0498      3.0690
                          0.4583      1.3261  |    3.4745      3.3026
                          0.6861      1.5323  |    0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    24.950     1.751      1.33      11.57
   OUTFLOW: ID= 1 (  0013)    24.950     0.038      4.13       9.13
```

```
                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.17
                TIME SHIFT OF PEAK FLOW         (min)=168.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.2535

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    24.95   0.038     4.13     9.13
     + ID2= 2 (  0050):    29.12   0.197     1.52     3.73
       ==================================================
       ID = 3 (  0005):    54.07   0.215     1.53     6.22

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    54.07   0.215     1.53     6.22
     + ID2= 2 (  0057):     7.91   0.019     4.03    12.08
       ==================================================
       ID = 1 (  0005):    61.98   0.227     1.53     6.97

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

    Unit Hyd Qpeak  (cms)=   1.360

    PEAK FLOW       (cms)=   0.074 (i)
    TIME TO PEAK    (hrs)=   2.083
    RUNOFF VOLUME    (mm)=   3.116
    TOTAL RAINFALL   (mm)=  25.040
    RUNOFF COEFFICIENT   =   0.124

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------

                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.20         0.20
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.50
    Length            (m)=      51.64        20.00
    Mannings n            =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    2.10 | 1.017    6.53 | 2.017    4.68 |  3.02    2.64
     0.033    2.10 | 1.033    6.53 | 2.033    4.68 |  3.03    2.64
     0.050    2.10 | 1.050    6.53 | 2.050    4.68 |  3.05    2.64
     0.067    2.10 | 1.067    6.53 | 2.067    4.68 |  3.07    2.64
     0.083    2.10 | 1.083    6.53 | 2.083    4.68 |  3.08    2.64
     0.100    2.20 | 1.100    8.86 | 2.100    4.36 |  3.10    2.56
     0.117    2.20 | 1.117    8.86 | 2.117    4.36 |  3.12    2.56
     0.133    2.20 | 1.133    8.86 | 2.133    4.36 |  3.13    2.56
     0.150    2.20 | 1.150    8.86 | 2.150    4.36 |  3.15    2.56
     0.167    2.20 | 1.167    8.86 | 2.167    4.36 |  3.17    2.56
     0.183    2.31 | 1.183   16.26 | 2.183    4.09 |  3.18    2.48
     0.200    2.31 | 1.200   16.26 | 2.200    4.09 |  3.20    2.48
     0.217    2.31 | 1.217   16.26 | 2.217    4.09 |  3.22    2.48
     0.233    2.31 | 1.233   16.26 | 2.233    4.09 |  3.23    2.48
     0.250    2.31 | 1.250   16.26 | 2.250    4.09 |  3.25    2.48
     0.267    2.45 | 1.267   87.43 | 2.267    3.85 |  3.27    2.41
     0.283    2.45 | 1.283   87.43 | 2.283    3.85 |  3.28    2.41
     0.300    2.45 | 1.300   87.43 | 2.300    3.85 |  3.30    2.41
     0.317    2.45 | 1.317   87.43 | 2.317    3.85 |  3.32    2.41
     0.333    2.45 | 1.333   87.43 | 2.333    3.85 |  3.33    2.41
     0.350    2.60 | 1.350   19.89 | 2.350    3.65 |  3.35    2.35
     0.367    2.60 | 1.367   19.89 | 2.367    3.65 |  3.37    2.35
     0.383    2.60 | 1.383   19.89 | 2.383    3.65 |  3.38    2.35
     0.400    2.60 | 1.400   19.89 | 2.400    3.65 |  3.40    2.35
     0.417    2.60 | 1.417   19.89 | 2.417    3.65 |  3.42    2.35
     0.433    2.78 | 1.433   12.66 | 2.433    3.47 |  3.43    2.29
     0.450    2.78 | 1.450   12.66 | 2.450    3.47 |  3.45    2.29
     0.467    2.78 | 1.467   12.66 | 2.467    3.47 |  3.47    2.29
     0.483    2.78 | 1.483   12.66 | 2.483    3.47 |  3.48    2.29
     0.500    2.78 | 1.500   12.66 | 2.500    3.47 |  3.50    2.29
     0.517    2.99 | 1.517    9.71 | 2.517    3.32 |  3.52    2.23
     0.533    2.99 | 1.533    9.71 | 2.533    3.32 |  3.53    2.23
     0.550    2.99 | 1.550    9.71 | 2.550    3.32 |  3.55    2.23
     0.567    2.99 | 1.567    9.71 | 2.567    3.32 |  3.57    2.23
     0.583    2.99 | 1.583    9.71 | 2.583    3.32 |  3.58    2.23
     0.600    3.24 | 1.600    8.03 | 2.600    3.17 |  3.60    2.17
     0.617    3.24 | 1.617    8.03 | 2.617    3.17 |  3.62    2.17
     0.633    3.24 | 1.633    8.03 | 2.633    3.17 |  3.63    2.17
     0.650    3.24 | 1.650    8.03 | 2.650    3.17 |  3.65    2.17
     0.667    3.24 | 1.667    8.03 | 2.667    3.17 |  3.67    2.17
     0.683    3.56 | 1.683    6.93 | 2.683    3.05 |  3.68    2.12
     0.700    3.56 | 1.700    6.93 | 2.700    3.05 |  3.70    2.12
     0.717    3.56 | 1.717    6.93 | 2.717    3.05 |  3.72    2.12
     0.733    3.56 | 1.733    6.93 | 2.733    3.05 |  3.73    2.12
     0.750    3.56 | 1.750    6.93 | 2.750    3.05 |  3.75    2.12
     0.767    3.97 | 1.767    6.14 | 2.767    2.93 |  3.77    2.07
     0.783    3.97 | 1.783    6.14 | 2.783    2.93 |  3.78    2.07
     0.800    3.97 | 1.800    6.14 | 2.800    2.93 |  3.80    2.07
     0.817    3.97 | 1.817    6.14 | 2.817    2.93 |  3.82    2.07
     0.833    3.97 | 1.833    6.14 | 2.833    2.93 |  3.83    2.07
     0.850    4.51 | 1.850    5.54 | 2.850    2.83 |  3.85    2.03
     0.867    4.51 | 1.867    5.54 | 2.867    2.83 |  3.87    2.03
     0.883    4.51 | 1.883    5.54 | 2.883    2.83 |  3.88    2.03
     0.900    4.51 | 1.900    5.54 | 2.900    2.83 |  3.90    2.03
     0.917    4.51 | 1.917    5.54 | 2.917    2.83 |  3.92    2.03
     0.933    5.29 | 1.933    5.06 | 2.933    2.73 |  3.93    1.99
     0.950    5.29 | 1.950    5.06 | 2.950    2.73 |  3.95    1.99
     0.967    5.29 | 1.967    5.06 | 2.967    2.73 |  3.97    1.99
     0.983    5.29 | 1.983    5.06 | 2.983    2.73 |  3.98    1.99
     1.000    5.29 | 2.000    5.06 | 3.000    2.73 |  4.00    1.99

Max.Eff.Inten.(mm/hr)=     87.43         9.45
          over (min)        5.00         8.00
Storage Coeff.  (min)=       1.81 (ii)    7.11 (ii)
Unit Hyd. Tpeak (min)=       5.00         8.00
Unit Hyd. peak  (cms)=       0.39         0.15
                                                  *TOTALS*
PEAK FLOW       (cms)=       0.03         0.00          0.030 (iii)
TIME TO PEAK    (hrs)=       1.35         1.45          1.37
RUNOFF VOLUME    (mm)=      24.04         4.28         11.19
TOTAL RAINFALL   (mm)=      25.04        25.04         25.04
```

```
     RUNOFF COEFFICIENT   =       0.96         0.17          0.45


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0704):     0.40   0.030     1.37    11.19
      + ID2= 2 (  0709):    18.51   0.074     2.08     3.12
        ====================================================
        ID = 3 (  0051):    18.91   0.077     2.08     3.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\374a1dda-8bc9-44bb-
998b-1b1679e5fc59\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\374a1dda-8bc9-44bb-
998b-1b1679e5fc59\scena


DATE: 10/06/2025                          TIME: 09:03:24

USER:



COMMENTS: _____


--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 25-Year                       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 746.000
| Ptotal= 61.68 mm |                          B=   0.085
--------------------                          C=   0.692
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.00    6.81 |  0.75   23.72 |  1.50   14.69 |  2.25    8.35
 0.08    7.29 |  0.83   44.17 |  1.58   13.42 |  2.33    8.01
 0.17    7.85 |  0.92  242.29 |  1.67   12.38 |  2.42    7.70
 0.25    8.53 |  1.00   54.27 |  1.75   11.52 |  2.50    7.42
 0.33    9.38 |  1.08   34.12 |  1.83   10.80 |  2.58    7.17
 0.42   10.47 |  1.17   26.03 |  1.92   10.17 |  2.67    6.93
 0.50   11.94 |  1.25   21.45 |  2.00    9.63 |  2.75    6.71
 0.58   14.04 |  1.33   18.45 |  2.08    9.15 |  2.83    6.51
 0.67   17.37 |  1.42   16.31 |  2.17    8.73 |  2.92    6.32


--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number    (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017    6.81 | 0.767   23.72 | 1.517   14.69 |  2.27    8.35
0.033    6.81 | 0.783   23.72 | 1.533   14.69 |  2.28    8.35
0.050    6.81 | 0.800   23.72 | 1.550   14.69 |  2.30    8.35
0.067    6.81 | 0.817   23.72 | 1.567   14.69 |  2.32    8.35
0.083    6.81 | 0.833   23.72 | 1.583   14.69 |  2.33    8.35
0.100    7.29 | 0.850   44.17 | 1.600   13.42 |  2.35    8.01
0.117    7.29 | 0.867   44.17 | 1.617   13.42 |  2.37    8.01
0.133    7.29 | 0.883   44.17 | 1.633   13.42 |  2.38    8.01
0.150    7.29 | 0.900   44.17 | 1.650   13.42 |  2.40    8.01
0.167    7.29 | 0.917   44.17 | 1.667   13.42 |  2.42    8.01
0.183    7.85 | 0.933  242.29 | 1.683   12.38 |  2.43    7.70
0.200    7.85 | 0.950  242.29 | 1.700   12.38 |  2.45    7.70
0.217    7.85 | 0.967  242.29 | 1.717   12.38 |  2.47    7.70
0.233    7.85 | 0.983  242.29 | 1.733   12.38 |  2.48    7.70
0.250    7.85 | 1.000  242.29 | 1.750   12.38 |  2.50    7.70
0.267    8.53 | 1.017   54.28 | 1.767   11.52 |  2.52    7.42
0.283    8.53 | 1.033   54.27 | 1.783   11.52 |  2.53    7.42
0.300    8.53 | 1.050   54.27 | 1.800   11.52 |  2.55    7.42
0.317    8.53 | 1.067   54.27 | 1.817   11.52 |  2.57    7.42
0.333    8.53 | 1.083   54.27 | 1.833   11.52 |  2.58    7.42
0.350    9.38 | 1.100   34.12 | 1.850   10.80 |  2.60    7.17
0.367    9.38 | 1.117   34.12 | 1.867   10.80 |  2.62    7.17
0.383    9.38 | 1.133   34.12 | 1.883   10.80 |  2.63    7.17
0.400    9.38 | 1.150   34.12 | 1.900   10.80 |  2.65    7.17
0.417    9.38 | 1.167   34.12 | 1.917   10.80 |  2.67    7.17
0.433   10.47 | 1.183   26.03 | 1.933   10.17 |  2.68    6.93
0.450   10.47 | 1.200   26.03 | 1.950   10.17 |  2.70    6.93
0.467   10.47 | 1.217   26.03 | 1.967   10.17 |  2.72    6.93
0.483   10.47 | 1.233   26.03 | 1.983   10.17 |  2.73    6.93
0.500   10.47 | 1.250   26.03 | 2.000   10.17 |  2.75    6.93
0.517   11.94 | 1.267   21.45 | 2.017    9.63 |  2.77    6.71
0.533   11.94 | 1.283   21.45 | 2.033    9.63 |  2.78    6.71
0.550   11.94 | 1.300   21.45 | 2.050    9.63 |  2.80    6.71
0.567   11.94 | 1.317   21.45 | 2.067    9.63 |  2.82    6.71
0.583   11.94 | 1.333   21.45 | 2.083    9.63 |  2.83    6.71
0.600   14.04 | 1.350   18.45 | 2.100    9.15 |  2.85    6.51
0.617   14.04 | 1.367   18.45 | 2.117    9.15 |  2.87    6.51
```

0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

Unit Hyd Qpeak (cms)= 3.083

PEAK FLOW (cms)= 1.060 (i)
TIME TO PEAK (hrs)= 1.133
RUNOFF VOLUME (mm)= 23.467
TOTAL RAINFALL (mm)= 61.678
RUNOFF COEFFICIENT = 0.380

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

CALIB							
NASHYD (0621)	Area (ha)= 6.08	Curve Number (CN)= 70.0					
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00					
	U.H. Tp(hrs)= 0.20						

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.362 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 19.406
TOTAL RAINFALL (mm)= 61.678
RUNOFF COEFFICIENT = 0.315

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

CALIB							
NASHYD (0623)	Area (ha)= 11.20	Curve Number (CN)= 70.0					
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00					
	U.H. Tp(hrs)= 0.46						

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71

0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

Unit Hyd Qpeak (cms)= 0.930

PEAK FLOW (cms)= 0.387 (i)
TIME TO PEAK (hrs)= 1.600
RUNOFF VOLUME (mm)= 19.406
TOTAL RAINFALL (mm)= 61.678
RUNOFF COEFFICIENT = 0.315

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

CALIB	
STANDHYD (0632)	Area (ha)= 0.54
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.43	0.11
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	60.00	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

Max.Eff.Inten.(mm/hr)=	242.29	118.09	
over (min)	5.00	3.00	
Storage Coeff. (min)=	1.32 (ii)	2.58 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.44	0.41	
			TOTALS
PEAK FLOW (cms)=	0.21	0.05	0.252 (iii)
TIME TO PEAK (hrs)=	1.02	1.02	1.02
RUNOFF VOLUME (mm)=	60.68	28.59	49.44
TOTAL RAINFALL (mm)=	61.68	61.68	61.68
RUNOFF COEFFICIENT =	0.98	0.46	0.80

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0621):	6.08	0.362	1.22	19.41
+ ID2= 2 (0623):	11.20	0.387	1.60	19.41
ID = 3 (0050):	17.28	0.636	1.37	19.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0050):	17.28	0.636	1.37	19.41
+ ID2= 2 (0627):	11.30	1.060	1.13	23.47
ID = 1 (0050):	28.58	1.553	1.17	21.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0050):	28.58	1.553	1.17	21.01

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 + ID2= 2 (  0632):     0.54   0.252     1.02    49.44
   ====================================================
   ID = 3 (  0050):    29.12   1.605     1.17    21.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB           |
| STANDHYD (  6221)|   Area    (ha)=   1.18
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.59         0.59
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=      88.69        20.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29       70.14
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.67 (ii)    4.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.12          0.387 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      60.68        23.62          36.59
     TOTAL RAINFALL   (mm)=      61.68        61.68          61.68
     RUNOFF COEFFICIENT   =       0.98         0.38           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB           |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29       73.43
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.71 (ii)    5.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.33         0.39          1.523 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      60.68        24.04          38.70
     TOTAL RAINFALL   (mm)=      61.68        61.68          61.68
     RUNOFF COEFFICIENT   =       0.98         0.39           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB           |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29       147.46
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.98 (ii)    1.78 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.04          0.279 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      60.68        30.83          51.72
     TOTAL RAINFALL   (mm)=      61.68        61.68          61.68
     RUNOFF COEFFICIENT   =       0.98         0.50           0.84

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB           |
| STANDHYD (  9622)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     115.76       173.97
     Mannings n            =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    6.81 | 0.767   23.72 | 1.517   14.69 |  2.27    8.35
     0.033    6.81 | 0.783   23.72 | 1.533   14.69 |  2.28    8.35
     0.050    6.81 | 0.800   23.72 | 1.550   14.69 |  2.30    8.35
     0.067    6.81 | 0.817   23.72 | 1.567   14.69 |  2.32    8.35
     0.083    6.81 | 0.833   23.72 | 1.583   14.69 |  2.33    8.35
     0.100    7.29 | 0.850   44.17 | 1.600   13.42 |  2.35    8.01
     0.117    7.29 | 0.867   44.17 | 1.617   13.42 |  2.37    8.01
     0.133    7.29 | 0.883   44.17 | 1.633   13.42 |  2.38    8.01
     0.150    7.29 | 0.900   44.17 | 1.650   13.42 |  2.40    8.01
     0.167    7.29 | 0.917   44.17 | 1.667   13.42 |  2.42    8.01
     0.183    7.85 | 0.933  242.29 | 1.683   12.38 |  2.43    7.70
     0.200    7.85 | 0.950  242.29 | 1.700   12.38 |  2.45    7.70
     0.217    7.85 | 0.967  242.29 | 1.717   12.38 |  2.47    7.70
```

```
              0.233    7.85 | 0.983  242.29 | 1.733   12.38 |  2.48    7.70
              0.250    7.85 | 1.000  242.29 | 1.750   12.38 |  2.50    7.70
              0.267    8.53 | 1.017   54.28 | 1.767   11.52 |  2.52    7.42
              0.283    8.53 | 1.033   54.27 | 1.783   11.52 |  2.53    7.42
              0.300    8.53 | 1.050   54.27 | 1.800   11.52 |  2.55    7.42
              0.317    8.53 | 1.067   54.27 | 1.817   11.52 |  2.57    7.42
              0.333    8.53 | 1.083   54.27 | 1.833   11.52 |  2.58    7.42
              0.350    9.38 | 1.100   34.12 | 1.850   10.80 |  2.60    7.17
              0.367    9.38 | 1.117   34.12 | 1.867   10.80 |  2.62    7.17
              0.383    9.38 | 1.133   34.12 | 1.883   10.80 |  2.63    7.17
              0.400    9.38 | 1.150   34.12 | 1.900   10.80 |  2.65    7.17
              0.417    9.38 | 1.167   34.12 | 1.917   10.80 |  2.67    7.17
              0.433   10.47 | 1.183   26.03 | 1.933   10.17 |  2.68    6.93
              0.450   10.47 | 1.200   26.03 | 1.950   10.17 |  2.70    6.93
              0.467   10.47 | 1.217   26.03 | 1.967   10.17 |  2.72    6.93
              0.483   10.47 | 1.233   26.03 | 1.983   10.17 |  2.73    6.93
              0.500   10.47 | 1.250   26.03 | 2.000   10.17 |  2.75    6.93
              0.517   11.94 | 1.267   21.45 | 2.017    9.63 |  2.77    6.71
              0.533   11.94 | 1.283   21.45 | 2.033    9.63 |  2.78    6.71
              0.550   11.94 | 1.300   21.45 | 2.050    9.63 |  2.80    6.71
              0.567   11.94 | 1.317   21.45 | 2.067    9.63 |  2.82    6.71
              0.583   11.94 | 1.333   21.45 | 2.083    9.63 |  2.83    6.71
              0.600   14.04 | 1.350   18.45 | 2.100    9.15 |  2.85    6.51
              0.617   14.04 | 1.367   18.45 | 2.117    9.15 |  2.87    6.51
              0.633   14.04 | 1.383   18.45 | 2.133    9.15 |  2.88    6.51
              0.650   14.04 | 1.400   18.45 | 2.150    9.15 |  2.90    6.51
              0.667   14.04 | 1.417   18.45 | 2.167    9.15 |  2.92    6.51
              0.683   17.37 | 1.433   16.31 | 2.183    8.73 |  2.93    6.32
              0.700   17.37 | 1.450   16.31 | 2.200    8.73 |  2.95    6.32
              0.717   17.37 | 1.467   16.31 | 2.217    8.73 |  2.97    6.32
              0.733   17.37 | 1.483   16.31 | 2.233    8.73 |  2.98    6.32
              0.750   17.37 | 1.500   16.31 | 2.250    8.73 |  3.00    6.32

     Max.Eff.Inten.(mm/hr)=     242.29       148.28
                over (min)        5.00         3.00
     Storage Coeff.  (min)=       1.96 (ii)    2.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.38         0.47
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.08         0.00          1.083 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.00           1.02
     RUNOFF VOLUME    (mm)=      60.68        60.68          60.68
     TOTAL RAINFALL   (mm)=      61.68        61.68          61.68
     RUNOFF COEFFICIENT   =       0.98         0.98           0.98


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  = 100.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0054)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=1256.25   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 502.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     2.01         1.083             1.02        60.69

   OVERFLOW:ID= 3     2.01         0.845             1.05        34.71

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow              )=       42.80
              Time to reach Max storage              (Hr)=        1.05
              Volume of water for drawdown in LID (cu.m.)=      487.48
              Volume of maximum water storage     (cu.m.)=      502.50
              Calculated Drawdown Time               (Hr)=       76.08

  -------------------------
  | Junction Command(0056) |
  -------------------------

                             AREA     QPEAK   TPEAK     R.V.
                             (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0054)    2.01      0.85     1.05    34.71
  OUTFLOW: ID= 2(  0056)    2.01      0.85     1.05    34.71

  -------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0056):     2.01   0.845     1.05    34.71
     + ID2= 2 (  0622):     5.16   1.523     1.00    38.70
       ==================================================
       ID = 3 (  0004):     7.17   1.907     1.05    37.58

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     7.17   1.907     1.05    37.58
     + ID2= 2 (  6221):     1.18   0.387     1.00    36.59
       ==================================================
       ID = 1 (  0004):     8.35   2.151     1.05    37.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     8.35   2.151     1.05    37.44
     + ID2= 2 (  0631):     0.50   0.279     1.00    51.72
       ==================================================
       ID = 3 (  0004):     8.85   2.305     1.05    38.25

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.1860      0.3754
                          0.0066      0.0316   |    0.2577      0.4191
                          0.0127      0.0646   |    0.3376      0.4638
                          0.0167      0.0989   |    0.4857      0.5095
                          0.0199      0.1347   |    0.6908      0.5561
                          0.0227      0.1718   |    0.9350      0.6038
                          0.0251      0.2104   |    1.2116      0.6525
                          0.0356      0.2502   |    1.5167      0.7022
```

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                          0.0723      0.2910   |    1.8476      0.7529
                          0.1236      0.3327   |    2.2023      0.8049

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0004)     8.850      2.305      1.05      38.25
   OUTFLOW: ID= 1 (  0014)     8.850      0.083      3.05      32.24

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.58
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2993

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-------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      84.46        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29       118.09
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.23 (ii)    4.12 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.24
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.46         0.08         0.540 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      60.68        28.59         49.44
     TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
     RUNOFF COEFFICIENT   =       0.98         0.46          0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.540      1.00      49.44
   OUTFLOW: ID= 1 (  0015)     1.070      0.039      1.58      48.77

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.26
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0329

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-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0014):     8.85   0.083     3.05    32.24
     + ID2= 2 (  0015):     1.07   0.039     1.58    48.77
       ================================================
       ID = 3 (  0057):     9.92   0.109     3.02    34.02

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29        70.14
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.50 (ii)    5.37 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.95         0.38          1.143 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      60.68        23.62         36.59
     TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
     RUNOFF COEFFICIENT   =       0.98         0.38          0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29        70.14
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.88 (ii)    7.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.47         0.52          1.729 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      60.68        23.62         36.59
     TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
     RUNOFF COEFFICIENT   =       0.98         0.38          0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
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          CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n           =      0.013        0.013

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    6.81 | 0.767   23.72 | 1.517   14.69 |  2.27    8.35
 0.033    6.81 | 0.783   23.72 | 1.533   14.69 |  2.28    8.35
 0.050    6.81 | 0.800   23.72 | 1.550   14.69 |  2.30    8.35
 0.067    6.81 | 0.817   23.72 | 1.567   14.69 |  2.32    8.35
 0.083    6.81 | 0.833   23.72 | 1.583   14.69 |  2.33    8.35
 0.100    7.29 | 0.850   44.17 | 1.600   13.42 |  2.35    8.01
 0.117    7.29 | 0.867   44.17 | 1.617   13.42 |  2.37    8.01
 0.133    7.29 | 0.883   44.17 | 1.633   13.42 |  2.38    8.01
 0.150    7.29 | 0.900   44.17 | 1.650   13.42 |  2.40    8.01
 0.167    7.29 | 0.917   44.17 | 1.667   13.42 |  2.42    8.01
 0.183    7.85 | 0.933  242.29 | 1.683   12.38 |  2.43    7.70
 0.200    7.85 | 0.950  242.29 | 1.700   12.38 |  2.45    7.70
 0.217    7.85 | 0.967  242.29 | 1.717   12.38 |  2.47    7.70
 0.233    7.85 | 0.983  242.29 | 1.733   12.38 |  2.48    7.70
 0.250    7.85 | 1.000  242.29 | 1.750   12.38 |  2.50    7.70
 0.267    8.53 | 1.017   54.28 | 1.767   11.52 |  2.52    7.42
 0.283    8.53 | 1.033   54.27 | 1.783   11.52 |  2.53    7.42
 0.300    8.53 | 1.050   54.27 | 1.800   11.52 |  2.55    7.42
 0.317    8.53 | 1.067   54.27 | 1.817   11.52 |  2.57    7.42
 0.333    8.53 | 1.083   54.27 | 1.833   11.52 |  2.58    7.42
 0.350    9.38 | 1.100   34.12 | 1.850   10.80 |  2.60    7.17
 0.367    9.38 | 1.117   34.12 | 1.867   10.80 |  2.62    7.17
 0.383    9.38 | 1.133   34.12 | 1.883   10.80 |  2.63    7.17
 0.400    9.38 | 1.150   34.12 | 1.900   10.80 |  2.65    7.17
 0.417    9.38 | 1.167   34.12 | 1.917   10.80 |  2.67    7.17
 0.433   10.47 | 1.183   26.03 | 1.933   10.17 |  2.68    6.93
 0.450   10.47 | 1.200   26.03 | 1.950   10.17 |  2.70    6.93
 0.467   10.47 | 1.217   26.03 | 1.967   10.17 |  2.72    6.93
 0.483   10.47 | 1.233   26.03 | 1.983   10.17 |  2.73    6.93
 0.500   10.47 | 1.250   26.03 | 2.000   10.17 |  2.75    6.93
 0.517   11.94 | 1.267   21.45 | 2.017    9.63 |  2.77    6.71
 0.533   11.94 | 1.283   21.45 | 2.033    9.63 |  2.78    6.71
 0.550   11.94 | 1.300   21.45 | 2.050    9.63 |  2.80    6.71
 0.567   11.94 | 1.317   21.45 | 2.067    9.63 |  2.82    6.71
 0.583   11.94 | 1.333   21.45 | 2.083    9.63 |  2.83    6.71
 0.600   14.04 | 1.350   18.45 | 2.100    9.15 |  2.85    6.51
 0.617   14.04 | 1.367   18.45 | 2.117    9.15 |  2.87    6.51
 0.633   14.04 | 1.383   18.45 | 2.133    9.15 |  2.88    6.51
 0.650   14.04 | 1.400   18.45 | 2.150    9.15 |  2.90    6.51
 0.667   14.04 | 1.417   18.45 | 2.167    9.15 |  2.92    6.51
 0.683   17.37 | 1.433   16.31 | 2.183    8.73 |  2.93    6.32
 0.700   17.37 | 1.450   16.31 | 2.200    8.73 |  2.95    6.32
 0.717   17.37 | 1.467   16.31 | 2.217    8.73 |  2.97    6.32
 0.733   17.37 | 1.483   16.31 | 2.233    8.73 |  2.98    6.32
 0.750   17.37 | 1.500   16.31 | 2.250    8.73 |  3.00    6.32

   Max.Eff.Inten.(mm/hr)=     242.29       148.28
             over (min)        5.00         3.00
   Storage Coeff.  (min)=       2.50 (ii)    2.60 (ii)
   Unit Hyd. Tpeak (min)=       5.00         3.00
   Unit Hyd. peak  (cms)=       0.34         0.41
                                                      *TOTALS*
   PEAK FLOW       (cms)=       2.32         0.00         2.322 (iii)
   TIME TO PEAK    (hrs)=       1.03         1.02          1.03
   RUNOFF VOLUME    (mm)=      60.68        60.68         60.68
   TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
   RUNOFF COEFFICIENT   =       0.98         0.98          0.98


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  = 100.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-----------------
|SOAKAWAY(  0011)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=2850.00   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level   (m)=   0.00
                   Width           (m)=   1.00   Min. Drawdown       (hr)=  24.00
                   Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)=1140.00

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0051

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)         (mm)
       INFLOW:ID= 2    4.56         2.322             1.03        60.68
     OVERFLOW:ID= 3    4.56         1.910             1.07        34.70

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                    If RVout= (Overflow             )=       42.81
              Time to reach Max storage              (Hr)=        1.05
              Volume of water for drawdown in LID (cu.m.)=     1138.10
              Volume of maximum water storage     (cu.m.)=     1140.00
              Calculated Drawdown Time               (Hr)=       78.30

  -------------------------
  | Junction Command(0012) |
  -------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0011)    4.56     1.91    1.07    34.70
  OUTFLOW: ID= 2(  0012)    4.56     1.91    1.07    34.70

  --------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  9625)|   Area    (ha)=   3.67
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.67         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     156.42        40.00
     Mannings n           =      0.013        0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

Max.Eff.Inten.(mm/hr)=	242.29	83.91	
over (min)	5.00	3.00	
Storage Coeff. (min)=	2.35 (ii)	2.66 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.35	0.41	
			TOTALS
PEAK FLOW (cms)=	1.90	0.00	1.898 (iii)
TIME TO PEAK (hrs)=	1.03	1.02	1.03
RUNOFF VOLUME (mm)=	60.68	34.49	60.65
TOTAL RAINFALL (mm)=	61.68	61.68	61.68
RUNOFF COEFFICIENT =	0.98	0.56	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0009)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 1.0 MIN | STORAGE LAYER:

Length (m)=2293.75 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.00 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 78.43 Available Storage (cu.m.)= 917.50

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	3.67	1.898	1.03	60.65
OVERFLOW:ID= 3	3.67	1.537	1.07	34.68

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 42.82
Time to reach Max storage (Hr)= 1.05
Volume of water for drawdown in LID (cu.m.)= 915.87
Volume of maximum water storage (cu.m.)= 917.50
Calculated Drawdown Time (Hr)= 78.28

Junction Command(0010)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0009)	3.67	1.54	1.07	34.68
OUTFLOW: ID= 2(0010)	3.67	1.54	1.07	34.68

CALIB
STANDHYD (0624)
ID= 1 DT= 5.0 min

Area (ha)= 11.74
Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.87	5.87	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	2.50	2.50	
Length	(m)=	279.76	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		242.29	70.14	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.53 (ii)	7.02 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.29	0.14	
				TOTALS
PEAK FLOW	(cms)=	2.45	0.85	2.878 (iii)
TIME TO PEAK	(hrs)=	1.00	1.08	1.00
RUNOFF VOLUME	(mm)=	60.68	23.62	36.59
TOTAL RAINFALL	(mm)=	61.68	61.68	61.68
RUNOFF COEFFICIENT	=	0.98	0.38	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

```
--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     3.67   1.537     1.07    34.68
     + ID2= 2 (  0012):     4.56   1.910     1.07    34.70
       ====================================================
       ID = 3 (  0002):     8.23   3.448     1.07    34.69
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):     8.23   3.448     1.07    34.69
     + ID2= 2 (  0624):    11.74   2.878     1.00    36.59
       ====================================================
       ID = 1 (  0002):    19.97   5.404     1.07    35.81
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):    19.97   5.404     1.07    35.81
     + ID2= 2 (  6241):     4.56   1.143     1.00    36.59
       ====================================================
       ID = 3 (  0002):    24.53   6.204     1.07    35.95
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    24.53   6.204     1.07    35.95
     + ID2= 2 (  0625):     7.31   1.729     1.00    36.59
       ====================================================
       ID = 1 (  0002):    31.84   7.426     1.07    36.10
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n           =      0.013        0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35		
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35		
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35		
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35		
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35		
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01		
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01		
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01		
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01		
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01		
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70		
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70		
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70		
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70		
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70		
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42		
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42		
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42		
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42		
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42		
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17		
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17		
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17		
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17		
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17		
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93		
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93		
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93		
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93		
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93		
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71		
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71		
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71		
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71		
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71		
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51		
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51		
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51		
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51		
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51		
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32		
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32		
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32		
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32		
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32		

```
Max.Eff.Inten.(mm/hr)=     242.29       118.09
          over (min)          5.00         3.00
Storage Coeff.  (min)=        1.10 (ii)    2.35 (ii)
Unit Hyd. Tpeak (min)=        5.00         3.00
Unit Hyd. peak  (cms)=        0.46         0.44
                                                  *TOTALS*
PEAK FLOW       (cms)=        0.11         0.03          0.139 (iii)
TIME TO PEAK    (hrs)=        1.02         1.02           1.02
RUNOFF VOLUME    (mm)=       60.68        28.59          49.44
TOTAL RAINFALL   (mm)=       61.68        61.68          61.68
RUNOFF COEFFICIENT   =        0.98         0.46           0.80
```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.29      0.14      1.02   49.44
     ==========================================================
     MAJOR SYS.(ID= 2):   0.01      0.04      1.02   49.44
     MINOR SYS.(ID= 3):   0.28      0.10      1.00   49.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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-------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0628)|   Area    (ha)=   0.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.45         0.08
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      59.44        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

```
Max.Eff.Inten.(mm/hr)=     242.29       147.46
            over (min)       5.00         3.00
Storage Coeff.  (min)=       1.31 (ii)    2.40 (ii)
Unit Hyd. Tpeak (min)=       5.00         3.00
Unit Hyd. peak  (cms)=       0.44         0.43
                                                  *TOTALS*
PEAK FLOW       (cms)=       0.22         0.04          0.261 (iii)
TIME TO PEAK    (hrs)=       1.02         1.02           1.02
RUNOFF VOLUME    (mm)=      60.68        30.83          51.72
TOTAL RAINFALL   (mm)=      61.68        61.68          61.68
RUNOFF COEFFICIENT   =       0.98         0.50           0.84


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN*  =  70.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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-------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0633)|   Area    (ha)=   0.07
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.06         0.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      21.60        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17

```
                0.367    9.38 | 1.117   34.12 | 1.867   10.80 |  2.62    7.17
                0.383    9.38 | 1.133   34.12 | 1.883   10.80 |  2.63    7.17
                0.400    9.38 | 1.150   34.12 | 1.900   10.80 |  2.65    7.17
                0.417    9.38 | 1.167   34.12 | 1.917   10.80 |  2.67    7.17
                0.433   10.47 | 1.183   26.03 | 1.933   10.17 |  2.68    6.93
                0.450   10.47 | 1.200   26.03 | 1.950   10.17 |  2.70    6.93
                0.467   10.47 | 1.217   26.03 | 1.967   10.17 |  2.72    6.93
                0.483   10.47 | 1.233   26.03 | 1.983   10.17 |  2.73    6.93
                0.500   10.47 | 1.250   26.03 | 2.000   10.17 |  2.75    6.93
                0.517   11.94 | 1.267   21.45 | 2.017    9.63 |  2.77    6.71
                0.533   11.94 | 1.283   21.45 | 2.033    9.63 |  2.78    6.71
                0.550   11.94 | 1.300   21.45 | 2.050    9.63 |  2.80    6.71
                0.567   11.94 | 1.317   21.45 | 2.067    9.63 |  2.82    6.71
                0.583   11.94 | 1.333   21.45 | 2.083    9.63 |  2.83    6.71
                0.600   14.04 | 1.350   18.45 | 2.100    9.15 |  2.85    6.51
                0.617   14.04 | 1.367   18.45 | 2.117    9.15 |  2.87    6.51
                0.633   14.04 | 1.383   18.45 | 2.133    9.15 |  2.88    6.51
                0.650   14.04 | 1.400   18.45 | 2.150    9.15 |  2.90    6.51
                0.667   14.04 | 1.417   18.45 | 2.167    9.15 |  2.92    6.51
                0.683   17.37 | 1.433   16.31 | 2.183    8.73 |  2.93    6.32
                0.700   17.37 | 1.450   16.31 | 2.200    8.73 |  2.95    6.32
                0.717   17.37 | 1.467   16.31 | 2.217    8.73 |  2.97    6.32
                0.733   17.37 | 1.483   16.31 | 2.233    8.73 |  2.98    6.32
                0.750   17.37 | 1.500   16.31 | 2.250    8.73 |  3.00    6.32

     Max.Eff.Inten.(mm/hr)=     242.29       118.09
               over (min)        5.00         2.00
     Storage Coeff.  (min)=       0.71 (ii)    1.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00         2.00
     Unit Hyd. peak  (cms)=       0.51         0.56
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.01         0.035 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.00          1.02
     RUNOFF VOLUME    (mm)=      60.68        28.59         49.44
     TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
     RUNOFF COEFFICIENT   =       0.98         0.46          0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.29       118.09
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.25 (ii)    2.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.29
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.04         0.234 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      60.68        28.59         49.44
     TOTAL RAINFALL   (mm)=      61.68        61.68         61.68
     RUNOFF COEFFICIENT   =       0.98         0.46          0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.28   0.099     1.00    49.44
     + ID2= 2 (  0628):     0.53   0.261     1.02    51.72
       ================================================
       ID = 3 (  0001):     0.81   0.360     1.02    50.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.81   0.360     1.02    50.94
     + ID2= 2 (  0633):     0.07   0.035     1.02    49.44
       ================================================
       ID = 1 (  0001):     0.88   0.395     1.02    50.82

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.88   0.395     1.02    50.82
     + ID2= 2 (  0634):     0.45   0.234     1.00    49.44
       ================================================
       ID = 3 (  0001):     1.33   0.612     1.00    50.35

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.33   0.612     1.00    50.35
     + ID2= 2 (  0002):    31.84   7.426     1.07    36.10
       ================================================
       ID = 3 (  0003):    33.17   7.804     1.07    36.67

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|    OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |    0.9471      1.7418
                         0.0238      0.1755   |    1.2374      1.9546
                         0.0564      0.3556   |    1.5542      2.1707
                         0.0756      0.5404   |    1.8953      2.3901
```

```
                        0.0909      0.7298   |    2.2592      2.6129
                        0.1337      0.9241   |    2.6444      2.8392
                        0.2699      1.1230   |    3.0498      3.0690
                        0.4583      1.3261   |    3.4745      3.3026
                        0.6861      1.5323   |    0.0000      0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)     33.166      7.804      1.07      36.67
   OUTFLOW: ID= 1 (  0013)     33.166      0.248      3.08      29.99

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.18
                  TIME SHIFT OF PEAK FLOW         (min)=121.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0908

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    33.17   0.248     3.08    29.99
     + ID2= 2 (  0050):    29.12   1.605     1.17    21.54
       ====================================================
       ID = 3 (  0005):    62.29   1.681     1.17    26.04

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    62.29   1.681     1.17    26.04
     + ID2= 2 (  0057):     9.92   0.109     3.02    34.02
       ====================================================
       ID = 1 (  0005):    72.21   1.734     1.17    27.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

    Unit Hyd Qpeak  (cms)=   1.360

    PEAK FLOW       (cms)=   0.589 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=  19.405
    TOTAL RAINFALL   (mm)=  61.678
    RUNOFF COEFFICIENT   =   0.315

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
    Surface Area    (ha)=       0.20         0.20
    Dep. Storage    (mm)=       1.00         5.00
    Average Slope    (%)=       1.00         2.50
    Length           (m)=      51.64        20.00
    Mannings n          =      0.013        0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	6.81	0.767	23.72	1.517	14.69	2.27	8.35
0.033	6.81	0.783	23.72	1.533	14.69	2.28	8.35
0.050	6.81	0.800	23.72	1.550	14.69	2.30	8.35
0.067	6.81	0.817	23.72	1.567	14.69	2.32	8.35
0.083	6.81	0.833	23.72	1.583	14.69	2.33	8.35
0.100	7.29	0.850	44.17	1.600	13.42	2.35	8.01
0.117	7.29	0.867	44.17	1.617	13.42	2.37	8.01
0.133	7.29	0.883	44.17	1.633	13.42	2.38	8.01
0.150	7.29	0.900	44.17	1.650	13.42	2.40	8.01
0.167	7.29	0.917	44.17	1.667	13.42	2.42	8.01
0.183	7.85	0.933	242.29	1.683	12.38	2.43	7.70
0.200	7.85	0.950	242.29	1.700	12.38	2.45	7.70
0.217	7.85	0.967	242.29	1.717	12.38	2.47	7.70
0.233	7.85	0.983	242.29	1.733	12.38	2.48	7.70
0.250	7.85	1.000	242.29	1.750	12.38	2.50	7.70
0.267	8.53	1.017	54.28	1.767	11.52	2.52	7.42
0.283	8.53	1.033	54.27	1.783	11.52	2.53	7.42
0.300	8.53	1.050	54.27	1.800	11.52	2.55	7.42
0.317	8.53	1.067	54.27	1.817	11.52	2.57	7.42
0.333	8.53	1.083	54.27	1.833	11.52	2.58	7.42
0.350	9.38	1.100	34.12	1.850	10.80	2.60	7.17
0.367	9.38	1.117	34.12	1.867	10.80	2.62	7.17
0.383	9.38	1.133	34.12	1.883	10.80	2.63	7.17
0.400	9.38	1.150	34.12	1.900	10.80	2.65	7.17
0.417	9.38	1.167	34.12	1.917	10.80	2.67	7.17
0.433	10.47	1.183	26.03	1.933	10.17	2.68	6.93
0.450	10.47	1.200	26.03	1.950	10.17	2.70	6.93
0.467	10.47	1.217	26.03	1.967	10.17	2.72	6.93
0.483	10.47	1.233	26.03	1.983	10.17	2.73	6.93
0.500	10.47	1.250	26.03	2.000	10.17	2.75	6.93
0.517	11.94	1.267	21.45	2.017	9.63	2.77	6.71
0.533	11.94	1.283	21.45	2.033	9.63	2.78	6.71
0.550	11.94	1.300	21.45	2.050	9.63	2.80	6.71
0.567	11.94	1.317	21.45	2.067	9.63	2.82	6.71
0.583	11.94	1.333	21.45	2.083	9.63	2.83	6.71
0.600	14.04	1.350	18.45	2.100	9.15	2.85	6.51
0.617	14.04	1.367	18.45	2.117	9.15	2.87	6.51
0.633	14.04	1.383	18.45	2.133	9.15	2.88	6.51
0.650	14.04	1.400	18.45	2.150	9.15	2.90	6.51
0.667	14.04	1.417	18.45	2.167	9.15	2.92	6.51
0.683	17.37	1.433	16.31	2.183	8.73	2.93	6.32
0.700	17.37	1.450	16.31	2.200	8.73	2.95	6.32
0.717	17.37	1.467	16.31	2.217	8.73	2.97	6.32
0.733	17.37	1.483	16.31	2.233	8.73	2.98	6.32
0.750	17.37	1.500	16.31	2.250	8.73	3.00	6.32

```
Max.Eff.Inten.(mm/hr)=     242.29        70.14
          over (min)          5.00         5.00
Storage Coeff.  (min)=        1.21 (ii)    4.73 (ii)
Unit Hyd. Tpeak (min)=        5.00         5.00
Unit Hyd. peak  (cms)=        0.45         0.23
                                                  *TOTALS*
PEAK FLOW       (cms)=        0.08         0.04          0.114 (iii)
TIME TO PEAK    (hrs)=        1.02         1.05          1.03
RUNOFF VOLUME    (mm)=       60.68        23.62         36.59
TOTAL RAINFALL   (mm)=       61.68        61.68         61.68
RUNOFF COEFFICIENT   =        0.98         0.38          0.59

  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN*  =  70.0    Ia = Dep. Storage  (Above)
```

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0051)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0704):	0.40	0.114	1.03	36.59
+	ID2= 2 (0709):	18.51	0.589	1.67	19.40
	ID = 3 (0051):	18.91	0.600	1.67	19.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\b5e711fb-3471-4117-8c90-3c7ad9da9d80\scena
Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\b5e711fb-3471-4117-8c90-3c7ad9da9d80\scena

DATE: 10/06/2025 TIME: 09:03:22

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : 2-Year                      **
**********************************************
```

CHICAGO STORM		IDF curve parameters: A= 415.000
Ptotal= 36.05 mm		B= 0.027
		C= 0.682
	used in:	INTENSITY = A / (t + B)^C
	Duration of storm	= 3.00 hrs
	Storm time step	= 5.00 min
	Time to peak ratio	= 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.10	0.75	13.98	1.50	8.73	2.25	5.01
0.08	4.38	0.83	25.67	1.58	7.99	2.33	4.81
0.17	4.71	0.92	137.96	1.67	7.38	2.42	4.63
0.25	5.12	1.00	31.39	1.75	6.88	2.50	4.46
0.33	5.62	1.08	19.97	1.83	6.45	2.58	4.31
0.42	6.26	1.17	15.32	1.92	6.08	2.67	4.17
0.50	7.12	1.25	12.67	2.00	5.76	2.75	4.04
0.58	8.35	1.33	10.93	2.08	5.48	2.83	3.92
0.67	10.30	1.42	9.68	2.17	5.23	2.92	3.81

CALIB					
NASHYD (0627)|	Area	(ha)=	11.30	Curve Number	(CN)= 76.0
ID= 1 DT= 1.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.14		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92
0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81

	0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
	0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
	0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

Unit Hyd Qpeak (cms)= 3.083

PEAK FLOW (cms)= 0.341 (i)
TIME TO PEAK (hrs)= 1.150
RUNOFF VOLUME (mm)= 8.667
TOTAL RAINFALL (mm)= 36.054
RUNOFF COEFFICIENT = 0.240

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

CALIB								
NASHYD (0621)	Area (ha)= 6.08	Curve Number (CN)= 70.0						
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00						
	U.H. Tp(hrs)= 0.20							

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92
0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81
0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.114 (i)
TIME TO PEAK (hrs)= 1.250
RUNOFF VOLUME (mm)= 6.893
TOTAL RAINFALL (mm)= 36.054
RUNOFF COEFFICIENT = 0.191

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

CALIB								
NASHYD (0623)	Area (ha)= 11.20	Curve Number (CN)= 70.0						
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00						
	U.H. Tp(hrs)= 0.46							

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92

0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81
0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

Unit Hyd Qpeak (cms)= 0.930

PEAK FLOW (cms)= 0.127 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 6.893
TOTAL RAINFALL (mm)= 36.054
RUNOFF COEFFICIENT = 0.191

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

CALIB	
STANDHYD (0632)	Area (ha)= 0.54
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.43	0.11
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	60.00	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92
0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81
0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

			TOTALS
Max.Eff.Inten.(mm/hr)=	137.96	43.57	
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.65 (ii)	3.23 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.40	0.32	
PEAK FLOW (cms)=	0.11	0.01	0.126 (iii)
TIME TO PEAK (hrs)=	1.02	1.03	1.02
RUNOFF VOLUME (mm)=	35.05	11.55	26.82
TOTAL RAINFALL (mm)=	36.05	36.05	36.05
RUNOFF COEFFICIENT =	0.97	0.32	0.74

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0621):	6.08	0.114	1.25	6.89
+ ID2= 2 (0623):	11.20	0.127	1.67	6.89
ID = 3 (0050):	17.28	0.205	1.42	6.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0050):	17.28	0.205	1.42	6.89
+ ID2= 2 (0627):	11.30	0.341	1.15	8.67
ID = 1 (0050):	28.58	0.497	1.20	7.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0050):	28.58	0.497	1.20	7.59
+ ID2= 2 (0632):	0.54	0.126	1.02	26.82
ID = 3 (0050):	29.12	0.524	1.18	7.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (6221)	Area (ha)= 1.18
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.59	0.59
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	5.00
Length	(m)=	88.69	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		137.96	23.92
over (min)		5.00	10.00
Storage Coeff. (min)=		2.09 (ii)	5.68 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00
Unit Hyd. peak (cms)=		0.31	0.15

		TOTALS
PEAK FLOW	(cms)=	0.15 0.03 0.161 (iii)
TIME TO PEAK	(hrs)=	1.00 1.08 1.00
RUNOFF VOLUME	(mm)=	35.05 8.95 18.08
TOTAL RAINFALL	(mm)=	36.05 36.05 36.05
RUNOFF COEFFICIENT	=	0.97 0.25 0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0622)	Area (ha)= 5.16
ID= 1 DT= 5.0 min	Total Imp(%)= 55.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.84	2.32
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	2.50
Length	(m)=	185.47	30.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		137.96	25.23
over (min)		5.00	15.00
Storage Coeff. (min)=		2.15 (ii)	11.78 (ii)
Unit Hyd. Tpeak (min)=		5.00	15.00
Unit Hyd. peak (cms)=		0.31	0.09

		TOTALS
PEAK FLOW	(cms)=	0.73 0.08 0.752 (iii)
TIME TO PEAK	(hrs)=	1.00 1.17 1.00
RUNOFF VOLUME	(mm)=	35.05 9.16 19.52
TOTAL RAINFALL	(mm)=	36.05 36.05 36.05
RUNOFF COEFFICIENT	=	0.97 0.25 0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0631)	Area (ha)= 0.50
ID= 1 DT= 5.0 min	Total Imp(%)= 85.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.42	0.07
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.50	2.50
Length	(m)=	57.74	6.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		137.96	56.17
over (min)		5.00	5.00
Storage Coeff. (min)=		1.23 (ii)	2.23 (ii)
Unit Hyd. Tpeak (min)=		5.00	5.00
Unit Hyd. peak (cms)=		0.33	0.30

		TOTALS
PEAK FLOW	(cms)=	0.13 0.02 0.148 (iii)
TIME TO PEAK	(hrs)=	1.00 1.00 1.00
RUNOFF VOLUME	(mm)=	35.05 12.80 28.38
TOTAL RAINFALL	(mm)=	36.05 36.05 36.05
RUNOFF COEFFICIENT	=	0.97 0.35 0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (9622)	Area (ha)= 2.01
ID= 1 DT= 1.0 min	Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.01	0.00
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	5.00
Length	(m)=	115.76	173.97
Mannings n	=	0.013	0.013

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46

```
              0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
              0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
              0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
              0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
              0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
              0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
              0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
              0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
              0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
              0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
              0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
              0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
              0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
              0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
              0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
              0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
              0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
              0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
              0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
              0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
              0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
              0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
              0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
              0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
              0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
              0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
              0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

    Max.Eff.Inten.(mm/hr)=     137.96        84.68
              over (min)          5.00         3.00
    Storage Coeff.  (min)=       2.45 (ii)    2.57 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.34         0.41
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.59         0.00          0.587 (iii)
    TIME TO PEAK    (hrs)=       1.03         1.02           1.03
    RUNOFF VOLUME    (mm)=      35.05        35.05          35.05
    TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
    RUNOFF COEFFICIENT   =       0.97         0.97           0.97


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  = 100.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-----------------
|SOAKAWAY(  0054)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=1256.25   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level    (m)=   0.00
                   Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                   Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 502.50

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0051

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)          (mm)
      INFLOW:ID= 2     2.01         0.587             1.03         35.07
    OVERFLOW:ID= 3     2.01         0.059             1.47          9.12

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow            )=       74.01
              Time to reach Max storage             (Hr)=        1.45

              Volume of water for drawdown in LID (cu.m.)=      489.24
              Volume of maximum water storage     (cu.m.)=      502.50
              Calculated Drawdown Time              (Hr)=       76.35

  -------------------------
  | Junction Command(0056) |
  -------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0054)    2.01     0.06    1.47     9.12
  OUTFLOW: ID= 2(  0056)    2.01     0.06    1.47     9.12

  --------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0056):     2.01   0.059     1.47     9.12
     + ID2= 2 (  0622):     5.16   0.752     1.00    19.52
       ================================================
       ID = 3 (  0004):     7.17   0.752     1.00    16.60

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     7.17   0.752     1.00    16.60
     + ID2= 2 (  6221):     1.18   0.161     1.00    18.08
       ================================================
       ID = 1 (  0004):     8.35   0.914     1.00    16.81

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     8.35   0.914     1.00    16.81
     + ID2= 2 (  0631):     0.50   0.148     1.00    28.38
       ================================================
       ID = 3 (  0004):     8.85   1.062     1.00    17.46

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |    0.1860      0.3754
                         0.0066      0.0316   |    0.2577      0.4191
                         0.0127      0.0646   |    0.3376      0.4638
                         0.0167      0.0989   |    0.4857      0.5095
                         0.0199      0.1347   |    0.6908      0.5561
                         0.0227      0.1718   |    0.9350      0.6038
                         0.0251      0.2104   |    1.2116      0.6525
                         0.0356      0.2502   |    1.5167      0.7022
                         0.0723      0.2910   |    1.8476      0.7529
                         0.1236      0.3327   |    2.2023      0.8049

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
```

```
   INFLOW : ID= 2 (  0004)     8.850     1.062     1.00      17.46
   OUTFLOW: ID= 1 (  0014)     8.850     0.020     3.12      15.44

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.91
                  TIME SHIFT OF PEAK FLOW         (min)=127.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1397

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      84.46        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     137.96        43.57
                 over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.54 (ii)    5.16 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.02         0.269 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      35.05        11.55         26.82
     TOTAL RAINFALL   (mm)=      36.05        36.05         36.05
     RUNOFF COEFFICIENT   =       0.97         0.32          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.269      1.00      26.82
   OUTFLOW: ID= 1 (  0015)     1.070      0.011      2.58      26.15

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.26
                  TIME SHIFT OF PEAK FLOW         (min)= 95.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0218

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-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0014):     8.85   0.020     3.12    15.44
      + ID2= 2 (  0015):     1.07   0.011     2.58    26.15
        ==========================================================
        ID = 3 (  0057):     9.92   0.031     3.00    16.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     137.96        23.92
                 over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.14 (ii)    6.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.51         0.11          0.562 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      35.05         8.95         18.08
     TOTAL RAINFALL   (mm)=      36.05        36.05         36.05
     RUNOFF COEFFICIENT   =       0.97         0.25          0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     137.96        23.92
                 over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.61 (ii)   13.45 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.25         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.77         0.12          0.808 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.00
     RUNOFF VOLUME    (mm)=      35.05         8.95         18.08
     TOTAL RAINFALL   (mm)=      36.05        36.05         36.05
     RUNOFF COEFFICIENT   =       0.97         0.25          0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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------------------
| CALIB            |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n           =      0.013        0.013

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
              0.017    4.10 | 0.767   13.98 | 1.517    8.73 |  2.27    5.01
              0.033    4.10 | 0.783   13.98 | 1.533    8.73 |  2.28    5.01
              0.050    4.10 | 0.800   13.98 | 1.550    8.73 |  2.30    5.01
              0.067    4.10 | 0.817   13.98 | 1.567    8.73 |  2.32    5.01
              0.083    4.10 | 0.833   13.98 | 1.583    8.73 |  2.33    5.01
              0.100    4.38 | 0.850   25.66 | 1.600    7.99 |  2.35    4.81
              0.117    4.38 | 0.867   25.67 | 1.617    7.99 |  2.37    4.81
              0.133    4.38 | 0.883   25.67 | 1.633    7.99 |  2.38    4.81
              0.150    4.38 | 0.900   25.67 | 1.650    7.99 |  2.40    4.81
              0.167    4.38 | 0.917   25.67 | 1.667    7.99 |  2.42    4.81
              0.183    4.71 | 0.933  137.96 | 1.683    7.38 |  2.43    4.63
              0.200    4.71 | 0.950  137.96 | 1.700    7.38 |  2.45    4.63
              0.217    4.71 | 0.967  137.96 | 1.717    7.38 |  2.47    4.63
              0.233    4.71 | 0.983  137.96 | 1.733    7.38 |  2.48    4.63
              0.250    4.71 | 1.000  137.96 | 1.750    7.38 |  2.50    4.63
              0.267    5.12 | 1.017   31.39 | 1.767    6.88 |  2.52    4.46
              0.283    5.12 | 1.033   31.39 | 1.783    6.88 |  2.53    4.46
              0.300    5.12 | 1.050   31.39 | 1.800    6.88 |  2.55    4.46
              0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
              0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
              0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
              0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
              0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
              0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
              0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
              0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
              0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
              0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
              0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
              0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
              0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
              0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
              0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
              0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
              0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
              0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
              0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
              0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
              0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
              0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
              0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
              0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
              0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
              0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
              0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

     Max.Eff.Inten.(mm/hr)=     137.96        84.68
               over (min)        5.00         4.00
     Storage Coeff.  (min)=       3.14 (ii)    3.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00         4.00
     Unit Hyd. peak  (cms)=       0.30         0.32
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.24         0.00          1.243 (iii)
     TIME TO PEAK    (hrs)=       1.03         1.02           1.03
     RUNOFF VOLUME    (mm)=      35.05        35.05          35.05
     TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
     RUNOFF COEFFICIENT   =       0.97         0.97           0.97


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  = 100.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
|SOAKAWAY(  0011)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2850.00   Height                  (m)=   1.00
                    Porosity           =   0.40   Initial Water Level     (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown          (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)=1140.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
        INFLOW:ID= 2    4.56         1.243             1.03        35.05
      OVERFLOW:ID= 3    4.56         0.137             1.47         9.10

                Volume Reduction Rate[(RVin-RVout)/RVin](%):
                         If RVout= (Overflow             )=       74.03
                Time to reach Max storage              (Hr)=        1.45
                Volume of water for drawdown in LID (cu.m.)=     1137.58
                Volume of maximum water storage     (cu.m.)=     1140.00
                Calculated Drawdown Time               (Hr)=       78.25

  --------------------------
  | Junction Command(0012) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0011)    4.56     0.14    1.47     9.10
  OUTFLOW: ID= 2(  0012)    4.56     0.14    1.47     9.10

  --------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  9625)|   Area    (ha)=   3.67
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.67         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     156.42        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92
0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81
0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

Max.Eff.Inten.(mm/hr)=	137.96	33.96		
over (min)	5.00	4.00		
Storage Coeff. (min)=	2.94 (ii)	3.33 (ii)		
Unit Hyd. Tpeak (min)=	5.00	4.00		
Unit Hyd. peak (cms)=	0.31	0.32		
				TOTALS
PEAK FLOW (cms)=	1.02	0.00		1.020 (iii)
TIME TO PEAK (hrs)=	1.03	1.03		1.03
RUNOFF VOLUME (mm)=	35.05	15.04		35.03
TOTAL RAINFALL (mm)=	36.05	36.05		36.05
RUNOFF COEFFICIENT =	0.97	0.42		0.97

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0009)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 1.0 MIN | STORAGE LAYER:

Length (m)=2293.75	Height (m)=	1.00	
Porosity =	0.40	Initial Water Level (m)=	0.00
Width (m)=	1.00	Min. Drawdown (hr)=	24.00
Max. Drawdown (hr)=	78.43	Available Storage (cu.m.)=	917.50

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	3.67	1.020	1.03	35.03
OVERFLOW:ID= 3	3.67	0.110	1.47	9.09

Volume Reduction Rate[(RVin-RVout)/RVin](%):		
If RVout= (Overflow)=		74.06
Time to reach Max storage	(Hr)=	1.45
Volume of water for drawdown in LID	(cu.m.)=	915.44
Volume of maximum water storage	(cu.m.)=	917.50
Calculated Drawdown Time	(Hr)=	78.25

Junction Command(0010)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0009)	3.67	0.11	1.47	9.09
OUTFLOW: ID= 2(0010)	3.67	0.11	1.47	9.09

CALIB
STANDHYD (0624)
ID= 1 DT= 5.0 min

Area (ha)= 11.74
Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.87	5.87	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	2.50	2.50	
Length	(m)=	279.76	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		137.96	23.92	
over (min)		5.00	15.00	
Storage Coeff. (min)=		3.16 (ii)	13.01 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.27	0.08	
				TOTALS
PEAK FLOW	(cms)=	1.30	0.19	1.360 (iii)
TIME TO PEAK	(hrs)=	1.00	1.17	1.00
RUNOFF VOLUME	(mm)=	35.05	8.95	18.08
TOTAL RAINFALL	(mm)=	36.05	36.05	36.05
RUNOFF COEFFICIENT	=	0.97	0.25	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     3.67   0.110     1.47     9.09
      + ID2= 2 (  0012):     4.56   0.137     1.47     9.10
        ====================================================
        ID = 3 (  0002):     8.23   0.247     1.47     9.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):     8.23   0.247     1.47     9.10
      + ID2= 2 (  0624):    11.74   1.360     1.00    18.08
        ====================================================
        ID = 1 (  0002):    19.97   1.360     1.00    14.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    19.97   1.360     1.00    14.38
      + ID2= 2 (  6241):     4.56   0.562     1.00    18.08
        ====================================================
        ID = 3 (  0002):    24.53   1.922     1.00    15.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    24.53   1.922     1.00    15.07
      + ID2= 2 (  0625):     7.31   0.808     1.00    18.08
        ====================================================
        ID = 1 (  0002):    31.84   2.730     1.00    15.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    4.10 | 0.767   13.98 | 1.517    8.73 |  2.27    5.01
               0.033    4.10 | 0.783   13.98 | 1.533    8.73 |  2.28    5.01
               0.050    4.10 | 0.800   13.98 | 1.550    8.73 |  2.30    5.01
               0.067    4.10 | 0.817   13.98 | 1.567    8.73 |  2.32    5.01
               0.083    4.10 | 0.833   13.98 | 1.583    8.73 |  2.33    5.01
               0.100    4.38 | 0.850   25.66 | 1.600    7.99 |  2.35    4.81
               0.117    4.38 | 0.867   25.67 | 1.617    7.99 |  2.37    4.81
               0.133    4.38 | 0.883   25.67 | 1.633    7.99 |  2.38    4.81
               0.150    4.38 | 0.900   25.67 | 1.650    7.99 |  2.40    4.81
               0.167    4.38 | 0.917   25.67 | 1.667    7.99 |  2.42    4.81
               0.183    4.71 | 0.933  137.96 | 1.683    7.38 |  2.43    4.63
               0.200    4.71 | 0.950  137.96 | 1.700    7.38 |  2.45    4.63
               0.217    4.71 | 0.967  137.96 | 1.717    7.38 |  2.47    4.63
               0.233    4.71 | 0.983  137.96 | 1.733    7.38 |  2.48    4.63
               0.250    4.71 | 1.000  137.96 | 1.750    7.38 |  2.50    4.63
               0.267    5.12 | 1.017   31.39 | 1.767    6.88 |  2.52    4.46
               0.283    5.12 | 1.033   31.39 | 1.783    6.88 |  2.53    4.46
               0.300    5.12 | 1.050   31.39 | 1.800    6.88 |  2.55    4.46
               0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
               0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
               0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
               0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
               0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
               0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
               0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
               0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
               0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
               0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
               0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
               0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
               0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
               0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
               0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
               0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
               0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
               0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
               0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
               0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
               0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
               0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
               0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
               0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
               0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
               0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
               0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

   Max.Eff.Inten.(mm/hr)=     137.96        43.57
             over (min)         5.00         3.00
   Storage Coeff.  (min)=       1.37 (ii)    2.95 (ii)
   Unit Hyd. Tpeak (min)=       5.00         3.00
   Unit Hyd. peak  (cms)=       0.43         0.38
                                                        *TOTALS*
   PEAK FLOW       (cms)=       0.06         0.01          0.071 (iii)
   TIME TO PEAK    (hrs)=       1.02         1.02           1.02
   RUNOFF VOLUME    (mm)=      35.05        11.55          26.82
   TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
   RUNOFF COEFFICIENT   =       0.97         0.32           0.74

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------       (ha)     (cms)     (hrs)    (mm)
```

```
     TOTAL HYD.(ID= 1):   0.29      0.07      1.02   26.82
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   0.29      0.07      1.02   26.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  0628)|   Area    (ha)=   0.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.45         0.08
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      59.44        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    4.10 | 0.767   13.98 | 1.517    8.73 |  2.27    5.01
 0.033    4.10 | 0.783   13.98 | 1.533    8.73 |  2.28    5.01
 0.050    4.10 | 0.800   13.98 | 1.550    8.73 |  2.30    5.01
 0.067    4.10 | 0.817   13.98 | 1.567    8.73 |  2.32    5.01
 0.083    4.10 | 0.833   13.98 | 1.583    8.73 |  2.33    5.01
 0.100    4.38 | 0.850   25.66 | 1.600    7.99 |  2.35    4.81
 0.117    4.38 | 0.867   25.67 | 1.617    7.99 |  2.37    4.81
 0.133    4.38 | 0.883   25.67 | 1.633    7.99 |  2.38    4.81
 0.150    4.38 | 0.900   25.67 | 1.650    7.99 |  2.40    4.81
 0.167    4.38 | 0.917   25.67 | 1.667    7.99 |  2.42    4.81
 0.183    4.71 | 0.933  137.96 | 1.683    7.38 |  2.43    4.63
 0.200    4.71 | 0.950  137.96 | 1.700    7.38 |  2.45    4.63
 0.217    4.71 | 0.967  137.96 | 1.717    7.38 |  2.47    4.63
 0.233    4.71 | 0.983  137.96 | 1.733    7.38 |  2.48    4.63
 0.250    4.71 | 1.000  137.96 | 1.750    7.38 |  2.50    4.63
 0.267    5.12 | 1.017   31.39 | 1.767    6.88 |  2.52    4.46
 0.283    5.12 | 1.033   31.39 | 1.783    6.88 |  2.53    4.46
 0.300    5.12 | 1.050   31.39 | 1.800    6.88 |  2.55    4.46
 0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
 0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
 0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
 0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
 0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
 0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
 0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
 0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
 0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
 0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
 0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
 0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
 0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
 0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
 0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
 0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
 0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
 0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
 0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
 0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
 0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
 0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
 0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
 0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
 0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
 0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
 0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

  Max.Eff.Inten.(mm/hr)=     137.96        56.17
            over (min)        5.00         4.00
  Storage Coeff.  (min)=       1.64 (ii)    3.01 (ii)
  Unit Hyd. Tpeak (min)=       5.00         4.00
  Unit Hyd. peak  (cms)=       0.41         0.34
                                                  *TOTALS*
  PEAK FLOW       (cms)=       0.12         0.01          0.133 (iii)
  TIME TO PEAK    (hrs)=       1.02         1.03           1.02
  RUNOFF VOLUME    (mm)=      35.05        12.80          28.37
  TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
  RUNOFF COEFFICIENT   =       0.97         0.35           0.79


    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  70.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0633)|   Area    (ha)=   0.07
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.06         0.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      21.60        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    4.10 | 0.767   13.98 | 1.517    8.73 |  2.27    5.01
 0.033    4.10 | 0.783   13.98 | 1.533    8.73 |  2.28    5.01
 0.050    4.10 | 0.800   13.98 | 1.550    8.73 |  2.30    5.01
 0.067    4.10 | 0.817   13.98 | 1.567    8.73 |  2.32    5.01
 0.083    4.10 | 0.833   13.98 | 1.583    8.73 |  2.33    5.01
 0.100    4.38 | 0.850   25.66 | 1.600    7.99 |  2.35    4.81
 0.117    4.38 | 0.867   25.67 | 1.617    7.99 |  2.37    4.81
 0.133    4.38 | 0.883   25.67 | 1.633    7.99 |  2.38    4.81
 0.150    4.38 | 0.900   25.67 | 1.650    7.99 |  2.40    4.81
 0.167    4.38 | 0.917   25.67 | 1.667    7.99 |  2.42    4.81
 0.183    4.71 | 0.933  137.96 | 1.683    7.38 |  2.43    4.63
 0.200    4.71 | 0.950  137.96 | 1.700    7.38 |  2.45    4.63
 0.217    4.71 | 0.967  137.96 | 1.717    7.38 |  2.47    4.63
 0.233    4.71 | 0.983  137.96 | 1.733    7.38 |  2.48    4.63
 0.250    4.71 | 1.000  137.96 | 1.750    7.38 |  2.50    4.63
 0.267    5.12 | 1.017   31.39 | 1.767    6.88 |  2.52    4.46
 0.283    5.12 | 1.033   31.39 | 1.783    6.88 |  2.53    4.46
 0.300    5.12 | 1.050   31.39 | 1.800    6.88 |  2.55    4.46
 0.317    5.12 | 1.067   31.39 | 1.817    6.88 |  2.57    4.46
 0.333    5.12 | 1.083   31.39 | 1.833    6.88 |  2.58    4.46
 0.350    5.62 | 1.100   19.97 | 1.850    6.45 |  2.60    4.31
 0.367    5.62 | 1.117   19.97 | 1.867    6.45 |  2.62    4.31
 0.383    5.62 | 1.133   19.97 | 1.883    6.45 |  2.63    4.31
 0.400    5.62 | 1.150   19.97 | 1.900    6.45 |  2.65    4.31
 0.417    5.62 | 1.167   19.97 | 1.917    6.45 |  2.67    4.31
 0.433    6.26 | 1.183   15.32 | 1.933    6.08 |  2.68    4.17
```

```
               0.450    6.26 | 1.200   15.32 | 1.950    6.08 |  2.70    4.17
               0.467    6.26 | 1.217   15.32 | 1.967    6.08 |  2.72    4.17
               0.483    6.26 | 1.233   15.32 | 1.983    6.08 |  2.73    4.17
               0.500    6.26 | 1.250   15.32 | 2.000    6.08 |  2.75    4.17
               0.517    7.12 | 1.267   12.67 | 2.017    5.76 |  2.77    4.04
               0.533    7.12 | 1.283   12.67 | 2.033    5.76 |  2.78    4.04
               0.550    7.12 | 1.300   12.67 | 2.050    5.76 |  2.80    4.04
               0.567    7.12 | 1.317   12.67 | 2.067    5.76 |  2.82    4.04
               0.583    7.12 | 1.333   12.67 | 2.083    5.76 |  2.83    4.04
               0.600    8.35 | 1.350   10.93 | 2.100    5.48 |  2.85    3.92
               0.617    8.35 | 1.367   10.93 | 2.117    5.48 |  2.87    3.92
               0.633    8.35 | 1.383   10.93 | 2.133    5.48 |  2.88    3.92
               0.650    8.35 | 1.400   10.93 | 2.150    5.48 |  2.90    3.92
               0.667    8.35 | 1.417   10.93 | 2.167    5.48 |  2.92    3.92
               0.683   10.30 | 1.433    9.68 | 2.183    5.23 |  2.93    3.81
               0.700   10.30 | 1.450    9.68 | 2.200    5.23 |  2.95    3.81
               0.717   10.30 | 1.467    9.68 | 2.217    5.23 |  2.97    3.81
               0.733   10.30 | 1.483    9.68 | 2.233    5.23 |  2.98    3.81
               0.750   10.30 | 1.500    9.68 | 2.250    5.23 |  3.00    3.81

     Max.Eff.Inten.(mm/hr)=     137.96        43.57
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       0.90 (ii)    2.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.49         0.42
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.018 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.02           1.02
     RUNOFF VOLUME    (mm)=      35.05        11.55          26.82
     TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
     RUNOFF COEFFICIENT   =       0.97         0.32           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     137.96        43.57
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.57 (ii)    3.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.27
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.01          0.122 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      35.05        11.55          26.82
     TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
     RUNOFF COEFFICIENT   =       0.97         0.32           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.29   0.071     1.02    26.82
     + ID2= 2 (  0628):     0.53   0.133     1.02    28.37
       ==========================================================
       ID = 3 (  0001):     0.82   0.204     1.02    27.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.82   0.204     1.02    27.83
     + ID2= 2 (  0633):     0.07   0.018     1.02    26.82
       ==========================================================
       ID = 1 (  0001):     0.89   0.222     1.02    27.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.89   0.222     1.02    27.75
     + ID2= 2 (  0634):     0.45   0.122     1.00    26.82
       ==========================================================
       ID = 3 (  0001):     1.34   0.326     1.02    27.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.34   0.326     1.02    27.43
     + ID2= 2 (  0002):    31.84   2.730     1.00    15.76
       ==========================================================
       ID = 3 (  0003):    33.18   3.056     1.00    16.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.9471      1.7418
                          0.0238      0.1755  |    1.2374      1.9546
                          0.0564      0.3556  |    1.5542      2.1707
                          0.0756      0.5404  |    1.8953      2.3901
                          0.0909      0.7298  |    2.2592      2.6129
                          0.1337      0.9241  |    2.6444      2.8392
                          0.2699      1.1230  |    3.0498      3.0690
                          0.4583      1.3261  |    3.4745      3.3026
                          0.6861      1.5323  |    0.0000      0.0000
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    33.180     3.056      1.00      16.23
   OUTFLOW: ID= 1 (  0013)    33.180     0.070      3.15      13.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.30
                  TIME SHIFT OF PEAK FLOW         (min)=129.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4898

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    33.18   0.070     3.15    13.12
      + ID2= 2 (  0050):    29.12   0.524     1.18     7.95
        ==================================================
        ID = 3 (  0005):    62.30   0.556     1.18    10.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    62.30   0.556     1.18    10.70
      + ID2= 2 (  0057):     9.92   0.031     3.00    16.59
        ==================================================
        ID = 1 (  0005):    72.22   0.575     1.18    11.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

     Unit Hyd Qpeak  (cms)=   1.360

     PEAK FLOW       (cms)=   0.195 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   6.892
     TOTAL RAINFALL   (mm)=  36.054
     RUNOFF COEFFICIENT   =   0.191

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.20         0.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      51.64        20.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	4.10	0.767	13.98	1.517	8.73	2.27	5.01
0.033	4.10	0.783	13.98	1.533	8.73	2.28	5.01
0.050	4.10	0.800	13.98	1.550	8.73	2.30	5.01
0.067	4.10	0.817	13.98	1.567	8.73	2.32	5.01
0.083	4.10	0.833	13.98	1.583	8.73	2.33	5.01
0.100	4.38	0.850	25.66	1.600	7.99	2.35	4.81
0.117	4.38	0.867	25.67	1.617	7.99	2.37	4.81
0.133	4.38	0.883	25.67	1.633	7.99	2.38	4.81
0.150	4.38	0.900	25.67	1.650	7.99	2.40	4.81
0.167	4.38	0.917	25.67	1.667	7.99	2.42	4.81
0.183	4.71	0.933	137.96	1.683	7.38	2.43	4.63
0.200	4.71	0.950	137.96	1.700	7.38	2.45	4.63
0.217	4.71	0.967	137.96	1.717	7.38	2.47	4.63
0.233	4.71	0.983	137.96	1.733	7.38	2.48	4.63
0.250	4.71	1.000	137.96	1.750	7.38	2.50	4.63
0.267	5.12	1.017	31.39	1.767	6.88	2.52	4.46
0.283	5.12	1.033	31.39	1.783	6.88	2.53	4.46
0.300	5.12	1.050	31.39	1.800	6.88	2.55	4.46
0.317	5.12	1.067	31.39	1.817	6.88	2.57	4.46
0.333	5.12	1.083	31.39	1.833	6.88	2.58	4.46
0.350	5.62	1.100	19.97	1.850	6.45	2.60	4.31
0.367	5.62	1.117	19.97	1.867	6.45	2.62	4.31
0.383	5.62	1.133	19.97	1.883	6.45	2.63	4.31
0.400	5.62	1.150	19.97	1.900	6.45	2.65	4.31
0.417	5.62	1.167	19.97	1.917	6.45	2.67	4.31
0.433	6.26	1.183	15.32	1.933	6.08	2.68	4.17
0.450	6.26	1.200	15.32	1.950	6.08	2.70	4.17
0.467	6.26	1.217	15.32	1.967	6.08	2.72	4.17
0.483	6.26	1.233	15.32	1.983	6.08	2.73	4.17
0.500	6.26	1.250	15.32	2.000	6.08	2.75	4.17
0.517	7.12	1.267	12.67	2.017	5.76	2.77	4.04
0.533	7.12	1.283	12.67	2.033	5.76	2.78	4.04
0.550	7.12	1.300	12.67	2.050	5.76	2.80	4.04
0.567	7.12	1.317	12.67	2.067	5.76	2.82	4.04
0.583	7.12	1.333	12.67	2.083	5.76	2.83	4.04
0.600	8.35	1.350	10.93	2.100	5.48	2.85	3.92
0.617	8.35	1.367	10.93	2.117	5.48	2.87	3.92
0.633	8.35	1.383	10.93	2.133	5.48	2.88	3.92
0.650	8.35	1.400	10.93	2.150	5.48	2.90	3.92
0.667	8.35	1.417	10.93	2.167	5.48	2.92	3.92
0.683	10.30	1.433	9.68	2.183	5.23	2.93	3.81
0.700	10.30	1.450	9.68	2.200	5.23	2.95	3.81
0.717	10.30	1.467	9.68	2.217	5.23	2.97	3.81
0.733	10.30	1.483	9.68	2.233	5.23	2.98	3.81
0.750	10.30	1.500	9.68	2.250	5.23	3.00	3.81

```
  Max.Eff.Inten.(mm/hr)=     137.96        23.92
            over (min)         5.00         6.00
  Storage Coeff.  (min)=       1.51 (ii)    5.93 (ii)
  Unit Hyd. Tpeak (min)=       5.00         6.00
  Unit Hyd. peak  (cms)=       0.42         0.19
                                                    *TOTALS*
  PEAK FLOW       (cms)=       0.05         0.01          0.053 (iii)
  TIME TO PEAK    (hrs)=       1.02         1.08           1.03
  RUNOFF VOLUME    (mm)=      35.05         8.95          18.08
  TOTAL RAINFALL   (mm)=      36.05        36.05          36.05
  RUNOFF COEFFICIENT   =       0.97         0.25           0.50

    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

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--------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     0.40   0.053     1.03    18.08
     + ID2= 2 (  0709):    18.51   0.195     1.75     6.89
       ================================================
       ID = 3 (  0051):    18.91   0.200     1.75     7.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
===============================================================================================================

      V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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8675-197e9cb51560\scena


DATE: 10/06/2025                          TIME: 09:03:25

USER:



COMMENTS: _____


---------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 50-Year                       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 820.000
| Ptotal= 68.06 mm |                          B=   0.010
--------------------                          C=   0.691
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    7.53 |  0.75   26.08 |  1.50   16.20 |  2.25    9.22
                0.08    8.05 |  0.83   48.18 |  1.58   14.79 |  2.33    8.85
                0.17    8.67 |  0.92  269.38 |  1.67   13.66 |  2.42    8.51
                0.25    9.42 |  1.00   59.02 |  1.75   12.71 |  2.50    8.20
                0.33   10.36 |  1.08   37.39 |  1.83   11.91 |  2.58    7.92
                0.42   11.56 |  1.17   28.59 |  1.92   11.23 |  2.67    7.66
                0.50   13.17 |  1.25   23.60 |  2.00   10.63 |  2.75    7.42
                0.58   15.48 |  1.33   20.32 |  2.08   10.11 |  2.83    7.19
                0.67   19.13 |  1.42   17.97 |  2.17    9.64 |  2.92    6.99


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number   (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
                0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
                0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
                0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
                0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
                0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
                0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
                0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
                0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
                0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
                0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
                0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
                0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
                0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
                0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
                0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
                0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
                0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
                0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
                0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
                0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
                0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
                0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
                0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
                0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
                0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
                0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
                0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
                0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
                0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
                0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
                0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
                0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
                0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
                0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
                0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
                0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
                0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
                0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
                0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
                0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
                0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
                0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
                0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
                0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
                0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

    Unit Hyd Qpeak  (cms)=   3.083
```

PEAK FLOW (cms)= 1.277 (i)
TIME TO PEAK (hrs)= 1.133
RUNOFF VOLUME (mm)= 27.757
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.408

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

CALIB					
NASHYD (0621)	Area (ha)=	6.08	Curve Number (CN)=	70.0	
ID= 1 DT= 1.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.20			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	7.53	0.767	26.08	1.517	16.20	2.27	9.22
0.033	7.53	0.783	26.08	1.533	16.20	2.28	9.22
0.050	7.53	0.800	26.08	1.550	16.20	2.30	9.22
0.067	7.53	0.817	26.08	1.567	16.20	2.32	9.22
0.083	7.53	0.833	26.08	1.583	16.20	2.33	9.22
0.100	8.05	0.850	48.18	1.600	14.79	2.35	8.85
0.117	8.05	0.867	48.18	1.617	14.79	2.37	8.85
0.133	8.05	0.883	48.18	1.633	14.79	2.38	8.85
0.150	8.05	0.900	48.18	1.650	14.79	2.40	8.85
0.167	8.05	0.917	48.18	1.667	14.79	2.42	8.85
0.183	8.67	0.933	269.38	1.683	13.66	2.43	8.51
0.200	8.67	0.950	269.38	1.700	13.66	2.45	8.51
0.217	8.67	0.967	269.38	1.717	13.66	2.47	8.51
0.233	8.67	0.983	269.38	1.733	13.66	2.48	8.51
0.250	8.67	1.000	269.38	1.750	13.66	2.50	8.51
0.267	9.42	1.017	59.03	1.767	12.71	2.52	8.20
0.283	9.42	1.033	59.02	1.783	12.71	2.53	8.20
0.300	9.42	1.050	59.02	1.800	12.71	2.55	8.20
0.317	9.42	1.067	59.02	1.817	12.71	2.57	8.20
0.333	9.42	1.083	59.02	1.833	12.71	2.58	8.20
0.350	10.36	1.100	37.39	1.850	11.91	2.60	7.92
0.367	10.36	1.117	37.39	1.867	11.91	2.62	7.92
0.383	10.36	1.133	37.39	1.883	11.91	2.63	7.92
0.400	10.36	1.150	37.39	1.900	11.91	2.65	7.92
0.417	10.36	1.167	37.39	1.917	11.91	2.67	7.92
0.433	11.56	1.183	28.59	1.933	11.23	2.68	7.66
0.450	11.56	1.200	28.59	1.950	11.23	2.70	7.66
0.467	11.56	1.217	28.59	1.967	11.23	2.72	7.66
0.483	11.56	1.233	28.59	1.983	11.23	2.73	7.66
0.500	11.56	1.250	28.59	2.000	11.23	2.75	7.66
0.517	13.17	1.267	23.60	2.017	10.63	2.77	7.42
0.533	13.17	1.283	23.60	2.033	10.63	2.78	7.42
0.550	13.17	1.300	23.60	2.050	10.63	2.80	7.42
0.567	13.17	1.317	23.60	2.067	10.63	2.82	7.42
0.583	13.17	1.333	23.60	2.083	10.63	2.83	7.42
0.600	15.48	1.350	20.32	2.100	10.11	2.85	7.19
0.617	15.48	1.367	20.32	2.117	10.11	2.87	7.19
0.633	15.48	1.383	20.32	2.133	10.11	2.88	7.19
0.650	15.48	1.400	20.32	2.150	10.11	2.90	7.19
0.667	15.48	1.417	20.32	2.167	10.11	2.92	7.19
0.683	19.13	1.433	17.97	2.183	9.64	2.93	6.99
0.700	19.13	1.450	17.97	2.200	9.64	2.95	6.99
0.717	19.13	1.467	17.97	2.217	9.64	2.97	6.99
0.733	19.13	1.483	17.97	2.233	9.64	2.98	6.99
0.750	19.13	1.500	17.97	2.250	9.64	3.00	6.99

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.438 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 23.132
TOTAL RAINFALL (mm)= 68.062
RUNOFF COEFFICIENT = 0.340

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

CALIB					
NASHYD (0623)	Area (ha)=	11.20	Curve Number (CN)=	70.0	
ID= 1 DT= 1.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.46			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	7.53	0.767	26.08	1.517	16.20	2.27	9.22
0.033	7.53	0.783	26.08	1.533	16.20	2.28	9.22
0.050	7.53	0.800	26.08	1.550	16.20	2.30	9.22
0.067	7.53	0.817	26.08	1.567	16.20	2.32	9.22
0.083	7.53	0.833	26.08	1.583	16.20	2.33	9.22
0.100	8.05	0.850	48.18	1.600	14.79	2.35	8.85
0.117	8.05	0.867	48.18	1.617	14.79	2.37	8.85
0.133	8.05	0.883	48.18	1.633	14.79	2.38	8.85
0.150	8.05	0.900	48.18	1.650	14.79	2.40	8.85
0.167	8.05	0.917	48.18	1.667	14.79	2.42	8.85
0.183	8.67	0.933	269.38	1.683	13.66	2.43	8.51
0.200	8.67	0.950	269.38	1.700	13.66	2.45	8.51
0.217	8.67	0.967	269.38	1.717	13.66	2.47	8.51
0.233	8.67	0.983	269.38	1.733	13.66	2.48	8.51
0.250	8.67	1.000	269.38	1.750	13.66	2.50	8.51
0.267	9.42	1.017	59.03	1.767	12.71	2.52	8.20
0.283	9.42	1.033	59.02	1.783	12.71	2.53	8.20
0.300	9.42	1.050	59.02	1.800	12.71	2.55	8.20
0.317	9.42	1.067	59.02	1.817	12.71	2.57	8.20
0.333	9.42	1.083	59.02	1.833	12.71	2.58	8.20
0.350	10.36	1.100	37.39	1.850	11.91	2.60	7.92
0.367	10.36	1.117	37.39	1.867	11.91	2.62	7.92
0.383	10.36	1.133	37.39	1.883	11.91	2.63	7.92
0.400	10.36	1.150	37.39	1.900	11.91	2.65	7.92
0.417	10.36	1.167	37.39	1.917	11.91	2.67	7.92
0.433	11.56	1.183	28.59	1.933	11.23	2.68	7.66
0.450	11.56	1.200	28.59	1.950	11.23	2.70	7.66
0.467	11.56	1.217	28.59	1.967	11.23	2.72	7.66
0.483	11.56	1.233	28.59	1.983	11.23	2.73	7.66
0.500	11.56	1.250	28.59	2.000	11.23	2.75	7.66
0.517	13.17	1.267	23.60	2.017	10.63	2.77	7.42
0.533	13.17	1.283	23.60	2.033	10.63	2.78	7.42
0.550	13.17	1.300	23.60	2.050	10.63	2.80	7.42
0.567	13.17	1.317	23.60	2.067	10.63	2.82	7.42
0.583	13.17	1.333	23.60	2.083	10.63	2.83	7.42
0.600	15.48	1.350	20.32	2.100	10.11	2.85	7.19
0.617	15.48	1.367	20.32	2.117	10.11	2.87	7.19
0.633	15.48	1.383	20.32	2.133	10.11	2.88	7.19
0.650	15.48	1.400	20.32	2.150	10.11	2.90	7.19
0.667	15.48	1.417	20.32	2.167	10.11	2.92	7.19
0.683	19.13	1.433	17.97	2.183	9.64	2.93	6.99
0.700	19.13	1.450	17.97	2.200	9.64	2.95	6.99
0.717	19.13	1.467	17.97	2.217	9.64	2.97	6.99
0.733	19.13	1.483	17.97	2.233	9.64	2.98	6.99
0.750	19.13	1.500	17.97	2.250	9.64	3.00	6.99

```
     Unit Hyd Qpeak  (cms)=   0.930

     PEAK FLOW       (cms)=   0.465 (i)
     TIME TO PEAK    (hrs)=   1.600
     RUNOFF VOLUME    (mm)=  23.132
     TOTAL RAINFALL   (mm)=  68.062
     RUNOFF COEFFICIENT   =   0.340

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

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-------------------
| CALIB            |
| STANDHYD (  0632)|   Area    (ha)=   0.54
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.43         0.11
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      60.00        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
 0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
 0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
 0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
 0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
 0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
 0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
 0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
 0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
 0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
 0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
 0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
 0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
 0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
 0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
 0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
 0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
 0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
 0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
 0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
 0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
 0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
 0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
 0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
 0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
 0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
 0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
 0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
 0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
 0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
 0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
 0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
 0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
 0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
 0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
 0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
 0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
 0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
 0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
 0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
 0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
 0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
 0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
 0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
 0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

     Max.Eff.Inten.(mm/hr)=     269.38       139.64
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       1.26 (ii)    2.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.44         0.42
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.06          0.286 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.02           1.02
     RUNOFF VOLUME    (mm)=      67.06        33.37          55.27
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.49           0.81

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0621):     6.08   0.438     1.22    23.13
      + ID2= 2 (  0623):    11.20   0.465     1.60    23.13
        ==========================================================
        ID = 3 (  0050):    17.28   0.768     1.35    23.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0050)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0050):    17.28   0.768     1.35    23.13
      + ID2= 2 (  0627):    11.30   1.277     1.13    27.76
        ==========================================================
        ID = 1 (  0050):    28.58   1.874     1.17    24.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0050)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0050):    28.58   1.874     1.17    24.96
      + ID2= 2 (  0632):     0.54   0.286     1.02    55.27
        ==========================================================
        ID = 3 (  0050):    29.12   1.931     1.17    25.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  6221)|   Area    (ha)=   1.18
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
```

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--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.59         0.59
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=      88.69        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38        83.97
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.60 (ii)    4.34 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.15          0.447 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      67.06        27.87          41.59
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.41           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38        87.81
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.64 (ii)    5.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.48         0.48          1.726 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      67.06        28.34          43.83
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.42           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38       173.47
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.94 (ii)    1.71 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.05          0.315 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      67.06        35.82          57.69
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.53           0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  9622)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     115.76       173.97
     Mannings n           =      0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
     0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
     0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
     0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
     0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
     0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
     0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
     0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
     0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
     0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
     0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
     0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
     0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
     0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
     0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
     0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
     0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
     0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
     0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
     0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
     0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
     0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
     0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
```

0.400	10.36	1.150	37.39	1.900	11.91	2.65	7.92
0.417	10.36	1.167	37.39	1.917	11.91	2.67	7.92
0.433	11.56	1.183	28.59	1.933	11.23	2.68	7.66
0.450	11.56	1.200	28.59	1.950	11.23	2.70	7.66
0.467	11.56	1.217	28.59	1.967	11.23	2.72	7.66
0.483	11.56	1.233	28.59	1.983	11.23	2.73	7.66
0.500	11.56	1.250	28.59	2.000	11.23	2.75	7.66
0.517	13.17	1.267	23.60	2.017	10.63	2.77	7.42
0.533	13.17	1.283	23.60	2.033	10.63	2.78	7.42
0.550	13.17	1.300	23.60	2.050	10.63	2.80	7.42
0.567	13.17	1.317	23.60	2.067	10.63	2.82	7.42
0.583	13.17	1.333	23.60	2.083	10.63	2.83	7.42
0.600	15.48	1.350	20.32	2.100	10.11	2.85	7.19
0.617	15.48	1.367	20.32	2.117	10.11	2.87	7.19
0.633	15.48	1.383	20.32	2.133	10.11	2.88	7.19
0.650	15.48	1.400	20.32	2.150	10.11	2.90	7.19
0.667	15.48	1.417	20.32	2.167	10.11	2.92	7.19
0.683	19.13	1.433	17.97	2.183	9.64	2.93	6.99
0.700	19.13	1.450	17.97	2.200	9.64	2.95	6.99
0.717	19.13	1.467	17.97	2.217	9.64	2.97	6.99
0.733	19.13	1.483	17.97	2.233	9.64	2.98	6.99
0.750	19.13	1.500	17.97	2.250	9.64	3.00	6.99

Max.Eff.Inten.(mm/hr)=	269.38	164.20	
over (min)	5.00	2.00	
Storage Coeff. (min)=	1.88 (ii)	1.97 (ii)	
Unit Hyd. Tpeak (min)=	5.00	2.00	
Unit Hyd. peak (cms)=	0.38	0.56	
			TOTALS
PEAK FLOW (cms)=	1.22	0.00	1.216 (iii)
TIME TO PEAK (hrs)=	1.02	1.00	1.02
RUNOFF VOLUME (mm)=	67.06	67.06	67.06
TOTAL RAINFALL (mm)=	68.06	68.06	68.06
RUNOFF COEFFICIENT =	0.99	0.99	0.99

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 100.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0054)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 1.0 MIN | STORAGE LAYER:

Length	(m)=1256.25	Height	(m)= 1.00
Porosity	= 0.40	Initial Water Level	(m)= 0.00
Width	(m)= 1.00	Min. Drawdown	(hr)= 24.00
Max. Drawdown (hr)=	78.43	Available Storage	(cu.m.)= 502.50

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0051

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	2.01	1.216	1.02	67.07
OVERFLOW:ID= 3	2.01	1.102	1.05	41.09

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 38.73
Time to reach Max storage (Hr)= 1.03
Volume of water for drawdown in LID (cu.m.)= 487.15
Volume of maximum water storage (cu.m.)= 502.50
Calculated Drawdown Time (Hr)= 76.03

Junction Command(0056)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0054)	2.01	1.10	1.05	41.09
OUTFLOW: ID= 2(0056)	2.01	1.10	1.05	41.09

ADD HYD (0004)| 1 + 2 = 3 |	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0056):	2.01	1.102	1.05	41.09
+ ID2= 2 (0622):	5.16	1.726	1.00	43.83
ID = 3 (0004):	7.17	2.314	1.05	43.06

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0004)| 3 + 2 = 1 |	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0004):	7.17	2.314	1.05	43.06
+ ID2= 2 (6221):	1.18	0.447	1.00	41.59
ID = 1 (0004):	8.35	2.594	1.05	42.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0004)| 1 + 2 = 3 |	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0004):	8.35	2.594	1.05	42.85
+ ID2= 2 (0631):	0.50	0.315	1.00	57.69
ID = 3 (0004):	8.85	2.778	1.03	43.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)| IN= 2---> OUT= 1 | DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1860	0.3754
	0.0066	0.0316	0.2577	0.4191
	0.0127	0.0646	0.3376	0.4638
	0.0167	0.0989	0.4857	0.5095
	0.0199	0.1347	0.6908	0.5561
	0.0227	0.1718	0.9350	0.6038
	0.0251	0.2104	1.2116	0.6525
	0.0356	0.2502	1.5167	0.7022
	0.0723	0.2910	1.8476	0.7529
	0.1236	0.3327	2.2023	0.8049

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	8.850	2.778	1.03	43.69
OUTFLOW: ID= 1 (0014)	8.850	0.117	3.03	37.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.23
TIME SHIFT OF PEAK FLOW (min)=120.00

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                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3277

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| CALIB             |
| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      84.46        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38       139.64
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.18 (ii)    3.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.24
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.51         0.10          0.610 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      67.06        33.37          55.27
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.49           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)     1.070      0.610      1.00      55.27
   OUTFLOW: ID= 1 (  0015)     1.070      0.047      1.50      54.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.71
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0360

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| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0014):     8.85   0.117     3.03    37.34
      + ID2= 2 (  0015):     1.07   0.047     1.50    54.59
        ==========================================================
        ID = 3 (  0057):     9.92   0.148     3.00    39.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| CALIB             |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38        83.97
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.40 (ii)    5.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.07         0.46          1.305 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      67.06        27.87          41.59
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.41           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38        83.97
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.76 (ii)    7.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.65         0.64          1.976 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      67.06        27.87          41.59
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.41           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
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                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36       173.97
     Mannings n           =      0.013        0.013

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
               0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
               0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
               0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
               0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
               0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
               0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
               0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
               0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
               0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
               0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
               0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
               0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
               0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
               0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
               0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
               0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
               0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
               0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
               0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
               0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
               0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
               0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
               0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
               0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
               0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
               0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
               0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
               0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
               0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
               0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
               0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
               0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
               0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
               0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
               0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
               0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
               0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
               0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
               0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
               0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
               0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
               0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
               0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
               0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

     Max.Eff.Inten.(mm/hr)=     269.38       164.20
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       2.40 (ii)    2.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.34         0.42
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.60         0.00          2.605 (iii)
     TIME TO PEAK    (hrs)=       1.03         1.00            1.03
     RUNOFF VOLUME    (mm)=      67.06        67.06           67.06
     TOTAL RAINFALL   (mm)=      68.06        68.06           68.06
     RUNOFF COEFFICIENT   =       0.99         0.99            0.99


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  = 100.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0011)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2850.00   Height                  (m)=   1.00
                    Porosity           =   0.40   Initial Water Level     (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown          (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)=1140.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
        INFLOW:ID= 2    4.56         2.605             1.03        67.06
      OVERFLOW:ID= 3    4.56         2.441             1.05        41.08

               Volume Reduction Rate[(RVin-RVout)/RVin](%):
                        If RVout= (Overflow             )=       38.74
               Time to reach Max storage              (Hr)=        1.03
               Volume of water for drawdown in LID (cu.m.)=     1138.07
               Volume of maximum water storage     (cu.m.)=     1140.00
               Calculated Drawdown Time               (Hr)=       78.28

  --------------------------
  | Junction Command(0012) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0011)    4.56     2.44    1.05    41.08
  OUTFLOW: ID= 2(  0012)    4.56     2.44    1.05    41.08

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  9625)|   Area    (ha)=   3.67
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.67         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     156.42        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
               0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
               0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
               0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
               0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
```

```
                0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
                0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
                0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
                0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
                0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
                0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
                0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
                0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
                0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
                0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
                0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
                0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
                0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
                0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
                0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
                0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
                0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
                0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
                0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
                0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
                0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
                0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
                0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
                0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
                0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
                0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
                0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
                0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
                0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
                0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
                0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
                0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
                0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
                0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
                0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
                0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
                0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
                0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
                0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
                0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
                0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

     Max.Eff.Inten.(mm/hr)=     269.38        97.81
               over (min)         5.00         3.00
     Storage Coeff.  (min)=       2.25 (ii)    2.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.36         0.42
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.13         0.00          2.127 (iii)
     TIME TO PEAK    (hrs)=       1.03         1.02           1.03
     RUNOFF VOLUME    (mm)=      67.06        39.78          67.03
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.58           0.98


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
|SOAKAWAY(  0009)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2293.75   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width              (m)=   1.00   Min. Drawdown          (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 917.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
        INFLOW:ID= 2     3.67         2.127             1.03        67.03
      OVERFLOW:ID= 3     3.67         1.980             1.05        41.06

                Volume Reduction Rate[(RVin-RVout)/RVin](%):
                         If RVout= (Overflow             )=       38.75
                Time to reach Max storage             (Hr)=        1.03
                Volume of water for drawdown in LID (cu.m.)=      915.84
                Volume of maximum water storage     (cu.m.)=      917.50
                Calculated Drawdown Time              (Hr)=       78.28

  -------------------------
  | Junction Command(0010) |
  -------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0009)    3.67     1.98    1.05    41.06
  OUTFLOW: ID= 2(  0010)    3.67     1.98    1.05    41.06

  --------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0624)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.87         5.87
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     279.76        30.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38        83.97
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.42 (ii)    6.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.14
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.75         1.05          3.283 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      67.06        27.87          41.59
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.41           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     3.67   1.980     1.05    41.06
      + ID2= 2 (  0012):     4.56   2.441     1.05    41.08
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        ==================================================
        ID = 3 (  0002):     8.23   4.421     1.05    41.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):     8.23   4.421     1.05    41.07
      + ID2= 2 (  0624):    11.74   3.283     1.00    41.59
        ==================================================
        ID = 1 (  0002):    19.97   6.927     1.05    41.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    19.97   6.927     1.05    41.38
      + ID2= 2 (  6241):     4.56   1.305     1.00    41.59
        ==================================================
        ID = 3 (  0002):    24.53   7.943     1.05    41.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    24.53   7.943     1.05    41.41
      + ID2= 2 (  0625):     7.31   1.976     1.00    41.59
        ==================================================
        ID = 1 (  0002):    31.84   9.489     1.05    41.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
 0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
 0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
 0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
 0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
 0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
 0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
 0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
 0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
 0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
 0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
 0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
 0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
 0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
 0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
 0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
 0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
 0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
 0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
 0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
 0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
 0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
 0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
 0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
 0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
 0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
 0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
 0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
 0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
 0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
 0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
 0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
 0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
 0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
 0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
 0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
 0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
 0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
 0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
 0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
 0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
 0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
 0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
 0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
 0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

     Max.Eff.Inten.(mm/hr)=     269.38       139.64
               over (min)        5.00         3.00
     Storage Coeff.  (min)=      1.05 (ii)    2.26 (ii)
     Unit Hyd. Tpeak (min)=      5.00         3.00
     Unit Hyd. peak  (cms)=      0.47         0.45
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.13         0.03          0.158 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.02           1.02
     RUNOFF VOLUME    (mm)=     67.06        33.37          55.27
     TOTAL RAINFALL   (mm)=     68.06        68.06          68.06
     RUNOFF COEFFICIENT   =      0.99         0.49           0.81


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.29      0.16      1.02   55.27
     ==================================================
     MAJOR SYS.(ID= 2):   0.02      0.06      1.02   55.27
     MINOR SYS.(ID= 3):   0.27      0.10      0.98   55.27
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB									
STANDHYD (0628)	Area (ha)= 0.53								
ID= 1 DT= 1.0 min	Total Imp(%)= 85.00	Dir. Conn.(%)= 70.00							

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.45	0.08
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	59.44	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	7.53	0.767	26.08	1.517	16.20	2.27	9.22
0.033	7.53	0.783	26.08	1.533	16.20	2.28	9.22
0.050	7.53	0.800	26.08	1.550	16.20	2.30	9.22
0.067	7.53	0.817	26.08	1.567	16.20	2.32	9.22
0.083	7.53	0.833	26.08	1.583	16.20	2.33	9.22
0.100	8.05	0.850	48.18	1.600	14.79	2.35	8.85
0.117	8.05	0.867	48.18	1.617	14.79	2.37	8.85
0.133	8.05	0.883	48.18	1.633	14.79	2.38	8.85
0.150	8.05	0.900	48.18	1.650	14.79	2.40	8.85
0.167	8.05	0.917	48.18	1.667	14.79	2.42	8.85
0.183	8.67	0.933	269.38	1.683	13.66	2.43	8.51
0.200	8.67	0.950	269.38	1.700	13.66	2.45	8.51
0.217	8.67	0.967	269.38	1.717	13.66	2.47	8.51
0.233	8.67	0.983	269.38	1.733	13.66	2.48	8.51
0.250	8.67	1.000	269.38	1.750	13.66	2.50	8.51
0.267	9.42	1.017	59.03	1.767	12.71	2.52	8.20
0.283	9.42	1.033	59.02	1.783	12.71	2.53	8.20
0.300	9.42	1.050	59.02	1.800	12.71	2.55	8.20
0.317	9.42	1.067	59.02	1.817	12.71	2.57	8.20
0.333	9.42	1.083	59.02	1.833	12.71	2.58	8.20
0.350	10.36	1.100	37.39	1.850	11.91	2.60	7.92
0.367	10.36	1.117	37.39	1.867	11.91	2.62	7.92
0.383	10.36	1.133	37.39	1.883	11.91	2.63	7.92
0.400	10.36	1.150	37.39	1.900	11.91	2.65	7.92
0.417	10.36	1.167	37.39	1.917	11.91	2.67	7.92
0.433	11.56	1.183	28.59	1.933	11.23	2.68	7.66
0.450	11.56	1.200	28.59	1.950	11.23	2.70	7.66
0.467	11.56	1.217	28.59	1.967	11.23	2.72	7.66
0.483	11.56	1.233	28.59	1.983	11.23	2.73	7.66
0.500	11.56	1.250	28.59	2.000	11.23	2.75	7.66
0.517	13.17	1.267	23.60	2.017	10.63	2.77	7.42
0.533	13.17	1.283	23.60	2.033	10.63	2.78	7.42
0.550	13.17	1.300	23.60	2.050	10.63	2.80	7.42
0.567	13.17	1.317	23.60	2.067	10.63	2.82	7.42
0.583	13.17	1.333	23.60	2.083	10.63	2.83	7.42
0.600	15.48	1.350	20.32	2.100	10.11	2.85	7.19
0.617	15.48	1.367	20.32	2.117	10.11	2.87	7.19
0.633	15.48	1.383	20.32	2.133	10.11	2.88	7.19
0.650	15.48	1.400	20.32	2.150	10.11	2.90	7.19
0.667	15.48	1.417	20.32	2.167	10.11	2.92	7.19
0.683	19.13	1.433	17.97	2.183	9.64	2.93	6.99
0.700	19.13	1.450	17.97	2.200	9.64	2.95	6.99
0.717	19.13	1.467	17.97	2.217	9.64	2.97	6.99
0.733	19.13	1.483	17.97	2.233	9.64	2.98	6.99
0.750	19.13	1.500	17.97	2.250	9.64	3.00	6.99

Max.Eff.Inten.(mm/hr)= 269.38 173.47

over (min)		5.00	3.00
Storage Coeff.	(min)=	1.26 (ii)	2.30 (ii)
Unit Hyd. Tpeak	(min)=	5.00	3.00
Unit Hyd. peak	(cms)=	0.44	0.44

				TOTALS
PEAK FLOW	(cms)=	0.24	0.05	0.296 (iii)
TIME TO PEAK	(hrs)=	1.02	1.02	1.02
RUNOFF VOLUME	(mm)=	67.06	35.82	57.69
TOTAL RAINFALL	(mm)=	68.06	68.06	68.06
RUNOFF COEFFICIENT	=	0.99	0.53	0.85

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB									
STANDHYD (0633)	Area (ha)= 0.07								
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00	Dir. Conn.(%)= 65.00							

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.06	0.01
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	21.60	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	7.53	0.767	26.08	1.517	16.20	2.27	9.22
0.033	7.53	0.783	26.08	1.533	16.20	2.28	9.22
0.050	7.53	0.800	26.08	1.550	16.20	2.30	9.22
0.067	7.53	0.817	26.08	1.567	16.20	2.32	9.22
0.083	7.53	0.833	26.08	1.583	16.20	2.33	9.22
0.100	8.05	0.850	48.18	1.600	14.79	2.35	8.85
0.117	8.05	0.867	48.18	1.617	14.79	2.37	8.85
0.133	8.05	0.883	48.18	1.633	14.79	2.38	8.85
0.150	8.05	0.900	48.18	1.650	14.79	2.40	8.85
0.167	8.05	0.917	48.18	1.667	14.79	2.42	8.85
0.183	8.67	0.933	269.38	1.683	13.66	2.43	8.51
0.200	8.67	0.950	269.38	1.700	13.66	2.45	8.51
0.217	8.67	0.967	269.38	1.717	13.66	2.47	8.51
0.233	8.67	0.983	269.38	1.733	13.66	2.48	8.51
0.250	8.67	1.000	269.38	1.750	13.66	2.50	8.51
0.267	9.42	1.017	59.03	1.767	12.71	2.52	8.20
0.283	9.42	1.033	59.02	1.783	12.71	2.53	8.20
0.300	9.42	1.050	59.02	1.800	12.71	2.55	8.20
0.317	9.42	1.067	59.02	1.817	12.71	2.57	8.20
0.333	9.42	1.083	59.02	1.833	12.71	2.58	8.20
0.350	10.36	1.100	37.39	1.850	11.91	2.60	7.92
0.367	10.36	1.117	37.39	1.867	11.91	2.62	7.92
0.383	10.36	1.133	37.39	1.883	11.91	2.63	7.92
0.400	10.36	1.150	37.39	1.900	11.91	2.65	7.92
0.417	10.36	1.167	37.39	1.917	11.91	2.67	7.92
0.433	11.56	1.183	28.59	1.933	11.23	2.68	7.66
0.450	11.56	1.200	28.59	1.950	11.23	2.70	7.66
0.467	11.56	1.217	28.59	1.967	11.23	2.72	7.66
0.483	11.56	1.233	28.59	1.983	11.23	2.73	7.66
0.500	11.56	1.250	28.59	2.000	11.23	2.75	7.66
0.517	13.17	1.267	23.60	2.017	10.63	2.77	7.42

```
                0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
                0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
                0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
                0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
                0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
                0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
                0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
                0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
                0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
                0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
                0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
                0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
                0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
                0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

     Max.Eff.Inten.(mm/hr)=     269.38       139.64
               over (min)        5.00         2.00
     Storage Coeff.  (min)=       0.69 (ii)    1.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00         2.00
     Unit Hyd. peak  (cms)=       0.51         0.58
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.01          0.040 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.00           1.00
     RUNOFF VOLUME    (mm)=      67.06        33.37          55.26
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.49           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     269.38       139.64
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.20 (ii)    2.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.30
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.05          0.264 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      67.06        33.37          55.27
     TOTAL RAINFALL   (mm)=      68.06        68.06          68.06
     RUNOFF COEFFICIENT   =       0.99         0.49           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.27   0.099     0.98    55.27
     + ID2= 2 (  0628):     0.53   0.296     1.02    57.69
       ====================================================
       ID = 3 (  0001):     0.80   0.395     1.02    56.87

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.80   0.395     1.02    56.87
     + ID2= 2 (  0633):     0.07   0.040     1.00    55.26
       ====================================================
       ID = 1 (  0001):     0.87   0.434     1.02    56.74

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.87   0.434     1.02    56.74
     + ID2= 2 (  0634):     0.45   0.264     1.00    55.27
       ====================================================
       ID = 3 (  0001):     1.32   0.680     1.00    56.24

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.32   0.680     1.00    56.24
     + ID2= 2 (  0002):    31.84   9.489     1.05    41.45
       ====================================================
       ID = 3 (  0003):    33.16  10.006     1.05    42.04

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.9471      1.7418
                          0.0238      0.1755   |    1.2374      1.9546
                          0.0564      0.3556   |    1.5542      2.1707
                          0.0756      0.5404   |    1.8953      2.3901
                          0.0909      0.7298   |    2.2592      2.6129
                          0.1337      0.9241   |    2.6444      2.8392
                          0.2699      1.1230   |    3.0498      3.0690
                          0.4583      1.3261   |    3.4745      3.3026
                          0.6861      1.5323   |    0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0003)     33.159     10.006      1.05      42.04
  OUTFLOW: ID= 1 (  0013)     33.159      0.355      3.05      34.94
```

```
                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.55
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.2150

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-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    33.16   0.355     3.05    34.94
     + ID2= 2 (  0050):    29.12   1.931     1.17    25.52
       ====================================================
       ID = 3 (  0005):    62.28   2.015     1.17    30.54

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    62.28   2.015     1.17    30.54
     + ID2= 2 (  0057):     9.92   0.148     3.00    39.20
       ====================================================
       ID = 1 (  0005):    72.20   2.079     1.17    31.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

    Unit Hyd Qpeak  (cms)=   1.360

    PEAK FLOW       (cms)=   0.707 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=  23.131
    TOTAL RAINFALL   (mm)=  68.062
    RUNOFF COEFFICIENT   =   0.340

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

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-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.20         0.20
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.50
    Length            (m)=      51.64        20.00
    Mannings n            =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
    0.017    7.53 | 0.767   26.08 | 1.517   16.20 |  2.27    9.22
    0.033    7.53 | 0.783   26.08 | 1.533   16.20 |  2.28    9.22
    0.050    7.53 | 0.800   26.08 | 1.550   16.20 |  2.30    9.22
    0.067    7.53 | 0.817   26.08 | 1.567   16.20 |  2.32    9.22
    0.083    7.53 | 0.833   26.08 | 1.583   16.20 |  2.33    9.22
    0.100    8.05 | 0.850   48.18 | 1.600   14.79 |  2.35    8.85
    0.117    8.05 | 0.867   48.18 | 1.617   14.79 |  2.37    8.85
    0.133    8.05 | 0.883   48.18 | 1.633   14.79 |  2.38    8.85
    0.150    8.05 | 0.900   48.18 | 1.650   14.79 |  2.40    8.85
    0.167    8.05 | 0.917   48.18 | 1.667   14.79 |  2.42    8.85
    0.183    8.67 | 0.933  269.38 | 1.683   13.66 |  2.43    8.51
    0.200    8.67 | 0.950  269.38 | 1.700   13.66 |  2.45    8.51
    0.217    8.67 | 0.967  269.38 | 1.717   13.66 |  2.47    8.51
    0.233    8.67 | 0.983  269.38 | 1.733   13.66 |  2.48    8.51
    0.250    8.67 | 1.000  269.38 | 1.750   13.66 |  2.50    8.51
    0.267    9.42 | 1.017   59.03 | 1.767   12.71 |  2.52    8.20
    0.283    9.42 | 1.033   59.02 | 1.783   12.71 |  2.53    8.20
    0.300    9.42 | 1.050   59.02 | 1.800   12.71 |  2.55    8.20
    0.317    9.42 | 1.067   59.02 | 1.817   12.71 |  2.57    8.20
    0.333    9.42 | 1.083   59.02 | 1.833   12.71 |  2.58    8.20
    0.350   10.36 | 1.100   37.39 | 1.850   11.91 |  2.60    7.92
    0.367   10.36 | 1.117   37.39 | 1.867   11.91 |  2.62    7.92
    0.383   10.36 | 1.133   37.39 | 1.883   11.91 |  2.63    7.92
    0.400   10.36 | 1.150   37.39 | 1.900   11.91 |  2.65    7.92
    0.417   10.36 | 1.167   37.39 | 1.917   11.91 |  2.67    7.92
    0.433   11.56 | 1.183   28.59 | 1.933   11.23 |  2.68    7.66
    0.450   11.56 | 1.200   28.59 | 1.950   11.23 |  2.70    7.66
    0.467   11.56 | 1.217   28.59 | 1.967   11.23 |  2.72    7.66
    0.483   11.56 | 1.233   28.59 | 1.983   11.23 |  2.73    7.66
    0.500   11.56 | 1.250   28.59 | 2.000   11.23 |  2.75    7.66
    0.517   13.17 | 1.267   23.60 | 2.017   10.63 |  2.77    7.42
    0.533   13.17 | 1.283   23.60 | 2.033   10.63 |  2.78    7.42
    0.550   13.17 | 1.300   23.60 | 2.050   10.63 |  2.80    7.42
    0.567   13.17 | 1.317   23.60 | 2.067   10.63 |  2.82    7.42
    0.583   13.17 | 1.333   23.60 | 2.083   10.63 |  2.83    7.42
    0.600   15.48 | 1.350   20.32 | 2.100   10.11 |  2.85    7.19
    0.617   15.48 | 1.367   20.32 | 2.117   10.11 |  2.87    7.19
    0.633   15.48 | 1.383   20.32 | 2.133   10.11 |  2.88    7.19
    0.650   15.48 | 1.400   20.32 | 2.150   10.11 |  2.90    7.19
    0.667   15.48 | 1.417   20.32 | 2.167   10.11 |  2.92    7.19
    0.683   19.13 | 1.433   17.97 | 2.183    9.64 |  2.93    6.99
    0.700   19.13 | 1.450   17.97 | 2.200    9.64 |  2.95    6.99
    0.717   19.13 | 1.467   17.97 | 2.217    9.64 |  2.97    6.99
    0.733   19.13 | 1.483   17.97 | 2.233    9.64 |  2.98    6.99
    0.750   19.13 | 1.500   17.97 | 2.250    9.64 |  3.00    6.99

  Max.Eff.Inten.(mm/hr)=     269.38        83.97
            over (min)          5.00         5.00
  Storage Coeff.  (min)=       1.16 (ii)    4.54 (ii)
  Unit Hyd. Tpeak (min)=       5.00         5.00
  Unit Hyd. peak  (cms)=       0.46         0.24
                                                    *TOTALS*
  PEAK FLOW       (cms)=       0.09         0.04          0.131 (iii)
  TIME TO PEAK    (hrs)=       1.02         1.05          1.03
  RUNOFF VOLUME    (mm)=      67.06        27.87         41.58
  TOTAL RAINFALL   (mm)=      68.06        68.06         68.06
  RUNOFF COEFFICIENT   =       0.99         0.41          0.61

    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  70.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
```

```
  ID1= 1 (  0704):     0.40   0.131     1.03    41.58
+ ID2= 2 (  0709):    18.51   0.707     1.67    23.13
  ================================================
  ID = 3 (  0051):    18.91   0.720     1.67    23.52

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================

      V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\e23af8e4-603f-4fa5-
9f16-390b55fed6f7\scena
  Summary filename: C:\Users\TNuman\AppData\Local\Civica\VH5\6c545e20-b2cf-4f92-8cdf-9d42f3662ed7\e23af8e4-603f-4fa5-
9f16-390b55fed6f7\scena


DATE: 10/06/2025                          TIME: 09:03:23

USER:



COMMENTS: _____


--------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 5-Year                       **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 545.000
| Ptotal= 47.35 mm |                          B=   0.027
--------------------                          C=   0.682
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    5.38 |  0.75   18.36 |  1.50   11.47 |  2.25    6.58
                0.08    5.75 |  0.83   33.70 |  1.58   10.49 |  2.33    6.31
                0.17    6.19 |  0.92  181.18 |  1.67    9.69 |  2.42    6.07
                0.25    6.72 |  1.00   41.22 |  1.75    9.03 |  2.50    5.86
                0.33    7.38 |  1.08   26.23 |  1.83    8.47 |  2.58    5.66
                0.42    8.22 |  1.17   20.12 |  1.92    7.99 |  2.67    5.47
                0.50    9.35 |  1.25   16.64 |  2.00    7.57 |  2.75    5.30
                0.58   10.97 |  1.33   14.35 |  2.08    7.20 |  2.83    5.15
                0.67   13.52 |  1.42   12.71 |  2.17    6.87 |  2.92    5.00


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--------------------
| CALIB            |
| NASHYD   (  0627)|   Area    (ha)=  11.30   Curve Number   (CN)= 76.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
                0.017    5.38 | 0.767   18.36 | 1.517   11.47 |  2.27    6.58
                0.033    5.38 | 0.783   18.36 | 1.533   11.47 |  2.28    6.58
                0.050    5.38 | 0.800   18.36 | 1.550   11.47 |  2.30    6.58
                0.067    5.38 | 0.817   18.36 | 1.567   11.47 |  2.32    6.58
                0.083    5.38 | 0.833   18.36 | 1.583   11.47 |  2.33    6.58
                0.100    5.75 | 0.850   33.70 | 1.600   10.49 |  2.35    6.31
                0.117    5.75 | 0.867   33.70 | 1.617   10.49 |  2.37    6.31
                0.133    5.75 | 0.883   33.70 | 1.633   10.49 |  2.38    6.31
                0.150    5.75 | 0.900   33.70 | 1.650   10.49 |  2.40    6.31
                0.167    5.75 | 0.917   33.70 | 1.667   10.49 |  2.42    6.31
                0.183    6.19 | 0.933  181.18 | 1.683    9.69 |  2.43    6.07
                0.200    6.19 | 0.950  181.18 | 1.700    9.69 |  2.45    6.07
                0.217    6.19 | 0.967  181.18 | 1.717    9.69 |  2.47    6.07
                0.233    6.19 | 0.983  181.18 | 1.733    9.69 |  2.48    6.07
                0.250    6.19 | 1.000  181.18 | 1.750    9.69 |  2.50    6.07
                0.267    6.72 | 1.017   41.22 | 1.767    9.03 |  2.52    5.86
                0.283    6.72 | 1.033   41.22 | 1.783    9.03 |  2.53    5.86
                0.300    6.72 | 1.050   41.22 | 1.800    9.03 |  2.55    5.86
                0.317    6.72 | 1.067   41.22 | 1.817    9.03 |  2.57    5.86
                0.333    6.72 | 1.083   41.22 | 1.833    9.03 |  2.58    5.86
                0.350    7.38 | 1.100   26.23 | 1.850    8.47 |  2.60    5.66
                0.367    7.38 | 1.117   26.23 | 1.867    8.47 |  2.62    5.66
                0.383    7.38 | 1.133   26.23 | 1.883    8.47 |  2.63    5.66
                0.400    7.38 | 1.150   26.23 | 1.900    8.47 |  2.65    5.66
                0.417    7.38 | 1.167   26.23 | 1.917    8.47 |  2.67    5.66
                0.433    8.22 | 1.183   20.12 | 1.933    7.99 |  2.68    5.47
                0.450    8.22 | 1.200   20.12 | 1.950    7.99 |  2.70    5.47
                0.467    8.22 | 1.217   20.12 | 1.967    7.99 |  2.72    5.47
                0.483    8.22 | 1.233   20.12 | 1.983    7.99 |  2.73    5.47
                0.500    8.22 | 1.250   20.12 | 2.000    7.99 |  2.75    5.47
                0.517    9.35 | 1.267   16.64 | 2.017    7.57 |  2.77    5.30
                0.533    9.35 | 1.283   16.64 | 2.033    7.57 |  2.78    5.30
                0.550    9.35 | 1.300   16.64 | 2.050    7.57 |  2.80    5.30
                0.567    9.35 | 1.317   16.64 | 2.067    7.57 |  2.82    5.30
                0.583    9.35 | 1.333   16.64 | 2.083    7.57 |  2.83    5.30
                0.600   10.97 | 1.350   14.35 | 2.100    7.20 |  2.85    5.15
                0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
                0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
                0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
                0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
                0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
                0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
                0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
                0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
                0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

    Unit Hyd Qpeak  (cms)=   3.083

    PEAK FLOW       (cms)=   0.614 (i)
    TIME TO PEAK    (hrs)=   1.150
    RUNOFF VOLUME    (mm)=  14.633
    TOTAL RAINFALL   (mm)=  47.349
```

RUNOFF COEFFICIENT = 0.309

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

CALIB											
NASHYD (0621)	Area (ha)= 6.08	Curve Number (CN)= 70.0									
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00									
	U.H. Tp(hrs)= 0.20										

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

Unit Hyd Qpeak (cms)= 1.161

PEAK FLOW (cms)= 0.207 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 11.861

TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

CALIB											
NASHYD (0623)	Area (ha)= 11.20	Curve Number (CN)= 70.0									
ID= 1 DT= 1.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00									
	U.H. Tp(hrs)= 0.46										

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

Unit Hyd Qpeak (cms)= 0.930

PEAK FLOW (cms)= 0.226 (i)
TIME TO PEAK (hrs)= 1.633

RUNOFF VOLUME (mm)= 11.861
TOTAL RAINFALL (mm)= 47.349
RUNOFF COEFFICIENT = 0.250

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

CALIB			
STANDHYD (0632)	Area (ha)= 0.54		
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00	Dir. Conn.(%)= 65.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.43	0.11	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.50	
Length (m)=	60.00	10.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

Max.Eff.Inten.(mm/hr)=	181.18	72.51	
over (min)	5.00	3.00	
Storage Coeff. (min)=	1.48 (ii)	2.90 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.42	0.38	
			TOTALS
PEAK FLOW (cms)=	0.15	0.03	0.178 (iii)
TIME TO PEAK (hrs)=	1.02	1.02	1.02
RUNOFF VOLUME (mm)=	46.35	18.55	36.62
TOTAL RAINFALL (mm)=	47.35	47.35	47.35
RUNOFF COEFFICIENT =	0.98	0.39	0.77

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0621):	6.08	0.207	1.23	11.86
+ ID2= 2 (0623):	11.20	0.226	1.63	11.86
ID = 3 (0050):	17.28	0.369	1.38	11.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0050):	17.28	0.369	1.38	11.86
+ ID2= 2 (0627):	11.30	0.614	1.15	14.63
ID = 1 (0050):	28.58	0.898	1.18	12.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0050)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0050):	28.58	0.898	1.18	12.96
+ ID2= 2 (0632):	0.54	0.178	1.02	36.62
ID = 3 (0050):	29.12	0.934	1.17	13.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (6221)	Area (ha)= 1.18		
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00	Dir. Conn.(%)= 35.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.59	0.59	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	5.00	

```
     Length            (m)=      88.69        20.00
     Mannings n          =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        41.53
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.87 (ii)    5.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.06          0.225 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      46.35        14.87          25.89
     TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
     RUNOFF COEFFICIENT   =       0.98         0.31           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0622)|   Area    (ha)=   5.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         2.32
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.50
     Length            (m)=     185.47        30.00
     Mannings n          =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        43.62
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.93 (ii)    6.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.98         0.22          1.082 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      46.35        15.18          27.64
     TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
     RUNOFF COEFFICIENT   =       0.98         0.32           0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0631)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  70.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.42         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      57.74         6.00
     Mannings n          =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        91.91
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.10 (ii)    2.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.31
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.03          0.202 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      46.35        20.26          38.52
     TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
     RUNOFF COEFFICIENT   =       0.98         0.43           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  9622)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     115.76       173.97
     Mannings n          =       0.013        0.013

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
     0.017    5.38 | 0.767   18.36 | 1.517   11.47 |  2.27    6.58
     0.033    5.38 | 0.783   18.36 | 1.533   11.47 |  2.28    6.58
     0.050    5.38 | 0.800   18.36 | 1.550   11.47 |  2.30    6.58
     0.067    5.38 | 0.817   18.36 | 1.567   11.47 |  2.32    6.58
     0.083    5.38 | 0.833   18.36 | 1.583   11.47 |  2.33    6.58
     0.100    5.75 | 0.850   33.70 | 1.600   10.49 |  2.35    6.31
     0.117    5.75 | 0.867   33.70 | 1.617   10.49 |  2.37    6.31
     0.133    5.75 | 0.883   33.70 | 1.633   10.49 |  2.38    6.31
     0.150    5.75 | 0.900   33.70 | 1.650   10.49 |  2.40    6.31
     0.167    5.75 | 0.917   33.70 | 1.667   10.49 |  2.42    6.31
     0.183    6.19 | 0.933  181.18 | 1.683    9.69 |  2.43    6.07
     0.200    6.19 | 0.950  181.18 | 1.700    9.69 |  2.45    6.07
     0.217    6.19 | 0.967  181.18 | 1.717    9.69 |  2.47    6.07
     0.233    6.19 | 0.983  181.18 | 1.733    9.69 |  2.48    6.07
     0.250    6.19 | 1.000  181.18 | 1.750    9.69 |  2.50    6.07
     0.267    6.72 | 1.017   41.22 | 1.767    9.03 |  2.52    5.86
     0.283    6.72 | 1.033   41.22 | 1.783    9.03 |  2.53    5.86
     0.300    6.72 | 1.050   41.22 | 1.800    9.03 |  2.55    5.86
     0.317    6.72 | 1.067   41.22 | 1.817    9.03 |  2.57    5.86
     0.333    6.72 | 1.083   41.22 | 1.833    9.03 |  2.58    5.86
     0.350    7.38 | 1.100   26.23 | 1.850    8.47 |  2.60    5.66
     0.367    7.38 | 1.117   26.23 | 1.867    8.47 |  2.62    5.66
     0.383    7.38 | 1.133   26.23 | 1.883    8.47 |  2.63    5.66
     0.400    7.38 | 1.150   26.23 | 1.900    8.47 |  2.65    5.66
     0.417    7.38 | 1.167   26.23 | 1.917    8.47 |  2.67    5.66
     0.433    8.22 | 1.183   20.12 | 1.933    7.99 |  2.68    5.47
     0.450    8.22 | 1.200   20.12 | 1.950    7.99 |  2.70    5.47
     0.467    8.22 | 1.217   20.12 | 1.967    7.99 |  2.72    5.47
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                0.483    8.22 | 1.233   20.12 | 1.983    7.99 |  2.73    5.47
                0.500    8.22 | 1.250   20.12 | 2.000    7.99 |  2.75    5.47
                0.517    9.35 | 1.267   16.64 | 2.017    7.57 |  2.77    5.30
                0.533    9.35 | 1.283   16.64 | 2.033    7.57 |  2.78    5.30
                0.550    9.35 | 1.300   16.64 | 2.050    7.57 |  2.80    5.30
                0.567    9.35 | 1.317   16.64 | 2.067    7.57 |  2.82    5.30
                0.583    9.35 | 1.333   16.64 | 2.083    7.57 |  2.83    5.30
                0.600   10.97 | 1.350   14.35 | 2.100    7.20 |  2.85    5.15
                0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
                0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
                0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
                0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
                0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
                0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
                0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
                0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
                0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

    Max.Eff.Inten.(mm/hr)=     181.18       111.20
              over (min)         5.00         3.00
    Storage Coeff.  (min)=       2.20 (ii)    2.31 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.36         0.44
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.79         0.00          0.790 (iii)
    TIME TO PEAK    (hrs)=       1.03         1.00           1.03
    RUNOFF VOLUME    (mm)=      46.35        46.35          46.35
    TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
    RUNOFF COEFFICIENT   =       0.98         0.98           0.98


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  = 100.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
|SOAKAWAY(  0054)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=1256.25   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 502.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     2.01         0.790             1.03        46.36
    OVERFLOW:ID= 3     2.01         0.272             1.13        20.39

                Volume Reduction Rate[(RVin-RVout)/RVin](%):
                         If RVout= (Overflow            )=       56.01
                Time to reach Max storage             (Hr)=       1.12
                Volume of water for drawdown in LID (cu.m.)=      488.36
                Volume of maximum water storage     (cu.m.)=      502.50
                Calculated Drawdown Time              (Hr)=       76.22

  -------------------------
  | Junction Command(0056) |
  -------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)

  INFLOW : ID= 3(  0054)    2.01     0.27    1.13    20.39
  OUTFLOW: ID= 2(  0056)    2.01     0.27    1.13    20.39

   --------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0056):     2.01   0.272     1.13    20.39
     + ID2= 2 (  0622):     5.16   1.082     1.00    27.64
       ==========================================================
       ID = 3 (  0004):     7.17   1.082     1.00    25.61

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     7.17   1.082     1.00    25.61
     + ID2= 2 (  6221):     1.18   0.225     1.00    25.89
       ==========================================================
       ID = 1 (  0004):     8.35   1.306     1.00    25.65

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     8.35   1.306     1.00    25.65
     + ID2= 2 (  0631):     0.50   0.202     1.00    38.52
       ==========================================================
       ID = 3 (  0004):     8.85   1.508     1.00    26.38

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.1860      0.3754
                          0.0066      0.0316   |    0.2577      0.4191
                          0.0127      0.0646   |    0.3376      0.4638
                          0.0167      0.0989   |    0.4857      0.5095
                          0.0199      0.1347   |    0.6908      0.5561
                          0.0227      0.1718   |    0.9350      0.6038
                          0.0251      0.2104   |    1.2116      0.6525
                          0.0356      0.2502   |    1.5167      0.7022
                          0.0723      0.2910   |    1.8476      0.7529
                          0.1236      0.3327   |    2.2023      0.8049

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0004)     8.850     1.508      1.00      26.38
   OUTFLOW: ID= 1 (  0014)     8.850     0.026      3.10      22.38

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.75
                TIME SHIFT OF PEAK FLOW         (min)=126.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.2151

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| CALIB            |
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| STANDHYD (  0626)|   Area    (ha)=   1.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.86         0.21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=      84.46        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        72.51
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.38 (ii)    4.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.22
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.04         0.387 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      46.35        18.55         36.62
     TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
     RUNOFF COEFFICIENT   =       0.98         0.39          0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |  (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0820      0.0500
                          0.0070      0.0200   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0626)      1.070      0.387      1.00      36.62
   OUTFLOW: ID= 1 (  0015)      1.070      0.023      1.92      35.94

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.85
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0263

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-------------------
| ADD HYD  (  0057)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0014):     8.85   0.026     3.10    22.38
     + ID2= 2 (  0015):     1.07   0.023     1.92    35.94
       ================================================
       ID = 3 (  0057):     9.92   0.046     2.12    23.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB            |
| STANDHYD (  6241)|   Area    (ha)=   4.56
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.28         2.28
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         5.00
     Length            (m)=     174.36        20.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        41.53
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.81 (ii)    6.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.21          0.794 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08          1.00
     RUNOFF VOLUME    (mm)=      46.35        14.87         25.89
     TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
     RUNOFF COEFFICIENT   =       0.98         0.31          0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0625)|   Area    (ha)=   7.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.65         3.65
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=     220.76        30.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        41.53
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.24 (ii)   11.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.06         0.23          1.129 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.00
     RUNOFF VOLUME    (mm)=      46.35        14.87         25.89
     TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
     RUNOFF COEFFICIENT   =       0.98         0.31          0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  9624)|   Area    (ha)=   4.56
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.56         0.00
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         5.00
```

```
Length            (m)=     174.36       173.97
Mannings n           =      0.013        0.013

    NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

```
Max.Eff.Inten.(mm/hr)=     181.18       111.20
          over (min)         5.00         3.00
Storage Coeff.  (min)=       2.81 (ii)    2.92 (ii)
Unit Hyd. Tpeak (min)=       5.00         3.00
Unit Hyd. peak  (cms)=       0.32         0.38
                                                  *TOTALS*
PEAK FLOW       (cms)=       1.68         0.00          1.686 (iii)
TIME TO PEAK    (hrs)=       1.03         1.02          1.03
RUNOFF VOLUME    (mm)=      46.35        46.35         46.35
TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
RUNOFF COEFFICIENT   =       0.98         0.98          0.98
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  = 100.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-----------------
|SOAKAWAY(  0011)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=2850.00   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level   (m)=   0.00
                   Width           (m)=   1.00   Min. Drawdown        (hr)=  24.00
                   Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)=1140.00

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0051

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2     4.56         1.686             1.03         46.35
    OVERFLOW:ID= 3    4.56         0.600             1.15         20.38

             Volume Reduction Rate[(RVin-RVout)/RVin](%):
                      If RVout= (Overflow             )=       56.02
             Time to reach Max storage              (Hr)=        1.13
             Volume of water for drawdown in LID (cu.m.)=     1137.98
             Volume of maximum water storage     (cu.m.)=     1140.00
             Calculated Drawdown Time               (Hr)=       78.28

  -------------------------
  | Junction Command(0012) |
  -------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0011)    4.56     0.60    1.15    20.38
  OUTFLOW: ID= 2(  0012)    4.56     0.60    1.15    20.38

  -------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  9625)|   Area    (ha)=   3.67
|ID= 1 DT= 1.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
-------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.67         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     156.42        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31

```
                0.167    5.75 | 0.917   33.70 | 1.667   10.49 |  2.42    6.31
                0.183    6.19 | 0.933  181.18 | 1.683    9.69 |  2.43    6.07
                0.200    6.19 | 0.950  181.18 | 1.700    9.69 |  2.45    6.07
                0.217    6.19 | 0.967  181.18 | 1.717    9.69 |  2.47    6.07
                0.233    6.19 | 0.983  181.18 | 1.733    9.69 |  2.48    6.07
                0.250    6.19 | 1.000  181.18 | 1.750    9.69 |  2.50    6.07
                0.267    6.72 | 1.017   41.22 | 1.767    9.03 |  2.52    5.86
                0.283    6.72 | 1.033   41.22 | 1.783    9.03 |  2.53    5.86
                0.300    6.72 | 1.050   41.22 | 1.800    9.03 |  2.55    5.86
                0.317    6.72 | 1.067   41.22 | 1.817    9.03 |  2.57    5.86
                0.333    6.72 | 1.083   41.22 | 1.833    9.03 |  2.58    5.86
                0.350    7.38 | 1.100   26.23 | 1.850    8.47 |  2.60    5.66
                0.367    7.38 | 1.117   26.23 | 1.867    8.47 |  2.62    5.66
                0.383    7.38 | 1.133   26.23 | 1.883    8.47 |  2.63    5.66
                0.400    7.38 | 1.150   26.23 | 1.900    8.47 |  2.65    5.66
                0.417    7.38 | 1.167   26.23 | 1.917    8.47 |  2.67    5.66
                0.433    8.22 | 1.183   20.12 | 1.933    7.99 |  2.68    5.47
                0.450    8.22 | 1.200   20.12 | 1.950    7.99 |  2.70    5.47
                0.467    8.22 | 1.217   20.12 | 1.967    7.99 |  2.72    5.47
                0.483    8.22 | 1.233   20.12 | 1.983    7.99 |  2.73    5.47
                0.500    8.22 | 1.250   20.12 | 2.000    7.99 |  2.75    5.47
                0.517    9.35 | 1.267   16.64 | 2.017    7.57 |  2.77    5.30
                0.533    9.35 | 1.283   16.64 | 2.033    7.57 |  2.78    5.30
                0.550    9.35 | 1.300   16.64 | 2.050    7.57 |  2.80    5.30
                0.567    9.35 | 1.317   16.64 | 2.067    7.57 |  2.82    5.30
                0.583    9.35 | 1.333   16.64 | 2.083    7.57 |  2.83    5.30
                0.600   10.97 | 1.350   14.35 | 2.100    7.20 |  2.85    5.15
                0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
                0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
                0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
                0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
                0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
                0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
                0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
                0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
                0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

     Max.Eff.Inten.(mm/hr)=     181.18        53.76
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       2.63 (ii)    2.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.33         0.38
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.38         0.00          1.381 (iii)
     TIME TO PEAK    (hrs)=       1.03         1.02           1.03
     RUNOFF VOLUME    (mm)=      46.35        23.18          46.32
     TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
     RUNOFF COEFFICIENT   =       0.98         0.49           0.98


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0009)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  1.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=2293.75   Height                (m)=   1.00
                    Porosity          =   0.40   Initial Water Level    (m)=   0.00
                    Width           (m)=   1.00   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  78.43   Available Storage   (cu.m.)= 917.50

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0051
```

```
                          AREA         QPEAK            TPEAK         R.V.
                          (ha)         (cms)            (hrs)         (mm)
       INFLOW:ID= 2     3.67         1.381             1.03         46.33
      OVERFLOW:ID= 3    3.67         0.542             1.13         20.36

                Volume Reduction Rate[(RVin-RVout)/RVin](%):
                         If RVout= (Overflow             )=       56.05
                Time to reach Max storage              (Hr)=        1.12
                Volume of water for drawdown in LID (cu.m.)=      915.77
                Volume of maximum water storage     (cu.m.)=      917.50
                Calculated Drawdown Time               (Hr)=       78.28


  -------------------------
  | Junction Command(0010) |
  -------------------------

                             AREA     QPEAK   TPEAK     R.V.
                             (ha)     (cms)    (hrs)    (mm)
    INFLOW : ID= 3(  0009)    3.67     0.54    1.13    20.36
    OUTFLOW: ID= 2(  0010)    3.67     0.54    1.13    20.36

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0624)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=       5.87         5.87
       Dep. Storage     (mm)=       1.00         5.00
       Average Slope     (%)=       2.50         2.50
       Length            (m)=     279.76        30.00
       Mannings n          =      0.013        0.250

       Max.Eff.Inten.(mm/hr)=     181.18        41.53
                 over (min)        5.00        15.00
       Storage Coeff.  (min)=       2.84 (ii)   10.73 (ii)
       Unit Hyd. Tpeak (min)=       5.00        15.00
       Unit Hyd. peak  (cms)=       0.28         0.09
                                                    *TOTALS*
       PEAK FLOW       (cms)=       1.77         0.38          1.890 (iii)
       TIME TO PEAK    (hrs)=       1.00         1.17           1.00
       RUNOFF VOLUME    (mm)=      46.35        14.87          25.89
       TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
       RUNOFF COEFFICIENT   =       0.98         0.31           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0010):     3.67   0.542     1.13    20.36
       + ID2= 2 (  0012):     4.56   0.600     1.15    20.38
         ==========================================================
         ID = 3 (  0002):     8.23   1.109     1.13    20.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

```
-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):     8.23   1.109     1.13    20.37
      + ID2= 2 (  0624):    11.74   1.890     1.00    25.89
        ====================================================
        ID = 1 (  0002):    19.97   1.930     1.13    23.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):    19.97   1.930     1.13    23.62
      + ID2= 2 (  6241):     4.56   0.794     1.00    25.89
        ====================================================
        ID = 3 (  0002):    24.53   2.683     1.00    24.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    24.53   2.683     1.00    24.04
      + ID2= 2 (  0625):     7.31   1.129     1.00    25.89
        ====================================================
        ID = 1 (  0002):    31.84   3.813     1.00    24.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0629)|   Area    (ha)=   0.29
|ID= 1 DT= 1.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.23         0.06
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      43.97        10.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
 0.017    5.38 | 0.767   18.36 | 1.517   11.47 |  2.27    6.58
 0.033    5.38 | 0.783   18.36 | 1.533   11.47 |  2.28    6.58
 0.050    5.38 | 0.800   18.36 | 1.550   11.47 |  2.30    6.58
 0.067    5.38 | 0.817   18.36 | 1.567   11.47 |  2.32    6.58
 0.083    5.38 | 0.833   18.36 | 1.583   11.47 |  2.33    6.58
 0.100    5.75 | 0.850   33.70 | 1.600   10.49 |  2.35    6.31
 0.117    5.75 | 0.867   33.70 | 1.617   10.49 |  2.37    6.31
 0.133    5.75 | 0.883   33.70 | 1.633   10.49 |  2.38    6.31
 0.150    5.75 | 0.900   33.70 | 1.650   10.49 |  2.40    6.31
 0.167    5.75 | 0.917   33.70 | 1.667   10.49 |  2.42    6.31
 0.183    6.19 | 0.933  181.18 | 1.683    9.69 |  2.43    6.07
 0.200    6.19 | 0.950  181.18 | 1.700    9.69 |  2.45    6.07
 0.217    6.19 | 0.967  181.18 | 1.717    9.69 |  2.47    6.07
 0.233    6.19 | 0.983  181.18 | 1.733    9.69 |  2.48    6.07
 0.250    6.19 | 1.000  181.18 | 1.750    9.69 |  2.50    6.07
 0.267    6.72 | 1.017   41.22 | 1.767    9.03 |  2.52    5.86
 0.283    6.72 | 1.033   41.22 | 1.783    9.03 |  2.53    5.86
 0.300    6.72 | 1.050   41.22 | 1.800    9.03 |  2.55    5.86
 0.317    6.72 | 1.067   41.22 | 1.817    9.03 |  2.57    5.86
 0.333    6.72 | 1.083   41.22 | 1.833    9.03 |  2.58    5.86
 0.350    7.38 | 1.100   26.23 | 1.850    8.47 |  2.60    5.66
 0.367    7.38 | 1.117   26.23 | 1.867    8.47 |  2.62    5.66
 0.383    7.38 | 1.133   26.23 | 1.883    8.47 |  2.63    5.66
 0.400    7.38 | 1.150   26.23 | 1.900    8.47 |  2.65    5.66
 0.417    7.38 | 1.167   26.23 | 1.917    8.47 |  2.67    5.66
 0.433    8.22 | 1.183   20.12 | 1.933    7.99 |  2.68    5.47
 0.450    8.22 | 1.200   20.12 | 1.950    7.99 |  2.70    5.47
 0.467    8.22 | 1.217   20.12 | 1.967    7.99 |  2.72    5.47
 0.483    8.22 | 1.233   20.12 | 1.983    7.99 |  2.73    5.47
 0.500    8.22 | 1.250   20.12 | 2.000    7.99 |  2.75    5.47
 0.517    9.35 | 1.267   16.64 | 2.017    7.57 |  2.77    5.30
 0.533    9.35 | 1.283   16.64 | 2.033    7.57 |  2.78    5.30
 0.550    9.35 | 1.300   16.64 | 2.050    7.57 |  2.80    5.30
 0.567    9.35 | 1.317   16.64 | 2.067    7.57 |  2.82    5.30
 0.583    9.35 | 1.333   16.64 | 2.083    7.57 |  2.83    5.30
 0.600   10.97 | 1.350   14.35 | 2.100    7.20 |  2.85    5.15
 0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
 0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
 0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
 0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
 0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
 0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
 0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
 0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
 0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

    Max.Eff.Inten.(mm/hr)=     181.18        72.51
              over (min)         5.00         3.00
    Storage Coeff.  (min)=       1.23 (ii)    2.64 (ii)
    Unit Hyd. Tpeak (min)=       5.00         3.00
    Unit Hyd. peak  (cms)=       0.45         0.41
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.08         0.01          0.099 (iii)
    TIME TO PEAK    (hrs)=       1.02         1.02           1.02
    RUNOFF VOLUME    (mm)=      46.35        18.55          36.62
    TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
    RUNOFF COEFFICIENT   =       0.98         0.39           0.77

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| DUHYD    (  0006)|
| Inlet Cap.= 0.099|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------       (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.29      0.10      1.02   36.62
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   0.29      0.10      1.02   36.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
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| STANDHYD (0628)| Area (ha)= 0.53
|ID= 1 DT= 1.0 min | Total Imp(%)= 85.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.45	0.08
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	59.44	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15
0.617	10.97	1.367	14.35	2.117	7.20	2.87	5.15
0.633	10.97	1.383	14.35	2.133	7.20	2.88	5.15
0.650	10.97	1.400	14.35	2.150	7.20	2.90	5.15
0.667	10.97	1.417	14.35	2.167	7.20	2.92	5.15
0.683	13.52	1.433	12.71	2.183	6.87	2.93	5.00
0.700	13.52	1.450	12.71	2.200	6.87	2.95	5.00
0.717	13.52	1.467	12.71	2.217	6.87	2.97	5.00
0.733	13.52	1.483	12.71	2.233	6.87	2.98	5.00
0.750	13.52	1.500	12.71	2.250	6.87	3.00	5.00

			TOTALS
Max.Eff.Inten.(mm/hr)=	181.18	91.91	
over (min)	5.00	3.00	
Storage Coeff. (min)=	1.47 (ii)	2.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	3.00	
Unit Hyd. peak (cms)=	0.42	0.40	
PEAK FLOW (cms)=	0.16	0.03	0.185 (iii)
TIME TO PEAK (hrs)=	1.02	1.02	1.02
RUNOFF VOLUME (mm)=	46.35	20.26	38.52
TOTAL RAINFALL (mm)=	47.35	47.35	47.35
RUNOFF COEFFICIENT =	0.98	0.43	0.81

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0633)| Area (ha)= 0.07
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 65.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.06	0.01
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.50
Length (m)=	21.60	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.38	0.767	18.36	1.517	11.47	2.27	6.58
0.033	5.38	0.783	18.36	1.533	11.47	2.28	6.58
0.050	5.38	0.800	18.36	1.550	11.47	2.30	6.58
0.067	5.38	0.817	18.36	1.567	11.47	2.32	6.58
0.083	5.38	0.833	18.36	1.583	11.47	2.33	6.58
0.100	5.75	0.850	33.70	1.600	10.49	2.35	6.31
0.117	5.75	0.867	33.70	1.617	10.49	2.37	6.31
0.133	5.75	0.883	33.70	1.633	10.49	2.38	6.31
0.150	5.75	0.900	33.70	1.650	10.49	2.40	6.31
0.167	5.75	0.917	33.70	1.667	10.49	2.42	6.31
0.183	6.19	0.933	181.18	1.683	9.69	2.43	6.07
0.200	6.19	0.950	181.18	1.700	9.69	2.45	6.07
0.217	6.19	0.967	181.18	1.717	9.69	2.47	6.07
0.233	6.19	0.983	181.18	1.733	9.69	2.48	6.07
0.250	6.19	1.000	181.18	1.750	9.69	2.50	6.07
0.267	6.72	1.017	41.22	1.767	9.03	2.52	5.86
0.283	6.72	1.033	41.22	1.783	9.03	2.53	5.86
0.300	6.72	1.050	41.22	1.800	9.03	2.55	5.86
0.317	6.72	1.067	41.22	1.817	9.03	2.57	5.86
0.333	6.72	1.083	41.22	1.833	9.03	2.58	5.86
0.350	7.38	1.100	26.23	1.850	8.47	2.60	5.66
0.367	7.38	1.117	26.23	1.867	8.47	2.62	5.66
0.383	7.38	1.133	26.23	1.883	8.47	2.63	5.66
0.400	7.38	1.150	26.23	1.900	8.47	2.65	5.66
0.417	7.38	1.167	26.23	1.917	8.47	2.67	5.66
0.433	8.22	1.183	20.12	1.933	7.99	2.68	5.47
0.450	8.22	1.200	20.12	1.950	7.99	2.70	5.47
0.467	8.22	1.217	20.12	1.967	7.99	2.72	5.47
0.483	8.22	1.233	20.12	1.983	7.99	2.73	5.47
0.500	8.22	1.250	20.12	2.000	7.99	2.75	5.47
0.517	9.35	1.267	16.64	2.017	7.57	2.77	5.30
0.533	9.35	1.283	16.64	2.033	7.57	2.78	5.30
0.550	9.35	1.300	16.64	2.050	7.57	2.80	5.30
0.567	9.35	1.317	16.64	2.067	7.57	2.82	5.30
0.583	9.35	1.333	16.64	2.083	7.57	2.83	5.30
0.600	10.97	1.350	14.35	2.100	7.20	2.85	5.15

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                0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
                0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
                0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
                0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
                0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
                0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
                0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
                0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
                0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

     Max.Eff.Inten.(mm/hr)=     181.18        72.51
               over (min)        5.00         3.00
     Storage Coeff.  (min)=       0.80 (ii)    2.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00         3.00
     Unit Hyd. peak  (cms)=       0.50         0.45
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.02          1.02
     RUNOFF VOLUME    (mm)=      46.35        18.55         36.61
     TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
     RUNOFF COEFFICIENT   =       0.98         0.39          0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0634)|   Area    (ha)=   0.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  65.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.36         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      54.77        10.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     181.18        72.51
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.40 (ii)    2.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.28
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.02          0.167 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=      46.35        18.55         36.62
     TOTAL RAINFALL   (mm)=      47.35        47.35         47.35
     RUNOFF COEFFICIENT   =       0.98         0.39          0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     0.29   0.099     1.02    36.62
     + ID2= 2 (  0628):     0.53   0.185     1.02    38.52
       ================================================
       ID = 3 (  0001):     0.82   0.284     1.02    37.85

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0001):     0.82   0.284     1.02    37.85
     + ID2= 2 (  0633):     0.07   0.025     1.02    36.61
       ================================================
       ID = 1 (  0001):     0.89   0.309     1.02    37.75

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.89   0.309     1.02    37.75
     + ID2= 2 (  0634):     0.45   0.167     1.00    36.62
       ================================================
       ID = 3 (  0001):     1.34   0.455     1.00    37.37

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.34   0.455     1.00    37.37
     + ID2= 2 (  0002):    31.84   3.813     1.00    24.46
       ================================================
       ID = 3 (  0003):    33.18   4.268     1.00    24.98

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.9471      1.7418
                          0.0238      0.1755   |    1.2374      1.9546
                          0.0564      0.3556   |    1.5542      2.1707
                          0.0756      0.5404   |    1.8953      2.3901
                          0.0909      0.7298   |    2.2592      2.6129
                          0.1337      0.9241   |    2.6444      2.8392
                          0.2699      1.1230   |    3.0498      3.0690
                          0.4583      1.3261   |    3.4745      3.3026
                          0.6861      1.5323   |    0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0003)     33.180     4.268     1.00      24.98
  OUTFLOW: ID= 1 (  0013)     33.180     0.098     3.15      20.11

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.29
                TIME SHIFT OF PEAK FLOW         (min)=129.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7612
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-------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    33.18   0.098     3.15    20.11
     + ID2= 2 (  0050):    29.12   0.934     1.17    13.40
       ====================================================
       ID = 3 (  0005):    62.30   0.985     1.18    16.97

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    62.30   0.985     1.18    16.97
     + ID2= 2 (  0057):     9.92   0.046     2.12    23.84
       ====================================================
       ID = 1 (  0005):    72.22   1.016     1.18    17.91

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0709)|   Area    (ha)=  18.51   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.52

    Unit Hyd Qpeak  (cms)=   1.360

    PEAK FLOW       (cms)=   0.346 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=  11.860
    TOTAL RAINFALL   (mm)=  47.349
    RUNOFF COEFFICIENT   =   0.250

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

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-------------------
| CALIB            |
| STANDHYD (  0704)|   Area    (ha)=   0.40
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.20         0.20
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.50
    Length            (m)=      51.64        20.00
    Mannings n            =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 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
             0.017    5.38 | 0.767   18.36 | 1.517   11.47 |  2.27    6.58
             0.033    5.38 | 0.783   18.36 | 1.533   11.47 |  2.28    6.58
             0.050    5.38 | 0.800   18.36 | 1.550   11.47 |  2.30    6.58
             0.067    5.38 | 0.817   18.36 | 1.567   11.47 |  2.32    6.58
             0.083    5.38 | 0.833   18.36 | 1.583   11.47 |  2.33    6.58
             0.100    5.75 | 0.850   33.70 | 1.600   10.49 |  2.35    6.31
             0.117    5.75 | 0.867   33.70 | 1.617   10.49 |  2.37    6.31
             0.133    5.75 | 0.883   33.70 | 1.633   10.49 |  2.38    6.31
             0.150    5.75 | 0.900   33.70 | 1.650   10.49 |  2.40    6.31
             0.167    5.75 | 0.917   33.70 | 1.667   10.49 |  2.42    6.31
             0.183    6.19 | 0.933  181.18 | 1.683    9.69 |  2.43    6.07
             0.200    6.19 | 0.950  181.18 | 1.700    9.69 |  2.45    6.07
             0.217    6.19 | 0.967  181.18 | 1.717    9.69 |  2.47    6.07
             0.233    6.19 | 0.983  181.18 | 1.733    9.69 |  2.48    6.07
             0.250    6.19 | 1.000  181.18 | 1.750    9.69 |  2.50    6.07
             0.267    6.72 | 1.017   41.22 | 1.767    9.03 |  2.52    5.86
             0.283    6.72 | 1.033   41.22 | 1.783    9.03 |  2.53    5.86
             0.300    6.72 | 1.050   41.22 | 1.800    9.03 |  2.55    5.86
             0.317    6.72 | 1.067   41.22 | 1.817    9.03 |  2.57    5.86
             0.333    6.72 | 1.083   41.22 | 1.833    9.03 |  2.58    5.86
             0.350    7.38 | 1.100   26.23 | 1.850    8.47 |  2.60    5.66
             0.367    7.38 | 1.117   26.23 | 1.867    8.47 |  2.62    5.66
             0.383    7.38 | 1.133   26.23 | 1.883    8.47 |  2.63    5.66
             0.400    7.38 | 1.150   26.23 | 1.900    8.47 |  2.65    5.66
             0.417    7.38 | 1.167   26.23 | 1.917    8.47 |  2.67    5.66
             0.433    8.22 | 1.183   20.12 | 1.933    7.99 |  2.68    5.47
             0.450    8.22 | 1.200   20.12 | 1.950    7.99 |  2.70    5.47
             0.467    8.22 | 1.217   20.12 | 1.967    7.99 |  2.72    5.47
             0.483    8.22 | 1.233   20.12 | 1.983    7.99 |  2.73    5.47
             0.500    8.22 | 1.250   20.12 | 2.000    7.99 |  2.75    5.47
             0.517    9.35 | 1.267   16.64 | 2.017    7.57 |  2.77    5.30
             0.533    9.35 | 1.283   16.64 | 2.033    7.57 |  2.78    5.30
             0.550    9.35 | 1.300   16.64 | 2.050    7.57 |  2.80    5.30
             0.567    9.35 | 1.317   16.64 | 2.067    7.57 |  2.82    5.30
             0.583    9.35 | 1.333   16.64 | 2.083    7.57 |  2.83    5.30
             0.600   10.97 | 1.350   14.35 | 2.100    7.20 |  2.85    5.15
             0.617   10.97 | 1.367   14.35 | 2.117    7.20 |  2.87    5.15
             0.633   10.97 | 1.383   14.35 | 2.133    7.20 |  2.88    5.15
             0.650   10.97 | 1.400   14.35 | 2.150    7.20 |  2.90    5.15
             0.667   10.97 | 1.417   14.35 | 2.167    7.20 |  2.92    5.15
             0.683   13.52 | 1.433   12.71 | 2.183    6.87 |  2.93    5.00
             0.700   13.52 | 1.450   12.71 | 2.200    6.87 |  2.95    5.00
             0.717   13.52 | 1.467   12.71 | 2.217    6.87 |  2.97    5.00
             0.733   13.52 | 1.483   12.71 | 2.233    6.87 |  2.98    5.00
             0.750   13.52 | 1.500   12.71 | 2.250    6.87 |  3.00    5.00

    Max.Eff.Inten.(mm/hr)=     181.18        41.53
              over (min)        5.00         6.00
    Storage Coeff.  (min)=       1.35 (ii)    5.31 (ii)
    Unit Hyd. Tpeak (min)=       5.00         6.00
    Unit Hyd. peak  (cms)=       0.43         0.20
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.06         0.02          0.076 (iii)
    TIME TO PEAK    (hrs)=       1.02         1.07           1.03
    RUNOFF VOLUME    (mm)=      46.35        14.87          25.88
    TOTAL RAINFALL   (mm)=      47.35        47.35          47.35
    RUNOFF COEFFICIENT   =       0.98         0.31           0.55

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0051)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0704):     0.40   0.076     1.03    25.88
     + ID2= 2 (  0709):    18.51   0.346     1.67    11.86
       ====================================================
       ID = 3 (  0051):    18.91   0.354     1.67    12.16

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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Appendix E

Geotechnical & Hydrogeological Reports

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951A-G October 14, 2021

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
7581 SIDEROAD 15
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your authorisation and subsequent discussions with Mr. Michael DeBiasio, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P301951, dated July 1, 2021, later revised and confirmed through email communication on August 3, 2021. This report should be read in conjunction with the formal report for the Clayton Lands to the west SM 301951B-G, dated October 5, 2021. Our comments and recommendations based on our findings at the seven [7] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development consisting of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services, located at 7581 Sideroad 15 [Gibson Farms] in Elora, Ontario. The purpose of this preliminary geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

SOIL-MAT ENGINEERS was provided with a sub-watershed study that encompasses the surrounding area – including the subject site – prepared by Aquafor Beech Limited, dated February 2008. The results of this investigation have been considered in preparation of this geotechnical report.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover.

2. PROCEDURE

A total of seven [7] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 5 and 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 2.1 and 5.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, a groundwater monitoring well was installed at Borehole No. 4 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in general accordance with

Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 7, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently an undeveloped agricultural property located at 7581 Sideroad 15 in Elora, Ontario. There is a single-family dwelling and an existing barn structure near the middle of the site, setback approximately 200 metres from Sideroad 15. The parcel is bordered to the south by an existing agricultural field, to the east by Gerrie Road, to the north by Sideroad 15, and to the west by Irvine Street, assuming a north-south orientation of Irvine Street. The field is bisected by a tributary of the Irvine Creek – a ditch-like drainage feature – at the north eastern portion of the site. West of the tributary, the two parcels generally slope down to the north, with a relief of approximately 6 metres, as measured across the boreholes. The grade is relatively flat and even with Gerrie Road on the east side of the tributary descending towards the creek with an approximate relief of 15 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 150 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life. Given the property has been historically used for agricultural purposes the upper levels of the soils would be expected to have a reworked nature resulting in more variable depths of topsoil over the site. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site for stripping, i.e. account for slightly greater stripping depth than those specifically noted at the borehole locations.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in the majority of the boreholes, and beneath a sand deposit in Borehole Nos. 3 and 6. The fine-grained granular to slightly cohesive soils were brown in colour, transitioning to grey below about 2.5 metres in Borehole No. 2, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a loose to compact state. The sandy silt/clayey silt deposit was present to depths of approximately 1.1 to 1.9 metres in Borehole Nos. 1 and 4, and was proven to termination at depths of approximately 2.1 to 3.7 metres below the existing ground surface in Borehole Nos. 2, 3, 5, 6, and 7.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole Nos. 3 and 6, and beneath the sandy silt/clayey silt layer in Borehole Nos. 1 and 4. The fine to medium grained soils were brown in colour, with a noted to transition to grey at a depth of approximately 4.8 metres in Borehole No. 4, contained trace amounts of clay, silt, and gravel, and was generally in a compact to dense state. The native sand soils were proven to a depth of approximately 1.5 and 1.8 metres within Borehole Nos. 3 and 6, and proven to termination at depths of between approximately 3.6 and 5.2 metres below the existing ground surface in Borehole Nos. 1 and 4.

Grain Size Analyses

Grain size analyses were conducted on three [3] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH3 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH4 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300
BH6 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15

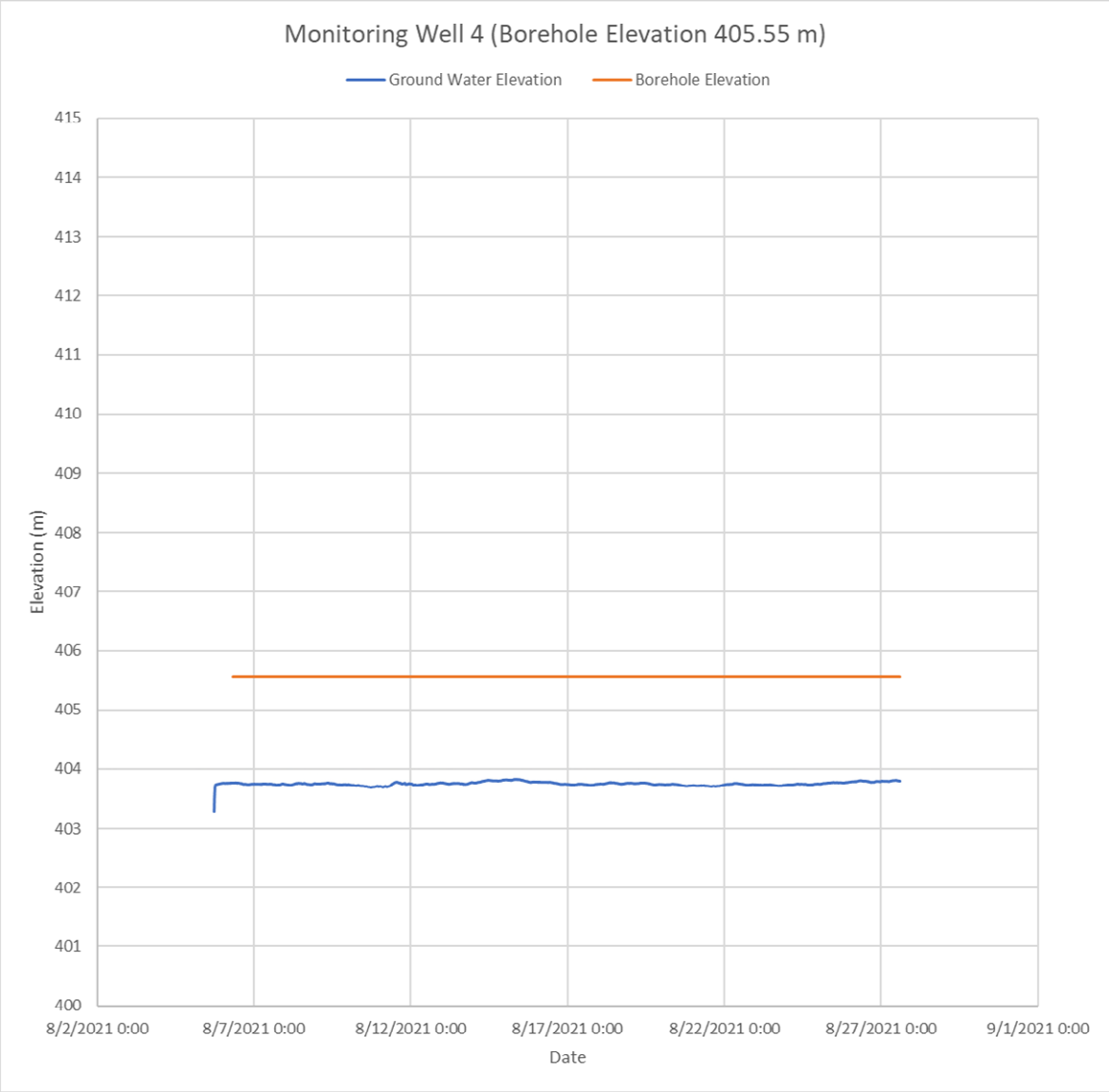
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Groundwater Observations

Borehole No. 6 was noted to have 'caved' to a depth of approximately 2.4 metres and 'wet' at a depth of approximately 2.0 metres, while Borehole No. 4 was noted to be open and 'wet' at a depth of 2.7 metres upon completion. Borehole Nos. 1 was noted to have cave to a depth of 1.5 metres, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole No. 4, to allow for future measurements of the static groundwater level. Furthermore, it is noted that 3 additional monitoring wells were installed on the abutting parcel of land to the west, the work of which was completed in concert with the fieldwork on the Gibson Farm lands. A data logger was installed in Borehole No. 4 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graph:


Monitoring Well 4 (Borehole Elevation 405.55 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition to this, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and August 27, 2021 and have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface Elevation [m]	August 6, 2021		August 27, 2021	
		Groundwater Depth [m]	Groundwater Elevation [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW4	405.55	2.74	402.81	1.75	403.80

The groundwater level observed at this monitoring well location, as well as the monitoring wells installed on the adjacent property [summarised in our geotechnical report SM 301951B-G under a separate cover] indicate a groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography, and shallower closer the tributary. As noted above this estimate is based on the groundwater data collected from Borehole No. 4, as well as the monitoring wells installed on the Clayton Lands to the west. There is an evident drop in the groundwater level from southwest to northeast, generally following the topography towards the Irvine Creek Tributary. It is noted that the groundwater level would be expected to fluctuate seasonally. It is also noted that the observed groundwater levels may be influenced by more localised shallower 'perched' deposits in more permeable seams within the sandy silt/clayey silt. Further long-term monitoring may allow for a more accurate estimate of the static groundwater level, including more data during the 'wet' and 'dry' seasons.

As noted above, SOIL-MAT ENGINEERS was also provided a sub-watershed study by Aquafor Beech, which included a number of monitoring wells to the east to monitor the groundwater elevations. The conditions and groundwater levels described in this geotechnical report are consistent with those encountered during our fieldwork as described above.

General Soil Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The grain size analyses indicate the sandy silt/clayey silt soils to have 10 to 20 percent clay content, lending a slightly cohesive characteristic. The sandy silt/clayey silt soils are relatively consistent in terms of its constituents but are noted to contain an increasing clay content with depth in some of the boreholes, as noted above. Where the material transitions into a sand the native soils are generally fine in gradation in the upper levels, becoming medium to coarse with depth. As demonstrated above the subsurface conditions exhibit a relatively inconsistent layered structure across the large area, but can be generally distinguished by a layer of slightly cohesive sandy silt overlying a cohesionless sand. The conditions will be best assessed during excavations on an area-by-area basis. As such it may also be prudent to advance a series of test excavations in the area of proposed deeper excavations and/or stormwater management ponds to confirm soil composition and groundwater conditions in the area of deep excavations.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 5 metres below the existing grade. Excavations through the native sandy silt/clayey silt and sand soils, as well as any engineered fill placed as part of site grading works, should be relatively straightforward, with the sides remaining stable for short construction periods at inclinations of up to 45 degrees to the horizontal, and possibly steeper depending on moisture condition and clay content. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to ‘slough in’ to as flat as 3 horizontal to 1 vertical, or flatter.

Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sandy silt/clayey silt and sand soils would generally be considered a Type 2 or 3 soil, depending on the moisture content and relative compact to dense condition, as outlined in the Ontario Health and Safety Act III – Excavations. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the groundwater level varies between depths of approximately 2 to 7 metres below the existing grade, roughly elevation 403.8 to 410.5 metres. The majority of excavations are anticipated to be above the groundwater level. Nevertheless, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated. Such infiltration should be readily controlled using typical construction dewatering methods. 'Perched' deposits of water may be encountered within more permeable pockets, which may require greater initial dewatering efforts and instability in the excavations, especially during the 'wet' times of the year. Where excavations extend to greater depths, to and below the groundwater level, especially within the sand deposit, the rate of infiltration will be much greater and additional pumping or more sophisticated dewatering methods should be anticipated. In this regard, ongoing monitoring of the groundwater levels, and careful review of the design servicing elevations, is recommended. As noted above, the advancement of test excavations in the area of proposed deep services and stormwater management ponds would allow for a first hand look at how groundwater levels may affect such excavations. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. This will be especially likely in the high silt content sandy silt/clayey silt soils. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or County of Wellington should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the sandy silt/clayey silt and sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that the sandy silt/clayey silt soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. It is also noted that these fine grained granular soils will present difficulties in achieving effective compaction when they become 'wet' of optimum, and where access with compaction equipment is restricted. The sandy silt/clayey silt soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content, with some noted 'wet' seams. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these silty soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas. The sand soils are generally well draining, and tend to be near optimum moisture content. At depth, approaching or below the water level, the sand soils will be expected to be saturated, requiring time to drain excess moisture or other drying efforts in order to achieve effective compaction.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is

well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained to cohesive soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator

should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap', etc.] 'punched' into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. A typical generic pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 60 millimetres of HL8 or HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Where a pit run, Granular B Type I, aggregate is utilised in the granular base, it should be increased to a minimum thickness of 450 millimetres. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. Notwithstanding, the pavement structure should conform to the relevant County of Wellington requirements where they are to be assumed by the County. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or County of Wellington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A typical recommended light duty pavement structure for residential driveways would

consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. Bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. In areas where 'wet' seams are present, or the native soils present in less compact condition, reduced bearing values of 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] are recommended. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete.

In the event that site grading works result in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This

reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend to up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, however further groundwater monitoring may be conducted to more accurately assess the static groundwater level.

The short term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could approach or be greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay ‘cut-offs’ within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be well above the groundwater level, and so would not be expected to require significant ongoing groundwater control, other than typical perimeter weeping tile and sump pump as noted above.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, and further detailed hydrogeological assessment is not considered warranted at this time. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern, or need for additional study.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

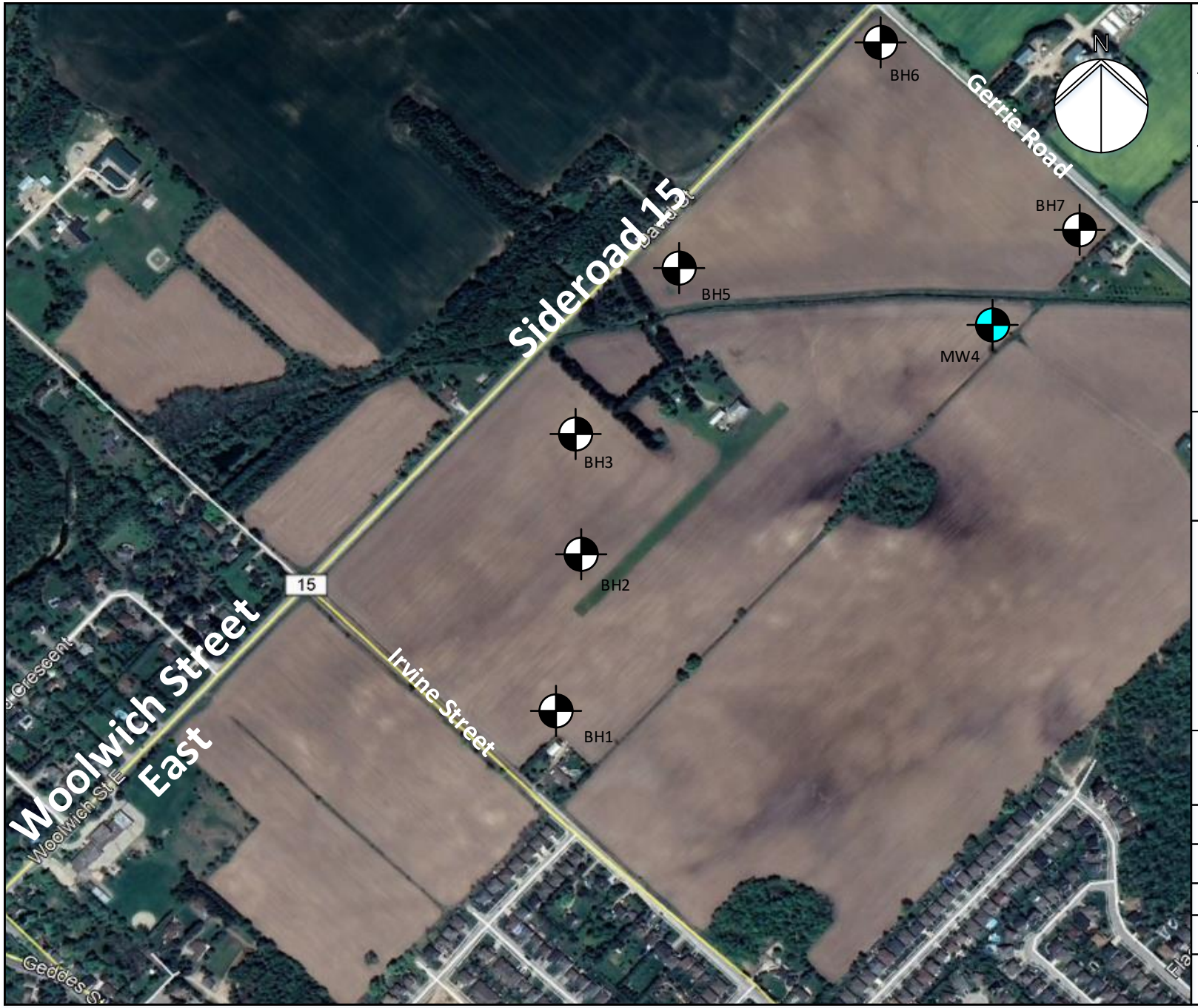
Scott Wylie, B.Eng., EIT.



Ian Shaw, P. Eng.
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 7, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction

Distribution: Cachet Developments [pdf]



LEGEND

Borehole Location
BH#

Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951A-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Sideroad 15
Elora, Ontario

Borehole Location Plan

Project No. SM 301591A-G

Date: September 2021

Drawn: SW	Checked: KR

SM 301591A-G Borehole Location Plan

Drawing No. 1

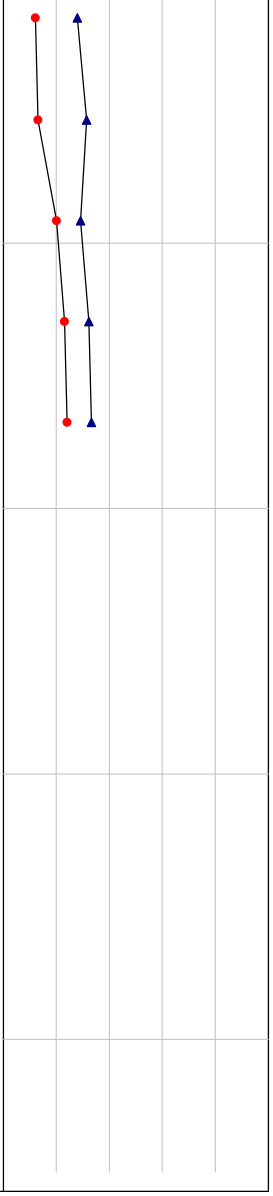
Log of Borehole No. 1

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		413.05		Ground Surface								
0	0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3	1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
				Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
9	3					SS	4	12 10 13 10	23			
11		409.40				SS	5	6 11 13 15	24			
12	4			End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

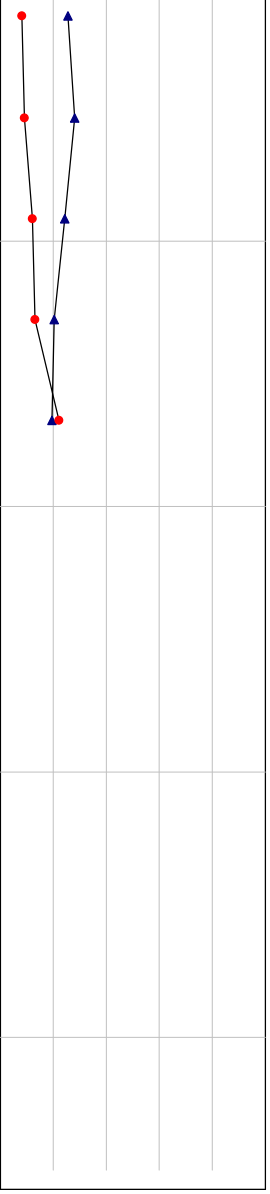
Log of Borehole No. 2

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	415.00	Ground Surface								
0 / 0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3 / 1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
7 / 2	412.50	**Clayey Silt** Brown, trace to some sand and gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
8 / 2		Transition to grey.		SS	4	3 7 6 7	13		4.0	
11 / 3	411.30			SS	5	9 7 15 18	22		>4.5	
12 / 4		End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
		409.93		Ground Surface									
0	0			**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
3	1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
6		408.10				SS	3	6 8 10 11	18				
7	2	407.80		**Sandy Silt** Brown, trace to some gravel and clay, compact.									
				End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

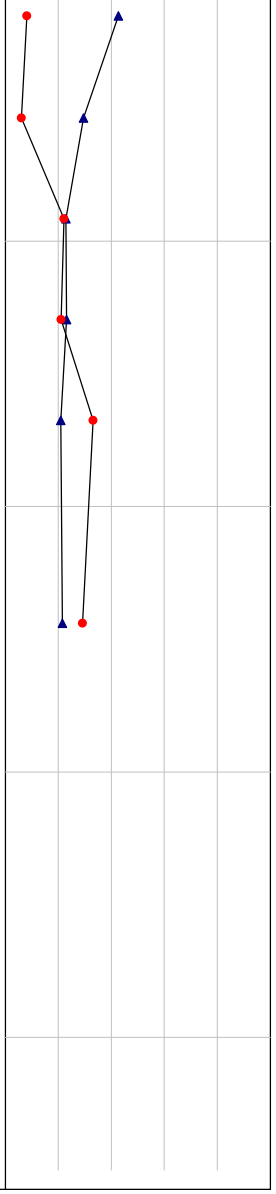
Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2				SS	2	4 3 3 5	6			
3	1									
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Well Data

SAMPLE

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.10		Ground Surface								
0	0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9			
3	1			**Sandy Silt** Brown, reworked in upper levels, trace to some clay, increasing clay content with depth, occasional gravel, loose to compact.		SS	2	1 3 3 5	6			
6	2	410.00				SS	3	3 5 7 9	12			
				End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 6

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	420.91		Ground Surface								
0 / 0	420.70		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
3 / 1	419.40		**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
6 / 2			**Sandy Silt** Brown, trace clay, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
9 / 3					SS	4	3 4 4 4	8			
11 / 3	417.30				SS	5	5 11 10 15	21			
12 / 4			End of Borehole								

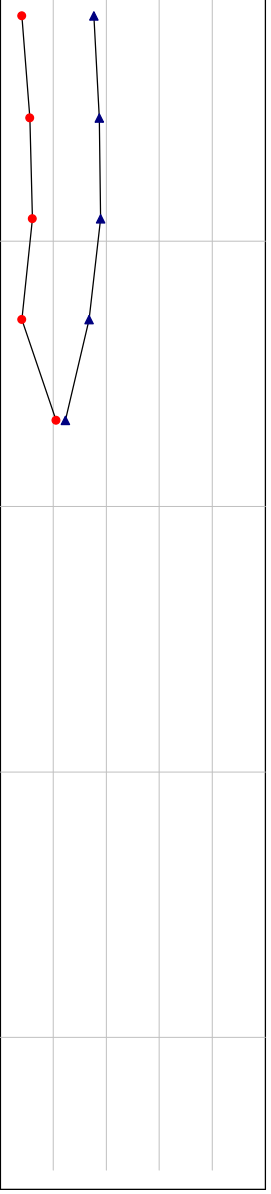
NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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130 Lancing Drive, Hamilton, ON L8W 3A1
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E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 7

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39		Ground Surface								
0 / 0	408.10		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
3 / 1	406.90		**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
6 / 2			**Clayey Silt** Brown, trace to some sand and gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
9 / 3					SS	4	5 7 10 18	17		2.5	
11 / 3	404.70				SS	5	24 36 50/5"	100		>4.5	
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

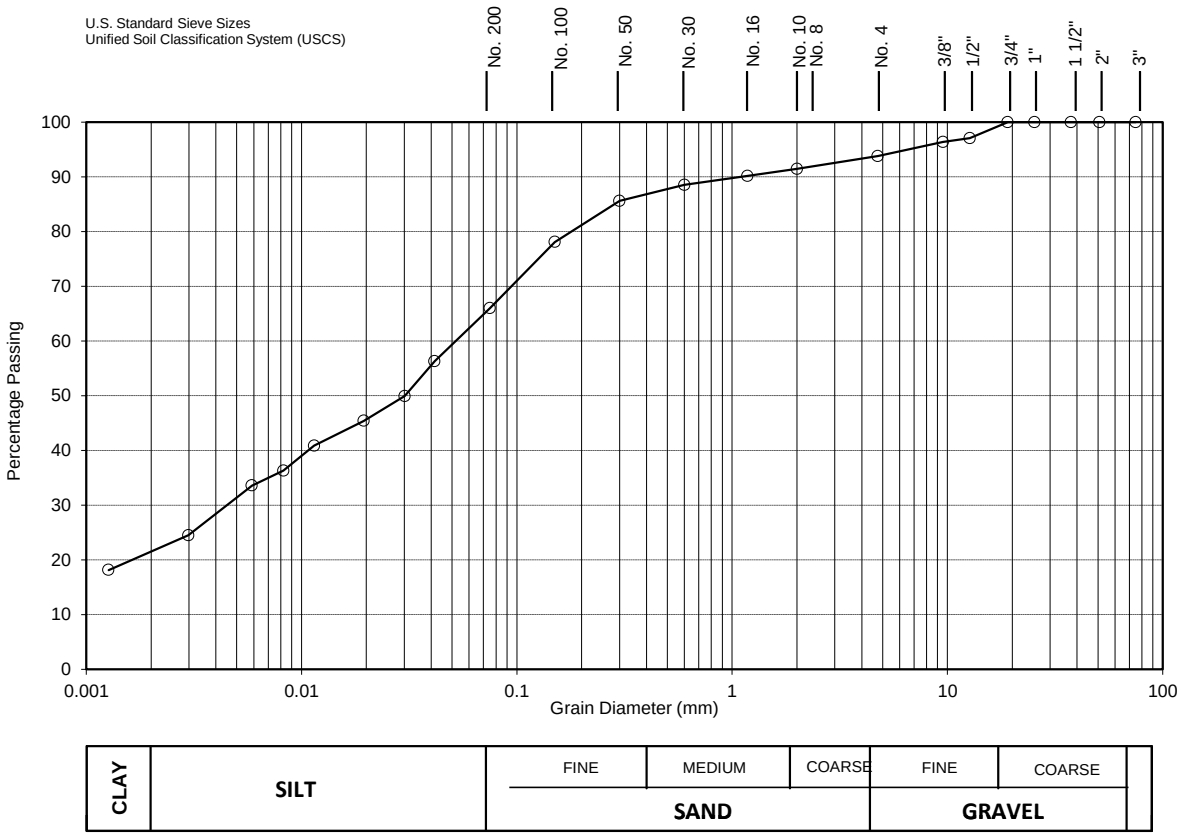
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



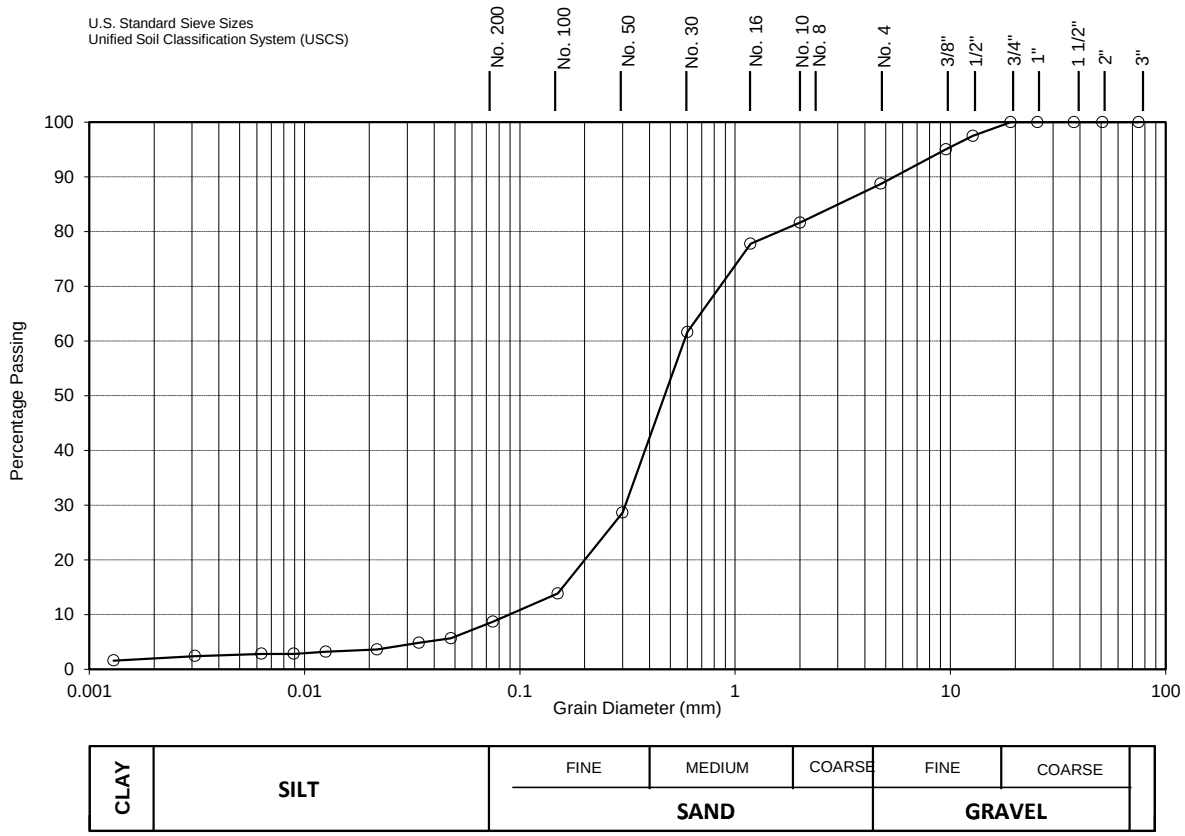
Lab No.:	**21-335**	Notes: Depth: 5'			
Sample No.:	**3**				
Borehole No.:	**3**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



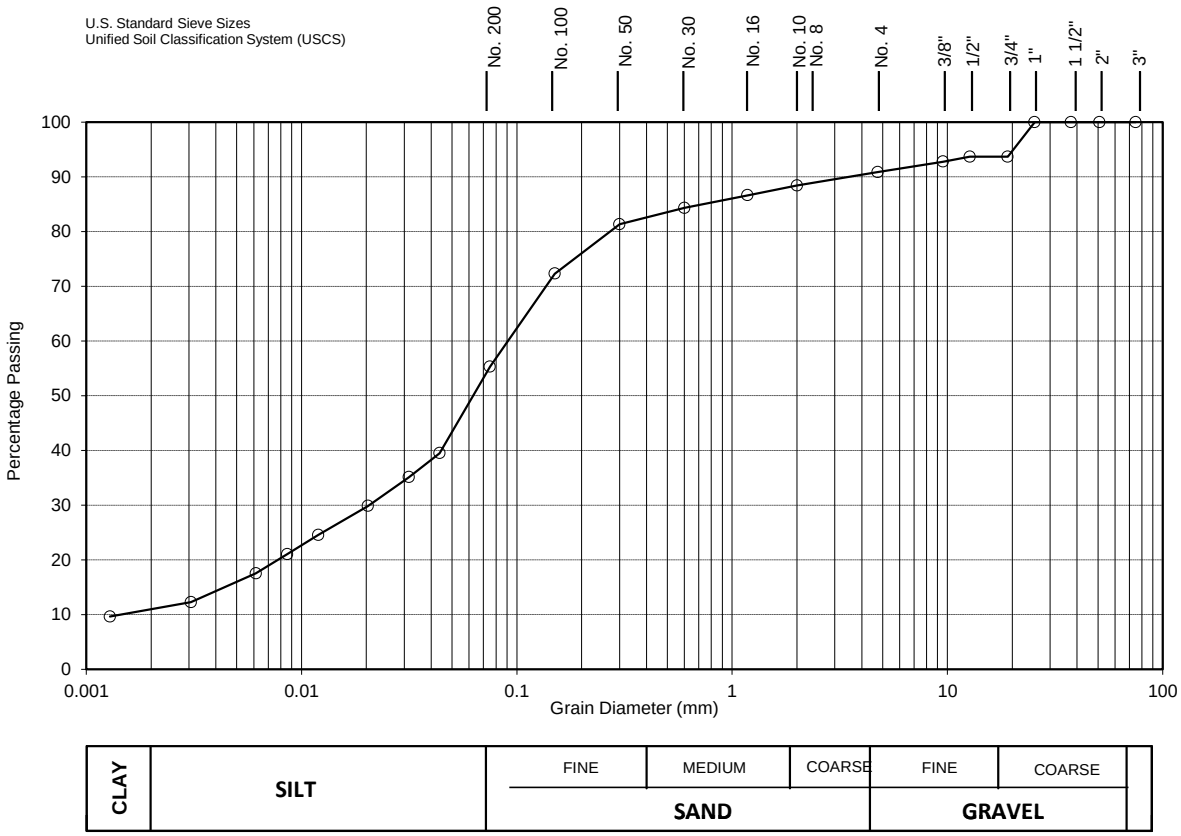
Lab No.:	**21-340**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses

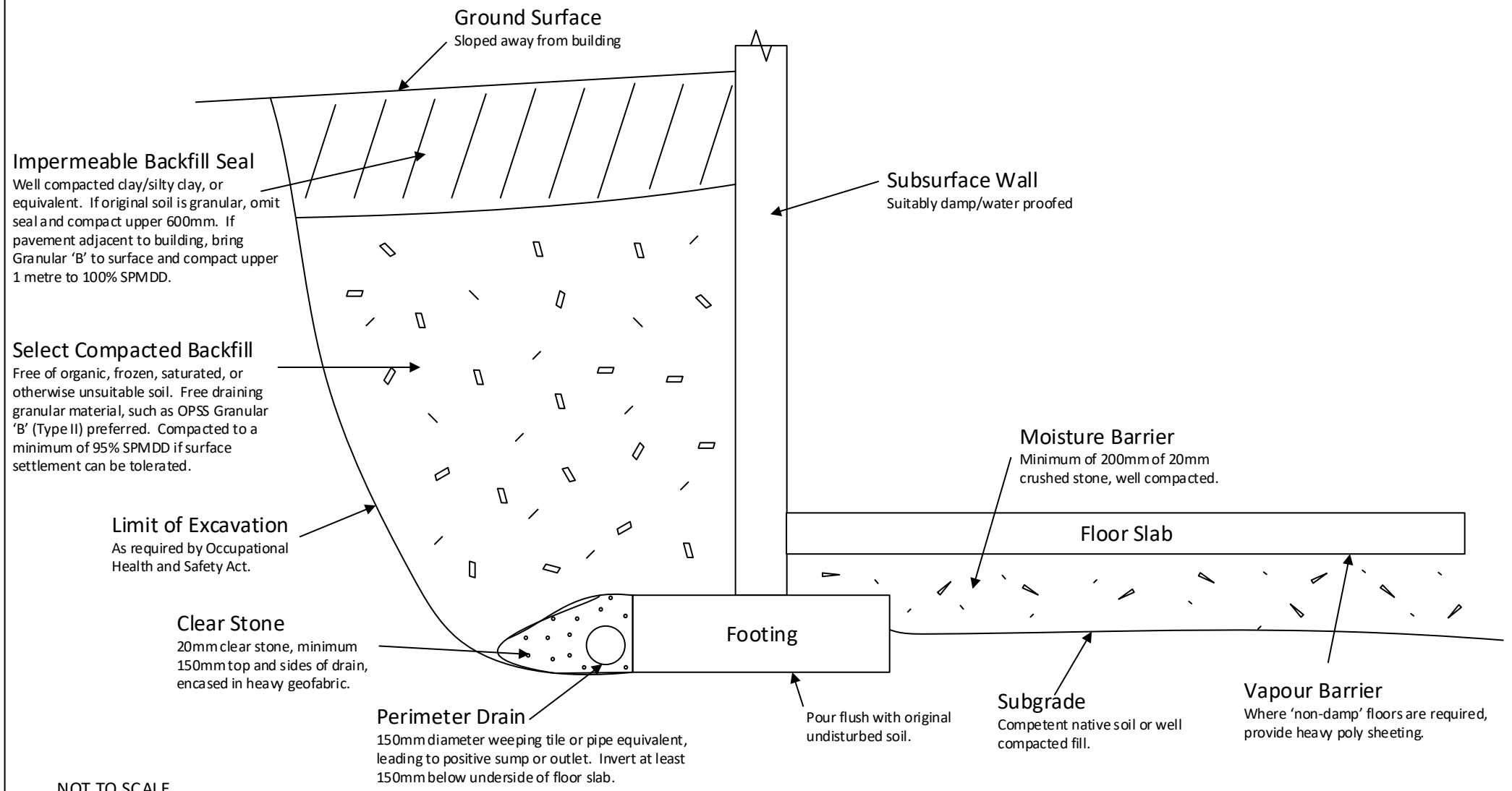


Lab No.:	**21-336**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**6**		
CLAY [%]:	**11**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**36**		
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U: **60.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301951-G
Date:	September 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951B-G October 14, 2021

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
75 WOOLWICH STREET EAST
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your authorisation and subsequent discussions with Mr. Michael DeBiasio, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P301951, dated July 1, 2021, later revised and confirmed through email communication on August 3, 2021. This report should be read in conjunction with the formal report for the Gibson Farms to the east SM 301951A-G, dated October 5, 2021. Our comments and recommendations based on our findings at the four [4] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development consisting of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services, located at 75 Woolwich Street East [Clayton Lands] in Elora, Ontario. The purpose of this preliminary geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

SOIL-MAT ENGINEERS was provided with a sub-watershed study that encompasses the surrounding area – including the subject site – prepared by Aquafor Beech Limited, dated February 2008. The results of this investigation have been considered in preparation of this geotechnical report.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover.

2. PROCEDURE

A total of four [4] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 3.6 and 7.6 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 1, 2, and 4 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3.0 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in

general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 4, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently an undeveloped agricultural property located at Woolwich Street East in Elora, Ontario. The parcel is bordered to the east by Irvine Street, to the south by Bricker Avenue, to the west by residential dwellings and a public school, and to the north by Woolwich Street East. The grade is relatively flat and even at the south portion of the site, sloping gently up towards the north, before quickly descending to the north towards Woolwich Street East with an approximate relief of 6 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 100 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term ‘topsoil’ has been used from a geotechnical point of view, and does

not necessarily reflect its nutrient content or ability to support plant life. Given the property has been historically used for agricultural purposes the upper levels of the soils would be expected to have a reworked nature resulting in more variable depths of topsoil over the site. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site for stripping, i.e. account for slightly greater stripping depth than those specifically noted at the borehole locations.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in Borehole Nos. 1, 2, and 3. The fine-grained granular to slightly cohesive soils were brown in colour, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a compact state. The sandy silt/clayey silt deposit was present to depths of approximately 0.9 to 2.2 metres in Borehole Nos. 2 and 3, and proven to termination within Borehole No. 1 at a depth of approximately 6.1 metres below the existing ground surface.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole No. 4, and beneath the sandy silt/clayey silt layer in Borehole Nos. 2 and 3. The fine to medium grained soils were brown in colour, contained trace amounts of clay, silt, and gravel, and was generally in a loose to compact state. The native sand soils were proven to termination at depths of approximately 3.6 and 7.6 metres below the existing ground surface.

Grain Size Analyses

Grain size analyses were conducted on three [3] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH2 SS6	4.6 m	2	6	91	1	10^{-2}	150 to 300
BH3 SS3	1.5 m	14	45	34	7	10^{-6}	<10
BH4 SS4	2.3 m	2	9	89	0	10^{-3} to 10^{-2}	100 to 150

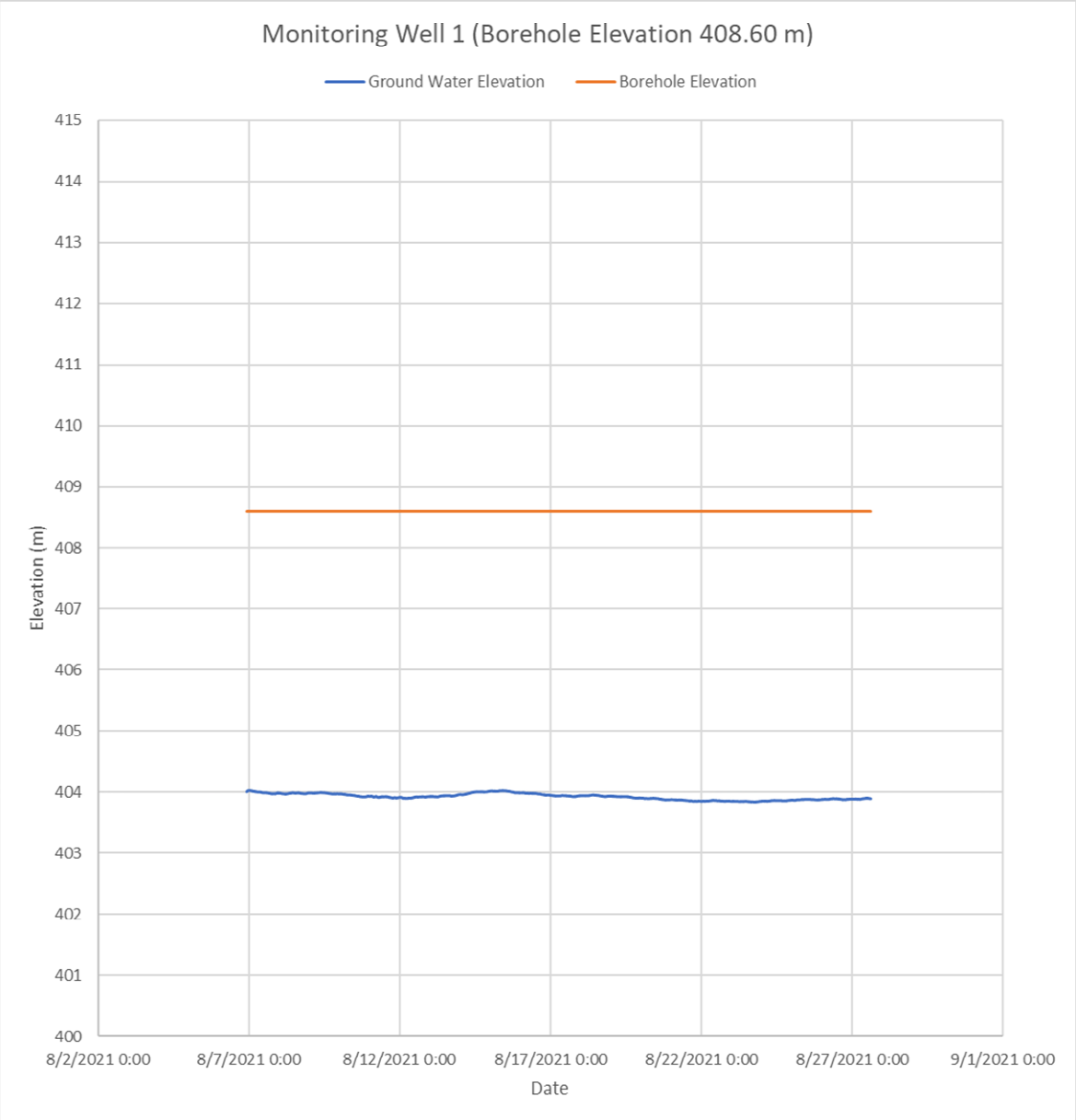
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

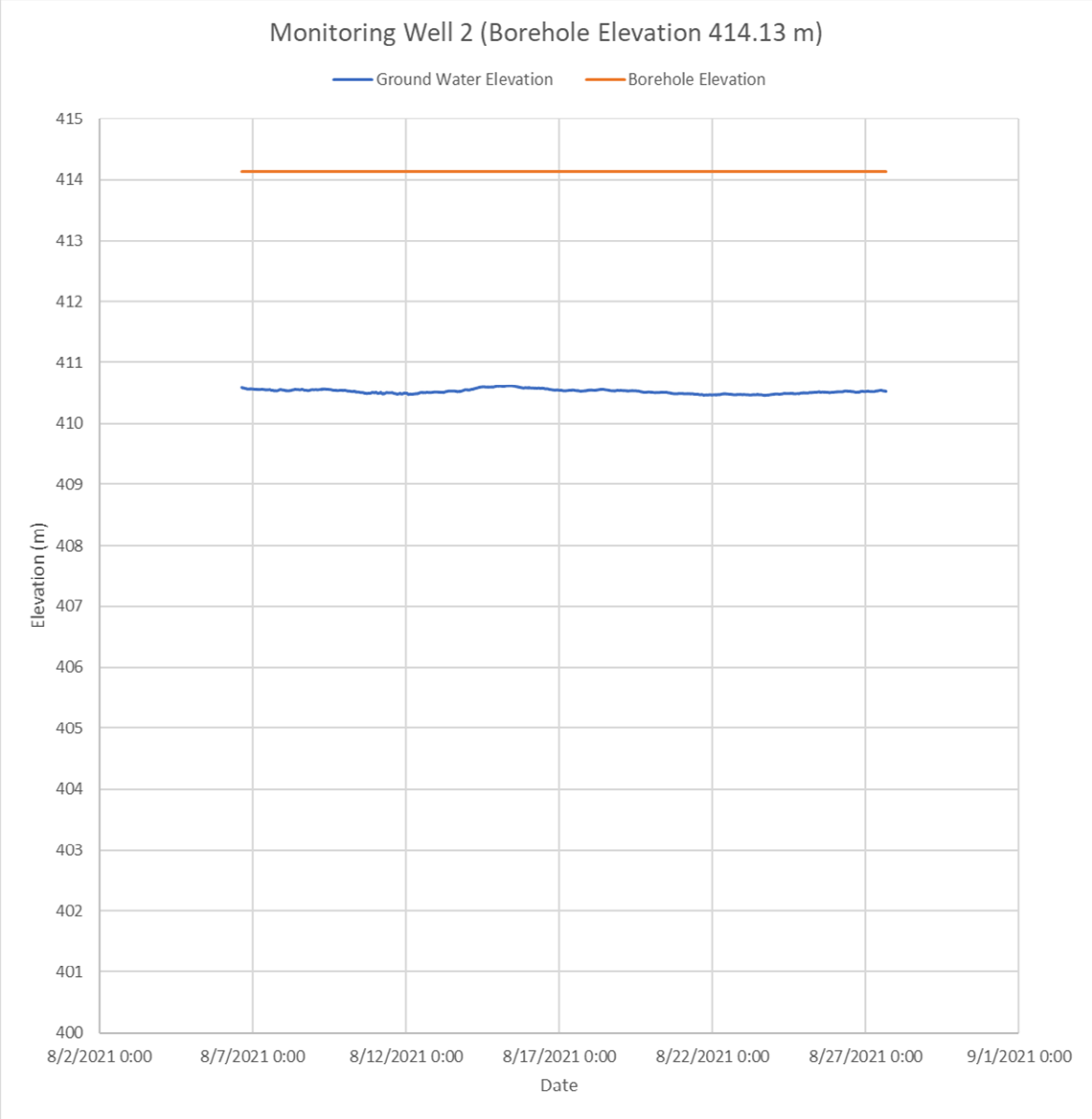
A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Groundwater Observations

Borehole No. 2 was noted to have ‘caved’ to a depth of approximately 3.8 metres and ‘wet’ at a depth of approximately 3.6 metres, while Borehole No. 4 was noted to be open and ‘wet’ at a depth of 7.0 metres upon completion. Borehole Nos. 3 was noted to have cave to a depth of 2.7 metres, and dry upon completion. Borehole No. 1 was noted as being open and ‘dry’ [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole Nos. 1, 2, and 4, to allow for future measurements of the static groundwater level. Furthermore, it is noted that an additional monitoring well was installed on the abutting parcel of land to the east, the work of which was completed in concert with the fieldwork on the Clayton Lands. A data logger was installed in Borehole Nos. 1 and 2 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graphs:




Monitoring Well 2 (Borehole Elevation 414.13 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition to this, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and August 27, 2021 and have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface Elevation [m]	August 6, 2021		August 27, 2021	
		Groundwater Depth [m]	Groundwater Elevation [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW1	408.60	4.78	403.82	4.71	403.89
MW2	414.13	3.58	410.55	3.61	410.52
MW4	414.87	6.78	408.09	6.96	407.91

The groundwater levels observed at these monitoring well locations, as well as the monitoring well installed at the adjacent property [summarised in our geotechnical report SM 301951A-G under a separate cover] indicate a stabilized groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography. This data is based on the groundwater data collected from Borehole Nos. 1, 2, and 4, as well as the monitoring well installed on the Gibson Farm land to the east. It is noted that the groundwater level would be expected to fluctuate seasonally. It is also noted that the observed groundwater levels may be influenced by more localised shallower 'perched' deposits in more permeable seams within the sandy silt/clayey silt. Further long-term monitoring may allow for a more accurate estimate of the static groundwater level, including more data during the 'wet' and 'dry' seasons.

As noted above, SOIL-MAT ENGINEERS was also provided a sub-watershed study by Aquafor Beech, which included a number of monitoring wells to the east to monitor the groundwater elevations. The conditions and groundwater levels described in this geotechnical report are consistent with those encountered during our fieldwork as described above.

General Soil Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The grain size analyses indicate the sandy silt/clayey silt soils to have 10 to 20 percent clay content, lending a slightly cohesive characteristic. The sandy silt/clayey silt soils are relatively consistent in terms of its constituents but are noted to contain an increasing clay content with depth in some of the boreholes, as noted above. Where the material transitions into a sand the native soils are generally fine in gradation in the upper levels, becoming medium to coarse with depth. As demonstrated above the subsurface conditions exhibit a relatively inconsistent layered structure across the large area, but can be generally distinguished by a layer of slightly cohesive sandy silt overlying a cohesionless sand. The conditions will be best assessed during excavations on an area-by-area basis. As such it may also be prudent to advance a series of test excavations in the area of proposed deeper excavations and/or stormwater management ponds to confirm soil composition and groundwater conditions in the area of deep excavations.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 5 metres below the existing grade. Excavations through the native sandy silt/clayey silt and sand soils, as well as any engineered fill placed as part of site grading works, should be relatively straightforward, with the sides remaining stable for short construction periods at inclinations of up to 45 degrees to the horizontal, and possibly steeper depending on moisture condition and clay content. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to ‘slough in’ to as flat as 3 horizontal to 1 vertical, or flatter.

Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sandy silt/clayey silt and sand soils would generally be considered a Type 2 or 3 soil, depending on the moisture content and relative compact to dense condition, as outlined in the Ontario Health and Safety Act III – Excavations. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the groundwater level varies between depths of approximately 2 to 7 metres below the existing grade, roughly elevation 403.8 to 410.5 metres. The majority of excavations are anticipated to be above the groundwater level. Nevertheless, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated. Such infiltration should be readily controlled using typical construction dewatering methods. 'Perched' deposits of water may be encountered within more permeable pockets, which may require greater initial dewatering efforts and instability in the excavations, especially during the 'wet' times of the year. Where excavations extend to greater depths, to and below the groundwater level, especially within the sand deposit, the rate of infiltration will be much greater and additional pumping or more sophisticated dewatering methods should be anticipated. In this regard, ongoing monitoring of the groundwater levels, and careful review of the design servicing elevations, is recommended. As noted above, the advancement of test excavations in the area of proposed deep services and stormwater management ponds would allow for a first hand look at how groundwater levels may affect such excavations. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. This will be especially likely in the high silt content sandy silt/clayey silt soils. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or County of Wellington should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the sandy silt/clayey silt and sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that the sandy silt/clayey silt soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. It is also noted that these fine grained granular soils will present difficulties in achieving effective compaction when they become 'wet' of optimum, and where access with compaction equipment is restricted. The sandy silt/clayey silt soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content, with some noted 'wet' seams. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these silty soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas. The sand soils are generally well draining, and tend to be near optimum moisture content. At depth, approaching or below the water level, the sand soils will be expected to be saturated, requiring time to drain excess moisture or other drying efforts in order to achieve effective compaction.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is

well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained to cohesive soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator

should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap', etc.] 'punched' into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. A typical generic pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 60 millimetres of HL8 or HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Where a pit run, Granular B Type I, aggregate is utilised in the granular base, it should be increased to a minimum thickness of 450 millimetres. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. Notwithstanding, the pavement structure should conform to the relevant County of Wellington requirements where they are to be assumed by the County. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or County of Wellington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A typical recommended light duty pavement structure for residential driveways would

consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. Bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. In areas where 'wet' seams are present, or the native soils present in less compact condition, reduced bearing values of 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] are recommended. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete.

In the event that site grading works result in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This

reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, however further groundwater monitoring may be conducted to more accurately assess the static groundwater level.

The short term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Depths of excavations should be confirmed via a preliminary site servicing and grading plan, which should be forwarded onto our office for further review and comments. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could approach or be greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay ‘cut-offs’ within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be well above the groundwater level, and so would not be expected to require significant ongoing groundwater control,

other than typical perimeter weeping tile and sump pump as noted above. This should be confirmed once our office has had a chance to review the site servicing and grading plans.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, and further detailed hydrogeological assessment is not considered warranted at this time. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern, or need for additional study.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.



Ian Shaw, P. Eng.
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 4, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction

Distribution: Cachet Developments [pdf]



LEGEND

Borehole Location
BH#

Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951B-G.

2. Borehole locations are approximate.

SOIL-MAT
ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
75 Woolwich Street East
Elora, Ontario

Borehole Location Plan

Project No. SM 301591B-G

Date: October 2021

Drawn: SW | Checked: KR

SM 301591B-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 1

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838437
E: 545149

Depth (ft)	Depth (m)	Elevation (m)	Description	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)
0	0	408.60	Ground Surface							
20	6	402.50	End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 6.10 metres.
2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. No soil samples were retrieved. The following free groundwater level readings have been measured:

August 6, 2021 - 4.78 metres below ground surface.

August 27, 2021 - 4.71 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838180
E: 545422

Depth (ft)	Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		414.13	Ground Surface							
0	0	413.90	**Topsoil** Approximately 250 millimetres of topsoil.							
3	1	413.20	**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, loose to compact.	SS	1	4 5 7 8	12			
				SS	2	2 3 6 5	9			
			Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, loose to compact.	SS	3	3 9 12 14	21			
				SS	4	7 8 11 10	19			
				SS	5	6 9 11 17	20			
16	5	408.90	End of Borehole	SS	6	7 5 4 9	9			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as caved to a depth of 3.8 metres and 'wet' at a depth of 3.6 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 3.58 metres below ground surface.

August 27, 2021 - 3.61 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

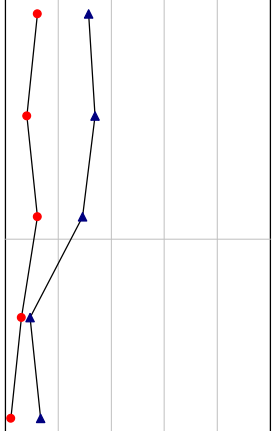
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837942
E: 545194

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft m	412.55	Ground Surface								
0 0		**Topsoil** Approximately 100 millimetres of topsoil.		SS	1	5 5 7 8	12			
1		**Sandy Silt** Brown, trace to some gravel and clay, reworked in upper levels, compact.		AS	2	6 5 3 3	8			
2 1				SS	3	5 6 6 6	12			
7 2	410.30									
8		**Sand** Brown, trace clay, silt, and gravel, medium gradation, loose.		SS	4	2 3 3 2	6			
10 3				SS	5	2 1 1 2	2			
12	408.90									
13 4		End of Borehole								
16 5										
20 6										
23 7										
26 8										
29 9										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded dry and caved to a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 4

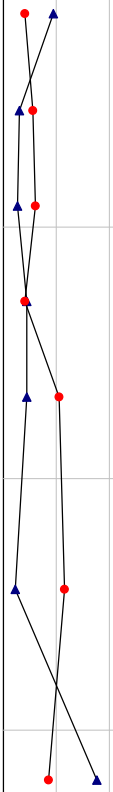
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838174
E: 545084

Depth (ft)	Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		414.87	Ground Surface							
0	0	414.60	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, fine to medium gradation, compact.	SS	1	5 5 6 7	11			
2										
3	1			SS	2	8 9 9 7	18			
4										
5				SS	3	2 5 8 7	13			
6	2									
7										
8				SS	4	6 11 16 13	27			
9										
10	3			SS	5	10 12 11 13	23			
11										
12										
13	4									
14										
15										
16				SS	6	5 10 13 15	23			
17	5									
18										
19										
20	6	408.80	Wet spoon							
21				SS	7	9 9 8 6	17			
22										
23	7									
24		407.30								
25			End of Borehole							
26	8									
27										
28										
29										
30	9									
31										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 7.6 metres.
2. Borehole was recorded as open and 'wet' at depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 6.78 metres below ground surface.
August 27, 2021 - 6.96 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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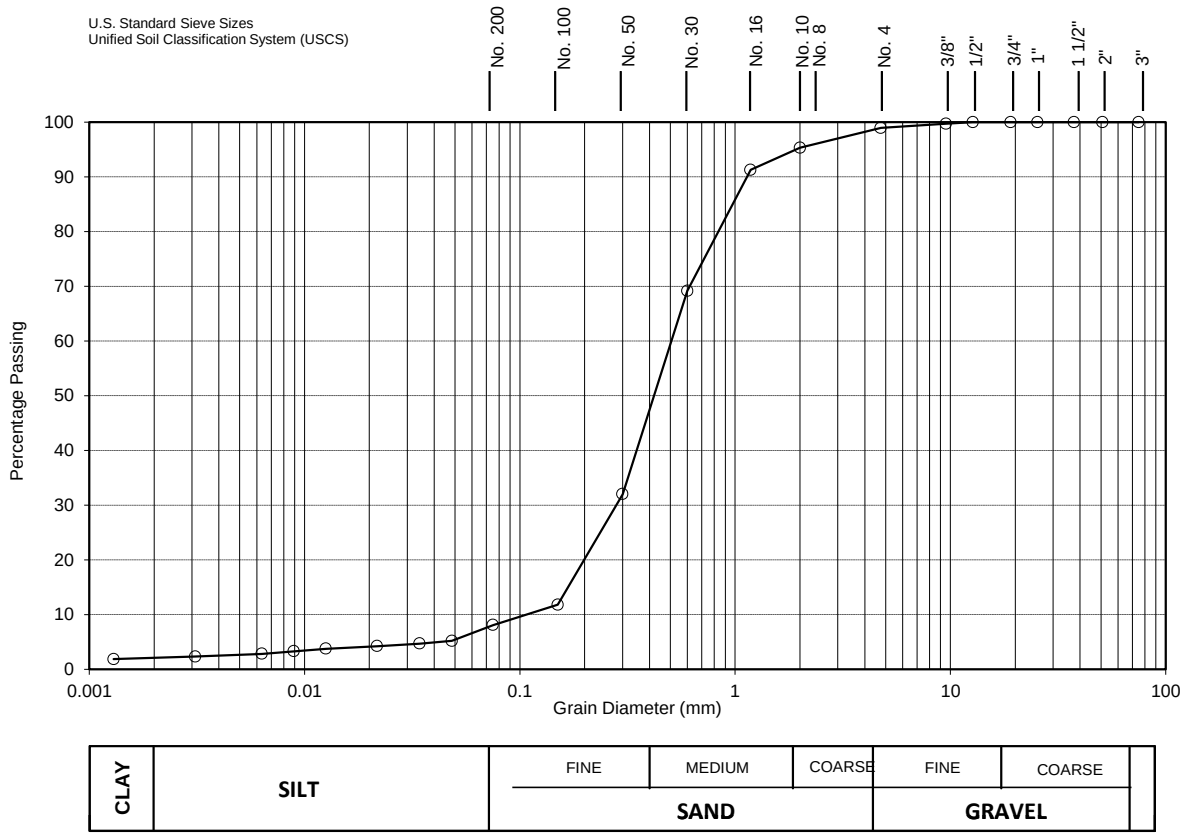
Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



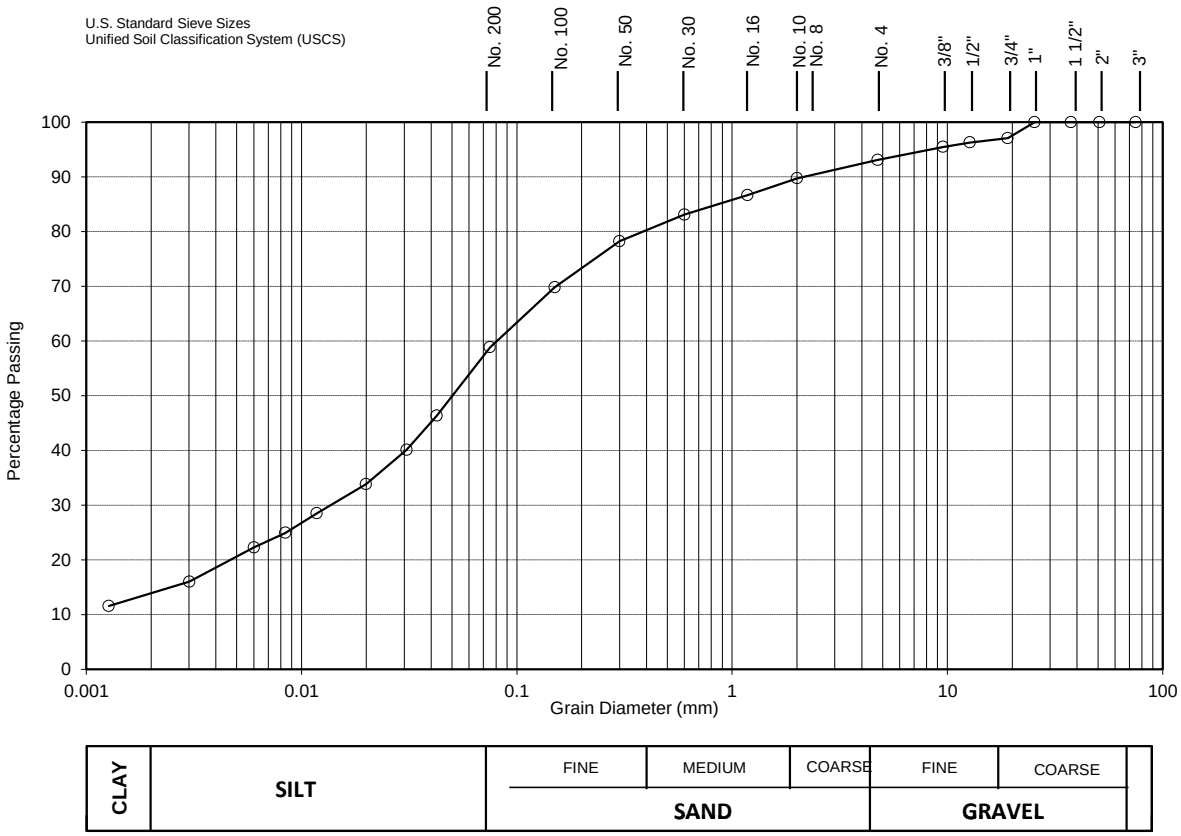
Lab No.:	**21-339**	Notes: Depth: 15'	
Sample No.:	**6**		
Borehole No.:	**2**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**6**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**91**		
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.10**	Coefficient of Uniformity C_U: **5.1**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



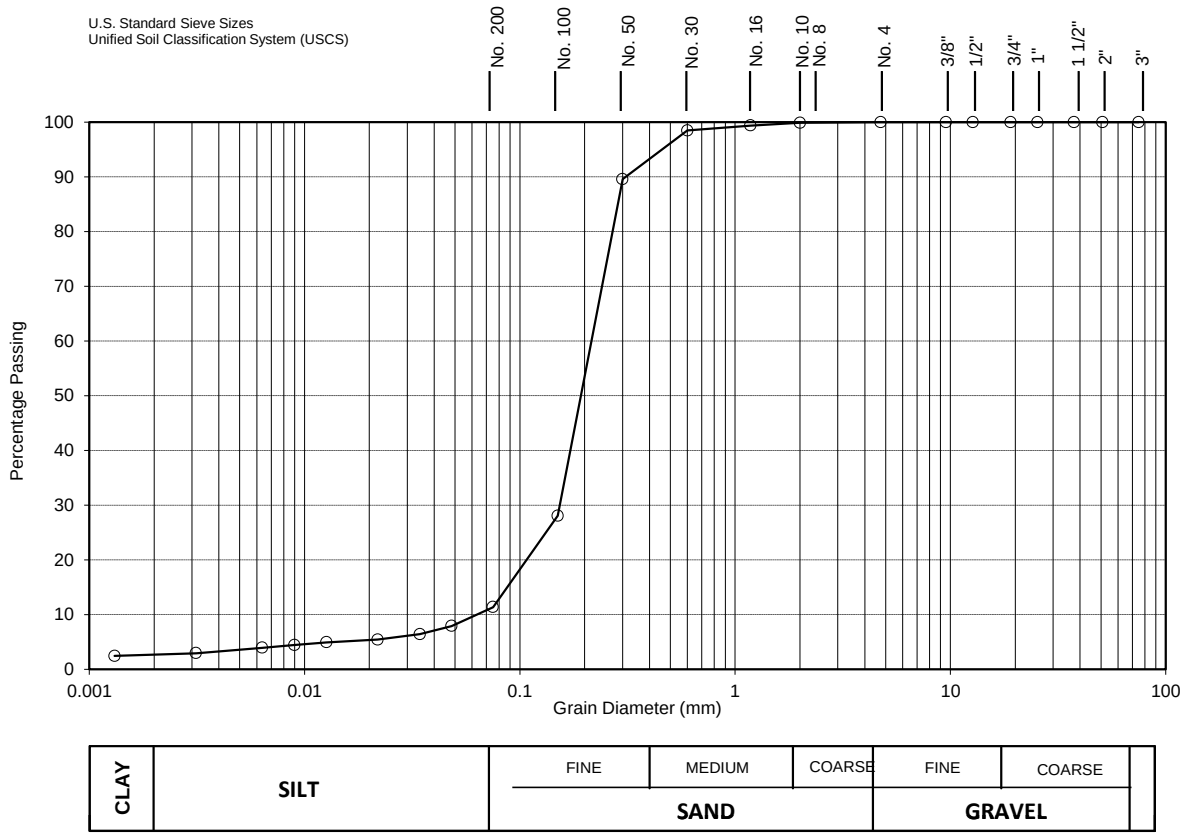
Lab No.:	**21-338**	Notes: Depth: 5'	
Sample No.:	**3**		
Borehole No.:	**3**		
CLAY [%]:	**14**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**45**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**34**		
GRAVEL [%]:	**7**	Estimated Infiltration Rate [mm/hr] : **< 10**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.00100**	Coefficient of Uniformity C_U: **80.0**	Coefficient of Curvature C_C: **2.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses

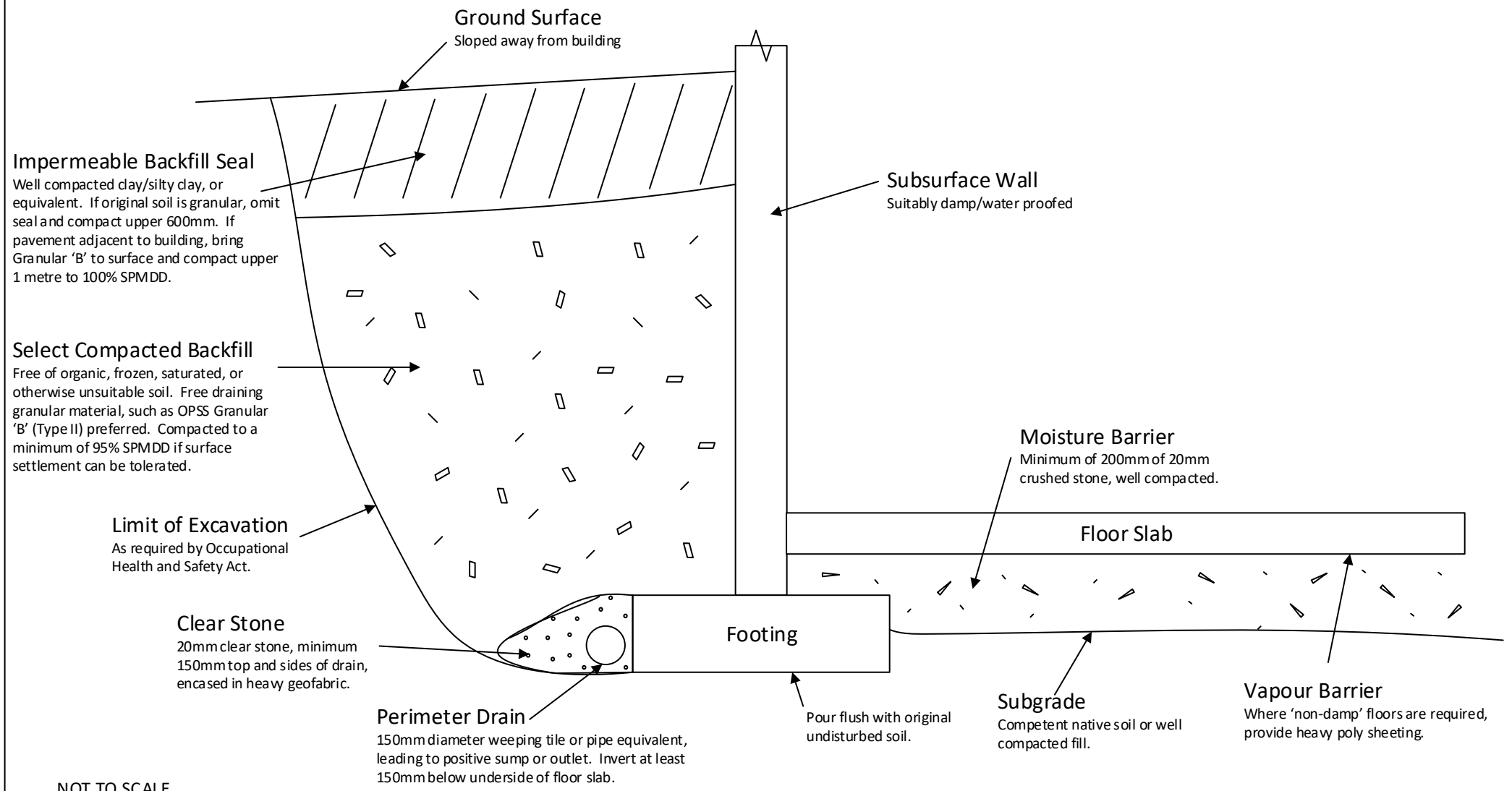


Lab No.:	**21-337**	Notes: Depth: 7.5'	
Sample No.:	**4**		
Borehole No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**9**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**89**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **100 to 150**	Estimated Permeability, k [cm/s] **10^{-3} to 10^{-2}**
D_{10} (Effective Diam. in mm):	**0.0600**	Coefficient of Uniformity C_U: **3.7**	Coefficient of Curvature C_C: **1.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301951-G
Date:	September 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

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Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951-G July 20, 2022

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

DRAFT HYDROGEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
CLAYTON AND ELORA SANDS
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your recent correspondence and discussions, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has prepared the following hydrogeological assessment based on the updated groundwater information to date. These comments are further to our Preliminary Geotechnical and Hydrogeological Investigation reports for the subject lands [SM 301951A-G and SM 301951B-G, dated October 14, 2021 and March 11, 2022], and recent discussions with the design team. As such, this hydrogeological report should be read in conjunction with our previous reports stated above. It is also noted that this report marks the completion of all of the proposed drilling fieldwork, and as such a new borehole numbering system has been implemented.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development on the Clayton Lands located at 75 Woolwich Street East [Clayton Lands] in Elora, Ontario, along with potential future development on the Elora Sands [Elora Sands] to the east. The development details are to be established, but are anticipated to consist of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services. The purpose of this hydrogeological assessment is to provide additional and more detailed information and comments to support the assessment of site servicing options for the proposed development, from a geotechnical point of view.

2. PROCEDURE

Ten [10] and fifteen [15] sampled boreholes were advanced on the Clayton and Elora Sands respectively, totalling twenty-five [25] boreholes at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment between August 5, 2021 and April 18, 2022 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 2.1 and 8.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses to allow for an estimate of the hydraulic conductivity of the subsurface soils. It is noted that slug testing will be performed on a number of the monitoring wells to get a more accurate in-situ measurement of the hydraulic conductivity, results of which will be summarised in a subsequent supplemental report.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, and 401 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3.0 metres. The monitoring wells were encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade. The depths screening intervals for each monitoring well has been summarized below.

Monitoring Well ID	Depth (m)	Screening Interval (m)
MW004	4.6	3.0 – 4.6
MW101	6.1	4.6 – 6.1
MW102	4.6	3.8 – 4.6
MW104	7.6	4.6 – 7.6
MW201	4.6	3.8 – 4.6
MW201A	3.0	2.2 – 3.0
MW202	6.1	4.6 – 6.1

Monitoring Well ID	Depth (m)	Screening Interval (m)
MW203	6.1	4.6 – 6.1
MW204	4.6	3.0 – 4.6
MW205	4.6	3.0 – 4.6
MW206	7.6	6.1 – 7.6
MW301	7.6	6.1 – 7.6
MW302	7.6	6.1 – 7.6
MW303	7.6	6.1 – 7.6
MW304	6.1	4.6 – 6.1
MW305	3.0	2.3 – 3.0
MW401	6.1	4.6 – 6.1

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at all of the borehole locations with the exception of Borehole Nos. 301 through 307 have been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office. The ground surface elevations at Borehole Nos. 301 through 307 have been linearly interpolated based on the topographic survey provided by BSR&D (Reference No. 21-14-573-00-topo) dated January 4, 2022 which was provided to our office. Once a complete topographic survey has been completed with up-to-date geodetic elevations of Borehole Nos. 301 through 307, this report will be updated.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 001 to 007, 101 to 104, 201 to 206, 301 to 307, and 401, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

2. SUBSURFACE CONDITIONS

The subsurface are presented in detail in our referenced Preliminary Geotechnical Investigation report. To summarize, the soil conditions encountered on the Elora Sands generally consisted of a sandy silt/silty sand deposit in the upper levels with some areas and layers of clayey sandy silt till with depth. The soils encountered on the perimeter of the site were highly variable, often encountering layered deposits of clayey sandy silt till

or sand. Occasional deposits of gravelly sand were encountered within some of the boreholes. As such, the presence of permeable granular deposits or 'veins' should be expected across the site. In areas where the presence of a predominately clayey material is expected or would be beneficial, such as in the area of the proposed SWM pond, it may be prudent to advance a series of test excavations to confirm the condition of the subsurface soils including composition, groundwater conditions, suitability for use as an impermeable SWM pond liner, etc.

The Clayton Lands was generally characterised by an upper layer consisting of a clayey sandy silt till underlain by a sand deposit that extended to deep depths. Some isolated areas were encountered that contained a more impermeable clayey sandy silt till. Representative geological cross sections are illustrated in Drawing Nos. 3, 4 and 5, attached.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Grain size analyses were conducted on sixteen [16] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Elora Sands							
Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH003 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH004 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300
BH006 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15
BH201 SS2	1.5 m	5	17	76	2	10^{-4}	50
BH202 SS2	1.5 m	30	38	26	0	10^{-8}	<10
BH202 SS5	6.1 m	10	51	39	0	10^{-6}	10 to 15
BH203 SS2	1.5 m	3	17	37	43	10^{-4}	50 to 60
BH203 SS5	6.1 m	3	8	87	2	10^{-3}	125 to 150
BH204 SS2	1.5 m	16	34	30	20	10^{-7}	10
BH205 SS3	3.0 m	2	4	94	0	10^{-3}	150 to 300

Clayton Lands							
Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH102 SS6	4.6 m	2	6	91	1	10^{-2}	150 to 300
BH103 SS3	1.5 m	14	45	34	7	10^{-6}	10
BH104 SS4	2.3 m	2	9	89	0	10^{-3} to 10^{-2}	100 to 150
BH302 SS2	1.5 m	2	3	95	0	10^{-2}	150 to 300
BH304 SS2	1.5 m	16	40	33	11	10^{-7}	10
BH305 SS2	1.5 m	7	16	77	0	10^{-4}	50 to 60

The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines to S.M. – Sand-silt mixtures at depth.

The clay and silt soils would generally behave as a cohesive material with slight to medium plasticity, and low hydraulic conductivity, on the order of 10^{-6} to 10^{-7} cm/sec, and would be of low permeability to effectively impermeable. The on-site clayey soils would generally be considered suitable for use as an impermeable clay liner for the stormwater management (SWM) pond, however should be confirmed with more specific testing and assessment, and would require selecting sorting to separate out from more sandy deposits. Further testing should be conducted within the area of the proposed stormwater management pond [SWM] in order to confirm the suitability of the clayey material for use as an impermeable liner.

The sand deposit would tend to yield a highly permeable characteristic. Provided that the low impact development (LID) stormwater management systems are located within the highly permeable sand deposits, the hydraulic conductivity for this material would be on the order of 10^{-2} to 10^{-4} cm/sec yielding infiltrations rates in the range of 50 to 300 mm/hr. LID systems such as rear yard catch basins, infiltration swales, etc. will be highly effective within the permeable sand soils and will be able to help with natural groundwater recharge as well as maintain pre and post development runoff volumes, specifically on the Clayton Lands. As noted previously, slug testing is slated to be performed within a number of the monitoring wells across the site to yield a more accurate estimate of the hydraulic conductivity of the native soils. Once available,

information on the location of these LID systems should be forwarded to our office in order to target specific areas with the slug testing.

Groundwater Observations

Borehole Nos. 006, 102, and 004 were noted to have 'caved' to depths of between approximately 2.4 to 3.8 metres and 'wet' at depths of between approximately 2.0 to 3.4 metres, while Borehole No. 104 was noted to be open and 'wet' at a depth of 7.0 metres upon completion. Borehole Nos. 103 and 001 were noted to have cave to depths of 2.7 and 1.5 metres, respectively, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, and 401, to allow for future measurements of the static groundwater level. A data logger was in each of the monitoring wells to allow for continuous monitoring of the groundwater level between August 2021 to June 2022, the readings of which have been illustrated in graphs which can be found appended to the end of this report.

In addition, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on various dates, ranging from August 2021 to June 2022. These have been summarized in the following charts:

TABLE B
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA SANDS)

Borehole No. 004 (Ground Surface Elevation of 405.55 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	2.74	402.8
August 27, 2021	1.75	403.8
February 23, 2022	1.33	404.2
April 22, 2022	1.47	404.1
June 1, 2022	1.78	403.8

Borehole No. 201 (Ground Surface Elevation of 404.80 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.69	402.1
April 22, 2022	1.88	402.9
June 1, 2022	2.44	402.4

Borehole No. 201A (Ground Surface Elevation of 404.75 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.8
April 22, 2022	2.05	402.7
June 1, 2022	2.43	402.3

Borehole No. 202 (Ground Surface Elevation of 406.59 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	5.5	401.1
April 22, 2022	4.76	401.8
June 1, 2022	5.43	401.2

Borehole No. 203 (Ground Surface Elevation of 407.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.0
April 22, 2022	5.90	401.2
June 1, 2022	5.91	401.2

Borehole No. 204 (Ground Surface Elevation of 409.56 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.81	406.7
April 22, 2022	1.16	408.4
June 1, 2022	1.53	408.0

Borehole No. 205 (Ground Surface Elevation of 412.99 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.56	410.4
April 22, 2022	2.25	410.7
June 1, 2022	2.39	410.6

Borehole No. 206 (Ground Surface Elevation of 412.88 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	6.83	406.1
April 22, 2022	4.60	408.3
June 1, 2022	4.66	408.2

Borehole No. 401 (Ground Surface Elevation of 420.91 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
April 22, 2022	2.29	418.6
June 1, 2022	2.39	418.5

TABLE C
SUMMARY OF MANUAL GROUNDWATER READINGS (CLAYTON LANDS)

Borehole No. 101 (Ground Surface Elevation of 408.60 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	4.78	403.8
August 27, 2021	4.71	403.9
October 14, 2021	4.33	404.3
February 23, 2022	4.31	404.3
April 22, 2022	4.07	404.5
June 1, 2022	4.15	404.5

Borehole No. 102 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	3.58	410.6
August 27, 2021	3.61	410.5
October 14, 2021	3.62	410.5
February 23, 2022	3.50	410.6
April 22, 2022	2.89	411.2
June 1, 2022	3.05	411.1

Borehole No. 103 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	6.78	408.1
August 27, 2021	6.96	407.9
October 14, 2021	7.09	407.8
February 23, 2022	6.83	408.0
April 22, 2022	6.13	408.7
June 1, 2022	6.28	408.6

Borehole No. 301 (Ground Surface Elevation of 412.75 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.29	406.5
April 22, 2022	5.65	407.1
June 1, 2022	5.71	407.0

Borehole No. 302 (Ground Surface Elevation of 413.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.62	406.4
April 22, 2022	6.06	406.9
June 1, 2022	6.12	406.9

Borehole No. 303 (Ground Surface Elevation of 414.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	5.40	408.6
April 22, 2022	6.04	407.9
June 1, 2022	6.11	407.9

Borehole No. 304 (Ground Surface Elevation of 407.90 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	2.87	405.0
April 22, 2022	2.60	405.3
June 1, 2022	2.96	404.9

Borehole No. 305 (Ground Surface Elevation of 408.60 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	Dry	<405.6
April 22, 2022	Dry	<405.6
June 1, 2022	Dry	<405.6

*Ground surface elevations have been interpolated based on contours from current topographic survey

The available data to date presented above illustrates a variable groundwater level, ranging from about 3 to 6 metres (elevations of between 407 to 411 metres) below the existing ground surface at Borehole Nos. 102, 104, 301, 302, and 303, at the southern half of the Clayton Lands, with the highest groundwater levels during the wet spring months. The groundwater drops to the southwest and to the north, as illustrated on Drawing No. 2, Groundwater Contour Map. The groundwater level drops to ranges of between 3 to 4 metres (elevations of between 404.5 to 405.3 metres) below the existing ground surface at the northern limits of the Clayton Lands. Based on the visual data displayed within the groundwater graphs, the data indicates a relatively stable groundwater level with small fluctuations between the 'wet' and 'dry' months of the year. This can be attributed to highly permeable fine to coarse grained sand and silty sand deposits within the southern half of the Clayton lands. The groundwater level within Borehole No. 304 was noted to be higher in comparison to the other wells, however may be more susceptible to precipitation, resulting in 'perched deposits' of water within the

more permeable above the clayey soils. The groundwater was noted to be deepest on the southern portion of the Clayton Lands, where the soil conditions at the borehole conditions generally indicated more permeable sandy soils until termination. The groundwater was shallowest at the northern portion of the Clayton lands, generally following the physical topography. Where encountered within the boreholes, the clayey deposits would tend to 'trap' the water within the low permeable layer and present a high groundwater condition than would otherwise be found within areas of permeable sandy soils. The manual readings gathered in April 2022 would be considered representative of a seasonal 'high'

The groundwater data gathered on the Elora Sands to date indicate a groundwater level on the order of 1.2 to 4.6 metres (elevations of between 408.5 to 410.7 metres) below the existing ground surface at Borehole Nos. 204, 205, and 206, predominantly located south of the landing strip within the farmer's field. The groundwater drops to the east towards a tributary of the Irvine Creek [also identified as Nichol Drain] with a groundwater elevation of between 402.8 to 404.2 metres measured manually periodically within Borehole No. 004 from August 2021 to June 2022. The groundwater level drops to the north as well towards Nichol Road 15 and where the storm water management pond is proposed. The groundwater level at this location is noted to be stabilizing at an elevation of between roughly 401 to 403 metres. The magnitude of fluctuations demonstrated within these areas are on the order of approximately 2 metres, according to the groundwater data graphs and may be attributed to the soil conditions, which is noted to be more layered.

It is also noted that the groundwater levels and elevations would tend to vary with the elevation changes across the site, which varies significantly. As such, it would be prudent to advance a series of test pits or additional boreholes across the site, specifically in the areas of notably higher groundwater levels and areas of large excavations for deeper services or pumping stations, in order to assess first hand how the groundwater will affect the excavations during site earthworks and servicing.

The direction of groundwater flow has been inferred from these groundwater levels, and has been illustrated on the groundwater contour map Drawing No. 2, Groundwater Contour Map. The direction of groundwater is locally flowing towards the Irvine Creek to the north and west on the Clayton Lands. The groundwater is flowing towards the tributary of the Irvine Creek [Nichol Drain] on the east side of the Elora Sands and to the north towards the Irvine Creek on the west side of the site. As such, the shallow groundwater is contributing to the base flow to the Nichol Drain. Best efforts should be exercised to maintain the overall natural drainage as part of the site grading, stormwater management plan and water balance across the site.

The subsurface soil and groundwater conditions described above are illustrated in the attached geological cross sections, Drawing Nos. 3, 4 and 5.

3. HYDROGEOLOGICAL SETTING AND WATER WELL STUDY

A review of available information, including water well records within an approximate 250 metre radius, was undertaken to inform the hydrogeological setting of the subject lands.

3.1.1 METHODS

Information was compiled for this hydrogeological assessment from sources including:

- Topographic, Bedrock Geology, and Soils maps.
- Ministry of Environment, Conservation and Parks [MOE] Water Well Records.
- Site visit of the property and review of adjacent lands.
- Site specific geotechnical investigation program involving a series of boreholes.

3.1.2 LIMITATIONS AND CONDITIONS

Information for this study was compiled from geological maps and well records for water wells drilled in the study area. Water well locations are approximated in well records using the UTM coordinate system and in some instances may be in error by more than 50 metres. Potential for mapping error therefore exists in correlation of well registration numbers with street addresses. Soils and bedrock descriptions in the well records are limited and generalized regarding formation lithology. Stratigraphic interpretation in this report is based on information from water well records, topographic maps, Paleozoic Geology maps of the area, and geotechnical investigations performed by SOIL-MAT ENGINEERS in the area.

3.2.1 GEOLOGY – OVERBURDEN SOIL

Local soils identified in the Ministry of Northern Development and Mine's "Quaternary Geology of Ontario, Southern Sheet Map M2556" are described predominantly as a silt to sandy silt 'till'. This is consistent with our geotechnical investigation, which found the overburden soils to consist primarily of sandy silt with some areas of sand with trace silt. Grain size analyses of representative soil samples yielded clay content in the range of 2 to 22 percent, silt content of 6 to 45 percent, sand content of 28 to 91 percent, and gravel content of 0 to 11 percent.

3.2.2 GEOLOGY – BEDROCK

Bedrock in the in the vicinity of the Site is recorded from the Ministry of Northern Development and Mine's "Bedrock Geology of Ontario, Southern Sheet Map M2344," as Limestone and Dolostone of the Guelph Formation. The depth to bedrock, as reported

in MOE water well records for wells in the proximity of the Site, is on the order of approximately 0.3 to 22.6 metres below ground surface.

3.2.3 GROUNDWATER CONDITIONS

The referenced geotechnical investigation for the site provides an estimate of the static groundwater level at approximately 2 to 7 metres below the existing grade. This is consistent with our experience on other nearby development projects. It is noted that the groundwater conditions within the overburden soils would be influenced by prevailing weather conditions and would experience seasonal fluctuation.

3.2.4 WATER WELL INVENTORY

MOE water well records revealed forty-four [44] wells located within an approximate 250 metre radius of the limits of the Site. The location of these available well records is illustrated in the attached Drawing No. 3. The water well records [https://www.ontario.ca/environment-and-energy/map-well-records] locations are approximated in well records using the UTM co-ordinate system and in some instances may be in error by more than 50 metres. Potential for mapping error therefore exists in correlation of well registration numbers with street addresses. Soils and bedrock descriptions in the well records are limited and generalized regarding formation lithology.

It is understood that the existing residential properties to the west and north are privately serviced with water wells or cisterns and septic systems, with the existing residential properties to the south and east are serviced with municipal water, storm and sanitary sewers.

The data contained in the water well records suggests that there are two [2] predominant aquifers in the Study Area, one which is considered a confined aquifer within the limestone bedrock at an estimated depth between 17.7 to 79.0 m bgs, with an average static water level of 11.3m. The other is an unconfined aquifer within the sandy silt, situated at an estimated depth between 2 and 7 m bgs. Data contained in MOE Water Well Records for forty-four [44] water wells within the *Study Area* are presented for statistical observations in Table A below.

The information gathered from the records indicates the following:

- Ground water was encountered as shallow as 17.7 metres below ground surface [“m bgs”] and as deep as 79.0 m bgs, with an average depth of 52.5 m bgs during the well drilling.
- Static water levels varied from 0.3 to 41.2 m bgs, with an average static level of 11.3 m bgs, and;
- The Pressure Head varied from 13.4 to 71.0 metres with an average of 41.2 metres.
- Recommended available pumping rates ranging between 3.5 and 25 gpm.
- The water bearing formation lithology reported in the majority of the wells was within the limestone bedrock.

Table 1: Water Well Records – Statistical Observations

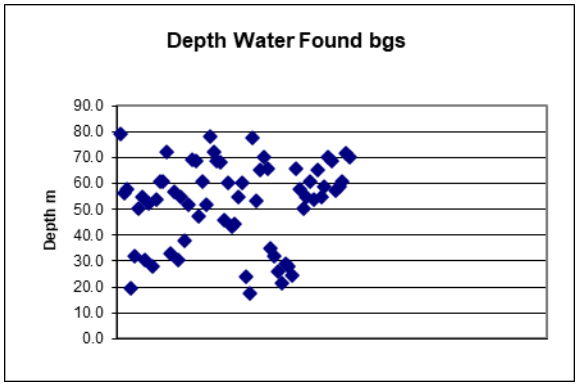
Part Lots 15-17 **Total wells =**
Concessions 8-10 **44**

Surface Elevation		Depth found bgs		Elevation found		Static depth bgs		Static Elevation		Pressure Head
fasl	masl	fasl	masl	fasl	masl	ft	m	fasl	masl	m
1380	420.7	*259*	79.0	*1121*	341.8	*26*	7.9	*1354*	412.8	71.0
1380	420.7	*184*	56.1	*1196*	364.6	*65*	19.8	*1315*	400.9	36.3
1358	414.0	*189*	57.6	*1169*	356.4	*20*	6.1	*1338*	407.9	51.5
1355	413.1	*64*	19.5	*1291*	393.6	*5*	1.5	*1350*	411.6	18.0
1350	411.6	*104*	31.7	*1246*	379.9	*23*	7.0	*1327*	404.6	24.7
1320	402.4	*165*	50.3	*1155*	352.1	*57*	17.4	*1263*	385.1	32.9
1300	396.3	*180*	54.9	*1120*	341.5	*47*	14.3	*1253*	382.0	40.5
1300	396.3	*100*	30.5	*1200*	365.9	*30*	9.1	*1270*	387.2	21.3
1300	396.3	*172*	52.4	*1128*	343.9	*53*	16.2	*1247*	380.2	36.3
1298	395.7	*91*	27.7	*1207*	368.0	*30*	9.1	*1268*	386.6	18.6
1305	397.9	*176*	53.7	*1129*	344.2	*30*	9.1	*1275*	388.7	44.5
1314	400.6	*200*	61.0	*1114*	339.6	*35*	10.7	*1279*	389.9	50.3
1314	400.6	*200*	61.0	*1114*	339.6	*135*	41.2	*1179*	359.5	19.8
1314	400.6	*237*	72.3	*1077*	328.4	*55*	16.8	*1259*	383.8	55.5
1315	400.9	*108*	32.9	*1207*	368.0	*36*	11.0	*1279*	389.9	22.0
1300	396.3	*186*	56.7	*1114*	339.6	*48*	14.6	*1252*	381.7	42.1
1290	393.3	*100*	30.5	*1190*	362.8	*35*	10.7	*1255*	382.6	19.8
1295	394.8	*180*	54.9	*1115*	339.9	*60*	18.3	*1235*	376.5	36.6
1300	396.3	*125*	38.1	*1175*	358.2	*20*	6.1	*1280*	390.2	32.0
1325	404.0	*170*	51.8	*1155*	352.1	*30*	9.1	*1295*	394.8	42.7
1335	407.0	*227*	69.2	*1108*	337.8	*50*	15.2	*1285*	391.8	54.0
1335	407.0	*226*	68.9	*1109*	338.1	*44*	13.4	*1291*	393.6	55.5
1335	407.0	*155*	47.3	*1180*	359.8	*66*	20.1	*1269*	386.9	27.1
1335	407.0	*200*	61.0	*1135*	346.0	*45*	13.7	*1290*	393.3	47.3
1330	405.5	*170*	51.8	*1160*	353.7	*46*	14.0	*1284*	391.5	37.8
1330	405.5	*257*	78.4	*1073*	327.1	*73*	22.3	*1257*	383.2	56.1
1330	405.5	*237*	72.3	*1093*	333.2	*33*	10.1	*1297*	395.4	62.2
1325	404.0	*225*	68.6	*1100*	335.4	*89*	27.1	*1236*	376.8	41.5
1325	404.0	*223*	68.0	*1102*	336.0	*61*	18.6	*1264*	385.4	49.4
1325	404.0	*150*	45.7	*1175*	358.2	*27*	8.2	*1298*	395.7	37.5
1325	404.0	*198*	60.4	*1127*	343.6	*47*	14.3	*1278*	389.6	46.0
1325	404.0	*142*	43.3	*1183*	360.7	*38*	11.6	*1287*	392.4	31.7
1350	411.6	*145*	44.2	*1205*	367.4	*39*	11.9	*1311*	399.7	32.3
1345	410.1	*180*	54.9	*1165*	355.2	*57*	17.4	*1288*	392.7	37.5
1345	410.1	*198*	60.4	*1147*	349.7	*53*	16.2	*1292*	393.9	44.2
1340	408.5	*78*	23.8	*1262*	384.8	*4*	1.2	*1336*	407.3	22.6
1325	404.0	*58*	17.7	*1267*	386.3	*1*	0.3	*1324*	403.7	17.4
1325	404.0	*255*	77.7	*1070*	326.2	*23*	7.0	*1302*	397.0	70.7

1315	400.9	*175*	53.4	*1140*	347.6	*24*	7.3	*1291*	393.6	46.0
1320	402.4	*214*	65.2	*1106*	337.2	*19*	5.8	*1301*	396.6	59.5
1310	399.4	*230*	70.1	*1080*	329.3	*15*	4.6	*1295*	394.8	65.5
1305	397.9	*215*	65.5	*1090*	332.3	*22*	6.7	*1283*	391.2	58.8
1305	397.9	*114*	34.8	*1191*	363.1	*1*	0.3	*1304*	397.6	34.5
1310	399.4	*105*	32.0	*1205*	367.4	*23*	7.0	*1287*	392.4	25.0
1305	397.9	*85*	25.9	*1220*	372.0	*6*	1.8	*1299*	396.0	24.1
1310	399.4	*70*	21.3	*1240*	378.0	*26*	7.9	*1284*	391.5	13.4
1310	399.4	*95*	29.0	*1215*	370.4	*22*	6.7	*1288*	392.7	22.3
1315	400.9	*91*	27.7	*1224*	373.2	*14*	4.3	*1301*	396.6	23.5
1315	400.9	*81*	24.7	*1234*	376.2	*35*	10.7	*1280*	390.2	14.0
1315	400.9	*215*	65.5	*1100*	335.4	*24*	7.3	*1291*	393.6	58.2
1310	399.4	*190*	57.9	*1120*	341.5	*30*	9.1	*1280*	390.2	48.8
1305	397.9	*165*	50.3	*1140*	347.6	*24*	7.3	*1281*	390.5	43.0
1310	399.4	*179*	54.6	*1131*	344.8	*20*	6.1	*1290*	393.3	48.5
1320	402.4	*200*	61.0	*1120*	341.5	*34*	10.4	*1286*	392.1	50.6
1320	402.4	*176*	53.7	*1144*	348.8	*30*	9.1	*1290*	393.3	44.5
1320	402.4	*214*	65.2	*1106*	337.2	*43*	13.1	*1277*	389.3	52.1
1315	400.9	*180*	54.9	*1135*	346.0	*38*	11.6	*1277*	389.3	43.3
1305	397.9	*193*	58.8	*1112*	339.0	*40*	12.2	*1265*	385.7	46.6
1305	397.9	*230*	70.1	*1075*	327.7	*39*	11.9	*1266*	386.0	58.2
1315	400.9	*225*	68.6	*1090*	332.3	*34*	10.4	*1281*	390.5	58.2
1305	397.9	*188*	57.3	*1117*	340.5	*26*	7.9	*1279*	389.9	49.4
1310	399.4	*192*	58.5	*1118*	340.9	*30*	9.1	*1280*	390.2	49.4
1310	399.4	*200*	61.0	*1110*	338.4	*77*	23.5	*1233*	375.9	37.5
1325	404.0	*235*	71.6	*1090*	332.3	*35*	10.7	*1290*	393.3	61.0
1325	404.0	*230*	70.1	*1095*	333.8	*44*	13.4	*1281*	390.5	56.7
		Avg.=	*52.5*	Avg.=	*350.1*	Avg.=	*11.3*	Avg.=	*391.3*	*41.2*
		SdevP=	*16.2*	SdevP=	*16.3*	SdevP=	*6.6*	SdevP=	*8.4*	*14.6*

Water bearing formation

Formation	#	%
Overburden	0	0
Bedrock	44	100



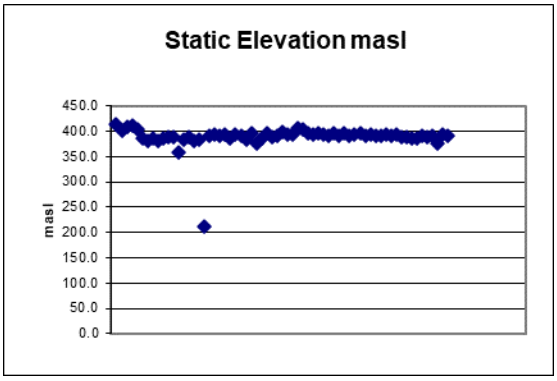


Table D – MOE Water Well Record Statistical Observations

The term aquifer here generally refers to a geologic unit(s) or formation permeable enough to yield economic quantities of water to wells. The term aquitard refers to a geologic unit(s) or formation with insufficient permeability to supply production wells. Aquifers and aquitards are interpreted here based on statistical observation of data contained in the MOE water well records. Hydrographs of water levels are normally not kept for private wells, therefore historical fluctuations in water levels are not known.

3.3 HYDROGEOLOGICAL SETTING

Based on the available information the following comments can be made:

- There are two [2] predominant aquifers in the Study Area, one which is considered a confined aquifer within the limestone bedrock at an estimated depth between 17.7 to 79.0 m bgs, with an average static water level of 11.3m. The other is an unconfined aquifer within the sandy silt, situated at an estimated depth between 2 and 7 m bgs.;
- In each case the aquifer within the limestone bedrock exhibited a positive pressure head [i.e., the static water level is above the elevation where the groundwater was encountered] in each well record, indicating the aquifer was under confined artesian conditions with respect to the confining layer.
- Pressure head (hydraulic head above aquifer) ranged from 13.4 to 71.0 metres with an average of 41.2 metres;
- Recommended available pumping rates ranging between 3.5 and 25 gpm.

Given the above, any active potable water wells in the area would be at greater depths as drilled bedrock wells. Such wells would be drawing water from within the limestone bedrock aquifer. The overburden soils consist of primarily sand and silty sands, with less permeable clayey silt. The shallow groundwater condition on the site is typical of an unconfined near surface aquifer, which would be influenced by seasonal weather conditions, drainage, and the presence of variable more permeable seams in the overburden soils.

4. EARTHWORKS AND SITE GRADING OPERATIONS

Based on the provided preliminary grading plan forwarded to our office by MTE (Project No. 50250-100, F16-FG.dwg) dated April 7, 2022 some cut and fill on the order of 2 to 4 metres will take place. Despite the moderate cut and fill operations, the preliminary grading plan has taken into consideration the groundwater elevations across this parcel of land, such that fill operations will take place on the northern portion of the site where groundwater was noted to be highest and cut operations in the middle and south portions of the site, where groundwater was observed to be deepest. It would be expected that natural surface drainage would result in pooling of water in low spots across the site, which are noted to be within the areas of fill. The predominantly sandy soils on the Clayton Lands will promote natural infiltration and will make site servicing easier, provided that contractors work their way from the low end of the site to the high end of the site.

At this time a preliminary site servicing and grading plan for the Elora Sands has not been provided to our office, as the potential development of those lands is a future

consideration. However, the existing topography of this parcel of land contains larger undulations and changes in elevations. Therefore, it is anticipated that the cut and fill operations for this parcel of land will require more significant regrading. It is recommended that the cut/fill operations be handled in a similar manner as the Clayton Lands, such that fill operations take place where groundwater is shallowest at the northern portion of the site and cut operations take place where the deepest groundwater was encountered at the southern end of the site. As noted above, the Elora Sands generally consists of sandy silt/silty sand within the upper levels, transitioning to a clayey sandy silt with depth, however is more variable at times with clayey or gravelly deposits. As such, 'perched' water deposits within the permeable seams may yield 'wet' excavated material. Contractors should anticipate difficulties with base stabilisation and engineered fill works when work is conducted during the 'wet' times of the year. It is recommended that where possible, earthworks be conducted during the dry summer months. Where engineered fill occurs during the 'wet' times of the year, considerable delays and challenges in achieving effective compaction associated with wet soil conditions may be incurred and should be anticipated. It may be necessary to spread a thin lift of wet backfill to 'air dry' for several days or more if engineered fill is undertaken during the 'wet' times of the year.

5. HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development is anticipated to consist of single-family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend up to approximately 1.5 to 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, generally 3.5 to 7 metres over the Clayton lands presently proposed for development. The groundwater level is shallower to the east, approaching the Irvine Creek tributary [Nichol Drain], generally following the drop in topography toward the creek. As the conditions consisted mostly of the permeable sand on the Clayton Lands, the groundwater level between the 'wet' and 'dry' seasons of the year was relatively consistent with little to no fluctuation. These conditions, with relatively permeable soil conditions at depth, and groundwater at sufficient depth, are well suited to proposed development. The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions.

The exception might be deeper trunk sewers, which would warrant closer assessment as the detailed design proceeds.

Shallower groundwater was observed on the Elora Sands at the northern portion of the site where more clayey and gravelly deposits were encountered, as noted above. These deposits are likely to trap and create a 'perched' water condition which may exacerbate the infiltration of groundwater into open excavations, however would likely be able to be handled with conventional dewatering methods and techniques. Furthermore, the fluctuations in groundwater level were higher on the Elora Sands as the soils conditions encountered within the boreholes consisted of more clayey deposits.

The short-term excavations for the proposed servicing are generally anticipated to extend through the permeable sandy soils and into the clayey sandy silt till where deeper excavations are required. Where the site calls for the placement of engineered fill, raising the grade, it would create an even larger separation between the groundwater table and the proposed servicing and foundation construction. Excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. However, during wet times of year and in deeper excavations, some instability of the excavations should be expected. In the event that deeper excavations are required below the groundwater level or where more permeable sand and gravel seams are encountered, a greater rate of infiltration should be anticipated, requiring multiple pumps and possibly more sophisticated dewatering techniques for deeper excavations.

The rate of dewatering would be a function of the time of year, depth of excavation, length of trench opened by the contractor, etc. In most cases it is expected to be below 50,000 L/day, though for deeper excavations may be as much as up to 400,000 L/day. Where dewatering rates of greater than 50,000 L/day are anticipated it would be necessary to file an EASR notice for construction dewatering. However, it is not anticipated that dewatering would be greater than 400,000 L/day, and so the need for a permit to take water [PTTW] is not expected. As noted above, the advancement of a number of test pits, would be prudent to assist in refining the anticipated construction dewatering requirements as the design of the site grading and servicing proceeds.

The layering of sandy and clayey soils encountered specifically on the Elora Sands would allow for some natural drainage and movement of groundwater, however given the high silt content this should not be solely relied upon. As such, excavations may have the potential to intercept shallow groundwater on parts of the site and thus create a "French Drain" within the bedding material, with possible affect to the groundwater.

Consequently, if groundwater is encountered during digging of the service trenches, measures may need to be implemented to mitigate/eliminate groundwater interference. These would include clay cut-offs within the service trench fill encasing the pipe/service. Such clay cut-offs should be installed in accordance with OPSD 80.095, using a suitable clay soil or alternatively a blend of 1 part bentonite chips to 3 parts OPSS Granular A, or suitably clayey soil encountered on site. The need for such measures is best assessed as the detailed design proceeds, and in the field during construction. Regardless, any such locally lowering of the groundwater associated with site servicing would be limited to the near surface soils, and would not be expected to significantly impact the regional groundwater conditions.

Excavations for the proposed basement levels should be well above the groundwater level, pending review of the final site grading plans and foundation depths, along with more detailed assessment such as test pits in the area of observed shallow groundwater levels. With proper consideration to the site grading and design founding elevations, it is not anticipated that foundation excavations would require ongoing groundwater control, other than typical perimeter weeping tile and sump pumps.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during pre and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit predominantly on the Clayton Lands, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such as in 'dry' ponds, infiltration galleries, rear yard infiltration swales or galleries, etc. As noted above, the sand deposit would have hydraulic conductivity on the order of 10^{-2} to 10^{-3} cm/sec, correlating to design infiltration rates on the order of 100 to 300 mm/hr. The use of infiltration systems could be readily utilised for lot level infiltration of rain water from downspouts, and also within the overall SWM plan. The soil conditions on the Elora Sands are more variable and contain more clayey deposits which are considered to have a low permeability characteristic. Preliminary grain size analyses on the clayey sandy silt till indicate a hydraulic conductivity on the order of 10^{-6} to 10^{-8} cm/sec, correlating to design infiltration rates on the order of less than 10 to 15 mm/hr. As such, LID systems aren't recommended where areas of clayey sandy silt till are encountered [generally the lower areas of the site, towards the tributary to Irvine Creek] but should be considered in areas consisting

of the more permeable sandy deposits [generally the higher portions of the site, to the south]. This would be better addressed during the detailed design process, supported with the advancement of test pits at specific locations proposed for LID measures. It is noted that single well response testing will be performed in a number of the monitoring wells installed which will allow for a more accurate estimate of the hydraulic conductivity for the various soil layers.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, provided the comments and recommendations provided in this report are adhered to. There is not expected to be a significant or long-term impact on the development, such as ongoing dewatering, etc., provided the above discussion and recommendations are considered in the site grading, servicing and stormwater design.

As outlined above, the hydrogeological setting of the site is such that potable wells in the area would be drawing from a deep confined bedrock aquifer, and would be largely unaffected by potential construction activities encountering the shallow near surface groundwater regime. Construction of the proposed development would involve relatively shallow excavations only, with limited interaction with the shallow groundwater regime, and would not have an impact on deeper supply aquifers. As such, there would be no anticipated negative impact from the proposed development on nearby potable wells, including municipal supply wells. Further, as the proposed development would be provided with municipal water supply, there would be no impact to potential supply aquifers or associated water wells in the area, if any.

It is noted that the subject lands are within a Wellhead Protection Area (WHPA). However, based on the comments noted above, there will be no anticipated negative impact with respect to the deep bedrock aquifer serving as the potable supply source for private and municipal potable wells within the area.

6. STORMWATER MANAGEMENT (SWM) POND DESIGN CONSIDERATIONS

As noted above, the static groundwater level at the northern portion of the Elora Sands is on the order of 0.5 to 4.5 metres below the existing ground surface, at a relative elevation of roughly 403 to 401 metres, based on the available groundwater data to date. The groundwater charts for the monitoring wells at these locations have illustrated the large fluctuations that are experienced during the ‘wet’ and ‘dry’ seasons of the year. At this time the design details of the proposed SWM pond proposed at the north edge of the Elora Sands are not known, however it is anticipated that the pool will have a

permanent pool elevation near the observed groundwater level, and the use of an impermeable liner would be expected to be required.

In general, where the permanent pool elevation is below the static groundwater elevation, it will be necessary to provide a low permeability layer over the base of the pond to resist the infiltration of natural groundwater, and of sufficient weight to resist the hydrostatic uplift pressures. Conversely, where the permanent pool elevation is above the static groundwater level, a low permeability liner will be required to prevent the exfiltration of water out of the pond. This could be accomplished through the use of a compacted clay liner, or with a weighed down proprietary liner system, etc. The weight of the liner system would have to exceed the uplift pressure of the ground water during the most severe periods of the year, likely when maximum storage is required. In approximate terms for example, one metre of clay liner, or equivalent, would be required for about every two meters of water storage below static ground water level, i.e., when the water level in the pond is 2 metres below the static ground water table, the clay liner would have to be at least one metre thick; if 3 metres below the static level, then 1.5 metres thick, etc.

Where the permanent pool elevation is below the static groundwater elevation, it will be necessary to provide a low permeability layer over the base of the pond to resist the infiltration of natural groundwater, and of sufficient weight to resist the hydrostatic uplift pressures. Conversely, where the permanent pool elevation is above the static groundwater level, a low permeability liner will be required to prevent the exfiltration of water out of the pond. This could be accomplished through the use of a compacted clay liner, or with a weighed down proprietary liner system, etc. The weight of the liner system would have to exceed the uplift pressure of the ground water during the most severe periods of the year, likely when maximum storage is required. In approximate terms for example, one metre of clay liner, or equivalent, would be required for about every two meters of water storage below static ground water level, i.e., when the water level in the pond is 2 metres below the static ground water table, the clay liner would have to be at least one metre thick; if 3 metres below the static level, then 1.5 metres thick, etc. It is recommended that best efforts be made to design the static pool elevation close to the static groundwater elevation so that the natural seasonal fluctuations of the groundwater elevation dictate the permanent pool elevation. This would eliminate the need to construct a weighted liner to resist the hydrostatic uplift pressures of the static groundwater elevation. That being said, this would only work if the former solution could be achieved whilst attaining the required water storage volume for the development.

An impermeable compacted clay liner would consist of a sufficiently plastic clay soil, with a recommended minimum clay content of 20 per cent and plasticity index of 7. Based on the current laboratory testing of the native soils, the majority of the clayey silt soils are generally suitable for use as an impermeable liner for the proposed SWM ponds, however any sandy deposits or silt material encountered should be selectively sorted and separated from its distinctly different counterpart to avoid use of the more permeable material. As such, during site grading and servicing activities, it would be prudent to stockpile such clayey soil near the area of the proposed SWM pond for use as such an impermeable liner. Additional testing may then be conducted on the stockpiled material, to confirm its suitability for use as an impermeable clay liner.

As noted above, the clayey soils encountered might be suitable for use as an impermeable clay liner but would require additional testing on at the specific location of the SWM pond. The base of the SWM pond may be prepared by scarifying or 'discing' in the upper perhaps 0.3 to 0.5 metres to destroy any natural layering structure, moisture conditioned to within -2 to +4 per cent of its optimum moisture content, and recompacted in place, however the soils present at the proposed base of the SWM pond should be confirmed. In the event that an imported clayey soil is required for use as an impermeable liner, the clay liner should be placed in nominal lifts of 300 millimetres, sufficiently worked and moisture conditions as noted above, and compacted to 95 per cent of its SPMDD. It is noted as well, regardless of the provision of an impermeable liner, the sides of the pond should be well worked or scarified to destroy any natural layers or seams, specifically any more permeable sandy or gravely seams. Where such layers are encountered, a layer of available on-site clayey soil should be placed and compacted, as outlined above, to restrict the natural infiltration of groundwater into the pond through these more permeable horizontal seams.

Alternatively, weighed down proprietary liners could be considered, however the suppliers of such materials (such as Layfield, Terrafix, Suprema) would have to be consulted for recommendations on the appropriate product and installation methods for the site conditions. Such artificial liners would not require compaction efforts and could be weighed down with practically any available soil or granular material.

Interior pond slopes beneath the permanent pool elevation should be limited to inclinations no steeper than 4 horizontal to 1 vertical, with interior slopes above permanent pool elevation and exterior slopes no steeper than 3 horizontal to 1 vertical. Should steeper slopes be required, it will be necessary to provide some form of stabilisation such as the placement of coarse 'rip rap' stone, or proprietary product such as Turfstone or Cable-Crete, or construction as a reinforced earth embankment. It is recommended that all interior pond slopes be provided with at least some form of

nominal stabilisation/protection to control loss erosion/loss of ground. Above the pond level this may consist of appropriate vegetation.

Material utilised in construction of pond slopes must be free of significant organic deposits, construction debris, or any other deleterious materials which would affect stability of the pond walls. Our office should be retained to review any imported material to the site, as well as to provide quality control services during construction.

It is also noted that appropriate care and effort will be required by the contractor around inlet and outlet structures to ensure the impermeable liner is continuous and avoid the potential of 'piping'. In this regard the clay liner should be completely constructed prior to the installation of inlet/outlet structures. A bentonite clay material could be utilised within the fill around any structures to provide a continuous impermeable seal.

7. GENERAL COMMENTS

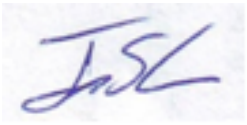
The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.



Scott Wylie, B.Eng., EIT.



Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Drawing No. 2, Groundwater Contour Map
Drawing No. 3, Water Well Records
Drawing Nos. 4, 5 and 6, Geologic Cross Sections
Log of Borehole Nos. 001 to 007, 101 to 104, 201 to 206, 301 to 307 and 401, inclusive
Grain Size Analyses

Distribution: Cachet Developments [pdf]



LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

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ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Borehole Location Plan

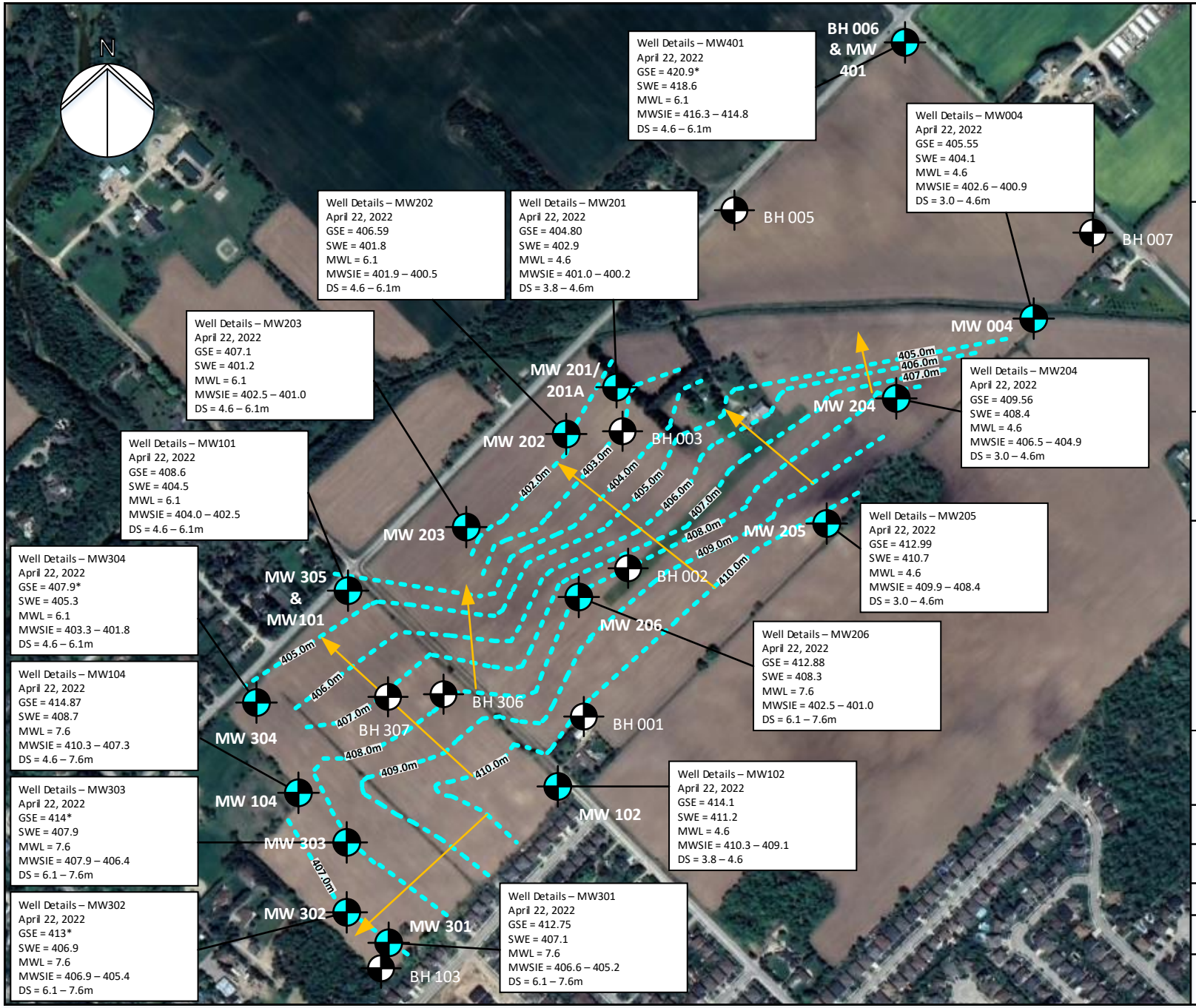
Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Borehole Location Plan

Drawing No. 1



LEGEND

Monitoring Well Location

MW#

GSE = Monitoring Well Ground Surface Elevation
SWE = Static Water Elevation [taken on April 22, 2022]
MWL = Monitoring Well Length
MWSIE = Monitoring Well Screen Interval Elevation
DS = Depth of Screen

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

*GSE interpolated between contour lines from topographic survey

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ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Groundwater Contour Map

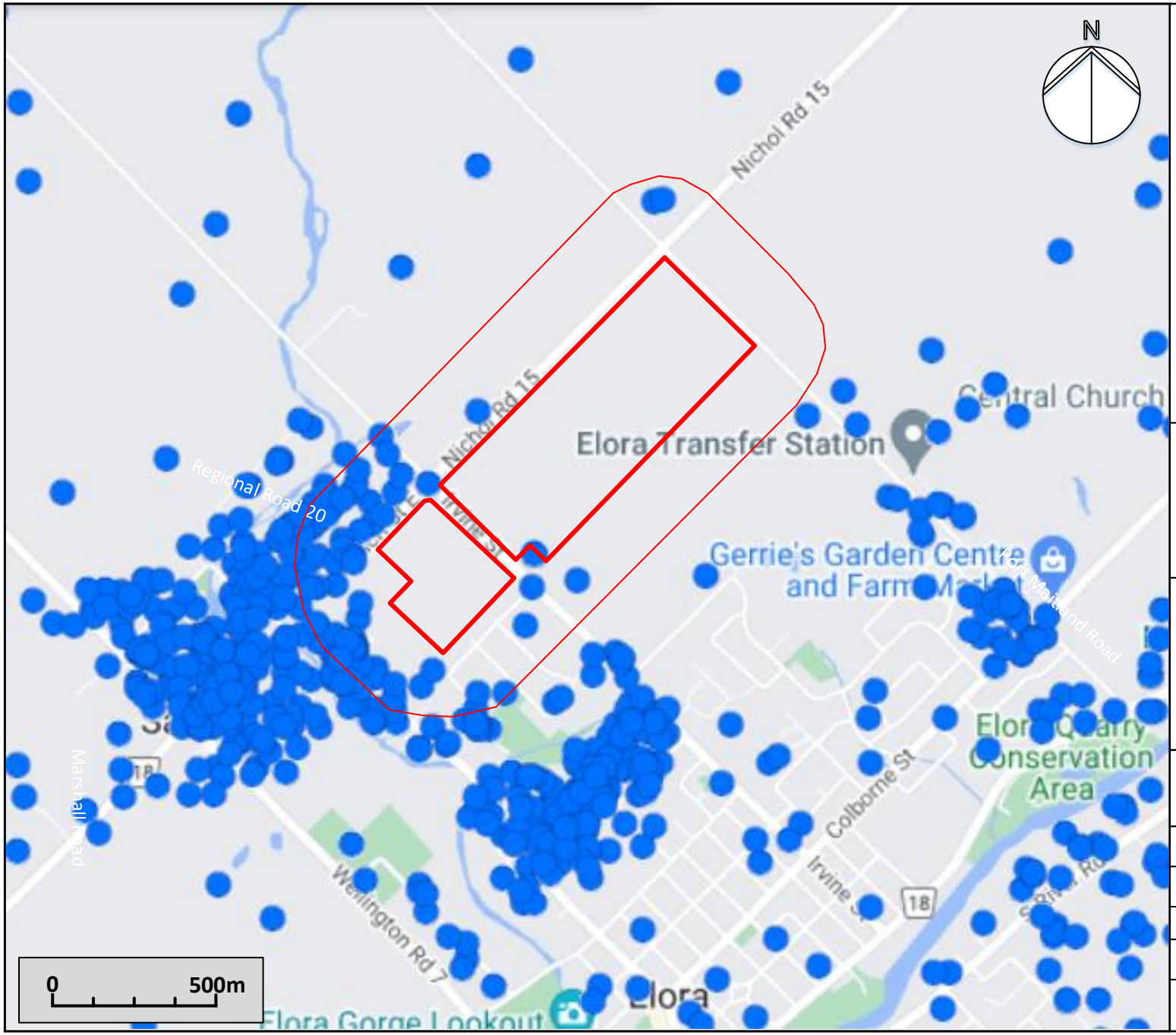
Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Groundwater Contour Map

Drawing No. 2



LEGEND

= Site

= Well Record

= Study Area

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Groundwater Well Survey
Proposed Residential Development
Nichol & Clayton Lands
Elora, Ontario

Ministry of the Environment
Water Well Records Plots

Project No. SM 302951-E

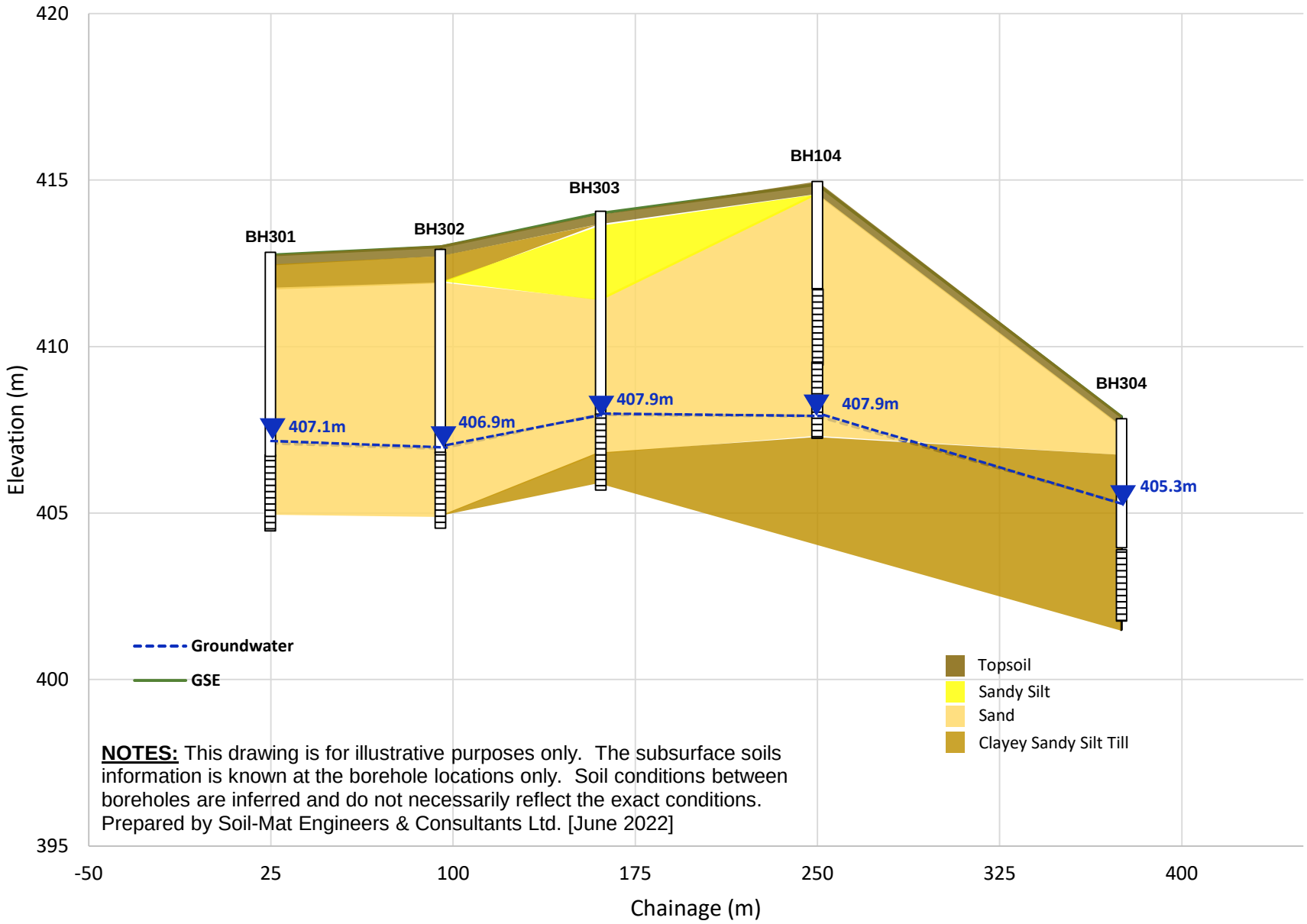
Date: July 2022

Drawn: PM | Checked: IS

SM 302951-E Water Well Records

Drawing No. 3

Geological Cross Section A-A

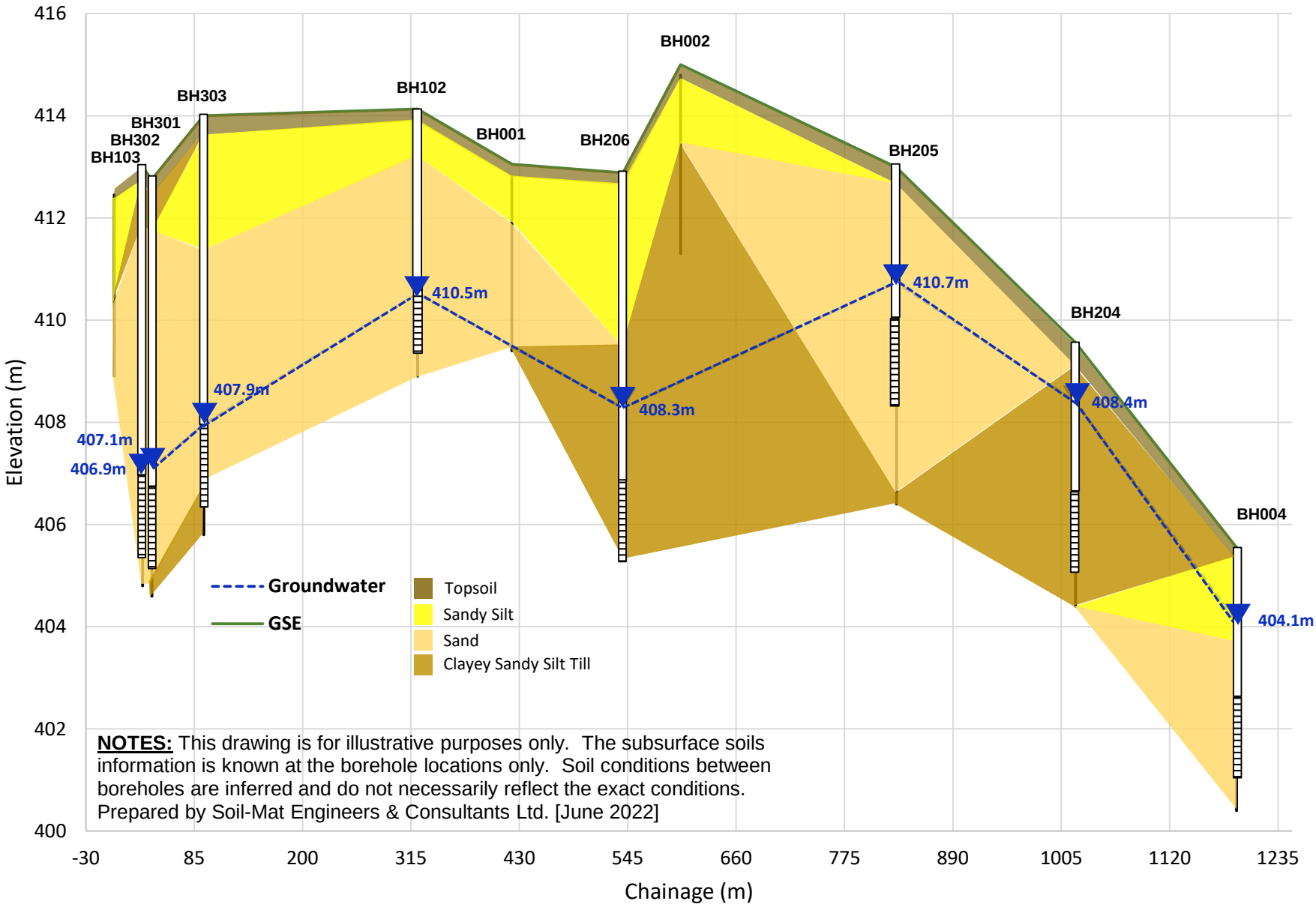


NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [June 2022]

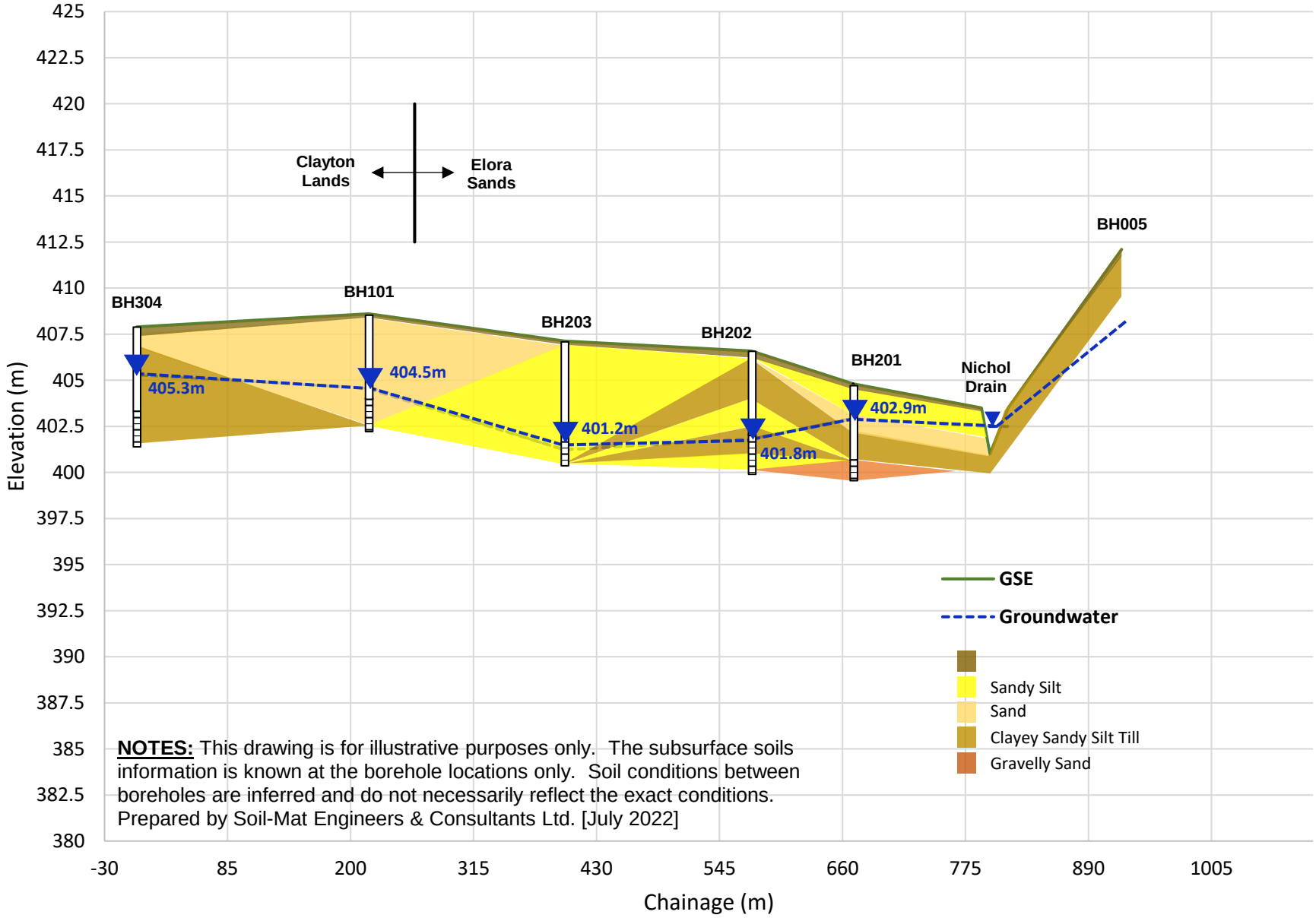
Drawing No. 4

Project No. SM 301951-G

Geological Cross Section B-B



Geological Cross Section C-C



NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [July 2022]

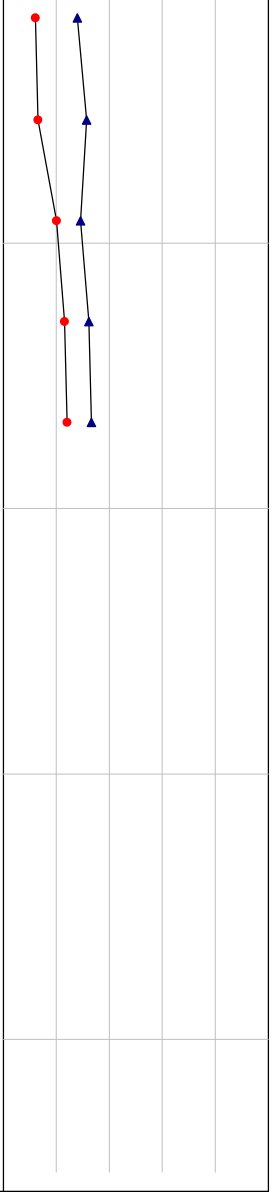
Log of Borehole No. 001

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	413.05		Ground Surface								
0 / 0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3 / 1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
			Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
					SS	4	12 10 13 10	23			
11 / 3	409.40				SS	5	6 11 13 15	24			
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 002

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		415.00	Ground Surface								
0	0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3	1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
6	2	412.50	**Clayey Sandy Silt Till** Brown, trace to some gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
9	3	411.30	Transition to grey.		SS	4	3 7 6 7	13		4.0	
12	4		End of Borehole		SS	5	9 7 15 18	22		>4.5	

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 003

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 ft / 0 m	409.93		Ground Surface									
0	409.93		**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
2	408.10				SS	3	6 8 10 11	18				
2	407.80		**Clayey Sandy Silt Till** Brown, trace to some gravel, compact.									
			End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 004

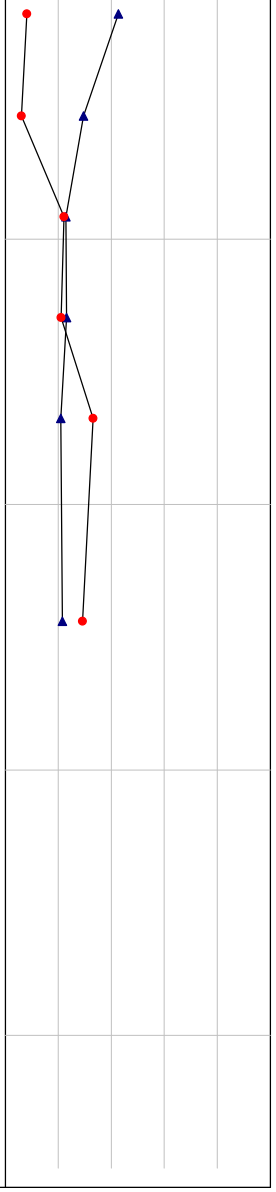
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2										
3	1			SS	2	4 3 3 5	6			
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

February 23, 2021 - 1.33 metres below ground surface.

April 22, 2022 - 1.47 metres below ground surface.

June 1, 2022 - 1.78 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Sheet: 1 of 1

Log of Borehole No. 005

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 / 0	412.10		Ground Surface									
0 / 0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9				
3 / 1			**Clayey Sandy Silt Till** Brown, reworked in upper levels, trace to some gravel, increasing clay content with depth, loose to compact.		SS	2	1 3 3 5	6				
6 / 2	410.00				SS	3	3 5 7 9	12				
7 / 2			End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Sheet: 1 of 1

Log of Borehole No. 006

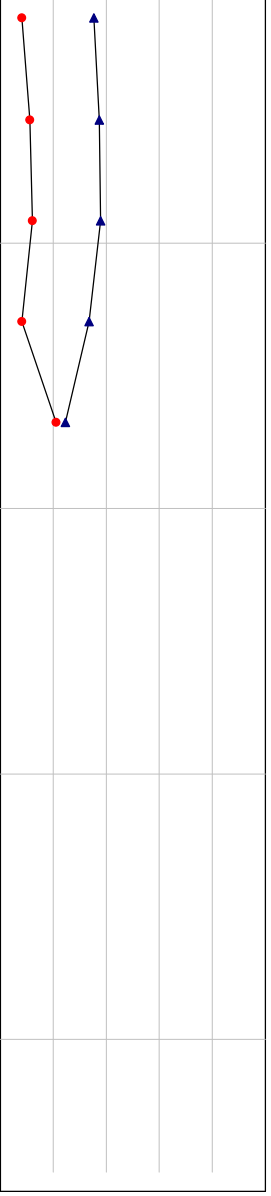
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		420.91	Ground Surface								
0	0	420.70	**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
1			**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
2	1	419.40	**Clayey Sandy Silt Till** Brown, trace gravel, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
3					SS	4	3 4 4 4	8			
4	2	417.30			SS	5	5 11 10 15	21			
5			End of Borehole								
6	3										
7											
8	4										
9											
10	5										
11											
12	6										
13											
14	7										
15											
16	8										
17											
18	9										
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											

Moisture Content w%
10 20 30 40

Standard Penetration Test blows/300mm
20 40 60 80



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
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Sheet: 1 of 1

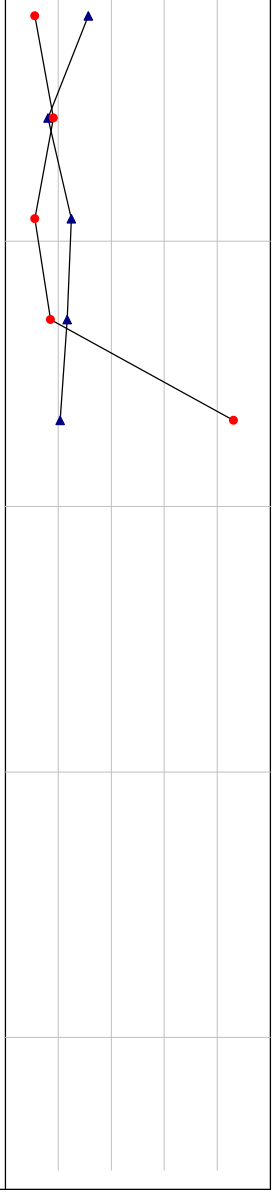
Log of Borehole No. 007

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39		Ground Surface								
0–1 / 0	408.10		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
1–3 / 1			**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
3–5 / 1–2	406.90		**Clayey Sandy Silt Till** Brown, trace to some gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
5–8 / 2–3					SS	4	5 7 10 18	17		2.5	
8–12 / 3					SS	5	24 36 50/5"	100		>4.5	
12 / 4	404.70		End of Borehole								
13–29 / 4–9											

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
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Log of Borehole No. 101

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838437
E: 545149

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE: Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0	408.60		Ground Surface									
0	408.30		**Topsoil** Approximately 250 millimetres of topsoil.									
			Sand Brown, trace gravel.									
	403.10		Transition to grey in colour									
6	402.50		End of Borehole									

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 6.10 metres.
2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. No soil samples were retrieved. The following free groundwater level readings have been measured:

August 6, 2021 - 4.78 metres below ground surface.

August 27, 2021 - 4.71 metres below ground surface.

October 14, 2021 - 4.33 metres below ground surface.

February 23, 2022 - 4.31 metres below ground surface.

April 22, 2022 - 4.07 metres below ground surface.

June 1, 2022 - 4.15 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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Datum: Geodetic
Field Logged by: EC
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Sheet: 1 of 1

Log of Borehole No. 102

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838180
E: 545422

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	414.13	Ground Surface								
0 / 0	413.90	**Topsoil** 250 millimetres of topsoil.								
3 / 1	413.20	**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, loose to compact.		SS	1	4 5 7 8	12			
				SS	2	2 3 6 5	9			
		Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, loose to compact.		SS	3	3 9 12 14	21			
				SS	4	7 8 11 10	19			
				SS	5	6 9 11 17	20			
16 / 5	408.90	End of Borehole		SS	6	7 5 4 9	9			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 5.2 metres.
2. Borehole was recorded as caved to a depth of 3.8 metres and 'wet' at a depth of 3.6 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 3.58 metres below ground surface.

August 27, 2021 - 3.61 metres below ground surface.

October 14, 2021 - 3.62 metres below ground surface.

February 23, 2021 - 3.5 metres below ground surface.

April 22, 2022 - 2.89 metres below ground surface.

June 1, 2022 - 3.05 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 103

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837942
E: 545194

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.55	Ground Surface								
0	0		**Topsoil** Approximately 100 millimetres of topsoil.		SS	1	5 5 7 8	12			
3	1		**Sandy Silt** Brown, trace to some gravel and clay, reworked in upper levels, compact.		AS	2	6 5 3 3	8			
6	2				SS	3	5 6 6 6	12			
7		410.30									
8			**Sand** Brown, trace clay, silt, and gravel, medium gradation, loose.		SS	4	2 3 3 2	6			
11	3				SS	5	2 1 1 2	2			
12		408.90									
13	4		End of Borehole								
29	9										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded dry and caved to a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
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Log of Borehole No. 104

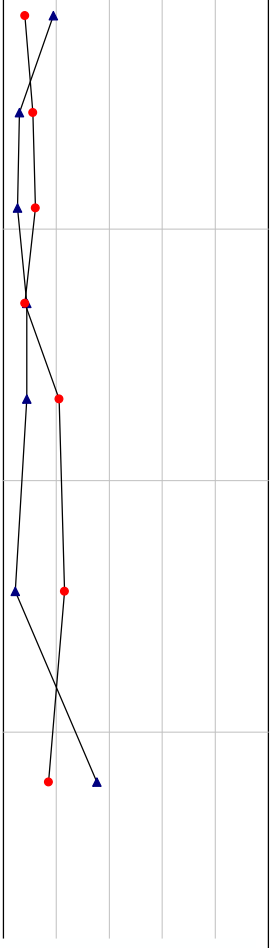
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838174
E: 545084

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	414.87	Ground Surface								
0 / 0	414.60	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	5 5 6 7	11			
1 /		**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, fine to medium gradation, compact.		SS	2	8 9 9 7	18			
2 / 1				SS	3	2 5 8 7	13			
3 /				SS	4	6 11 16 13	27			
4 / 2				SS	5	10 12 11 13	23			
5 /										
6 / 3				SS	6	5 10 13 15	23			
7 /										
8 / 4	408.80	Wet spoon		SS	7	9 9 8 6	17			
9 /										
10 / 5										
11 /										
12 / 6	407.30	End of Borehole								
13 /										
14 / 7										
15 /										
16 / 8										
17 /										
18 / 9										
19 /										
20 / 10										
21 /										
22 / 11										
23 /										
24 / 12										
25 /										
26 / 13										
27 /										
28 / 14										
29 /										
30 / 15										
31 /										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 7.6 metres.

2. Borehole was recorded as open and 'wet' at depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 6.78 metres below ground surface.

August 27, 2021 - 6.96 metres below ground surface.

October 14, 2021 - 7.09 metres below ground surface.

February 23, 2022 - 6.83 metres below ground surface.

April 22, 2022 - 6.13 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 201

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838708
E: 545501

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	404.80	Ground Surface								
0 / 0	404.35	**Topsoil** Approximately 450 millimetres of topsoil.		SS	1	5,3,3,3	6			
1 / 0		**Sandy Silt/Silty Sand** Brown, trace to some clay and gravel, loose.								
1 / 1	403.10	**Sand** Brown, loose.		SS	2	2,4,5,6	9			
2 / 1	402.20	**Clayey Sandy Silt Till** Brown, some gravel, ocasional cobbles, compact to dense								
3 / 1				SS	3	6,12,18,20	30			
4 / 2	400.70	**Gravely Sand** Brown, trace silt, compact.								
5 / 2	399.60			SS	4	10,9,9,13	18			
5 / 2		End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 16, 2022 to termination at a depth of 5.2 metres.

2. Borehole was recorded as caved to a depth of 3.0 metres and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 2.69 metres below ground surface.

April 22, 2022 - 1.88 metres below ground surface.

June 1, 2022 - 2.44 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 201A

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838708
E: 545501

Depth ft	Depth m	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0	0	404.75		Ground Surface									
10	3	401.70		End of Borehole									

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 16, 2026 to termination at a depth of 3.1 metres.

2. Soil samples will be discarded after 3 months unless otherwise directed by our client.

3. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - dry

April 22, 2022 - 2.05 metres below ground surface.

June 1, 2022 - 2.43 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 202

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838647
E: 545436

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	406.59	Ground Surface							
	406.14	**Topsoil** Approximately 450 millimetres of topsoil.							
		Clayey Sandy Silt Till Brown, some gravel, compact.	SS	1	2,2,3,2	5			
			SS	2	4,7,9,12	16			
	404.00	**Sandy Silt** Brown, dense.	SS	3	21,19,18,24	37			
	402.50	**Clayey Sandy Silt Till** Brown, some gravel and sand, very dense dense	SS	4	10,24,50/4	100			
	401.00	**Sandy Silt** Brown, very dense.	SS	5	34,50/4	100			
	400.20	End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 17, 2022 to termination at a depth of 6.4 metres.

2. Borehole was recorded as open and 'wet' at a depth of 0 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 5.5 metres below ground surface.

April 22, 2022 - 4.76 meters below ground surface.

June 1, 2022 - 5.43 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 17, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 203

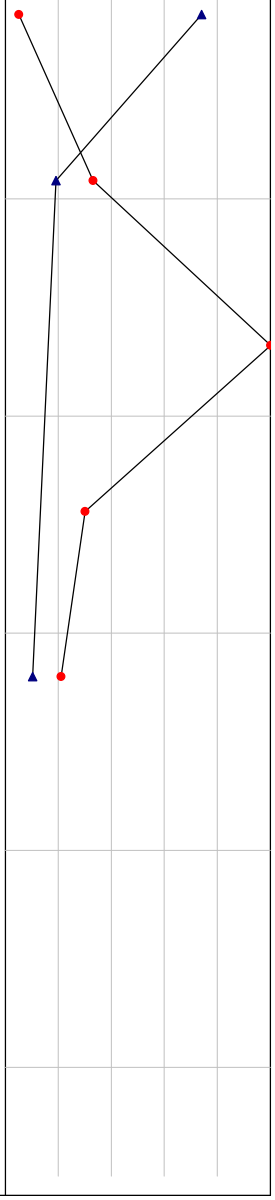
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838523
E: 545307

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		407.13	Ground Surface							
0	0	406.88	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some gravel, frequent cobbles, loose to very dense.	SS	1	9,3,2,1	5			
2										
3	1									
4				SS	2	8,16,17,27	33			
5										
6										
7	2									
8										
9				SS	3	50/6	100			
10	3									
11										
12										
13	4									
14										
15				SS	4	36,15,15,8	30			
16										
17	5									
18										
19										
20	6									
21				SS	5	7,9,12,14	21			
22		400.40								
23	7		End of Borehole							
24										
25										
26	8									
27										
28										
29	9									
30										
31										
32										
33	10									
34										
35										
36	11									

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 17, 2022 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 0 metres upon completion and backfilled as per Ontario Regulation 903.

3 Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - dry

April 22, 2022 - 5.9 metres below ground surface.

June 1, 2022 - 5.91 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 204

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838693
E: 545861

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	409.56	Ground Surface								
0 / 0	409.16	**Topsoil** Approximately 400 millimetres of topsoil.								
1 / 0		**Clayey Sandy Silt Till** Brown, trace to some gravel, compact to dense.		SS	1	9,4,4,4	8			
2 / 1										
3 / 1				SS	2	4,5,7,17	12			
4 / 1										
5 / 2				SS	3	5,7,20,29	27			
6 / 2										
7 / 3				SS	4	15,21,22,36	43			
8 / 3	404.40	End of Borehole								
9 / 4		NOTES: 1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 5.2 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client. 4. A monitoring well was installed. The following free groundwater level readings have been measured: February 17, 2022 - 2.81 metres below ground surface. April 22, 2022 - 1.16 metres below ground surface. June 1, 2022 - 1.53 metres below ground surface.								
10 / 5										
11 / 6										
12 / 7										
13 / 8										
14 / 9										
15 / 10										
16 / 11										
17 / 12										
18 / 13										
19 / 14										
20 / 15										
21 / 16										
22 / 17										
23 / 18										
24 / 19										
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26 / 21										
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31 / 26										
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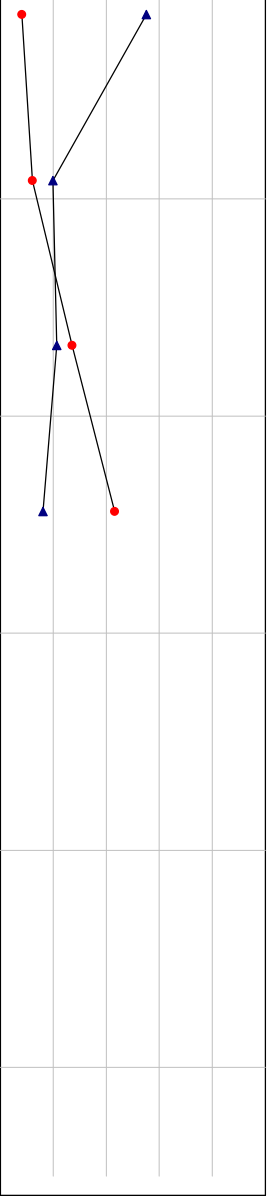
35 / 30										
36 / 31										

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 205

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838523
E: 545777

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.99	Ground Surface							
0	0	412.74	**Topsoil** Approximately 250 millimetres of topsoil.							
			Sand Brown, loose.	SS	1	6,5,3,2	8			
				SS	2	4,4,4,4	8			
				SS	3	4,4,5,6	9			
				SS	4	3,3,4,6	7			
		406.60		SS	5	5,4,50/5	100			
6	2	406.40	**Clayey Sandy Silt Till** Brown, trace to some gravel, very dense.							
			End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 6.6 metres.

2. Borehole was recorded as 'dry' and caved to a depth of 4.8 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 2.56 metres below ground surface.

April 22, 2022 - 2.25 metres below ground surface.

June 1, 2022 - 2.39 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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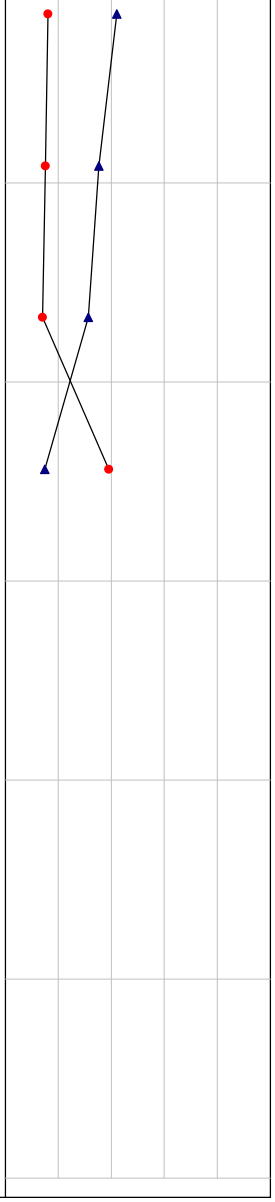
Log of Borehole No. 206

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838460
E: 545394

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.88	Ground Surface							
0	0	412.58	**Topsoil** Approximately 300 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay and gravel, compact.	SS	1	11,11,5,2	16			
2										
3	1			SS	2	7,7,8,9	15			
4										
5										
6	2			SS	3	3,4,10,12	14			
7										
8										
9	3			SS	4	10,15,24,30	39			
10		409.50	**Clayey Sandy Silt Till** Brown, trace to some gravel, compact to dense.							
11										
12										
13	4									
14										
15										
16										
17	5									
18										
19										
20	6									
21										
22										
23	7									
24		405.30								
25			End of Borehole							
26	8									
27										
28										
29										
30	9									
31										
32										
33	10									
34										
35										
36	11									
37										
38										
39										



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 7.6 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 6.83 metres below ground surface.

April 22, 2022 - 4.6 metres below ground surface.

June 1, 2022 - 4.66 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 301

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837975
E: 545199

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.75	Ground Surface							
0	0	412.50	**Topsoil** Approximately 250 millimetres of topsoil.							
3	1	411.70	**Clayey Sandy Silt Till** Brown, trace gravel, loose .	SS	1	2,1,3,4	4			
			Sand Brown, loose to compact.	SS	2	1,3,6,9	9			
	3			SS	3	7,7,6,9	13			
	4			SS	4	8,9,13,15	22			
	6			SS	5	6,7,10,13	17			
25	7	404.90								
26	8	404.60	**Clayey Sandy Silt Till** Brown, trace gravel, dense to very dense.	SS	6	3,13,32,42	45			

Well Data

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 6.3 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 6.29 metres below ground surface.

April 22, 2022 - 5.65 metres below ground surface.

June 1, 2022 - 5.71 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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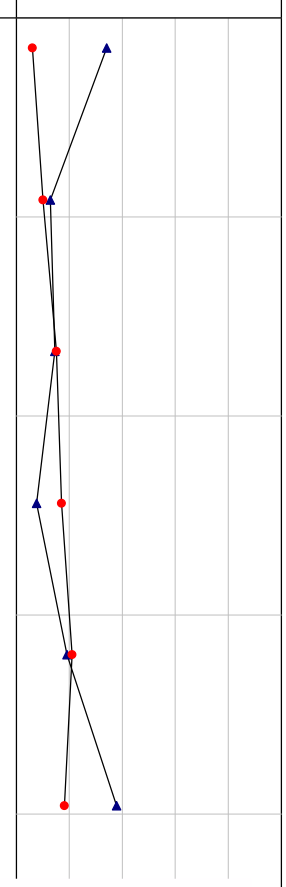
Log of Borehole No. 302

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838015
E: 545142

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0	413.00		Ground Surface								
0	412.75		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2,2,4,9	6			
1	411.90		**Clayey Sandy Silt Till** Brown, trace gravel, loose .								
2			**Sand** Brown, loose to compact.		SS	2	2,4,6,8	10			
3					SS	3	5,7,8,15	15			
4					SS	4	5,8,9,11	17			
6					SS	5	10,10,11,15	21			
8	404.80				SS	6	5,8,10,8	18			
			End of Borehole								



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 6.6 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 6.62 metres below ground surface.

April 22, 2022 - 6.06 metres below ground surface.

June 1, 2022 - 6.12 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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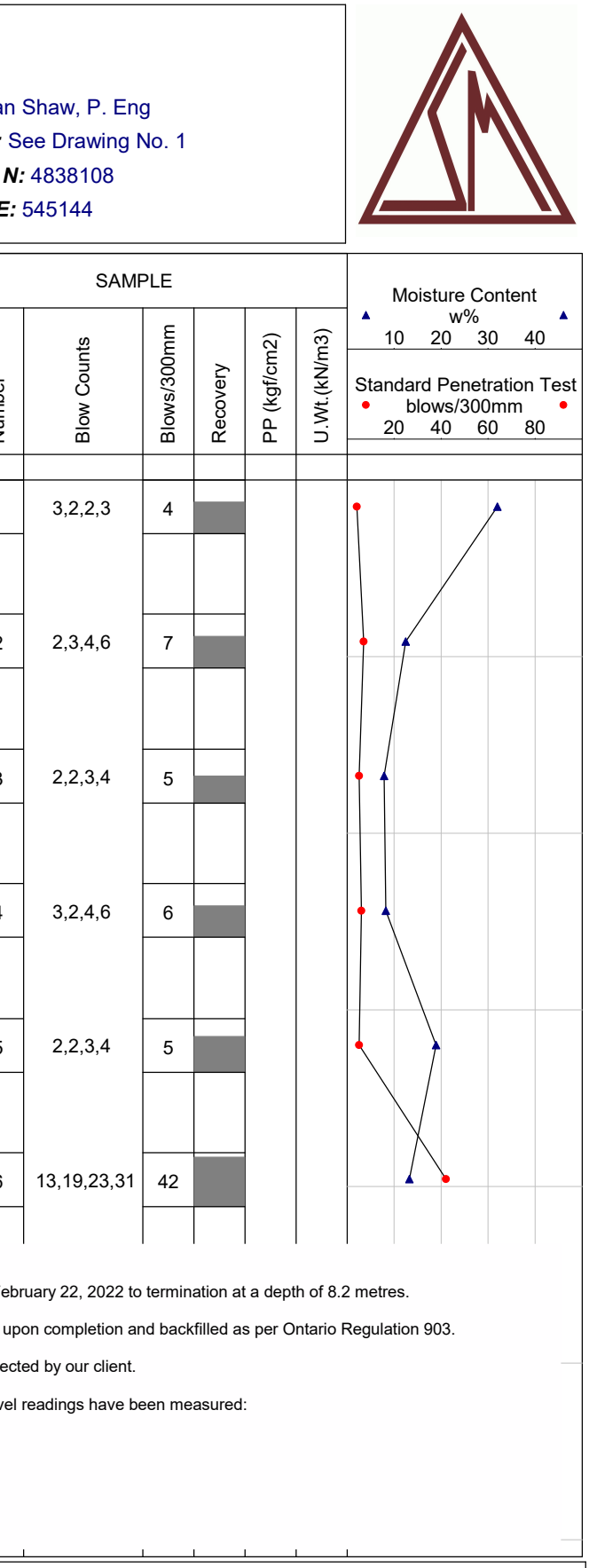
Log of Borehole No. 303

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838108
E: 545144



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 5.4 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 5.4 metres below ground surface.

April 22, 2022 - 6.04 metres below ground surface.

June 1, 2022 - 6.11 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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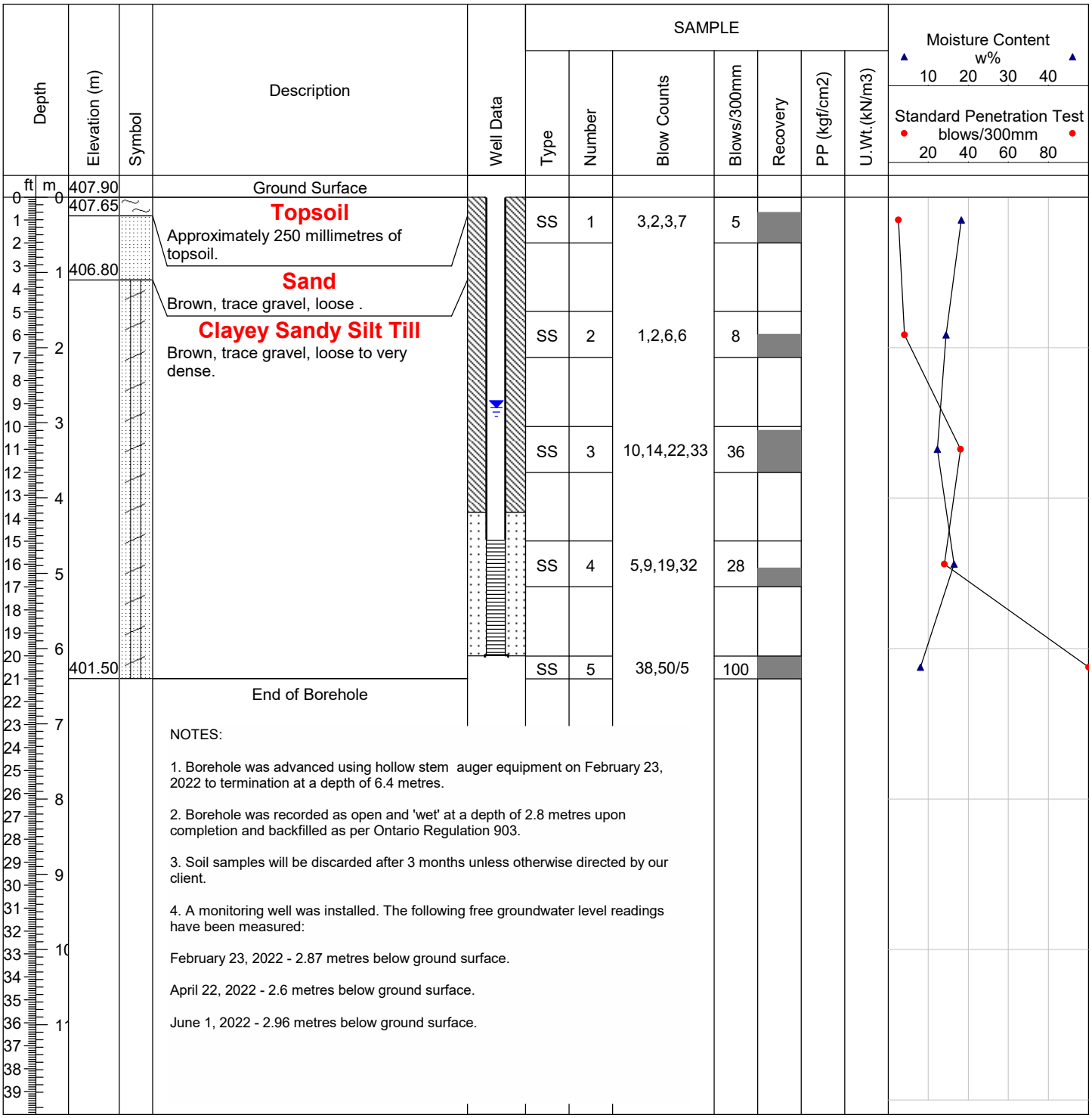
Log of Borehole No. 304

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4538292
E: 545023



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 23, 2022 to termination at a depth of 6.4 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.8 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 2.87 metres below ground surface.

April 22, 2022 - 2.6 metres below ground surface.

June 1, 2022 - 2.96 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 23, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 305

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838438
E: 545144

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.60	Ground Surface								
0 / 0	408.35	**Topsoil** Approximately 250 millimetres of topsoil.		AS	1					
1 / 0		**Sand** Brown, trace gravel, loose to very loose.								
5 / 1				SS	2	2,3,4,4	7			
10 / 3				SS	3	2,1,1,5	2			
12 / 4	404.90	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 23, 2022 to termination at a depth of 3.6 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - dry

April 22, 2022 - dry

June 1, 2022 - dry

Drill Method: Hollow Stem Augers
Drill Date: February 23, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: KJR
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 306

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838305
E: 545271

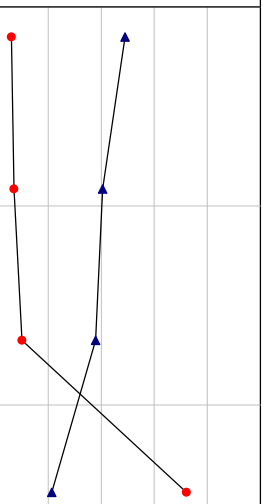
Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.85	Ground Surface							
0	0	412.60	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sand** Brown, trace gravel, loose.	SS	1	2,2,4,5	6			
2										
3	1									
4										
5				SS	2	3,2,5,6	7			
6										
7	2									
8										
9										
10	3			SS	3	3,3,7,15	10			
11		409.40								
12			**Clayey Sandy Silt Till** Brown, some gravel, very dense							
13	4									
14										
15										
16				SS	4	20,34,38,50/4	72			
17	5	407.70								
18			End of Borehole							
19			NOTES:							
20	6		1. Borehole was advanced using solid stem auger equipment on February 23, 2022 to termination at a depth of 5.2 metres.							
21										
22			2. Borehole was recorded as caved to a depth of 2.4 metres and dry upon completion and backfilled as per Ontario Regulation 903							
23	7									
24										
25			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.							
26										
27	8									
28										
29										
30	9									
31										
32										
33	10									
34										
35										
36	11									
37										
38										
39										

Well Data

SAMPLE

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Solid Stem Augers
Drill Date: February 23, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: KJR
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 307

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 3838296
E: 545199

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	411.12	Ground Surface								
0 / 0	410.87	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	1,2,2,3	4			
		Clayey Sandy Silt Till Brown, some gravel, compact.								
6 / 2				SS	2	5,7,10,12	17			
10 / 3				SS	3	9,10,15,19	25			
16 / 5	405.90			SS	4	6,11,12,41	23			
		End of Borehole								

NOTES:

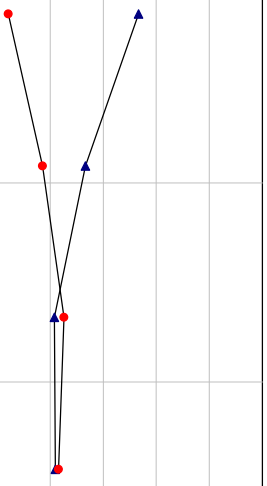
1. Borehole was advanced using solid stem auger equipment on February 23, 2022 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.3 metres below the existing grade upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Solid Stem Augers
Drill Date: February 23, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

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130 Lancing Drive, Hamilton, ON L8W 3A1
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Datum: Geodetic
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Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 401

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Rd, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839146
E: 545881

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		420.91	Ground Surface							
0	0	420.66	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Silty Sand** Brown, trace to some gravel and clay, loose to compact.	SS	1	2,2,4,4	6			
2	1			SS	2	1,2,3,5	5			
3		419.10	**Clayey Sandy Silt Till** Brown, trace to some sand and gravel, compact to very dense	SS	3	1,4,9,7	13			
6	2			SS	4	6,15,50/4	100			
9	3			SS	5	6,17,16,24	33			
12	4									
15				SS	6	10,35,50/5	100			
16	5									
19										
20	6			SS	7	27,46,43, 50/3	89			
22		414.20	End of Borehole							
23	7									
26	8									
29	9									
33	10									
36	11									
39										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on April 18, 2022 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.7 metres below the existing grade upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

April 22, 2022 - 2.29 metres below ground surface.

June 1, 2022 - 2.39 metres below ground surface.

Drill Method: Solid Stem Augers
Drill Date: April 18, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
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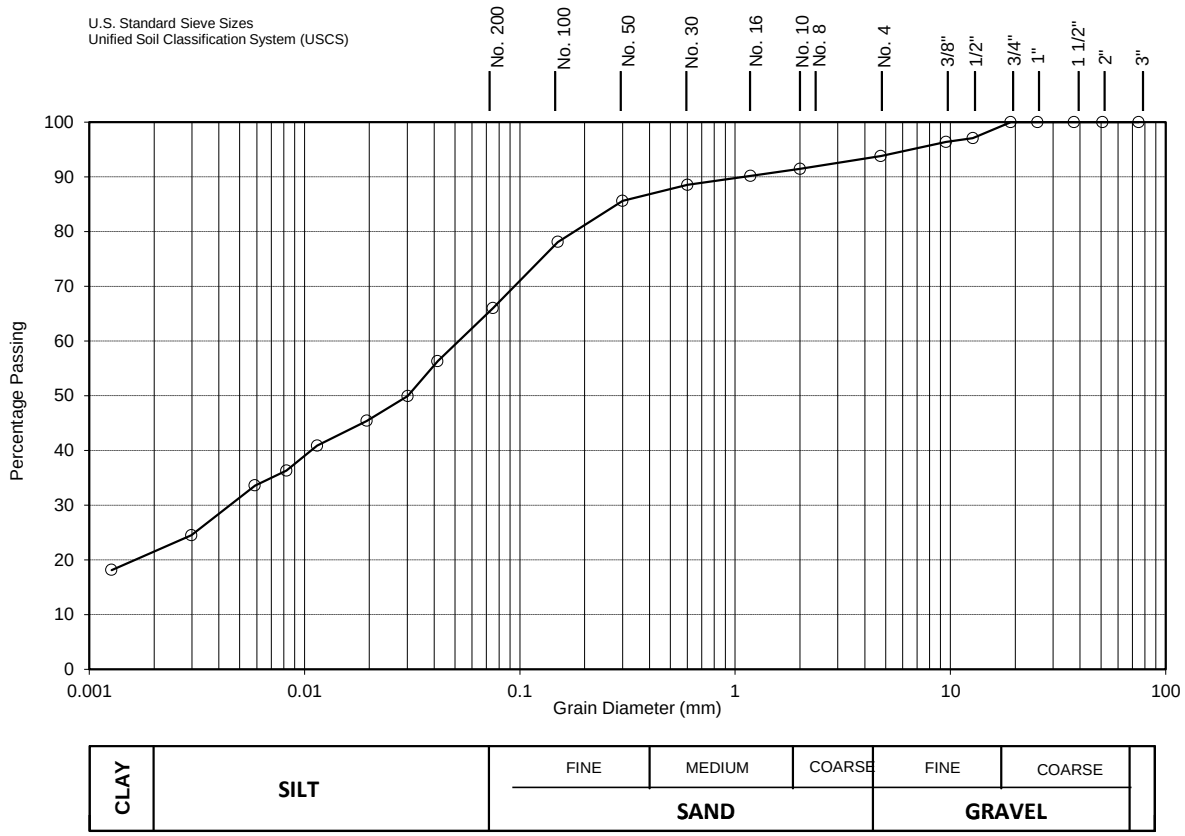
Datum: Geodetic
Field Logged by: KJR
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



Lab No.:	**21-335**	Notes: Depth: 5'			
Borehole No.:	**003**				
Sample No.:	**3**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

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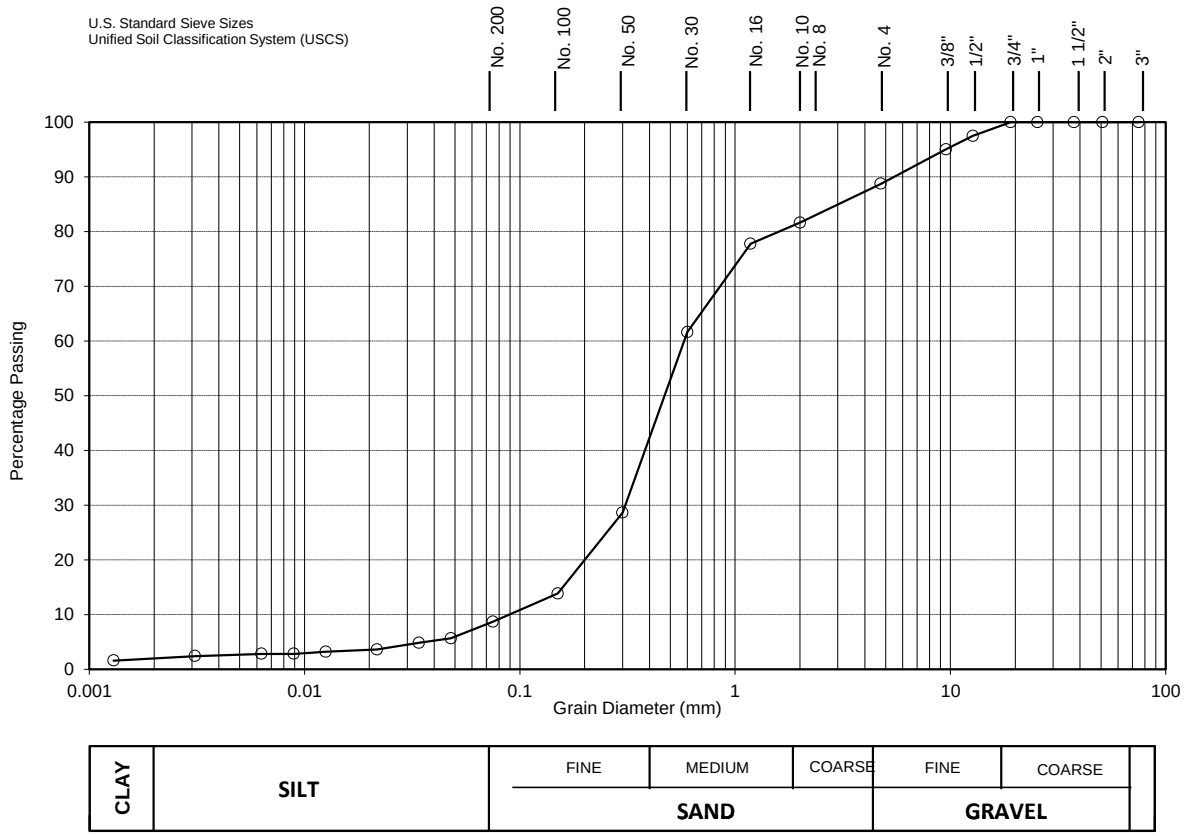
7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



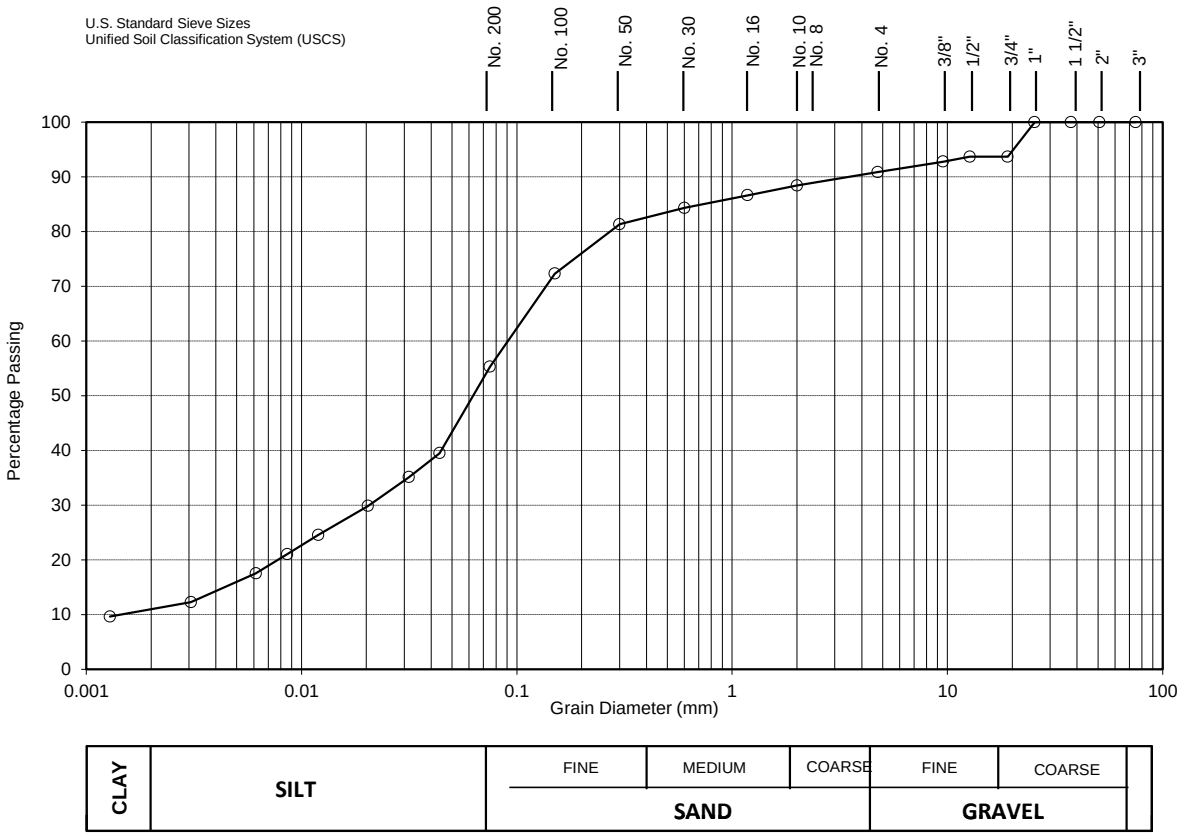
Lab No.:	**21-340**	Notes: Depth: 10'	
Borehole No.:	**004**		
Sample No.:	**5**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



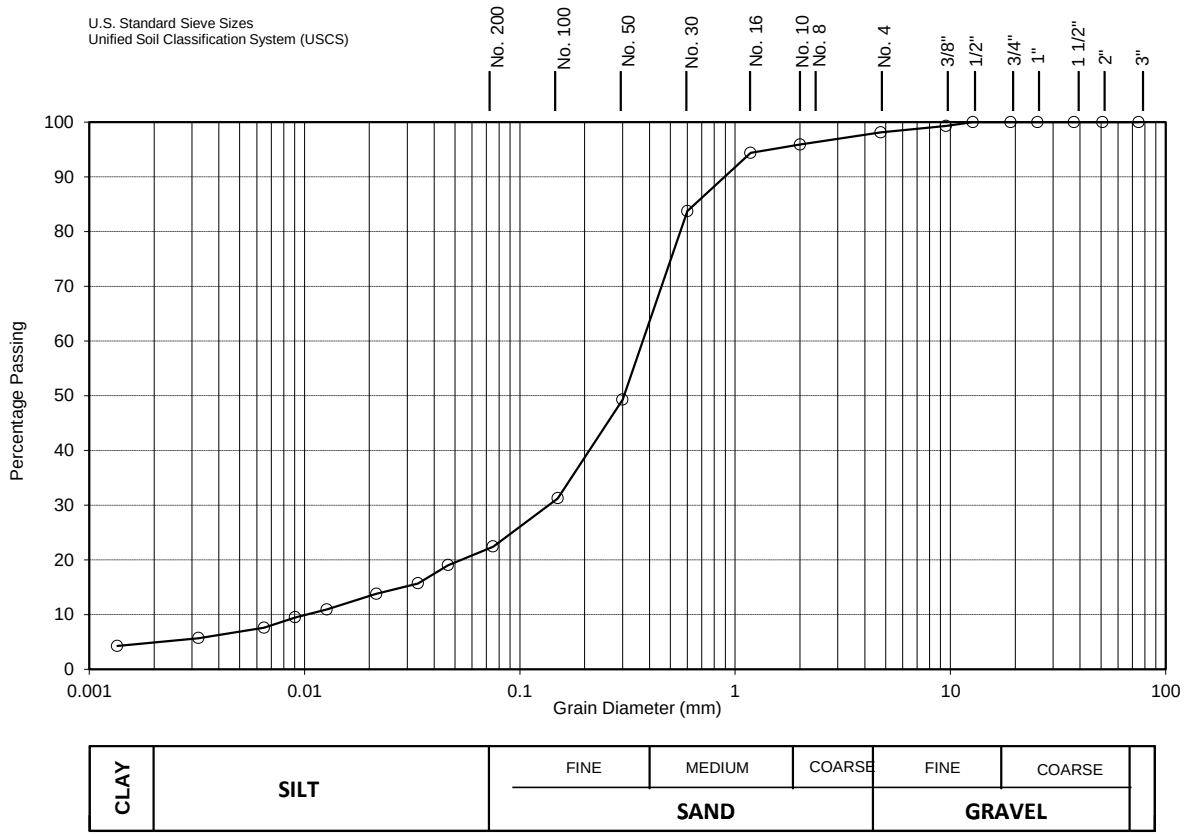
Lab No.:	**21-336**	Notes: Depth: 10'	
Borehole No.:	**006**		
Sample No.:	**5**		
CLAY [%]:	**11**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**36**		
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U: **60.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



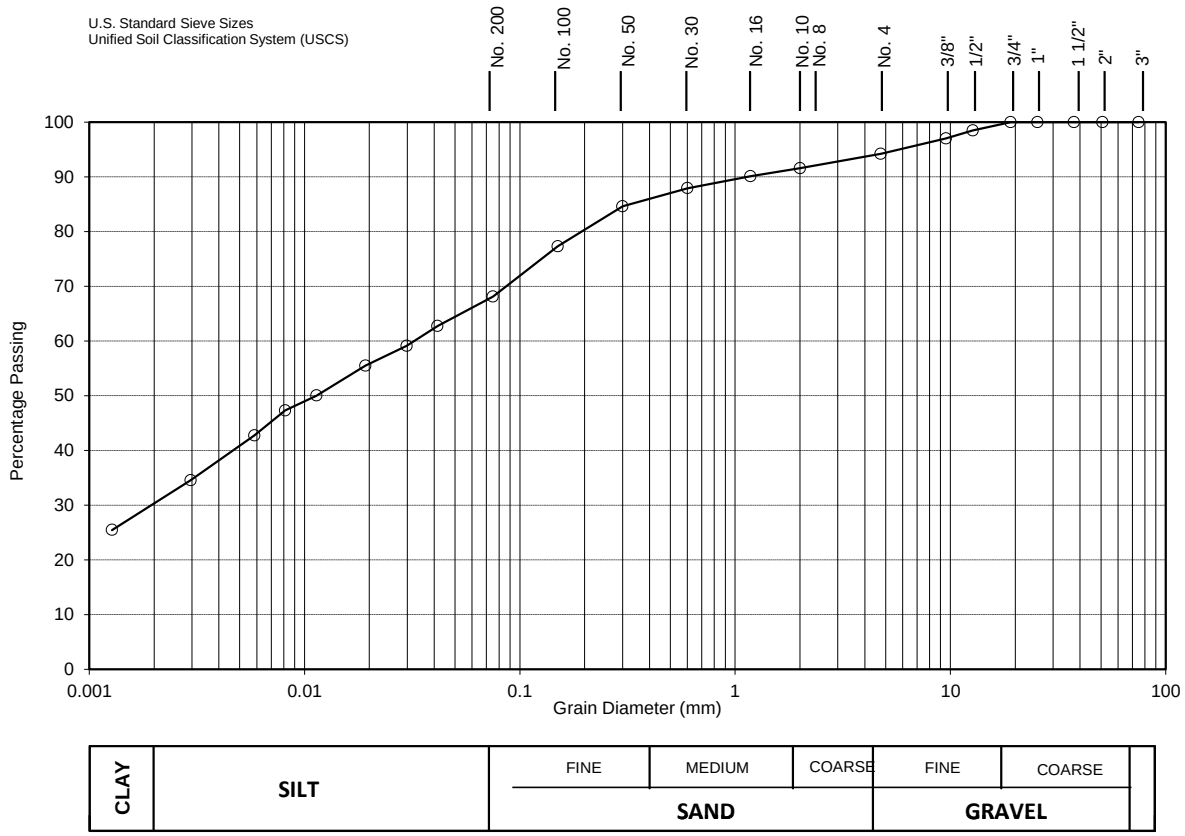
Lab No.:	**22-088**	Notes: Depth: 5'	
Borehole No.:	**201**		
Sample No.:	**2**		
CLAY [%]:	**5**	Soil Description:	**Brown Sand w/ Some Silt and traces of Clay and Gravel**
SILT [%]:	**17**		**S.M. - Silty sands, sand-silt mixtures**
SAND [%]:	**76**		
GRAVEL [%]:	**2**	Estimated Infiltration Rate [mm/hr] : **50**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.0001**	Coefficient of Uniformity C_U: **40.0**	Coefficient of Curvature C_C: **5.4**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 4**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



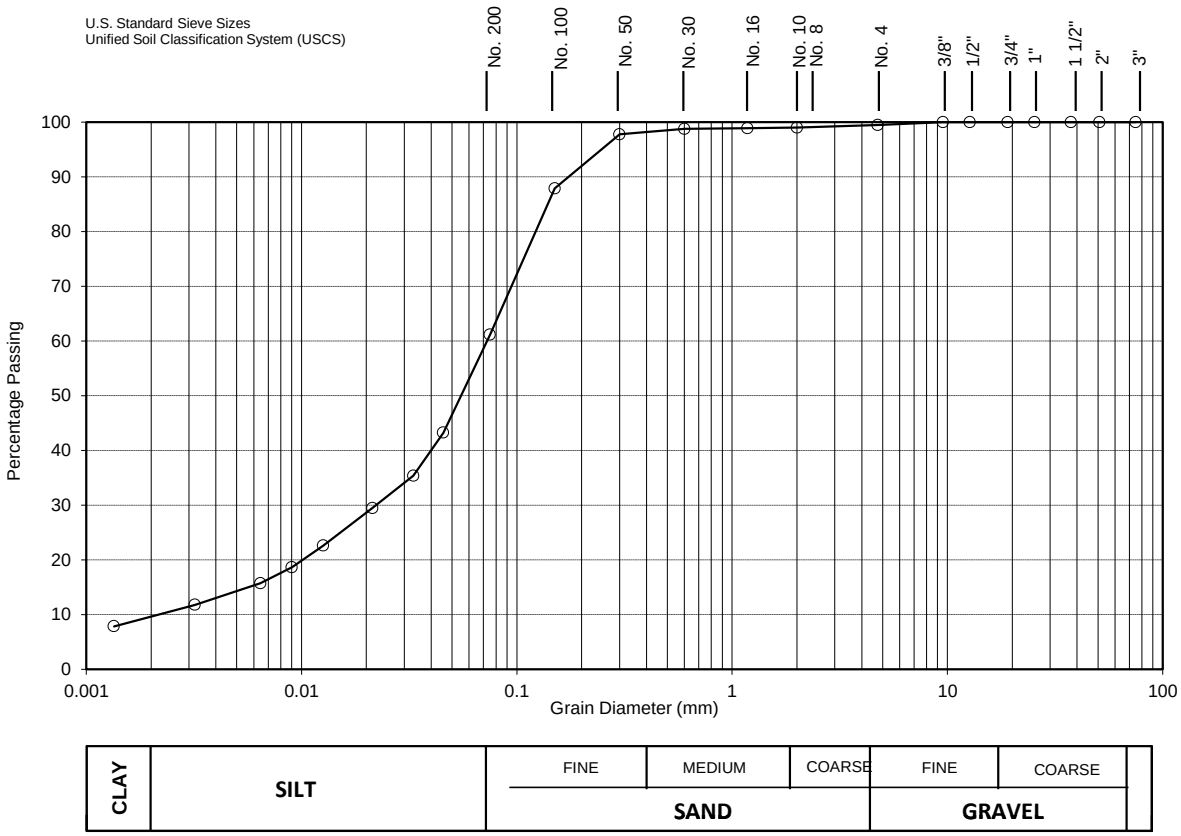
Lab No.:	**22-089**	Notes: Depth: 5'			
Borehole No.:	**202**				
Sample No.:	**2**				
CLAY [%]:	**30**	Soil Description:	**Brown Clayey Sandy Silt w/ a trace of Gravel**		
SILT [%]:	**38**		**M.L - Clayey silts with slight plasticity, silty or clayey fine sands,**		
SAND [%]:	**26**		**inorganic silts and very fine sands**		
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-8}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**80.0**	Coefficient of Curvature C_C:	**0.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 5**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



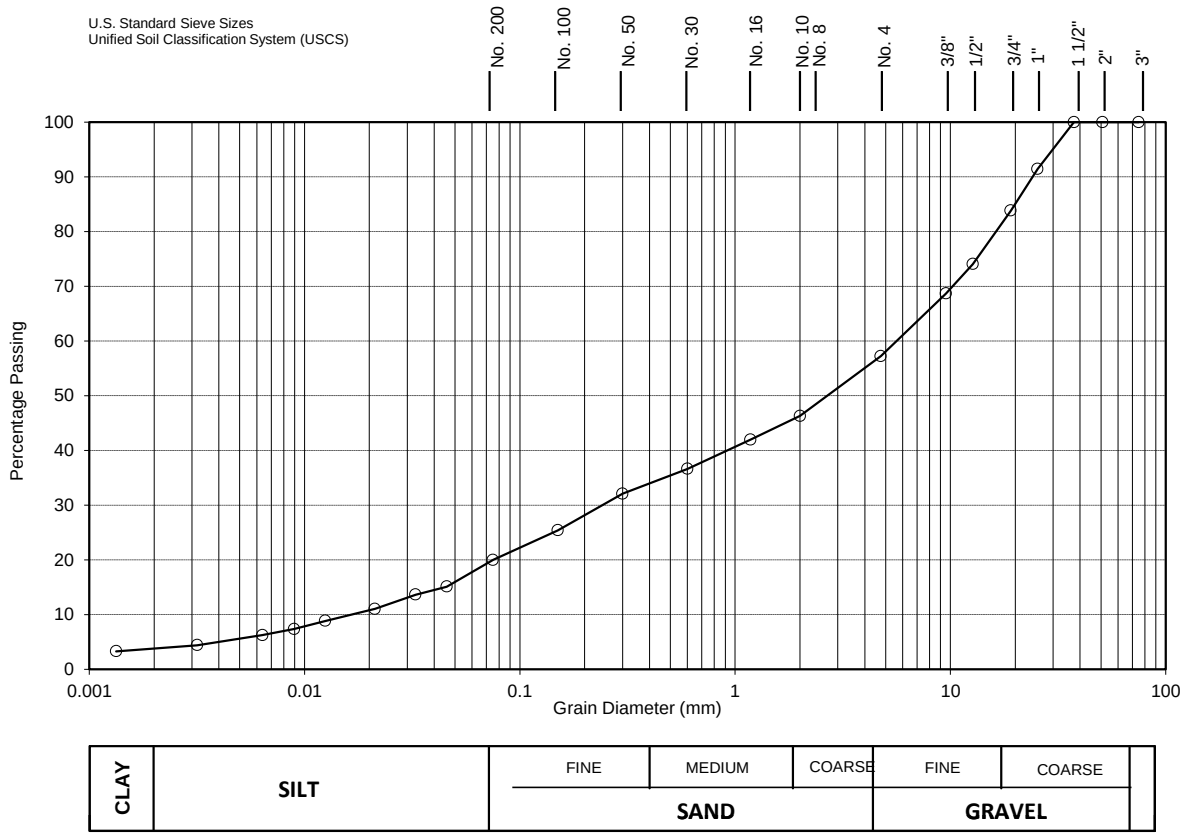
Lab No.:	**22-090**	Notes: Depth: 20'	
Borehole No.:	**202**		
Sample No.:	**5**		
CLAY [%]:	**10**	Soil Description: **Light Brown Silt and Sand w/ some Clay**	
SILT [%]:	**51**	**M.L. - Inorganic silts and very fine sands**	
SAND [%]:	**39**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0022**	Coefficient of Uniformity C_U: **33.2**	Coefficient of Curvature C_C: **3.0**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 6**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



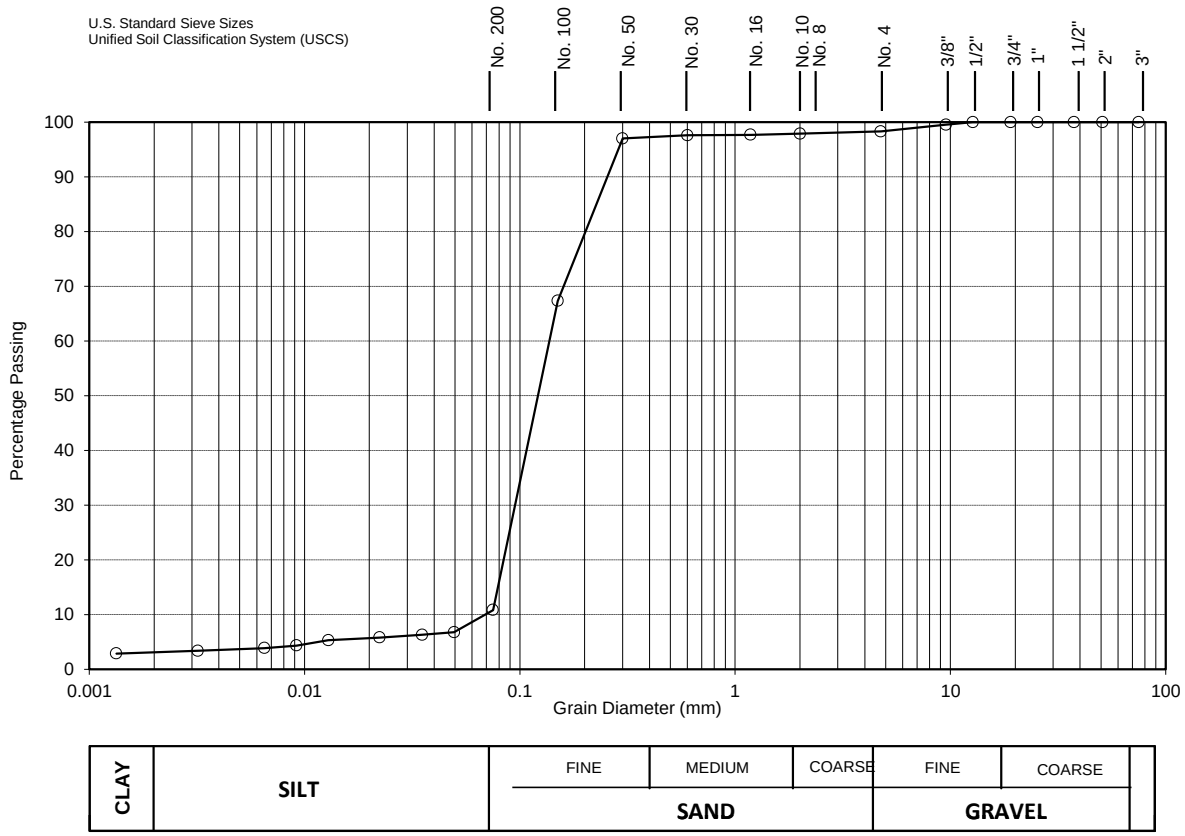
Lab No.:	**22-091**	Notes: Depth: 5'	
Borehole No.:	**203**		
Sample No.:	**2**		
CLAY [%]:	**3**	Soil Description:	**Brown Gravel and Sand w/ some Silt and a trace of Clay**
SILT [%]:	**17**		**G.M. - Gravel-sand-silt mixtures, silty gravels**
SAND [%]:	**37**		
GRAVEL [%]:	**43**	Estimated Infiltration Rate [mm/hr] : **50 to 60**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.017**	Coefficient of Uniformity C_U: **335.3**	Coefficient of Curvature C_C: **0.6**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 7**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-092**	Notes: Depth: 20'	
Borehole No.:	**203**		
Sample No.:	**5**		
CLAY [%]:	**3**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**8**	**S.P. - Poorly graded sands**	
SAND [%]:	**87**		
GRAVEL [%]:	**2**	Estimated Infiltration Rate [mm/hr] : **125 to 150**	Estimated Permeability, k [cm/s] **10^{-3}**
D_{10} (Effective Diam. in mm):	**0.07**	Coefficient of Uniformity C_U: **2.1**	Coefficient of Curvature C_C: **0.9**

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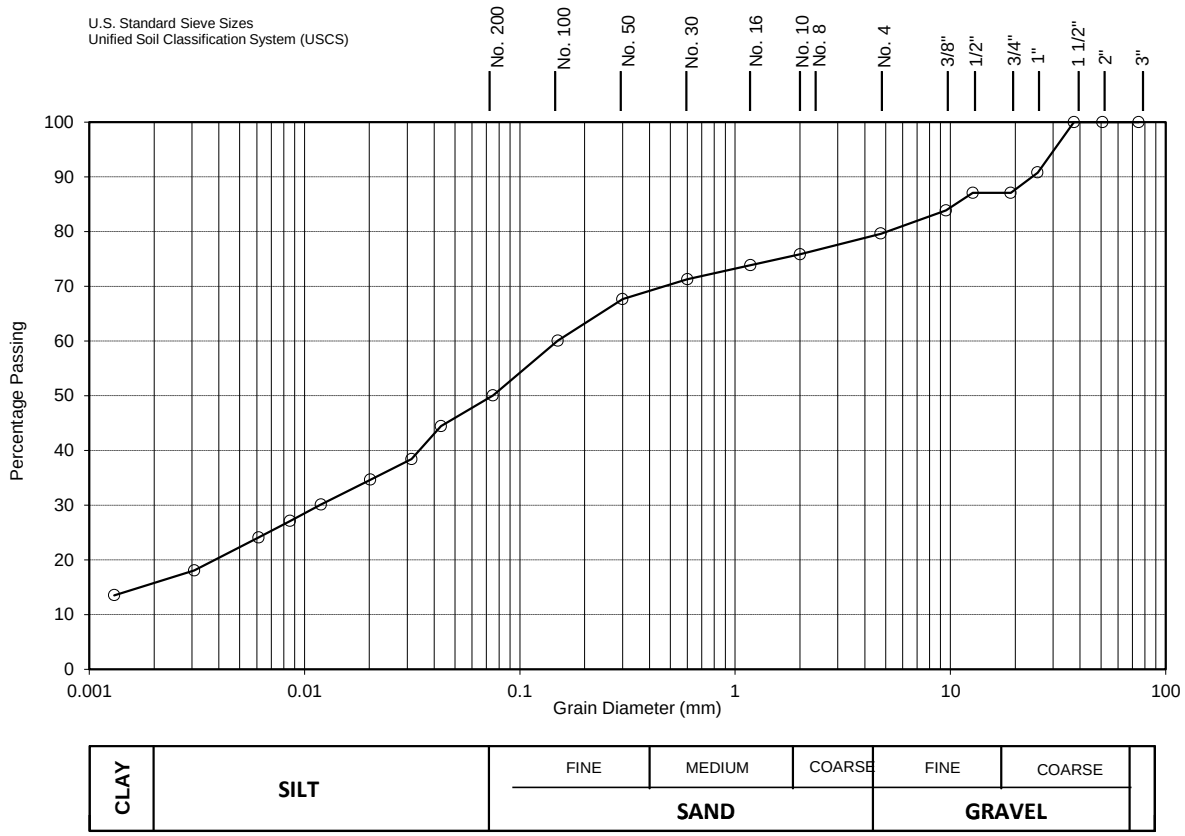
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 8**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



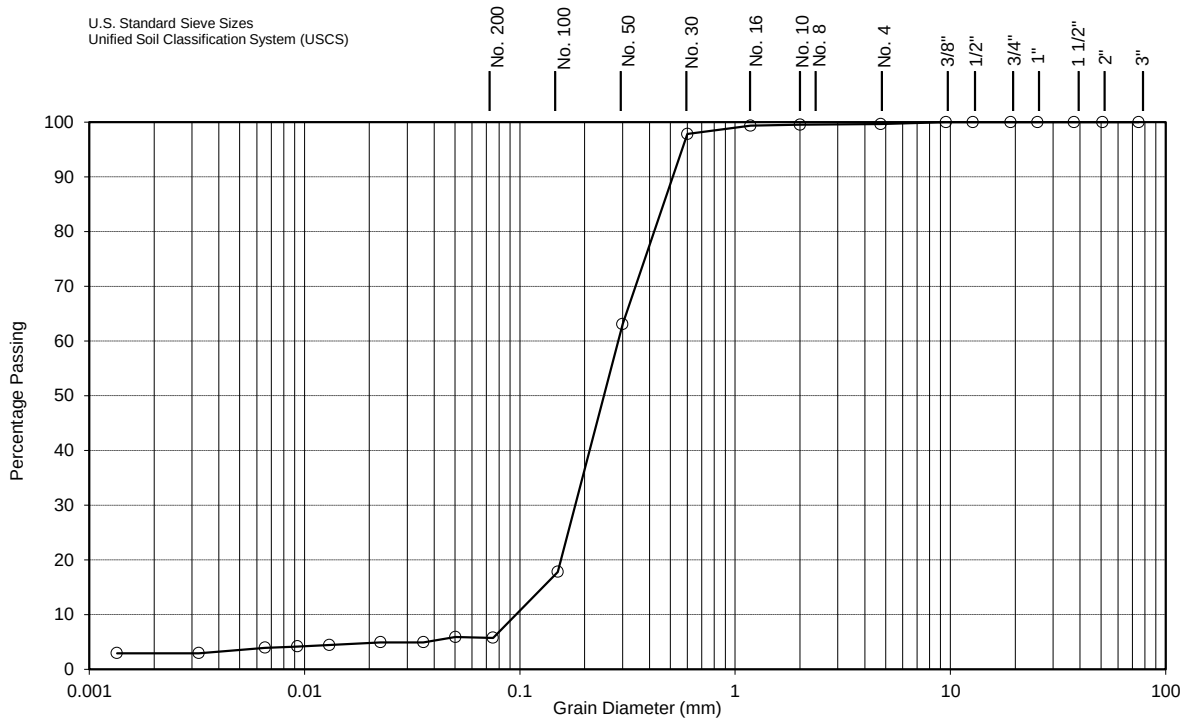
Lab No.:	**22-094**	Notes: Depth: 5'	
Borehole No.:	**204**		
Sample No.:	**2**		
CLAY [%]:	**16**	Soil Description: **Brown Sandy Gravelly Silt w/ some Clay**	
SILT [%]:	**34**	**M.L. - Silty or clayey fine sands**	
SAND [%]:	**30**		
GRAVEL [%]:	**20**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-7}**
D_{10} (Effective Diam. in mm):	**0.00085**	Coefficient of Uniformity C_U: **188.2**	Coefficient of Curvature C_C: **1.2**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 9**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE

Lab No.:	**22-093**	Notes: Depth: 10'			
Borehole No.:	**205**				
Sample No.:	**3**				
CLAY [%]:	**2**	Soil Description:	**Brown Sand w/ traces of Silt and Clay**		
SILT [%]:	**4**		**S.P. - Poorly graded sands**		
SAND [%]:	**94**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**150 to 300**	Estimated Permeability, k [cm/s]	**10^{-3}**
D_{10} (Effective Diam. in mm):	**0.095**	Coefficient of Uniformity C_U:	**3.1**	Coefficient of Curvature C_C:	**1.2**

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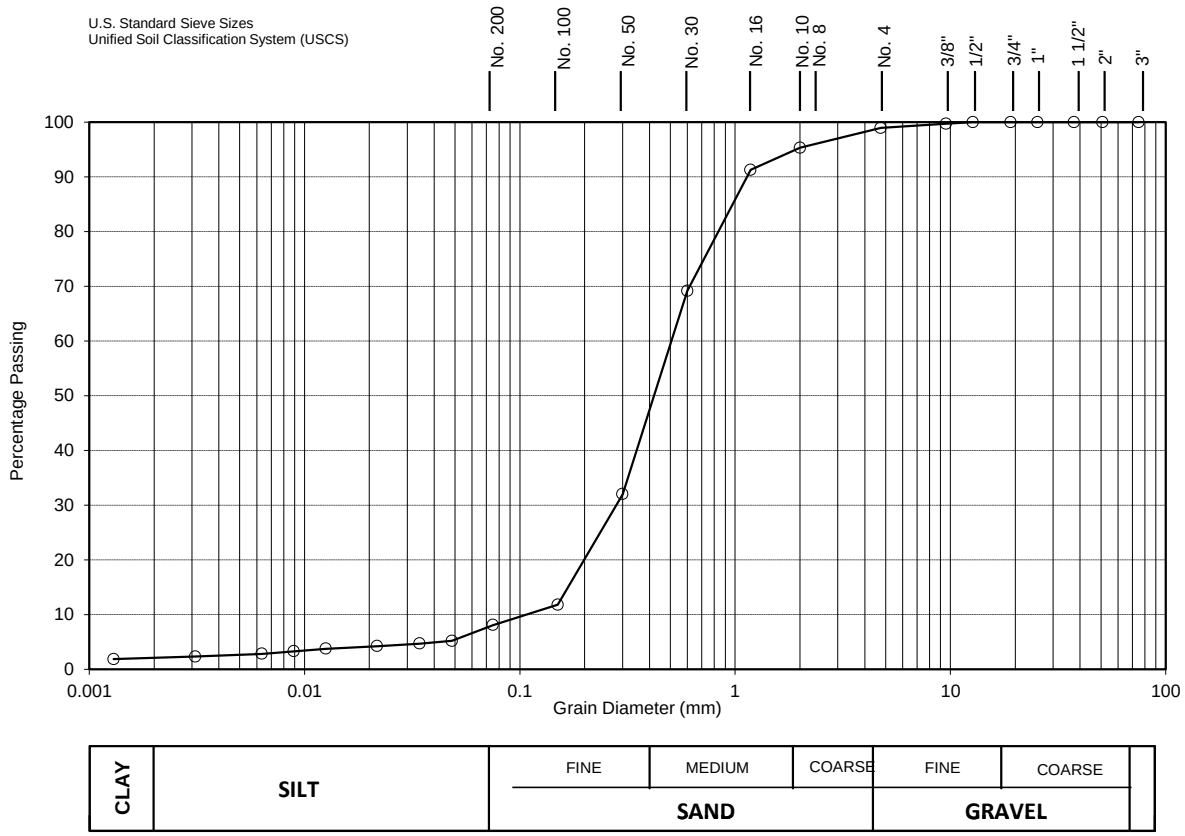
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 10**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



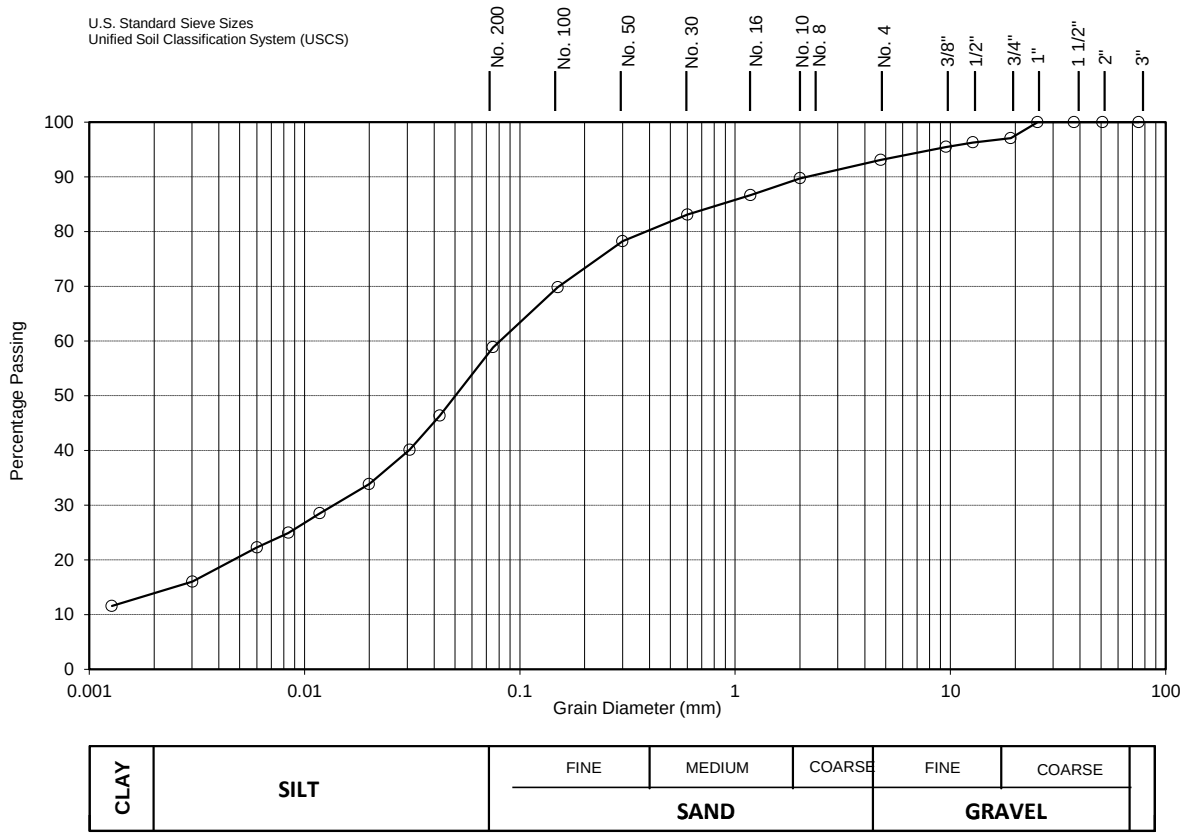
Lab No.:	**21-339**	Notes: Depth: 15'	
Borehole No.:	**102**		
Sample No.:	**6**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**6**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**91**		
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.10**	Coefficient of Uniformity C_U: **5.1**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 11**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



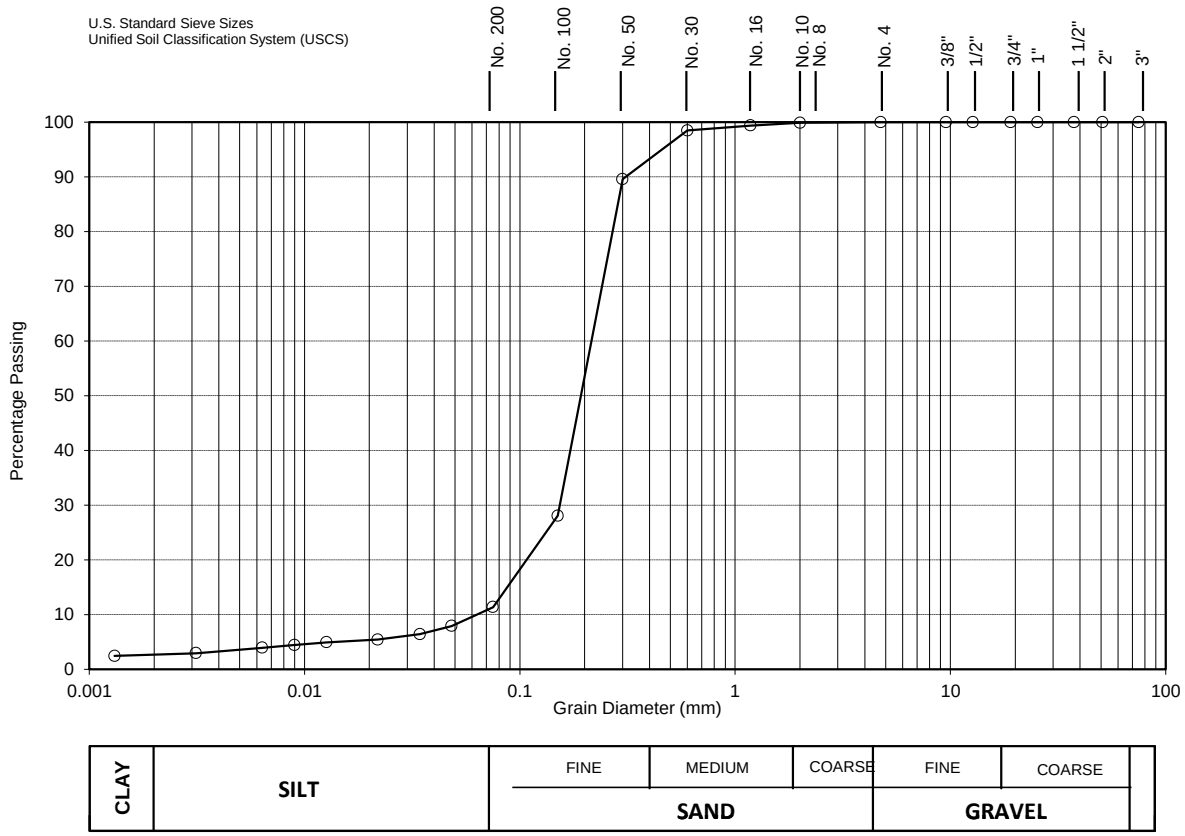
Lab No.:	**21-338**	Notes: Depth: 5'	
Borehole No.:	**103**		
Sample No.:	**3**		
CLAY [%]:	**14**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**45**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**34**		
GRAVEL [%]:	**7**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.00100**	Coefficient of Uniformity C_U: **80.0**	Coefficient of Curvature C_C: **2.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 12**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



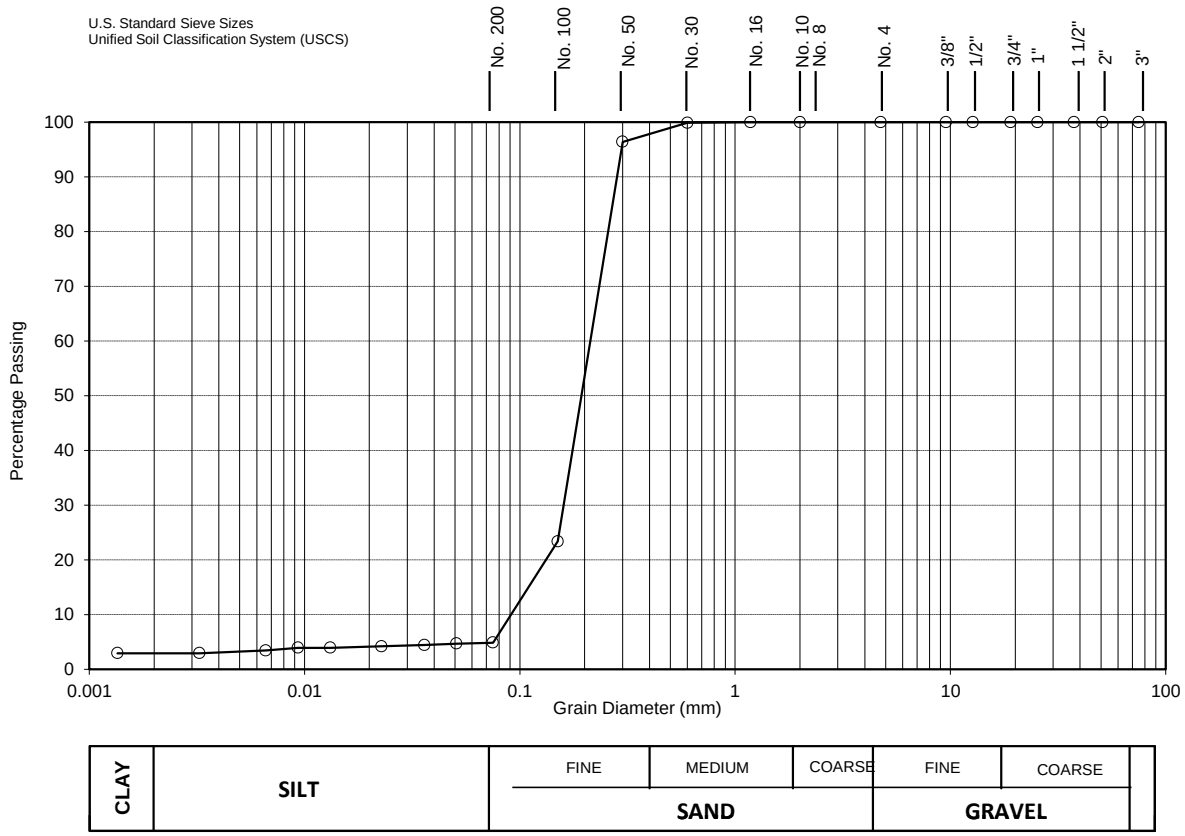
Lab No.:	**21-337**	Notes: Depth: 7.5'	
Borehole No.:	**104**		
Sample No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**9**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**89**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **100 to 150**	Estimated Permeability, k [cm/s] **10^{-3} to 10^{-2}**
D_{10} (Effective Diam. in mm):	**0.0600**	Coefficient of Uniformity C_U: **3.7**	Coefficient of Curvature C_C: **1.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 13**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



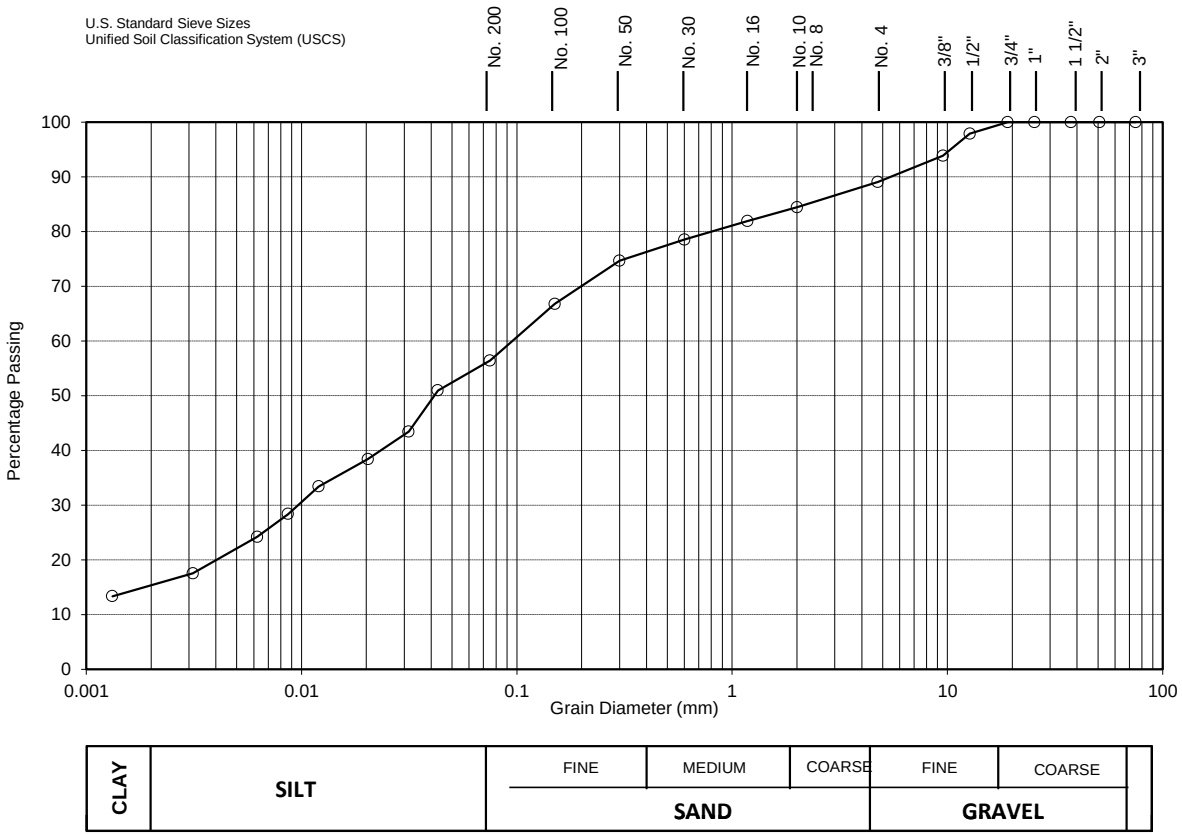
Lab No.:	**22-096**	Notes: Depth: 5'	
Borehole No.:	**302**		
Sample No.:	**2**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**3**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**95**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.09**	Coefficient of Uniformity C_U: **2.3**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 14**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



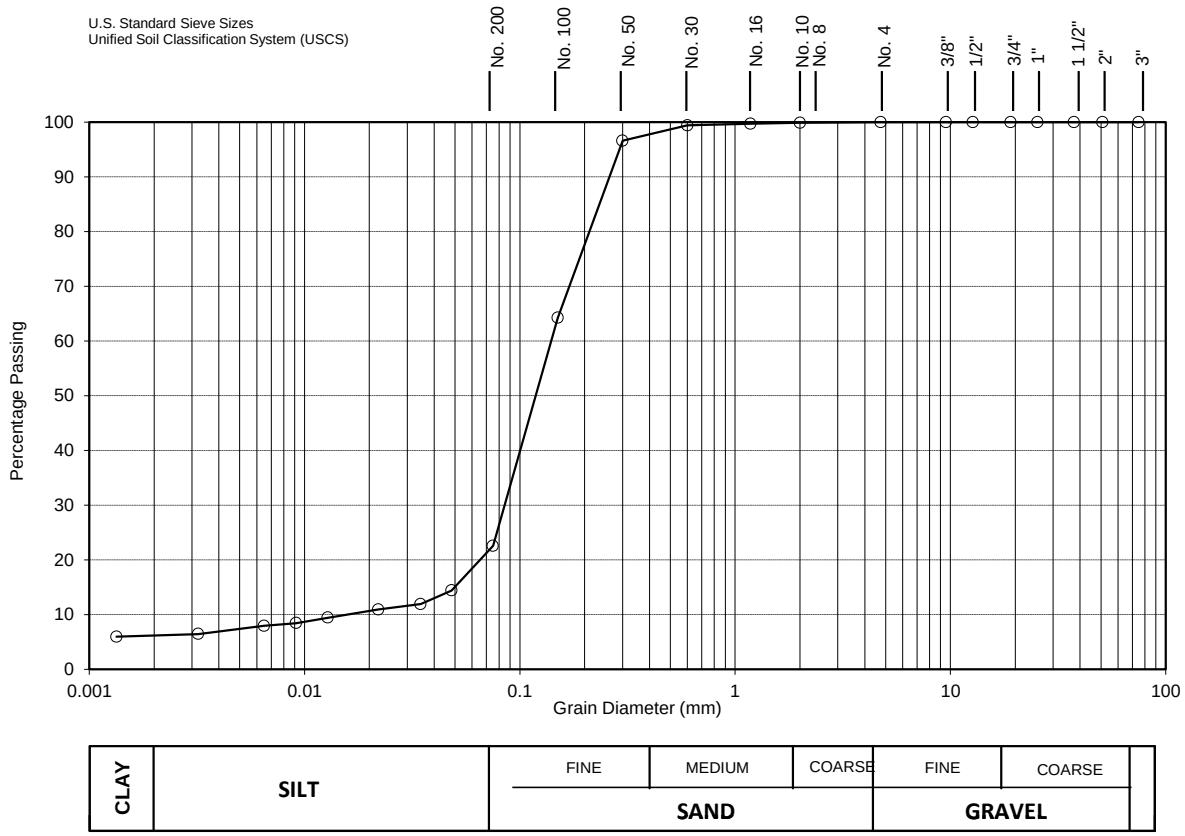
Lab No.:	**22-097**	Notes: Depth: 5'	
Borehole No.:	**304**		
Sample No.:	**2**		
CLAY [%]:	**16**	Soil Description: **Brown Sandy Silt w/ some Clay and Gravel**	
SILT [%]:	**40**	**M.L. - Inorganic silts and very fine sands, silty or clayey fine sands, clayey silts with slight plasticity to S.M. - Sand-silt mixtures**	
SAND [%]:	**33**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0009**	Coefficient of Uniformity C_U: **103.3**	Coefficient of Curvature C_C: **1.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 15**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-098**	Notes: Depth: 5'	
Borehole No.:	**305**		
Sample No.:	**2**		
CLAY [%]:	**7**	Soil Description: **Brown Sand w/ some Silt and a trace of Clay**	
SILT [%]:	**16**	**S.M. - Sand-silt mixtures, silty sands**	
SAND [%]:	**77**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **50 to 60**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.015**	Coefficient of Uniformity C_U: **10.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 16**	**Project No.: SM 301951-T**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

401 Grays Road · Hamilton, ON · L8E 2Z3

www.soil-mat.ca info@soil-mat.ca 905.318.7440 905.318.7455

PROJECT NO.: SM 241154-G September 22, 2025

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Brendan Walton, P. Eng.
Engineering Manager, Land Development

SUPPLEMENTAL GROUNDWATER DATA
PROPOSED RESIDENTIAL DEVELOPMENT
CLAYTON AND ELORA SANDS
ELORA, ONTARIO

Dear Mr. Walton,

Further to the recent request and correspondence with MTE Consultants, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has prepared the following brief updated groundwater level summary based on information collected between February 24, 2025 to May 13, 2025. This information is further to our preliminary hydrogeological assessment reports for the development lands [SM 301951-G, dated June 17, July 20, 2022 and August 19, 2024], and should be referenced in conjunction with those reports.

Groundwater Observations

Monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, 401, 501 and 502 to allow for future measurements of the static groundwater level. Monitoring data up to May 2023 was presented in the prior referenced reports. A data logger was maintained in each of the monitoring wells to allow for further continuous monitoring of the groundwater level between March 2025 to May 2025, the readings of which have been illustrated in graphs which can be found appended to the end of this report. It is noted ground water monitoring is ongoing through the summer and fall of 2025.

In addition, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on various dates, ranging from February to May 2025. These have been summarized in the following charts. As well, the detailed plots of continuous groundwater levels for each monitoring well are appended.

TABLE A
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA SANDS)

Borehole No. 004 (Ground Surface Elevation of 404.68 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	2.74	401.9
August 27, 2021	1.75	402.9
February 23, 2022	1.33	403.4
April 22, 2022	1.47	403.2
June 1, 2022	1.78	402.9
May 3, 2023	1.20	403.5
May 13, 2025	1.77	402.9

Borehole No. 201 (Ground Surface Elevation of 404.80 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.69	402.1
April 22, 2022	1.88	402.9
June 1, 2022	2.44	402.4
May 3, 2023	1.88	402.9
May 13, 2025	2.13	402.7

Borehole No. 201A (Ground Surface Elevation of 404.75 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.8
April 22, 2022	2.05	402.7
June 1, 2022	2.43	402.3
May 3, 2023	1.71	403.1

Borehole No. 202 (Ground Surface Elevation of 406.59 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	5.5	401.1
April 22, 2022	4.76	401.8
June 1, 2022	5.43	401.2
May 3, 2023	4.51	402.1
May 13, 2025	5.17	401.4

Borehole No. 203 (Ground Surface Elevation of 407.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.0
April 22, 2022	5.90	401.2

June 1, 2022	5.91	401.2
May 3, 2023	Dry	<401.0
May 13, 2025	5.91	401.2

Borehole No. 204 (Ground Surface Elevation of 409.56 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.81	406.7
April 22, 2022	1.16	408.4
June 1, 2022	1.53	408.0
May 3, 2023	1.20	408.4
May 13, 2025	1.59	408.0

Borehole No. 205 (Ground Surface Elevation of 412.99 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.56	410.4
April 22, 2022	2.25	410.7
June 1, 2022	2.39	410.6
May 3, 2023	2.34	410.6
May 13, 2025	2.32	410.7

Borehole No. 206 (Ground Surface Elevation of 412.88 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	6.83	406.1
April 22, 2022	4.60	408.3
June 1, 2022	4.66	408.2
May 3, 2023	4.76	408.1
May 13, 2025	4.55	408.3

Borehole No. 401 (Ground Surface Elevation of 419.77 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
April 22, 2022	2.29	417.5
June 1, 2022	2.39	417.4
May 3, 2023	2.31	417.5
May 13, 2025	2.44	417.3

TABLE B
SUMMARY OF MANUAL GROUNDWATER READINGS (CLAYTON LANDS)

Borehole No. 101 (Ground Surface Elevation of 407.50 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	4.78	402.7
August 27, 2021	4.71	402.8
October 14, 2021	4.33	403.2
February 23, 2022	4.31	403.2
April 22, 2022	4.07	403.4
June 1, 2022	4.15	403.3
May 3, 2023	4.06	403.4
May 13, 2025	4.12	403.4

Borehole No. 102 (Ground Surface Elevation of 413.0 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	3.58	409.4
August 27, 2021	3.61	409.4
October 14, 2021	3.62	409.4
February 23, 2022	3.50	409.5
April 22, 2022	2.89	410.1
June 1, 2022	3.05	409.9
May 3, 2023	3.00	410.0
May 13, 2025	2.82	410.2

Borehole No. 104 (Ground Surface Elevation of 414.2 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	6.78	407.4
August 27, 2021	6.96	407.2
October 14, 2021	7.09	407.1
February 23, 2022	6.83	407.3
April 22, 2022	6.13	408.1
June 1, 2022	6.28	407.9
May 3, 2023	6.56	407.6
May 13, 2025	6.24	407.9

Borehole No. 301 (Ground Surface Elevation of 412.81 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.29	406.5
April 22, 2022	5.65	407.1

June 1, 2022	5.71	407.0
May 3, 2023	5.85	406.9
May 13, 2025	5.59	407.2

Borehole No. 302 (Ground Surface Elevation of 413.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.62	406.4
April 22, 2022	6.06	406.9
June 1, 2022	6.12	406.9
May 3, 2023	6.35	406.7
May 13, 2025	6.03	407.0

Borehole No. 303 (Ground Surface Elevation of 414.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	5.40	408.6
April 22, 2022	6.04	407.9
June 1, 2022	6.11	407.9
May 3, 2023	6.41	407.6
May 13, 2025	5.98	408.0

Borehole No. 304 (Ground Surface Elevation of 407.90 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	2.87	405.0
April 22, 2022	2.60	405.3
June 1, 2022	2.96	404.9
May 3, 2023	2.42	405.5
May 13, 2025	2.72	405.2

Borehole No. 305 (Ground Surface Elevation of 407.48 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	Dry	<404.6
April 22, 2022	Dry	<404.6
June 1, 2022	Dry	<404.6
May 3, 2023	Dry	<404.6
May 13, 2025	Dry	<404.6

Borehole No. 501 (Ground Surface Elevation of 412.80 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
May 13, 2025	3.78	409.0

Borehole No. 502 (Ground Surface Elevation of 413.60 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
May 13, 2025	3.27	410.3

*Ground surface elevations have been interpolated based on contours from current topographic survey

The water level readings are noted to be reasonably consistent between May 2023 and May 2025, indicative of the seasonal high groundwater levels. As such the previously prepared groundwater contour plan for the site would be considered valid. This has been appended for reference.

As noted above, continuous collection of groundwater data in each of the monitoring wells is ongoing. This information will be updated in late 2025, or sooner as may be warranted.

We trust that this brief supplemental information is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

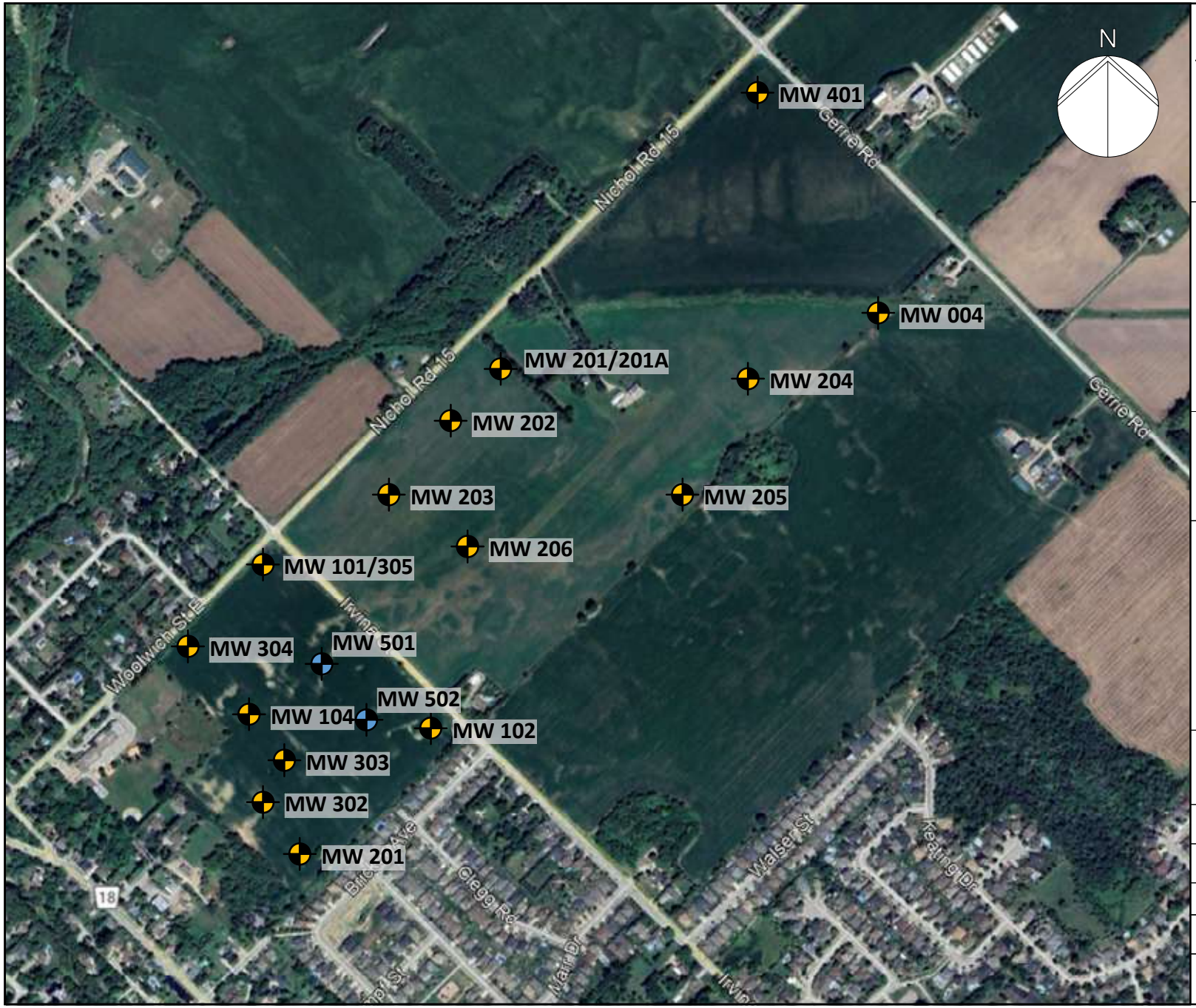
Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Kevin Reid, P. Eng.
Project Engineer

Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Drawing No. 2, Groundwater Contour Plan
Drawing No. 3A-C, Groundwater Contour Plans
Groundwater Monitoring Well Plots

Distribution: Cachet Developments [pdf]



LEGEND

BH/MW# Borehole Location

MW# Previous Monitoring Well

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
Elora Sands/Clayton Lands
Elora, Ontario

Proposed Borehole Location Plan

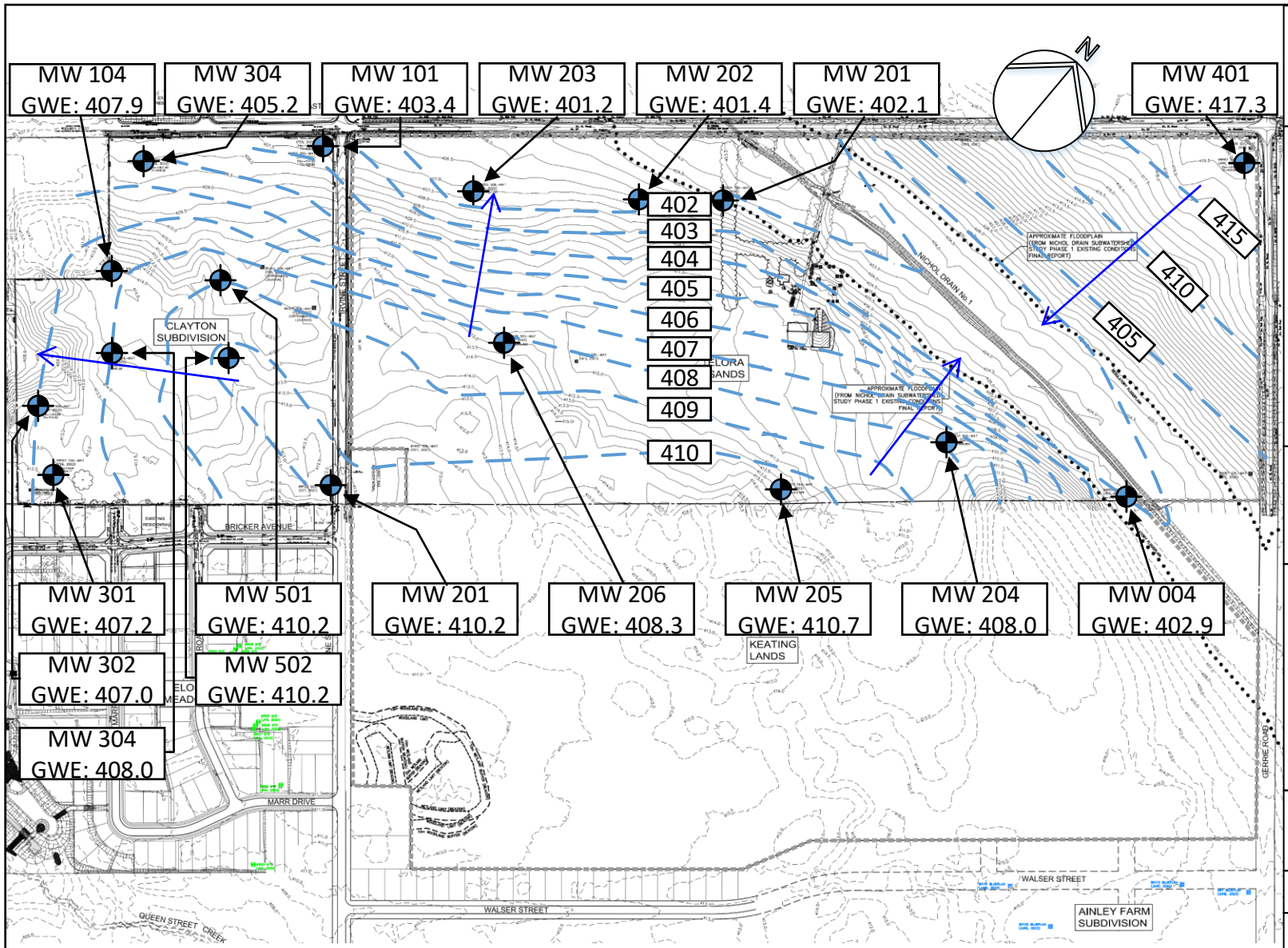
Project No. SM 241154-G

Date: August, 2025

Drawn: MG

Checked: IS

Drawing No. 1



LEGEND

Soil-Mat Monitoring Well Location

MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Drawing Ref: Existing Conditions Plan, MTE, Drawing No. EC2.1, dated January 29, 2025

3. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Clayton Lands
Elora, Ontario

Groundwater Contour Map

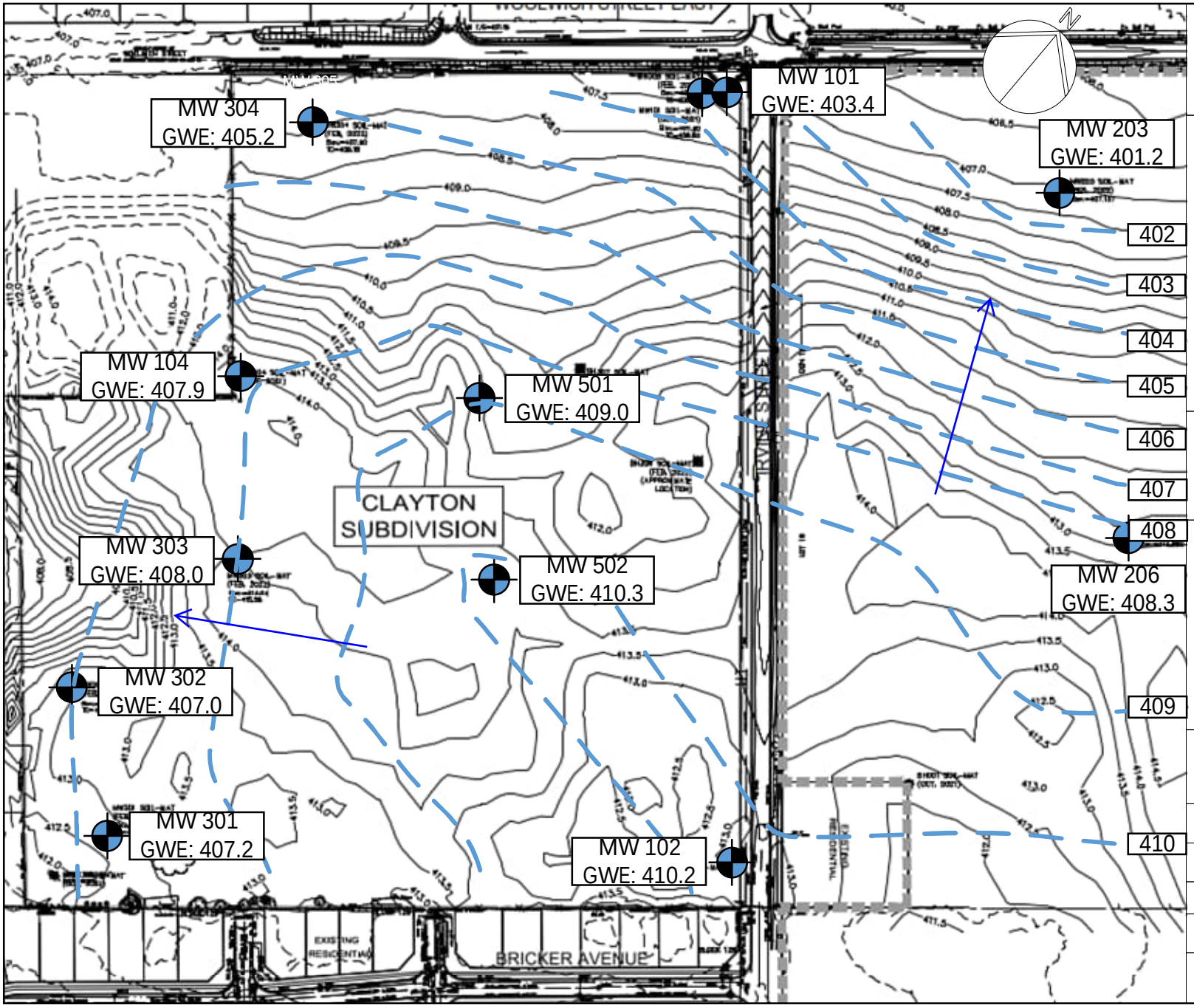
Project No. SM 241154-G

Date: September 2025

Drawn: KJR | Checked: IS

SM 241154-G Groundwater Contour Map

Drawing No. 2



LEGEND

Soil-Mat Monitoring Well Location

MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Drawing Ref: Existing Conditions Plan, MTE, Drawing No. EC2.1, dated January 29, 2025

3. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Clayton Lands
Elora, Ontario

Groundwater Contour Map

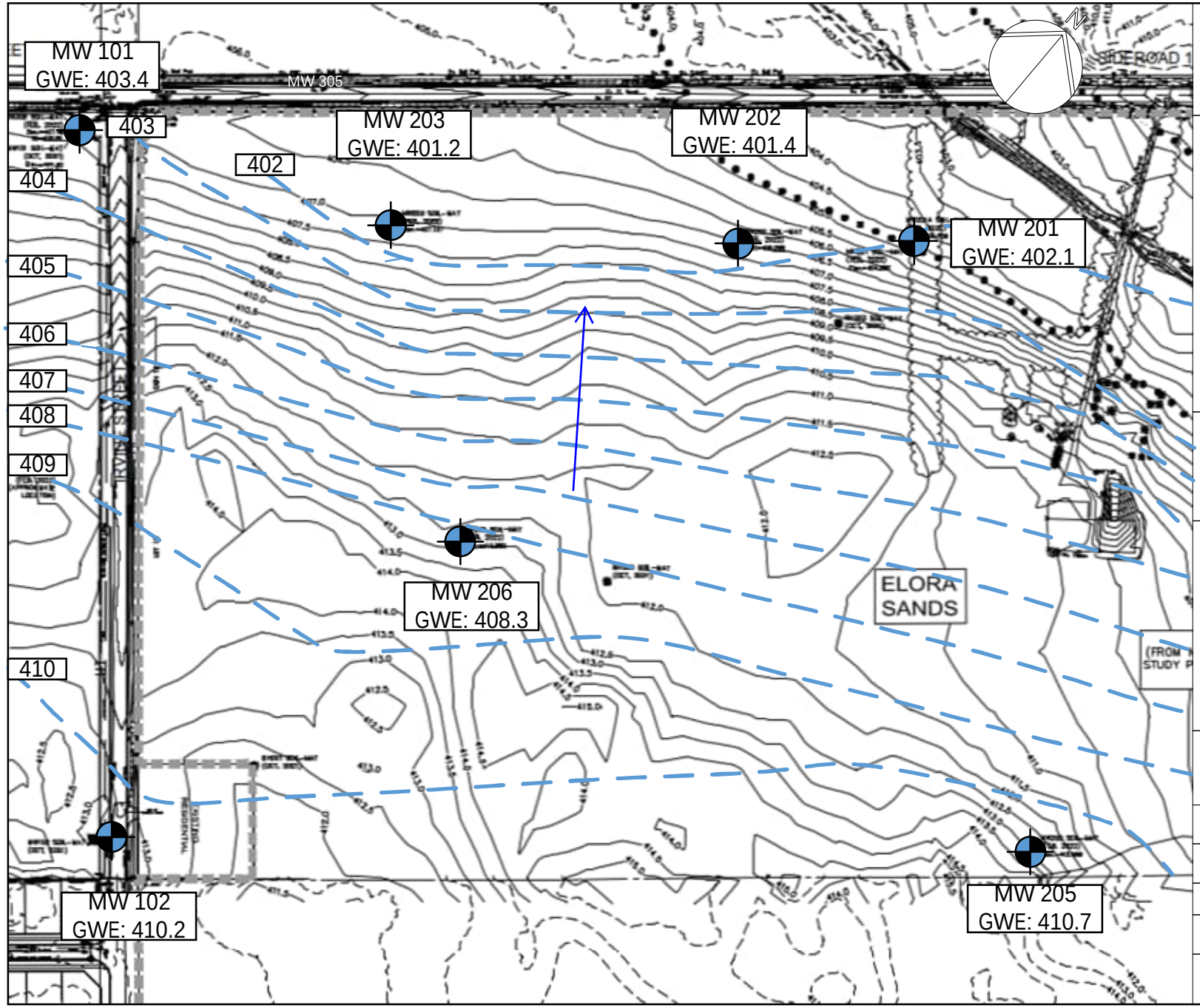
Project No. SM 241154-G

Date: September 2025

Drawn: KJR | Checked: IS

SM 241154-G Groundwater Contour Map

Drawing No. 3A



LEGEND

Soil-Mat Monitoring Well Location

MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Drawing Ref: Existing Conditions Plan, MTE, Drawing No. EC2.1, dated January 29, 2025

3. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Clayton Lands
Elora, Ontario

Groundwater Contour Map

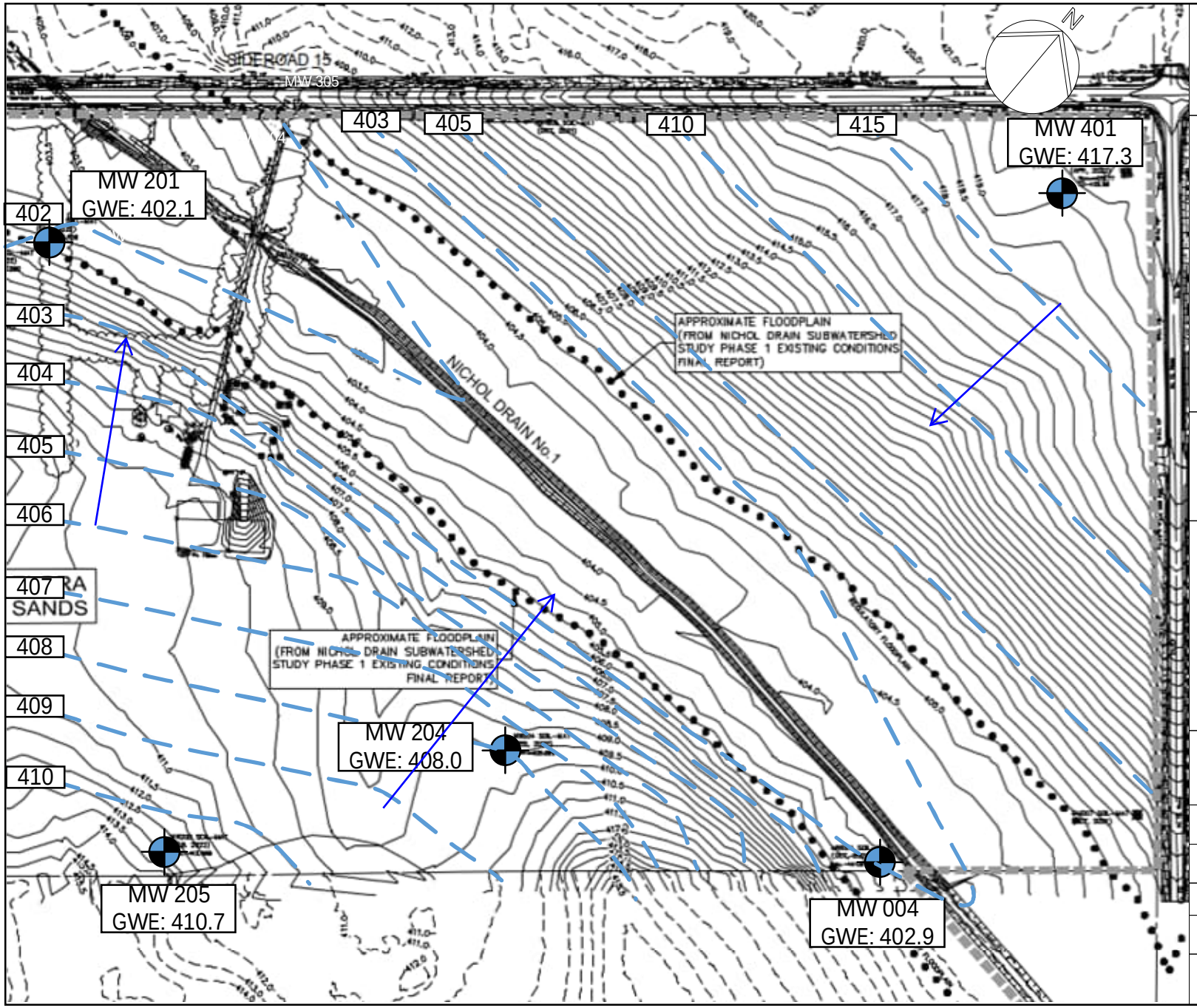
Project No. SM 241154-G

Date: September 2025

Drawn: KJR | Checked: IS

SM 241154-G Groundwater Contour Map

Drawing No. 3B



LEGEND

Soil-Mat Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Drawing Ref: Existing Conditions Plan, MTE, Drawing No. EC2.1, dated January 29, 2025

3. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Clayton Lands and Elora Sands
Elora, Ontario

Groundwater Contour Map

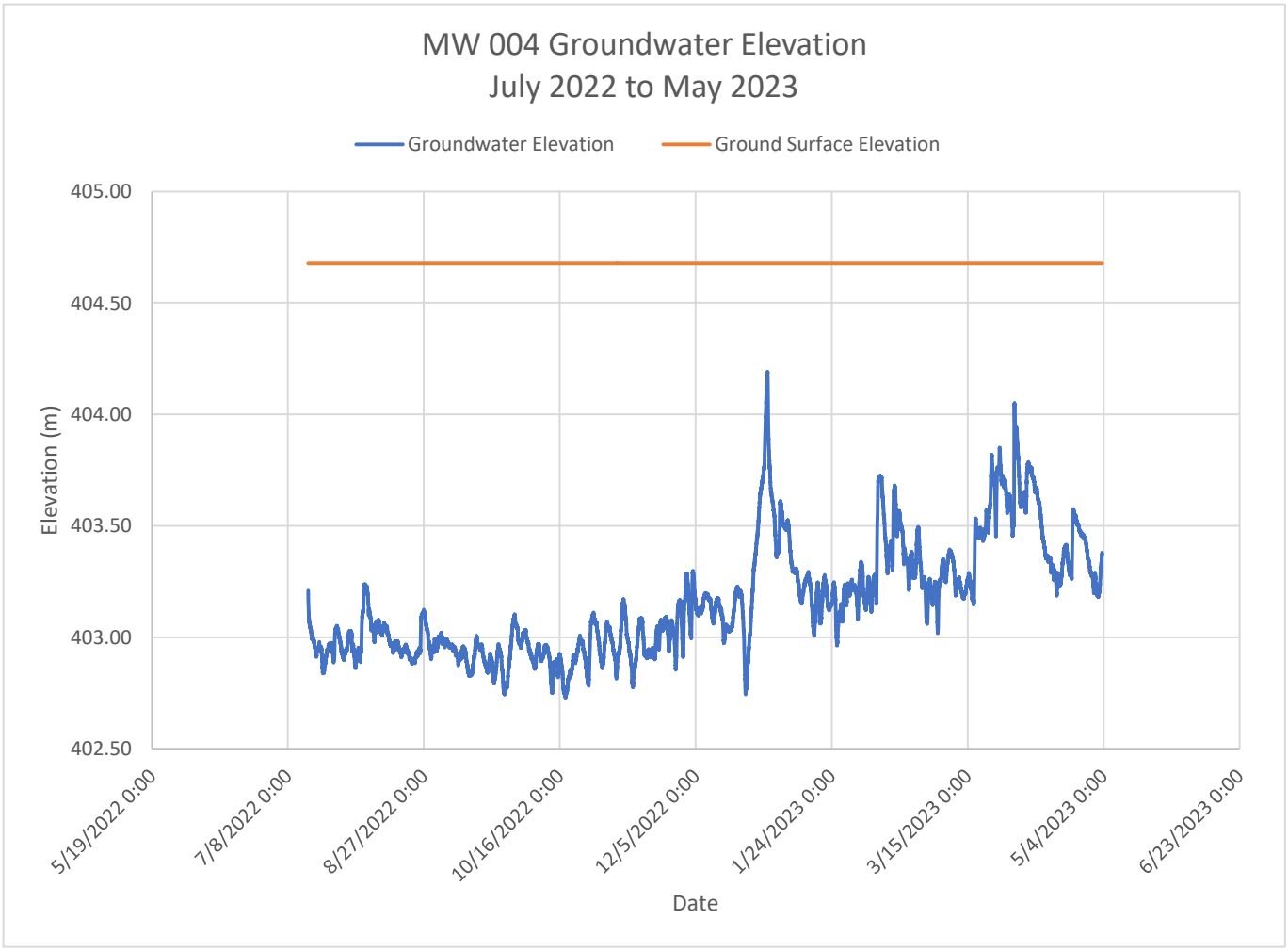
Project No. SM 241154-G

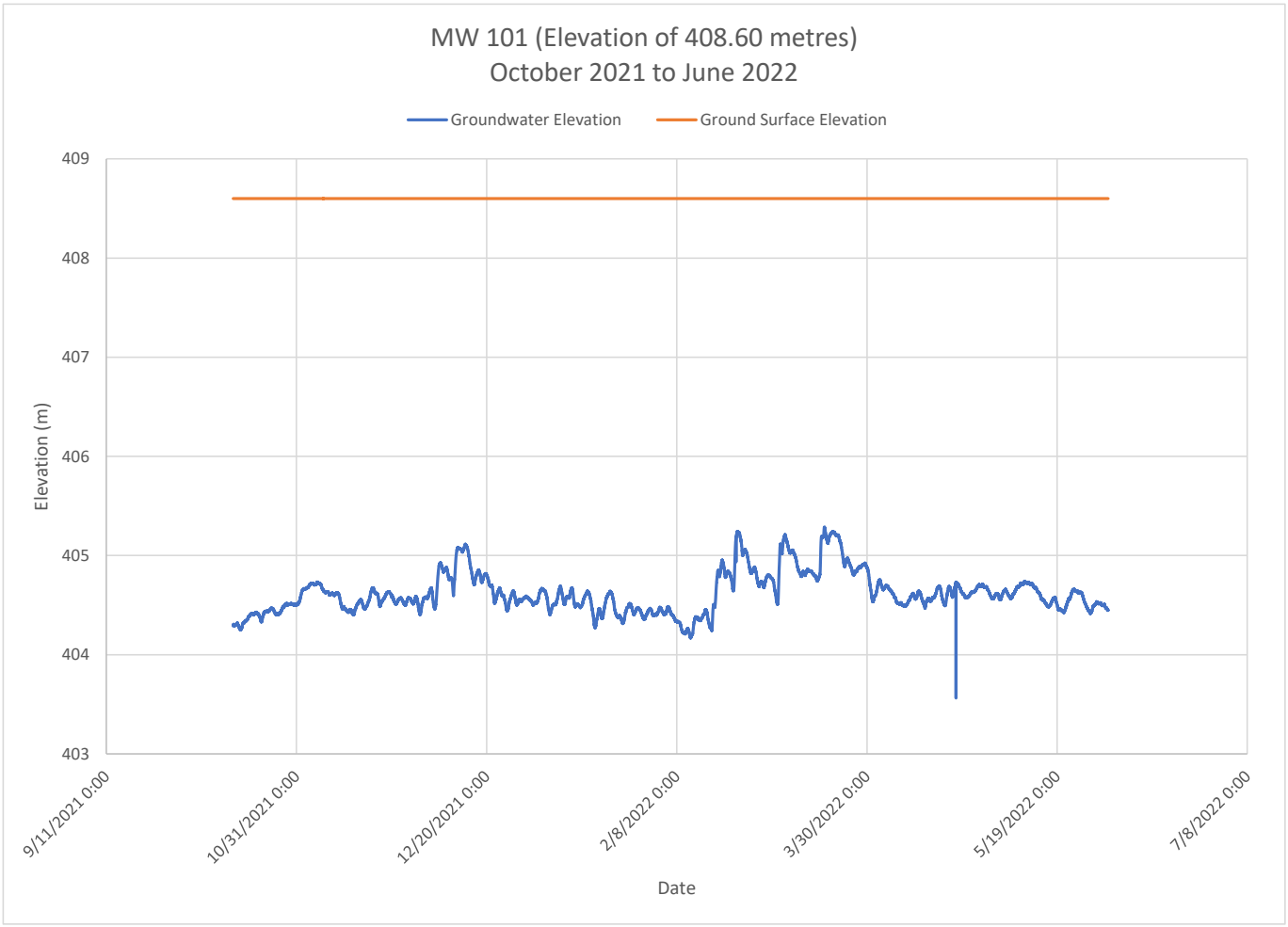
Date: September 2025

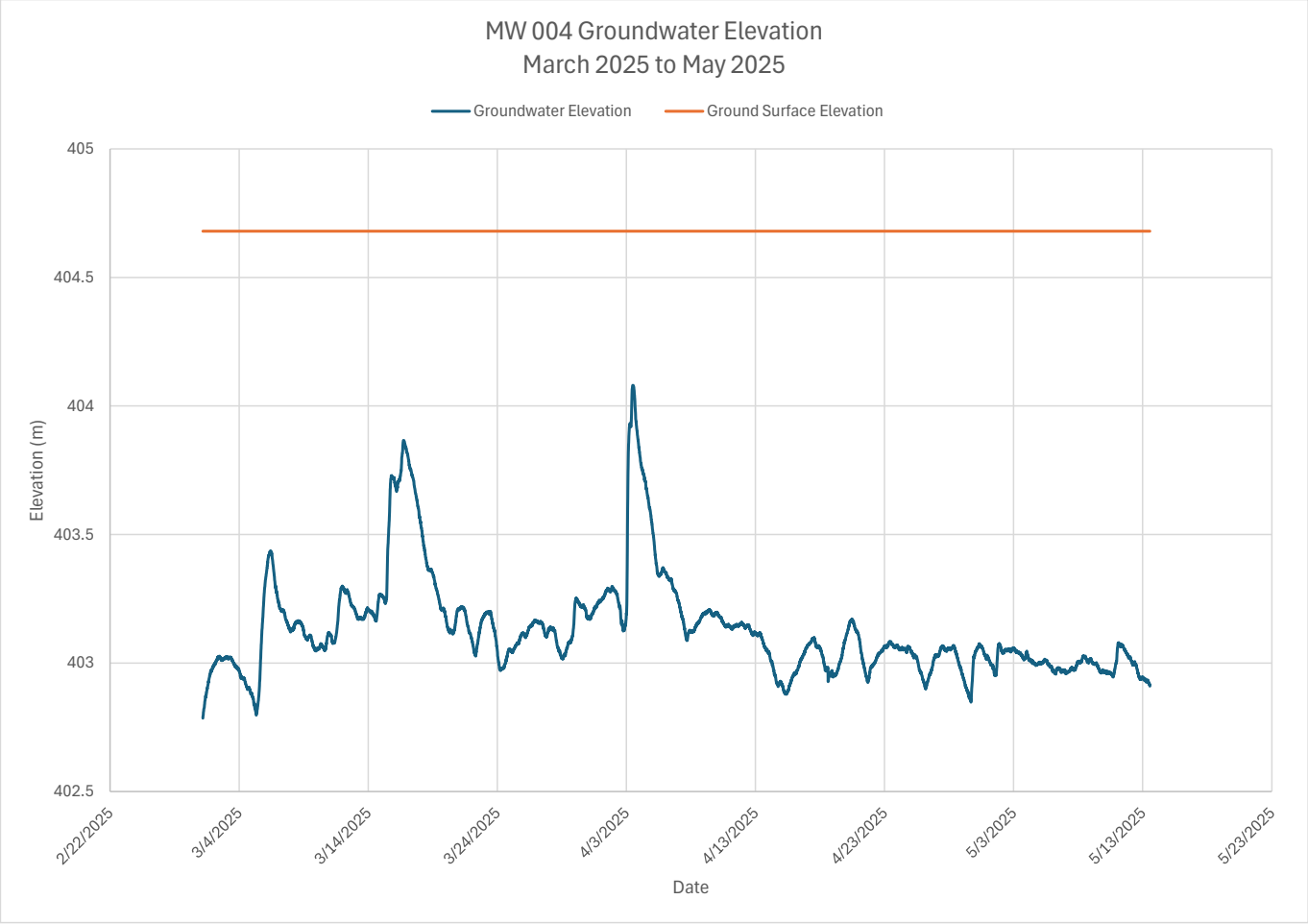
Drawn: KJR | Checked: IS

SM 241154-G Groundwater Contour Map

Drawing No. 3C


MW 004 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
405.00
404.50
404.00
403.50
403.00
402.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date


MW 101 (Elevation of 408.60 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
409
408
407
406
405
404
403
Elevation (m)
9/11/2021 0:00
10/31/2021 0:00
12/20/2021 0:00
2/8/2022 0:00
3/30/2022 0:00
5/19/2022 0:00
7/8/2022 0:00
Date


MW 004 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
405
404.5
404
403.5
403
402.5
Elevation (m)
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
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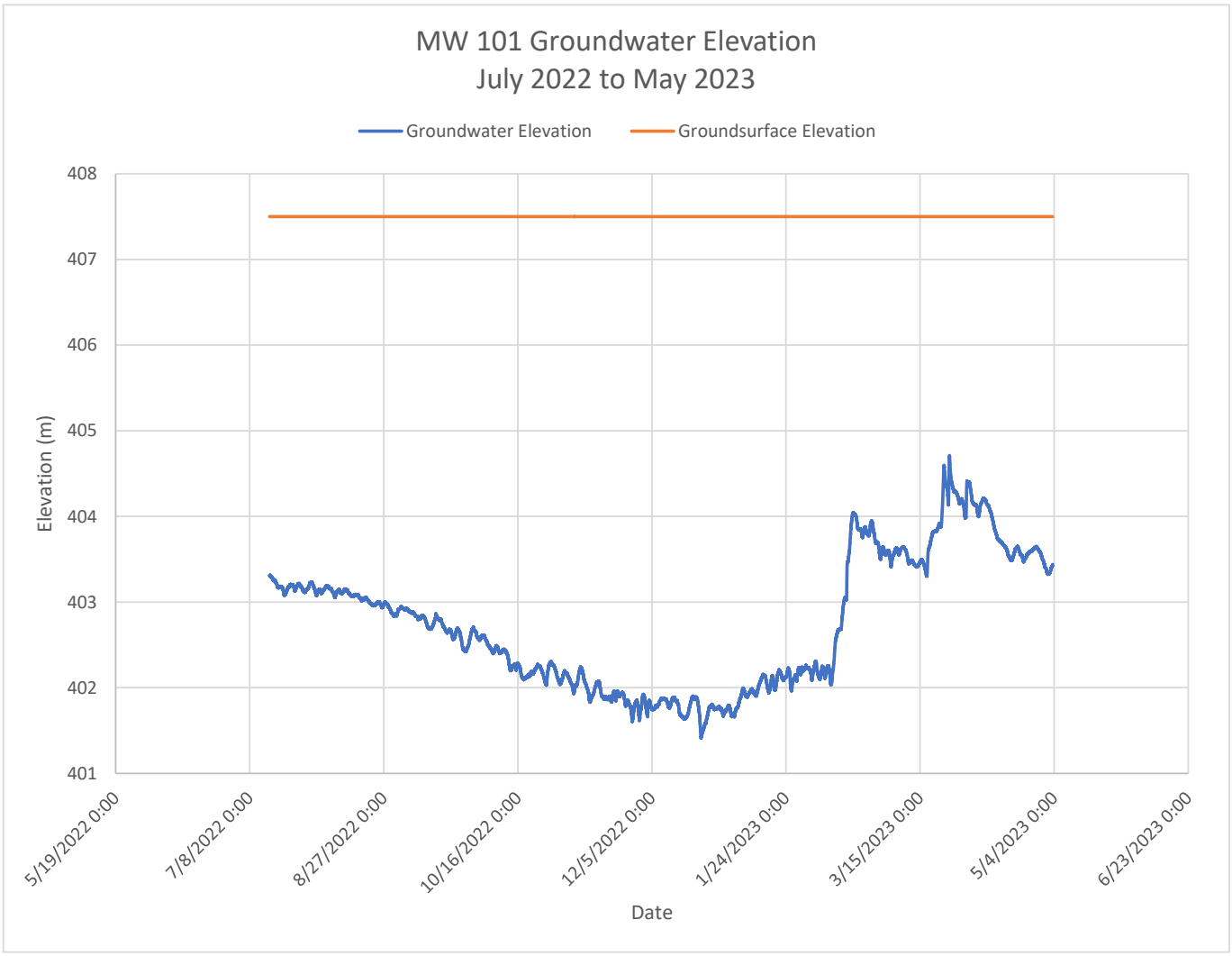
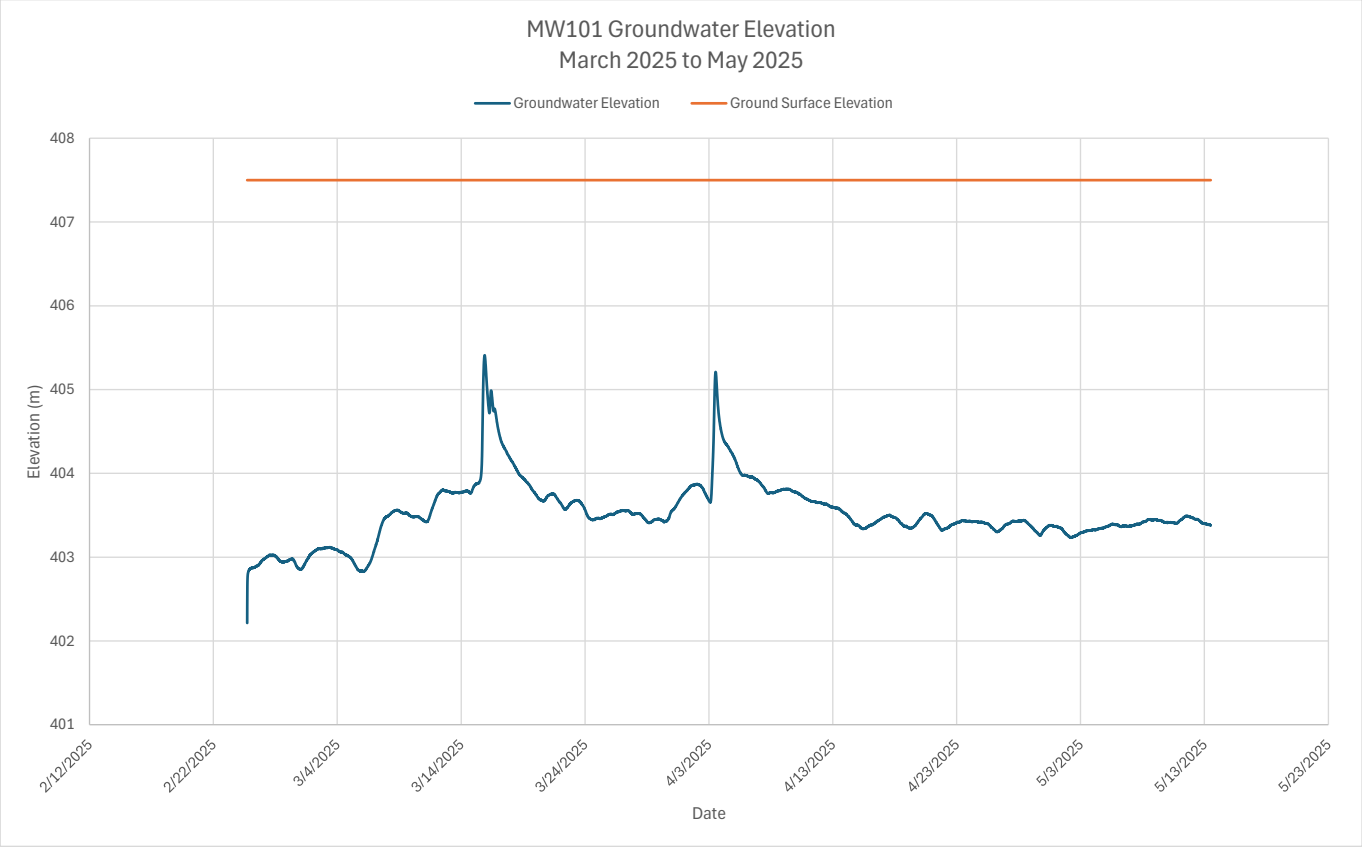
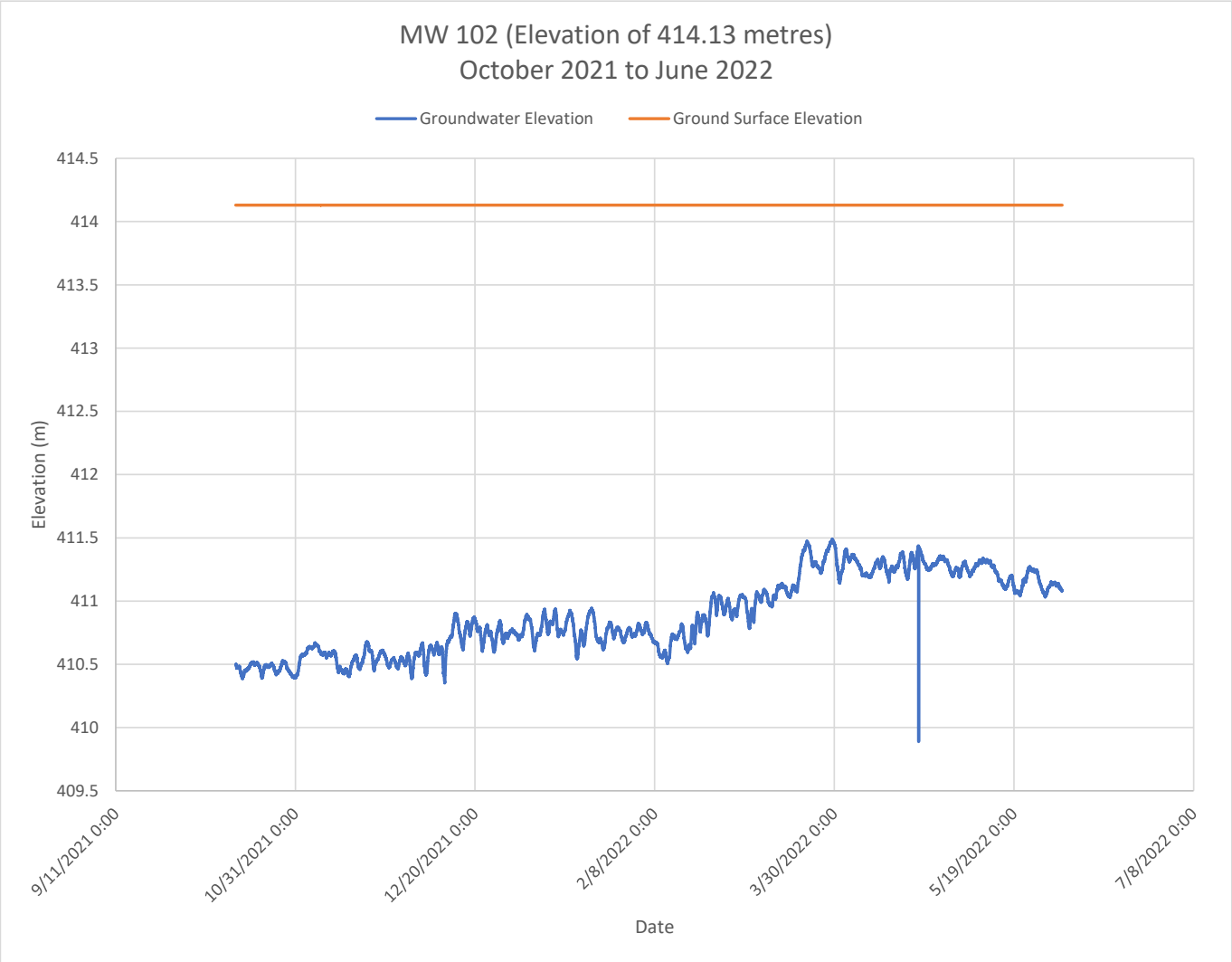
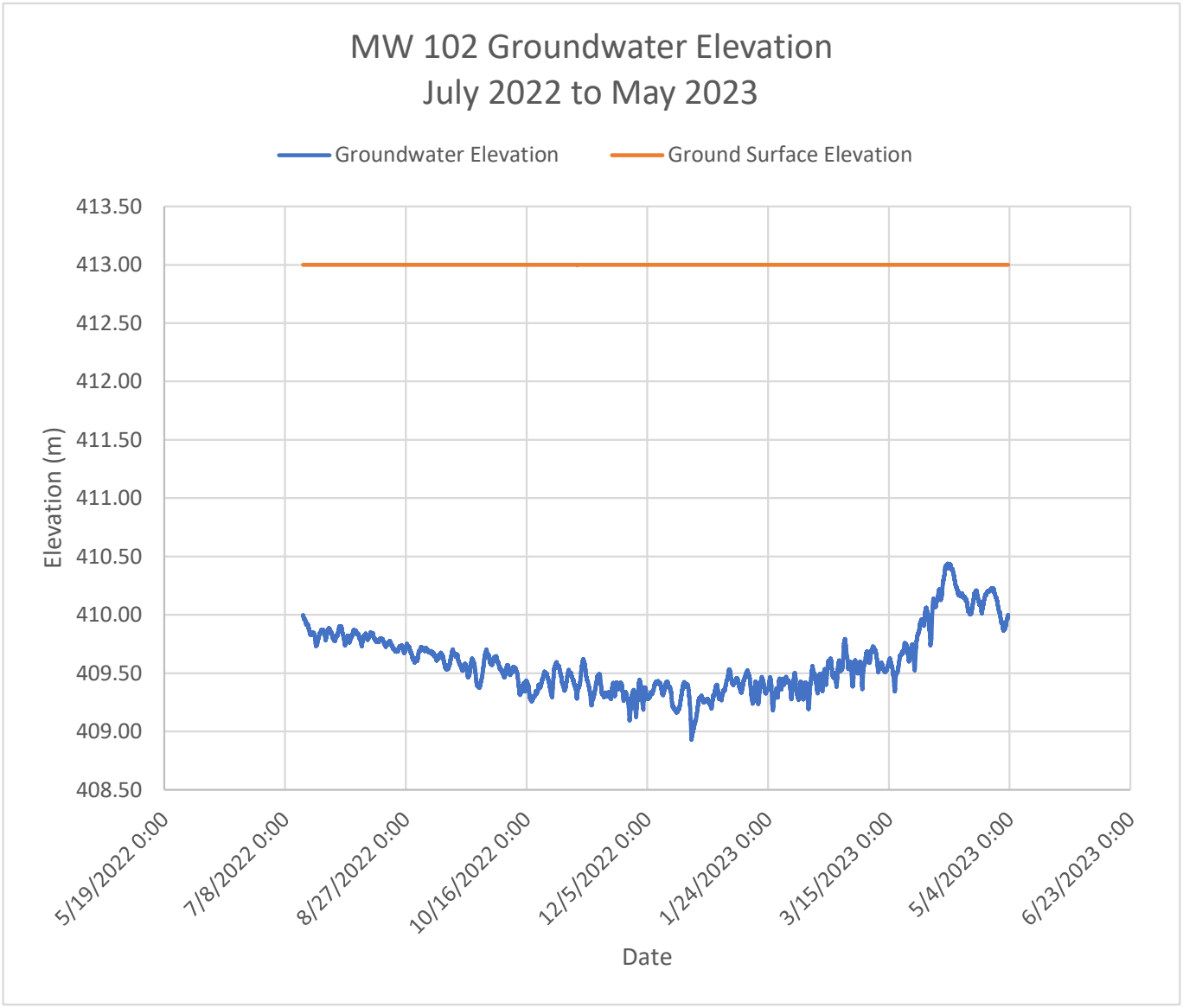
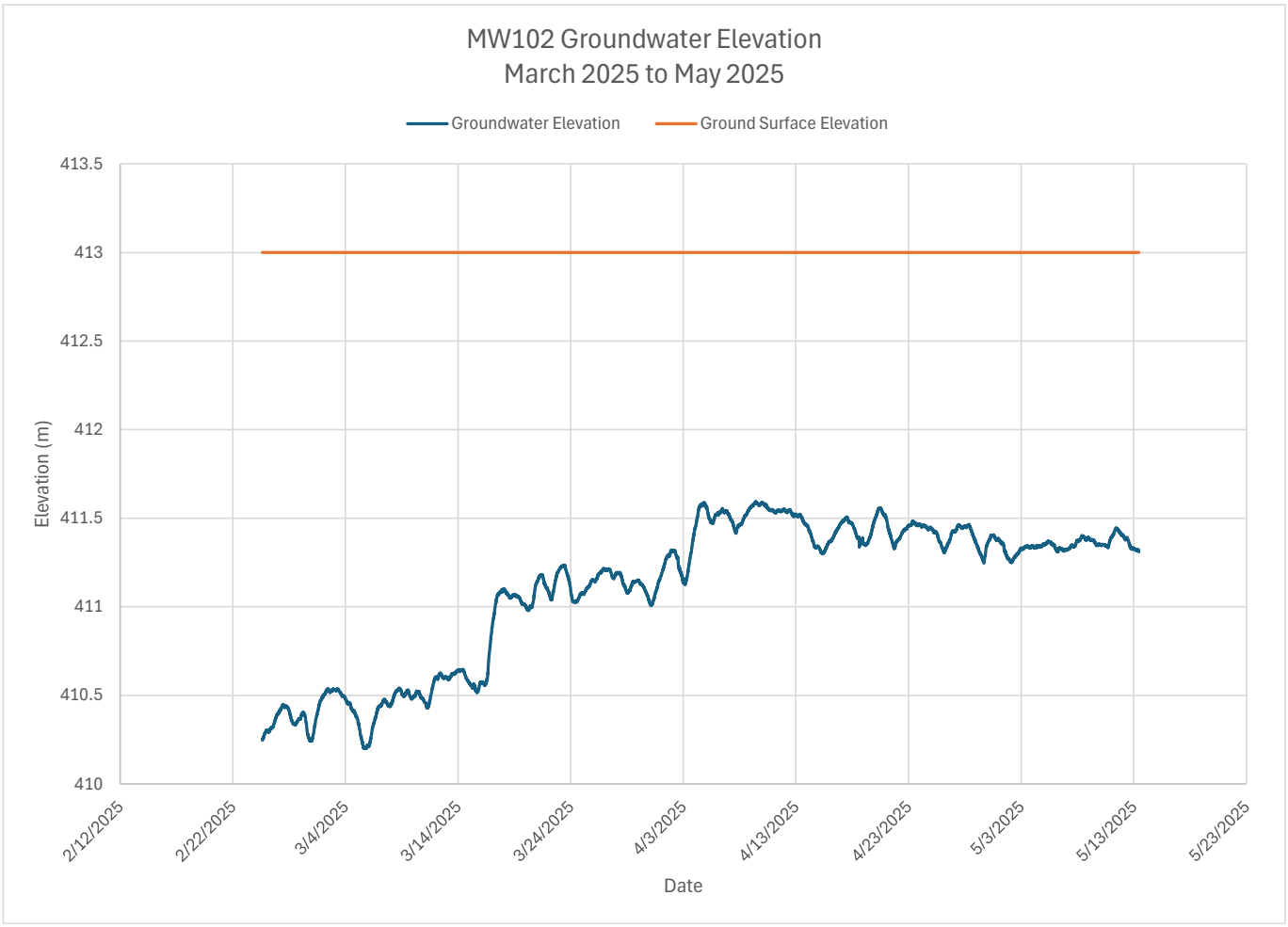
5/23/2025
Date

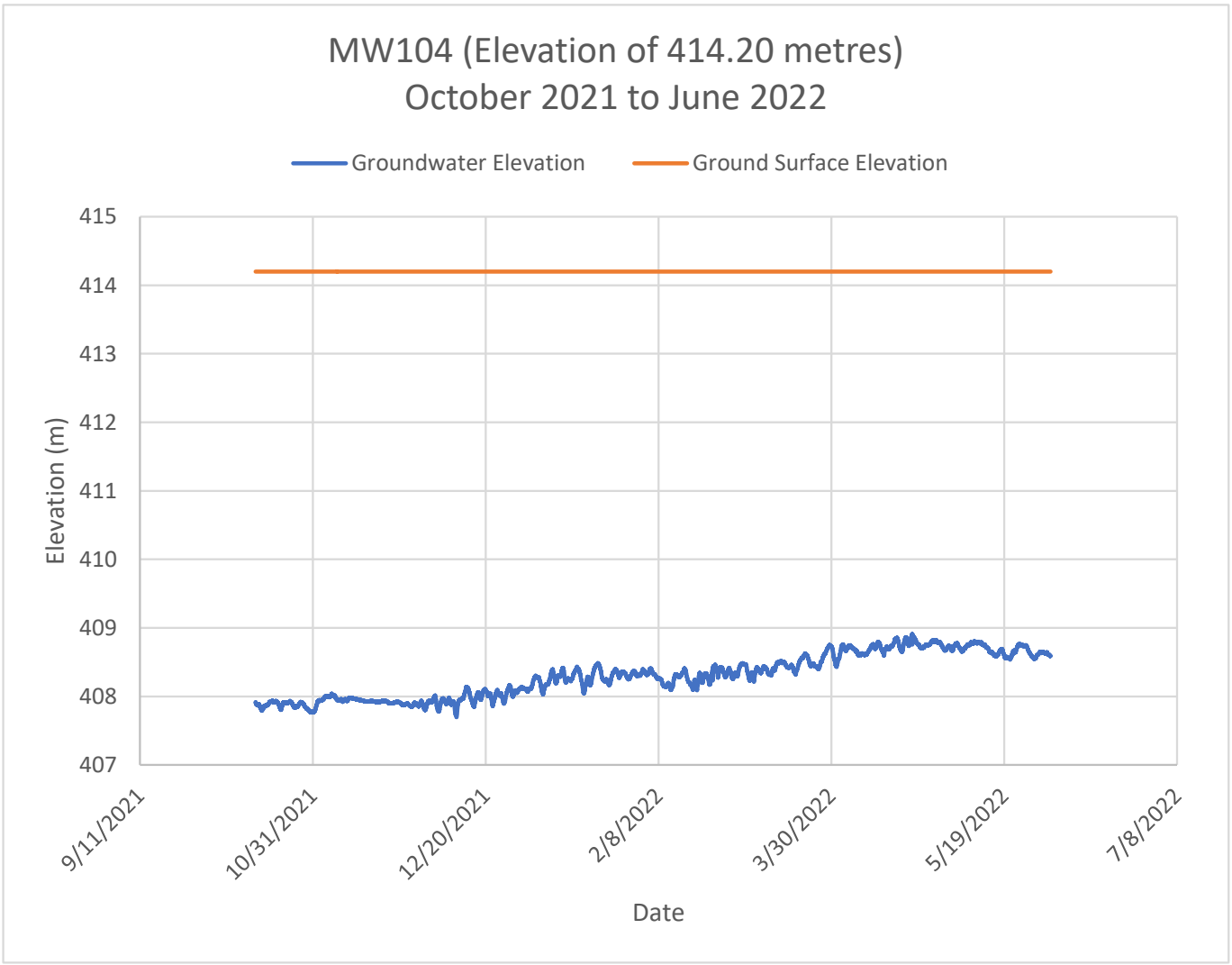

MW 101 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Groundsurface Elevation
408
407
406
405
404
403
402
401
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

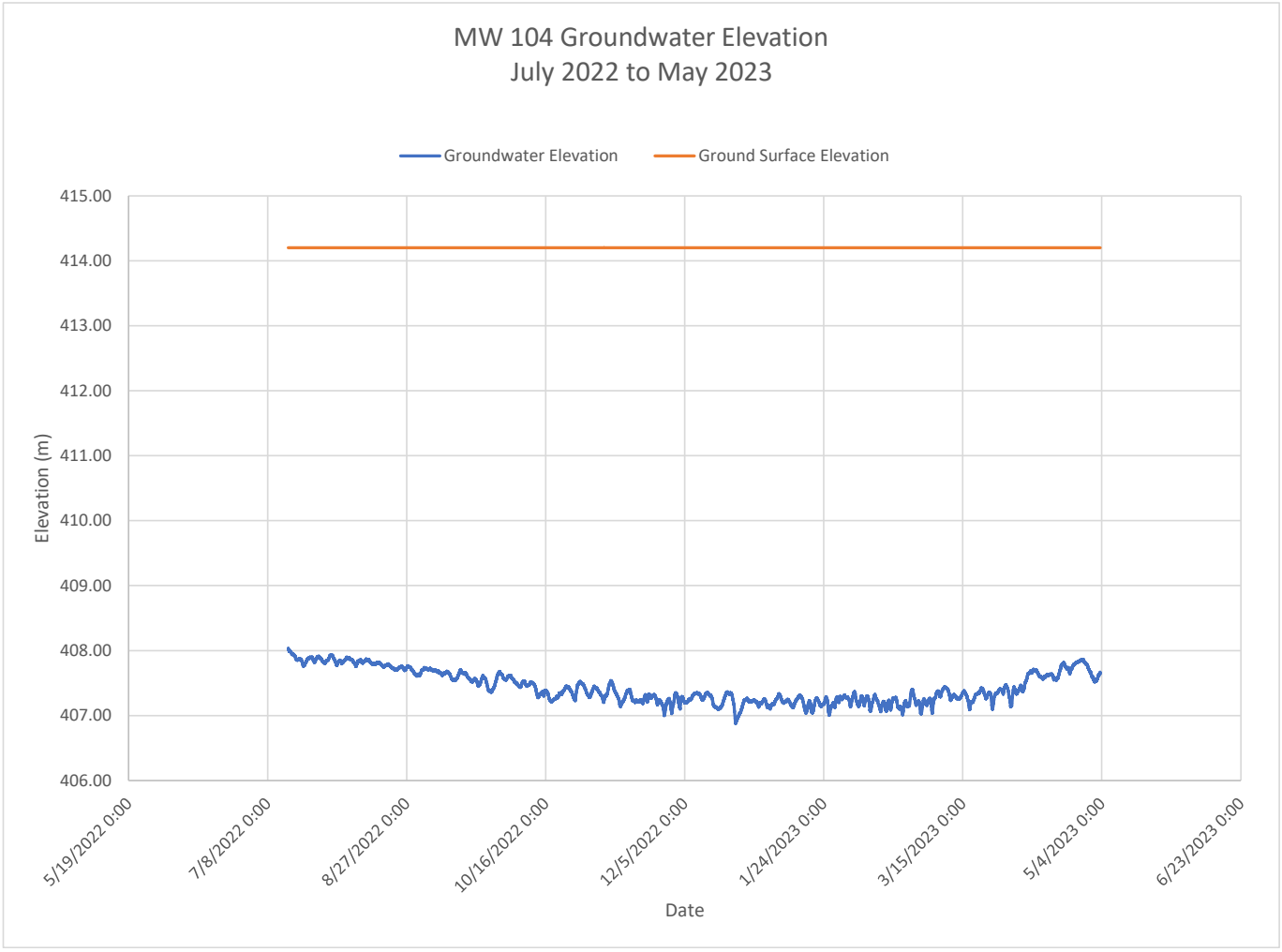

MW101 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
408
407
406
405
404
403
402
401
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

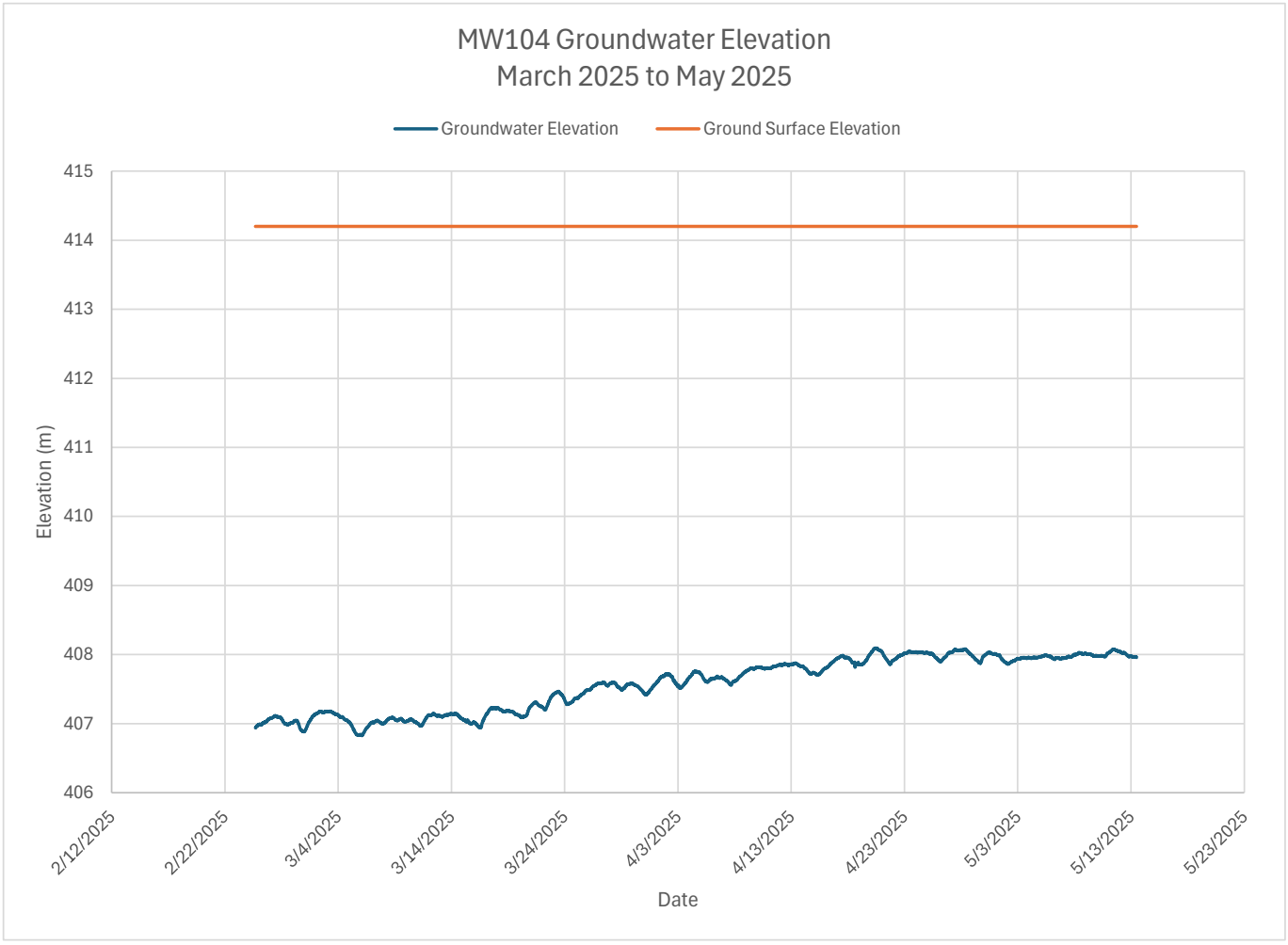

MW 102 (Elevation of 414.13 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
414.5
414
413.5
413
412.5
412
411.5
411
410.5
410
409.5
Elevation (m)
9/11/2021 0:00
10/31/2021 0:00
12/20/2021 0:00
2/8/2022 0:00
3/30/2022 0:00
5/19/2022 0:00
7/8/2022 0:00
Date

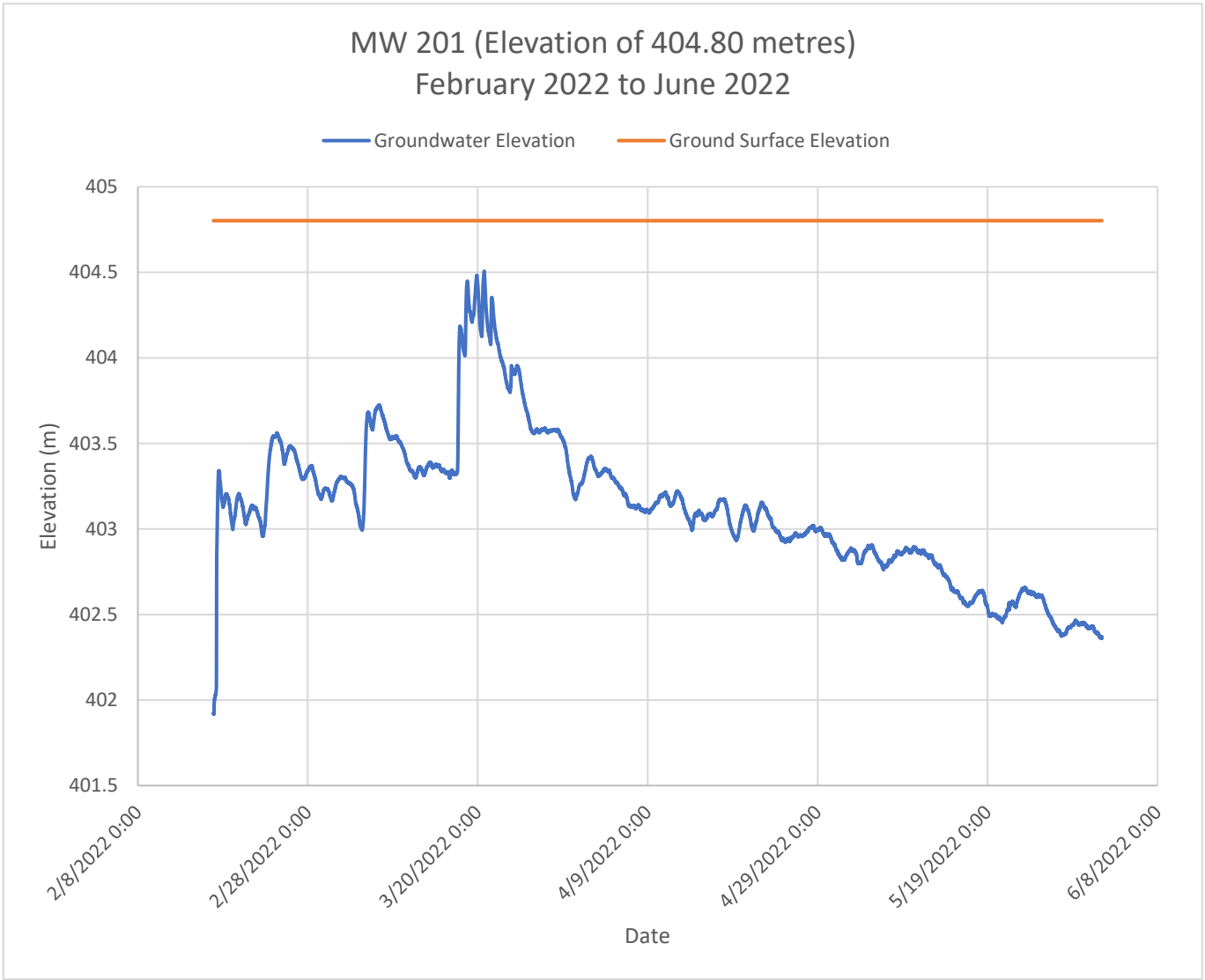

MW 102 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
413.50
413.00
412.50
412.00
411.50
411.00
410.50
410.00
409.50
409.00
408.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

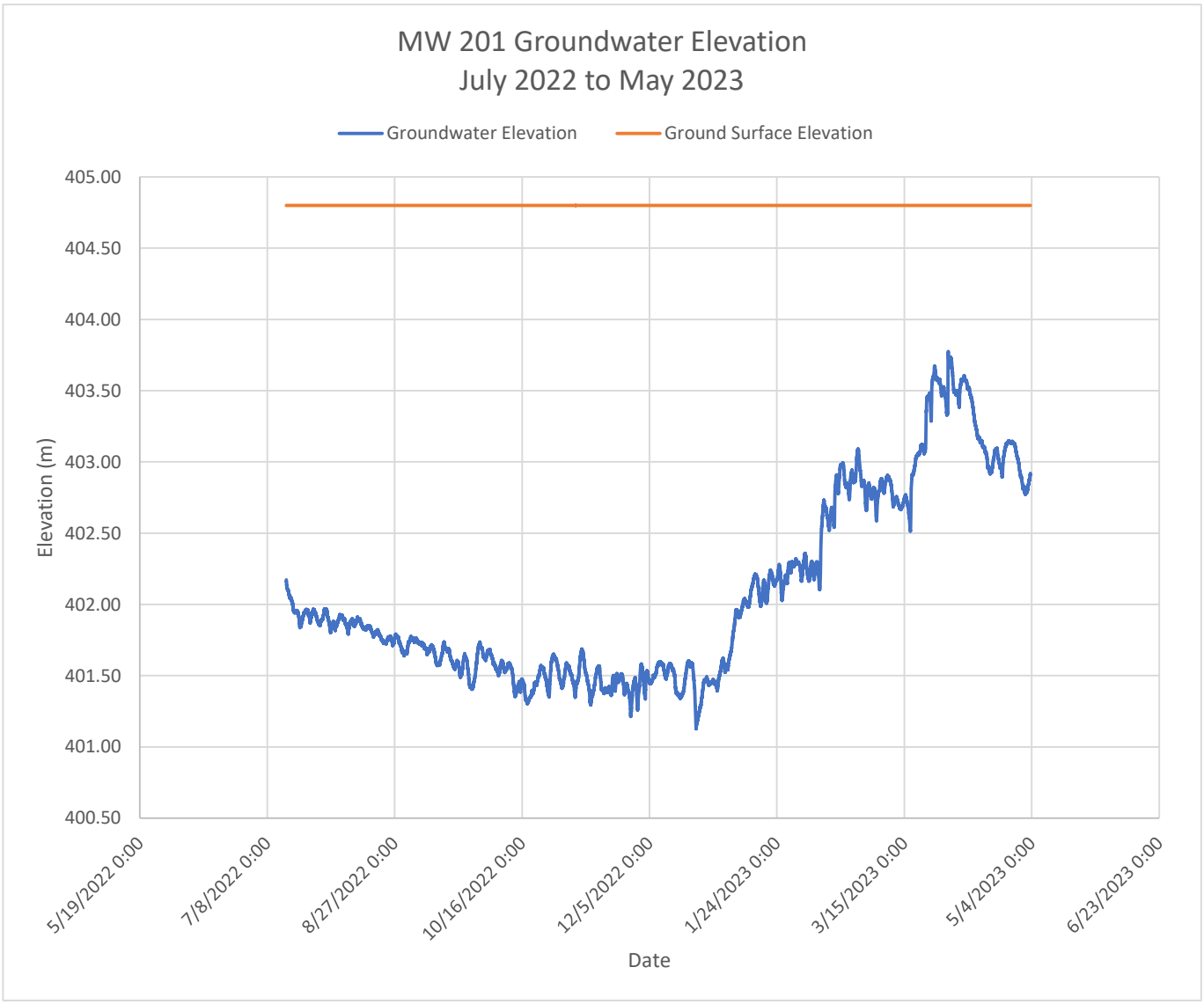

MW102 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
413.5
413
412.5
412
411.5
411
410.5
410
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

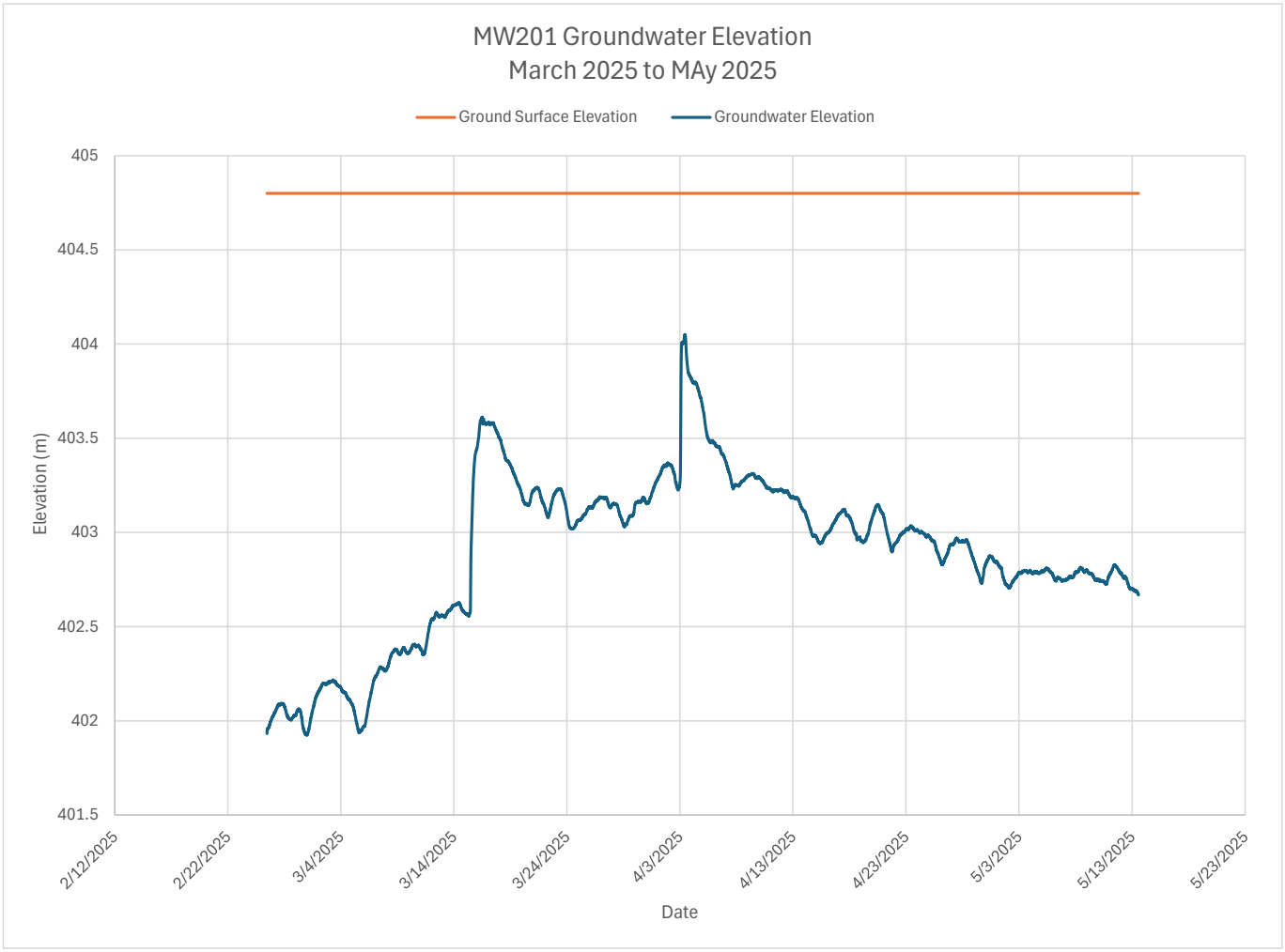

MW104 (Elevation of 414.20 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
9/11/2021
10/31/2021
12/20/2021
2/8/2022
3/30/2022
5/19/2022
7/8/2022
Date

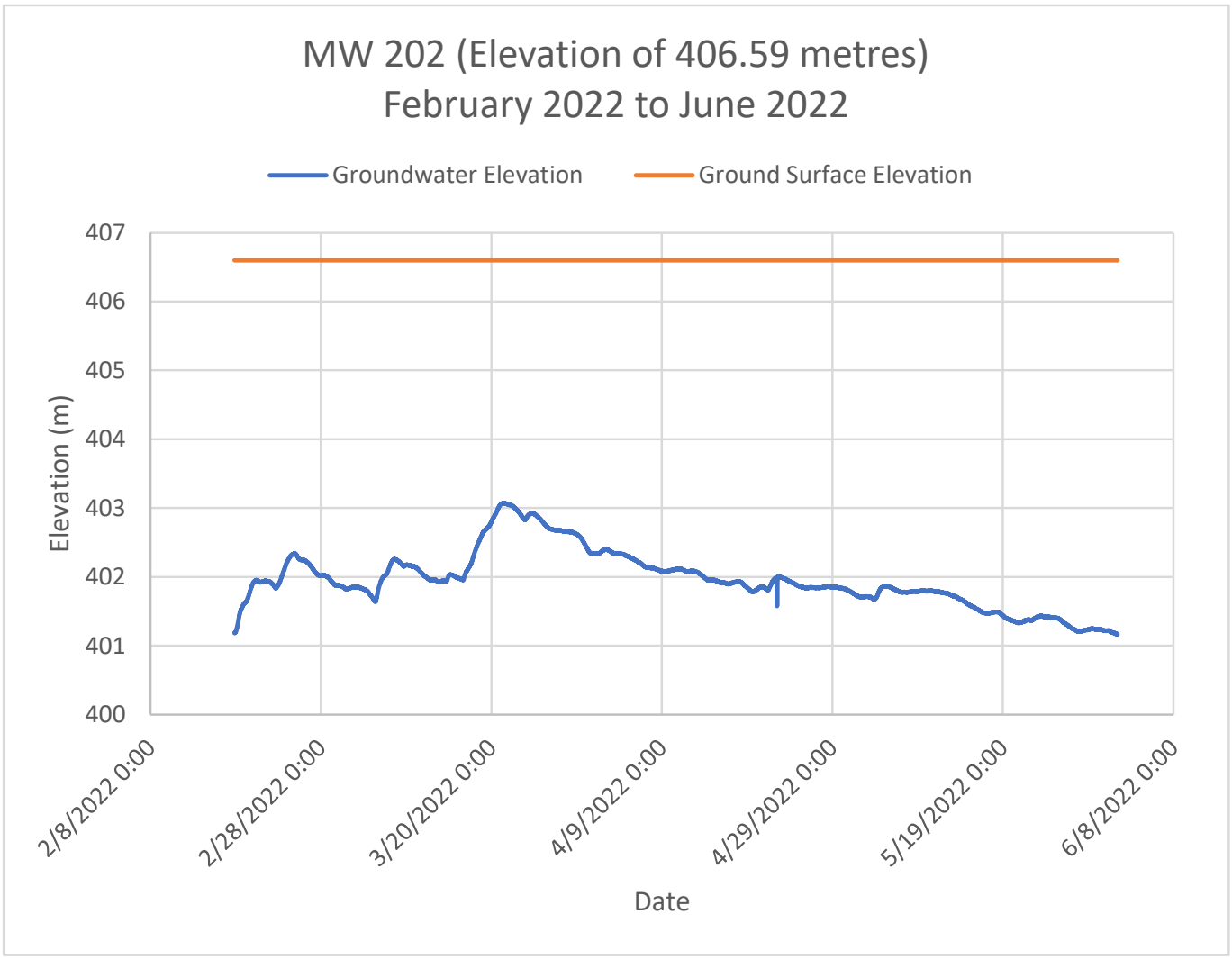

MW 104 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
415.00
414.00
413.00
412.00
411.00
410.00
409.00
408.00
407.00
406.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

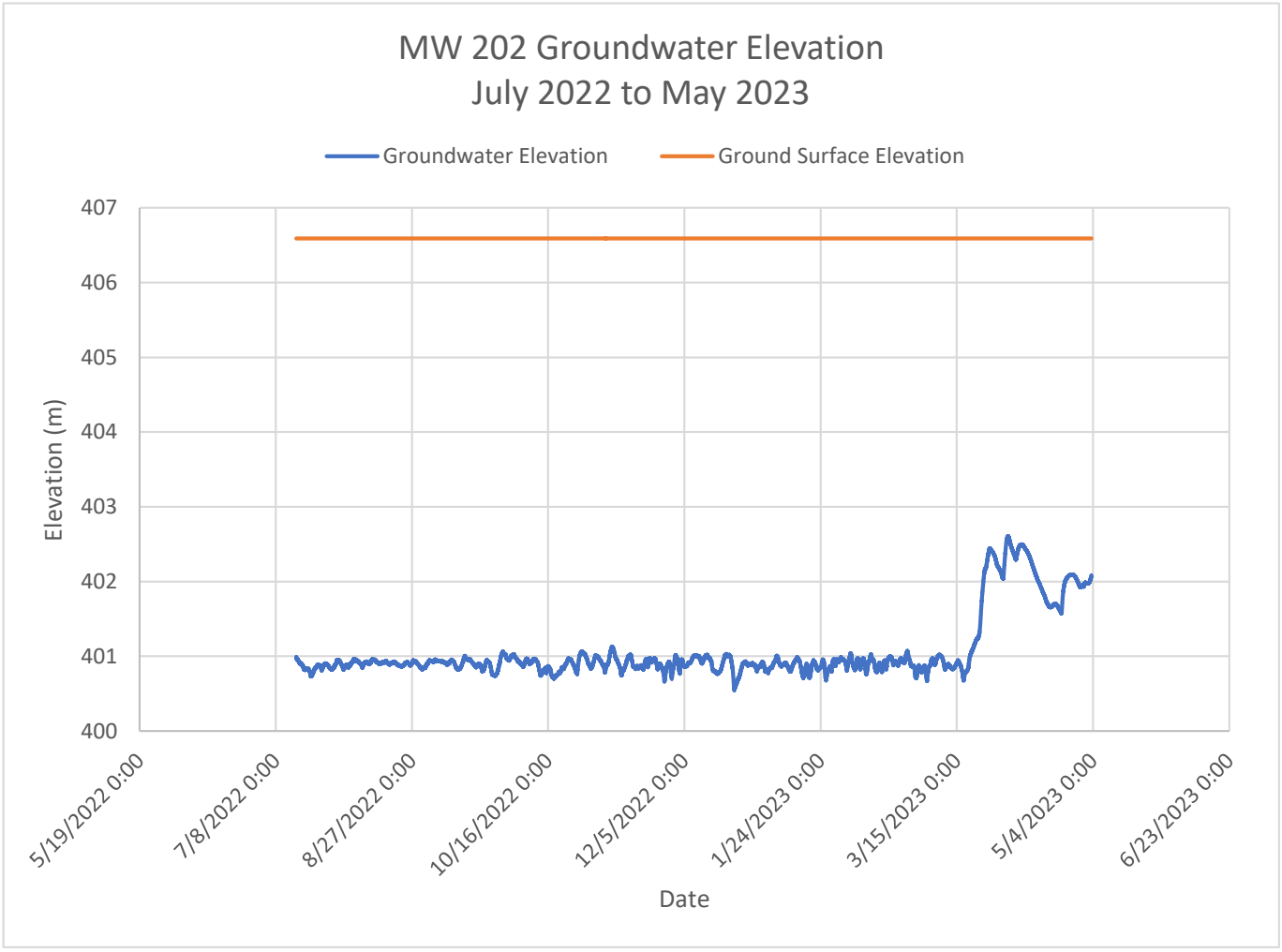

MW104 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

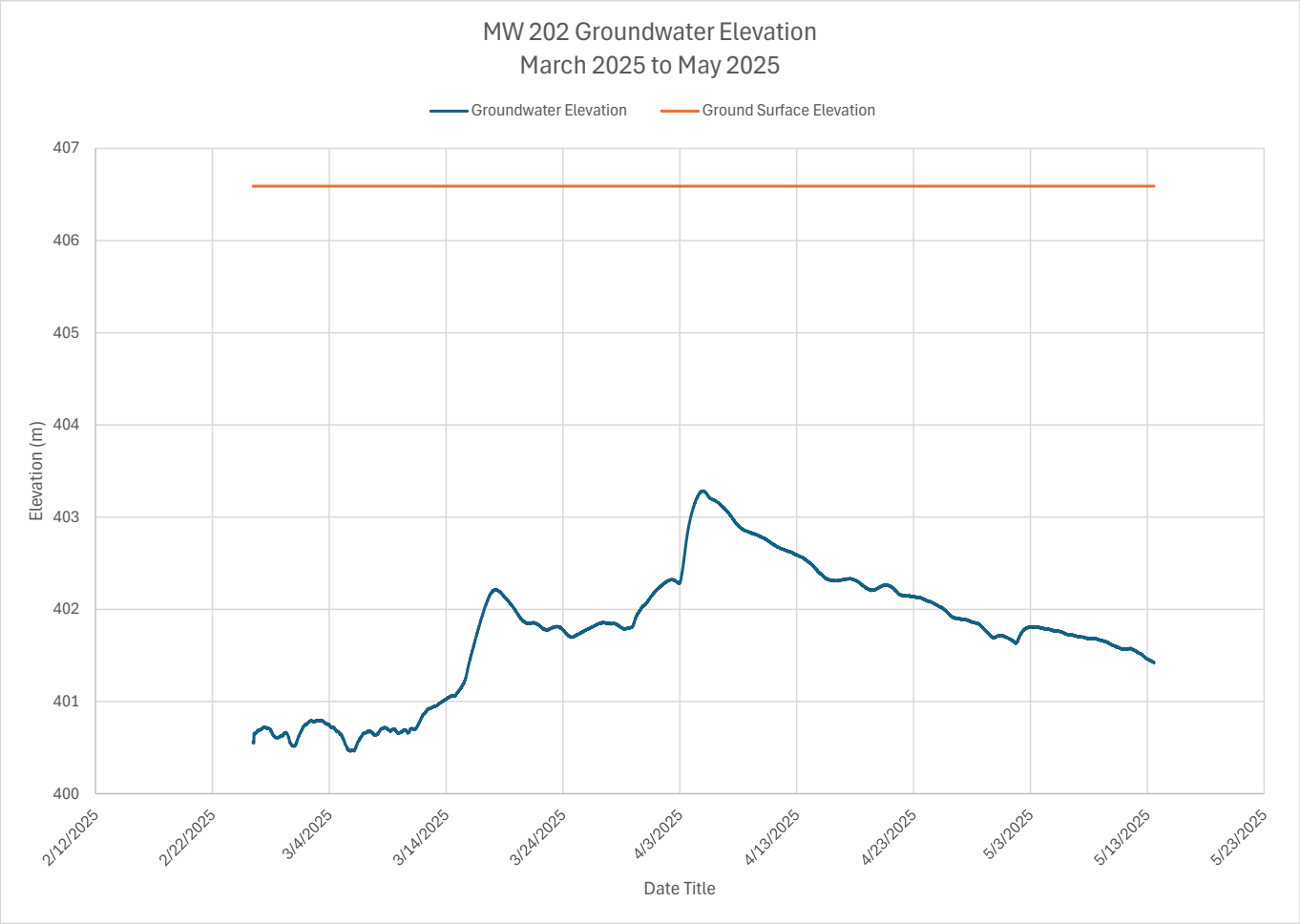

MW 201 (Elevation of 404.80 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
405
404.5
404
403.5
403
402.5
402
401.5
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

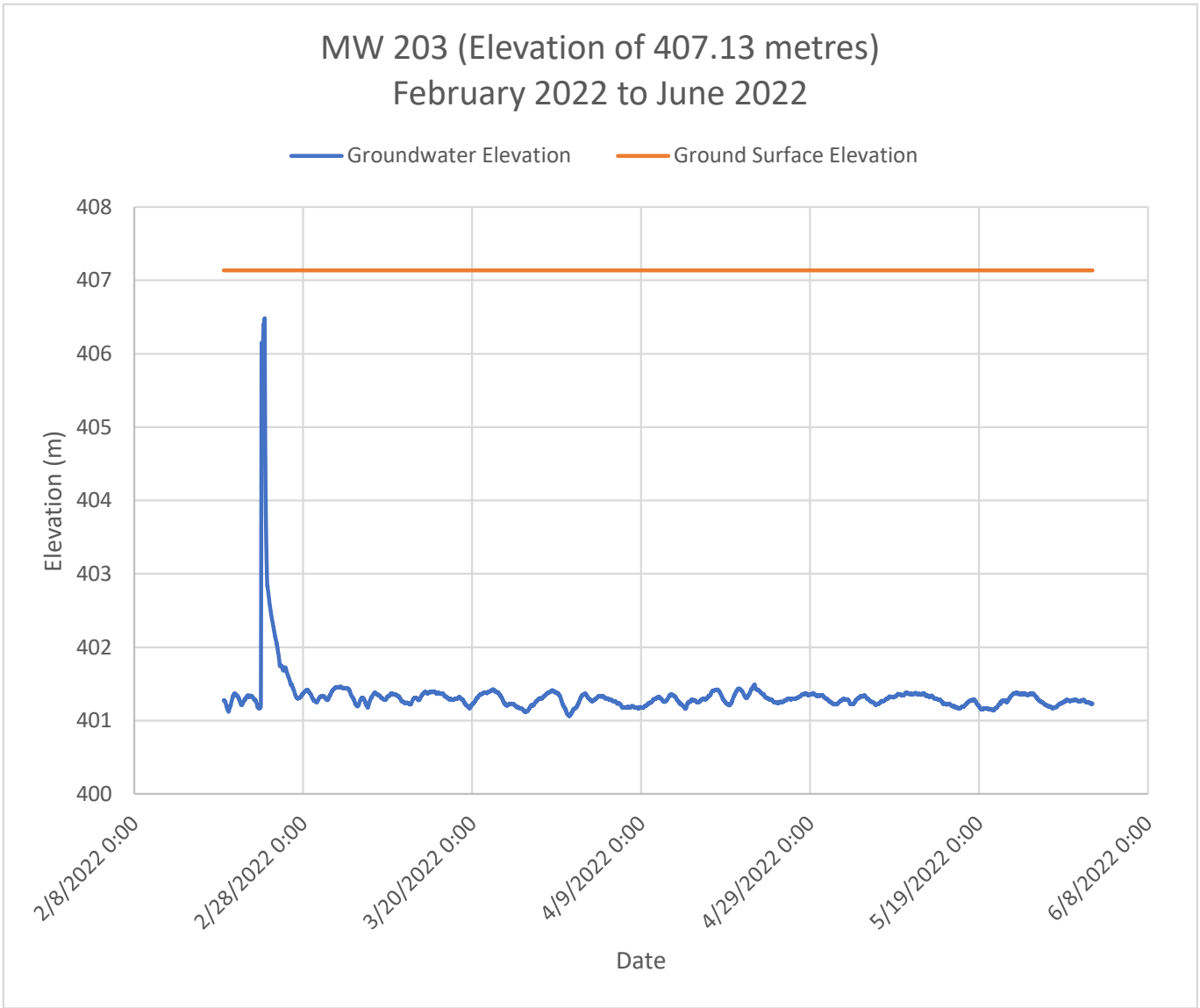

MW 201 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
405.00
404.50
404.00
403.50
403.00
402.50
402.00
401.50
401.00
400.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

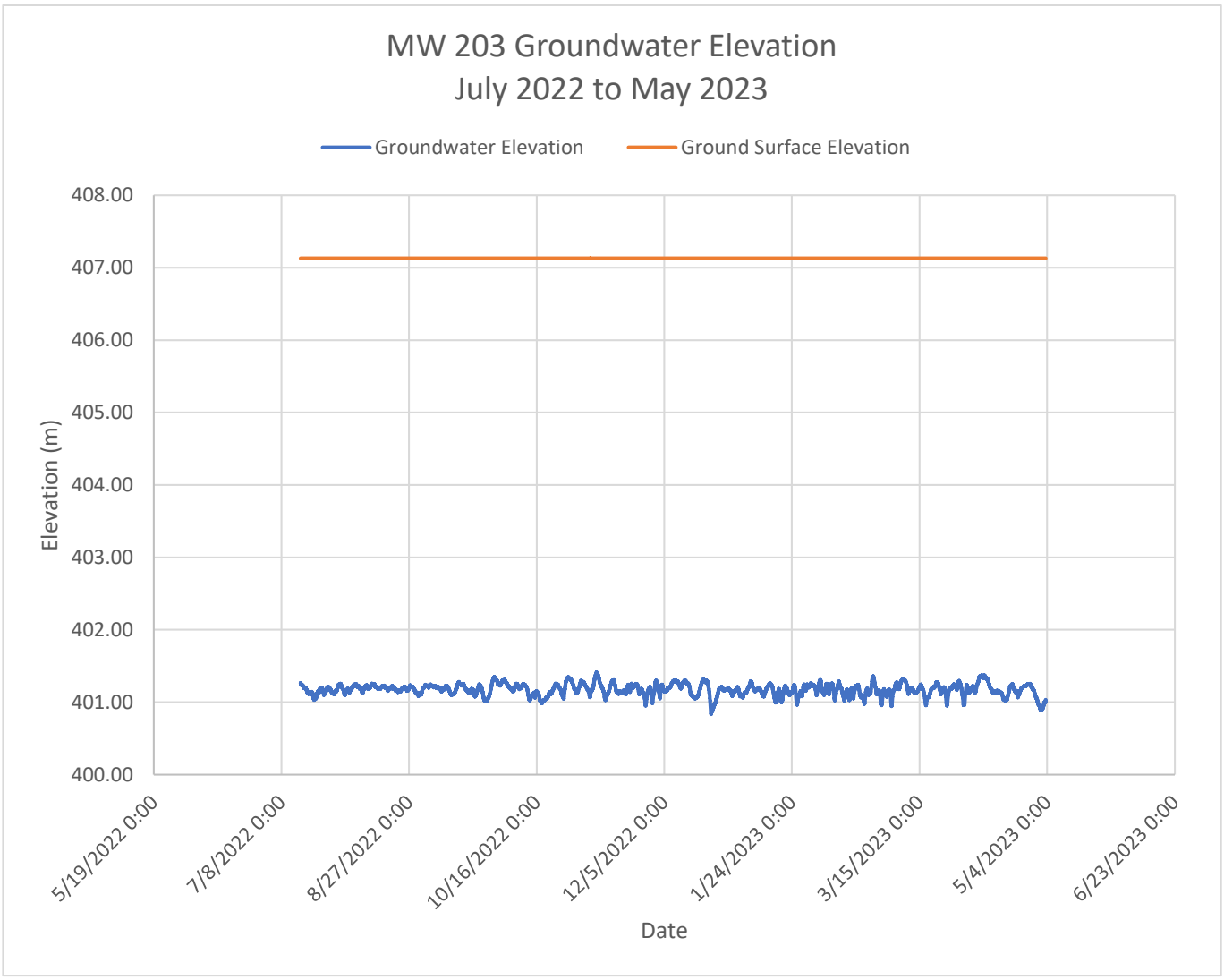

MW201 Groundwater Elevation
March 2025 to MAy 2025
Ground Surface Elevation
Groundwater Elevation
405
404.5
404
403.5
403
402.5
402
401.5
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

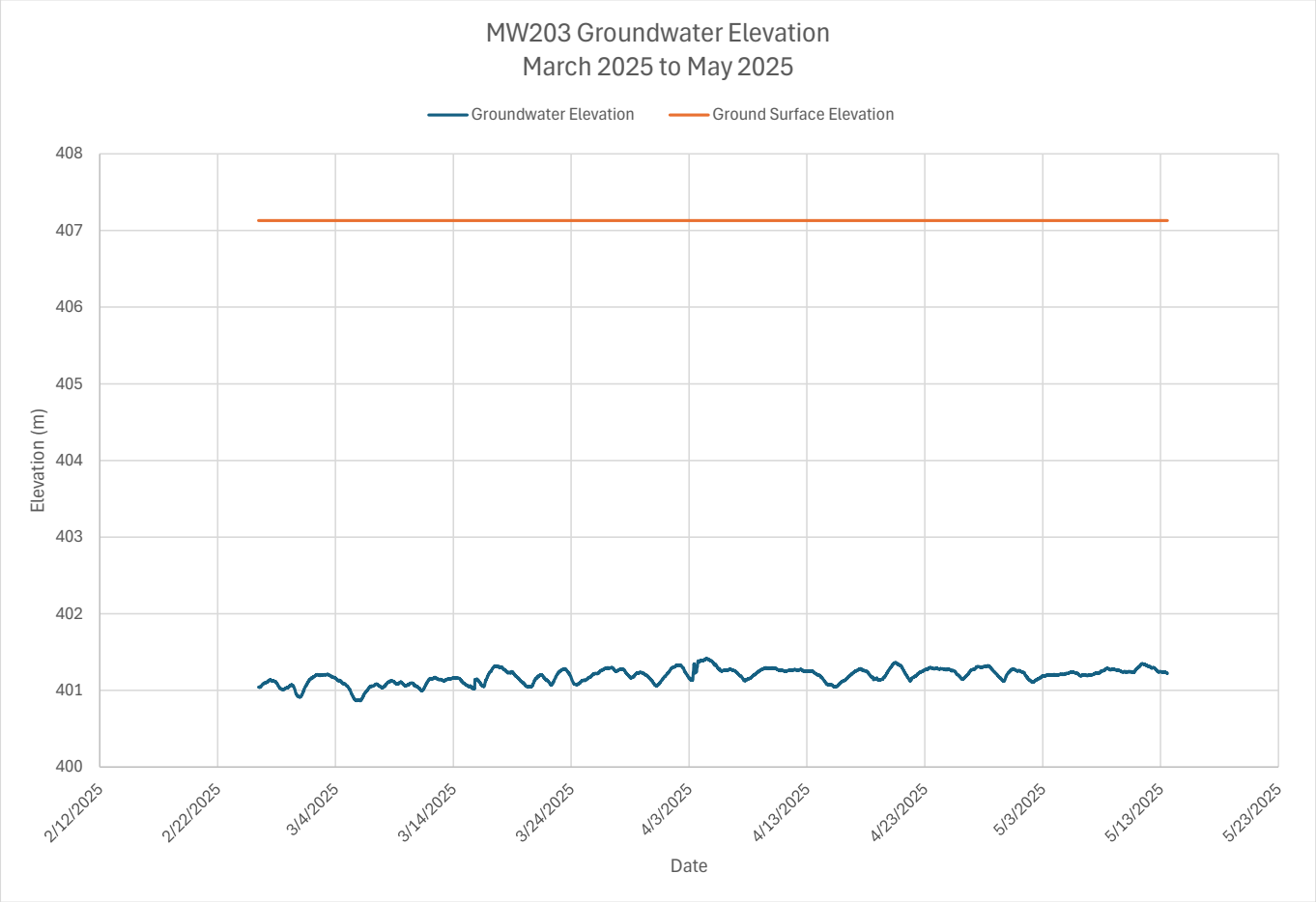

MW 202 (Elevation of 406.59 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
407
406
405
404
403
402
401
400
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

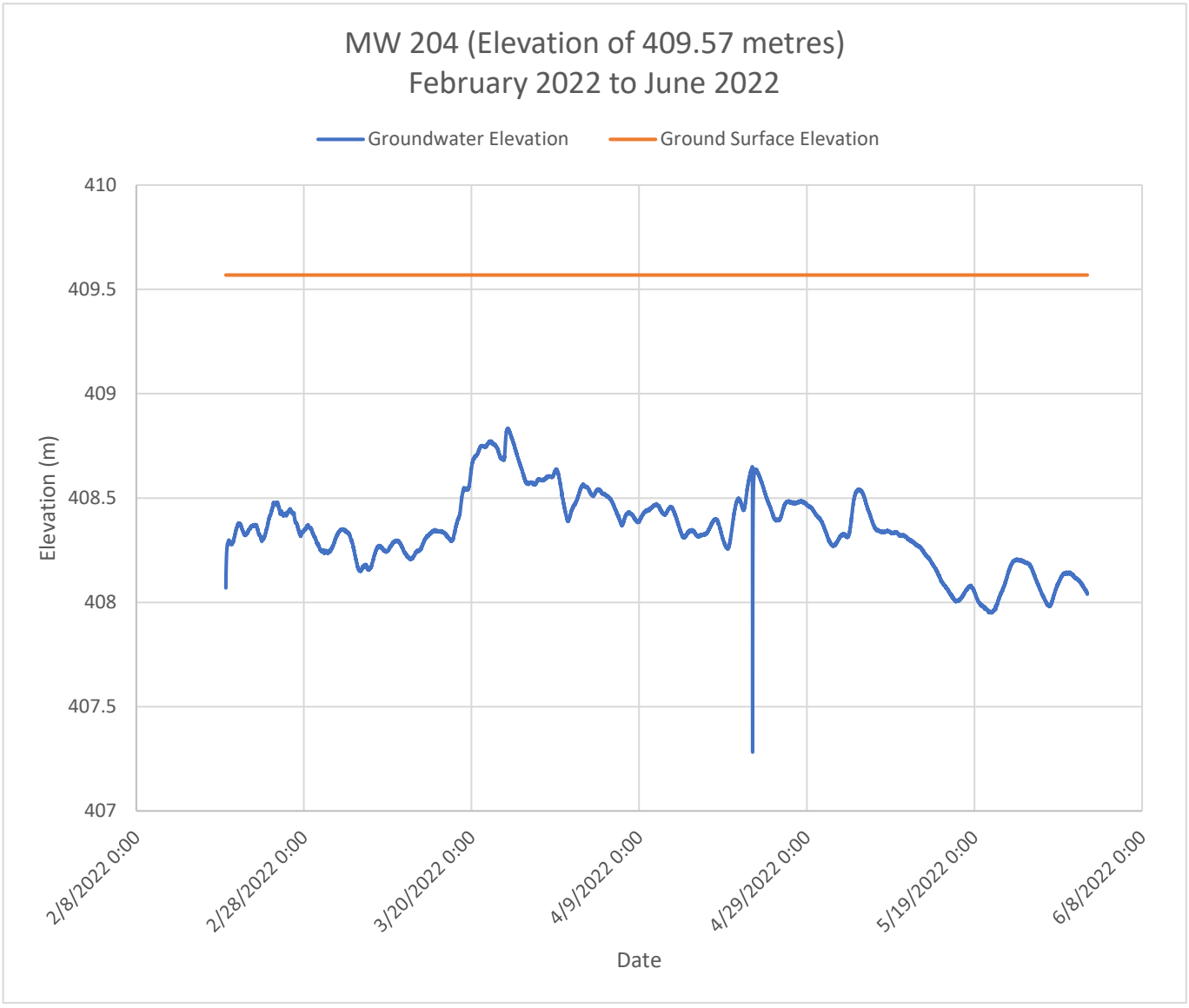

MW 202 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
407
406
405
404
403
402
401
400
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

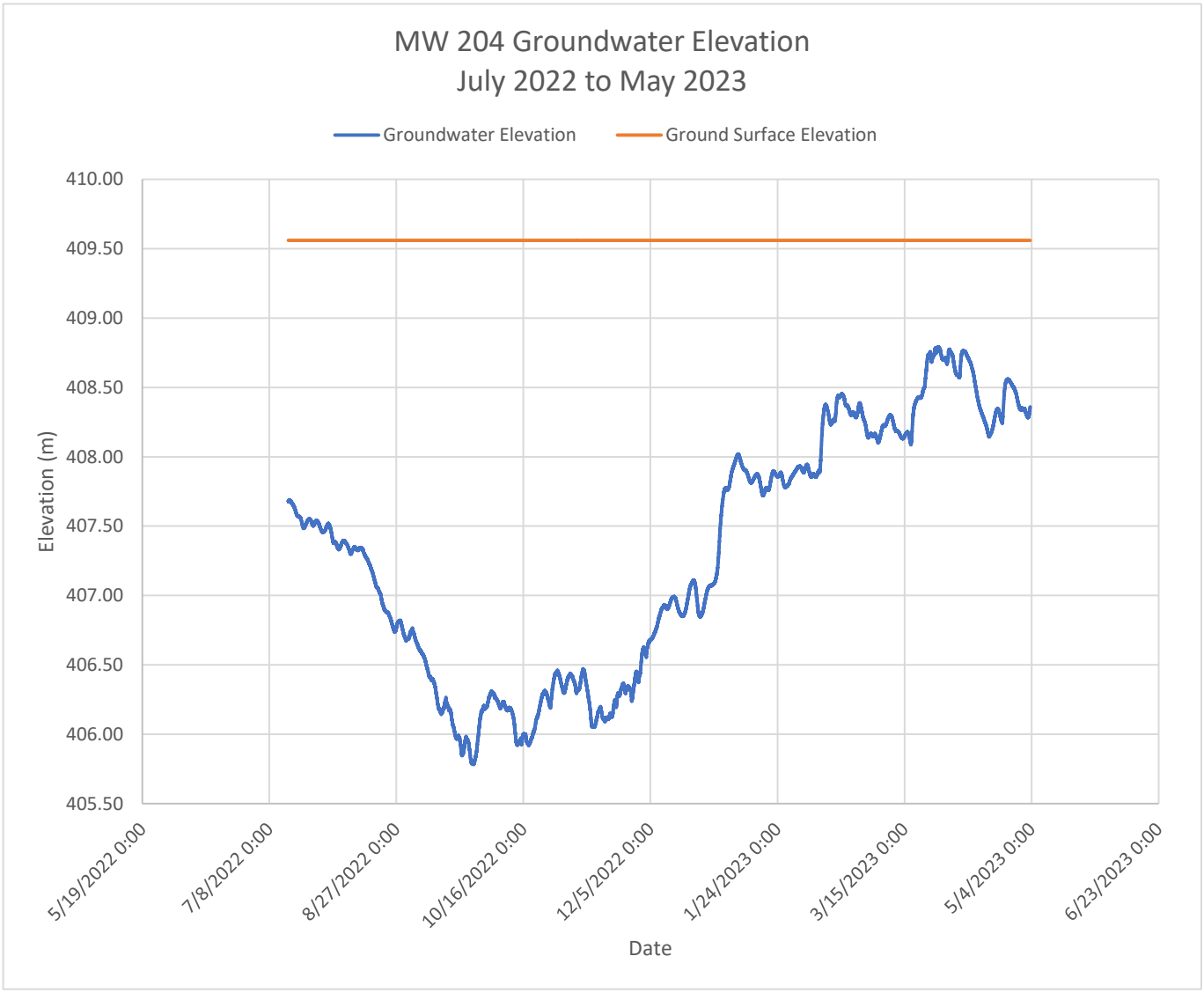

MW 202 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
407
406
405
404
403
402
401
400
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date Title

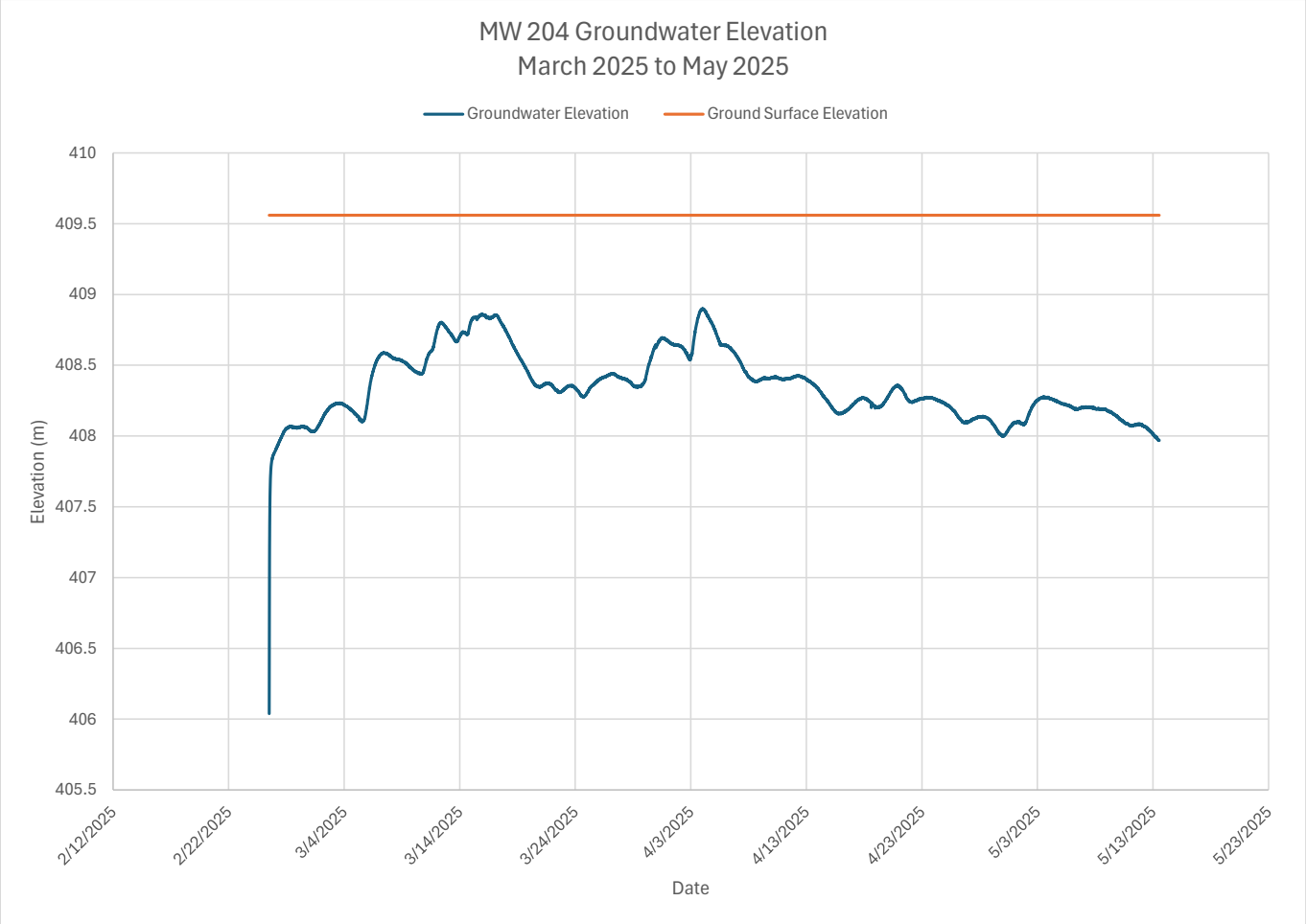

MW 203 (Elevation of 407.13 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
408
407
406
405
404
403
402
401
400
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

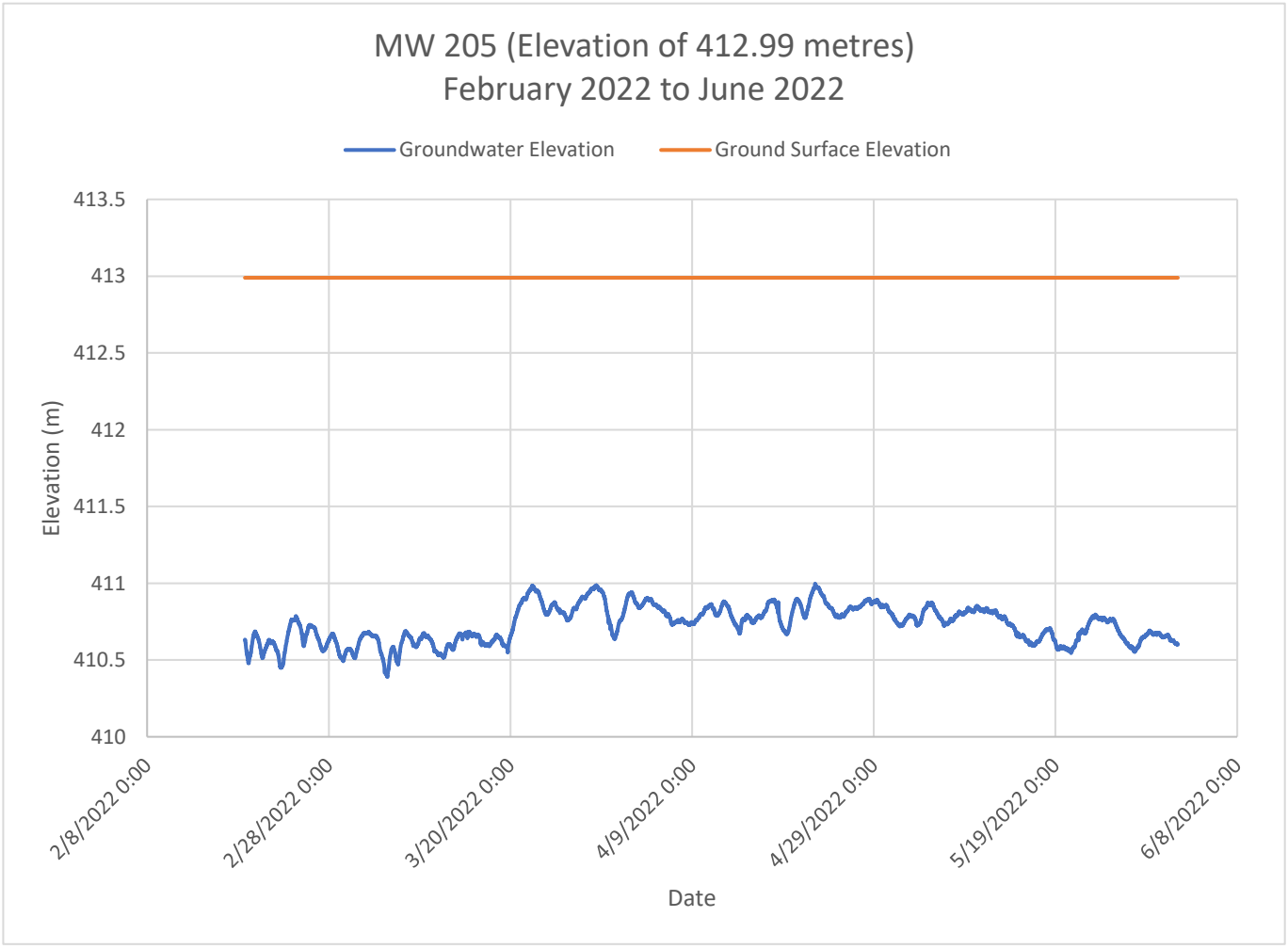

MW 203 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
408.00
407.00
406.00
405.00
404.00
403.00
402.00
401.00
400.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

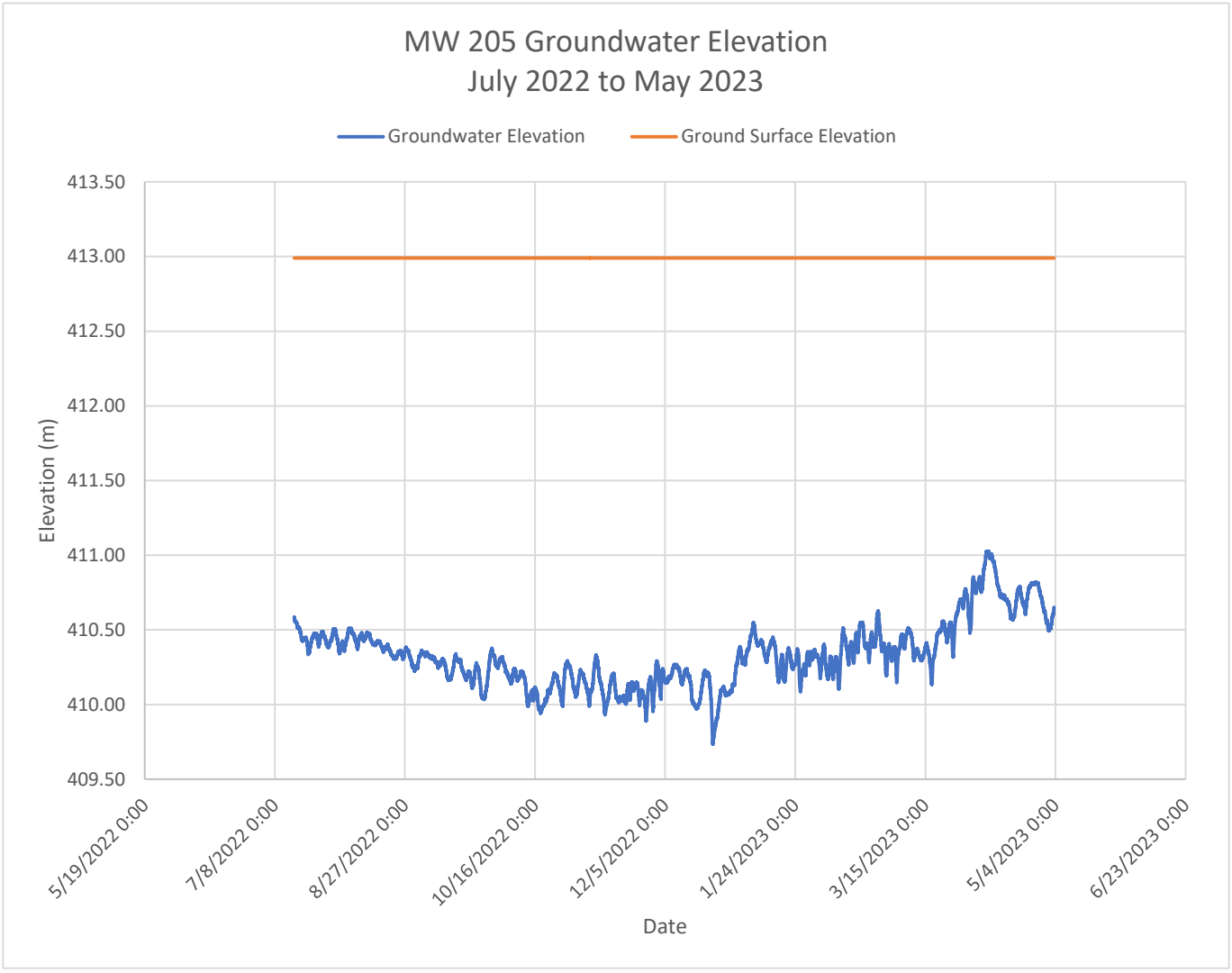

MW203 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
408
407
406
405
404
403
402
401
400
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

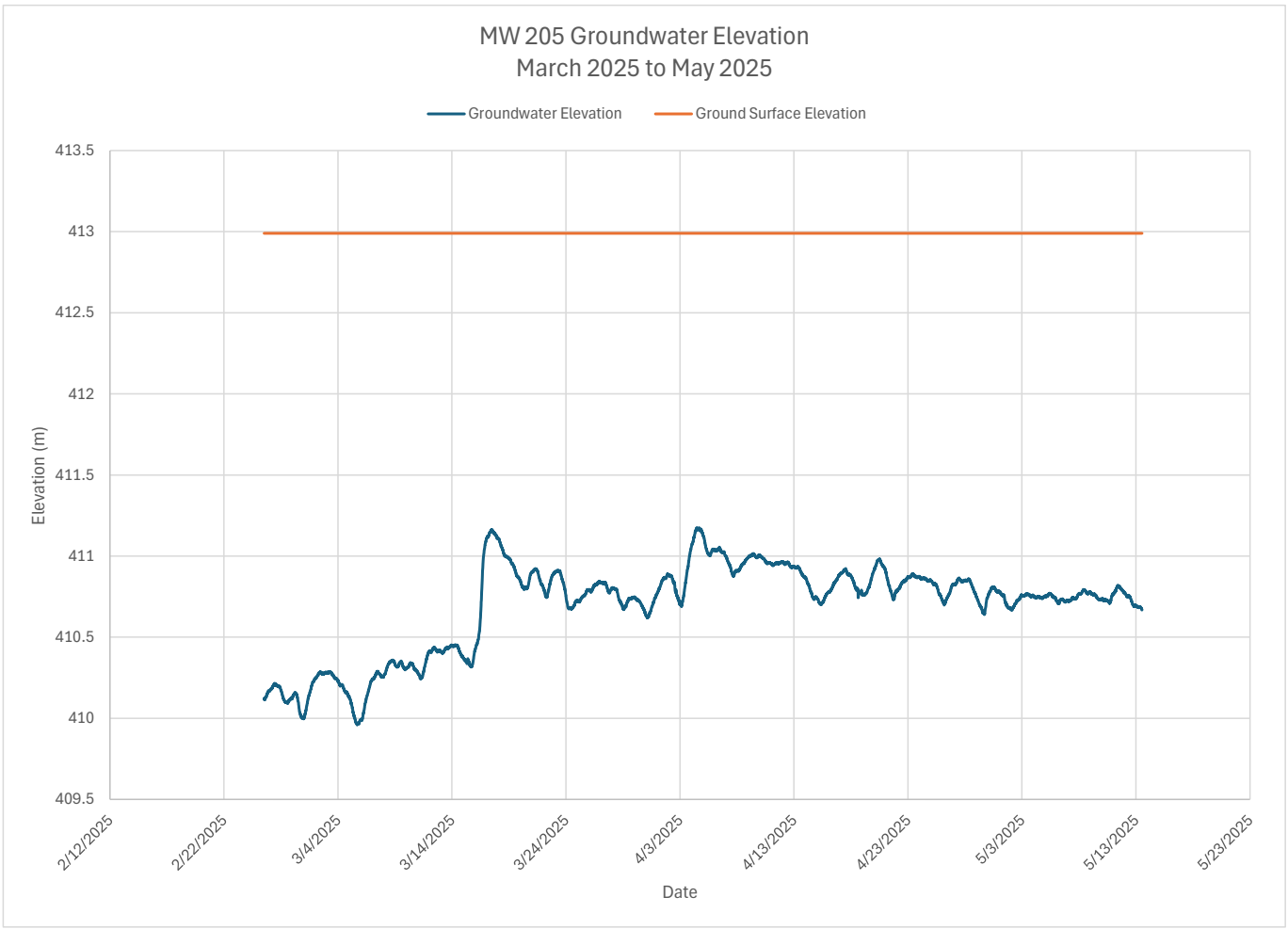

MW 204 (Elevation of 409.57 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
410
409.5
409
408.5
408
407.5
407
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

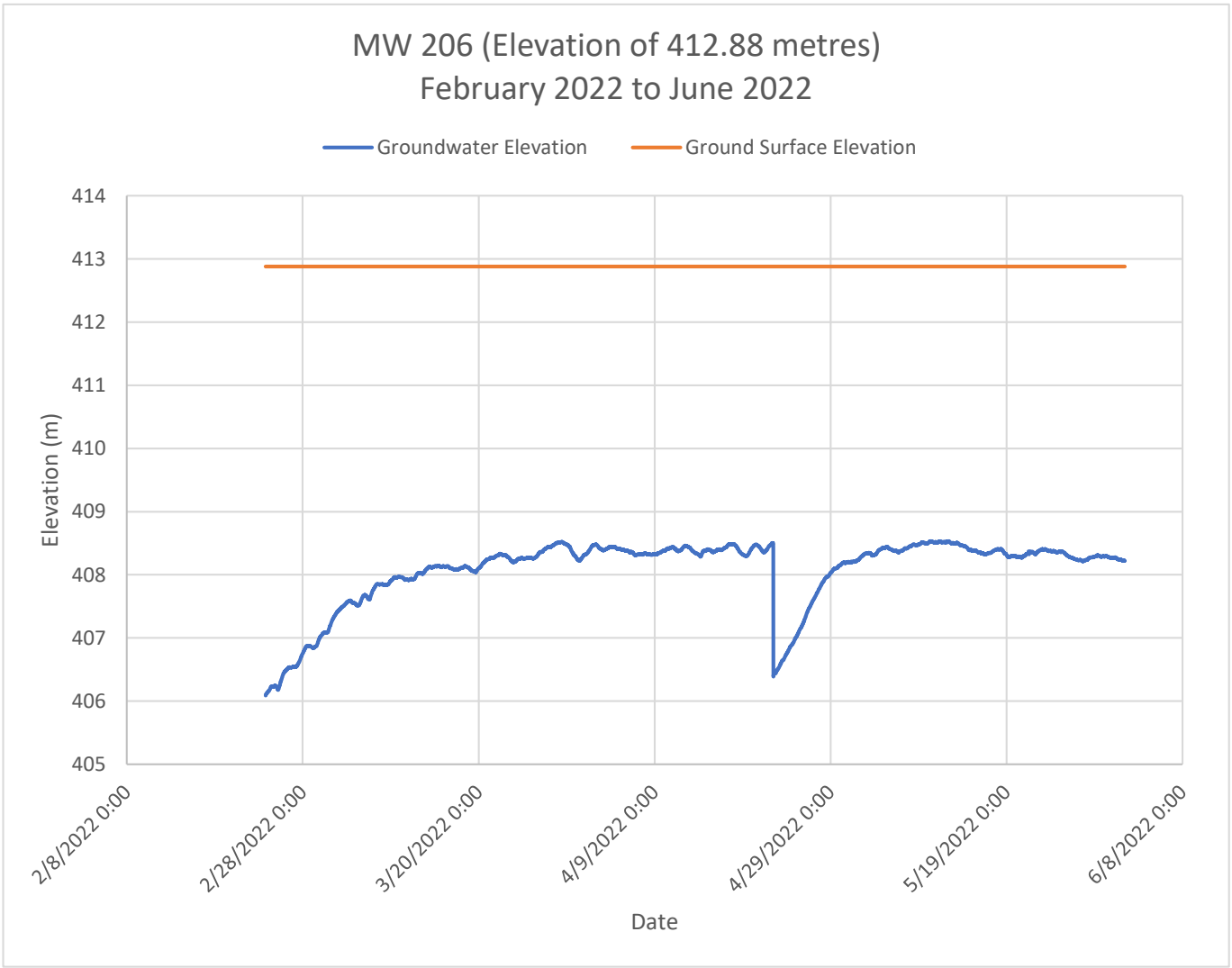

MW 204 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
410.00
409.50
409.00
408.50
408.00
407.50
407.00
406.50
406.00
405.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

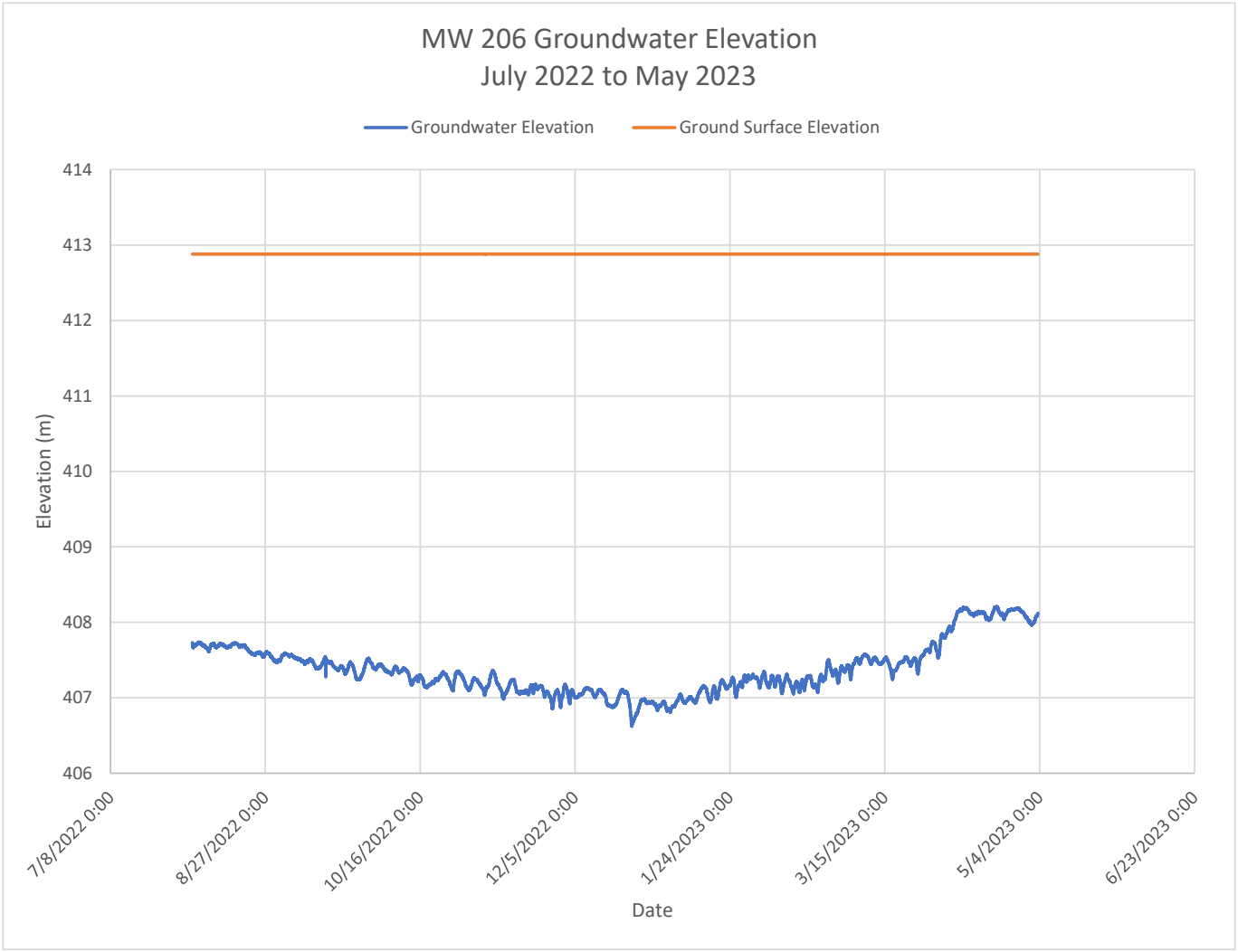

MW 204 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
410
409.5
409
408.5
408
407.5
407
406.5
406
405.5
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

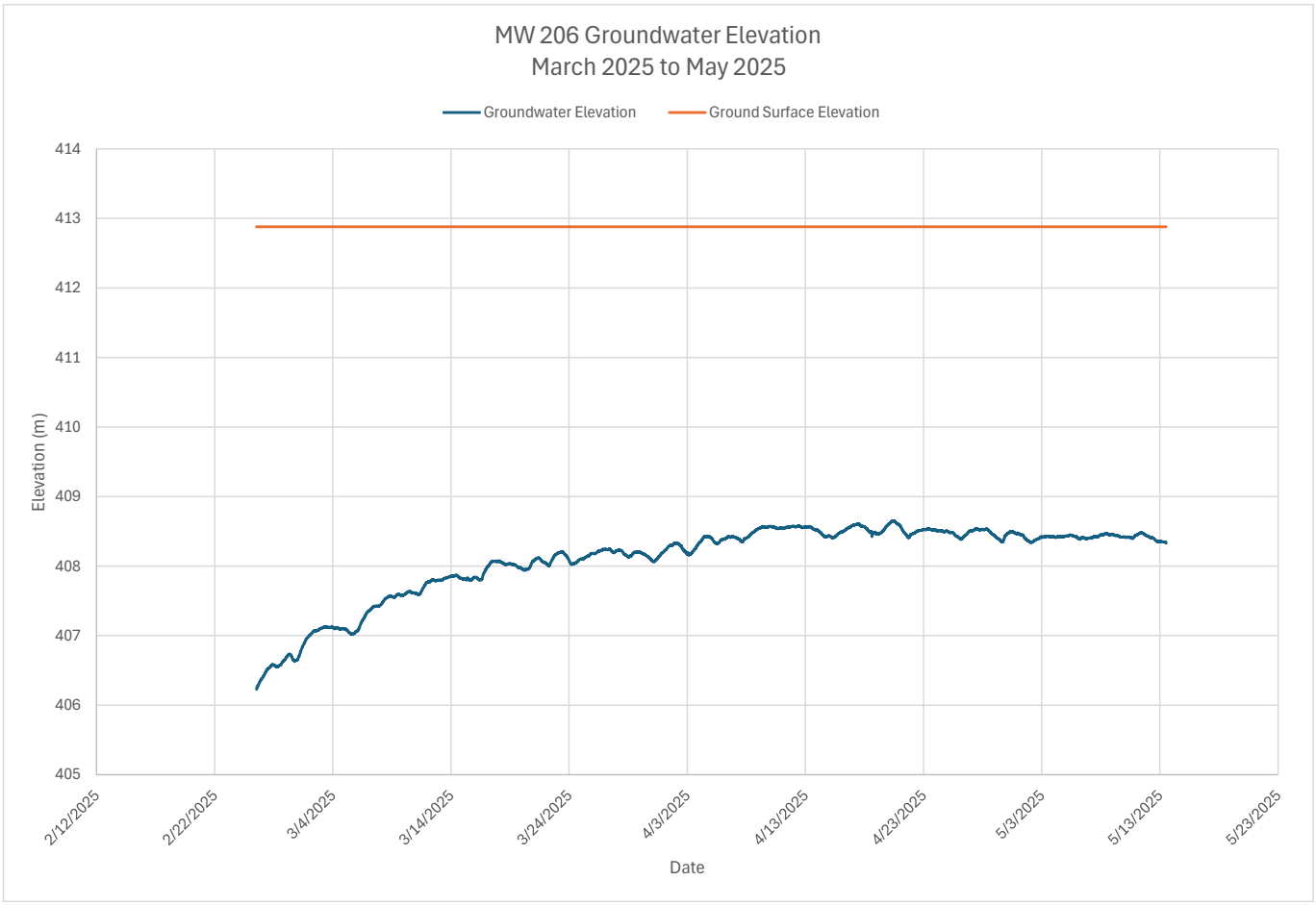

MW 205 (Elevation of 412.99 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
413.5
413
412.5
412
411.5
411
410.5
410
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

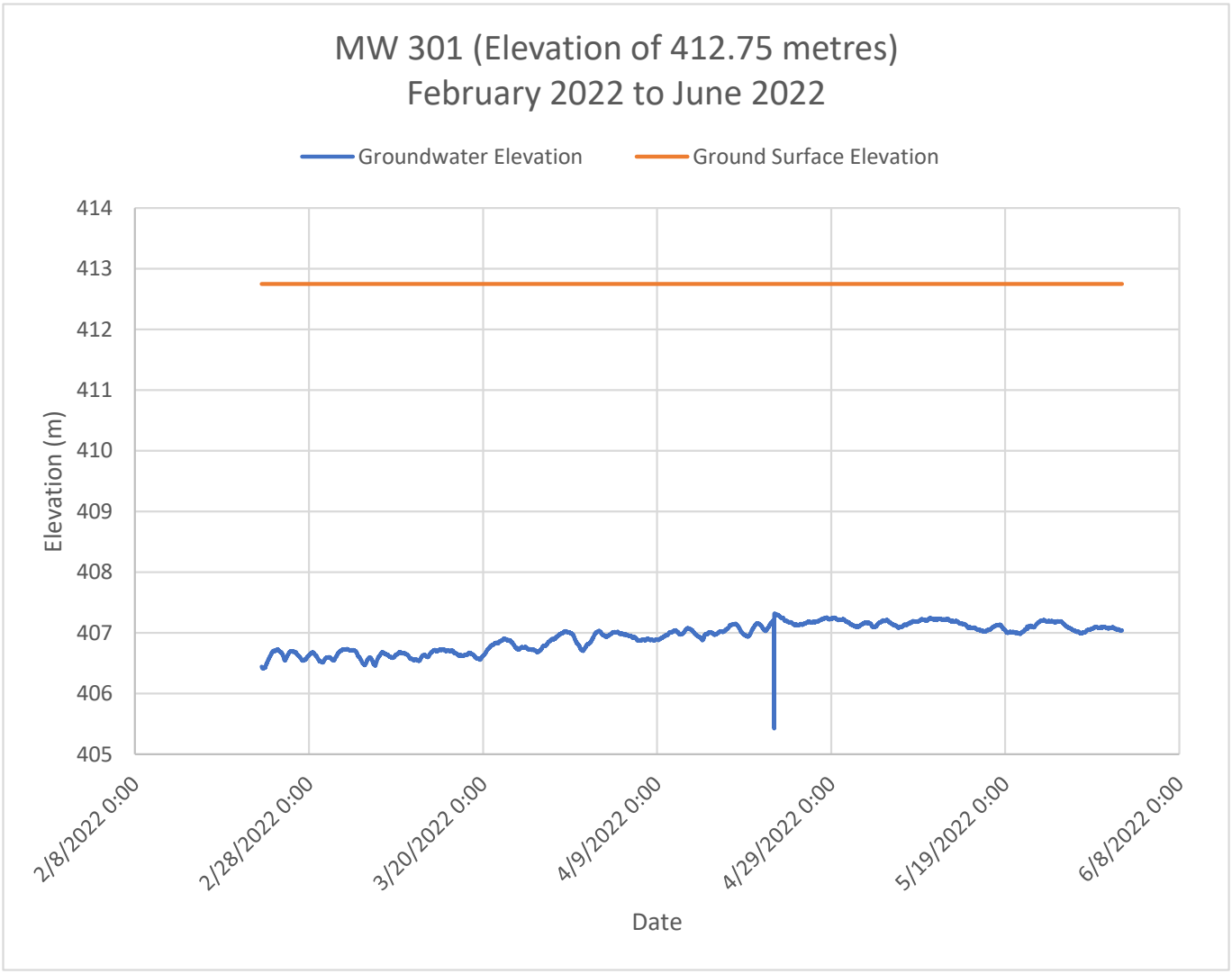

MW 205 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
413.50
413.00
412.50
412.00
411.50
411.00
410.50
410.00
409.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

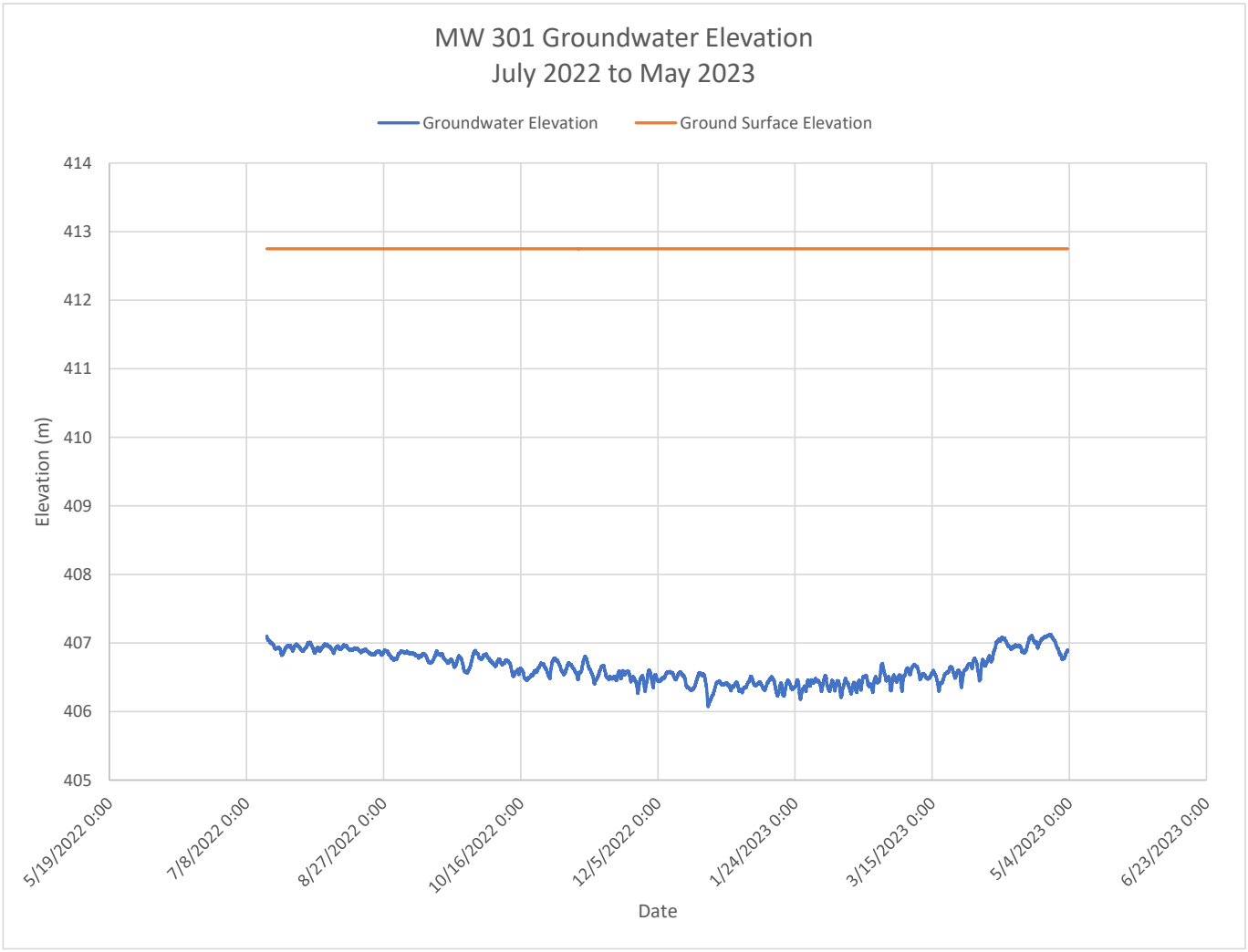

MW 205 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
413.5
413
412.5
412
411.5
411
410.5
410
409.5
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

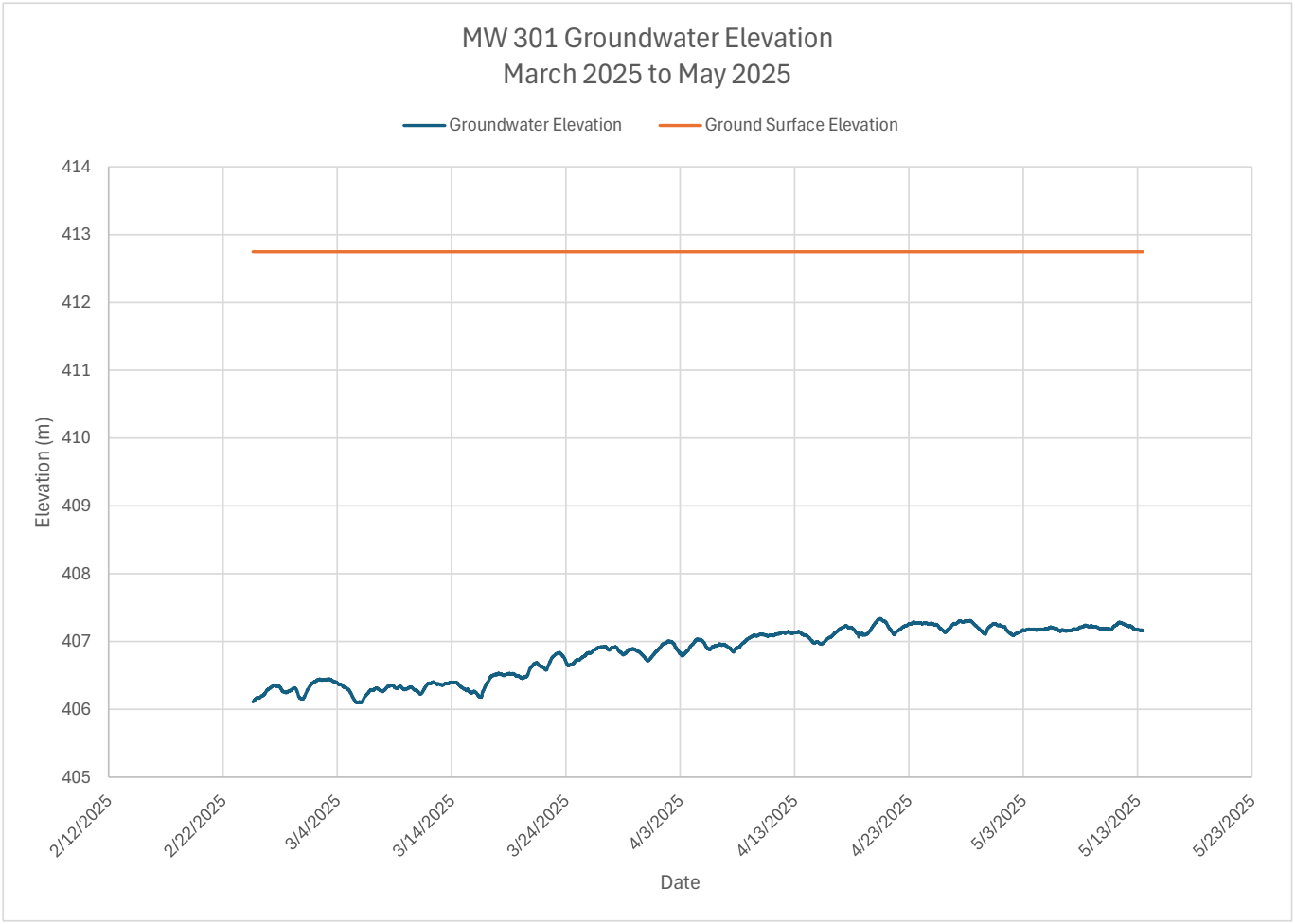

MW 206 (Elevation of 412.88 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

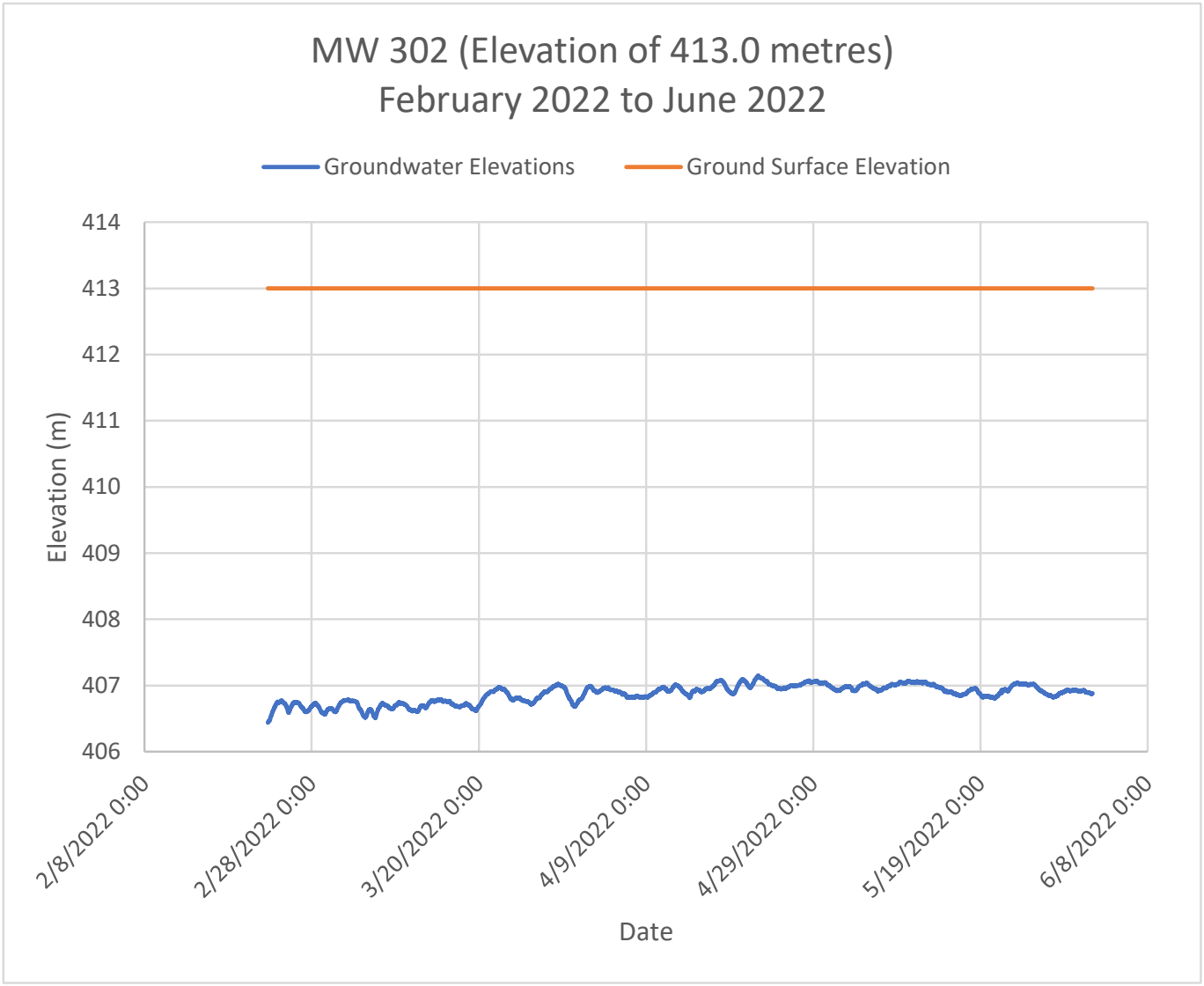

MW 206 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
Elevation (m)
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

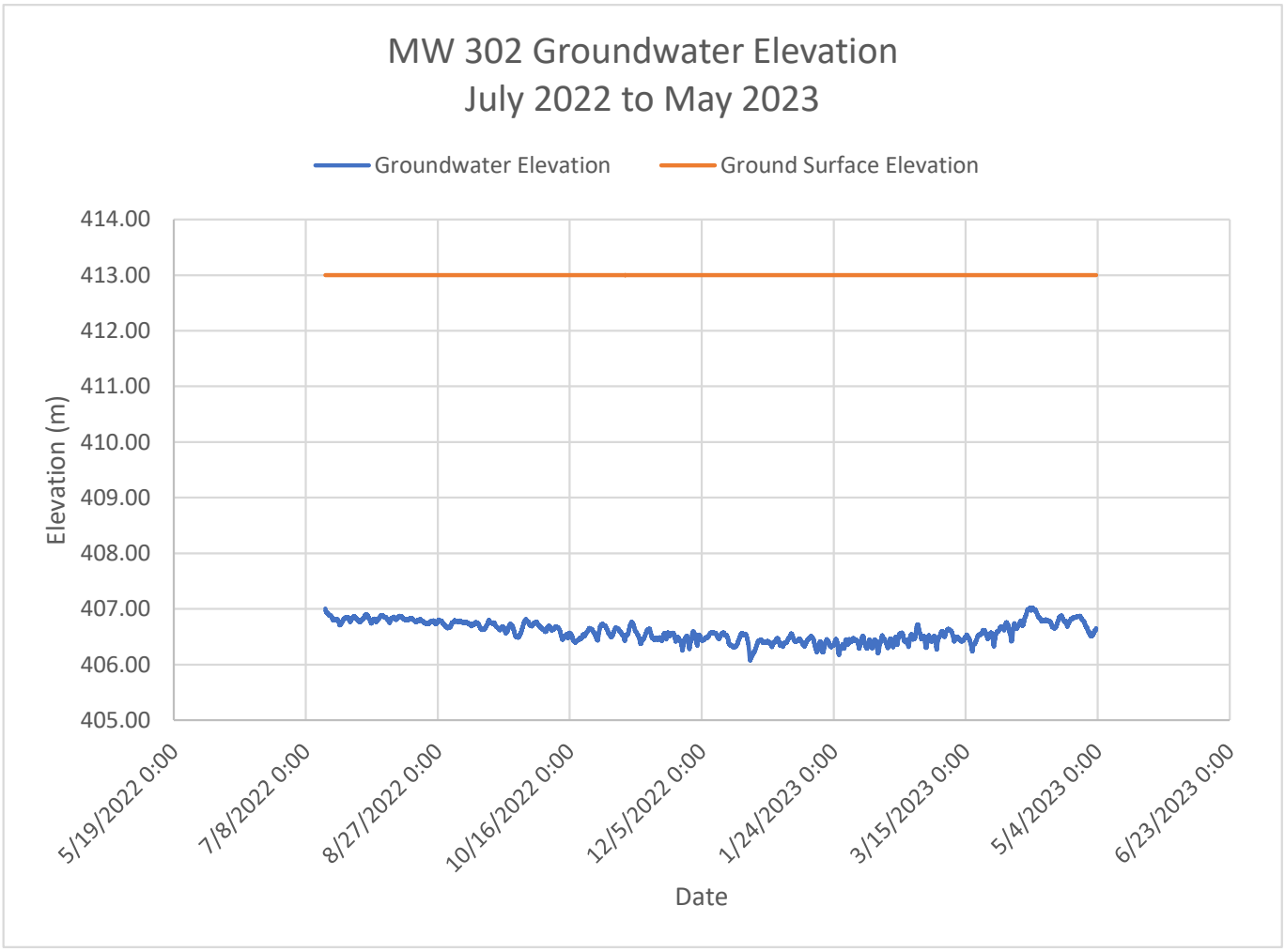

MW 206 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

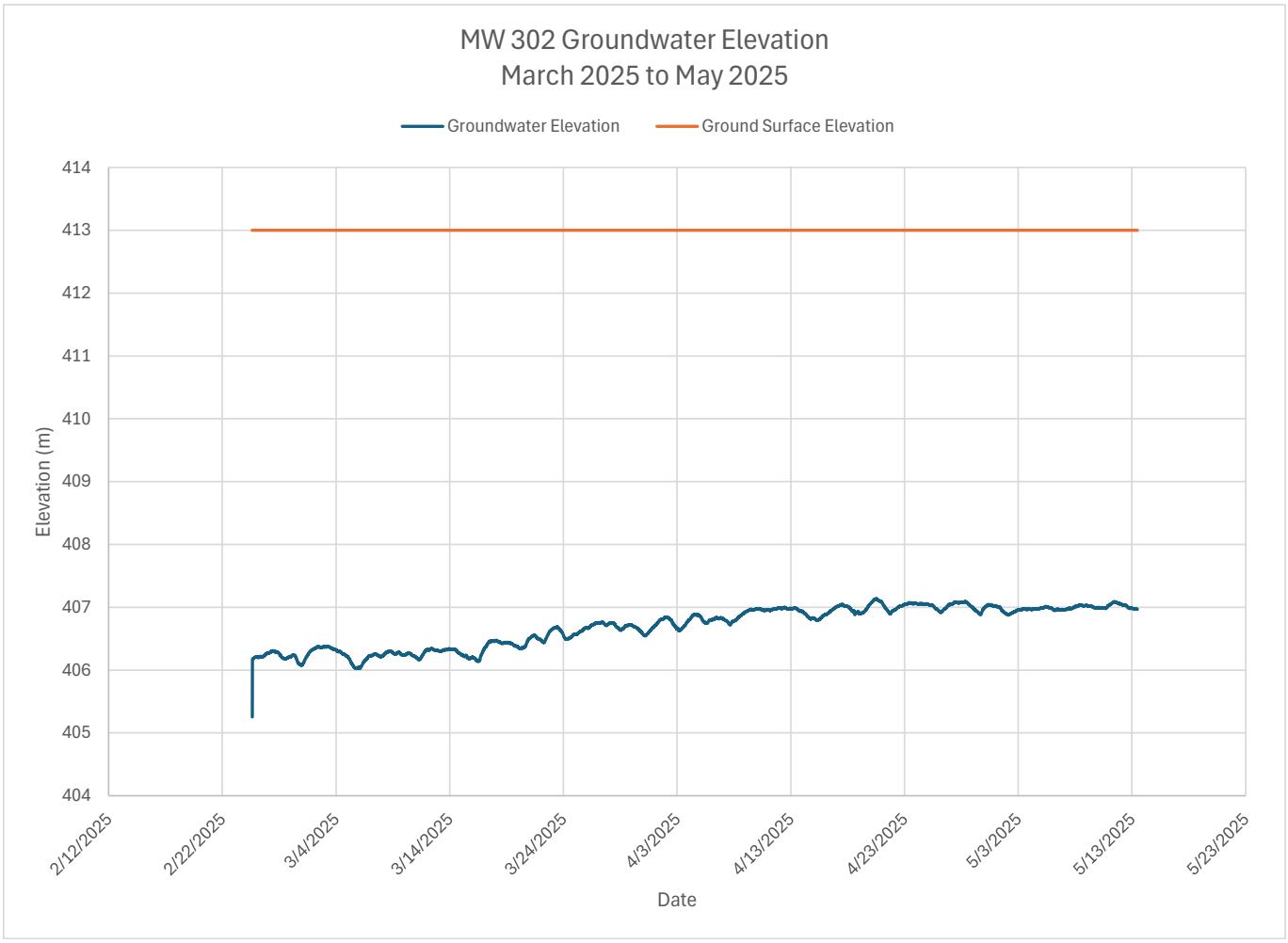

MW 301 (Elevation of 412.75 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

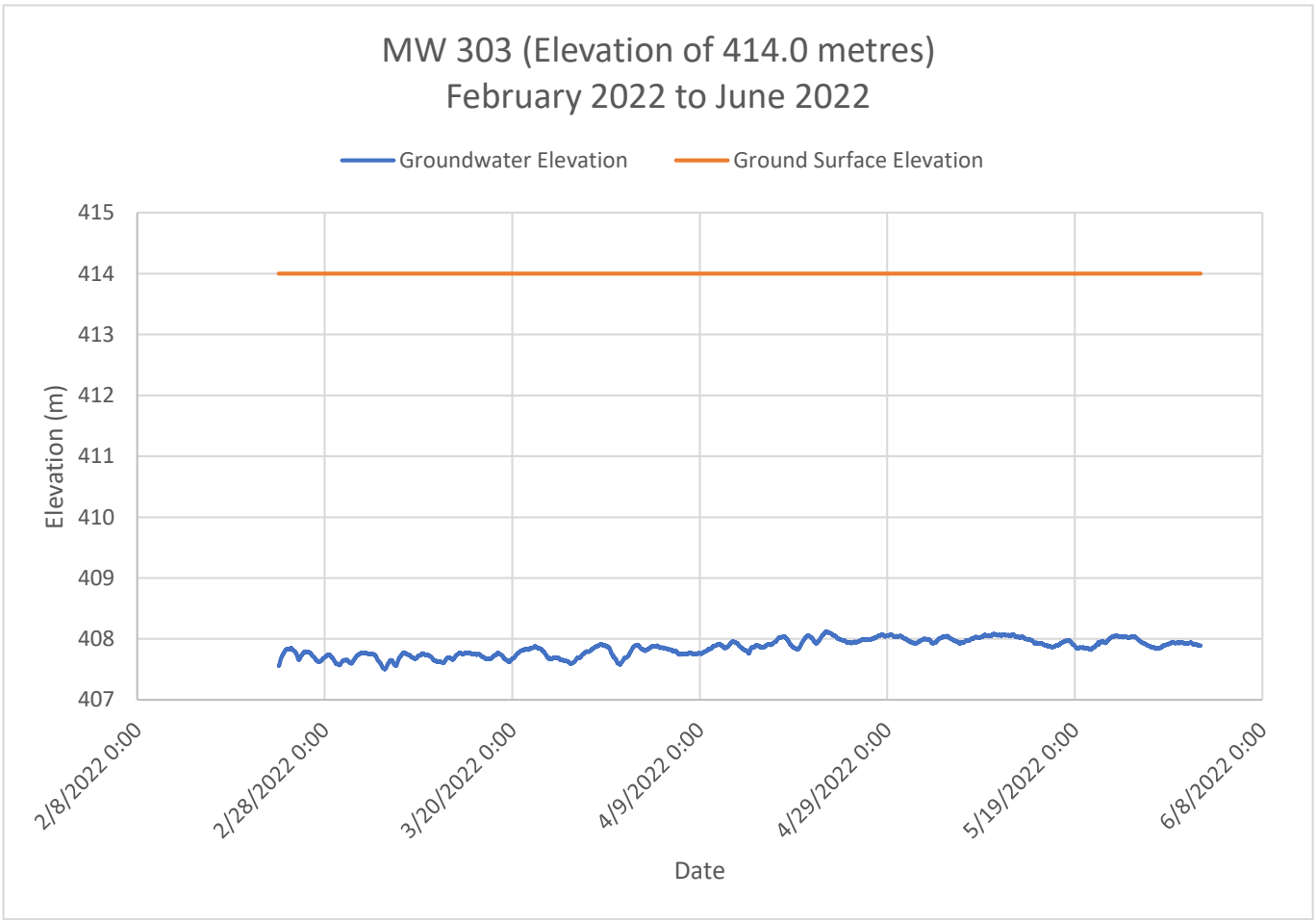

MW 301 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

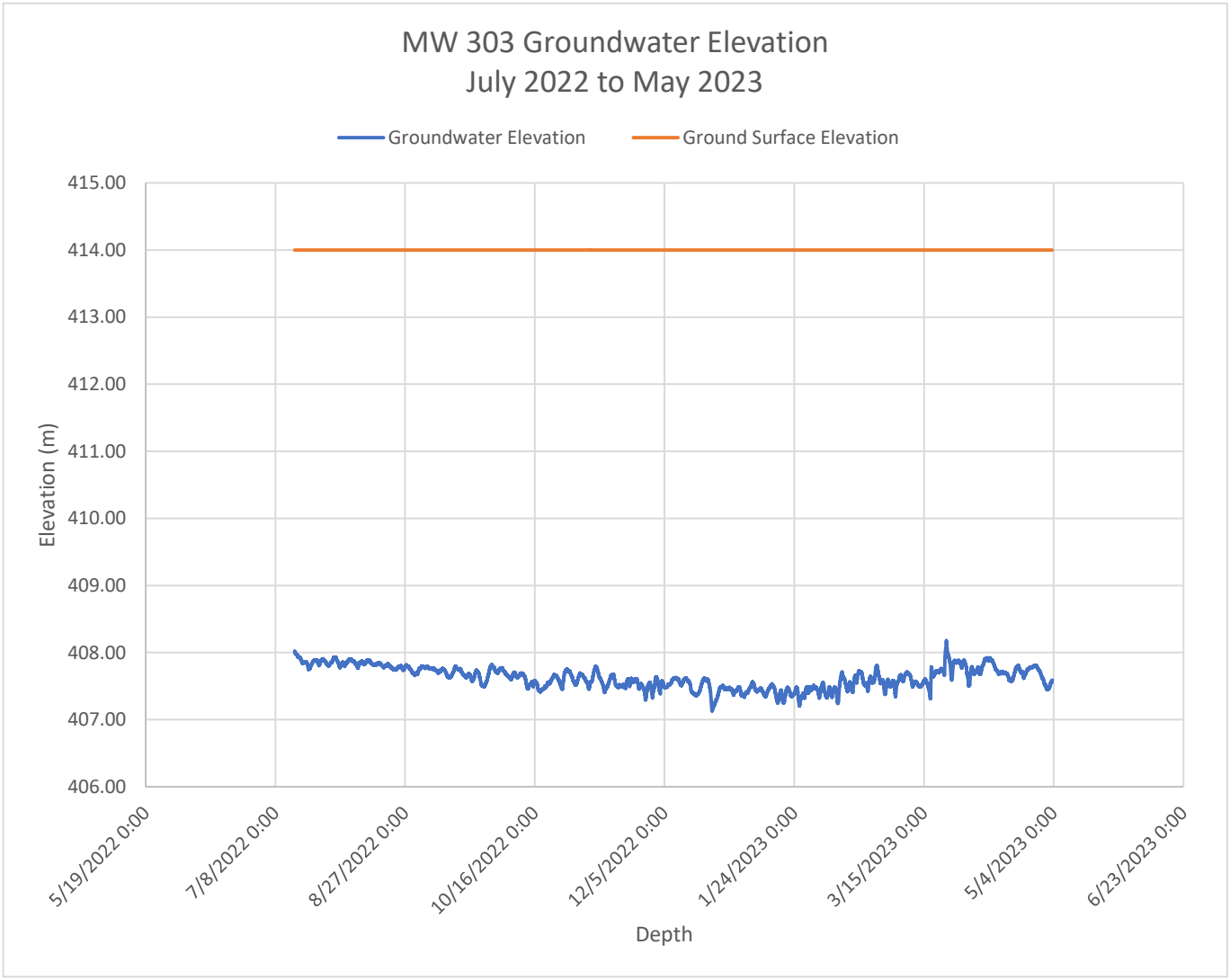

MW 301 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date


MW 302 (Elevation of 413.0 metres)
February 2022 to June 2022
Groundwater Elevations
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 302 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414.00
413.00
412.00
411.00
410.00
409.00
408.00
407.00
406.00
405.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date


MW 302 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
404
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date


MW 303 (Elevation of 414.0 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 303 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
415.00
414.00
413.00
412.00
411.00
410.00
409.00
408.00
407.00
406.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
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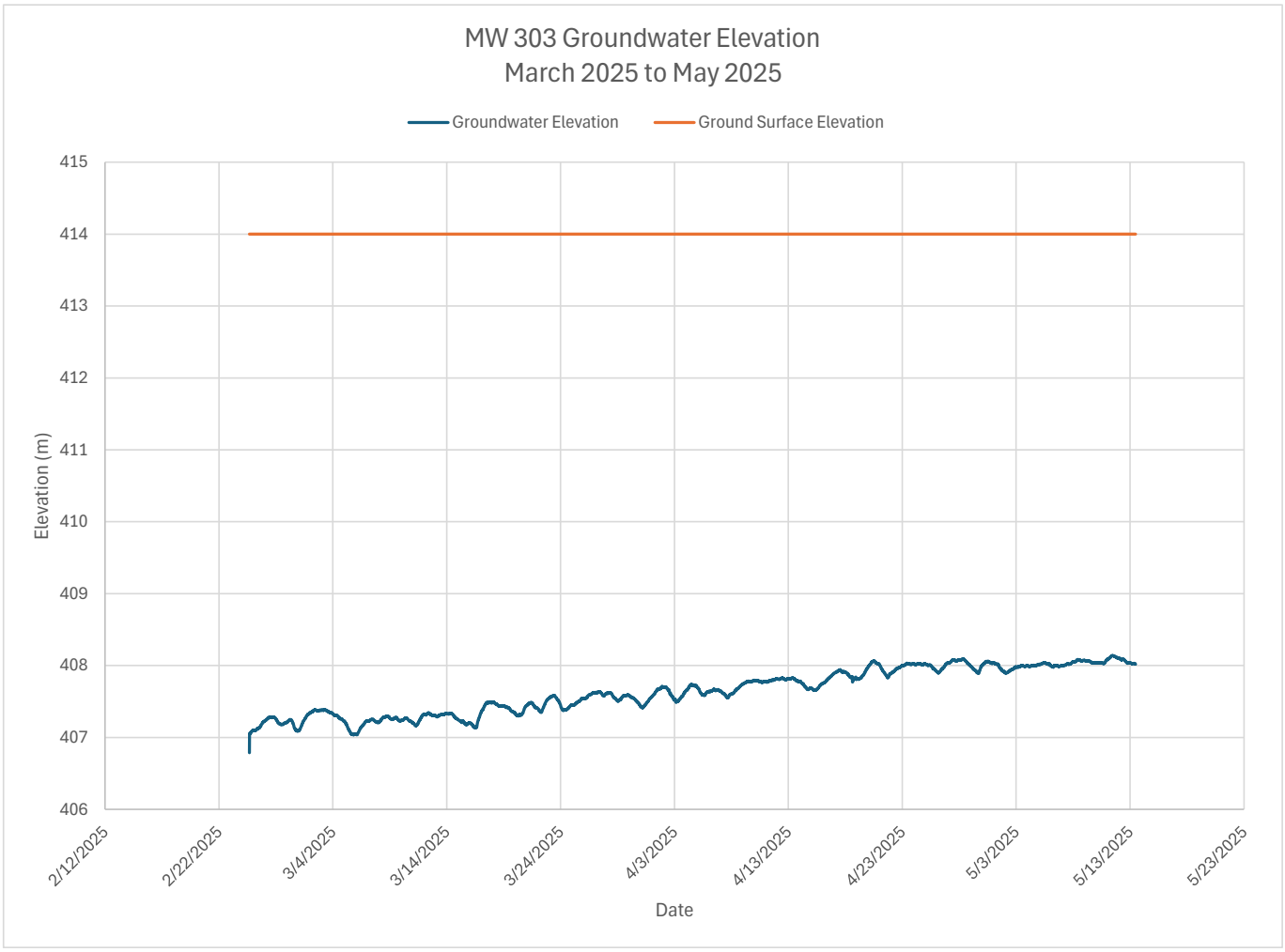
6/23/2023 0:00
Depth


MW 303 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
415
414
413
412
411
410
409
408
407
406
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
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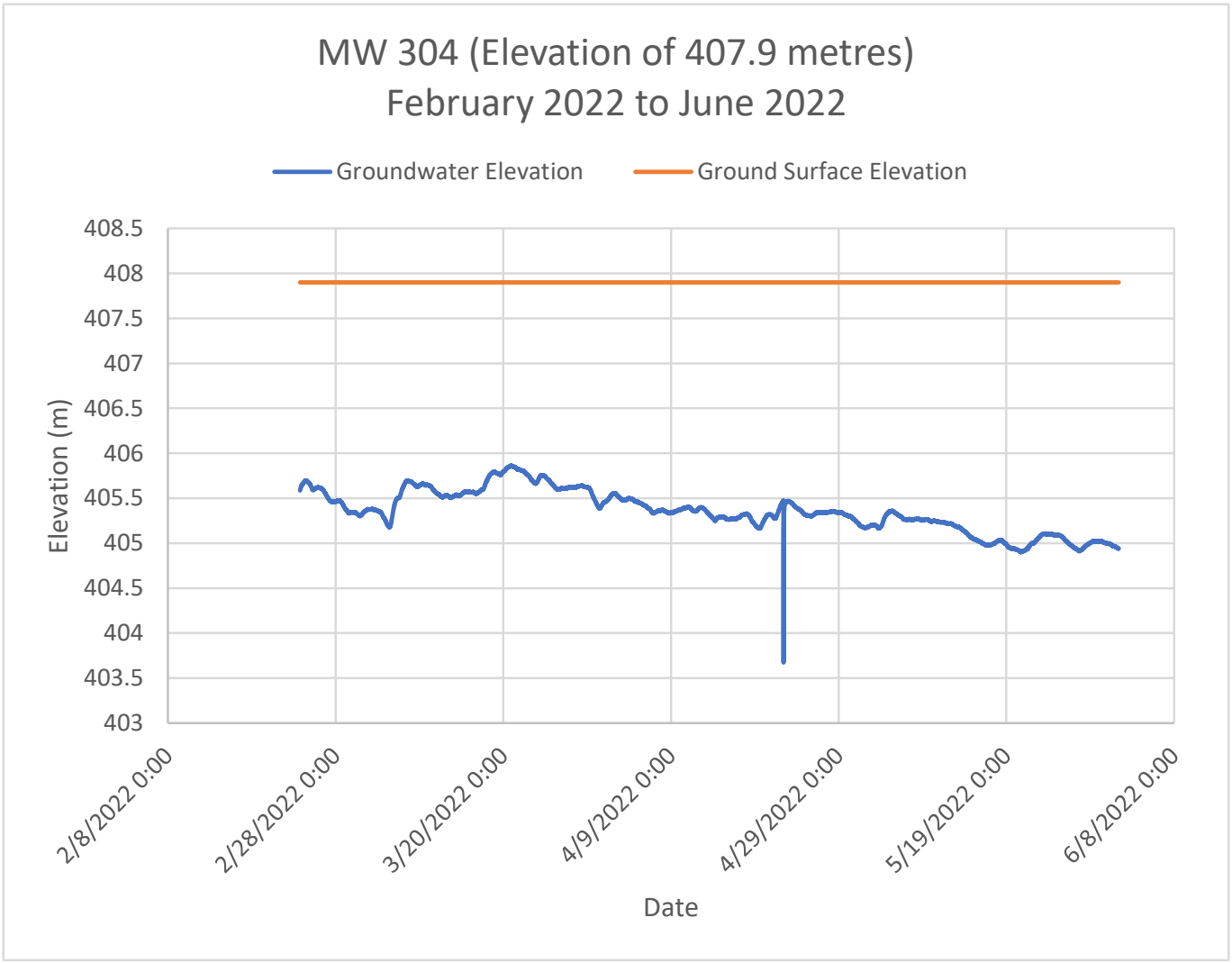
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date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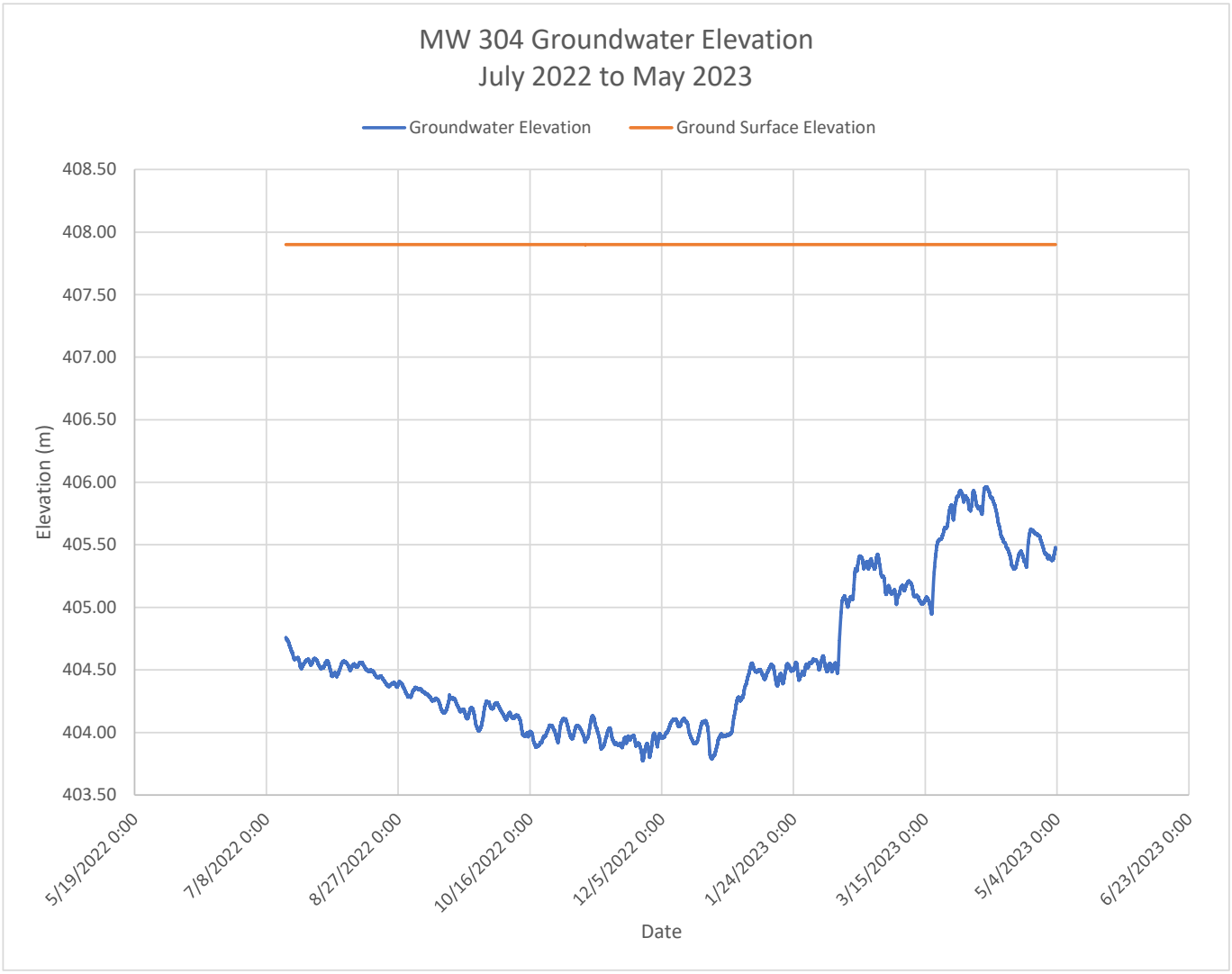
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
408.5
408
407.5
407
406.5
406
405.5
405
404.5
404
403.5
403
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 304 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
408.50
408.00
407.50
407.00
406.50
406.00
405.50
405.00
404.50
404.00
403.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
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12/5/2022 0:00
1/24/2023 0:00
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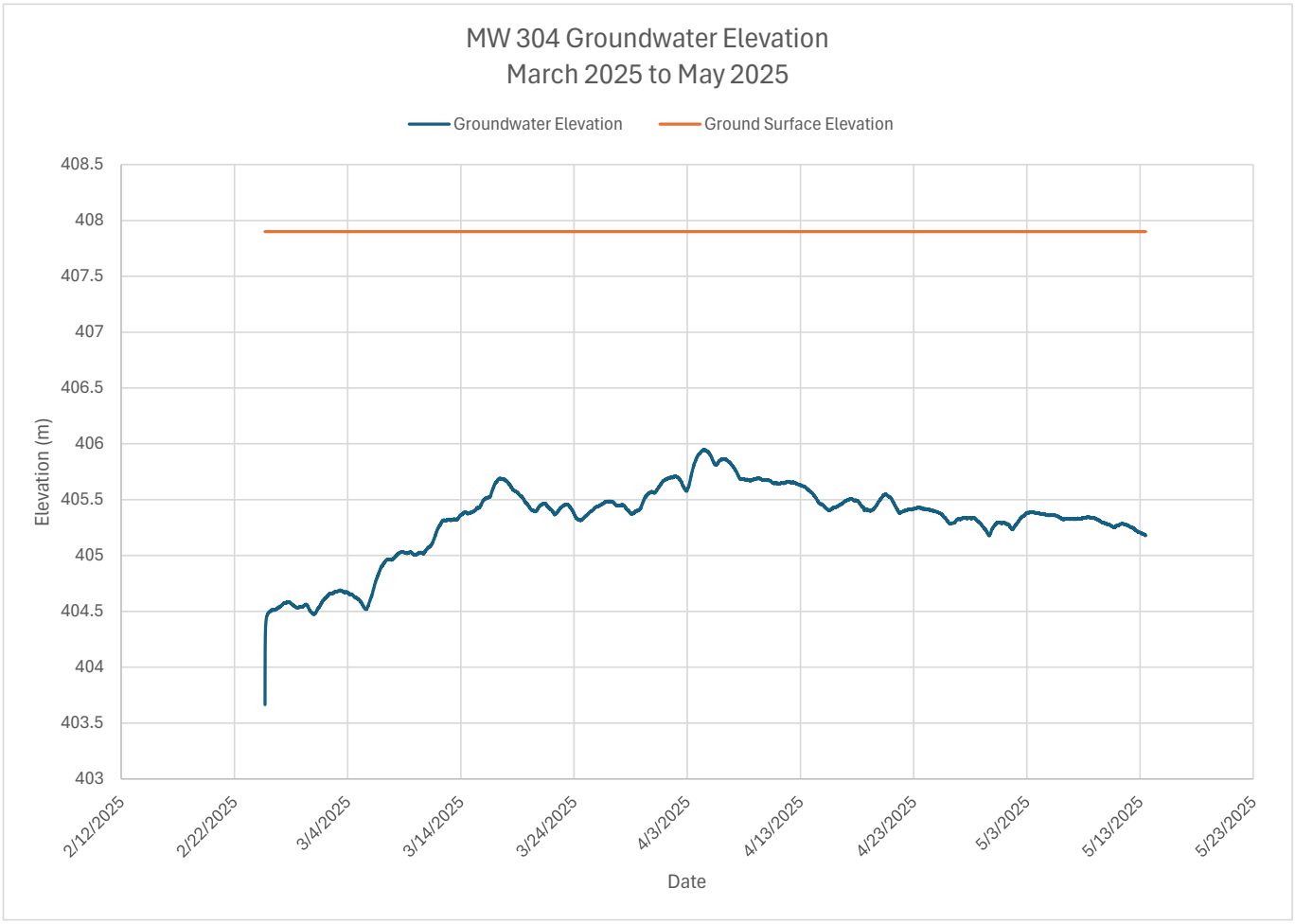
6/23/2023 0:00
Date


MW 304 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
408.5
408
407.5
407
406.5
406
405.5
405
404.5
404
403.5
403
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
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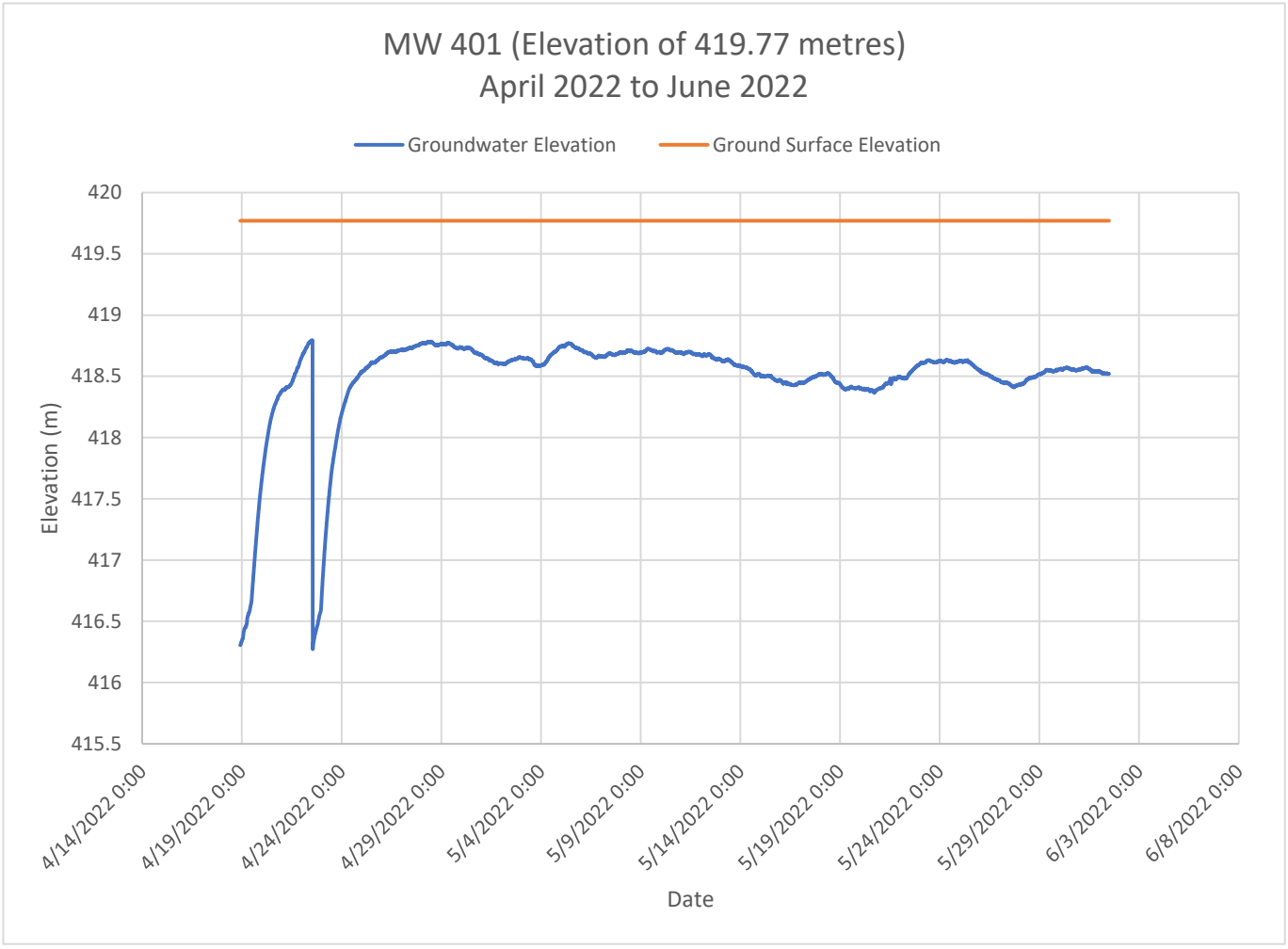
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date


MW 401 (Elevation of 419.77 metres)
April 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
420
419.5
419
418.5
418
417.5
417
416.5
416
415.5
Elevation (m)
4/14/2022 0:00
4/19/2022 0:00
4/24/2022 0:00
4/29/2022 0:00
5/4/2022 0:00
5/9/2022 0:00
5/14/2022 0:00
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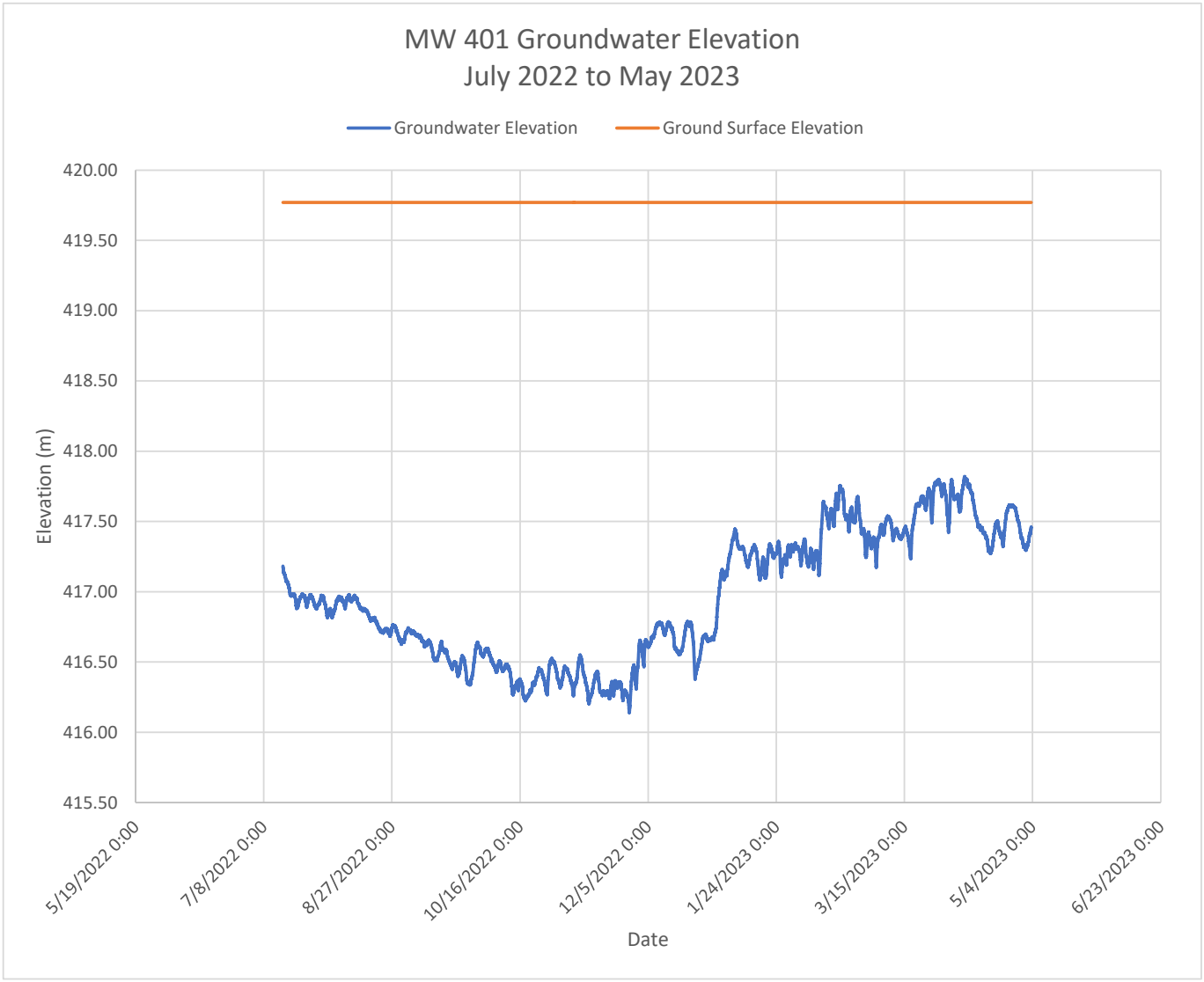
5/24/2022 0:00
5/29/2022 0:00
6/3/2022 0:00
6/8/2022 0:00
Date


MW 401 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
420.00
419.50
419.00
418.50
418.00
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417.00
416.50
416.00
415.50
Elevation (m)
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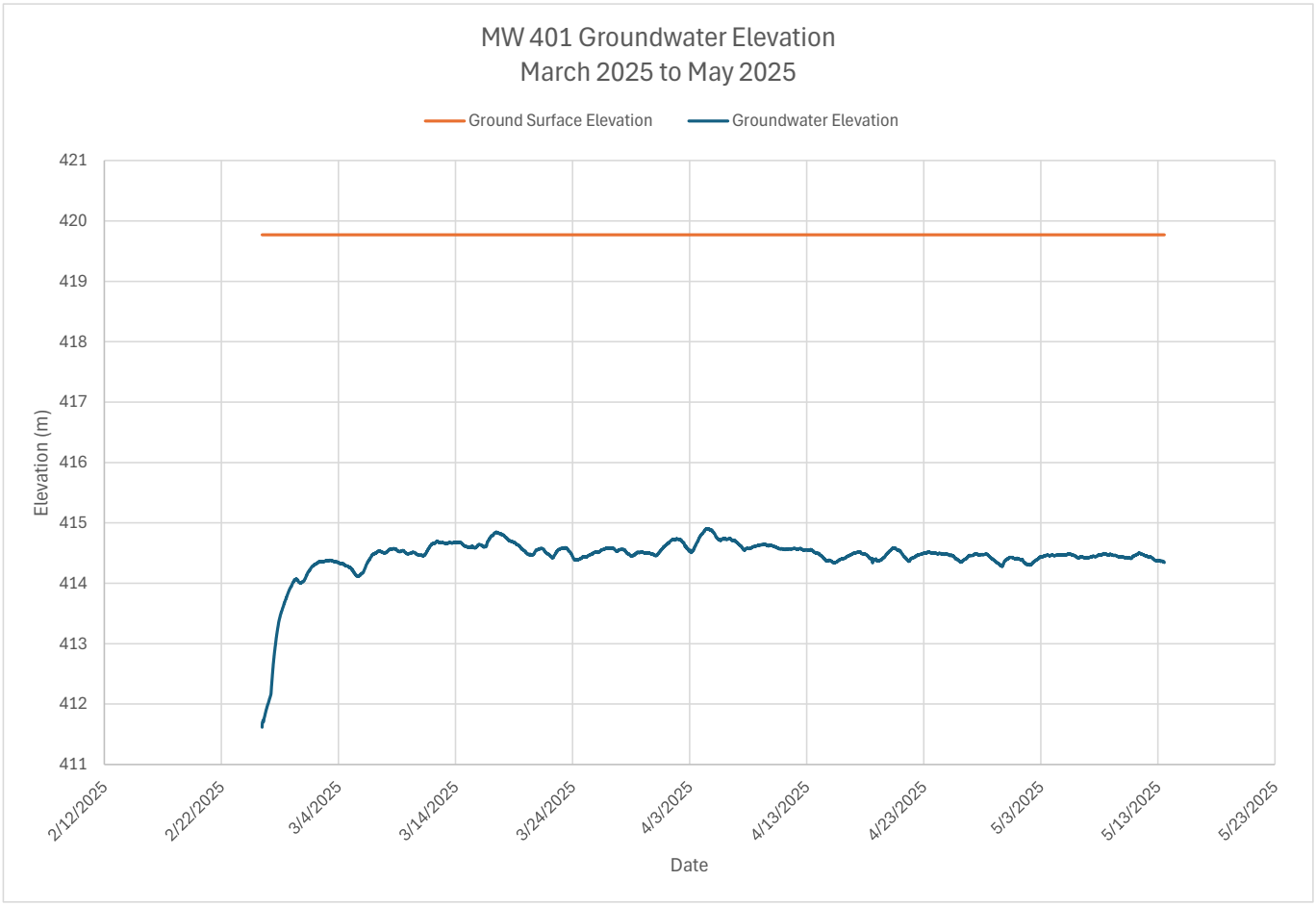
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date


MW 401 Groundwater Elevation
March 2025 to May 2025
Ground Surface Elevation
Groundwater Elevation
421
420
419
418
417
416
415
414
413
412
411
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
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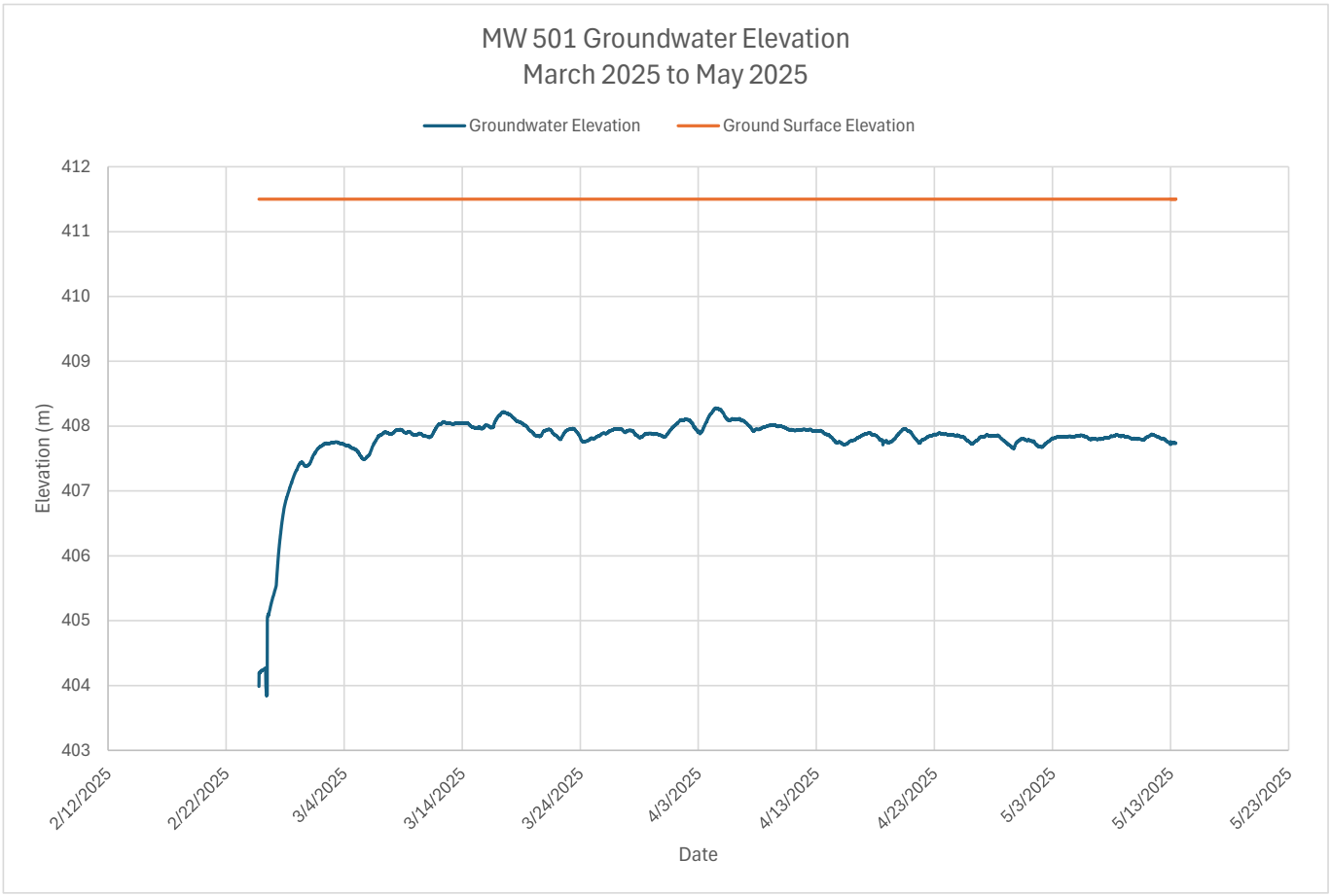
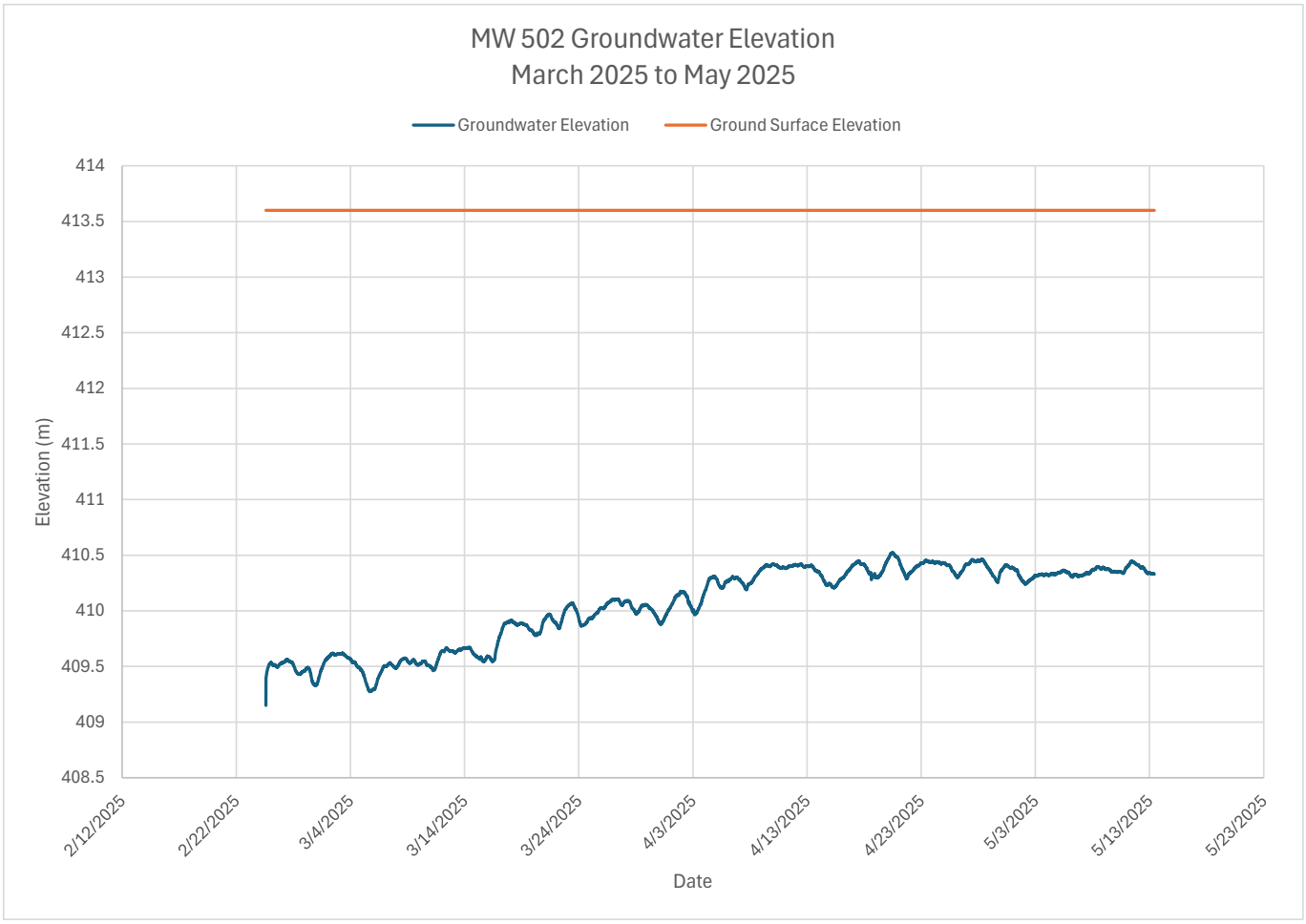
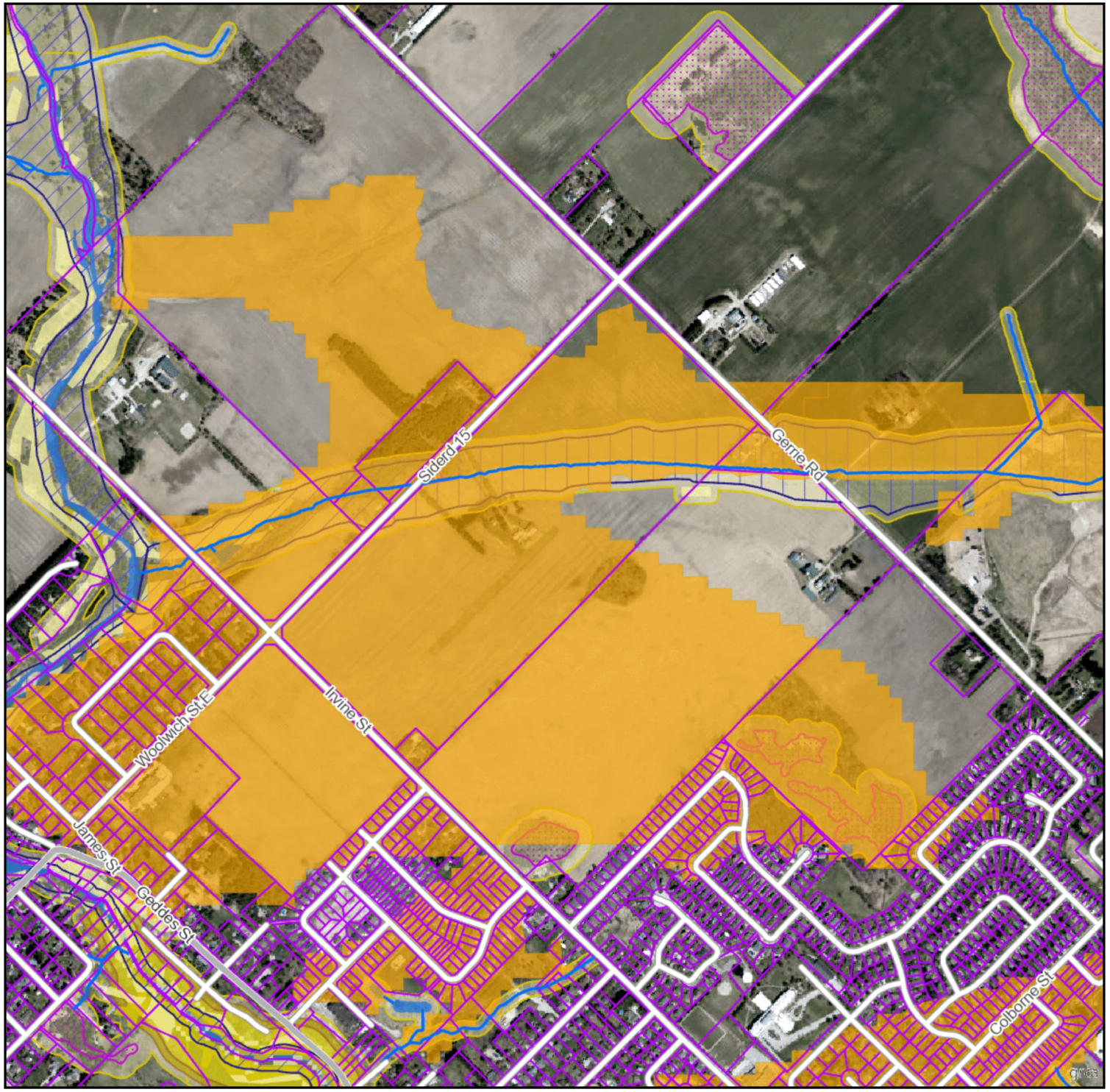
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date


MW 501 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
412
411
410
409
408
407
406
405
404
403
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date


MW 502 Groundwater Elevation
March 2025 to May 2025
Groundwater Elevation
Ground Surface Elevation
414
413.5
413
412.5
412
411.5
411
410.5
410
409.5
409
408.5
Elevation (m)
2/12/2025
2/22/2025
3/4/2025
3/14/2025
3/24/2025
4/3/2025
4/13/2025
4/23/2025
5/3/2025
5/13/2025
5/23/2025
Date

Appendix F

Source Water Protection Mapping (GRCA)



Grand River Conservation Authority

Date: Sep 30, 2025

Elora Sands - SGRA Mapping

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- Signif. GW Recharge - Tier 2 (GRCA)

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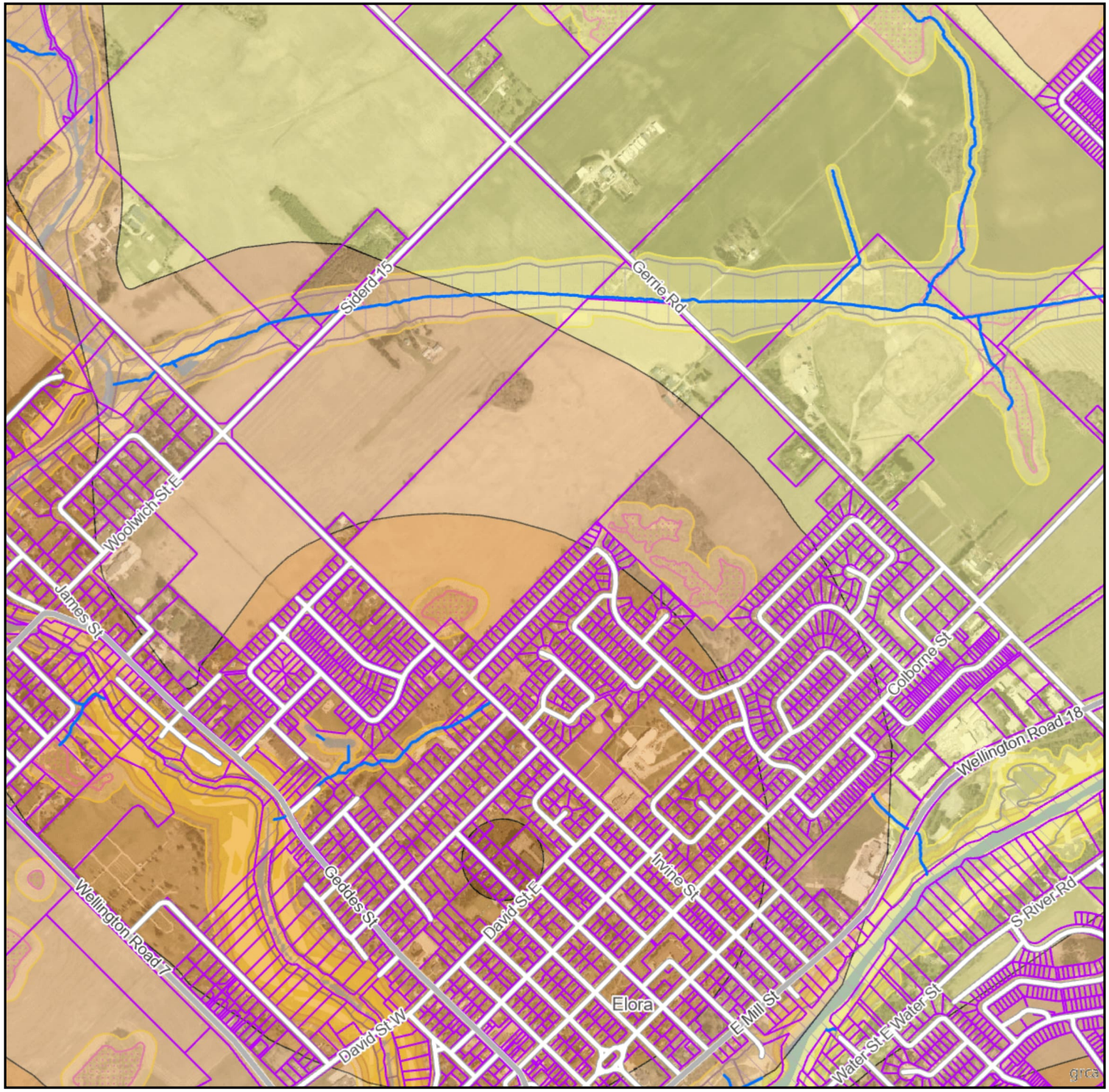
The source for each data layer is shown in parentheses in the map legend.
See Sources and Citations for details.

Scale 1:11,453

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545736.98, 4838644.97 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)



Map Centre (X,Y): 545978.84, 4838187.14 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Grand River Conservation Authority

Date: Oct 29, 2025

Elora Sands - WHPA Mapping

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- WHPA-Wellhead Protection Area (GRCA)
  - WHPA-A
  - WHPA-B
  - WHPA-C
  - WHPA-D

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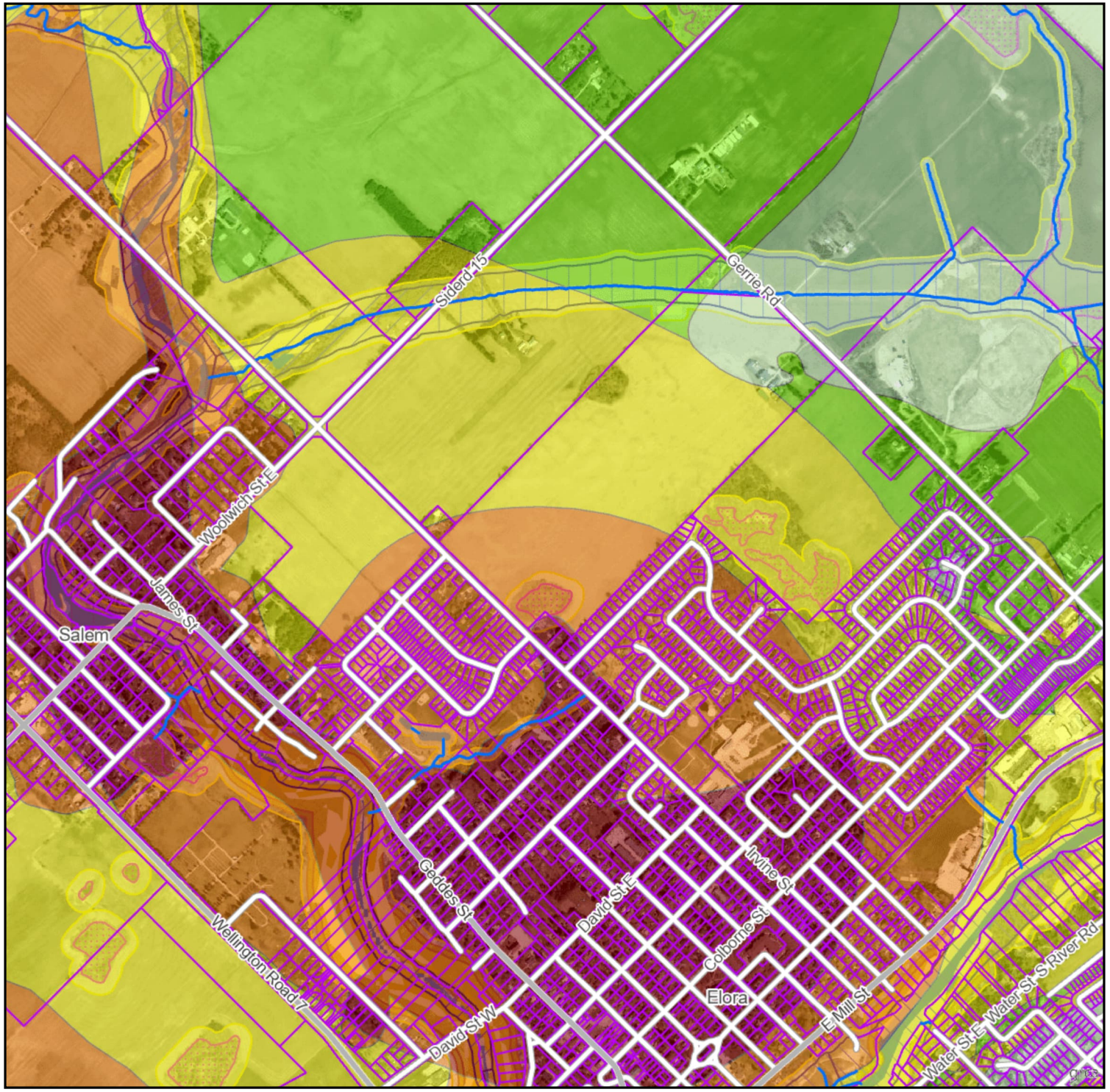
See Sources and Citations for details.

Scale 1:13,850

NAD83 UTM zone 17 (EPSG:26917)



Grand River Conservation Authority

Date: Oct 29, 2025

Elora Sands - WHPA Vulnerability

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- WHPA Vulnerability (GRCA)
  - 10
  - 8
  - 6
  - 4
  - 2

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The source for each data layer is shown in parentheses in the map legend.
See Sources and Citations for details.

Scale 1:13,850

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545742.58, 4838170.37 | Map Link

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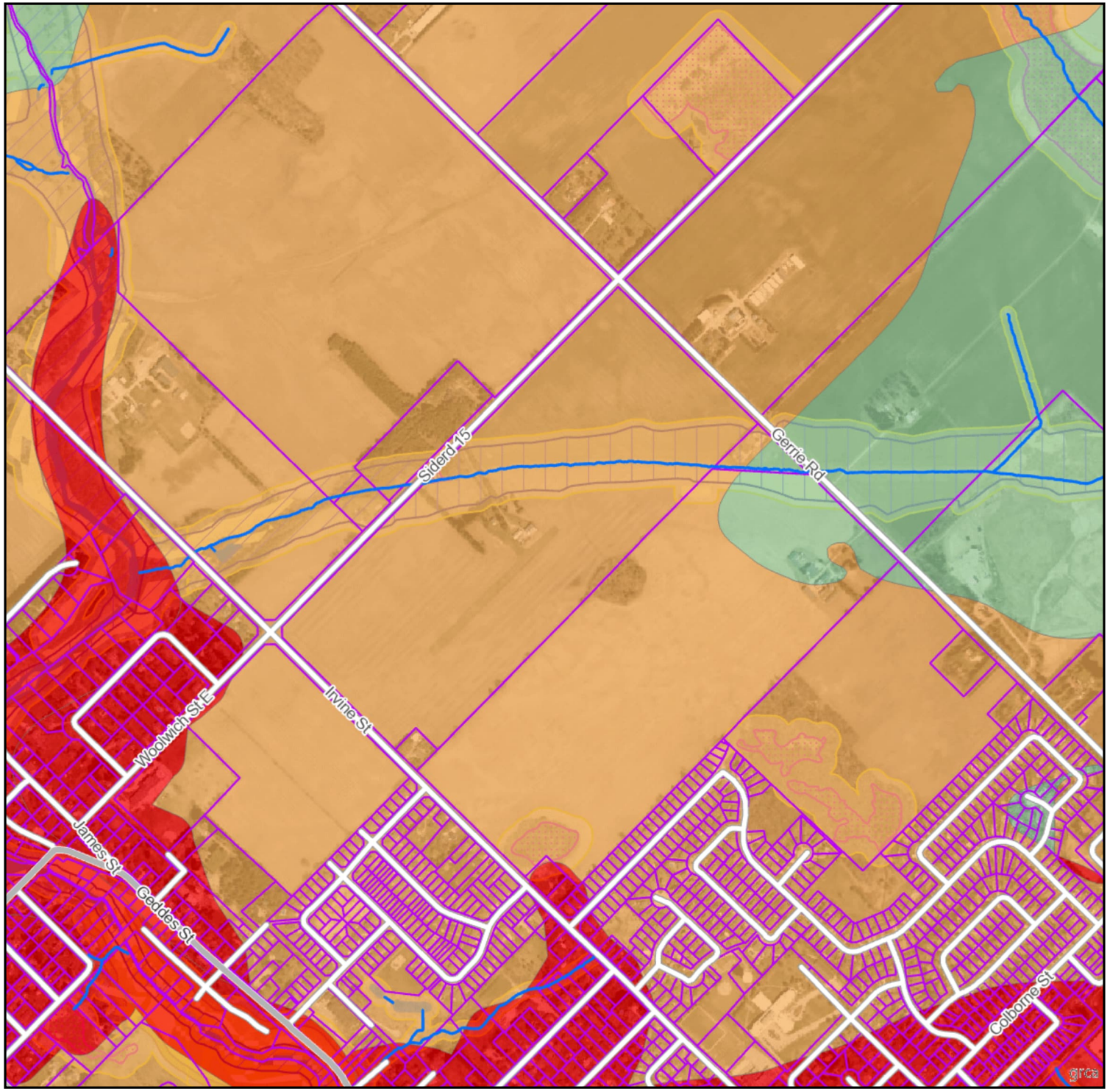

Grand River Conservation Authority

Date: Sep 30, 2025

Elora Sands - Intrinsic Vulnerability

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- Intrinsic Vulnerability (GRCA)
  - H
  - M
  - L

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The source for each data layer is shown in parentheses in the map legend. See Sources and Citations for details.

Scale 1:11,453

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545736.98, 4838644.97 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Terra-Dynamics inc.
432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3

March 6, 2025

Cachet Developments
c/o Brendan Walton, P.Eng.
361 Connie Crescent, Suite 200
Concord, ON L4K 5R2

Re: Source Water Protection Due Diligence Review, Elora Sands, 7581 Sideroad 15 (SR15), and Keating Lands (Part of Lot 17, Concession 12), Salem (Elora), ON

Dear Mr. Walton,

1.0 Introduction, Purpose and Background Information

Terra-Dynamics Inc. (Terra-Dynamics) respectfully submits this source water protection due diligence review of the 39.2 hectares of the Elora Sands property at 7581 Sideroad 15 (SR15), and the 38.7 hectares of the adjacent Keating Lands, Part of Lot 17, Concession 12, Elora (Salem), Township of Centre Wellington, County of Wellington, Ontario (Site). It is our understanding that residential development is proposed for the Site and will be serviced by municipal water and sewage (Malone Given Parsons Ltd., 2024).

The purpose of this Source Water Protection due diligence review is to advise Cachet Developments of future site development limitations with respect to addressing source water protection policies or/and related requirements. It is our understanding that the lands have been historically used for agriculture, e.g. corn, soybeans and pasture and corn.

The Site is currently outside of the existing Settlement Area boundary outlined in the Centre Wellington Official Plan, but it is our understanding that an application may be made to bring the Site into the Settlement Area.

2.0 Scope of Work

A background review of available information was completed that included, but was not limited to:

1. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) AgMaps, including mapping of tile drainage, municipal drains and soil types.

2. Ontario Geological Survey (OGS) surficial geology and Aggregate Resources Inventory.

3. Consultant reports (e.g. Soil-Mat, Beacon, MTE, Waterloo Geoscience and GM Blue Plan);

4. Ministry of the Environment, Conservation and Parks, Source Protection Information Atlas.

5. Grand River Source Water Protection Area Source Water Protection datasets and reporting, including vulnerable area mapping (e.g. wellhead protection areas and significant groundwater recharge areas.

6. Liaison with Wellington Source Water Protection (Funk, 2025); and

7. Wellington County Official Plan (2024) and Centre Wellington Official Plan (2005).

3.0 Physical Setting Summary

3.1 Surficial Geology

The surficial geology of the Site has been regionally mapped as primarily gravel (59%) and sand (21%) with some sandy silt to silty sand diamicton (20%) (i.e. till) (Ontario Geological Survey (OGS), 2003). The OGS have also mapped much of the Site as a '*selected sand and gravel resource area of primary significance*' with 7 to 14 metres thickness coarse aggregate based upon water well data (OGS, 1999). This significance is recognized in the Centre Wellington Official Plan in Schedule C - Sand and Gravel Resources (Township of Centre Wellington, 2005). However the regional characterization appears to largely over-estimate the amount of high-permeable materials on-site, this is discussed below.

3.1.1 Elora Sands Property

The surficial geology of the Elora Sands property has been regionally mapped as primarily gravel (49%) and sand (38%) with some sandy silt to silty sand diamicton (13%) (i.e. till) (OGS, 2003). However, Site level borehole investigations of the Elora Sands property by Soil-Mat Engineers & Consultants Ltd. (2022) have proven that the regional mapping does not reflect actual site conditions. For example, the fourteen (14) boreholes completed at the Elora Sands property have delineated no gravel at-surface, and the areas of sand (~33% of the Site) are generally limited to between 1 and 2 metres thick in the northwest (i.e. BH006 and MW401 with sand thicknesses of 1.3 m and 1.6 m, respectively), and central portions of the Site (i.e. BH003 and MW201 with sand thicknesses of 1.7 m and 2.2 m, respectively), although at MW205 the sand thickness was 6.1 m (Drawing No.1, Soil-Mat, 2022).

3.1.1 Keating Lands

A borehole investigation southeast of the Keating Lands also suggests much less permeable/high recharge materials than regionally mapped (GM Blue Plan Engineering, 2023).

3.2 Groundwater Recharge

Groundwater recharge rates have been recently modelled as part of the Centre Wellington Tier Three Water Budget Risk Assessment – Risk Assessment Report (Matrix Solutions Inc., 2020) (Map 1, Figure 5). The modelled groundwater recharge rates are largely a reflection of the regional surficial geological mapping, with 60% of the Site modelled as between 300 and 500 mm/year or greater, i.e. equivalent to coarse sand or gravel (MECP, 1995).

These modelled values appear to include over-estimates for recharge at the Site, as much lower permeability soils have been identified based upon the borehole investigations completed by Soil-Mat Engineers & Consultants Ltd (2022). For example, in the central portion of the Elora Sands at borehole BH003 and MW202, clayey to sandy silt soils were identified (e.g. calculated infiltration rates of <10 mm/hour) and none of the regionally mapped gravel was identified (Drawing No. 1). High infiltration rates have been calculated for some boreholes, e.g. 201, 203 and 205 (50 mm/hour or greater).

3.3 Surface Water

The watercourse crossing the Site, the Nichol Drain (or Municipal Drain No.1), was classified by the Department of Fisheries and Oceans (DFO) in 2022 as "Type E", permanent flow, with a 'Spring' season restricted timing window (OMAFRA, 2025, Map 2). The Site north of the drain is mapped as tile-drained, likely installed about 1 metre below ground surface (OMAFRA, 2007), and tile outlets to the drain were observed by Beacon Environmental (2025). Past research suggests tile-drainage may capture between 10 and 15% of infiltration (Mulhern, 2008). The Nichol Drain outlets to Irvine Creek west of the Site.

Beacon Environmental have indicated the "*Nichol Drain should be considered to have coldwater fishery potential and be classified as a coldwater stream for construction and stormwater management perspective. Watercress was visible during the Beacon investigation, supporting this designation*" (Beacon Environmental, 2025). The drain at the Site has been previously mapped by the GRCA as a groundwater discharge area (GRCA, 2024) since the regional water table is higher in elevation than the drain. Groundwater levels at MW004 appear to support the local water table being higher in elevation than the drain (Drawing No.1).

The GRCA have regionally mapped the Site as about 75% within the Nichol Drain catchment and 25% towards the Queen Street Tributary with a small portion along the eastern boundary towards the southeast (GRCA, 2017). The subcatchment divides have been refined via a Site topographic survey to show a slightly larger area draining towards the Queen Street Tributary and not towards the southeast, under-predevelopment conditions (MTE, 2025).

3.4 Southwest Unevaluated Wetland – Keating Lands

The Ministry of Natural Resources and Forestry (MNRF) and GRCA have regionally mapped a 0.78 ha unevaluated wetland in the southern part of the Site adjacent Irvine Street. This wetland vegetation is presented as part of the Core Greenlands within the Wellington County Official Plan (2024). This wetland vegetation has not been staked with the GRCA, but is scheduled for staking in 2025.

Beacon Environmental have identified the wetland vegetation as consisting of primarily Willow Mineral Thicket Swamp and Red-osier Mineral Thicket Swamp, with some Fresh-Moist Lowland Deciduous Forest adjacent and an inclusion of Mineral Shallow Marsh within the swamp with standing water (Beacon Environmental, 2025).

This unevaluated wetland is located on the margin of regionally mapped gravel and sandy silt/silty sand till (OGS, 2003). Geology from nearby Elora Meadows boreholes MW18 and MW19 recorded sand on silty sand till with groundwater levels as high as within 1 m of surface (Waterloo Geoscience, 2005). It is possible the wetland is an area of slower groundwater recharge as GRCA has regionally mapped a weak

downwards vertical gradient (GRCA, 2024). The wetland vegetation does not appear to have a connection to a watercourse, i.e. it may be supplied water by only precipitation and overland runoff.

3.5 Township of Centre Wellington Well Supply Municipal Well E1

Elora municipal well E1 is located 535 m south-southeast of the Site and 860 m south-southeast of the Elora Sands property (Map 3, Figure 8, Matrix Solutions Inc., 2017). This well is constructed to take water from the bedrock aquifer and is 130 metres deep with casing to 19.8 metres below ground surface (Map 4, Figure 13, Matrix Solutions Inc., 2017). The well produced on average 47% of the Elora municipal supply in 2018 (Matrix Solutions Inc., 2020).

The bedrock aquifer beneath the Site has been most recently regionally mapped as having primarily low vulnerability (vulnerability scores of 2, 4 and 6), with a portion of the southern area of the Site mapped as 8 (medium vulnerability score), and a very small portion mapped as 10 (high) (Map 5, Figure 6-29, Grand River Source Protection Committee, 2022a, and Map 5b, MECP, 2025).

4.0 Source Water Protection

The Site is within the Grand River Source Protection Area. The Grand River Source Protection Committee was responsible for mapping four types of vulnerable areas within the Grand River Source Protection Area: (i) wellhead protection areas, (ii) intake protection zones, (iii) highly vulnerable aquifers and (iv) significant groundwater recharge areas. Two of these types of vulnerable areas are mapped at the Site: (1) wellhead protection areas and (2) significant groundwater recharges areas (MECP, 2025).

Wellhead protection areas (WHPAs) can include different zones for water quality protection of a groundwater supply. These different zones are based largely upon the expected travel time of contaminants to the water supply after they enter the aquifer (Table 1, Figure 1 – Illustration of WHPA Zones, MECP, 2006). These zones were mapped using a groundwater flow model to include both areas upgradient of the well as well as cross- and down-gradient as the well captures water from these areas.

Table 1 –Water Quality Well Head Protection Areas (WHPA) Details (MECP, 2006)

WHPA	Description
A	100 m radius
B	2 year Time of Travel
C	2 to 5 year Time of Travel
D	5 to 25 year Time of Travel

WHPAs can also include areas for water quantity protection, called WHPA Q1 and/or Q2. WHPA-Q1 is delineated based upon a combination of the cone of influence of each pumping well and WHPA-Q2 for land areas where reductions in recharge have the potential to have a measurable impact on the municipal wells (Matrix Solutions Inc., 2020).

Significant groundwater recharge areas (SGRAs) were also mapped at the Site, as areas regionally having groundwater recharge 15% above the average watershed rate. The average watershed recharge rate was calculated as 176 mm/year, for an SGRA criterion of greater than 202 mm/year (GRCA, 2023). This mapping was completed as part of the Tier 2 Water Budget Assessment derived from previous GRCA

Hydrologic Response Unit modelling using the Guelph-All-Weather-Storm-Event-Runoff (GAWSER) model which used regional surficial geologic mapping (GRCA, 2023). However, as mentioned in Section 3.2, an analysis of local borehole results is expected to reduce the amount of SGRAs at the Site.

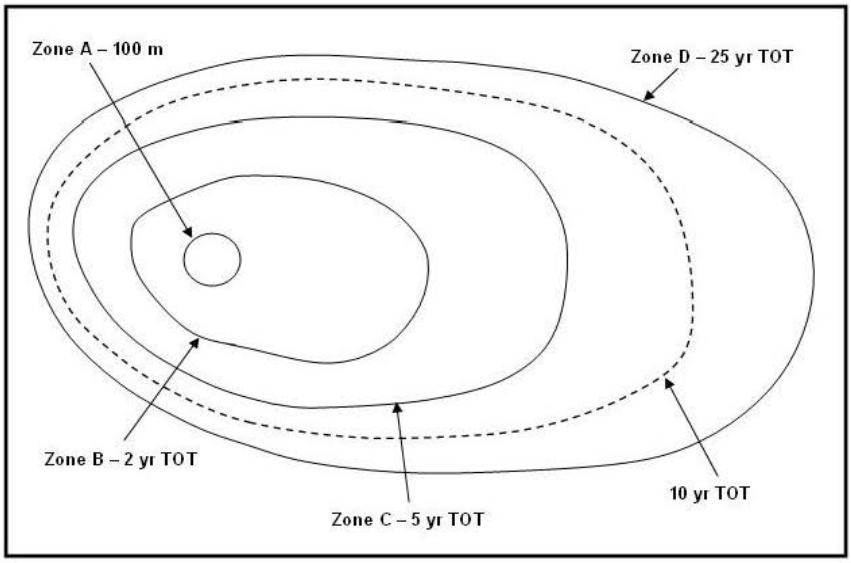


Figure 1 – Illustration of WHPA Zones (MECP, 2006)

4.1 Wellhead Protection Areas

A series of WHPAs for the nearby municipal well E1 extend onto the Site (Map 6, Figure 7.1, Grand River Source Protection Committee, 2022b). The areal coverage and location of these WHPAs is approximated below (Tables 2a and 2b).

A WHPA-Q was also delineated for the Centre Wellington municipal groundwater supplies (Map 7, Figure 11, Matrix Solutions Inc., 2020) as "*the combined area that is the cone of influence of the well… plus the whole of the cones of influence of all other wells… that intersect that area…the WHPA-Q1 and WHPA-Q2 are coincident*" (Matrix Solutions Inc., 2020).

Significant water quality threat policies exist for the WHPA-B and WHPA-C areas that must be conformed to, or complied with (Section 4.3), e.g. regarding dense non-aqueous phase liquids (DNAPLs). Examples of DNAPLs include metal degreasers, paint removers and brake fluid. However, the current Grand River Source Protection Plan does not include policies for moderate and low threats.

With respect to significant water quantity threats, all "…*future areas of recharge reduction (due to land use development within this policy area)* (i.e. WHPA-Q) *are classified as Significant water quantity threats …*" (Matrix Solutions Inc., 2020). This preliminary designation was because "…*the potential impact of stormwater management measures and low impact development techniques was not considered when estimating recharge reductions on future land development areas*" (Matrix Solutions Inc., 2020). For example, southwest lands at 75 Woolwich Street East (Elora, Ontario), were mapped as a '*Groundwater Recharge Reduction Threat*" (Map 7, Figure 11, Matrix Solutions Inc., 2020).

Table 2a – Site WHPA Summary Details (Grand River Source Protection Committee, 2022b)

WHPA	Area (hectares)	Percent of Site	On-site Location	Vulnerability Score	Significant Threat Policy Categories
B	<0.1	<0.2%	Southern	10	Waste Disposal, Sewage Systems, Agricultural Source Material, Non-Agricultural Source Material, Commercial Fertilizer, Pesticide, Road Salt, Storage of Snow, Fuel, DNAPLs, Organic Solvents, Aircraft De-icing, Livestock Area, Oil Pipelines
	10.9	14%	Southern	8	Waste Disposal, Sewage Systems DNAPLs
C	47	60%	Central	6/4/2	DNAPLs
D	20	26%	North/ Northeast	4/2	None
Q1/Q2	Entire Site	100%	NA	NA	To be confirmed

Table 2b – Elora Sands WHPA Summary Details (Grand River Source Protection Committee, 2022b)

WHPA	Area (hectares)	Percent of Site	On-site Location	Vulnerability Score	Significant Threat Policy Categories
B	0.03	<0.1%	South	8	Waste Disposal, Sewage Systems DNAPLs
C	26.5	68%	Southwest	6	DNAPLs
D	12.7	32%	Northeast	4	None
Q1/Q2	Entire Site	100%	NA	NA	To be confirmed

4.2 Significant Groundwater Recharge Areas (SGRAs) Mapping

SGRAs have been regionally mapped to cover about 83% of the Site (Map 8, MECP, 2025). However, this is based upon modelled recharge rates that used regional surficial geologic mapping that appears to over-estimate SGRAs at the Site (Section 3.1). AquaResource Inc. (2009) acknowledge the limitation of regional SGRA modelling and provide the following regarding the SGRA mapping:

> "*Caution also applies to the use of SGRAs, which are delineated using regional estimates of recharge… For use at a site-specific scale, they should be refined to take into account a more detailed hydrogeological characterization.*"

4.3 Source Water Protection Policies

Significant Threat Source Protection Plan policies for consideration include water quality and water quantity. Acronyms used in this section include: WC – Wellington County, CW – Centre Wellington, MC – Must Conform, CWA – Clean Water Act, LID – Low Impact Development and ICA – Issue Contributing Area, TCE – trichloroethylene and EPA – Environmental Protection Act.

The Significant Water Quality Threat policies are presented from greatest to least areal coverage of the Site, i.e. (i) WHPA-C, (ii) WHPA-B vulnerability score of 8, and (iii) WHPA-B vulnerability score of 10.

4.3.1 Significant Water Quality Threats (WHPA-C and WHPA-B vulnerability score of 8)

Within the area of the Site mapped as WHPA-C (or ~60% of the Site), one significant water quality threat may apply, WC-CW-16.3, this policy is listed below (Table 3) (Grand River Source Protection Committee, 2022b). This policy is not expected to exert a constraint on residential development of the Site, as it is intended to inform industrial, commercial, institutional or agricultural activities with respect to the handling and storage of a DNAPL. However, this is expected to be reviewed by the Risk Management Official to determine if a Risk Management Plan is required, and in some cases an Education and Outreach Program for residents will be required.

Table 3 – Relevant DNAPL Policy (Grand River Source Protection Committee, 2022b**)**

Policy	Text
WC-CW-16.3	To ensure any Future handling and storage of a dense non-aqueous phase liquid (DNAPL) for industrial, commercial, institutional or agricultural purposes within a WHPA-B, C or TCE ICA, never becomes a significant drinking water threat, where this activity would be a significant drinking water threat, this activity shall be designated for the purpose of Section 58 of the CWA and a Risk Management Plan shall be required where the following apply: a. Any quantity of DNAPL in a WHPA-B with a vulnerability score of 10, including within an ICA for trichloroethylene; or b. Any quantity of the following chlorinated solvents in a WHPA-B or WHPA-C, with a vulnerability score < 10, including within an ICA for TCE, or within a WHPA-D in an ICA for TCE: • Dioxane-1,4 • Tetrachloroethylene (PCE), TCE or another DNAPL that could degrade to TCE • Vinyl chloride or another DNAPL that could degrade to vinyl chloride; or c. 25 Litres or greater of Poly Aromatic Hydrocarbons (PAHs) in a WHPA-B or WHPA-C, with a vulnerability score < 10, including within an ICA for TCE, or within a WHPA-D in an ICA for TCE.

Within the area of the Site mapped as WHPA-B vulnerability score 8 (approximately 14%), three significant water quality threats may apply, WC-CW-16.3 (already discussed above) as well as policies WC-MC-2.3 and WC-MC-3.4, and these two additional policies are listed below (Table 4). It is not expected that these policies will exert constraints on residential development of the Site as neither a waste management disposal site (WC-MC-2.3) nor a sewage treatment plant (WC-MC-3.4) are proposed.

Table 4 – Waste Disposal and Sewage System Relevant Policies
(Grand River Source Protection Committee, 2022b**)**

Policy	Text
WC-MC-2.3	To ensure the establishment, operation or maintenance of a Future waste disposal site within the meaning of Part V of the *EPA* that is subject to an Environmental Compliance Approval, never becomes a significant drinking water threat, where this activity would be a significant drinking water threat, the MECP shall prohibit these activities within the Environmental Compliance Approvals process.

Policy	Text
WC-MC-3.4	To ensure the establishment of Future sewage treatment plants with effluent and/or bypass discharge or Future sewage treatment plants with sewage storage tanks never becomes a significant drinking water threat, where these activities would be a significant drinking water threat, the MECP shall prohibit these activities within the Environmental Compliance Approvals process. This policy does not apply to the expansion, modification, optimization, re-rating, operation, maintenance or replacement of Existing sewage treatment plants.

Each Significant Water Quality Threat Source Protection Plan policy has a legal effect, and these are listed below in Table 5.

Table 5 – Legal Effect of Water Quality Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Legal Effect
WC-CW-16.3	Section 58 (Risk Management Plans) of the Clean Water Act
WC-MC-2.3	Affects EPA and Ontario Water Resources Act Prescribed Instrument Decisions (e.g. Stormwater management ECA approvals)
WC-MC-3.4	

4.3.2 Significant Water Quantity Threats (WHPA-B vulnerability score of 10)

Within the area of the Site mapped as WHPA-B and a vulnerability score of 10 (or <0.2% of the Site, Map 5b), there are many significant water quality threat policies listed for consideration however many will not require consideration (Grand River Source Protection Committee, 2022b).

For example, the current development plan proposes a southernmost stormwater management facility that covers the WHPA-B with a vulnerability score of 10. Consequently, additional groundwater protection measures will be required by the MECP for the Environmental Compliance Approval (Policy WC-MC-3.7), as well as some Risk Management Plan component (Policy WC-CW-3.8), however these policies do not appear to include prohibition. Also, additional groundwater protection measures will be required for any sanitary sewers in this area by the MECP (WC-MC-3.5), however this policy also does not appear to include prohibition of sanitary sewers and the current design does not appear to have any in this area (MTE, 2025).

The policies discussed in Section 4.3.1 also apply to the small area of WHPA-B with a vulnerability score of 10.

There are also a number of other policies that may apply to this small area regarding road salt, snow storage and fuel storage and handling, e.g. during the construction phase. However, these 'threats' are likely to be managed as part of the stormwater ECA for the built-out development.

However, many of the policies are not expected to affect the proposed development because the water quality threats will not be occurring, e.g. waste disposal sites, sewage holding tanks, sewage treatment plant discharge, industrial effluent, application of agricultural source material, storage of agricultural source material, application of non-agricultural source material, handling and storage of non-agricultural source materials, application of commercial fertilizer to land, handling and storage of commercial fertilizer, application of pesticide, handling and storage of pesticides, the handling and storage of an

organic solvent. de-icing aircraft chemical runoff, livestock grazing/animal yards and a liquid hydrocarbon pipeline.

4.3.3 Significant Water Quantity Threats

There are three Significant Water Quantity Source Protection Plan policies that apply to residential development of the Site: (i) WC-MC-23.2, (ii) WC-MC-23.3 and (iii) WC-MC-23.5. These are listed below from the Source Protection Plan in Table 6.

Table 6 – Relevant Water Quantity Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Text
Common introductory text	To ensure that any Recharge Reducing Activity never becomes a significant drinking water threat, where this activity would be a significant drinking water threat as prescribed by the CWA
WC-MC-23.2	…the MECP should, during any pre-submission consultation for Environmental Compliance Approvals for Stormwater Management Facilities and / or Sewage Works, encourage design and implementation measures for the maintenance of groundwater recharge functions including but not limited to LID, minimizing impervious surfaces, and lot level infiltration. The MECP shall issue Environmental Compliance Approvals for Stormwater Management Facilities and / or Sewage Works that, where appropriate, incorporate conditions that address groundwater recharge considerations. In addition, the MECP, where appropriate, shall consider incorporating conditions in the Environmental Compliance Approvals to address the proper functioning of groundwater recharge measures including, but not limited to, conditions requiring or related to operations, inspection and maintenance of the Stormwater Management Facilities and / or Sewage Works, groundwater or surface water monitoring related to groundwater recharge, and documentation including manuals and maintenance records. For Stormwater Management Facilities and / or Sewage Works located within the WHPA-Q in a Chloride, Sodium or Nitrate ICA, the MECP shall consider conditions that require best management practices that address how recharge will be maintained and water quality will be protected from application and storage of winter maintenance materials including Salt.
WC-MC-23.3	… the County, as the Planning Approval Authority, in consultation with the Municipalities, shall only approve settlement area expansions within a WHPA-Q as part of a municipal comprehensive review or as otherwise provided by the Provincial Growth Plan for the Greater Golden Horseshoe, where it can be adequately demonstrated that recharge functions can be maintained or improved on lands designated as Significant Groundwater Recharge Areas within a WHPA-Q.
WC-MC-23.5	… the Planning Approval Authority shall require that all site plan, subdivision and vacant land condominium applications to facilitate Major Development for new residential, commercial, industrial and institutional uses provide a water balance assessment for the proposed development which addresses each of the following requirements:

Policy	Text
	a. maintain pre-development recharge to the greatest extent feasible through best management practices such as LID, minimizing impervious surfaces, and lot level infiltration; b. where pre-development recharge cannot be maintained on site, implement and maximize off-site recharge enhancement (within the same WHPA-Q) to compensate for any predicted loss of recharge from the development; and c. within a WHPA-Q in a Chloride, Sodium or Nitrate ICA, the water balance assessment must consider water quality when recommending best management practices and address how recharge will be maintained and water quality will be protected including consideration of how water quality will be protected from application and storage of winter maintenance materials including Salt. The Planning Approval Authority shall use its discretion to implement the requirements of this policy to the extent feasible and practicable given the nature of the proposed development, specific circumstances of a site and off-site recharge opportunities.

However, as the Site is not located in a Chloride, Sodium or Nitrate ICA, consequently those portions of these policies should not apply.

Each Significant Water Quantity Threat Source Protection Plan policy has a legal effect, and these are listed below in Table 7.

Table 7 – Legal Effect of Water Quantity Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Legal Effect
WC-MC-23.2	Affects EPA and Ontario Water Resources Act Prescribed Instrument Decisions (e.g. Stormwater management ECA approvals)
WC-MC-23.3	Affects decisions under the Planning Act and Condominium Act and Imposes obligation on Municipality and Source Protection Authority
WC-MC-23.5	

5.0 Discussion

For expansion of the Settlement Area (and subsequent development of the Site), it will be required to adequately demonstrate that "*recharge functions can be maintained or improved on lands designated as Significant Groundwater Recharge Areas within a WHPA-Q*" (Policy WC-MC-23.3). However, as mentioned in Section 4.2, the amount of SGRAs at the Site may be reduced upon further analysis.

The demonstration of maintenance, or improvement of recharge, is expected to be accomplished through a water balance assessment (and Stormwater Management Plan) that maintains "…*pre-development recharge to the greatest extent feasible through best management practices such as LID, minimizing impervious surfaces, and lot level infiltration*…" (Policy WC-MC-23.5).

However, it is expected that Site development will also require maintenance of baseflow to the Nichol Drain including ecological function with respect to temperature control (CVC, 2012). This may require additional monitoring of the Nichol Drain.

In a somewhat similar proposed residential development that we assisted with, pre-development recharge was primarily maintained through a below grade infiltration facility to allow for centralized infiltration.

Source Protection Plan policies to prevent significant water quality threats are not anticipated to prohibit the development plan but will require some additional coordination to address potential concerns with the MECP and the Source Water Protection Risk Management Officer.

The unevaluated wetland at the southern end of the Site is presumed to be maintained by a combination of precipitation and runoff, however site characterization would be required to confirm, e.g. wetland hydroperiod monitoring, borehole, monitoring well and measurement of the vertical groundwater gradient.

6.0 Conclusions and Recommendations

The following conclusions are provided:

1. Site boreholes have identified less permeable at-surface soils than regionally mapped and used for regional water budget modelling.

2. Recently modelled GRCA Tier 3 Water Budget recharge rates appear to over-estimate actual Site recharge, and historic GRCA Tier 2 Water Budget recharge rates appear to over-estimate the amount of Significant Groundwater Recharge Areas at the Site.

3. The Site primarily drains to the Nichol Drain, which has permanent flow, a coldwater thermal classification and indicators of groundwater discharge.

4. Tile-drainage is mapped in the northeast portion of the Site with some discharge to the Nichol Drain. This tile-drainage may have a role in sustaining the drain flow and temperature regime.

5. The bedrock aquifer beneath the Site has been primarily mapped as having low vulnerability with a portion of the Site mapped as medium and a very small portion mapped as highly vulnerable.

6. The Site overlies Wellhead Protection Areas (WHPAs) for Municipal Well E1 located about 535 m south-southeast. The WHPAs include both quality protection zones (WHPA-B, WHPA-C and WHPA-D) and a quantity protection zone (WHPA-Q, entire Site).

7. Significant Groundwater Recharge Areas (SGRAs) have been regionally mapped over 83% of the Site and are expected to decline in extent following analyses of local geologic conditions.

8. The Site is considered a significant water quantity threat to the municipal groundwater supplies if groundwater recharge is reduced.

9. Source Water Protection Water Quality Threat Policies are not expected to prevent residential development of the Site, however additional coordination with the MECP and the Source Water Protection Risk Management Officer will be required, e.g. with respect to the southernmost stormwater management facility.

10. Source Water Protection Water Quantity Threat Policies are expected to require post-development groundwater recharge at the Site to equal or exceed pre-development groundwater recharge rates. It is expected that the water management approach will require maintenance of groundwater discharge to the drain including coldwater temperature.

11. The unevaluated wetland may be maintained by a combination of precipitation and runoff but field characterization and analyses would be required to confirm.

The following recommendations are provided:

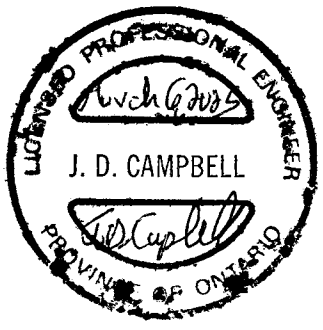
1. Project budgeting for residential development of the Site should include consideration for (a) further Site characterization (e.g. Nichol drain flow, level and temperature monitoring and Unevaluated wetland staff gauge, borehole and monitoring well), (b) analyses of local geologic conditions and GRCA modelling to complete the water balance assessment and refined SGRA mapping, and (c) design of Site infiltration measures.

2. Pre-consultation should be completed with the local government agencies (Wellington County, Centre Wellington, Grand River Conservation Authority and Wellington Source Water Protection) in order to scope the level of assessment required.

We trust this information is sufficient for your present needs. Please do not hesitate to contact us if you have any questions.

Yours truly,

TERRA-DYNAMICS INC.



Jayme D. Campbell, P. Eng.
Senior Water Resources Engineer

Attachments
Drawing No.1 – Elora Sands Borehole Location Plan
Map 1 – Land Use Change and Future Recharge
Map 2 – OMAFRA Municipal Drain and Tile-Drainage

Map 3 – Surficial Geology
Map 4 – Local Elora Cross Section C-C'
Map 5 – Centre Wellington Wellhead Protection Area Final Vulnerability
Map 5b – Bedrock Aquifer Vulnerability
Map 6 – County of Wellington, Centre Wellington Wells, Significant Drinking Water Threat Applicability
Map 7 – Water Quantity Threats
Map 8 – Significant Groundwater Recharge Areas

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LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Borehole Location Plan

Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Borehole Location Plan

Drawing No. 1

Easting (m)

541500 543000 544500 546000 547500 549000 550500 552000 553500

Northing (m)

4843500 4842000 4840500 4839000 4837500 4836000 4834500

TOWNSHIP OF MAPLETON

TOWNSHIP OF CENTRE WELLINGTON

SITE

F1 F2 F4 F5 F6 F7

E1 E2 E3 E4

Fergus

Elora

Salem

Belwood Reservoir

Grand River

Irvine Creek

Carroll Creek

Swan Creek

Sideroad 5

Sideroad 10

Sideroad 15

Sideroad 18

Sideroad 19

Sideroad 4

Sideroad 6 North

2nd Line

4th Line

6th Line

Wellington 29 Road

Wellington 7 Road

Townline Eramosa Garafraxa

N

- Land Use Change
- Municipal Boundary
- Water Body
- Watercourse
- Highway
- Road
- Municipal Well

Future Groundwater Recharge (mm/yr)

- 0
- 0 < ... <= 75
- 75 <...<= 125
- 125 < ...<= 200
- 200 < ... <= 300
- 300 < ... <= 400
- 400 < ... <= 500
- > 500

Map 1

1:45,000

500 0 500 1,000 metres

NAD 1983 UTM Zone 17N

Reference: Data obtained from Grand River Conservation Authority (2017) and GeoBase® used under license. Contains information licensed under the Open Government Licence – Ontario.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget Assessment - Risk Assessment Report

Land Use Change and Future Recharge

Date:	Project:	Submitter:	Reviewer:
October 2019	23876	J. Melchin	D. Van Vliet

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Figure 5

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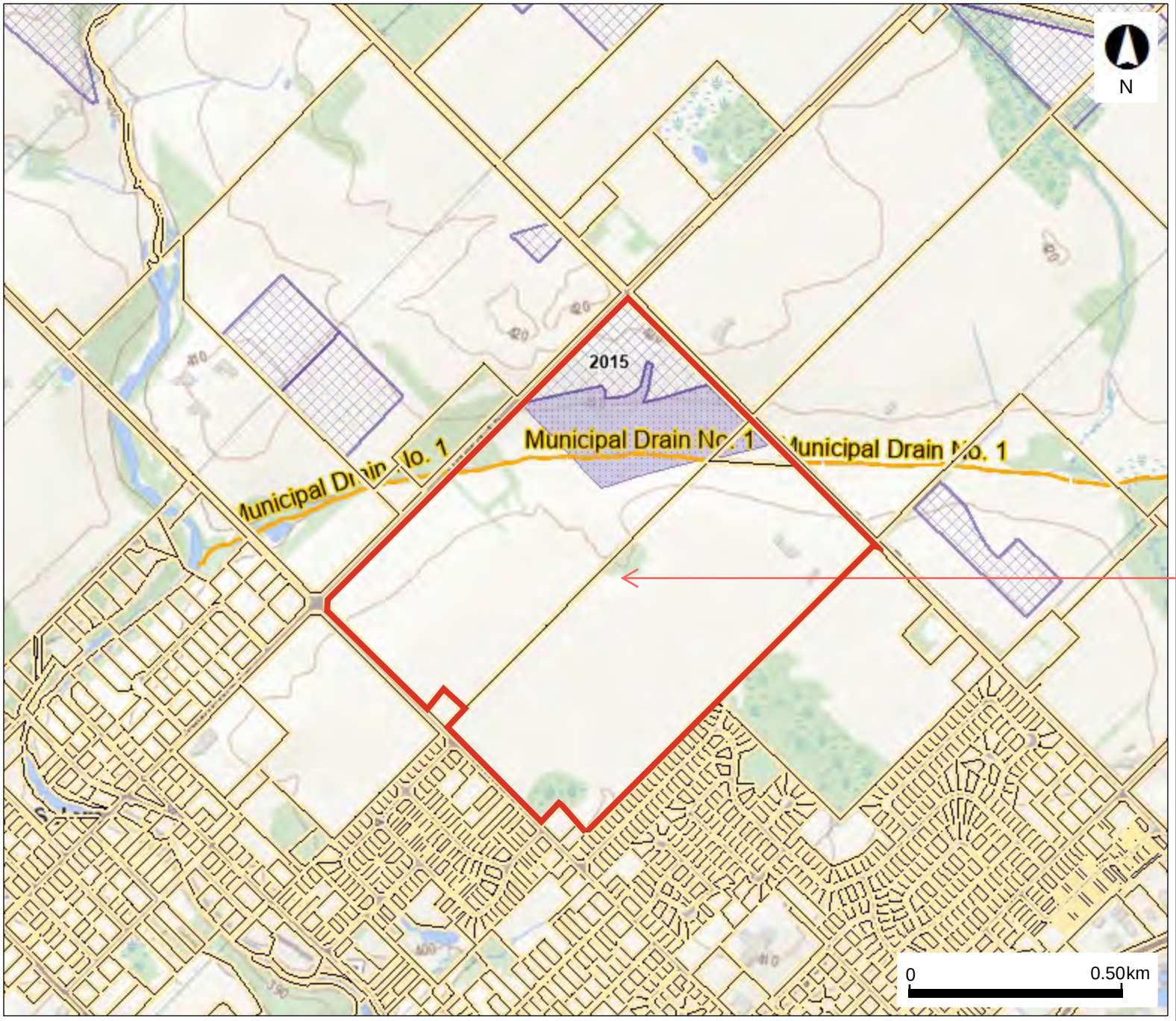
OMAFRA Municipal Drain and Tile-Drainage



Legend

- Assessment Parcel
- Constructed Drains
  - Open or Unknown
  - Closed/Tiled
- Agricultural Tile Drainage
  - Random
  - Systematic

Map 2

SITE

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

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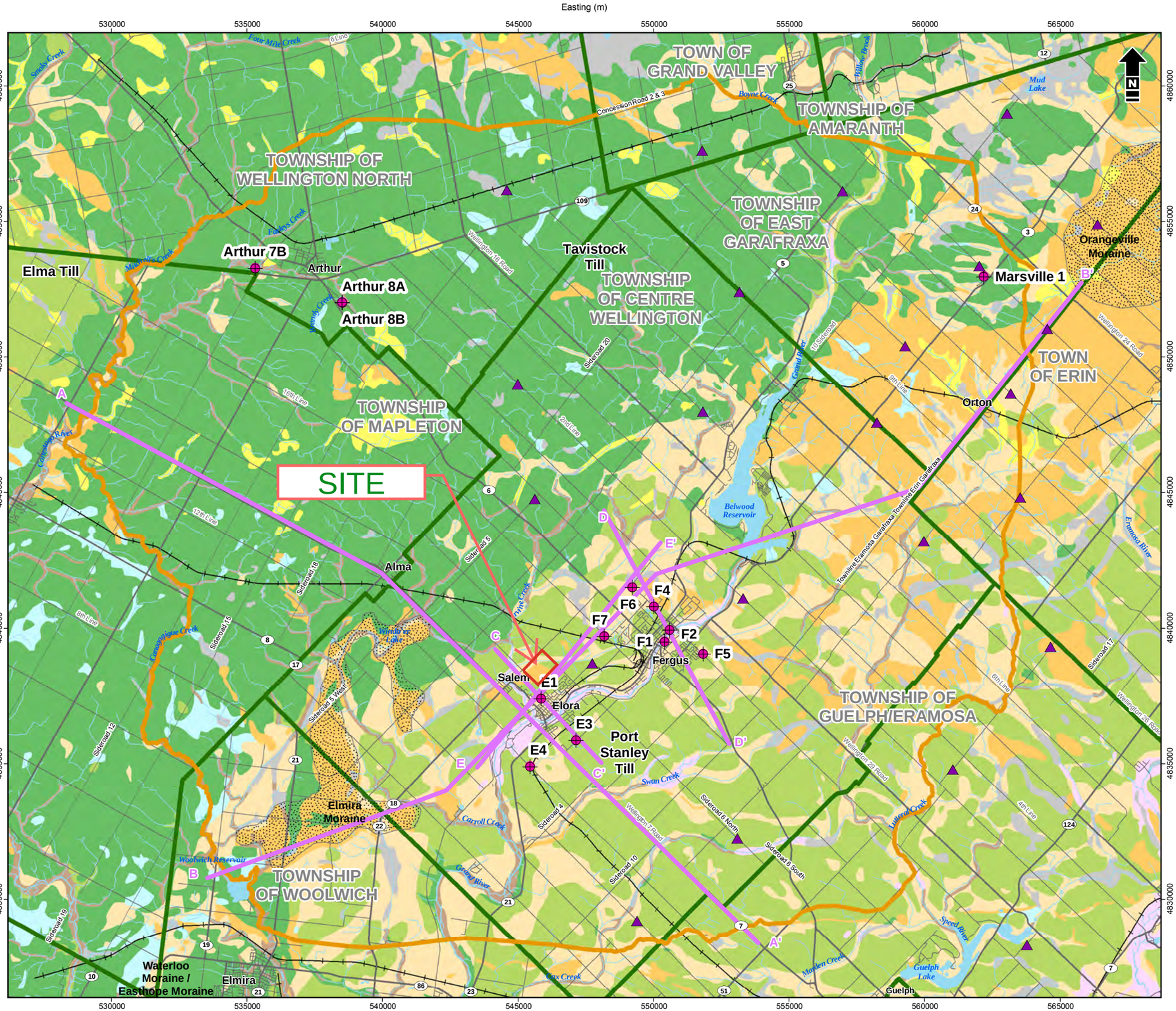

Study Area
Moraine
Municipal Boundary
Water Body
Watercourse
Highway
Road
Railroad Trail
Conceptual Cross Section Location
Municipal Well
High Quality Overburden Well

Surficial Geology

- 3: Paleozoic bedrock
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 5d: Glaciolacustrine-derived silty to clayey till
- 6: Ice-contact stratified deposits
- 7: Glaciofluvial deposits
- 7a: Sandy deposits
- 7b: Gravelly deposits
- 8a: Massive-well laminated
- 9c: Foreshore-basinal deposits
- 19: Modern alluvial deposits
- 20: Organic deposits

Map 3

Reference: Data obtained from Grand River Conservation Authority (2017) and GeoBase® used under license. Municipal boundaries obtained from Ontario Ministry of Municipal Affairs and Housing.
Surficial Geology from the Ontario Geological Survey 2010. Surficial geology of Southern Ontario: Ontario Geological Survey, Miscellaneous Release--Data 128-REV.
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1:145,000
m
1,400 0 1,400 2,800
NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget and Local Area Risk Assessment

Surficial Geology

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Nov 2017	23876	J. Melchin	P. Meyer	C. Curry

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Figure 8

I:\Grand River\CA\23876\Figures and Tables\T3\2017\Report\Characterization Report\Figure-8-Surficial_Geology.mxd

Map 4

Irvine Creek
MILLFORD CRES
WOOLWICH ST E
MATHIESON ST
C-C'
SOPHIA ST
E-E'
DAVID ST E
MOIR ST
COLBORNE ST
CHURCH ST E
MILL ST E
Grand River
WATER ST E
MCNAB ST E
YORK ST E
HALLS DR
1ST LINE

SITE

Municipal Well E1

C (N)

C' (S)

6705138 (263.8)
6710107 (57.7)
6710818 (51.5)
6709795 (10.9)
6709734 (32.1)
6709830 (5.1)
6709735 (292.0)
MW2-11 (264.9)
6711919 (32.4)
E1 (48.7)
6710701 (66.5)
6700128 (164.5)
6700126 (168.9)
6700137 (275.7)
6703463 (369.9)
MW1-12 (375.0)
E3 (115.6)
6710773 (41.3)
6705103 (182.6)

Guelph Formation
Goat Island Fm – Ancaster Mbr
Goat Island Fm – Niagara Falls Mbr
Gasport Formation
Lions Head Formation
Cabot Head Fm
Irondequoit, Rockway, and Merriton Fms (IRM)
Older Paleozoic Rocks
?

Elevation (m asl)
420
400
380
360
340
320
300
280
260
240
220

0
1000
2000
3000
4000
5000

Distance (m)

LEGEND

- Road
- Drainage
- Observed Water Level
- Profile
- Top of Bedrock
- Screened Interval

Borehole Lithology

- Topsoil, fill
- Organic deposits
- Clay, silty clay
- Silt, clayey silt, sandy silt
- Clay to clayey silt till
- Silt to sandy silt till
- Sandy till
- Sand, silty sand
- Gravelly sand, gravel
- Limestone, Dolostone
- Shale

Interpreted Unit

- Grand River Outwash (AFA2)
- Tavistock, Port Stanley Till (ATB1)
- Moraine Aquifer (AFB1)
- Maryhill/ Catfish Creek Drift (ATB3, ATC1, AFC1, ATC2)
- Pre-Catfish Aquifer (AFD1)
- Canning Drift Aquitard (ATE1)
- Pre-Canning Aquifer (AFF1)
- PreCanning Aquitard (ATG1)

NOTE: Water levels for domestic wells are levels contained within the WWIS. Water levels for high quality wells are from recent, higher quality transient water level observations.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget and Local Area Risk Assessment

Local Elora Cross Section C-C'

Date:	Project:	Technical:	Reviewer:	Drawn:
08 Nov 2017	23876	J. Melchin	P. Meyer	C.Curry

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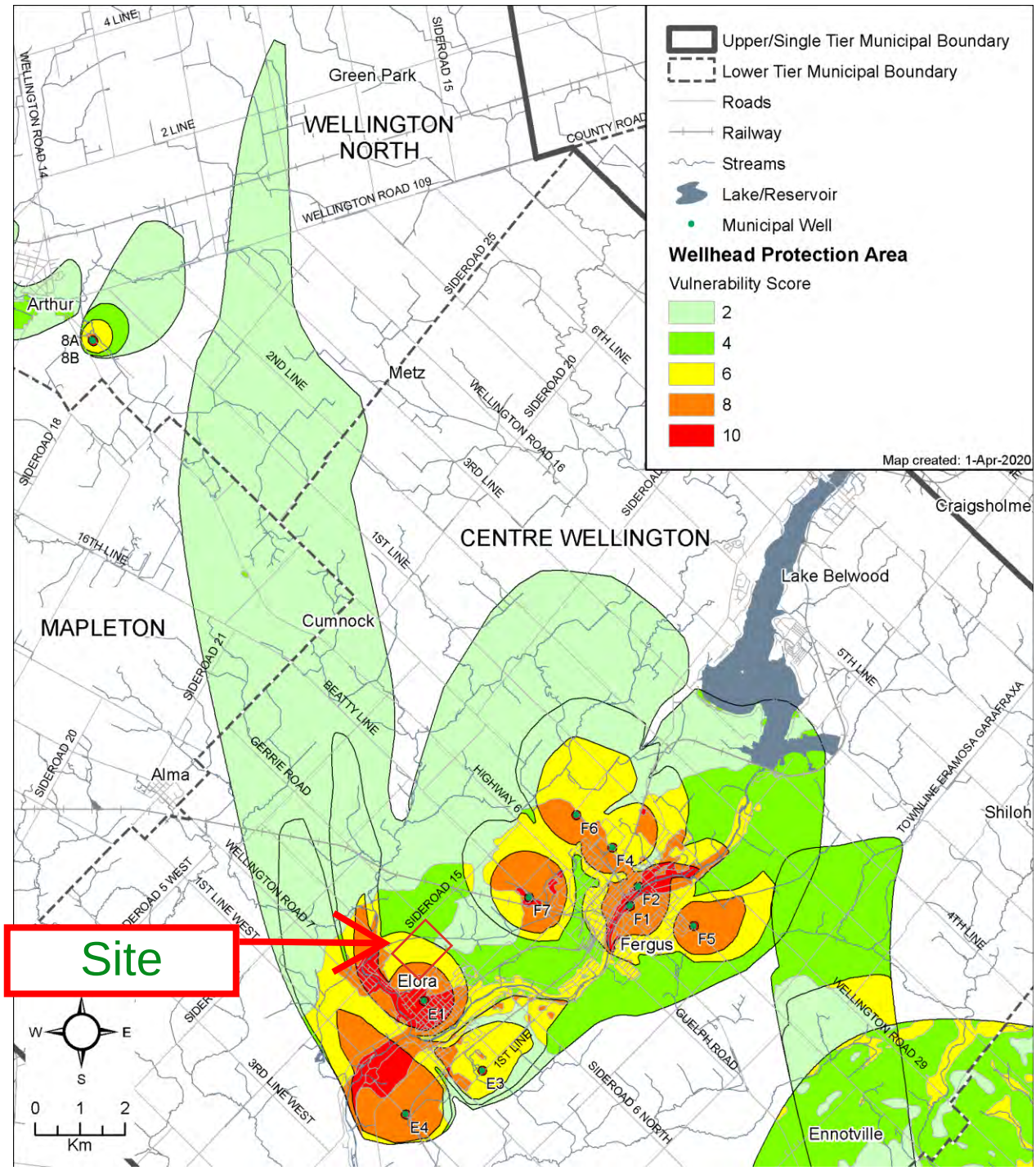
Figure 13

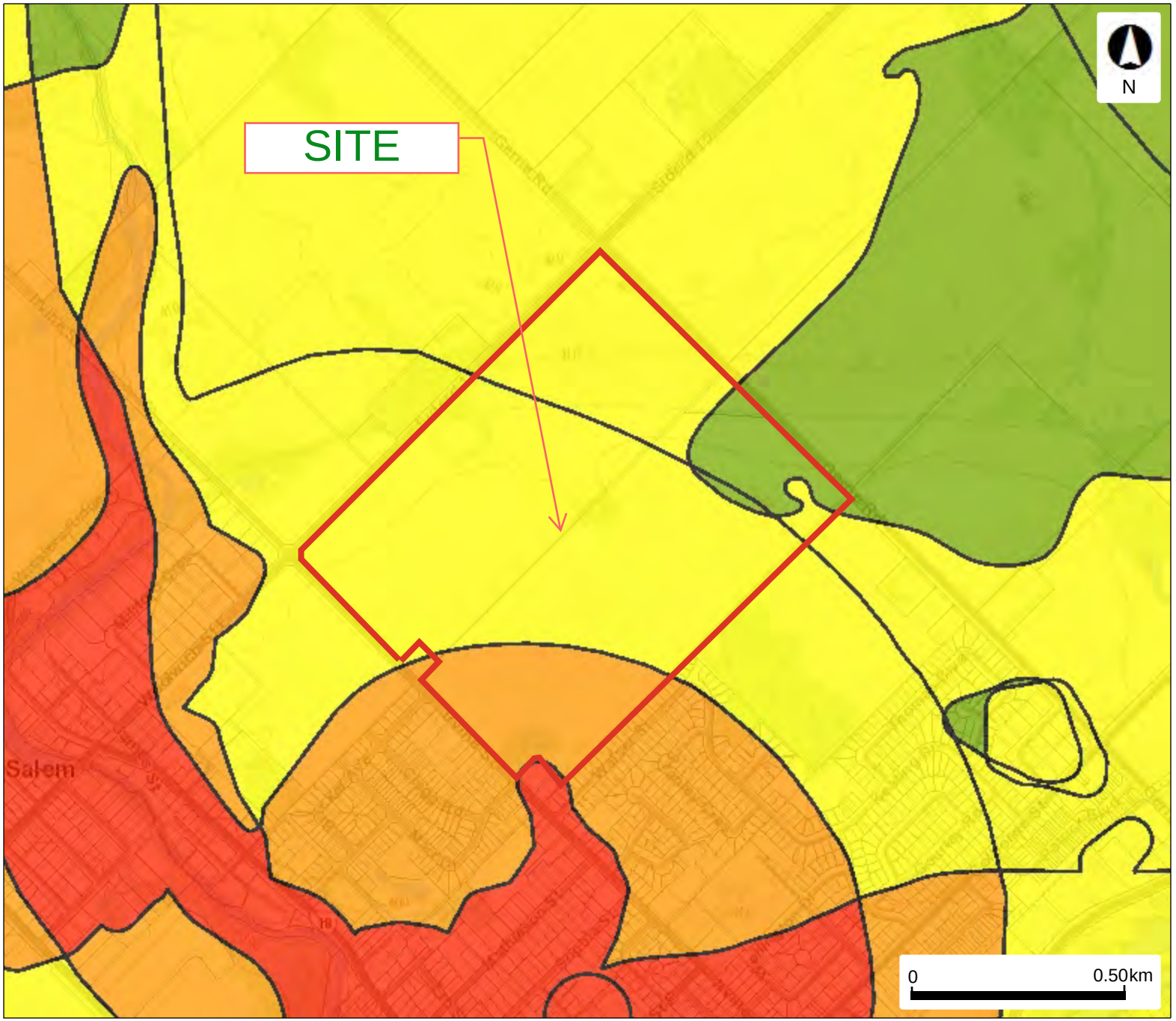
I:\GrandRiverCA\23876\Figures\Tables\T3\2017\Report\CharacterizationReport\Figure-13-Local_Elora_Cross_Section_C-C.mxd

Map 6-29: Centre Wellington Wellhead Protection Area Final Vulnerability



Map 5

MECP Bedrock Groundwater Vulnerability



Legend

Vulnerable Scoring Area - Groundwater

- 2
- 4
- 6
- 8
- 10

Assessment Parcel

Map 5b

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

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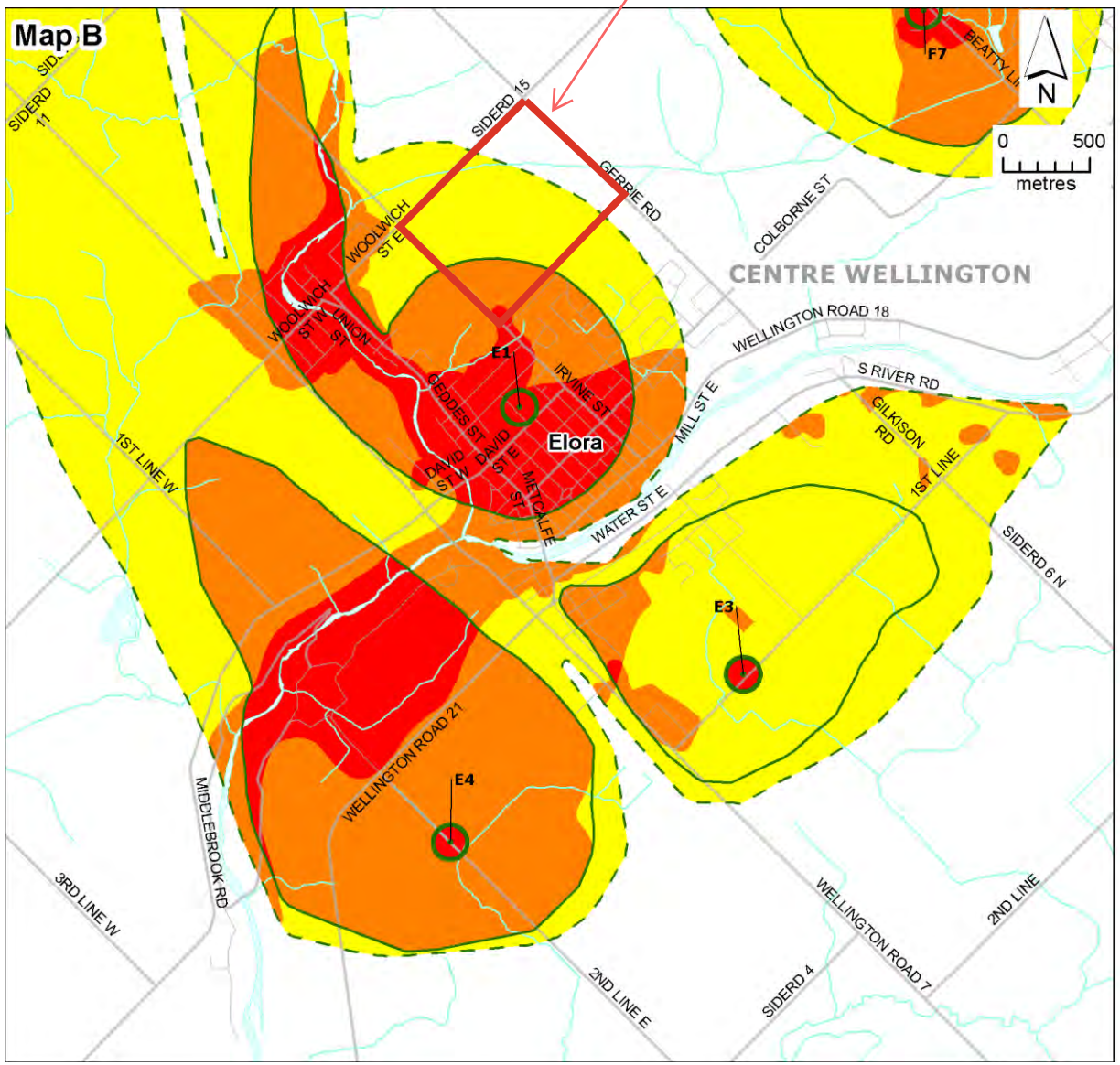
Map Created: 2/27/2025
Map Center: 43.69877 N, -80.43112 W

7.12 Schedule F: County of Wellington, Centre Wellington Well, Map B



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Significant Drinking Water Threat Policy Applicability

Significant Drinking Water Threat Policy Categories		Vulnerability Scores on Map 10	8	2,4,6
1.	Waste Disposal			
2.	Sewage Systems			
3, 4.	Agricultural Source Material			
6, 7.	Non-Agricultural Source Material*			
8, 9.	Commercial Fertilizer*			
10, 11.	Pesticide			
12, 13.	Road Salt*			
14.	Storage of Snow			
15.	Fuel			
16.	DNAPLs			
17.	Organic Solvents			
18.	Aircraft De-icing			
21.	Livestock Area			
22.	Oil Pipelines			

Note: This table provides a summary of the activities listed in the Clean Water Act (2006) that apply as Prescribed Drinking Water Threats (PDWT) within Non-GUDI Wellhead Protection Zones on this map. For details refer to the Drinking Water Threats Tables from the Ministry of the Environment and Climate Change, and the text of this Source Protection Plan.
*Application of Commercial Fertilizer, Non-Agricultural Source Material, and Road Salt may not be a significant drinking water threat in some areas due to the % managed land, livestock density, and/or % impervious surface calculations for these areas. See the text of this plan for further details.

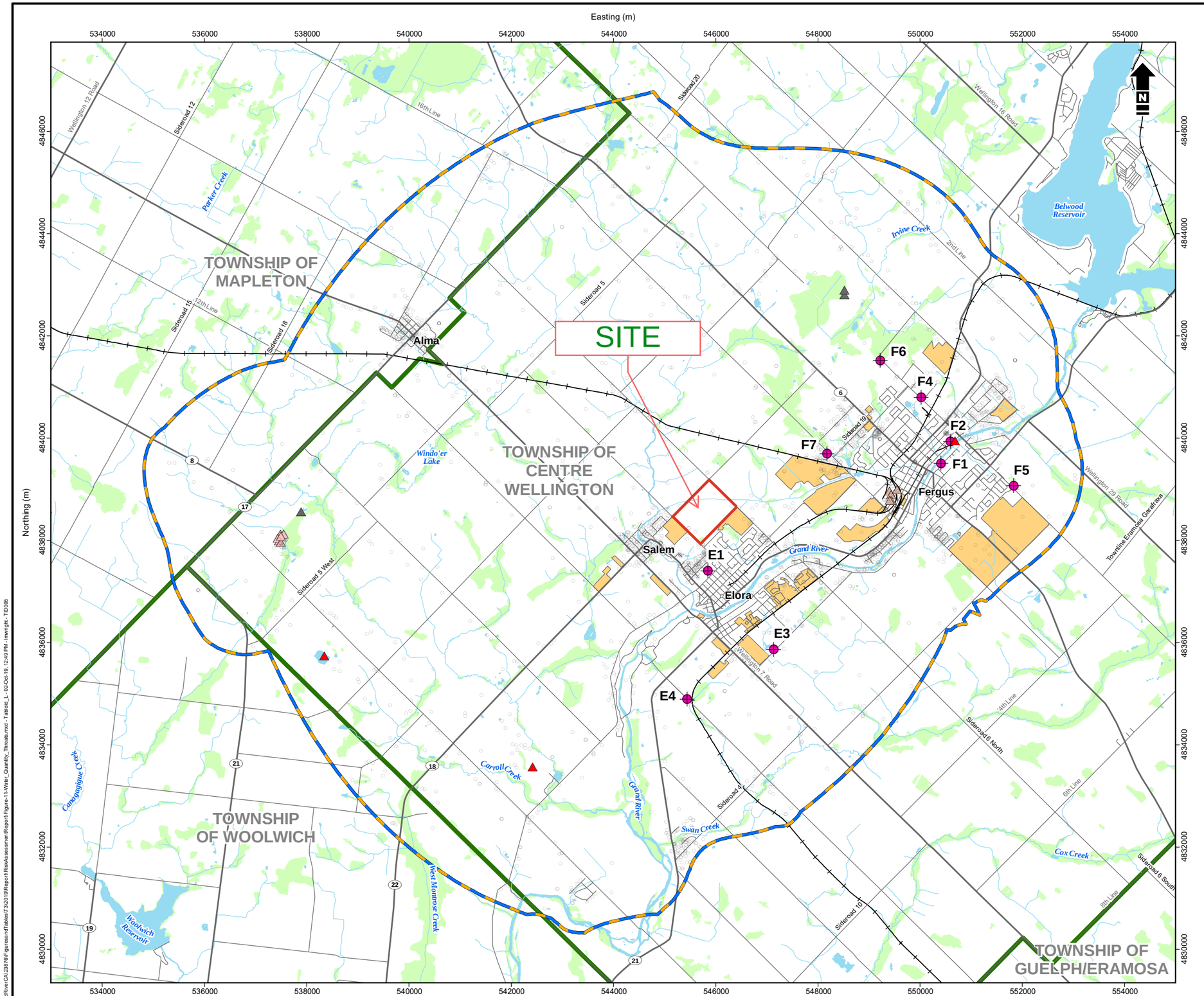
- Well
- Road
- Minor River
- Lake / Main River
- Wellington County Boundary
- Lower Tier Municipal Boundary

Wellhead Protection Zones:
- WHPA-A
- WHPA-B
- WHPA-C

Grand River Conservation Authority

1. Updated November 08, 2019
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at www.sourcewater.ca.
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

Map 6



- WHPA-Q1/WHPA-Q2/Groundwater Vulnerable Area
- Municipal Boundary
- Groundwater Recharge Reduction Threat
- Wetland
- Water Body
- Watercourse
- Highway
- Road
- Railroad Trail
- Municipal Well
- Non-Permitted Consumptive Water Taking Threat

Permitted Consumptive Water Taking Threat

- Commercial
- Industrial
- Miscellaneous
- Remediation

Map 7

Note: the Risk Level assignment to the Groundwater Vulnerable Area does not imply that an individual groundwater taking or recharge reduction activity within that area will threaten the reliability of the municipal water supply.

1:75,000 metres
750 0 750 1,500
NAD 1983 UTM Zone 17N

Reference: Data obtained from Grand River Conservation Authority (2017) and GeoBase® used under license. Contains information licensed under the Open Government Licence – Ontario.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget Assessment - Risk Assessment Report

Water Quantity Threats

Date:	Project:	Submitter:	Reviewer:
October 2019	23876	J. Melchin	D. Van Vliet

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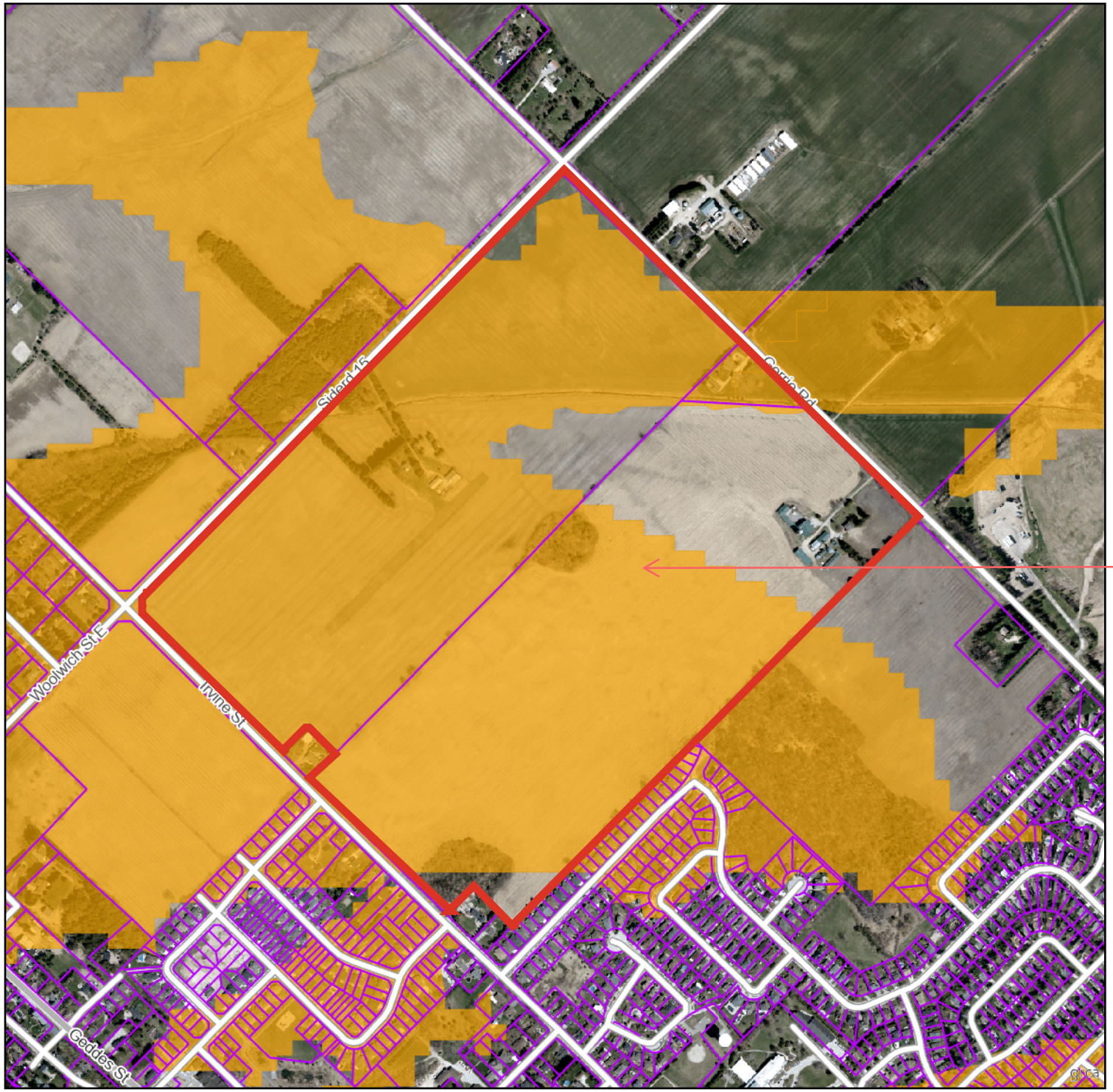
Figure 11

I:\GrandRiverCA\23876\Figures\and\Tables\T3\2019\Report\RiskAssessment\Report\Figure-11-Water_Quantity_Threats.mxd - Tabloid_L - 02-Oct-19, 12:49 PM -mwright - TD005



Grand River Conservation Authority

Date: Mar 06, 2025

Significant Groundwater Recharge Area

Legend

- Parcel - Assessment (MPAC/MNRF)
- Signif. GW Recharge - Tier 2 (GRCA)

Map 8

SITE

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The source for each data layer is shown in parentheses in the map legend.
See Sources and Citations for details.

Scale 1:9,106

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545855.94, 4838565.21 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Appendix G

Water Balance

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\Water Balance\62018-001 Water Balance Results and Calculations.xlsx

	Area ha	Precipitation (m^3)	Rain (m^3)	Snow (m^3)	Snowmelt (m^3)	ET (m^3)	Infil (m^3)	GWI (m^3)	Runoff (m^3)	Storage (m^3)
QSC Wetland										
Existing Conditions										
704	2.74	25229	19524	5705	8076	13920	13431	5121	6113	75
709	18.51	170432	131895	38537	54557	94037	90736	34595	41295	506
Total	21.25	195661	151419	44242	62633	107957	104167	39716	47407	581
Proposed Conditions										
704	0.40	3683	2850	833	1179	1206	1247	577	1842	58
709	18.51	170432	131895	38537	54557	94037	90736	34595	41295	506
Total	18.91	174115	134745	39370	55736	95243	91982	35172	43137	564
Overall Water Balance										
Existing	798.05	7348102	5686591	1661512	2352217	3967961	3925170	1482698	1864321	33122
Current	795.40	7323702	5667708	1655994	2344407	3745027	3361757	1438843	2091621	48211
Proposed	799.15	7358231	5694429	1663802	2355460	3674343	3354609	1501624	2132036	50227
Surface Water Inputs to Nichol Drain										
Existing Conditions										
Upstream	655.79	6038233	4672902	1365331	1932912	3244628	3281797	1216087	1548403	29115
Catchments 620-627	72.38	666444	515751	150693	213337	364113	346051	134734	165559	2038
Total	728.17	6704677	5188653	1516024	2146249	3608742	3627848	1350822	1713961	31153
Current Conditions										
Upstream	656.47	6044494	4677747	1366747	1934917	3047993	2737752	1180528	1772077	43897
Catchment 620	4.15	38211	29571	8640	12232	10756	11188	5971	20991	493
Catchments 621-627	64.90	597571	462452	135119	191290	327059	315496	120467	148193	1851
Total	725.52	6680277	5169770	1510507	2138438	3385807	3064435	1306966	1941261	46242
Proposed Conditions										
Upstream	656.47	6044494	4677747	1366747	1934917	3047993	2737752	1180528	1772077	43897
Catchment 620	4.15	38211	29571	8640	12232	10756	11188	5971	20991	493
SWMF Discharge	43.10	396846	307114	89733	127035	102432	170122	118842	170682	4890
Uncontrolled and External Drainage	29.12	268124	207498	60627	85830	142791	137788	54090	70442	802
Total	732.84	6747677	5221930	1525747	2160014	3303972	3056850	1359430	2034192	50083
Groundwater Balance										
Existing/Current	43.64	401818	310961	90857	128627	219052	211279	80733	100764	1270
Proposed	43.64	401818	310961	90857	128627	115582	181382	89420	159723	4120

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

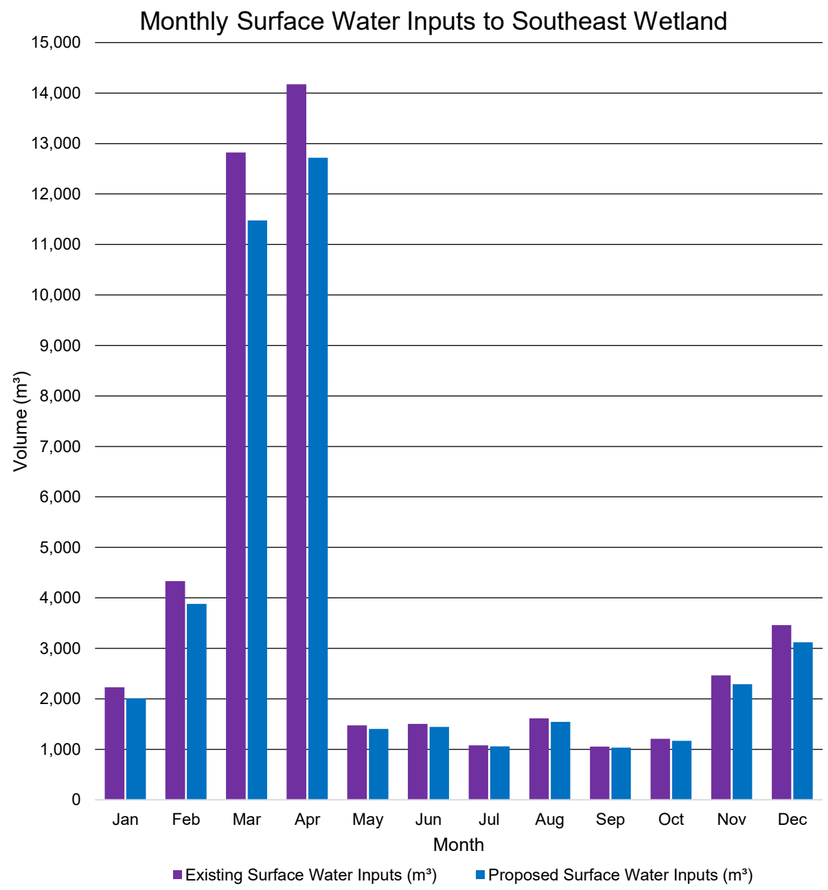
Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\Water Balance\62018-001 Water Balance Results and Calculations.xlsx

Existing/Current

Month	Precipitation (m^3)	Rain (m^3)	Snow (m^3)	Snowmelt (m^3)	ET (m^3)	Infil (m^3)	GWI (m^3)	Existing Surface Water Inputs (m^3)	Storage (m^3)
Jan	14415	3244	11171	4835	0	3118	3592	2227	8596
Feb	11848	3344	8504	8105	0	2991	2458	4331	5058
Mar	13653	5929	7724	23759	0	8787	5579	12821	-4747
Apr	16219	13995	2224	17740	6421	11784	9813	14172	-14187
May	17154	17127	27	28	16037	9312	5167	1474	-5525
Jun	18638	18638	0	0	23216	10130	1067	1505	-7151
Jul	17269	17269	0	0	22646	9488	292	1077	-6747
Aug	19087	19087	0	0	17687	10867	96	1611	-306
Sep	17250	17216	34	34	13012	9833	632	1055	2551
Oct	15953	15679	275	270	7404	9869	1311	1209	6030
Nov	18519	14043	4476	3195	1534	12584	4293	2465	10227
Dec	15655	5848	9806	4666	0	5405	5415	3458	6782
Avg	**16305**	**12618**	**3687**	**5219**	**8996**	**8681**	**3310**	**3951**	**48**

Proposed

Month	Precipitation (m^3)	Rain (m^3)	Snow (m^3)	Snowmelt (m^3)	ET (m^3)	Infil (m^3)	GWI (m^3)	Proposed Surface Water Inputs (m^3)	Storage (m^3)
Jan	12827	2886	9941	4303	0	2750	3173	2007	7648
Feb	10543	2976	7567	7213	0	2637	2171	3878	4494
Mar	12150	5276	6873	21143	0	7749	4922	11479	-4252
Apr	14433	12454	1979	15787	5668	10401	8663	12716	-12613
May	15265	15241	24	25	14138	8227	4573	1404	-4850
Jun	16585	16585	0	0	20459	8951	955	1443	-6272
Jul	15367	15367	0	0	19974	8385	264	1056	-5927
Aug	16986	16986	0	0	15622	9601	90	1542	-268
Sep	15351	15320	30	30	11490	8689	566	1034	2260
Oct	14197	13952	244	240	6535	8717	1179	1166	5317
Nov	16480	12496	3983	2843	1358	11108	3823	2290	9009
Dec	13931	5204	8727	4152	0	4767	4793	3120	6018
Avg	**14510**	**11229**	**3281**	**4645**	**7937**	**7665**	**2931**	**3595**	**47**



Appendix H

Erosion Analysis

ELORA SANDS SUBDIVISION
STORMWATER MANAGEMENT
Township of Centre Wellington, Ontario

Project Number: 62018-001
Date: October 6, 2025
Design By: TRN
File: Q:\62018_001\SWM\Erosion Analysis\62018-001 Erosion Assessment.xlsx

Year	Reach 1a						Reach 2a					
	Existing Conditions		Current Conditions		Proposed Conditions		Existing Conditions		Current Conditions		Proposed Conditions	
	Erosion Hours (hrs)	Effective Work (m^3)	Erosion Hours (hrs)	Effective Work (m^3)	Erosion Hours (hrs)	Effective Work (m^3)	Erosion Hours (hrs)	Effective Work (m^3)	Erosion Hours (hrs)	Effective Work (m^3)	Erosion Hours (hrs)	Effective Work (m^3)
1950	177	1549825	186	1550365	189	1524427	143	1371841	149	1376755	150	1347520
1951	335	3070850	367	3116732	371	3088858	266	2713320	286	2754788	288	2722820
1952	271	2241731	292	2267435	295	2237670	216	1975781	231	2002104	230	1965042
1953	175	673085	200	712706	198	686318	126	548089	145	594814	139	561006
1954	317	2105622	354	2180135	364	2150665	248	1834240	272	1904443	276	1865905
1955	318	1900260	355	1988183	344	1943201	239	1630206	272	1729447	269	1692835
1956	302	2386076	335	2456053	344	2440786	245	2109398	268	2181442	269	2151857
1957	296	1588529	325	1626678	328	1591668	230	1365214	241	1389524	245	1354694
1958	117	602111	130	624467	133	613786	96	526860	103	546030	108	538628
1959	351	3130060	381	3182465	379	3153607	288	2774444	315	2838740	314	2807978
1960	269	1993360	295	2034061	303	2019319	227	1766963	239	1798211	246	1781831
1961	185	882565	211	919706	208	892454	141	752803	168	803243	164	772960
1962	165	1107320	183	1131682	181	1105603	139	983016	148	1002996	149	979844
1963	144	1221973	154	1236460	154	1224000	118	1085965	123	1100520	123	1085918
1964	272	1908004	307	1941869	317	1904929	226	1690610	243	1714428	246	1665868
1965	379	2226247	406	2268684	406	2227298	321	1961406	334	2000020	333	1955614
1966	280	1758841	307	1795522	310	1761764	222	1528448	247	1578175	243	1531991
1967	347	2922653	392	3015533	406	2987345	277	2587511	302	2668205	305	2621678
1968	326	1985263	366	2058109	373	2026116	278	1761059	297	1821737	298	1778702
1969	255	1521709	270	1545390	274	1516619	210	1334509	221	1361322	223	1328774
1970	224	1885586	251	1916881	252	1892351	185	1673053	204	1703855	202	1670562
1971	249	2567066	276	2592587	285	2572492	212	2300206	230	2322986	230	2287174
1972	240	2386804	256	2422235	263	2410571	211	2144632	223	2184113	228	2166714
1973	316	1843243	360	1918192	358	1881007	253	1600945	275	1656256	272	1615126
1974	238	2356524	252	2377390	257	2353216	208	2114543	220	2141723	220	2109355
1975	282	2215753	315	2247127	320	2224166	242	1975903	254	1987578	253	1952734
1976	262	1799042	295	1831864	300	1789405	209	1576681	225	1600513	229	1557529
1977	211	1702598	249	1765282	247	1741298	176	1512220	197	1563433	192	1530914
1978	213	1505920	225	1526825	229	1506103	169	1318644	183	1350918	186	1328458
1979	333	2176340	359	2218918	361	2184437	264	1891469	287	1944029	290	1909440
1980	188	915962	217	972770	222	949126	136	770897	153	822715	153	791593
1981	289	1213153	309	1264514	309	1239836	219	1019315	241	1081447	242	1058584
1982	326	1993536	370	2056579	373	2008732	257	1732691	288	1793506	285	1734685
1983	184	535838	212	579478	204	544910	109	389812	131	440885	117	394463
1984	342	1930439	367	1953292	375	1922328	290	1695146	307	1723050	307	1680116
1985	318	2383420	351	2426447	358	2389295	262	2113060	285	2156224	288	2111378
1986	290	1930637	326	2023862	339	1996301	235	1704748	258	1797278	264	1758283
1987	280	1341994	300	1372320	300	1340068	214	1142068	231	1182650	230	1147345
1988	157	590796	183	641369	184	623027	107	473688	129	528750	129	509000
1989	181	792216	208	834300	210	809500	134	668084	152	713848	151	682589
1990	274	1483643	308	1538759	312	1501945	226	1297426	240	1335096	237	1286244
1991	275	1454227	318	1541884	322	1508378	210	1248530	230	1319497	232	1281355
1992	356	1591812	409	1704251	411	1660892	257	1326146	296	1436108	285	1368436
1993	155	971536	185	1023026	184	1000728	122	846677	141	890723	144	871949
1994	154	815792	168	835801	163	809536	120	700942	129	721814	128	700772
1995	222	992844	264	1079021	262	1043435	169	845568	194	923656	191	883768
1996	349	1999955	388	2043032	389	1986091	264	1719220	285	1753340	282	1688306
1997	217	1416089	237	1442178	240	1411013	174	1235999	182	1253761	187	1226585
1998	160	608620	172	627271	167	604004	101	478692	110	502502	106	479761
1999	250	1100444	276	1146028	271	1106622	181	917453	197	962471	200	933919
2000	235	1107788	262	1160021	257	1121105	166	920920	190	981072	184	936562
2001	319	2575382	349	2616106	354	2589559	260	2276546	278	2312320	282	2284240
2002	201	671231	229	709520	218	667922	136	528469	150	560826	140	517795
2003	187	1305151	207	1347908	207	1323644	147	1146690	163	1195348	161	1166749
2004	291	1554397	321	1593299	321	1556946	224	1331946	247	1376053	244	1333746
2005	218	1247951	239	1276859	246	1247627	173	1083481	183	1106791	183	1066993
nual Avera	**255**	**1638211**	**283**	**1683561**	**285**	**1653822**	**201**	**1429003**	**220**	**1473109**	**219**	**1438119**

Appendix I

Monitoring Summary

TABLE I1 SURFACE AND GROUNDWATER MONITORING PROGRAM - ELORA SANDS SUBDIVISION

Monitoring Component	Type of Monitoring	Development Phase	Sampling Frequency	Location(s)	Methodology / Timing
SWM Facilities	Water Quality (TSS)	During/Post-Construction	Seasonally	WQ1, WQ2 - Forebay and Outlet of SWMF	Manual samples collected monthly March - November and event based following significant rainfall events (>15mm).
	Water Quality (Temperature)	During/Post-Construction	Continuous (15 min. interval)	WQ1, WQ2 - Forebay and Outlet of SWMF	Water temperature continuously measured at SWMF forebay and outlet, installed upon completion of SWM facility construction and facility receiving flow from development.
Climactic Conditions	Ambient Temperature + Rainfall	All	Hourly	GRCA Shand Dam Climate Station	Hourly recordings of ambient temperature and rainfall totals.
Surface Water	Water Quality (chlorides, nitrates, total phosphorous, TSS)	All	Seasonally	Nichol Drain No. 1 (SWQ1, SWQ2)	Manual samples captured seasonally following significant rainfall events (>15mm) and one melt event (4 per year).
	Water Quality (Temperature)	All	Continuous (March - November)	Nichol Drain No. 1 (SWQ1, SWQ2)	Water temperatures will be continuously measured with recordings every 30 minutes.
Groundwater	Water Levels	All	Continuously	BH004, BH201, BH201A, BH202, BH203, BH204, BH205, BH206, BH401	Water levels continuously measured with recordings taken every 1 hour. Manual water level measurements taken 4 times per year.
	Chemistry	All	Annually	BH004, BH201, BH201A, BH202, BH203, BH204, BH205, BH206, BH401	Sampled on an annual basis and analyzed for general chemistry parameters (including major anions, cations, nutrients, metals, pH, e-coli).
Fluvial Geomorphology	Instream Erosion	Post-Construction	Refer to *Fluvial Geomorphology Assessment - Elora Sands* (Geomorphix, October 2025) for details.		

References:
https://mte85.sharepoint.com/sites/62018_001/Shared Documents/03- Reports/MTE Reports/SWM/Table I1 - Monitoring Program.xlsx

Appendix J

Floodplain Assessment

Technical Memorandum

Project Name:	Elora Sands Subdivision Floodplain Assessment	**MTE File No.:**	62018-001
To:	Michael Felinczak	**Date:**	November 4, 2025
cc:	Garett Korber, MTE Jeff Martens, MTE	**From:**	Taylor Numan

RE: Floodplain Assessment – Elora Sands Subdivision (Township of Centre Wellington)

1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by Cachet Developments (Elora) Inc. to prepare the following Floodplain Assessment in support of a Draft Plan of Subdivision application.

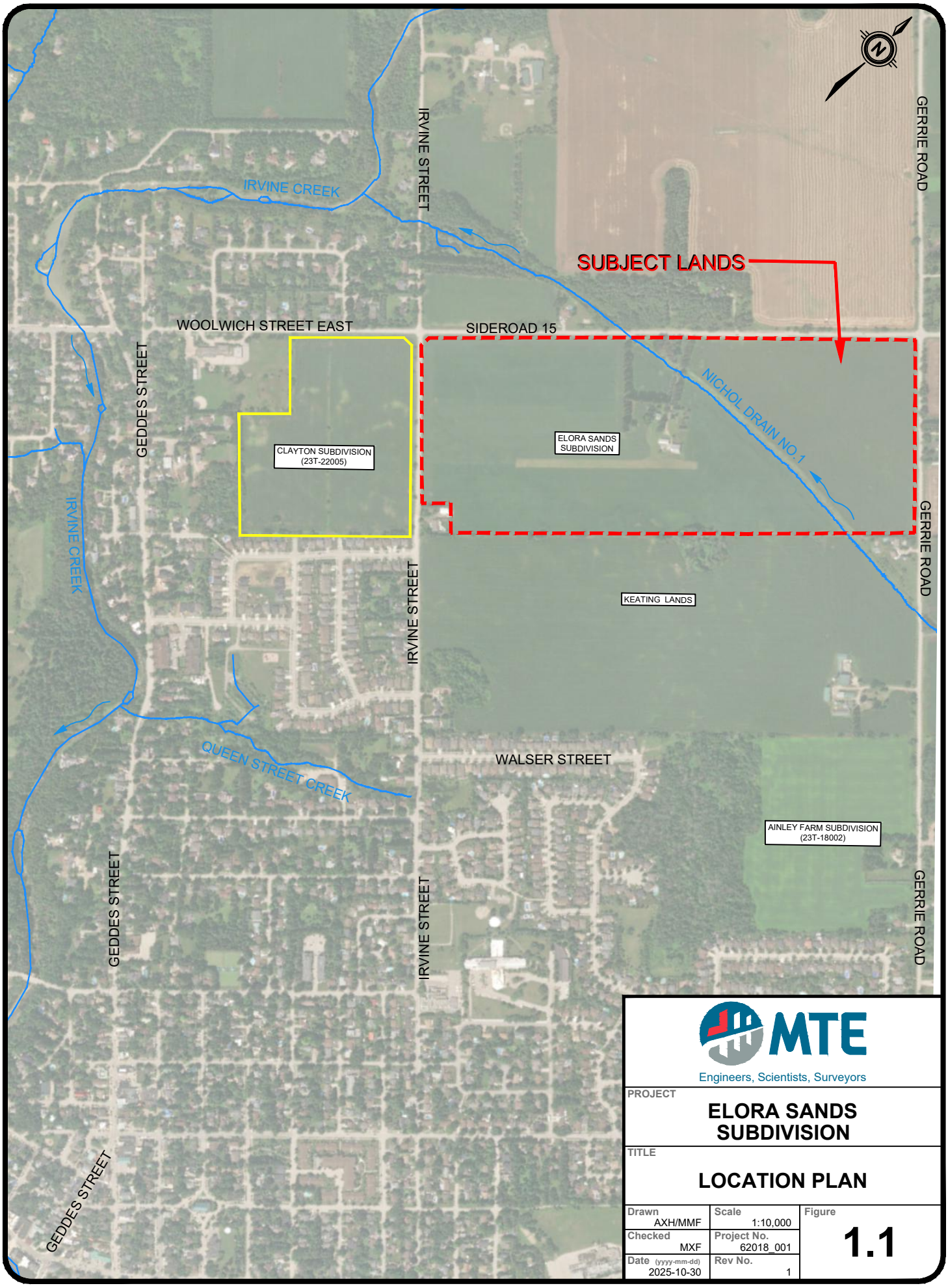
The lands that comprise the Draft Plan of Subdivision application are known as the Elora Sands (formerly Gibson Farm). The Elora Sands (referred to hereafter as the Subject Lands) are located at 7581 Sideroad 15, in the Township of Centre Wellington, and are approximately 39.8ha. Refer to **Figure 1.1** which illustrates the location of the Elora Sands property.

The Subject Lands are generally bounded by Sideroad 15 to the north, Gerrie Road to the east, existing agricultural lands to the south, and Irvine Street to the west. The Nichol Municipal Drain No. 1 (ND) flows generally in an east to west orientation through the northern portion of the Subject Lands. Further west of Irvine Street is the Clayton Subdivision (23T-22005, also owned by Cachet Developments).

1.1 Historical Perspective

The Hurricane Hazel disaster in the fall of 1954 served as the major catalyst for floodplain management in Ontario. In response to this and changing attitudes over the years, a review of Ontario's policy positions and approaches to floodplain management was initiated. This resulted in the Government of Ontario implementing a Provincial Policy Statement on Floodplain Planning in the early 1980's. The Ministry of Natural Resources (MNR) has the provincial mandate for many of the aspects of floodplain management. It is responsible for overall policy direction, flood warning and forecasting, and the administration of the Conservation Authorities Act. The Conservation Authorities are responsible for ensuring that municipal land use planning documents have satisfactory regard for the Floodplain Planning Policy Statement.

The MNR has specified regulatory floods for the Province of Ontario to prevent loss of life and to minimize property damage. Every watershed in Ontario has a regulatory flood standard used to define floodplain limits for regulatory purposes. The regulatory flood for Southern Ontario is that flood produced by the Hurricane Hazel storm (1954) or the 100-year flood, whichever is greater.



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PROJECT
ELORA SANDS SUBDIVISION

TITLE
LOCATION PLAN

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Date (yyyy-mm-dd): 2025-10-30	Rev No.: 1	

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Plot Date: November 4, 2025 - 10:42 AM

2.0 BACKGROUND INFORMATION

2.1 Nichol Drain Subwatershed Study

A subwatershed study for the ND was undertaken by the Township of Centre Wellington and is detailed in the *Nichol Drain Subwatershed Study* (NDSS) prepared by Aquafor Beech Limited et al (October 2008). Based on the NDSS, the drainage area of the subwatershed encompasses an area of approximately 767ha, mostly of agricultural lands.

The ND is an open channel type municipal drain that starts adjacent to Beatty Line, at its most upstream point. The channel flows west approximately 4km and discharges to Irvine Creek immediately west of Irvine Street, which in-turn discharges to the Grand River just downstream of the Village of Elora.

2.1.1 Nichol Drain Hydrology

Hydrologic analysis of the ND was completed as part of the NDSS process. A comparison between existing conditions and future conditions was completed to ascertain peak flow changes resulting from development. The 2-year through 100-year and regional events were modelled using the SWMHYMO hydrologic model. The following table summarizes the published peak flows from the NDSS.

Table 2.1 – Peak Flow Estimates (NDSS 2008)

Location	Drainage Area (ha)	Peak Flow Rate (m^3/s)						
		2yr	5yr	10yr	25yr	50yr	100yr	Regional
Nichol Drain – Existing Conditions								
C1	136.9	0.8	1.7	2.5	3.7	4.6	5.7	13.0
C2	168.7	1.0	2.2	3.2	4.7	5.9	7.2	15.9
C3	181.9	1.1	2.4	3.4	5.0	6.2	7.6	17.3
C4	263.0	1.8	4.0	5.9	8.6	10.9	13.3	26.0
C5a	443.0	2.8	6.1	8.8	12.6	15.9	19.1	41.7
C5b	563.0	3.5	7.7	11.1	15.9	20.1	24.3	53.3
C6a	640.1	3.7	8.4	12.2	17.3	21.7	26.2	58.4
C6b	700.6	4.0	8.9	13.0	18.4	22.9	27.7	62.6
C6c	767.1	4.3	9.7	14.2	20.1	24.9	30.0	68.8
Nichol Drain – Future Conditions								
C1	136.9	0.8	1.7	2.5	3.7	4.6	5.7	13.0
C2	168.7	1.0	2.2	3.2	4.7	5.9	7.2	15.9
C3	181.9	1.1	2.4	3.4	5.0	6.2	7.6	17.3
C4	263.0	1.8	4.0	5.9	8.6	10.9	13.3	26.0
C5a	443.0	3.3	7.2	10.4	15.0	18.3	21.7	42.9
C5b	563.0	4.3	9.3	13.4	19.3	23.7	28.3	55.9
C6a	640.1	4.5	10.0	14.3	20.3	25.0	30.0	61.5
C6b	700.6	4.9	11.0	15.6	22.1	27.2	32.7	67.4
C6c	767.1	5.4	12.3	17.4	24.8	30.6	36.7	74.3

2.1.2 Nichol Drain Hydraulics

Hydraulic analysis of the ND was conducted as part of the NDSS. Utilizing the peak flows determined through the hydrologic analysis, a hydraulic analysis was completed using the HEC-RAS modelling platform (Version 3.1.1). Floodplain limits for the ND were established between Beatty Line and Sideroad 15. The HEC-RAS model developed as part of the NDSS was provided to MTE by the GRCA.

2.1.3 Recommendation for Riparian Corridor

The 2008 NDSS recommended establishing a riparian corridor of 30m on each side of the existing stream channel. The implementation of terracing was recommended to "improve floodplain connectivity" and allow for "the development of natural forms and functions within the corridor". The study recommended beginning the terracing 0.1m above the invert of the channel. The floodplain would then be sloped at 1% before connected to the existing grades at 4:1. This approach allows for flows to spill onto the floodplain more frequently, reducing erosion stress on the main channel.

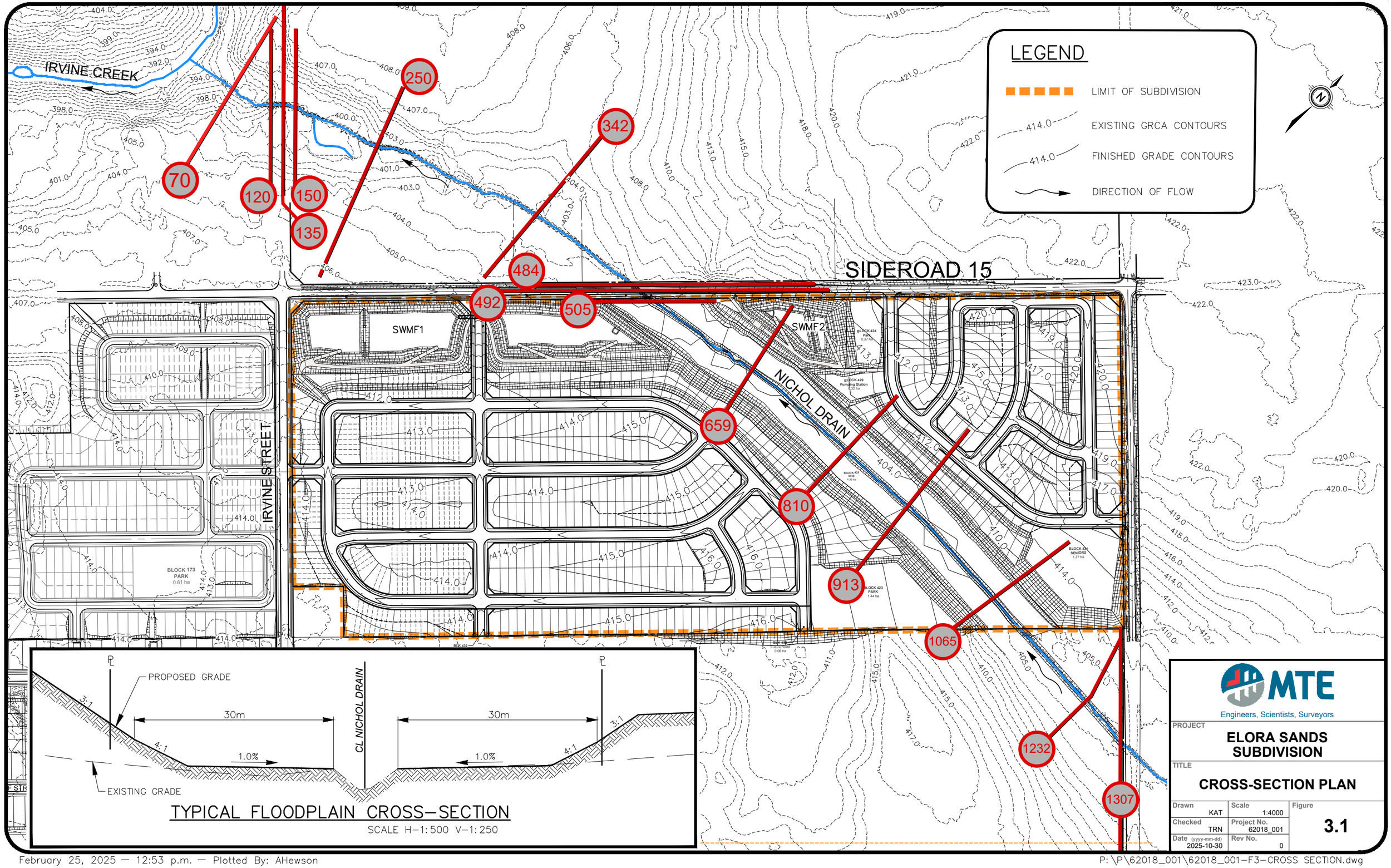
2.2 One-Zone Floodplain Policy

The Township of Centre Wellington has applied a One-Zone Floodplain policy to all floodplains, except where a Two-Zone policy has been designated through OPA No. 8. The ND floodplain bisecting the Subject Lands is a One-Zone policy area, and new development within the floodplain is generally prohibited.

3.0 POST-DEVELOPMENT CONDITIONS

The proposed development is comprised of primarily residential land use with two park blocks, three stormwater management (SWM) blocks, a sanitary pumping station block, and a natural heritage system (NHS) block containing the ND. The SWM Facilities are located adjacent to the NHS block on the north and south side of the ND, with outlets situated upstream of the Sideroad 15 culvert.

In agreement with the NDSS, floodplain terracing has been proposed for the portion of the ND which bisects the Subject Lands. Refer to **Figure 3.1** for the proposed terracing area and locations of cross-sections.



TYPICAL FLOODPLAIN CROSS–SECTION

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ELORA SANDS SUBDIVISION

TITLE
CROSS-SECTION PLAN

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Date (yyyy-mm-dd): 2025-10-30	Rev No.: 0	

February 25, 2025 – 12:53 p.m. – Plotted By: AHewson

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4.0 ANALYSIS

To update the floodplain limits with respect to the Subject Lands the following has been completed:

- Review of background literature.
- Field investigation of select culverts to verify NDSS structure inventory.
- Hydraulic modelling to establish flood elevations following development.

Peak flow rates published in the NDSS were used to establish floodplain limits in the updated HEC-RAS modelling.

4.1 Hydraulics

As part of this floodplain assessment the HEC-RAS model developed as part of the NDSS was expanded to include the reaches downstream of Sideroad 15, and the culvert which conveys flows beneath Sideroad 15.

4.1.1 Cross Sections & Drain Characteristics

As part of this floodplain assessment, updates were made to the portion of the model downstream of Gerrie Road. An additional 7 cross-sections were added to the model, with cross-section topographic information being sourced from GRCA's GRIN mapping. Cross-sections within the Subject Lands were updated based on proposed terracing of the ND floodplain. **Figure 3.1** above, depicts cross-sections that were updated or added as part of the model update.

Physical characteristics of the creek within the Subject Lands, such as channel length and slope were determined from detailed topographic survey completed by MTE. The Manning's roughness coefficient for the channel was estimated to be 0.035, and 0.055 for the floodplain. This is consistent with the upstream portion of the model developed in the NDSS.

4.1.2 Hydraulic Structures

Two crossings were added to the model as part of this update: the Sideroad 15 elliptical culvert and the Irvine Street box culvert. Culvert characteristics were taken from the structure inventory completed as part of the NDSS and then confirmed during site visits.

4.1.3 Boundary Conditions

The boundary condition at the downstream end was set to be critical depth under steady flow conditions. A sensitivity analysis was conducted to determine if the flood elevations upstream of Sideroad 15 were impacted by the selected boundary condition. It was determined under all reasonable scenarios the reach between Irvine Street and Sideroad 15 flows in a supercritical flow regime during the regulatory flood event, and the model assumes critical depth. This means that the flood elevations upstream of this supercritical reach are insensitive to any downstream backwater effects.

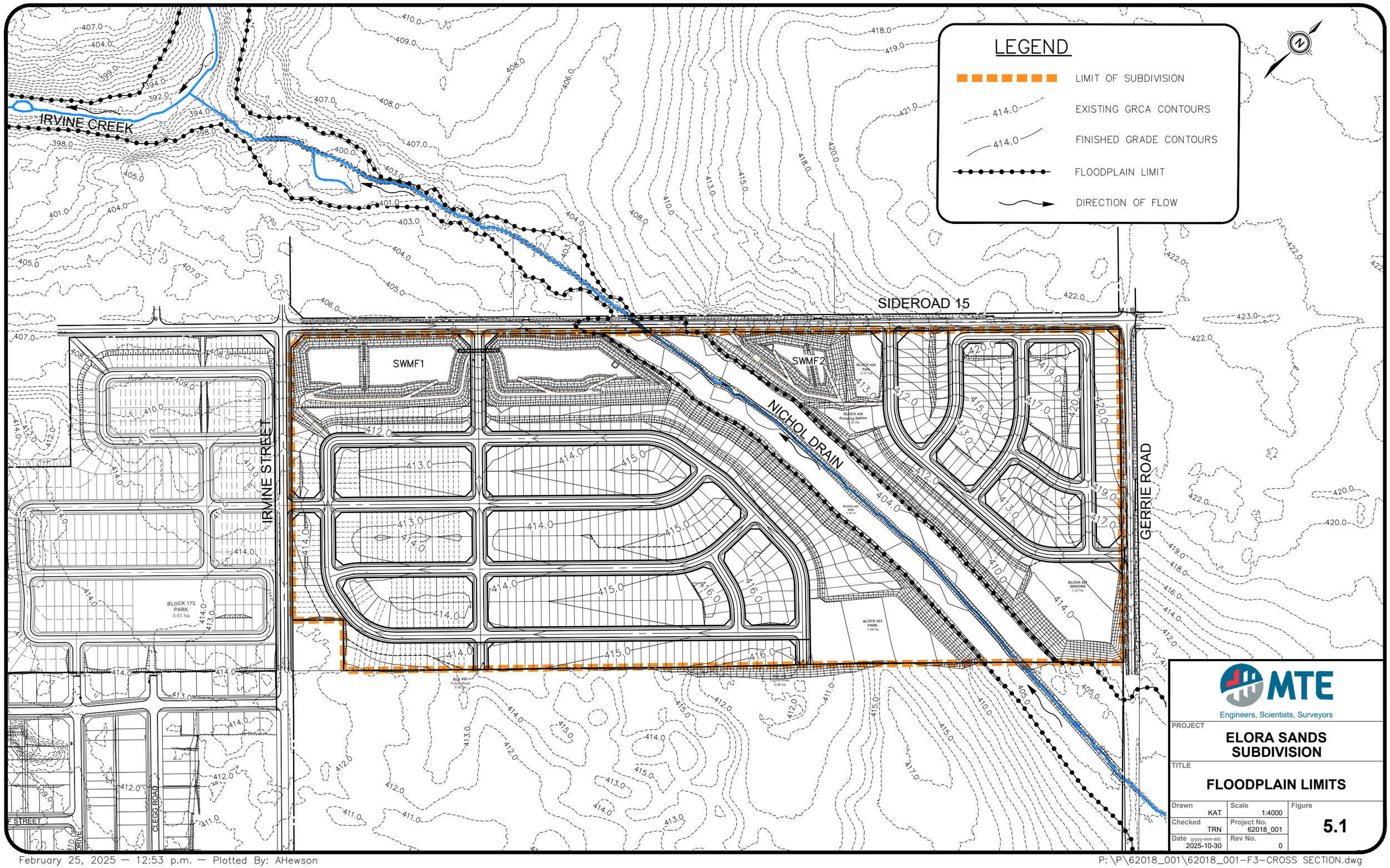
5.0 REGULATORY FLOOD LEVELS

As a result of this modelling update, the regulatory flooding elevations across the subject lands are as follows:

Table 5.1 – Flood Levels

Regulatory Flood Levels – HEC-RAS Modelling – Nichol Drain No. 2			
Section #	**Flow (m^3/s)**	**CWSEL (m)**	**EG (m)**
505	67.4	404.07	404.10
695	67.4	404.16	404.44
810	67.4	404.79	404.88
913	67.4	404.98	405.10
1065	67.4	405.32	405.42

Please refer to **Figure 5.1**.



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PROJECT
ELORA SANDS SUBDIVISION

TITLE
FLOODPLAIN LIMITS

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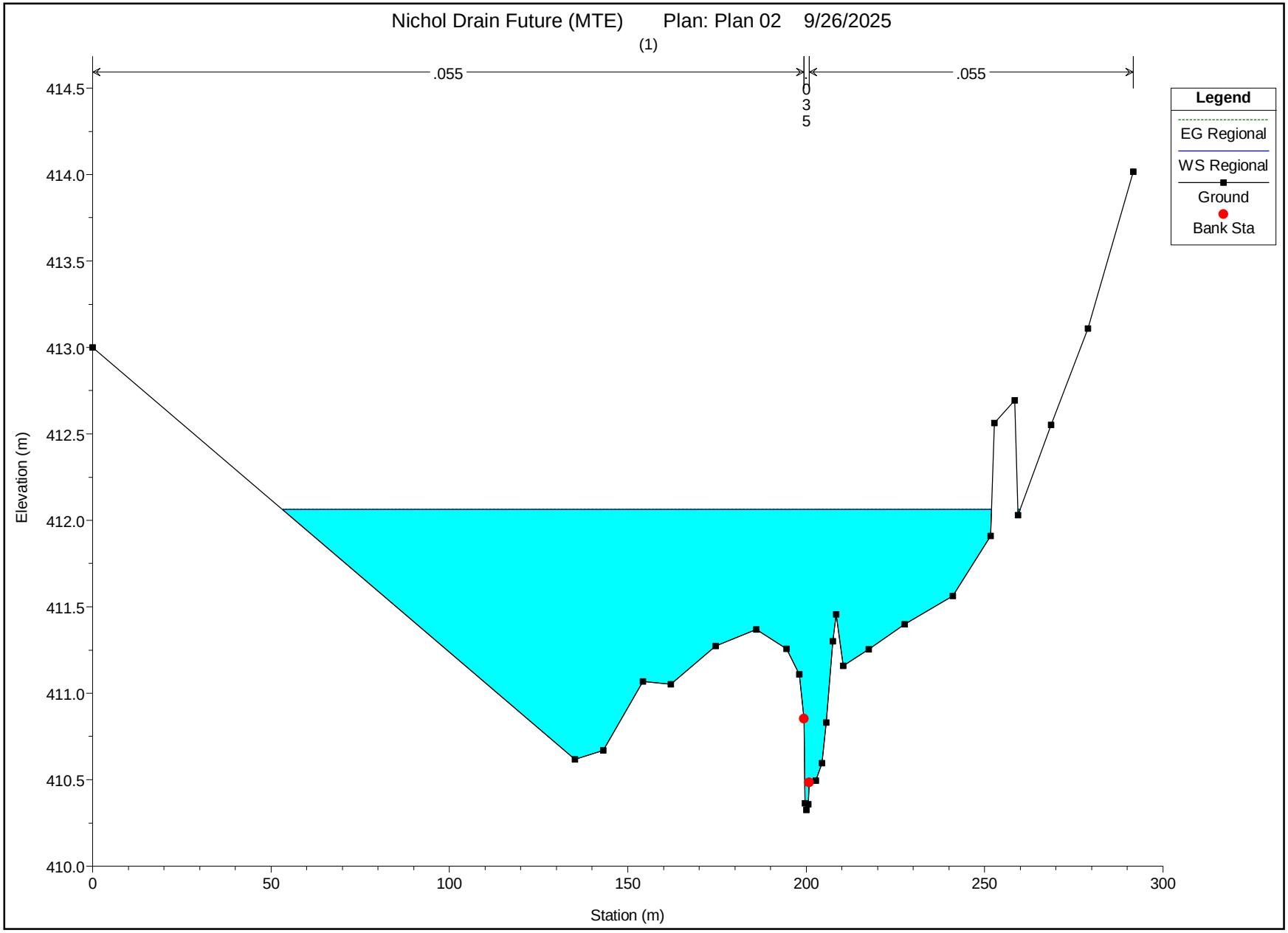
6.0 CONCLUSIONS

Past hydrologic and hydraulic studies of the Nichol Drain have been reviewed in this technical memorandum. An update and refinement of the HEC-RAS model associated with the floodplain map was completed with information provided in those studies and GRCA topographic information. The updated existing model was used to assess potential hydraulic impacts of proposed development. A HEC-RAS model incorporating the proposed terracing was built to determine future flood elevations. The results show that the proposed terracing limits the floodplain to within the NHS Block and the development complies with the One-Zone Floodplain policy.

Attachments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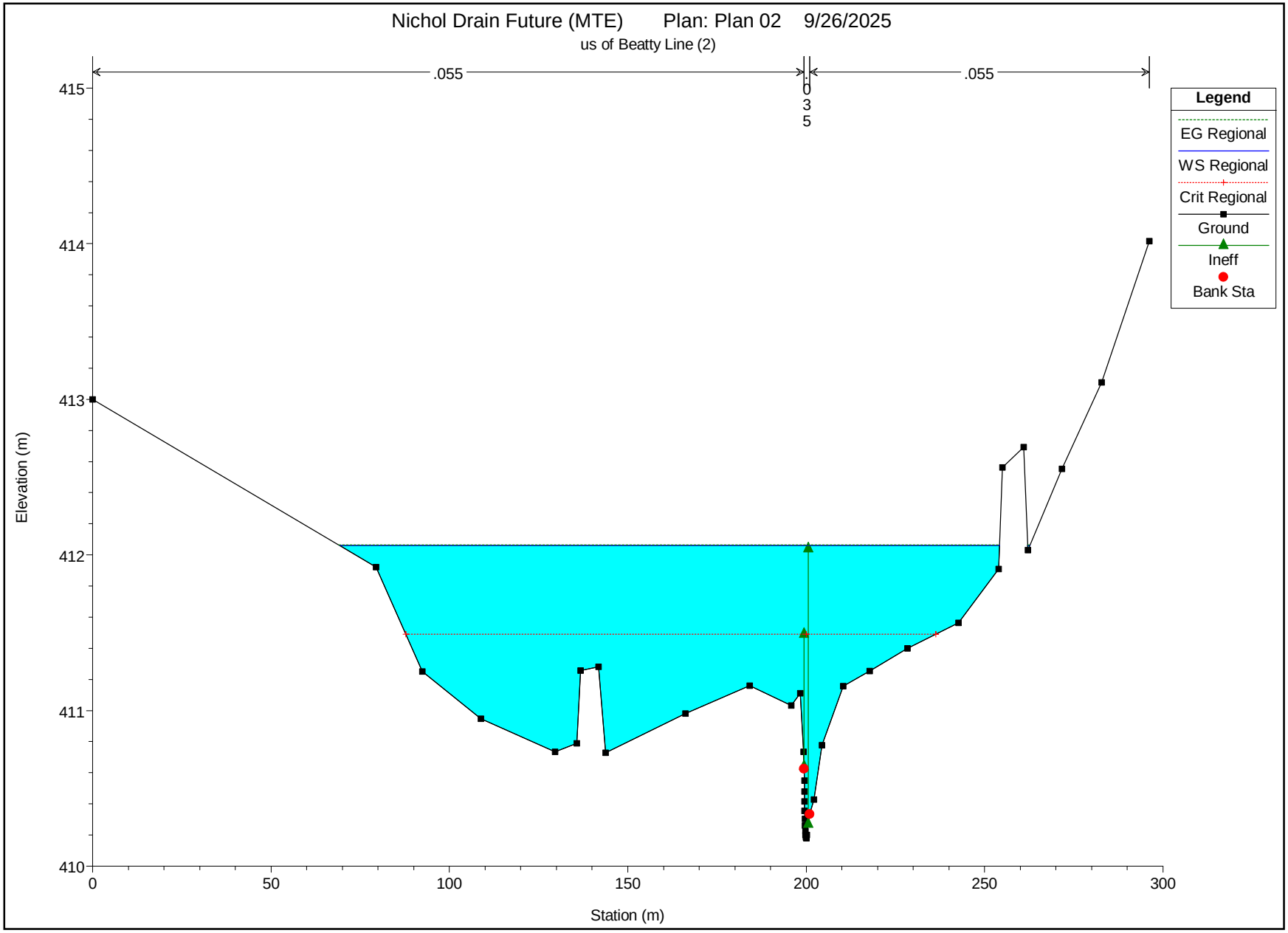
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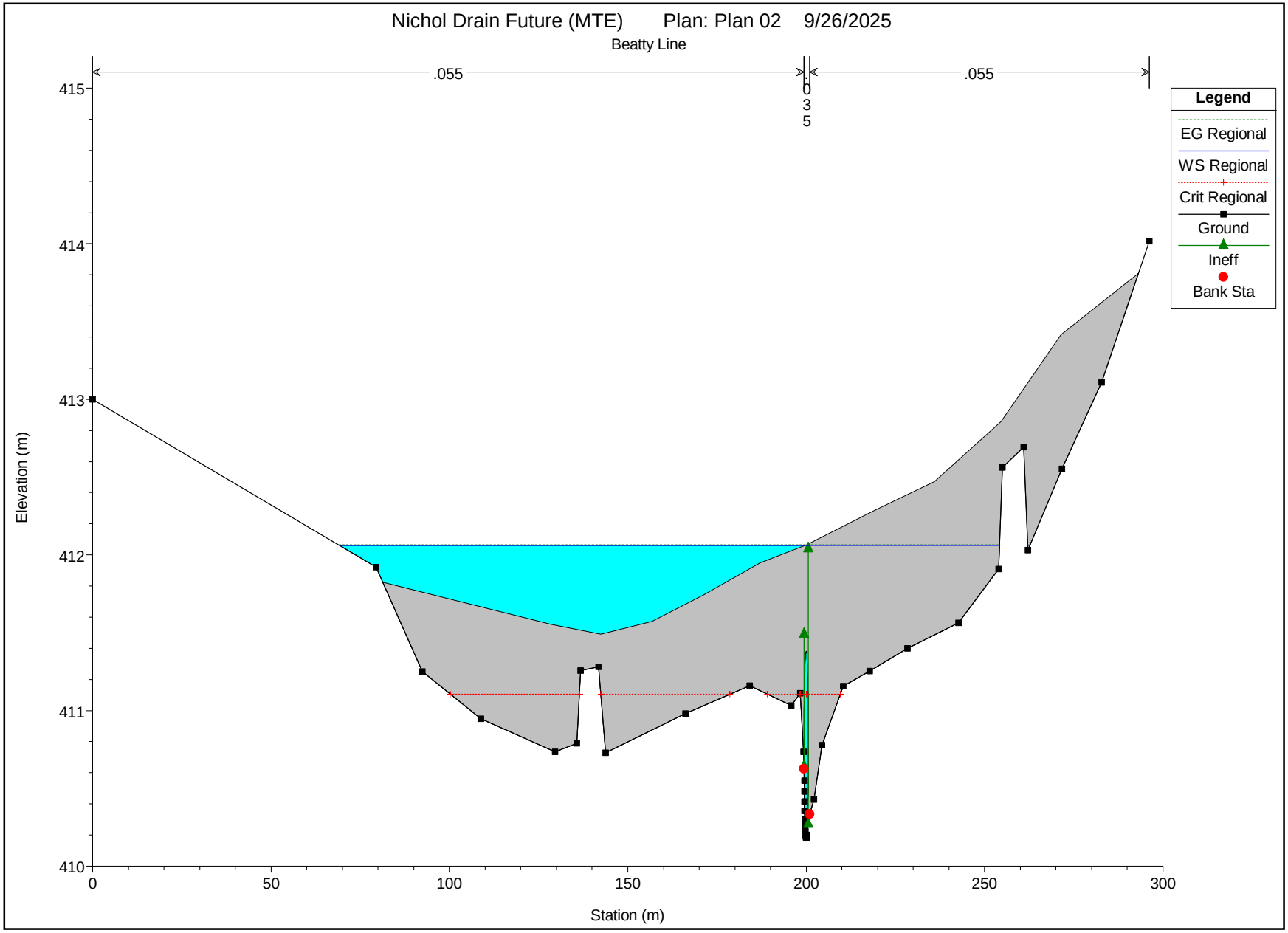
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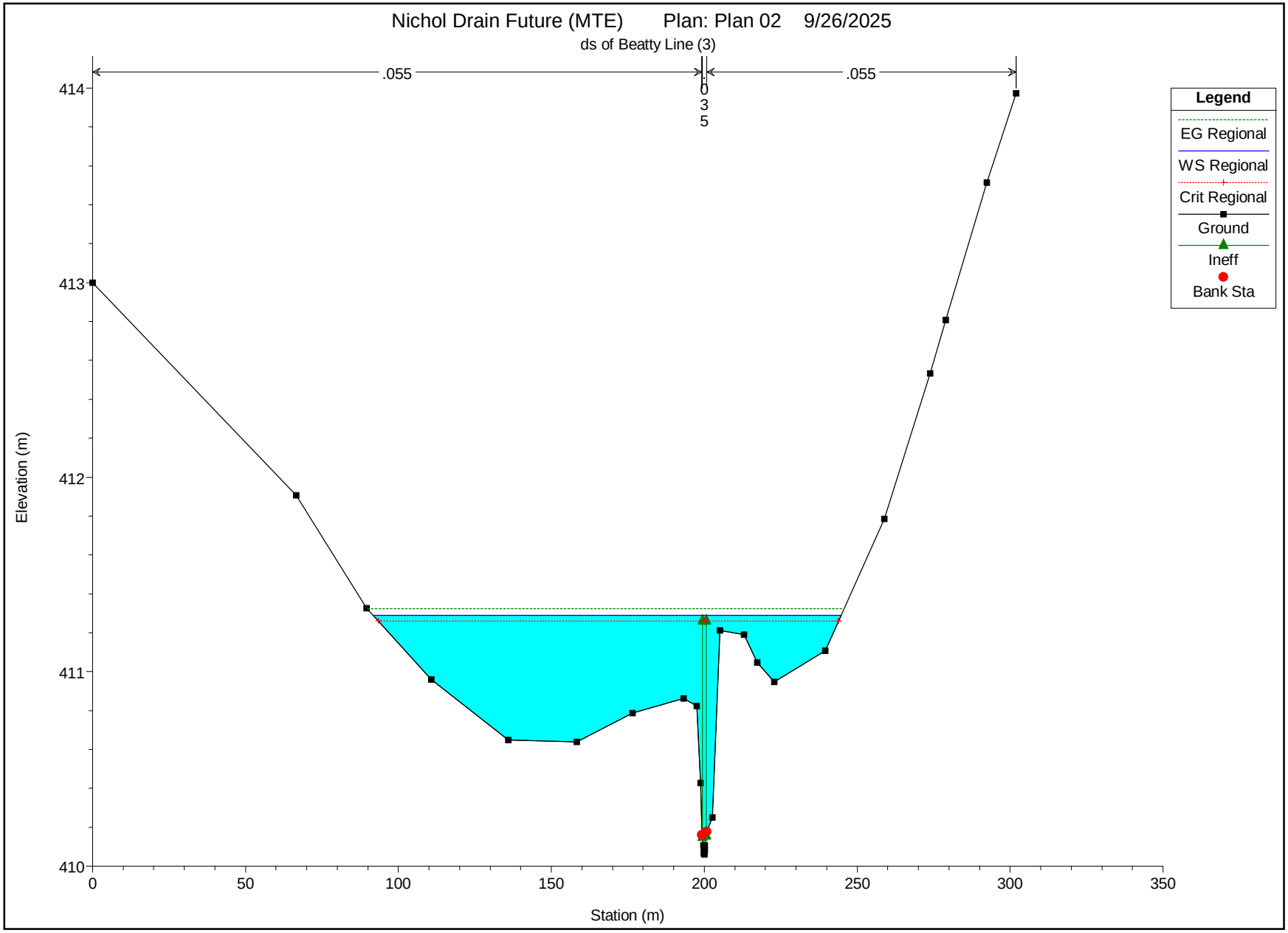
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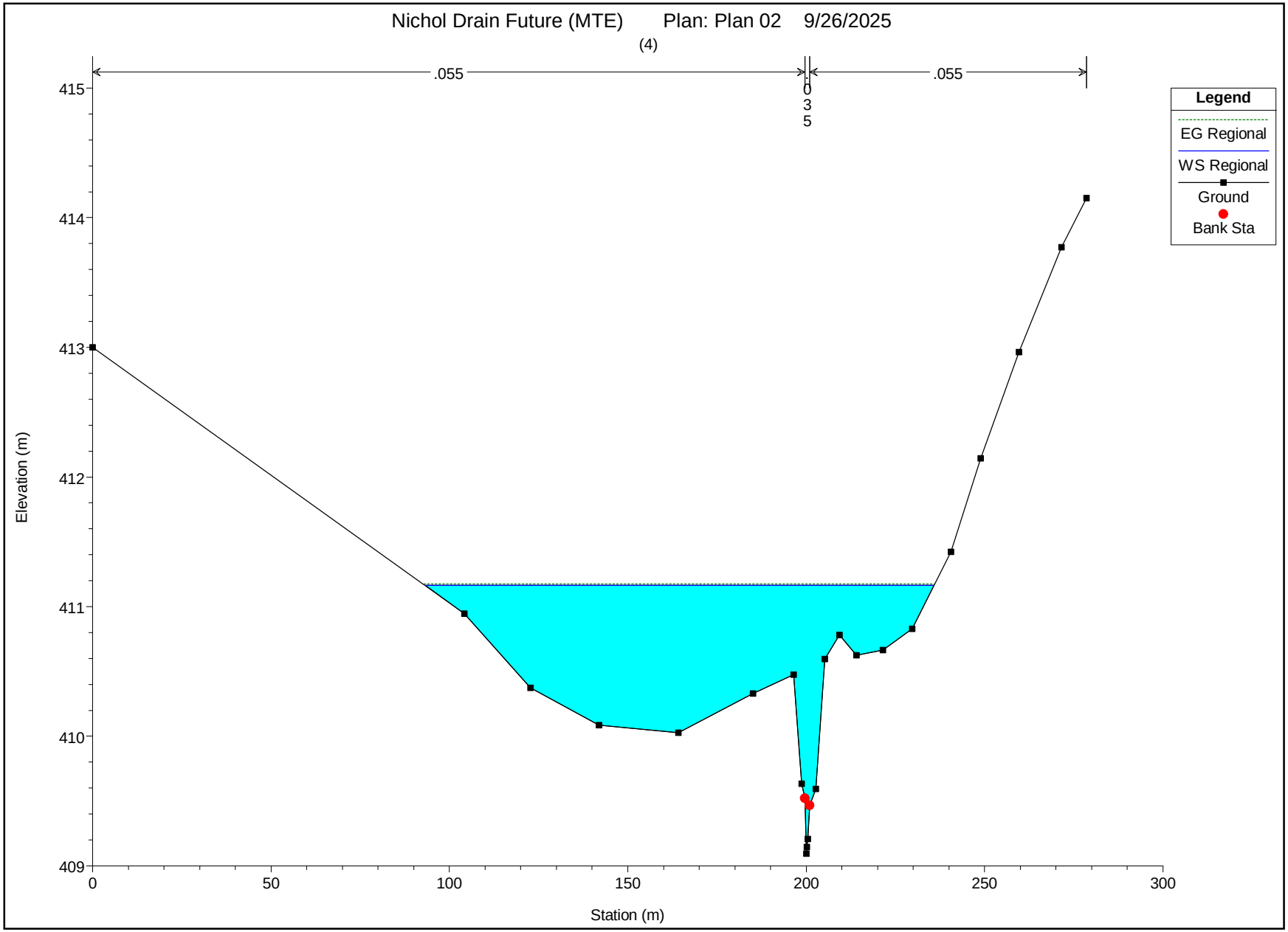
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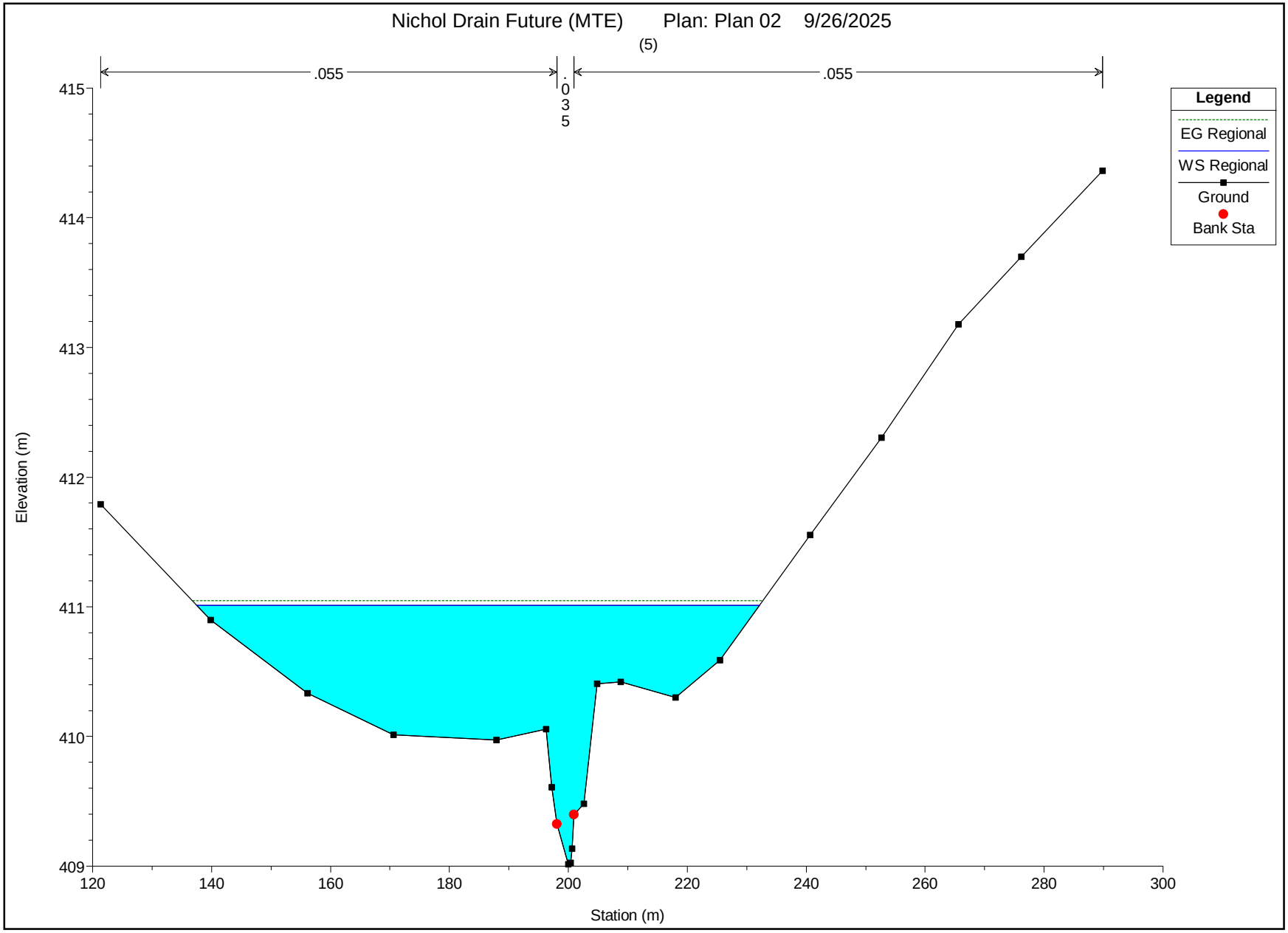
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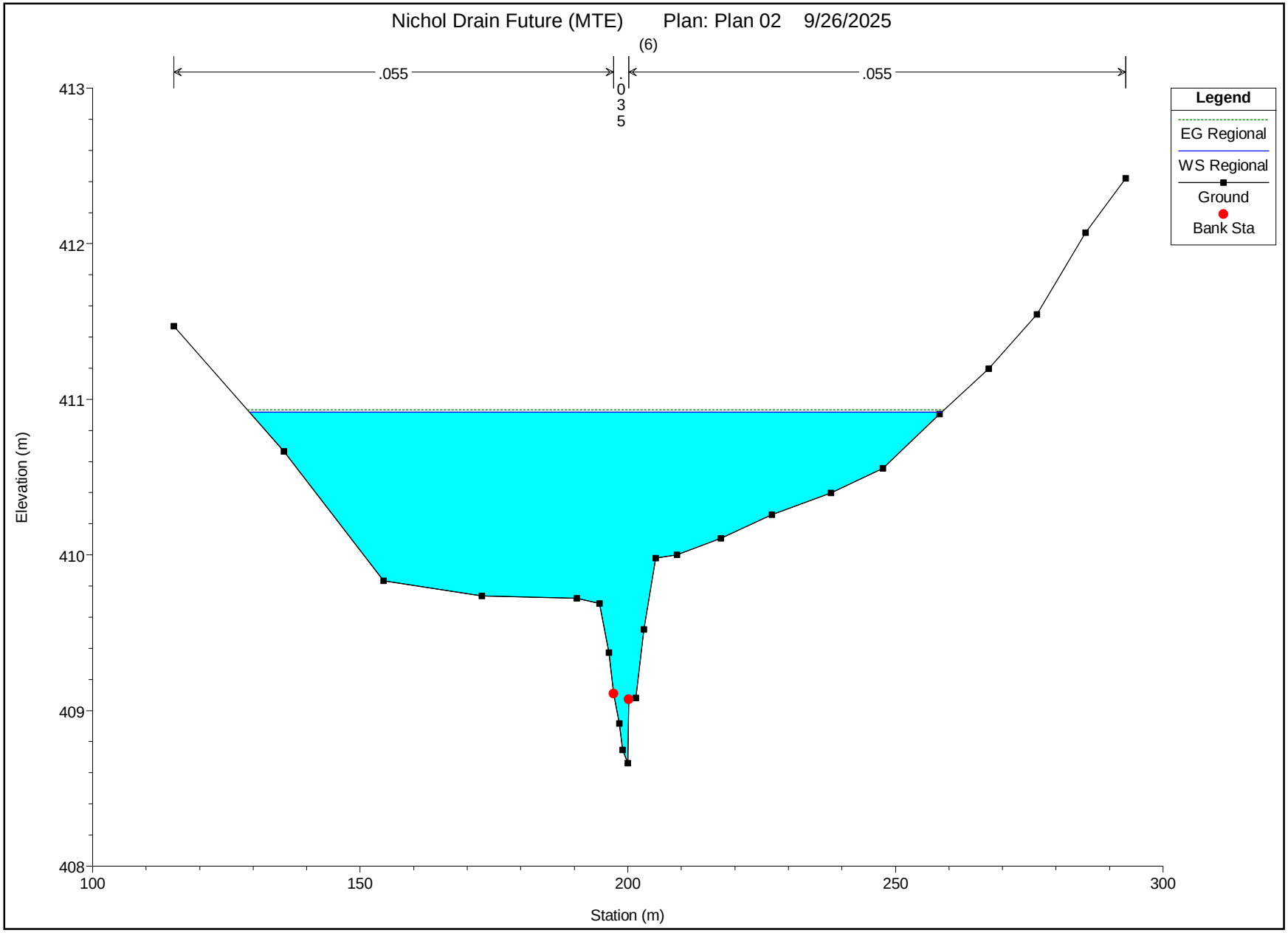
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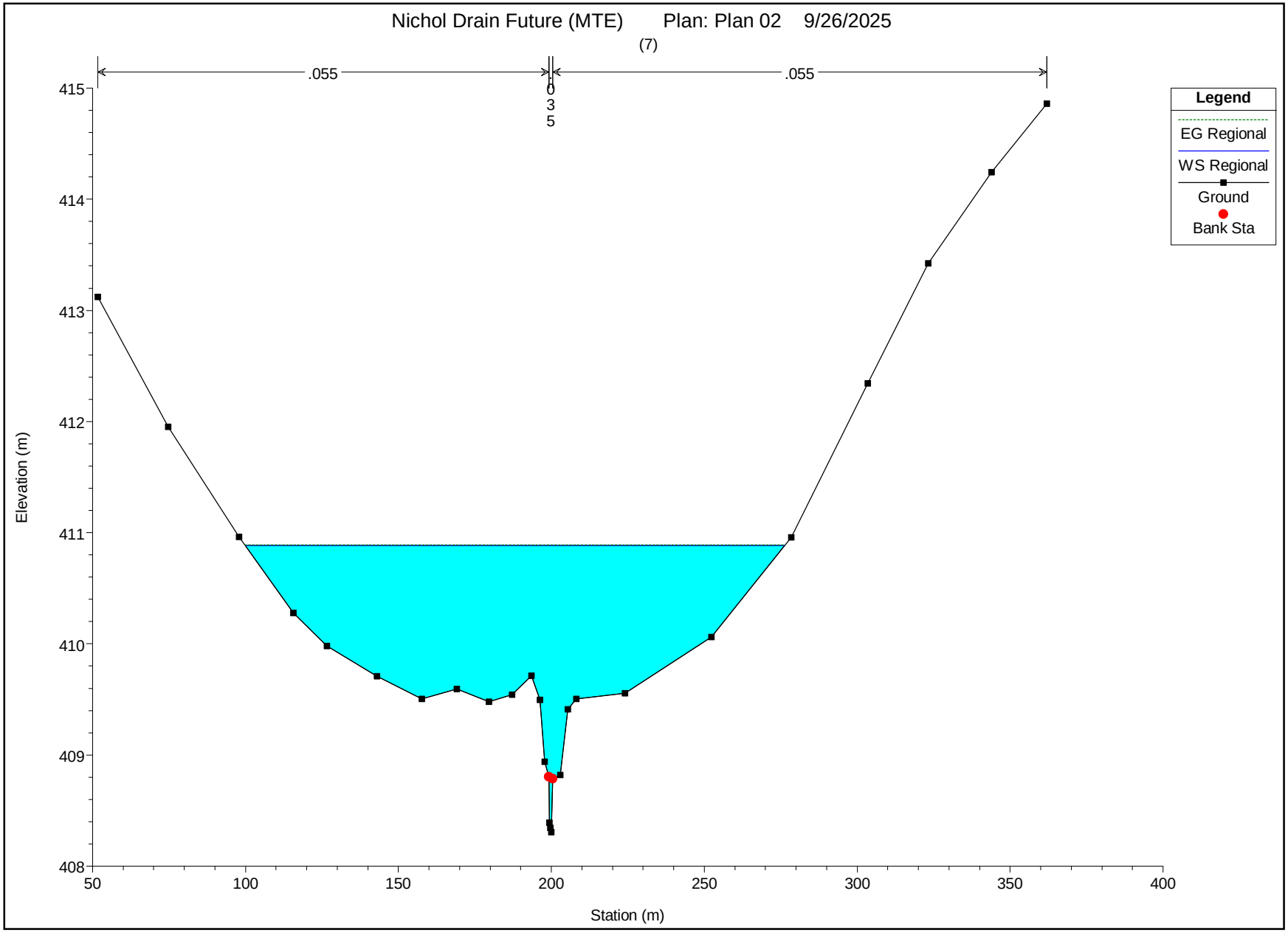
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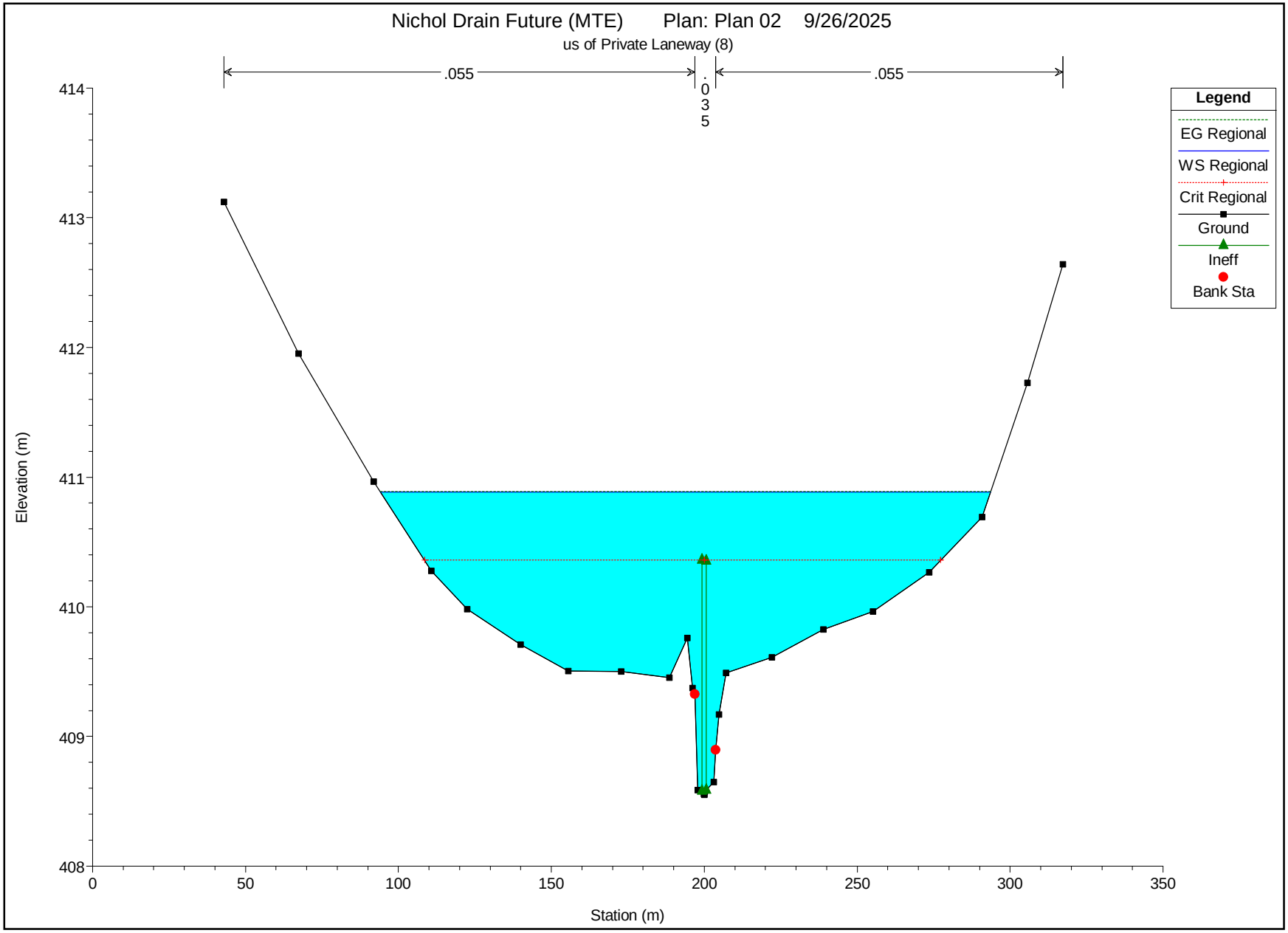
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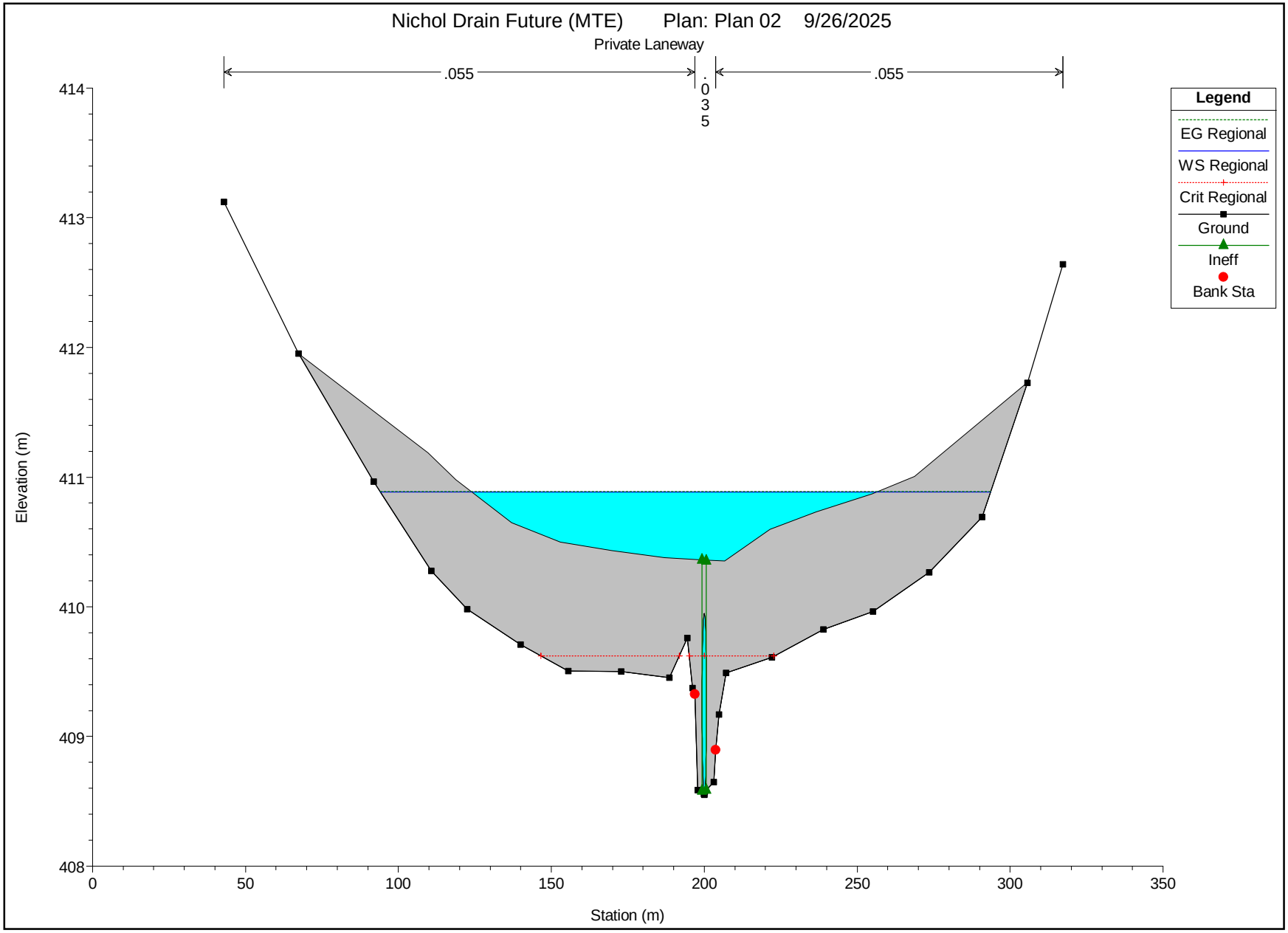
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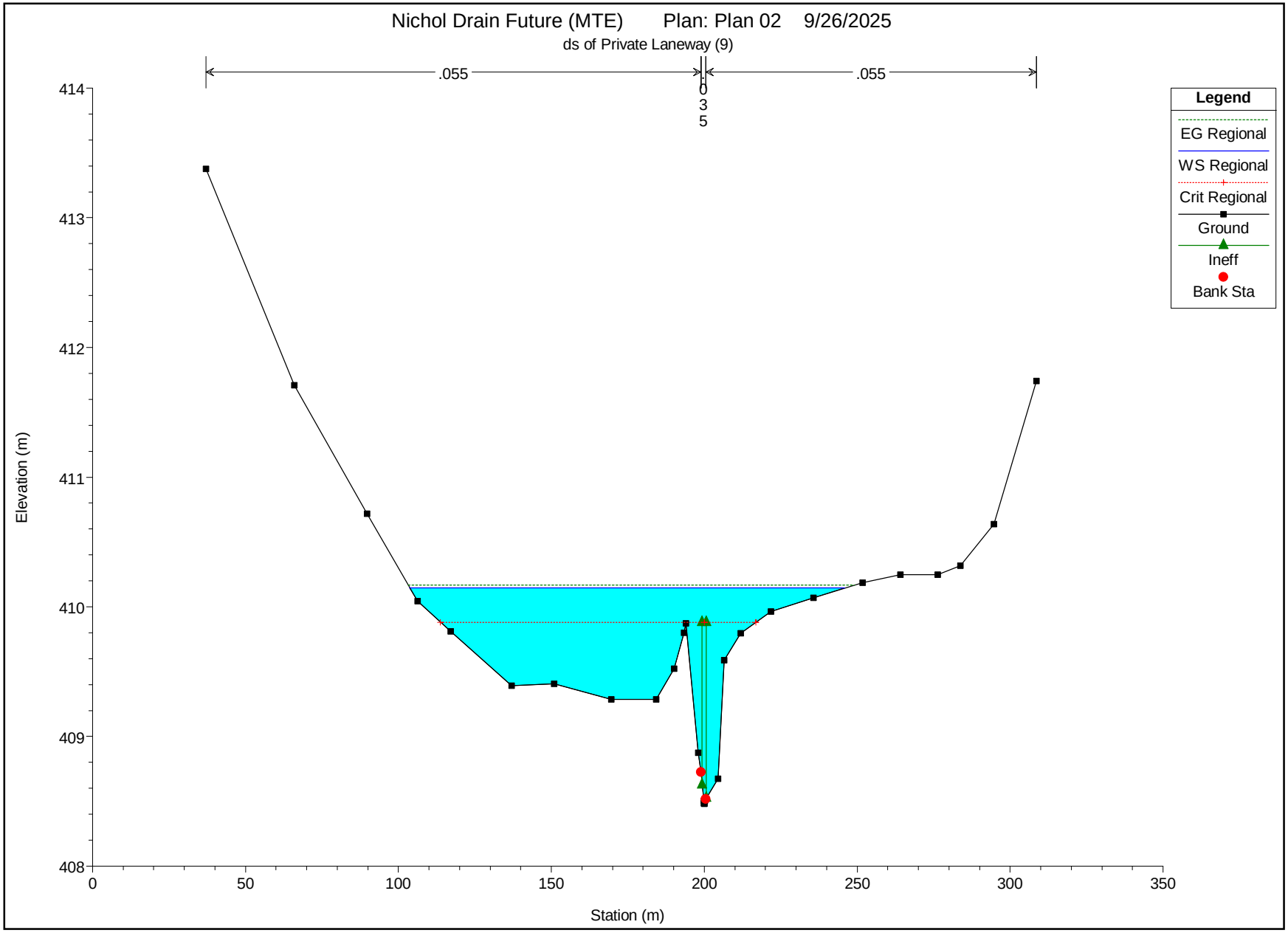
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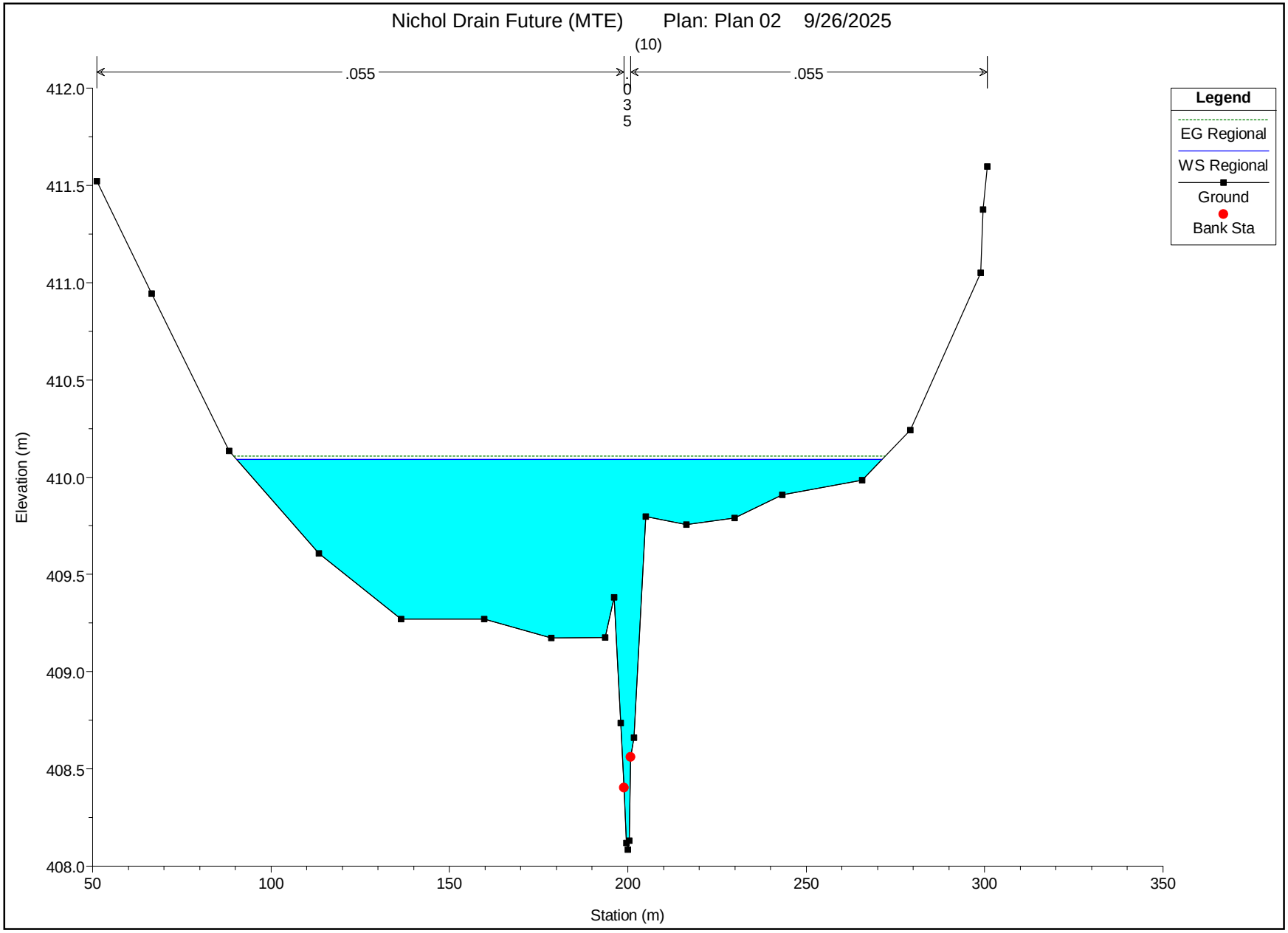
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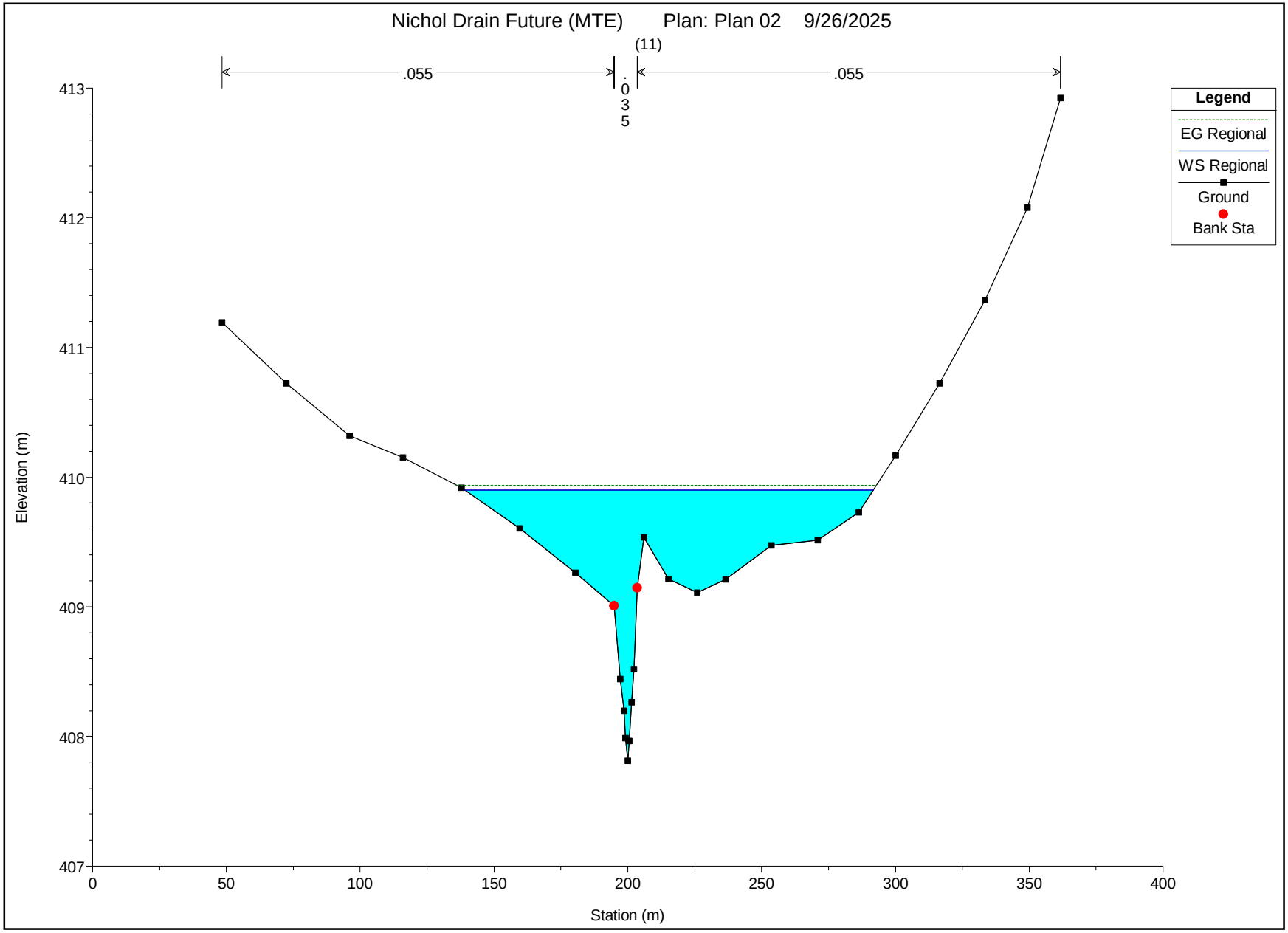
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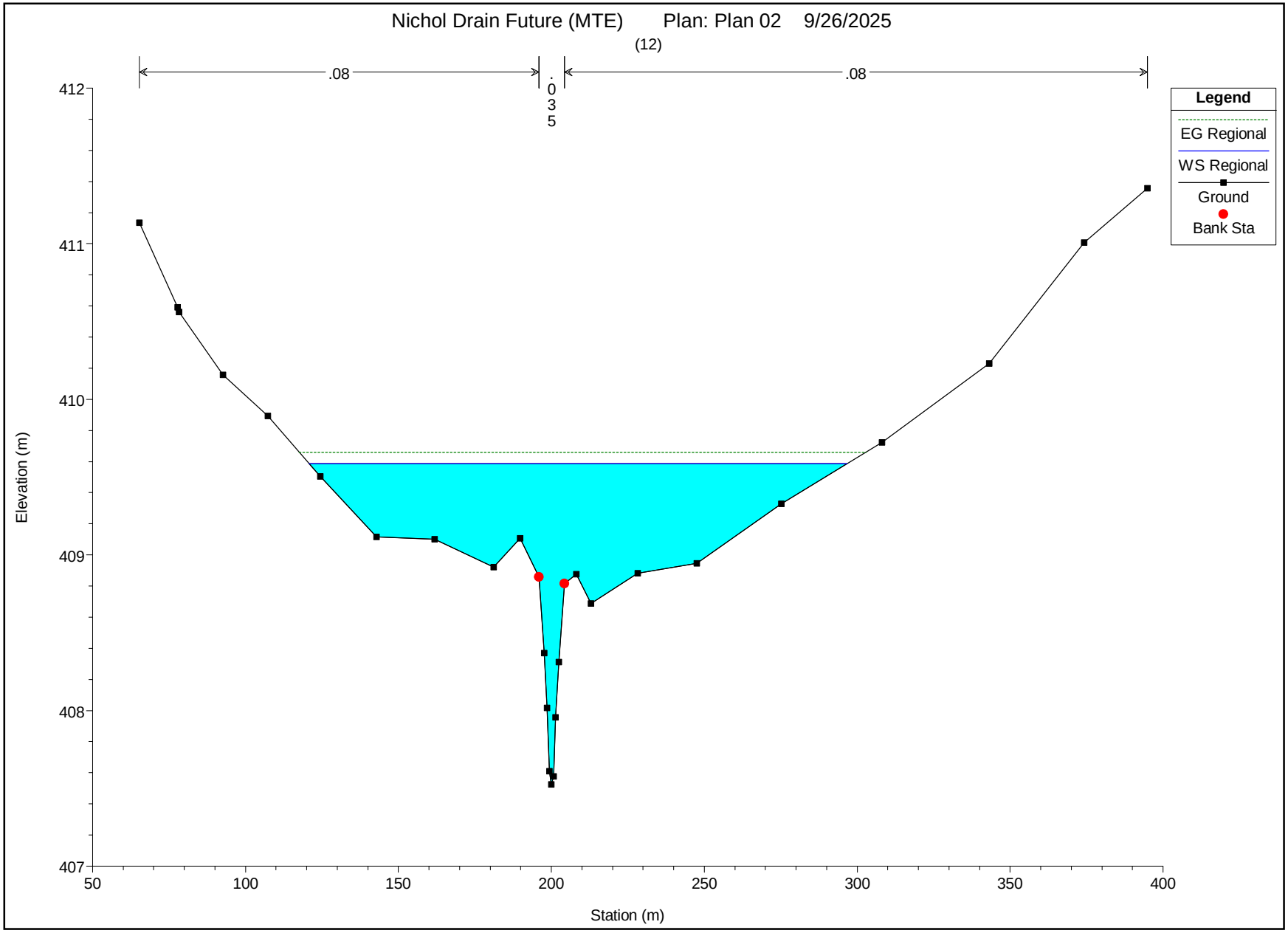
Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(12)
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.035
.08
Legend
EG Regional
WS Regional
Ground
Bank Sta
Elevation (m)
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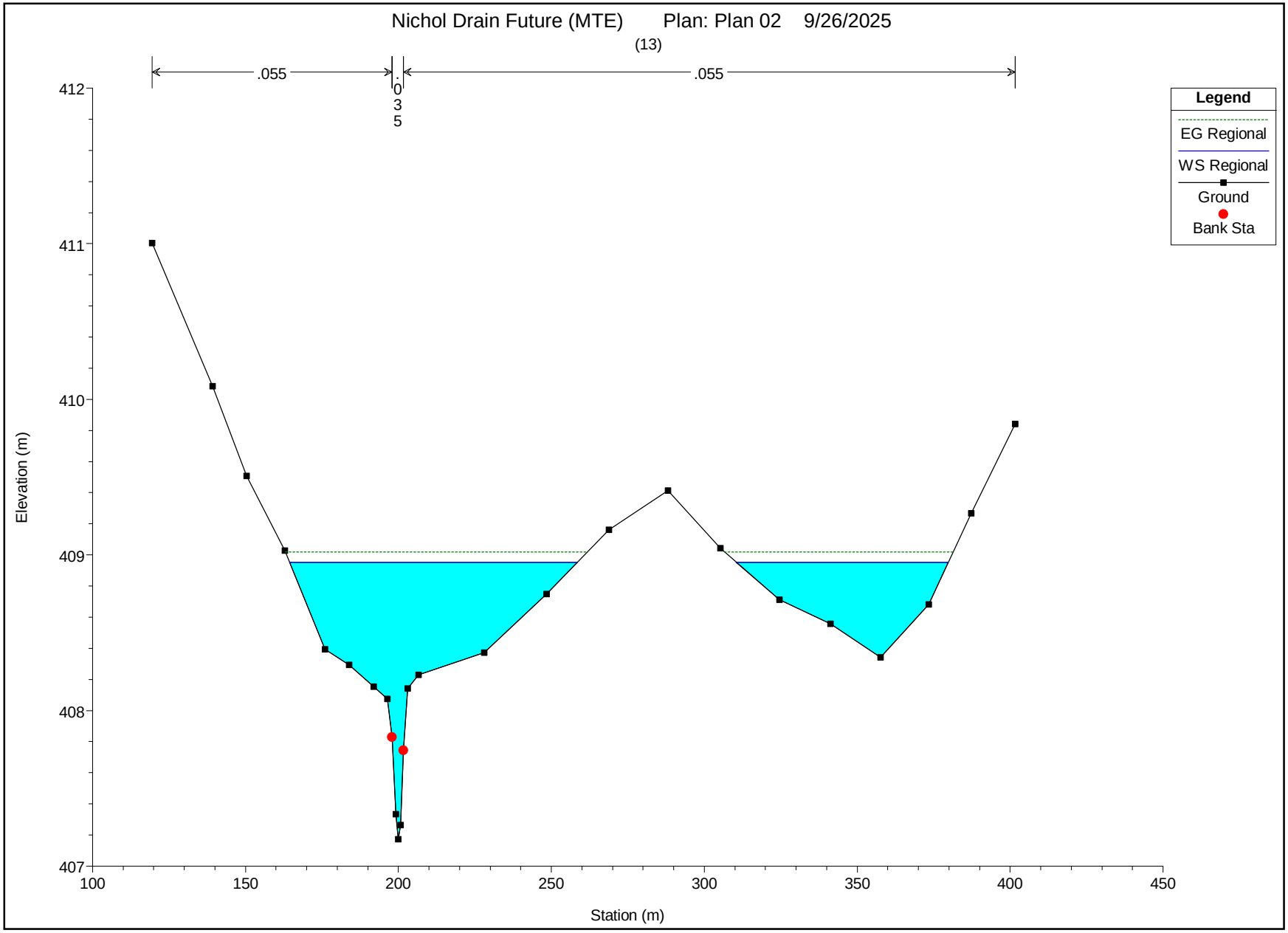
Station (m)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Legend
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WS Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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410
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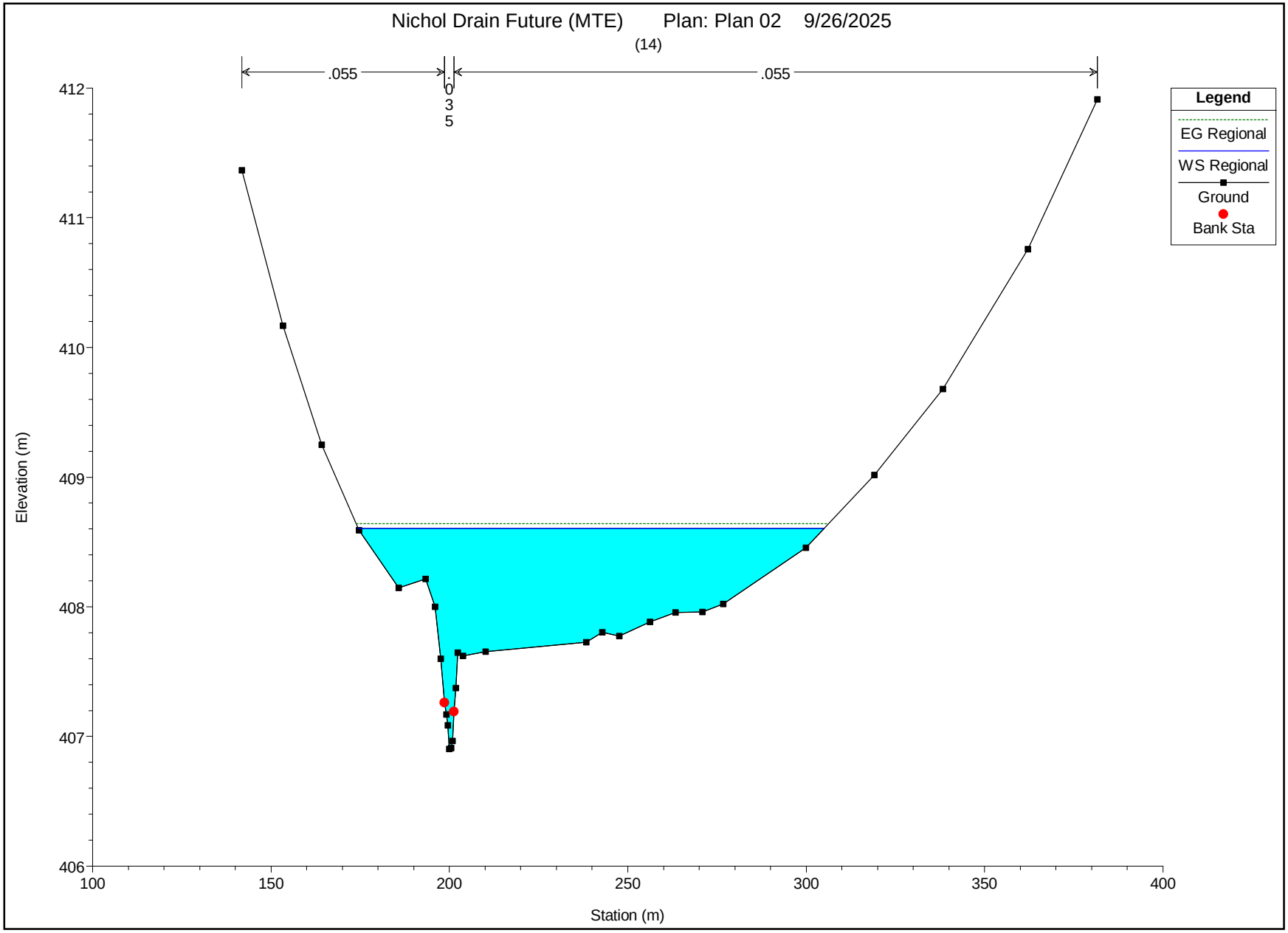
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WS Regional
Ground
Bank Sta
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Station (m)
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411
410
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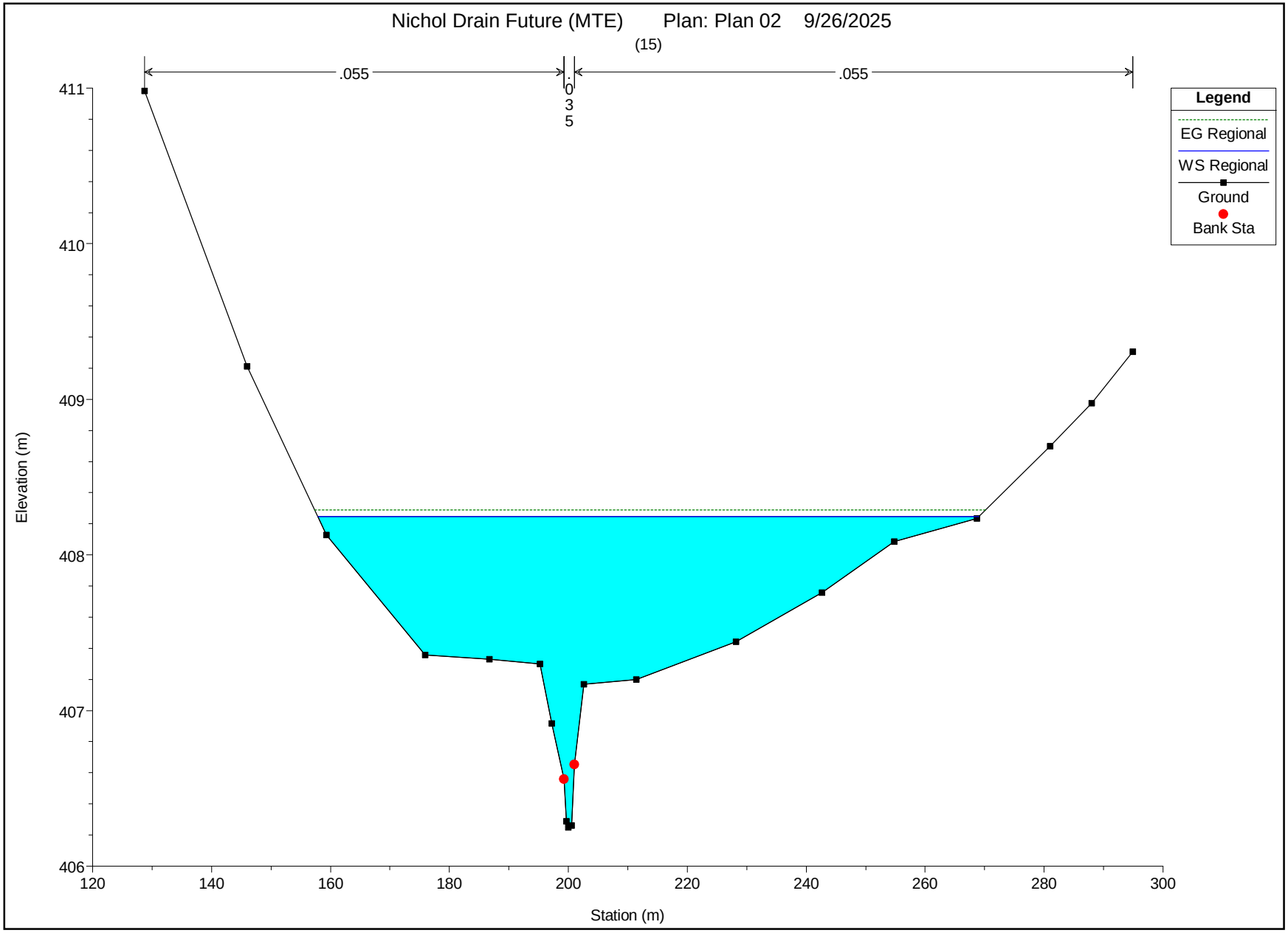
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Ground
Bank Sta
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407
406
Elevation (m)
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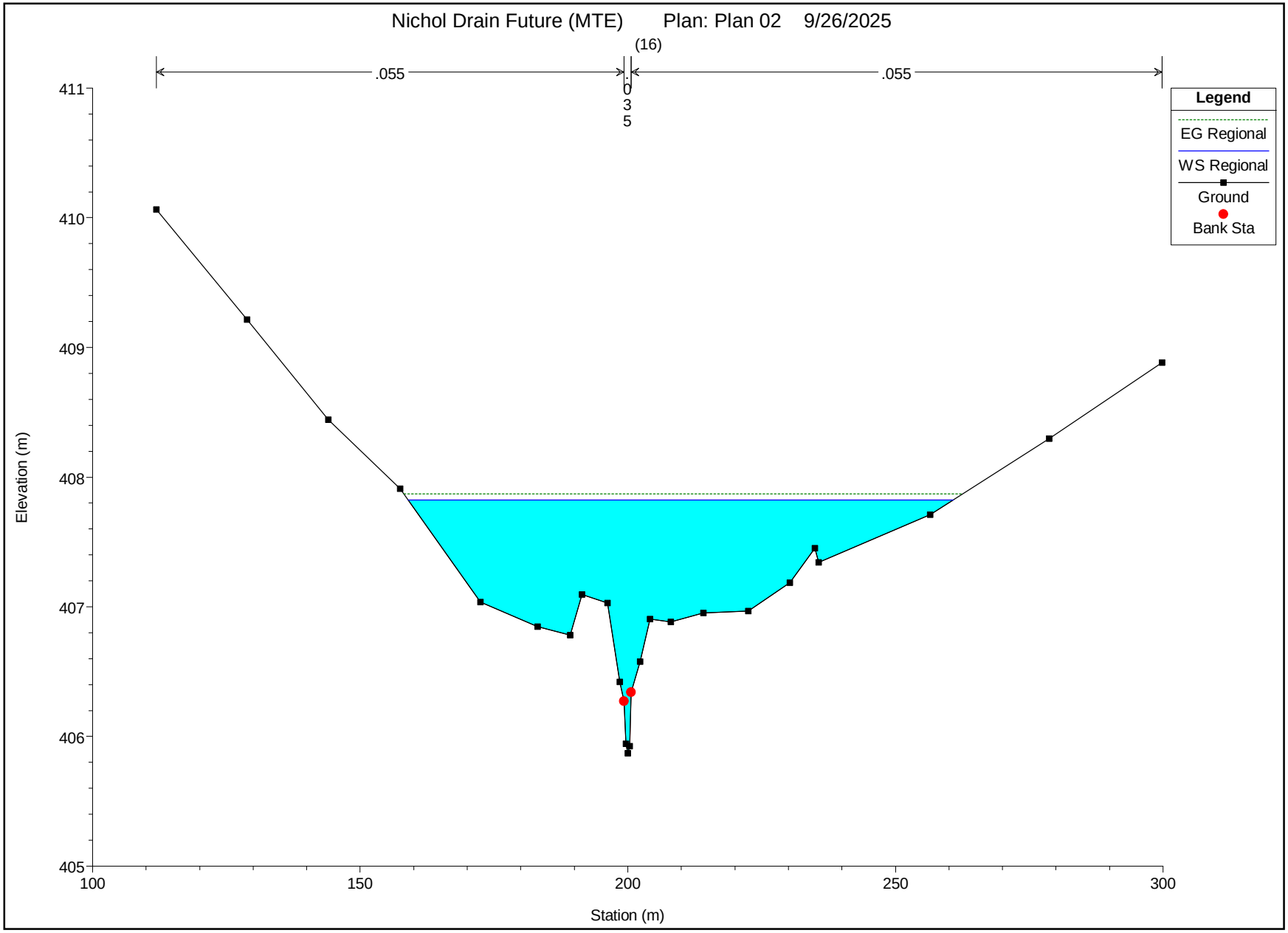
300
Station (m)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Elevation (m)
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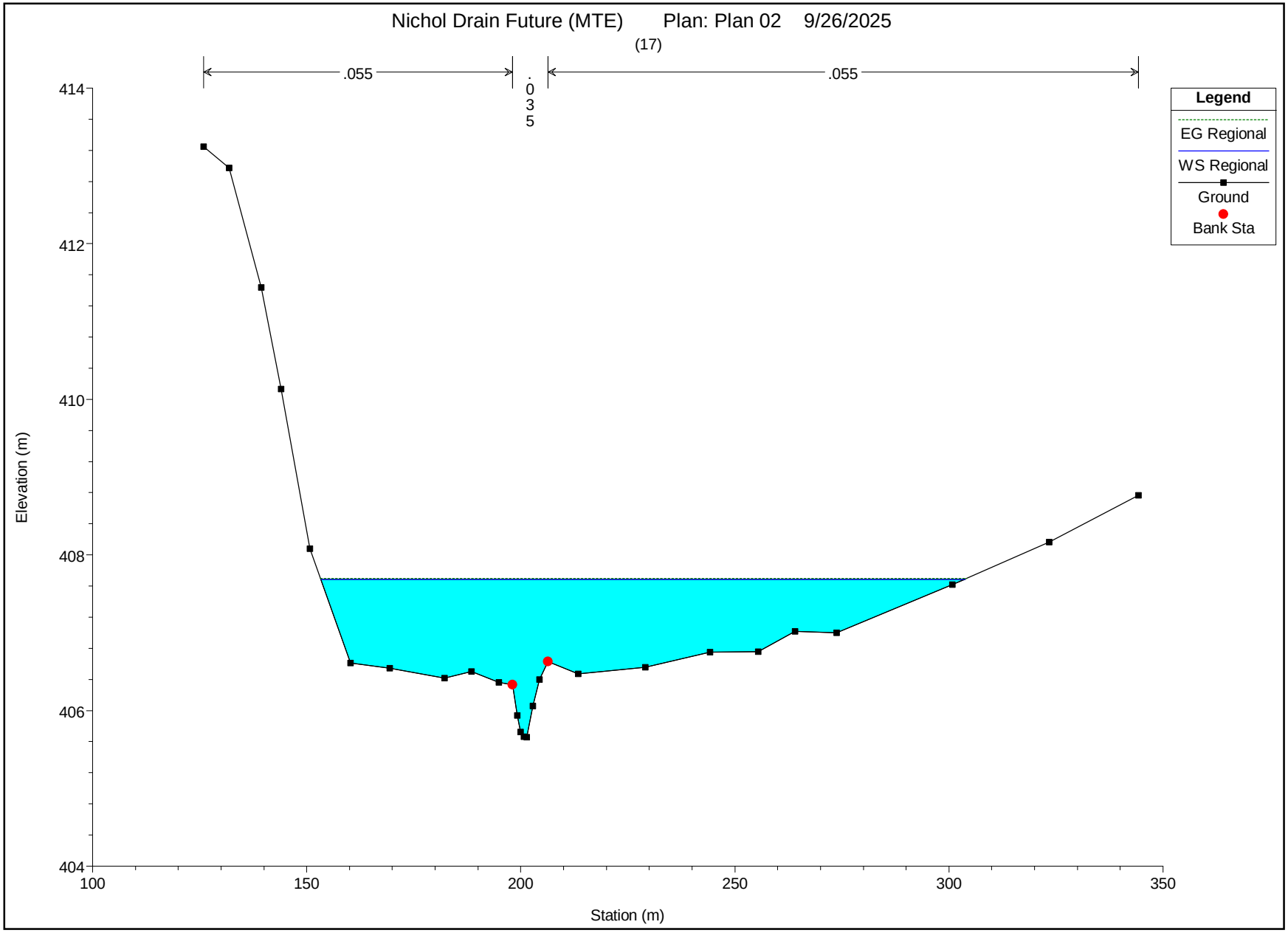
Station (m)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Ground
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Elevation (m)
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300
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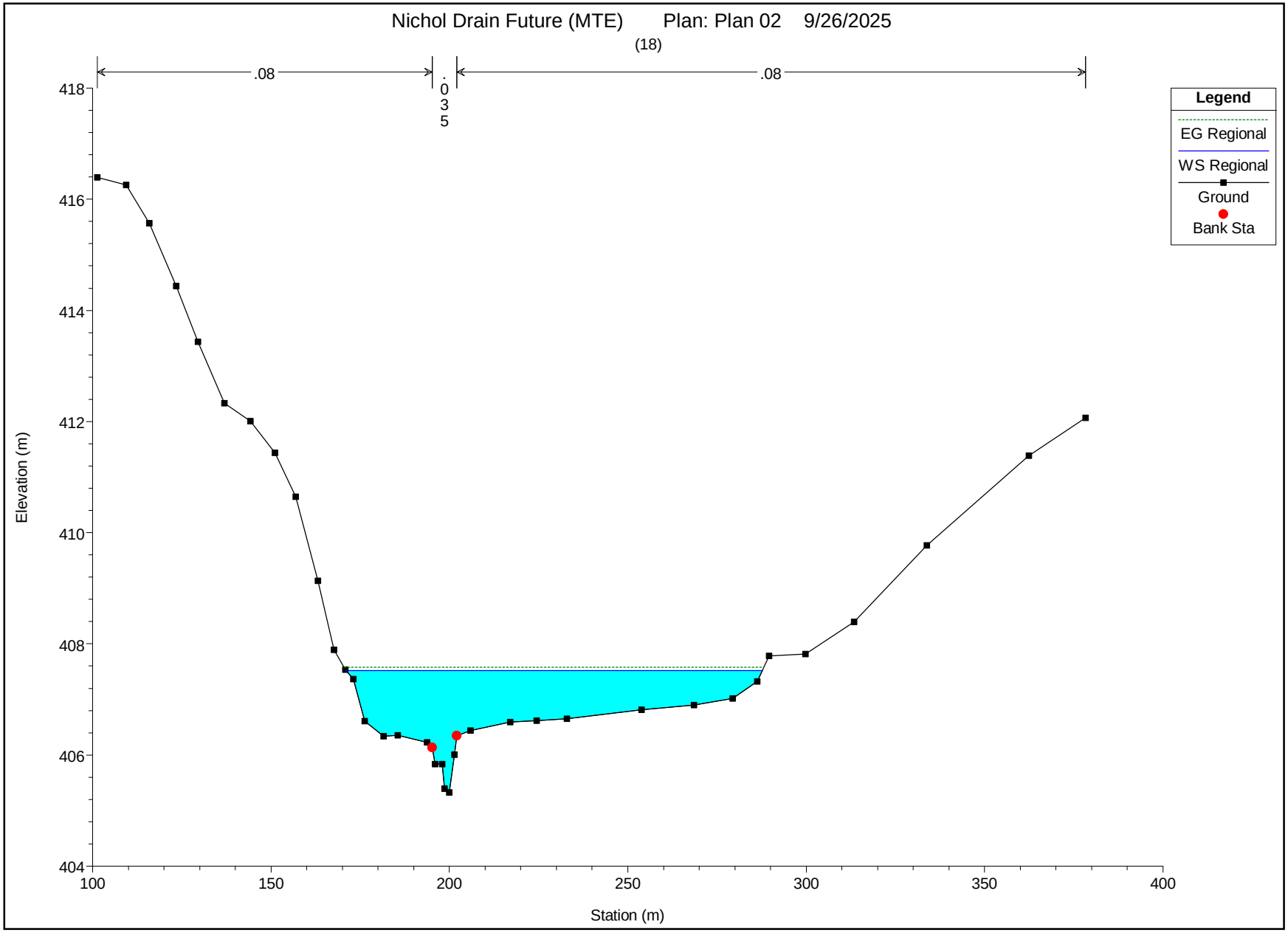
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(18)
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WS Regional
Ground
Bank Sta
Elevation (m)
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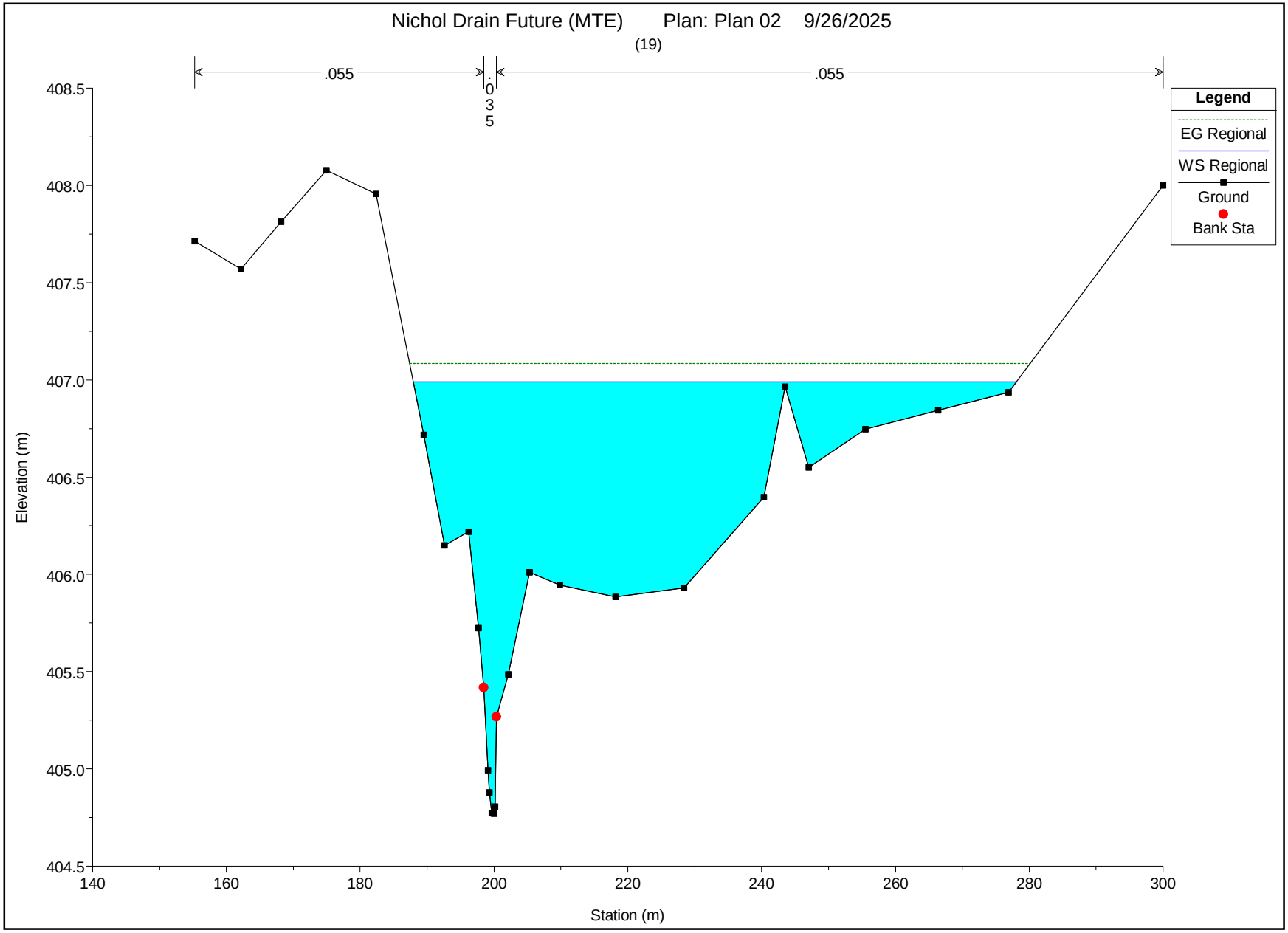
Station (m)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Ground
Bank Sta
Elevation (m)
Station (m)
408.5
408.0
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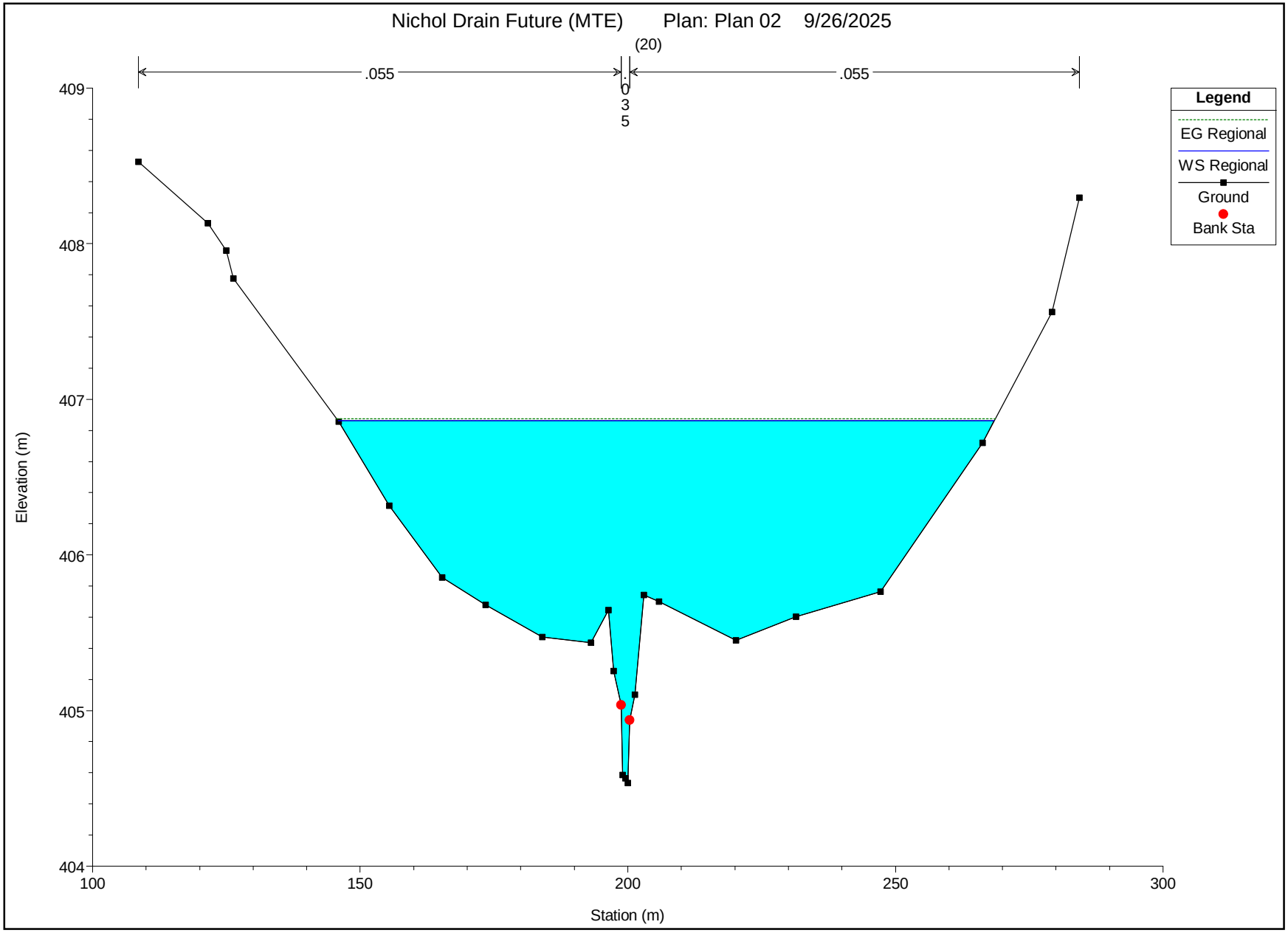
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Bank Sta
Elevation (m)
Station (m)
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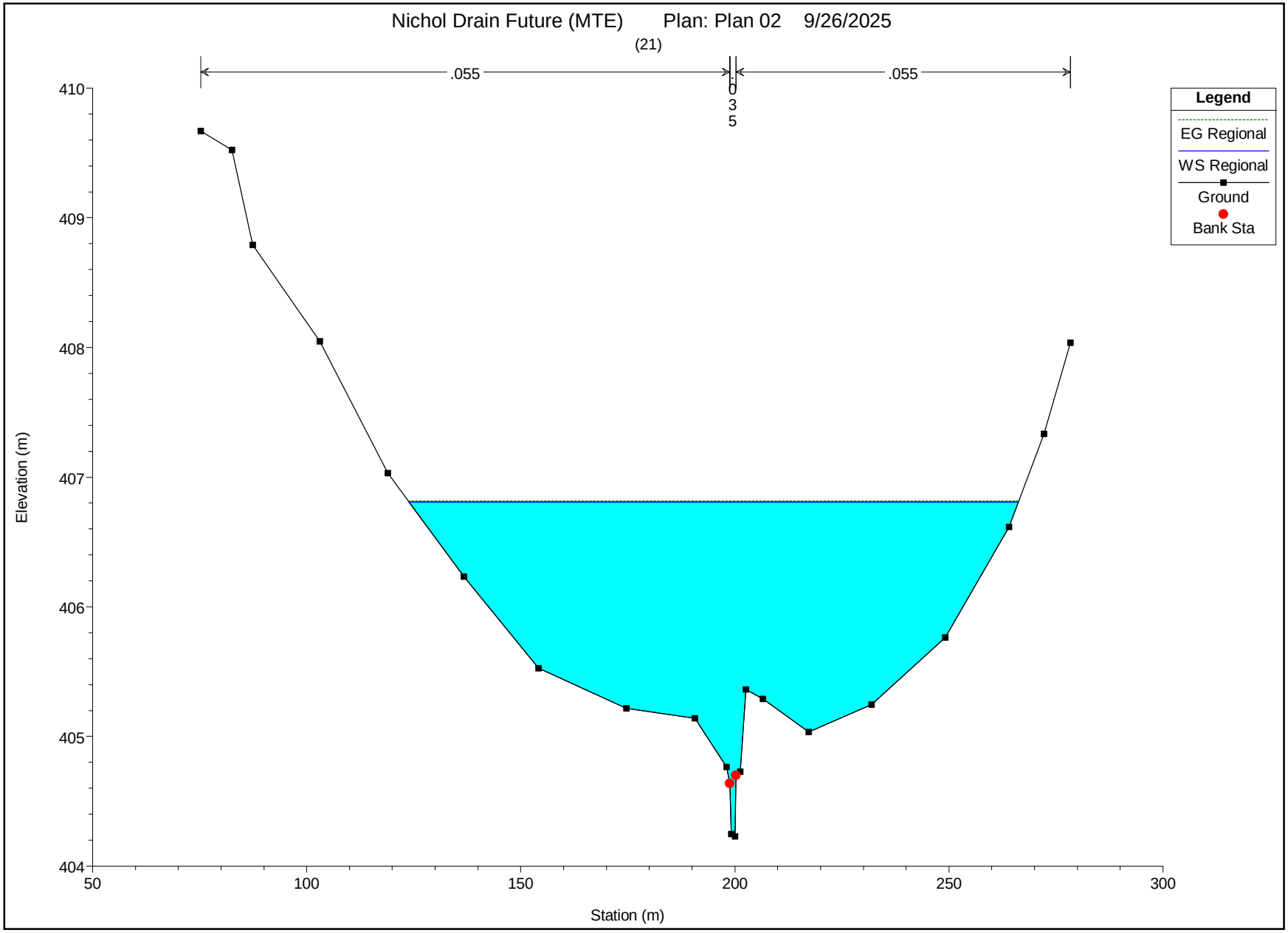
300


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(21)
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Legend
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WS Regional
Ground
Bank Sta
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Station (m)
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409
408
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405
404
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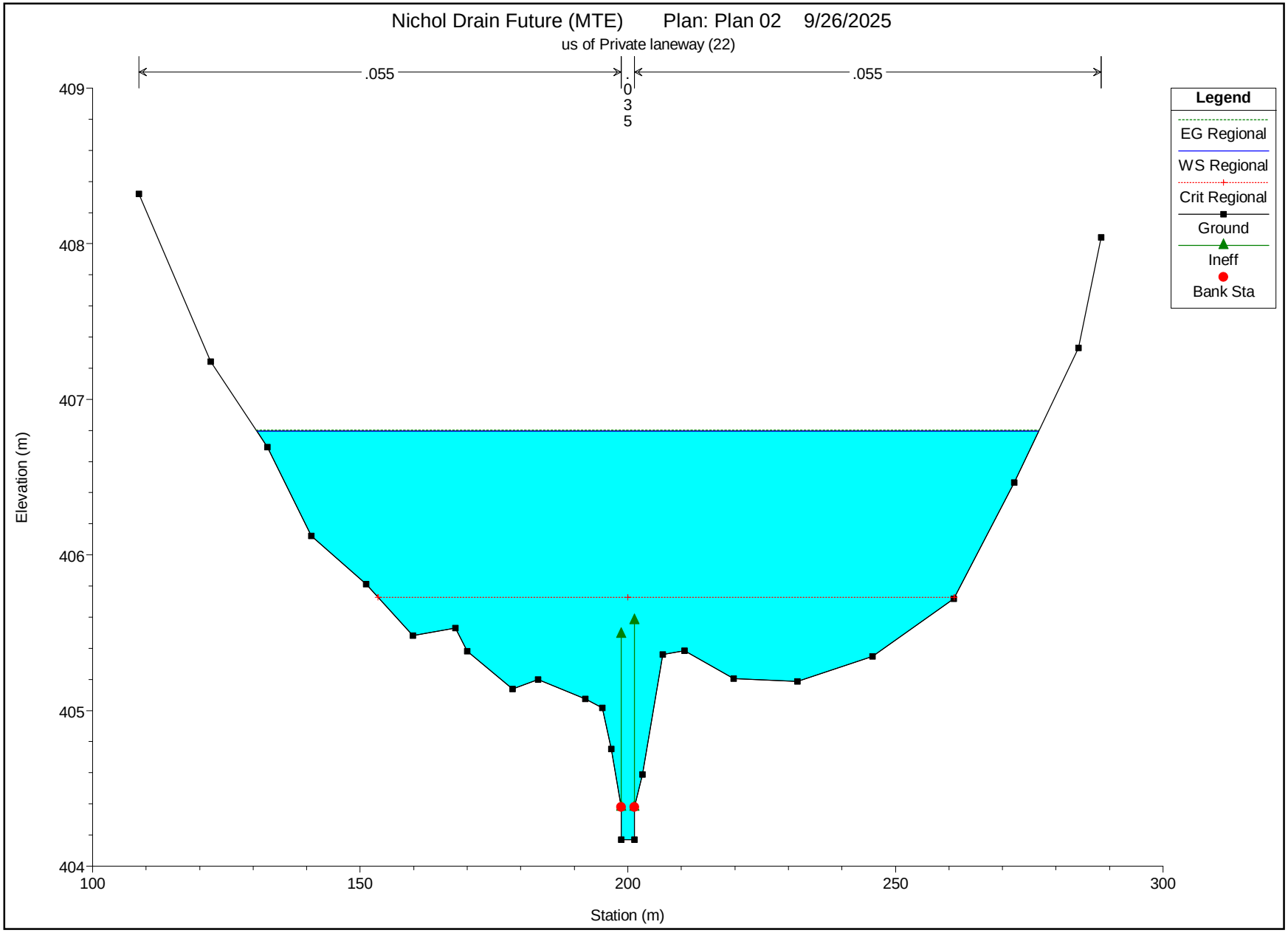
250
300


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
us of Private laneway (22)
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.035
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Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
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408
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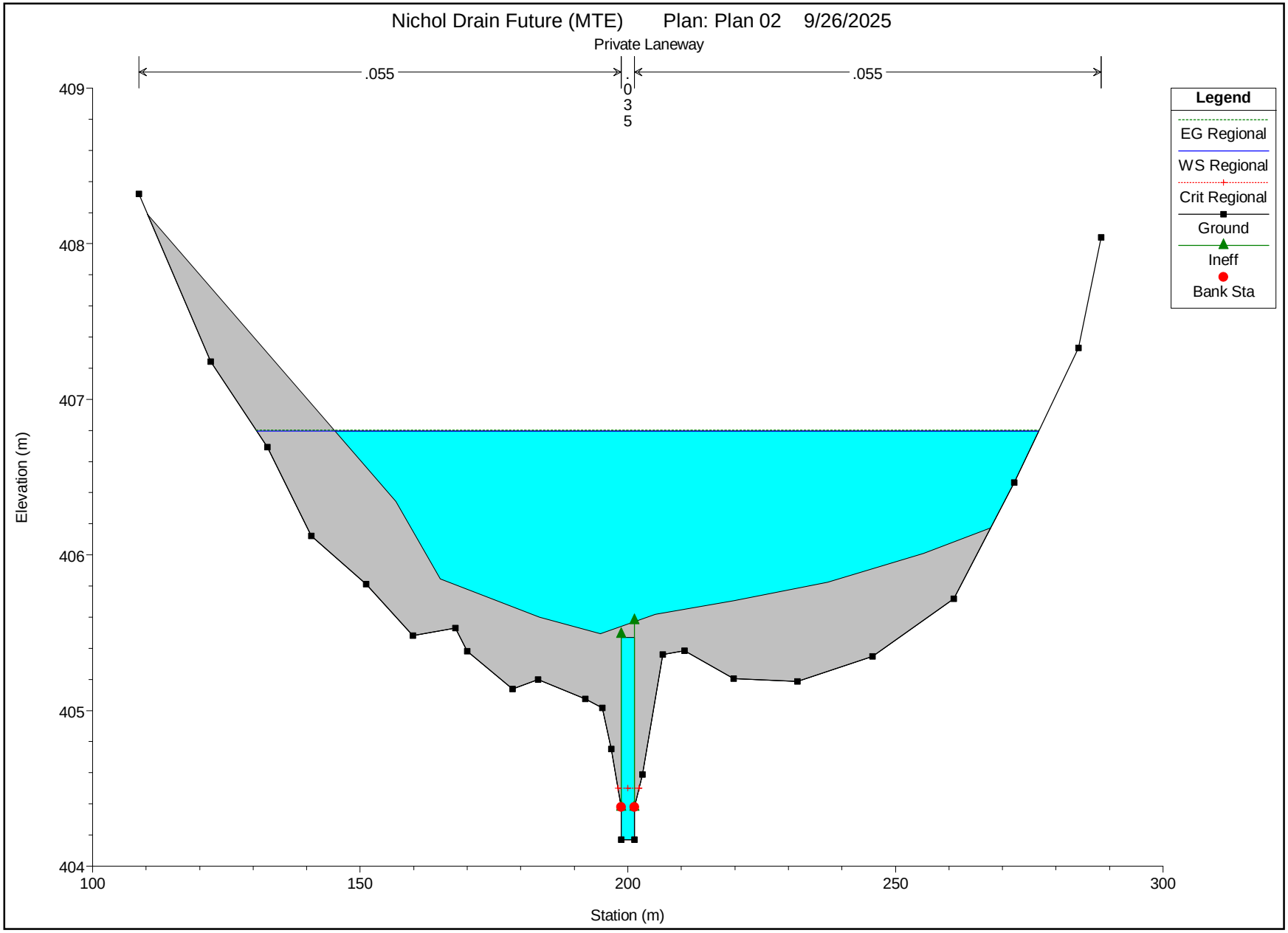
404
100
150
200
250
300
Station (m)


Nichol Drain Future (MTE)
Plan: Plan 02
9/26/2025
Private Laneway
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.035
.055
Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
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407
406
405
404
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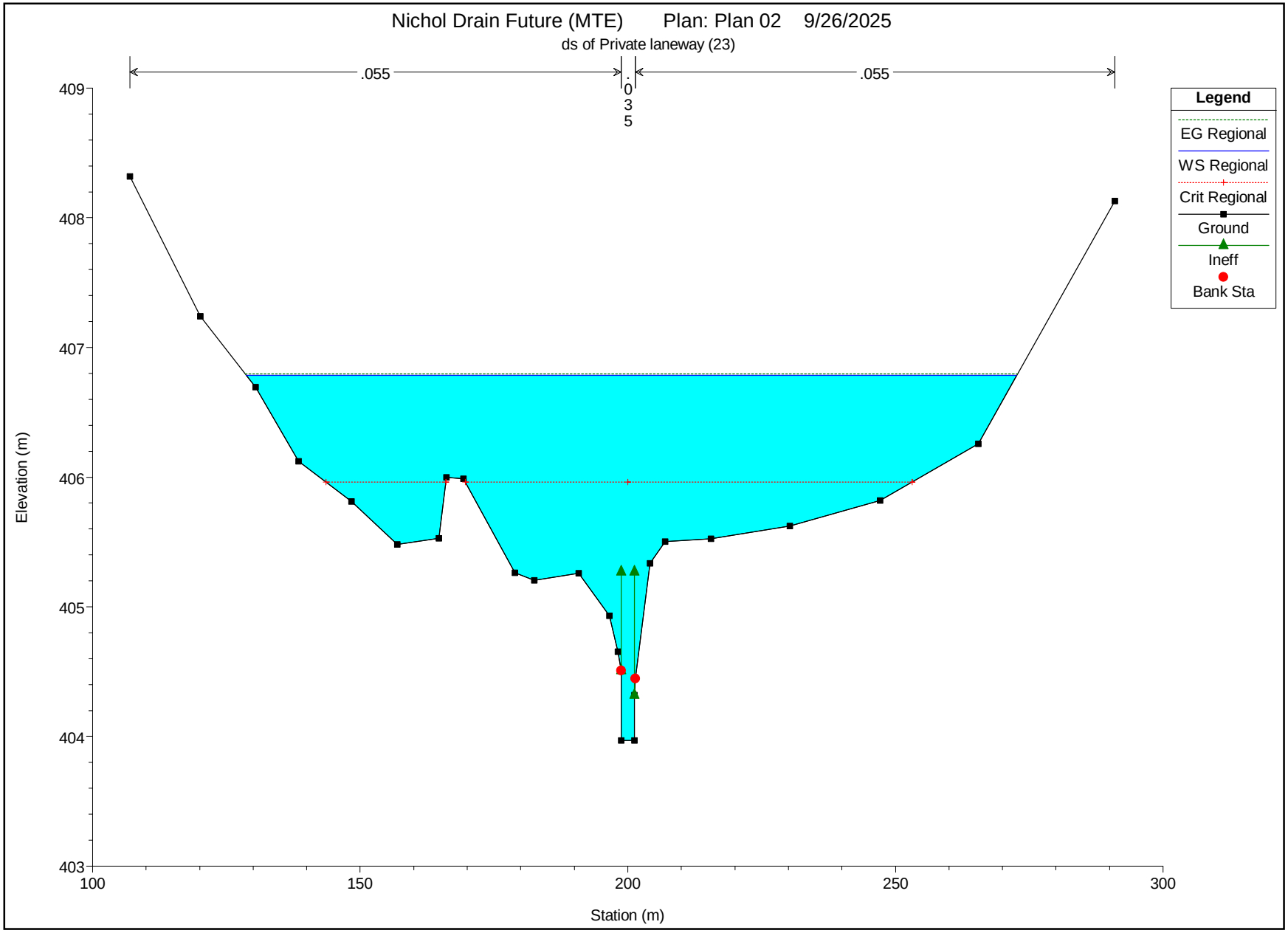
250
300


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
ds of Private laneway (23)
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.035
.055
Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
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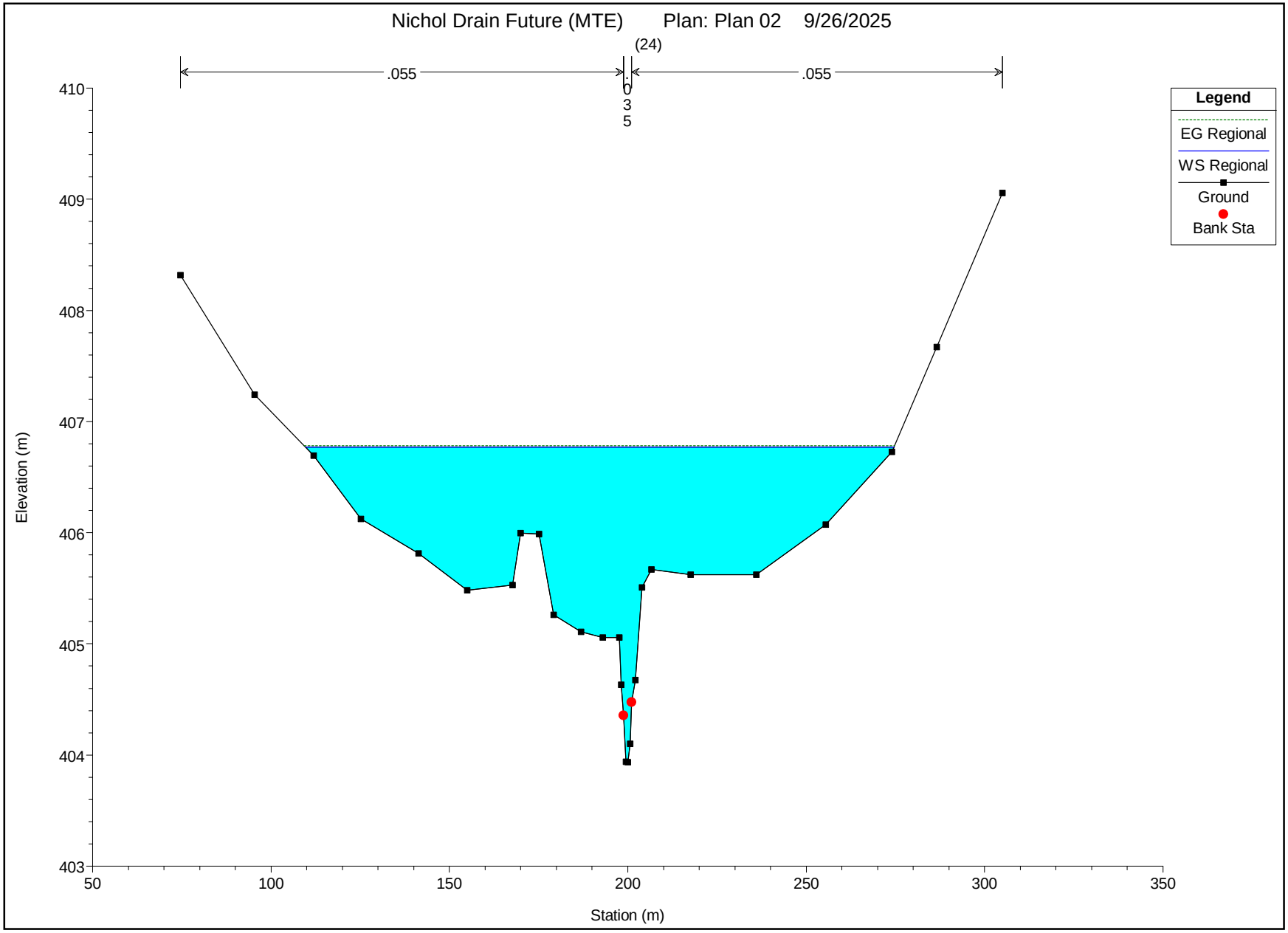
408
407
406
405
404
403
100
150
200
250
300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(24)
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Legend
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WS Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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407
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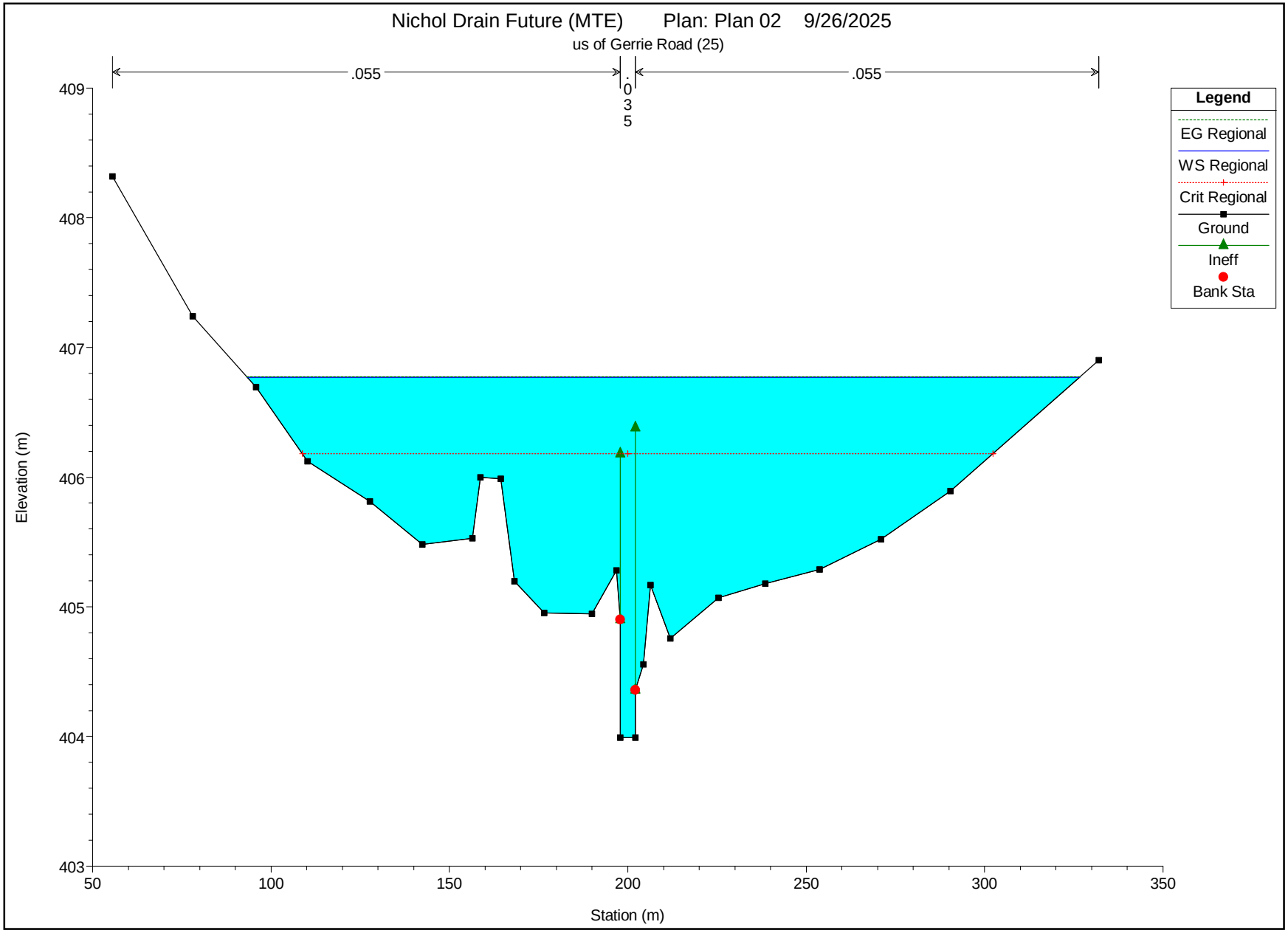
Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
us of Gerrie Road (25)
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Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
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Station (m)
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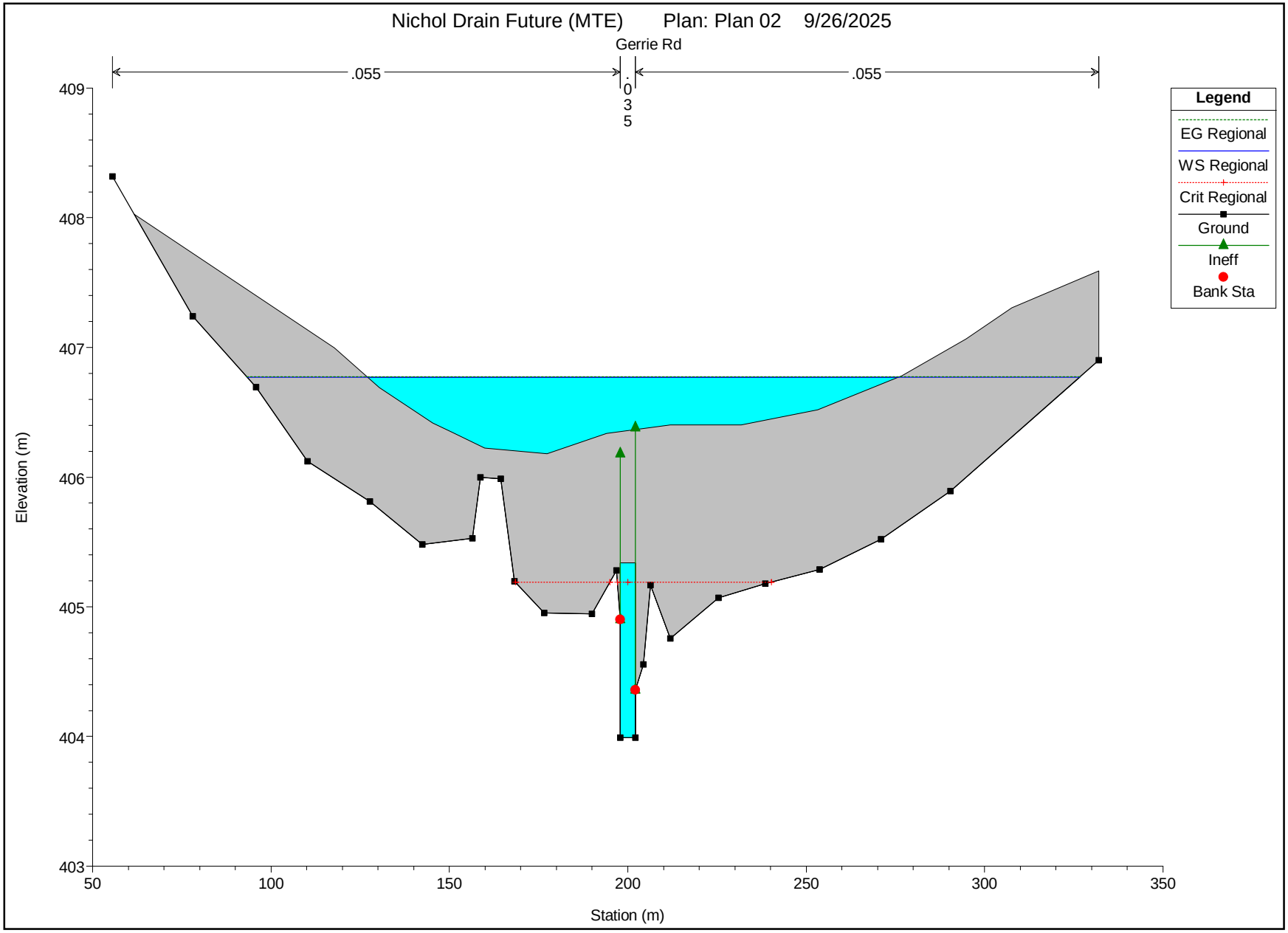
Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
Gerrie Rd
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Legend
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WS Regional
Crit Regional
Ground
Ineff
Bank Sta
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100
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200
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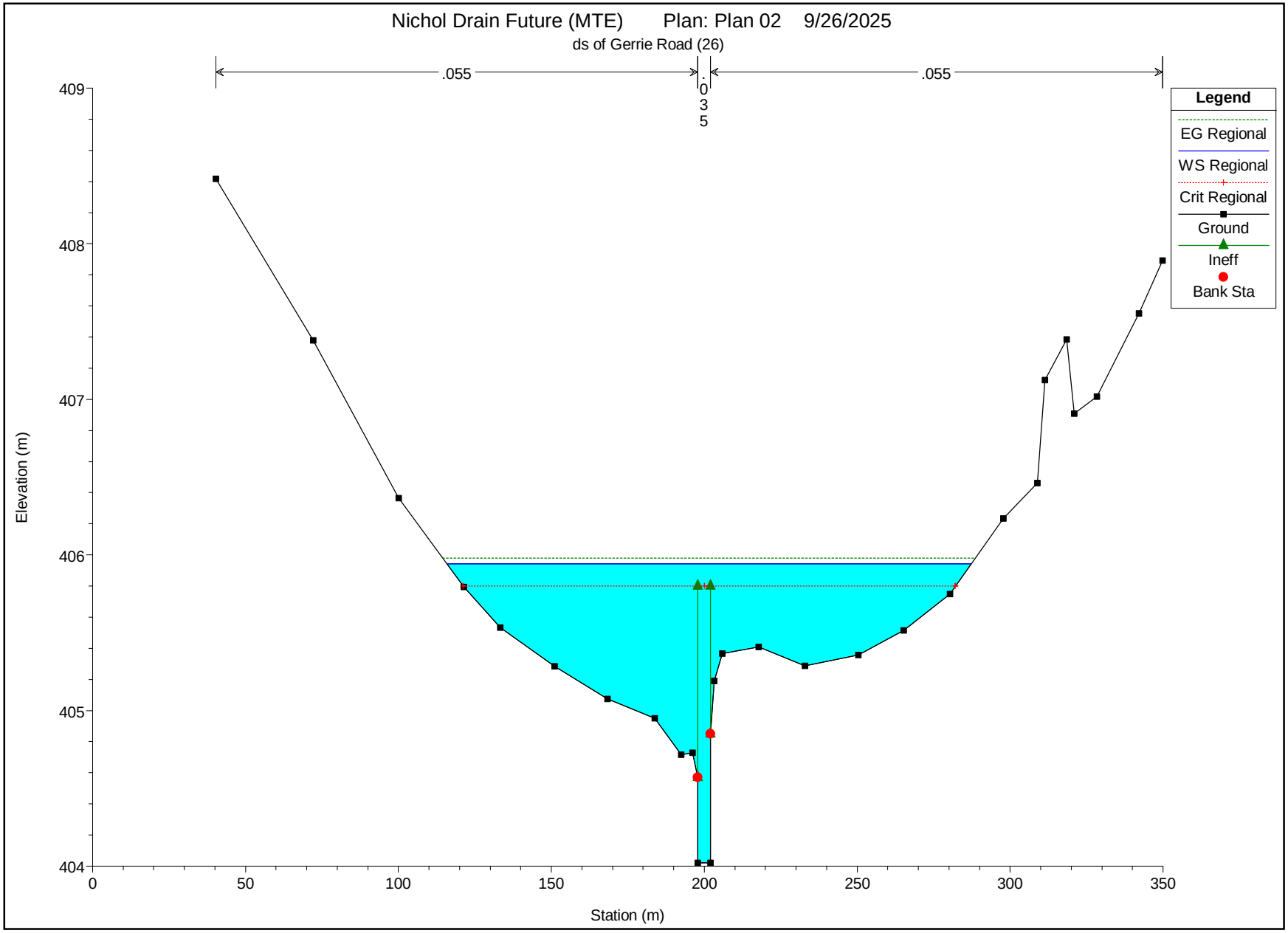
300
350
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
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Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
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Station (m)
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0
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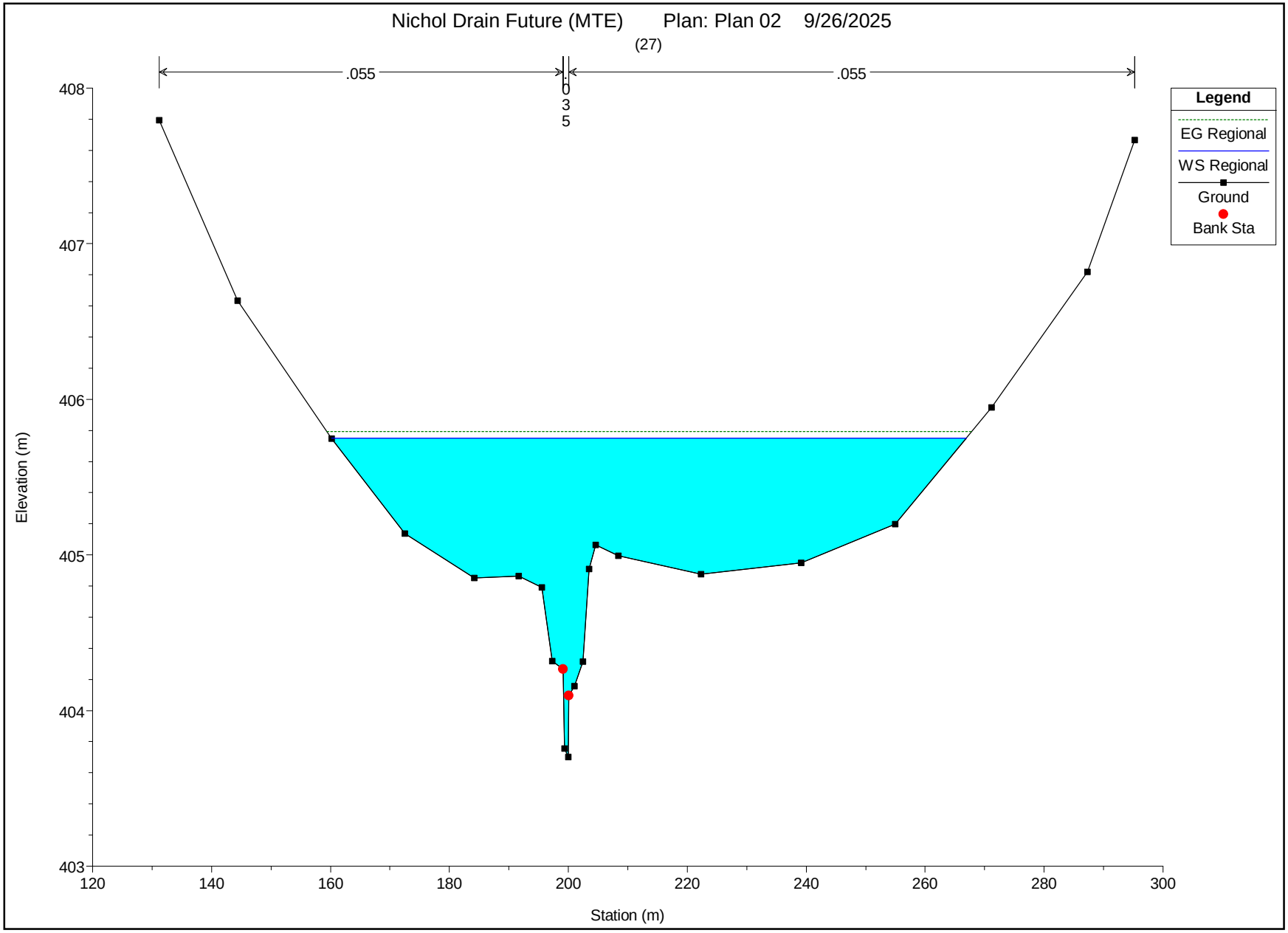
300
350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(27)
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.035
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Legend
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WS Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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407
406
405
404
403
120
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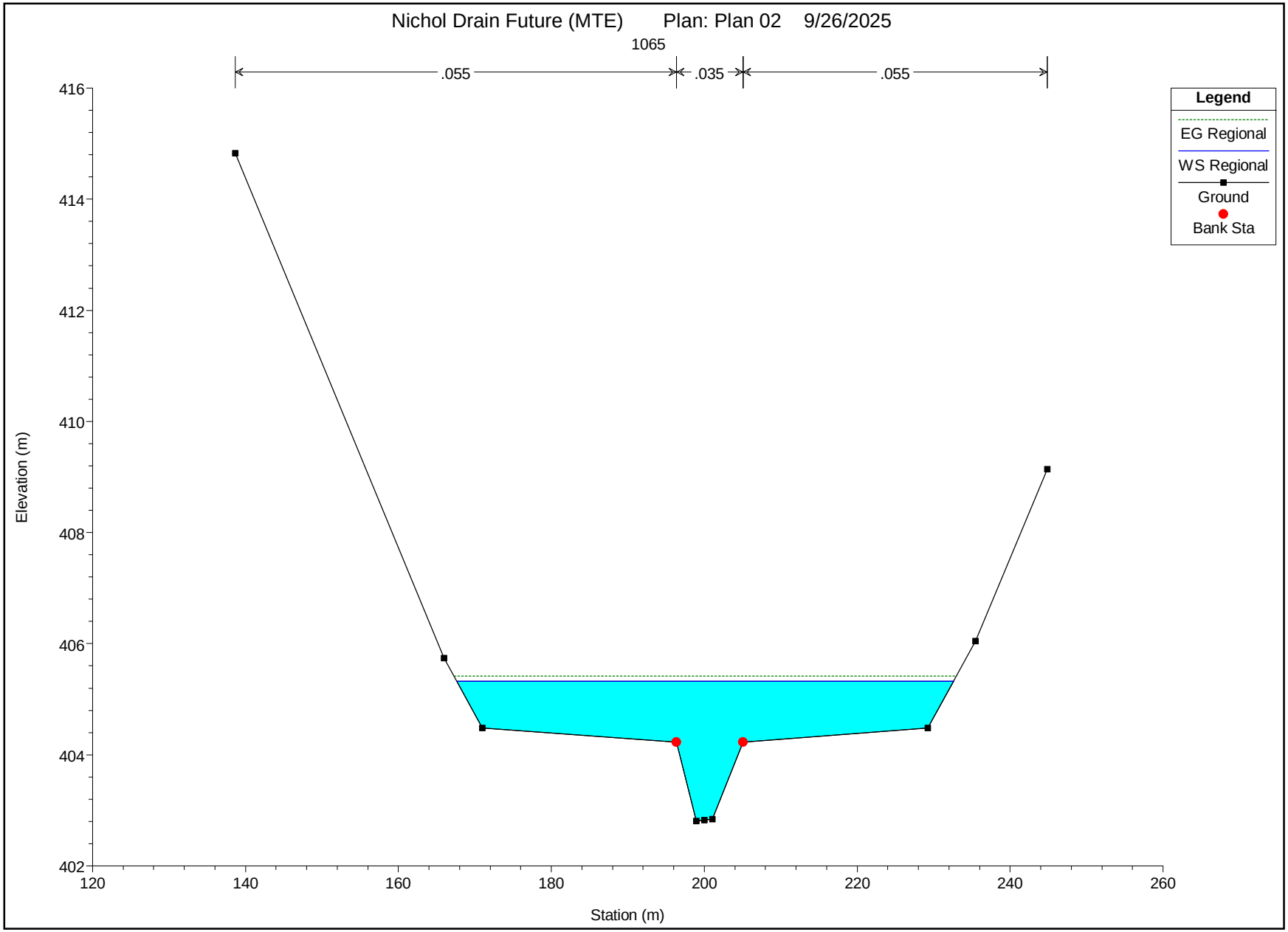
160
180
200
220
240
260
280
300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1065
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.035
.055
Legend
EG Regional
WS Regional
Ground
Bank Sta
Elevation (m)
Station (m)
416
414
412
410
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120
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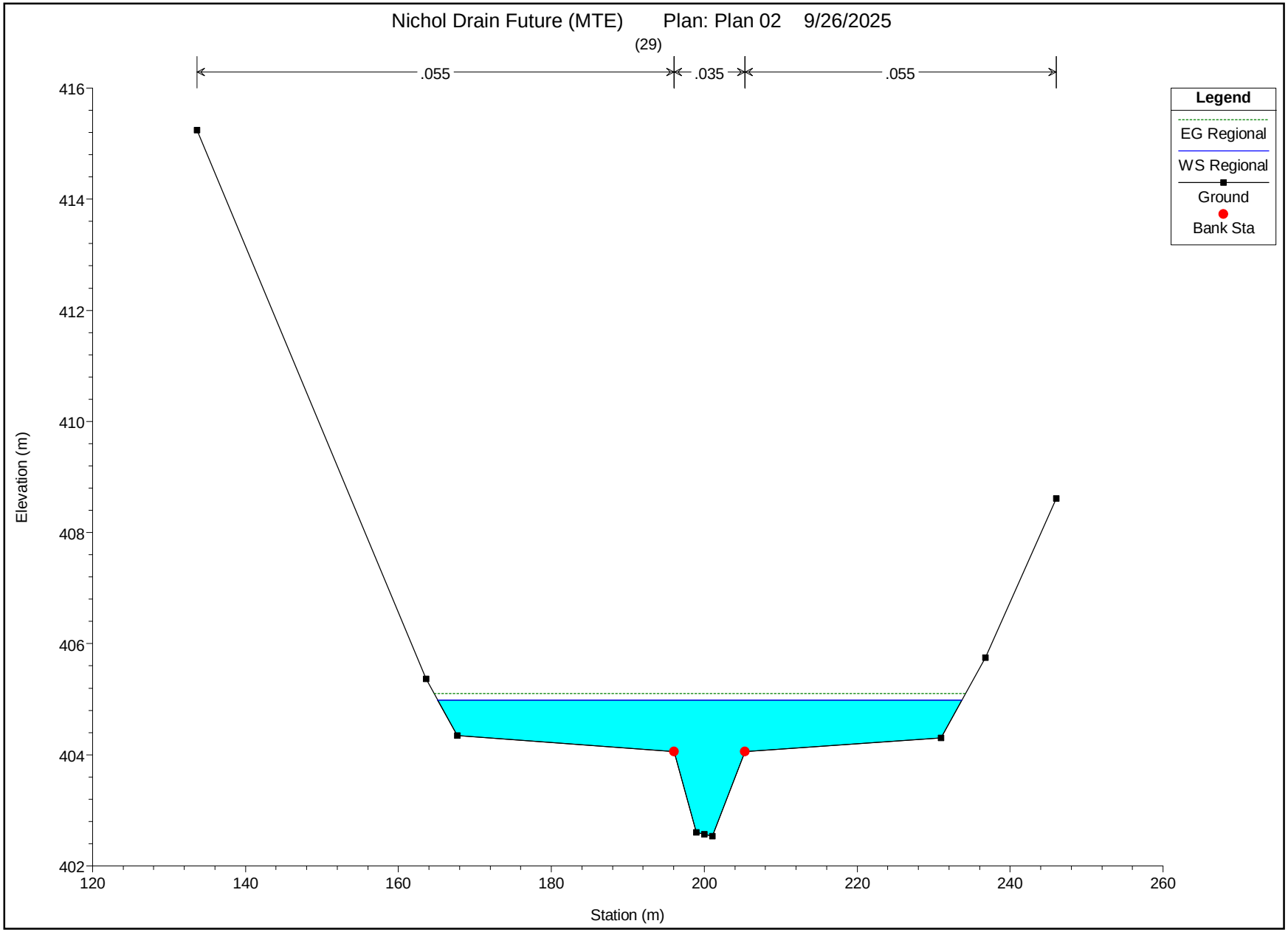
160
180
200
220
240
260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(29)
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WS Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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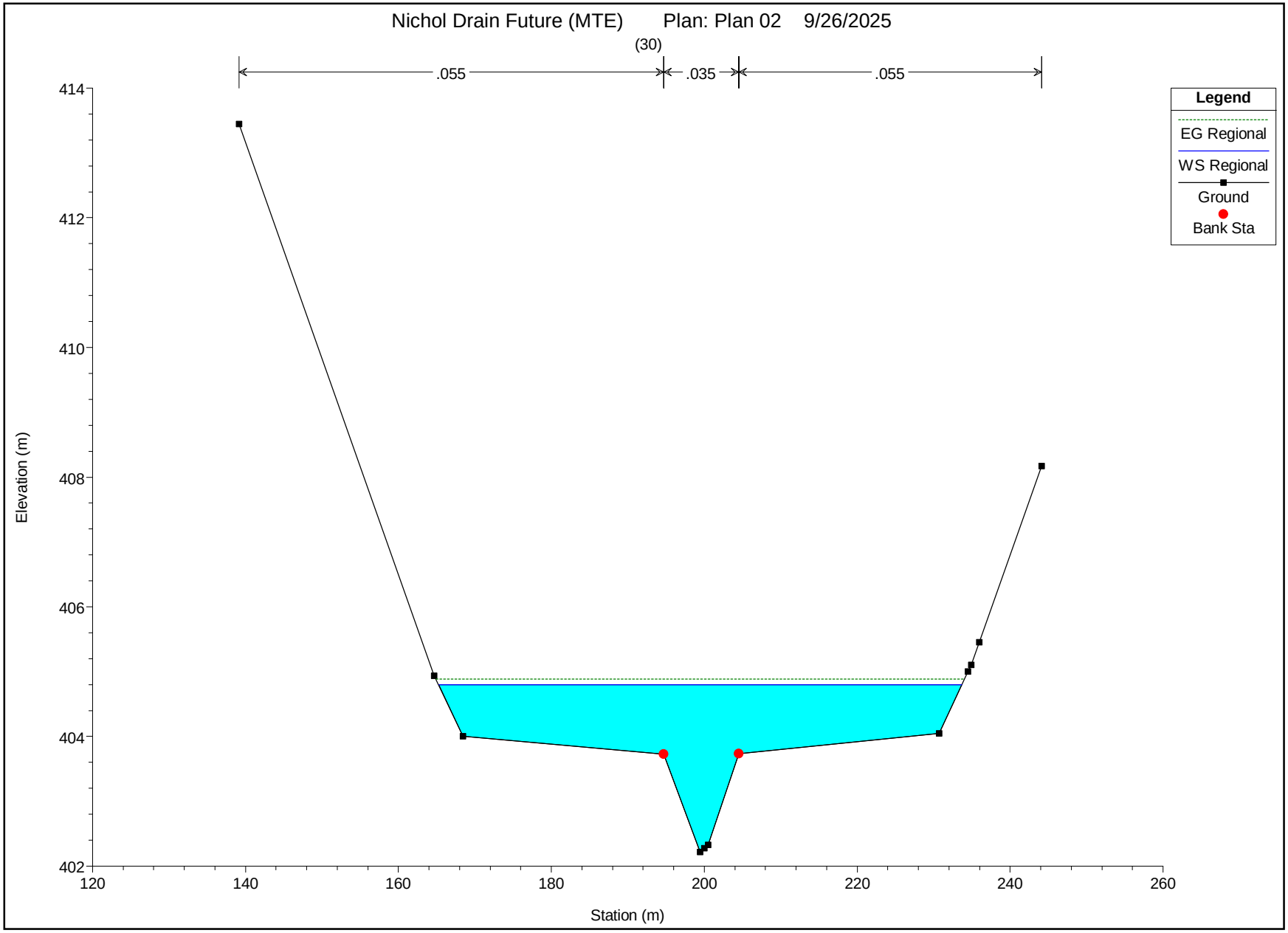
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Ground
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160
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240
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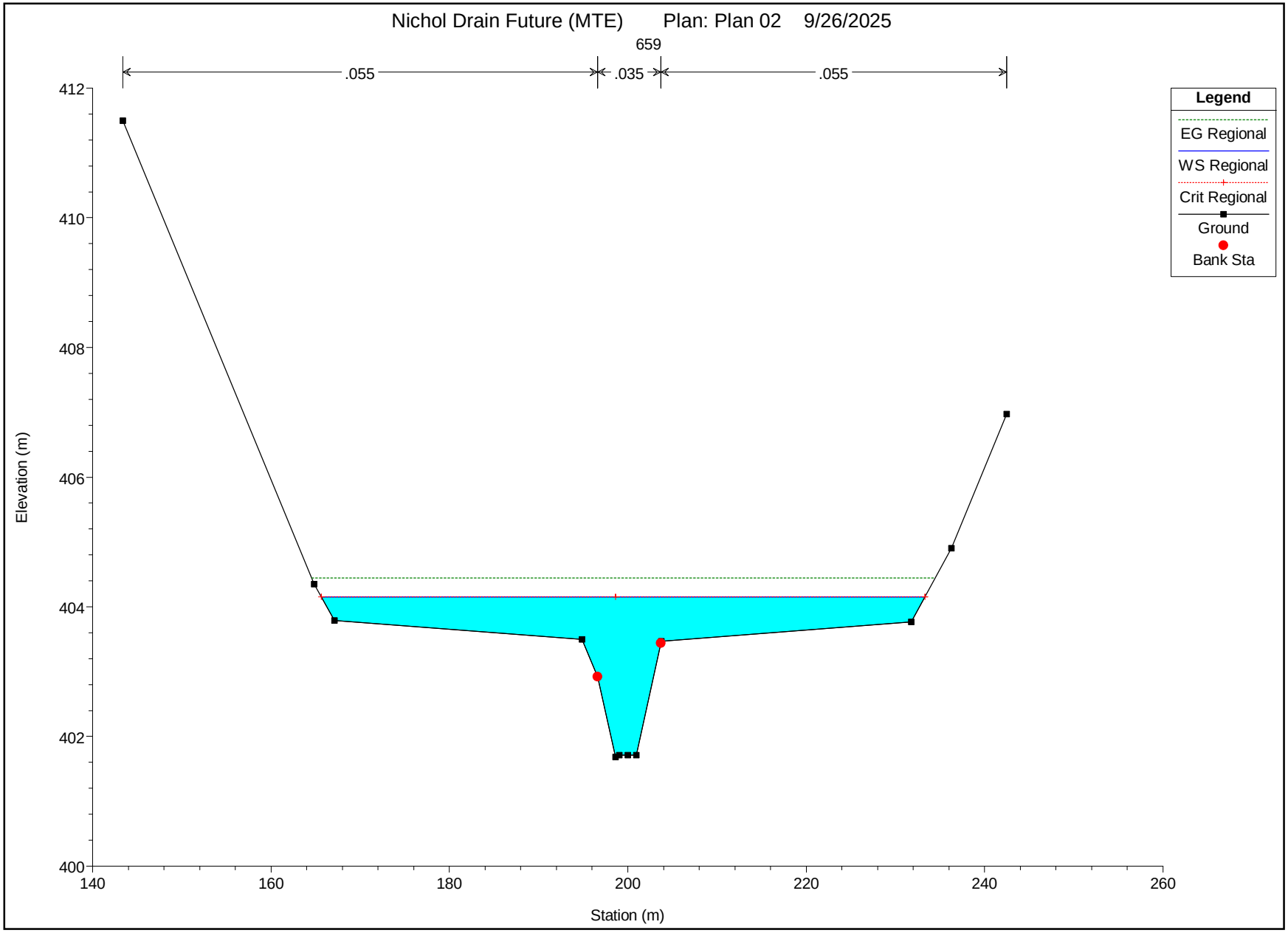
Station (m)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659
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.055
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Crit Regional
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Bank Sta
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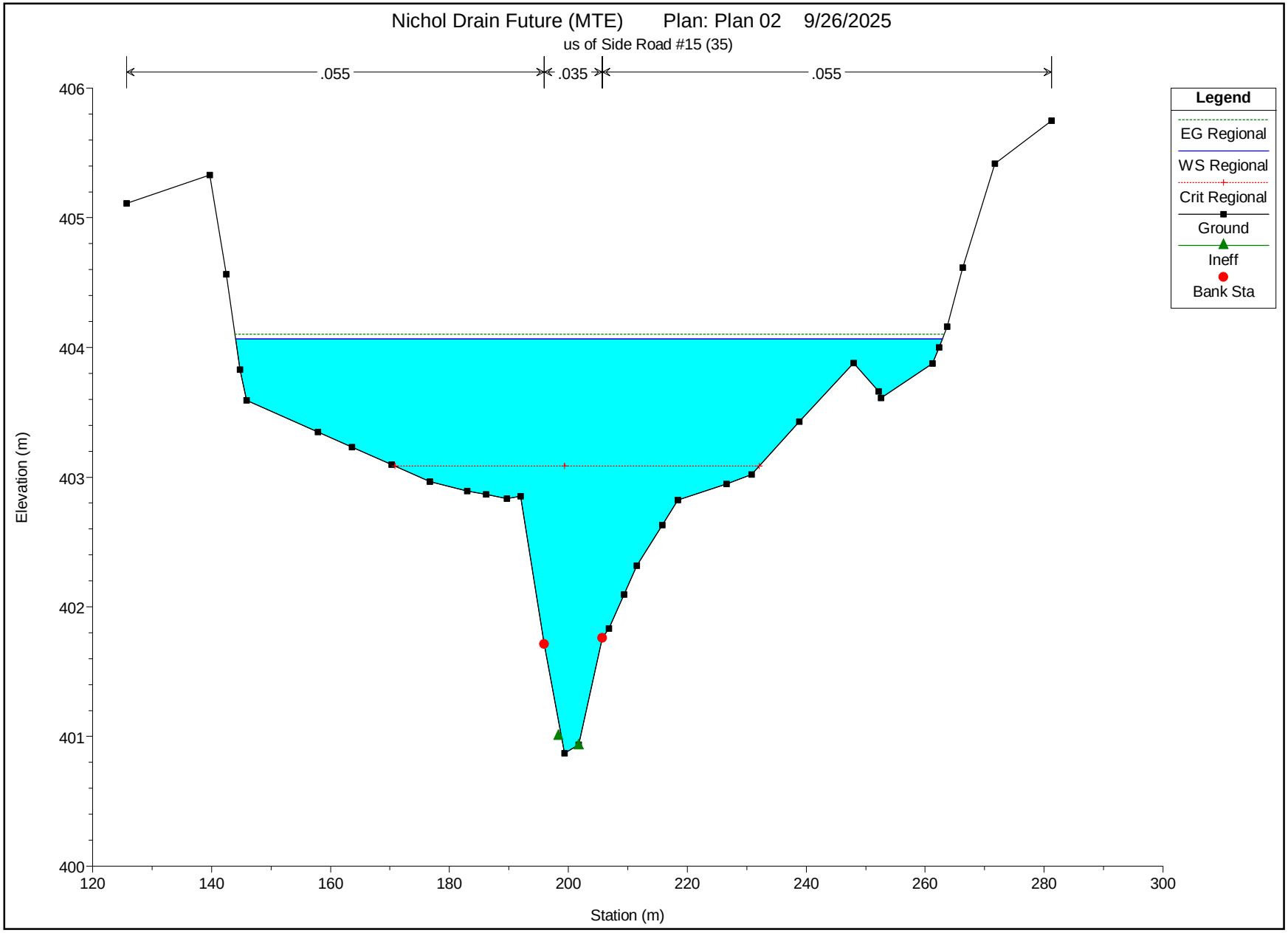
260
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
us of Side Road #15 (35)
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Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
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200
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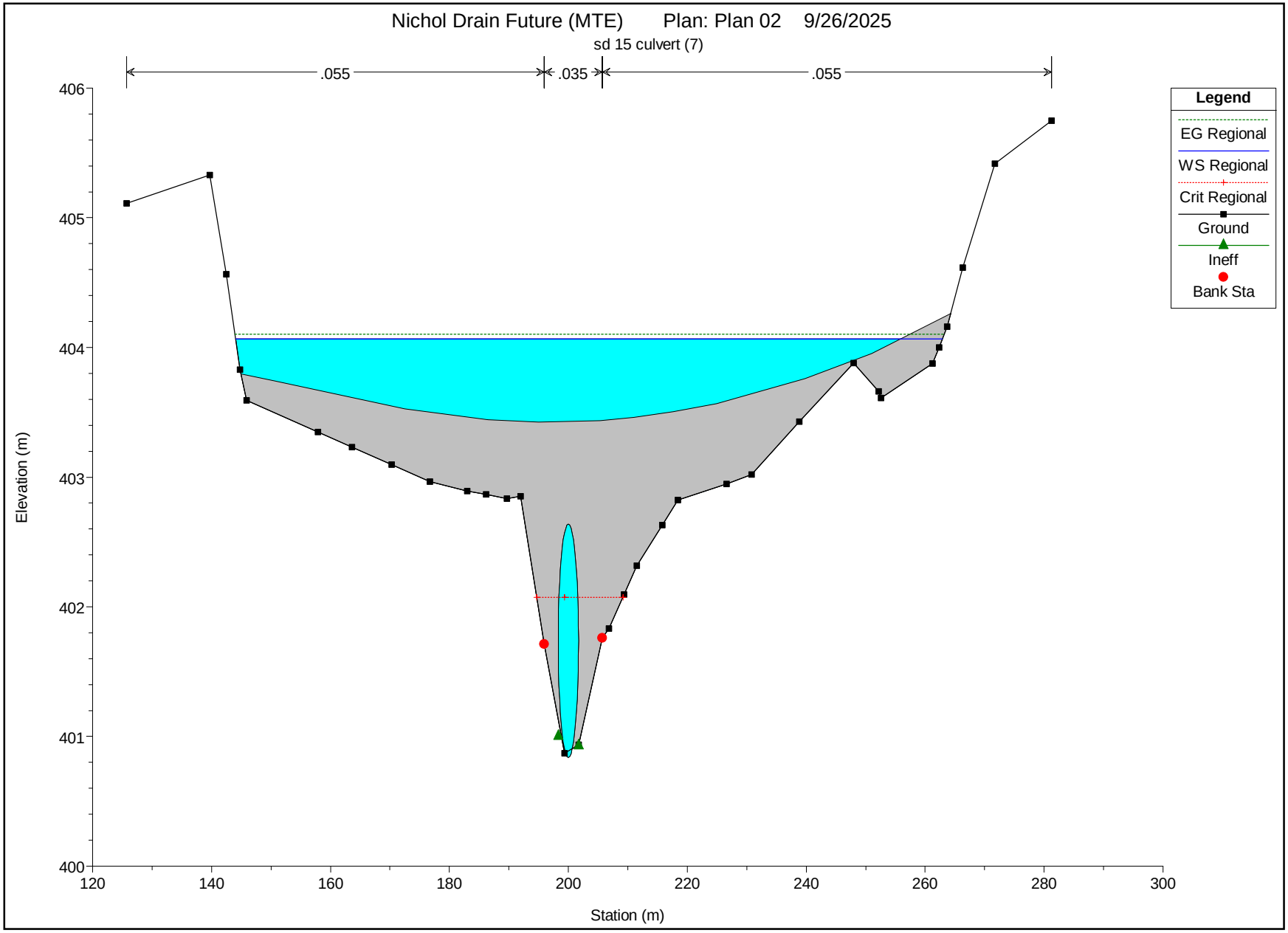
260
280
300
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
sd 15 culvert (7)
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EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
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400
120
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200
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280
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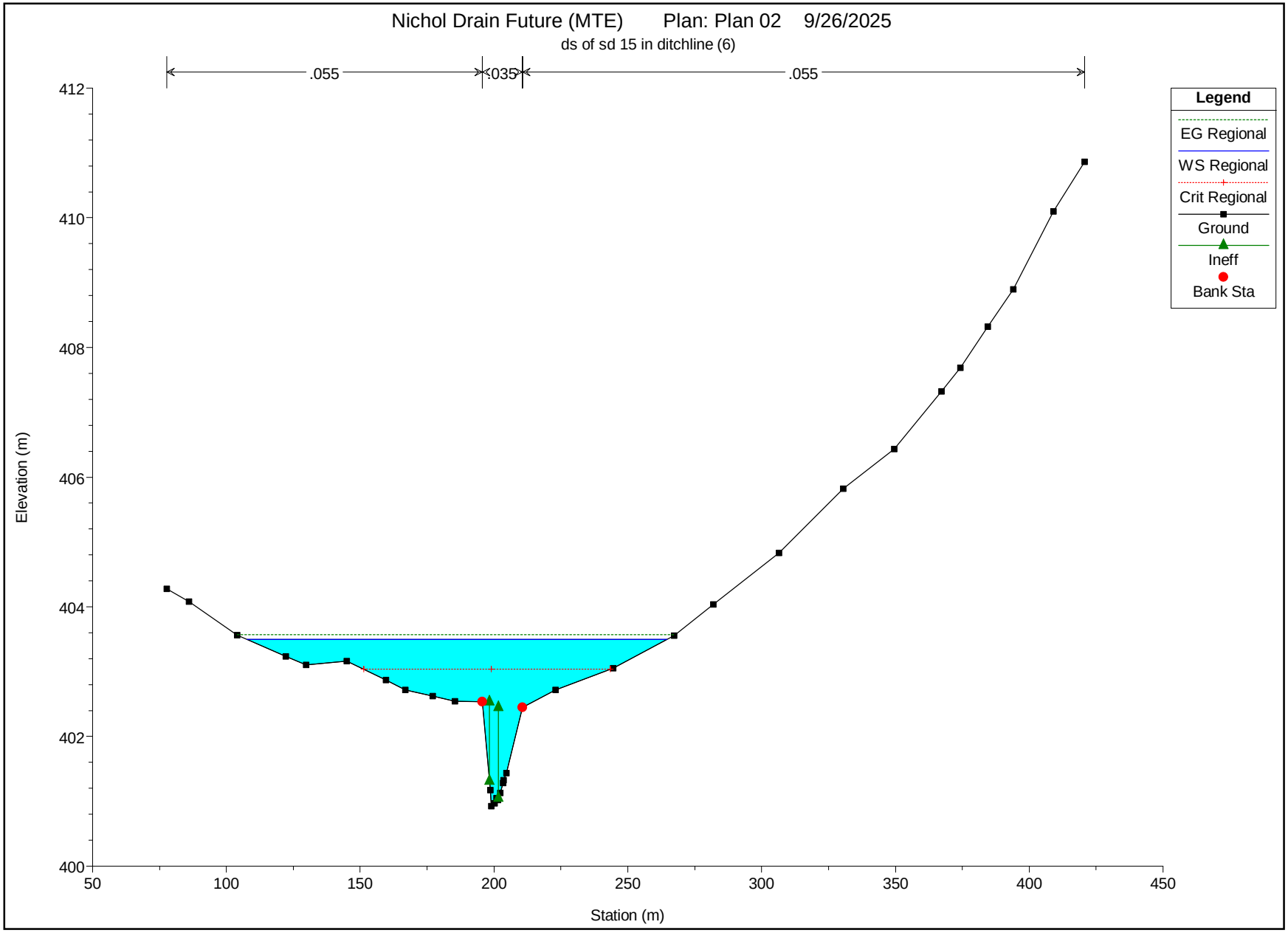
Station (m)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ds of sd 15 in ditchline (6)
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EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
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200
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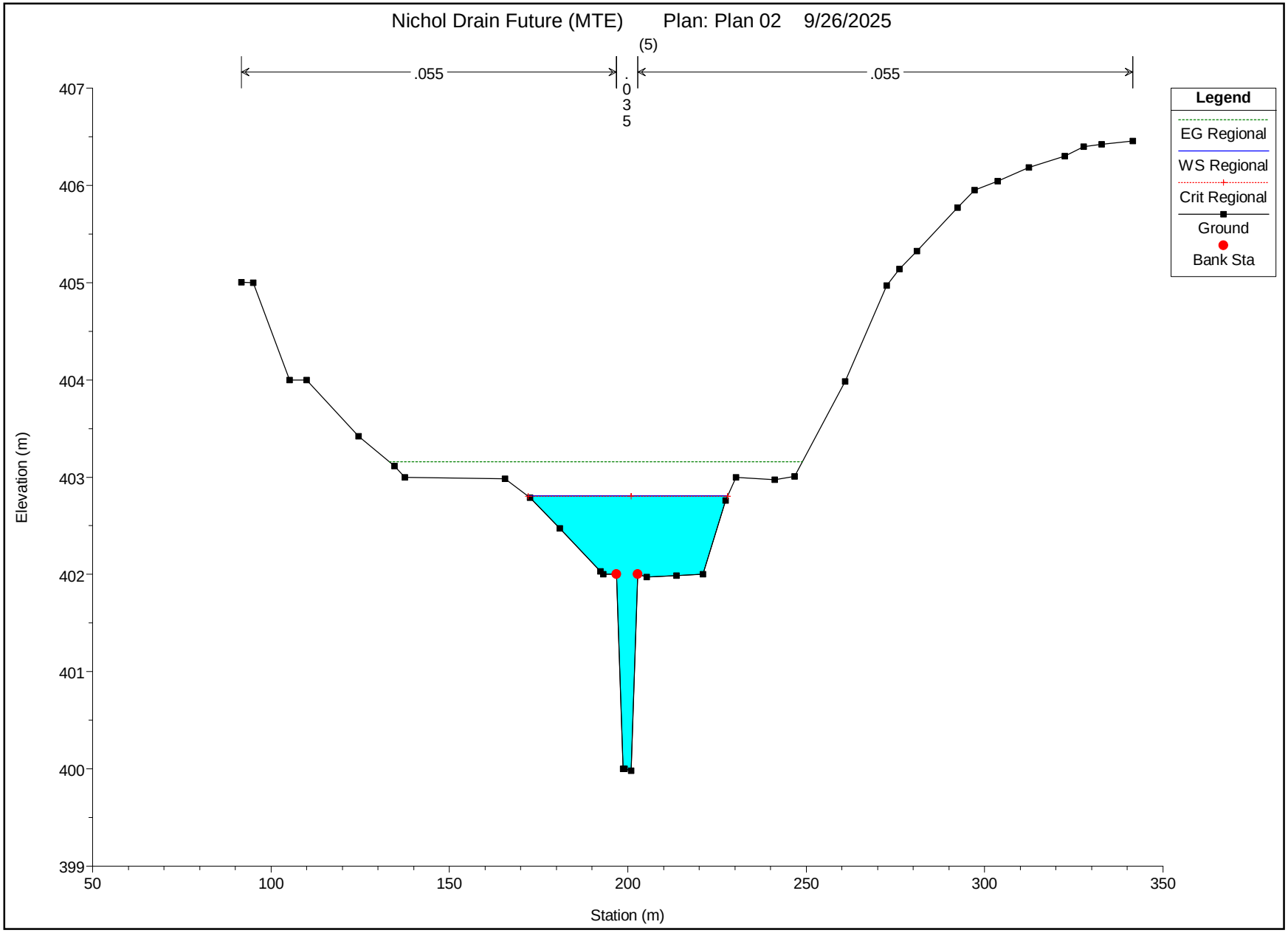
300
350
400
450
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(5)
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.035
.055
Legend
EG Regional
WS Regional
Crit Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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406
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404
403
402
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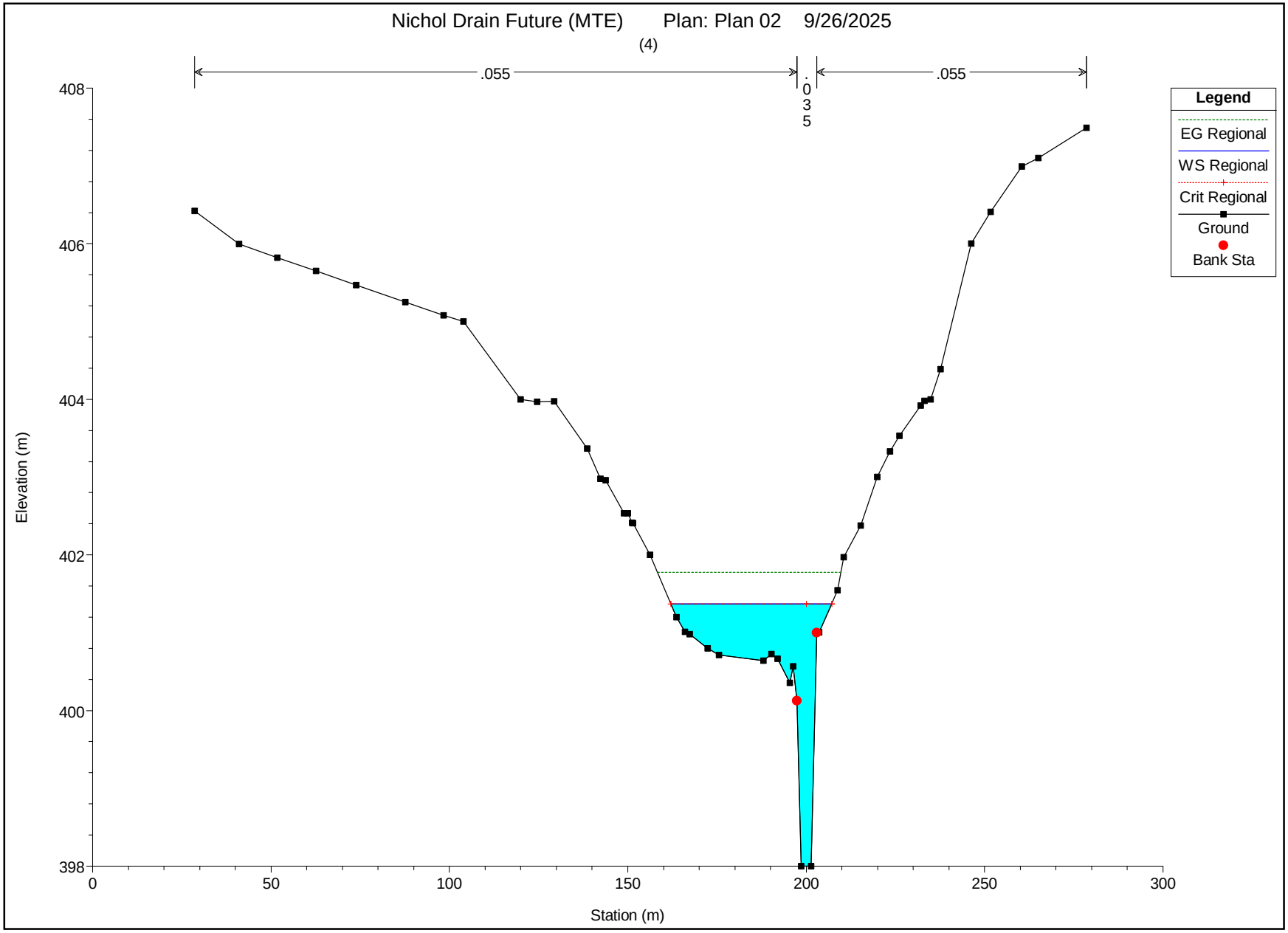
300
350


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(4)
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Legend
EG Regional
WS Regional
Crit Regional
Ground
Bank Sta
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Station (m)
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406
404
402
400
398
0
50
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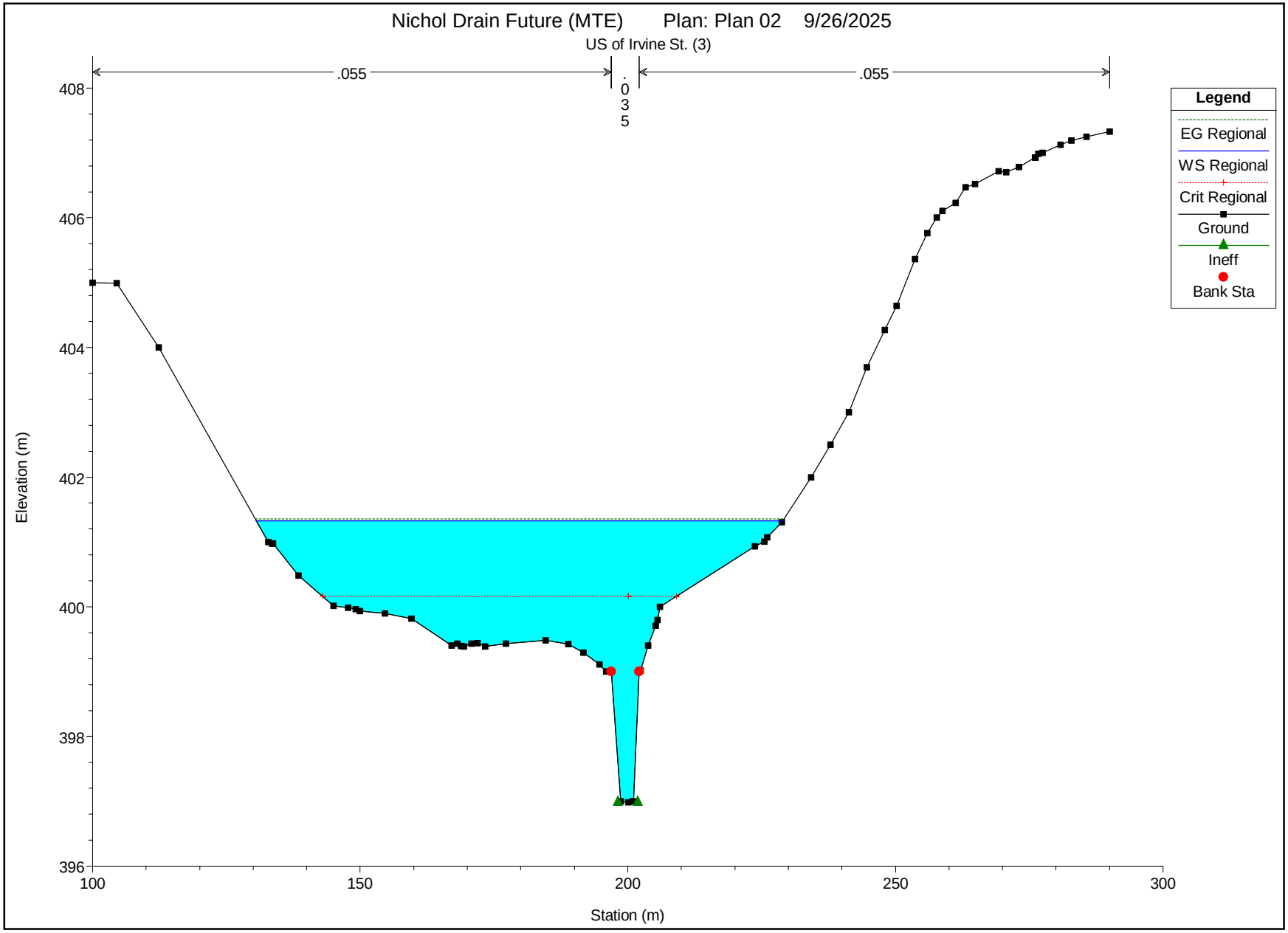
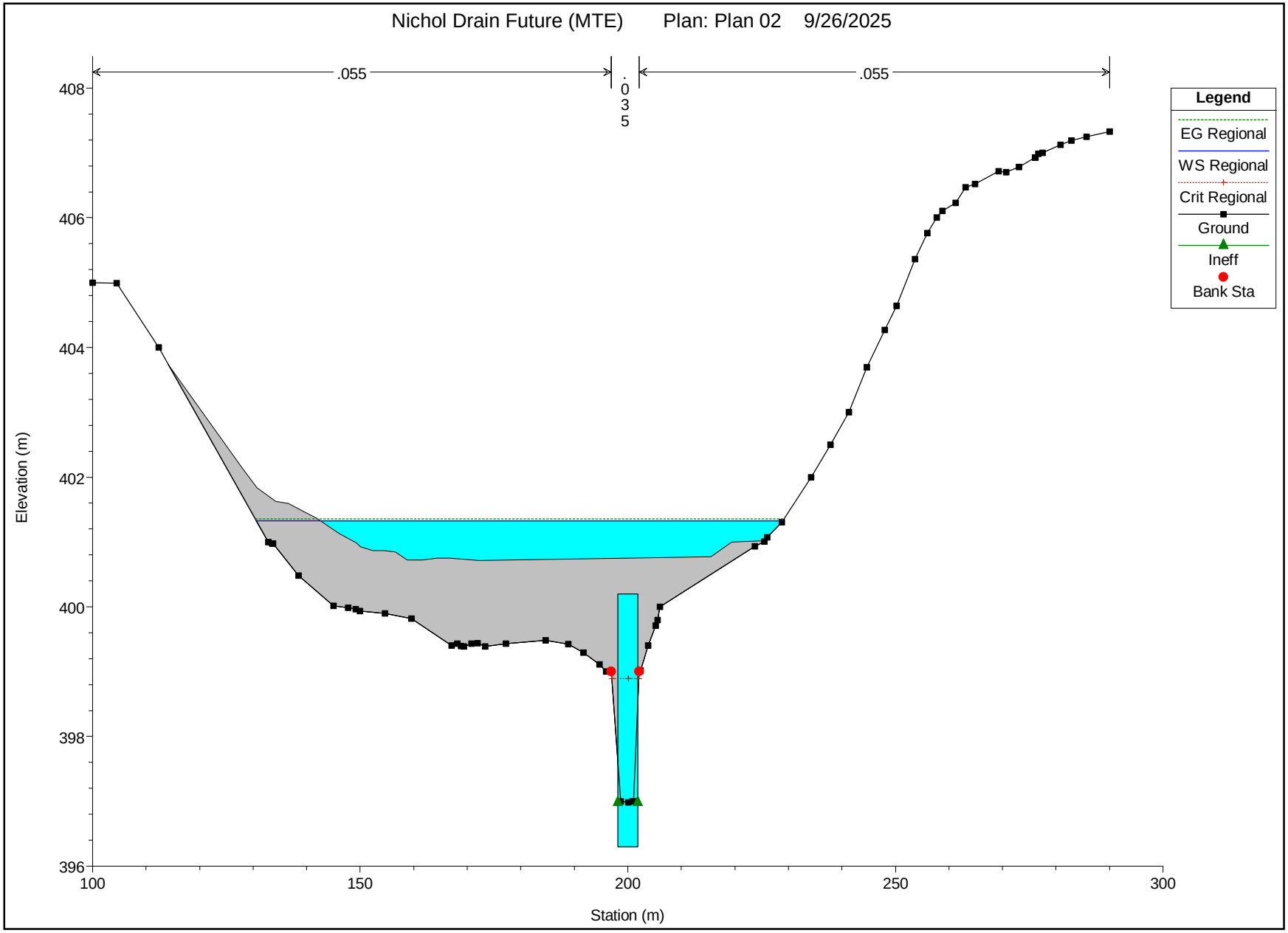
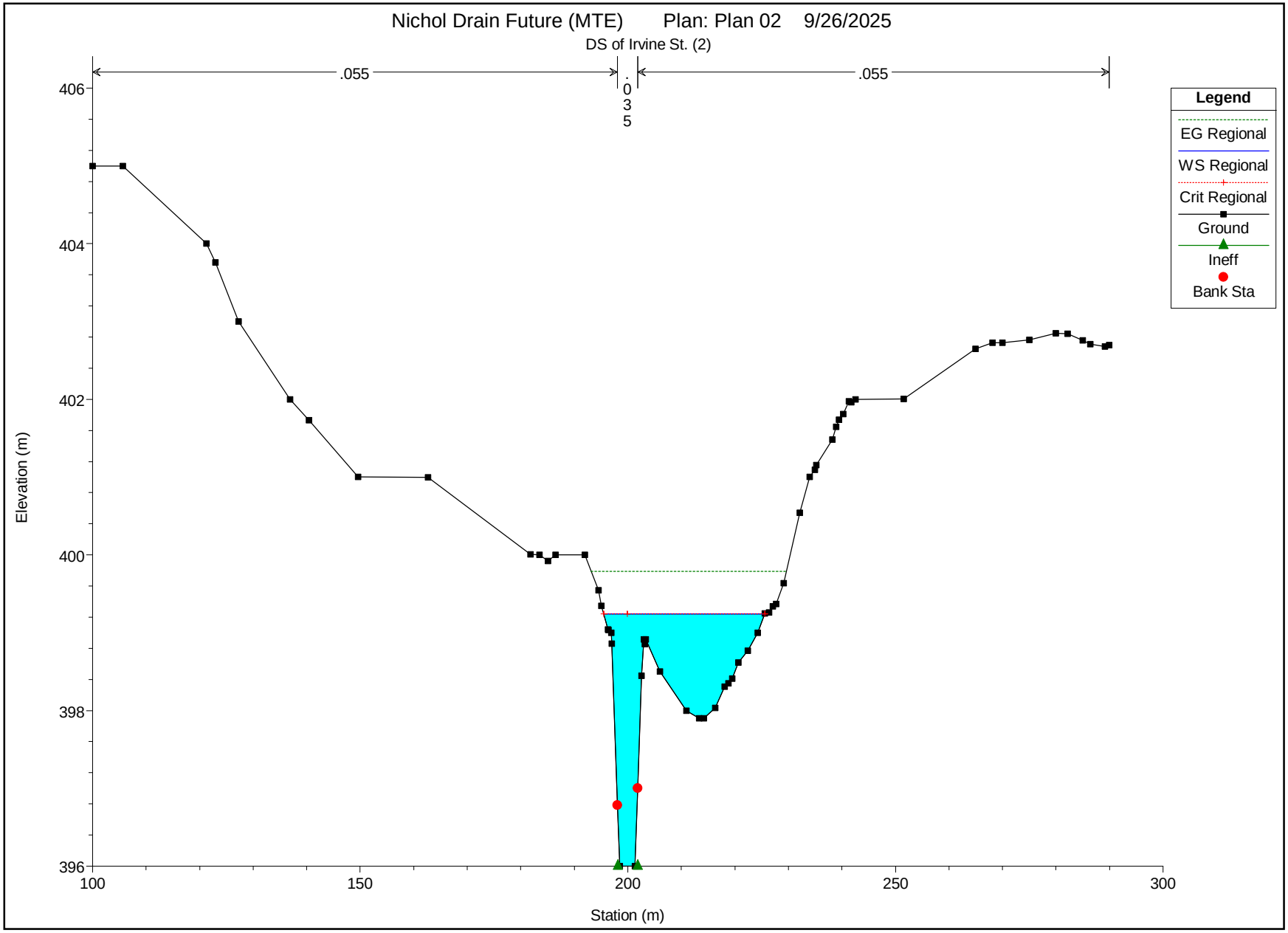
150
200
250
300


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
US of Irvine St. (3)
.055
.035
.055
Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
408
406
404
402
400
398
396
100
150
200
250
300


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
.055
.035
.055
Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta
Elevation (m)
408
406
404
402
400
398
396
100
150
200
250
300
Station (m)


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
DS of Irvine St. (2)
.055
.035
.055
406
404
402
400
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396
Elevation (m)
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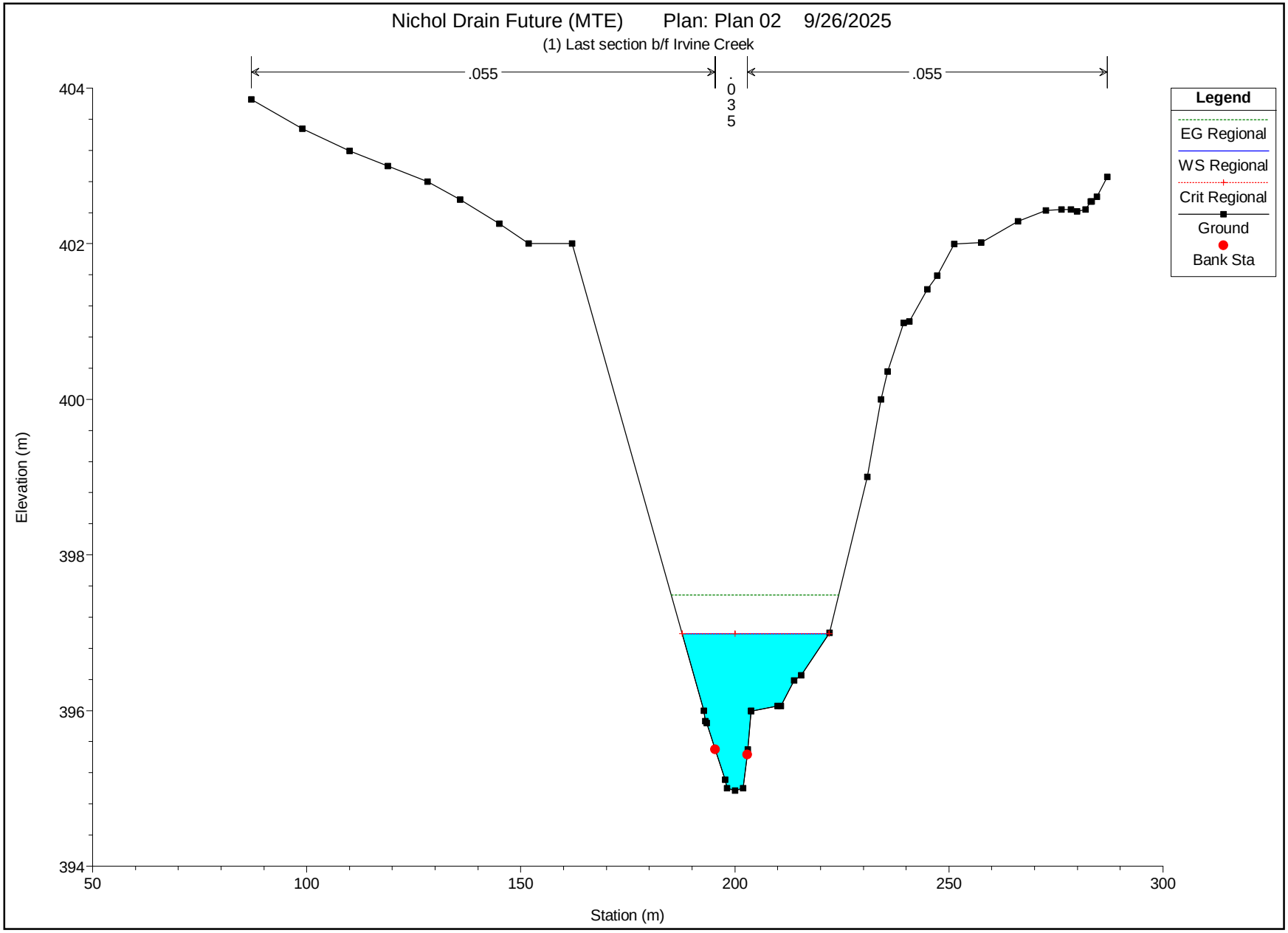
200
250
300
Station (m)
Legend
EG Regional
WS Regional
Crit Regional
Ground
Ineff
Bank Sta


Nichol Drain Future (MTE) Plan: Plan 02 9/26/2025
(1) Last section b/f Irvine Creek
.055
.035
.055
Legend
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WS Regional
Crit Regional
Ground
Bank Sta
Elevation (m)
Station (m)
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394
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300

Drawings

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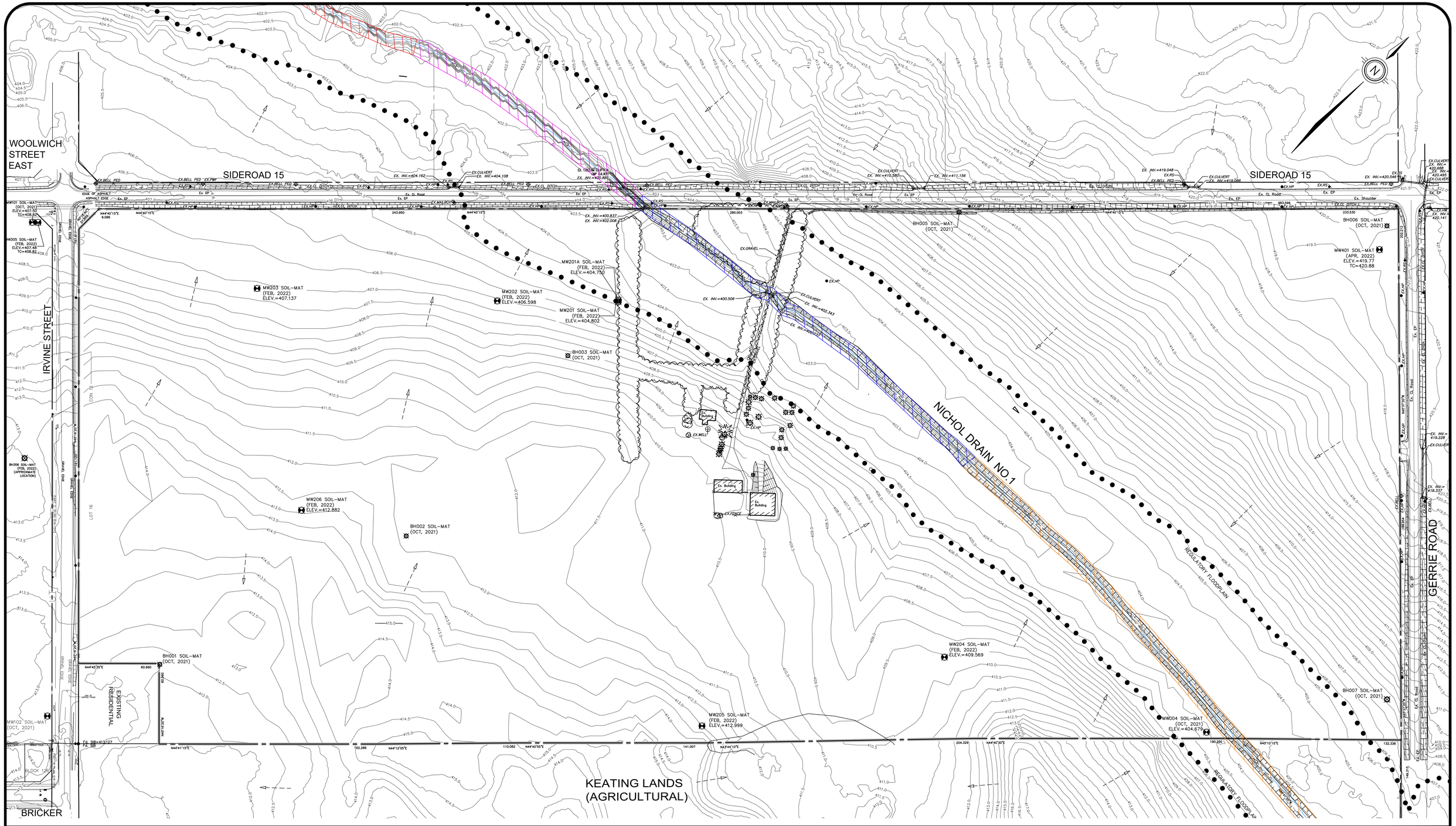
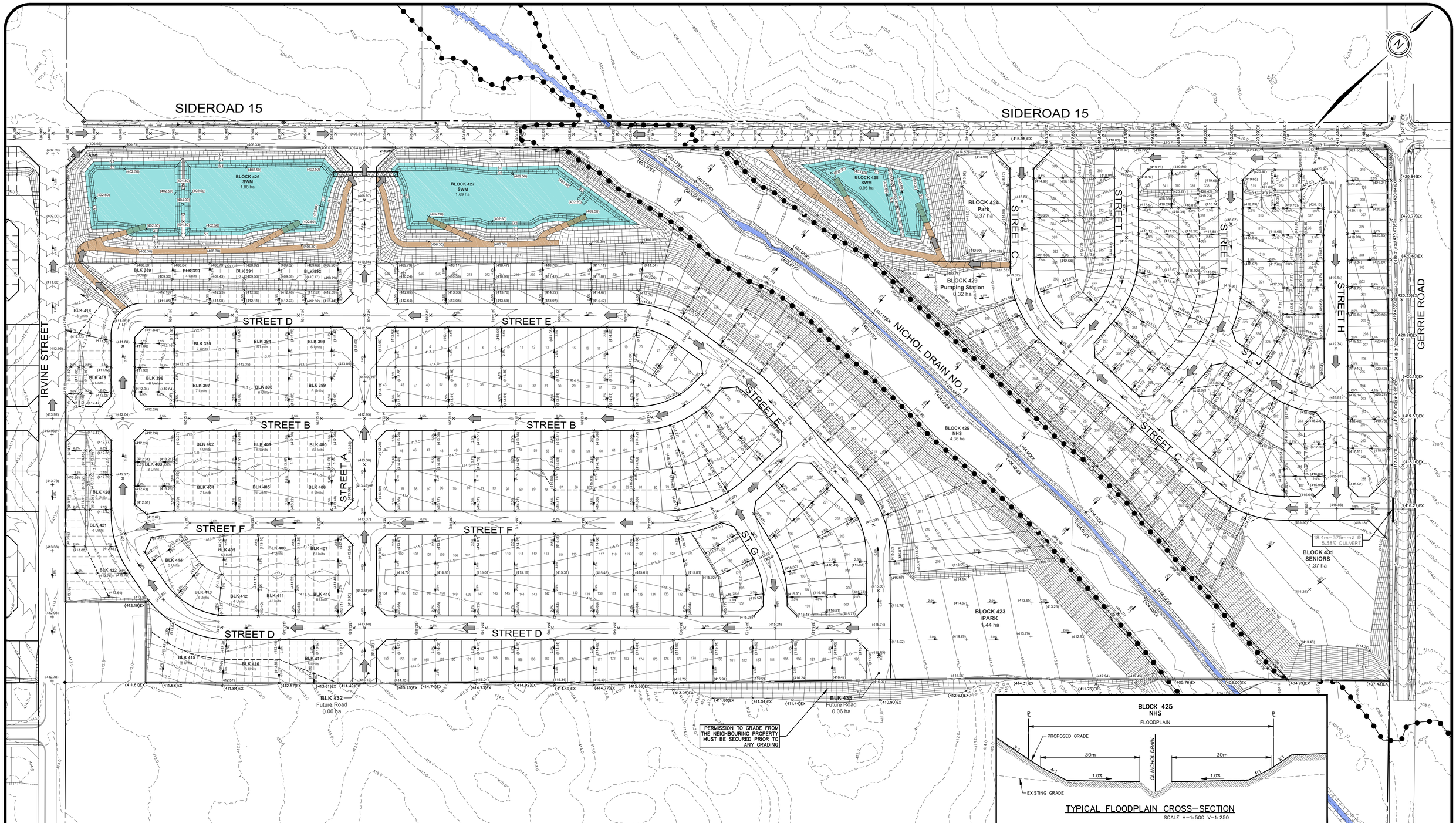
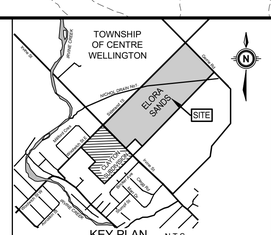

WOOLWICH STREET EAST
SIDEROAD 15
SIDEROAD 15
IRVINE STREET
NICHOL DRAIN NO.1
REGULATORY FLOODPLAIN
GERRIE ROAD
BRICKER
KEATING LANDS (AGRICULTURAL)
EXISTING RESIDENTIAL
MW101 SOIL–MAT (OCT, 2021) ELEV.=407.50 TC=408.82
MW305 SOIL–MAT (FEB, 2022) ELEV.=407.48 TC=408.82
MW203 SOIL–MAT (FEB, 2022) ELEV.=407.137
MW201A SOIL–MAT (FEB, 2022) ELEV.=404.750
MW202 SOIL–MAT (FEB, 2022) ELEV.=406.598
MW201 SOIL–MAT (FEB, 2022) ELEV.=404.802
BH003 SOIL–MAT (OCT, 2021)
BH306 SOIL–MAT (FEB, 2022) (APPROXIMATE LOCATION)
MW206 SOIL–MAT (FEB, 2022) ELEV.=412.882
BH002 SOIL–MAT (OCT, 2021)
BH001 SOIL–MAT (OCT, 2021)
MW102 SOIL–MAT (OCT, 2021)
MW205 SOIL–MAT (FEB, 2022) ELEV.=412.999
MW204 SOIL–MAT (FEB, 2022) ELEV.=409.569
MW004 SOIL–MAT (OCT, 2021) ELEV.=404.679
BH007 SOIL–MAT (OCT, 2021)
BH005 SOIL–MAT (OCT, 2021)
BH006 SOIL–MAT (OCT, 2021)
MW401 SOIL–MAT (APR, 2022) ELEV.=419.77 TC=420.88
EX. INV.=404.162
EX.CULVERT EX. INV.=404.108
EX. INV.=400.837
EX. INV.=402.008
EX. INV.=400.506
EX.CULVERT EX. INV.=402.343
EX. INV.=402.105
EX.CULVERT EX. INV.=410.587
EX. INV.=411.156
EX. INV.=419.048
EX.CULVERT EX. INV.=419.086
EX. INV.=420.546
EX.CULVERT EX. INV.=420.105
EX.CULVERT EX. INV.=420.141
EX. INV.=418.228
EX.CULVERT EX. INV.=418.133
EX.GRAVEL
EX.WELL
Ex. Building
EX.FENCE
EX.MAILBOX
EX.BELL PED
EX.HP
EX.RS
EX. CL DITCH
Ex. CL Road
Ex. EP
EDGE OF ASPHALT
Ex. Shoulder
Ex. Driveway
Ex. Culvert
Ex. Catch Basin
Ex. Manhole
Ex. Hydrant
Ex. Utility Pole
Ex. Guiderail
Ex. Fence
Ex. Gate
Ex. Deciduous Tree
Ex. Coniferous Tree
Ex. Hedgerow
Ex. Shrub
Ex. Bush
Ex. Stump
Ex. Rock
Ex. Retaining Wall
Ex. Sign
Ex. Mailbox
Ex. Bell Ped
Ex. Light Standard
Ex. Hydro Pole
Ex. Guy Wire
Ex. Transformer
Ex. Telephone Pole
Ex. Telephone Box
Ex. Hydro Box
Ex. Gas Valve
Ex. Water Valve
Ex. Water Box
Ex. Water Meter
Ex. Sanitary Manhole
Ex. Sanitary Cleanout
Ex. Storm Manhole
Ex. Storm Cleanout
Ex. Storm Inlet
Ex. Catch Basin
Ex. Culvert
Ex. Headwall
Ex. Flared End
Ex. Rip Rap
Ex. Swale
Ex. Ditch
Ex. Berm
Ex. Curb
Ex. Sidewalk
Ex. Asphalt
Ex. Gravel
Ex. Concrete
Ex. Pavement
Ex. Building
Ex. Shed
Ex. Garage
Ex. Barn
Ex. Silo
Ex. Greenhouse
Ex. Pool
Ex. Deck
Ex. Porch
Ex. Chimney
Ex. Antenna
Ex. Satellite Dish
Ex. Solar Panel
Ex. Windmill
Ex. Well
Ex. Septic Tank
Ex. Septic Bed
Ex. Septic Vent
Ex. Septic Cleanout
Ex. Septic Inspection Chamber
Ex. Septic Distribution Box
Ex. Septic Pump Chamber
Ex. Septic Pump
Ex. Septic Float
Ex. Septic Alarm
Ex. Septic Control Panel
Ex. Septic Riser
Ex. Septic Lid
Ex. Septic Baffle
Ex. Septic Filter
Ex. Septic Effluent Filter
Ex. Septic Pump Out
Ex. Septic Pump Out Riser
Ex. Septic Pump Out Lid
Ex. Septic Pump Out Baffle
Ex. Septic Pump Out Filter
Ex. Septic Pump Out Effluent Filter
Ex. Septic Pump Out Pump
Ex. Septic Pump Out Float
Ex. Septic Pump Out Alarm
Ex. Septic Pump Out Control Panel



LEGEND

SITE BOUNDARY	
EXISTING CONTOURS	414.0
GRCA CONTOURS	415.0
PROPOSED CONTOURS	412.0
EXISTING DRIPLINE	
FLOODPLAIN LIMIT	
DRAINAGE SPLIT (RIDGE)	
PROPOSED GRADE	(413.83)
DIRECTION OF DRAINAGE	1.0%
OVERLAND FLOW ROUTE (MAJOR STORM)	
EMBANKMENT (SLOPE AS NOTED)	(TOP) 3:1 (BOTTOM)



KEY PLAN N.T.S.

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	YYYY-MM-DD
1.			

TOWNSHIP OF CENTRE WELLINGTON

GEODETIC BM ELEV. = 387.982m
ELORA POST OFFICE, BOLT IN FRONT WALL, IN LINTEL OF CENTRE BASEMENT WINDOW. (HISTORICAL NUMBER 16U117E)

SITE BENCHMARK ELEV. = m

CLIENT
ELORA SANDS DEVELOPMENT INC.
2555 Meadowpine Blvd. Unit 3 Mississauga Ont.

PROJECT
ELORA SANDS SUBDIVISION

DRAWING
AREA GRADING PLAN

MTE
Engineers, Scientists, Surveyors.

Design By	AXF	Project Manager	M.FELINCZAK
Drawn By	ACH	Project No.	62018_001
Checked By	X.XXX	Drawing No.	AG1.1
Date (yyyy-mm-dd)	2025-10-17		
SCALE	1:1250	Sheet	of

MTE File Path: P:\P\62018_001\62018_001-AG1

November 3, 2025 - 11:05:07 AM - Plotted By: Kenneth A. Taylor