GSS ENGINEERING CONSULTANTS LTD

FUNCTIONAL SERVICING REPORT
Nagel Residential Development

Shallow Lake

December 4, 2025

PROJECT 21-112

SUBMITTED TO:

Sunset View Farms & Investments
548 Princess Street
Shallow Lake, ON N0H 2K0

ATTENTION:

Christian Nagel, Owner

Table of Contents

APPENDICES

FIGURES

TABLES

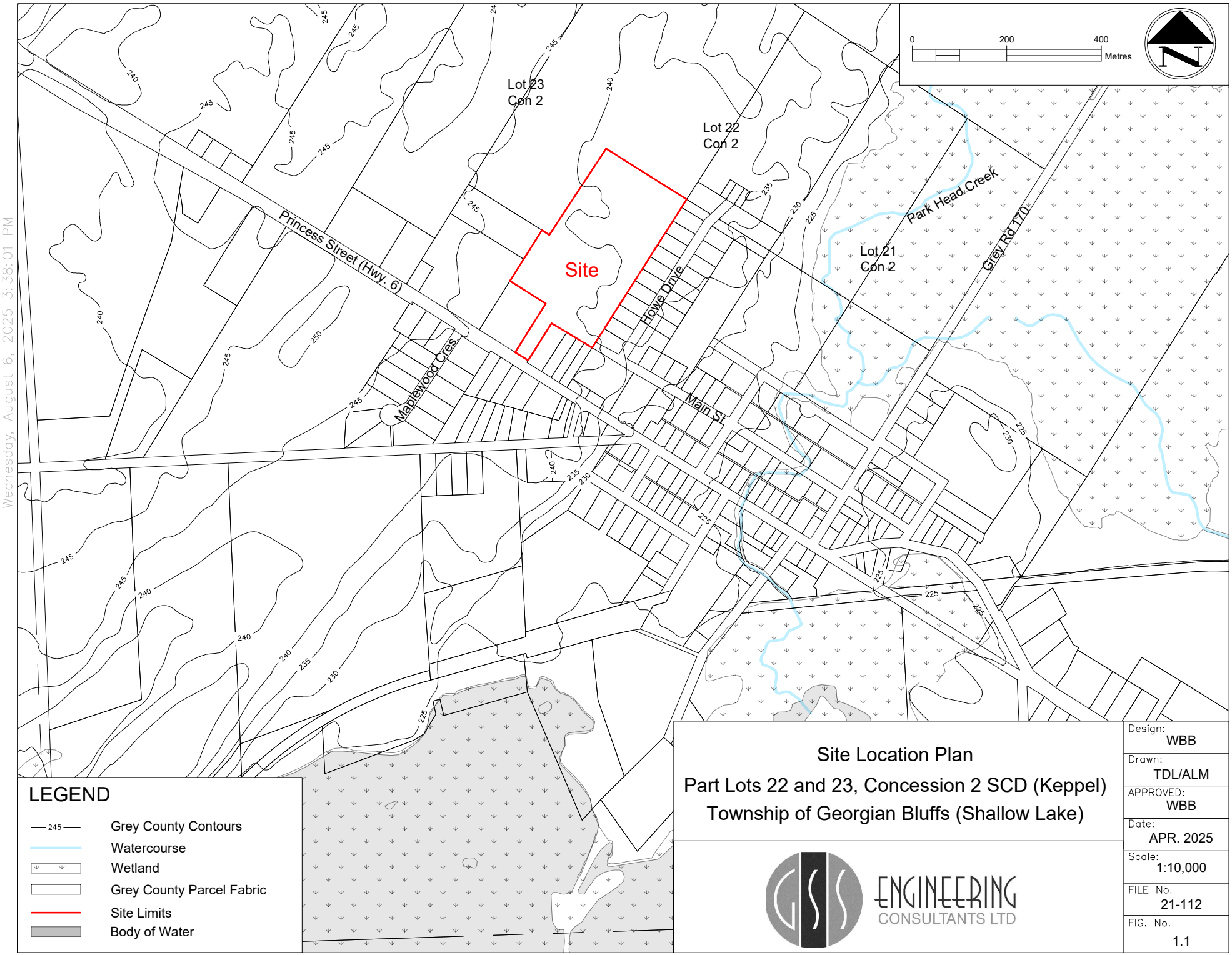
1.0 INTRODUCTION

GSS ENGINEERING LTD. has been retained by Sunset View Farms & Investments represented by Christian Nagel to provide engineering services for a proposed residential subdivision, to be located in Part of Lots 22 & 23, Conc. 2 South of Centre Diagonal (SCD), Geographic Township of Keppel, now in the Township of Georgian Bluffs (hereafter referred to as the Site). The Site is legally described as Part of Lot 23, Concession 2 SCD (Keppel) and Part of Lot 1, Judge's Plan 857 (Keppel).

It is proposed to develop approximately 8.14 ha (20.1 acres) parcels of land into a residential development with 27 single-detached houses and one (1) fourplex. The existing parcel is agricultural cropland, with a treed area located in the eastern portion of the property. The limits of the site and the area of the proposed development are shown in **Figure 1.1.**

The residential development is proposed to be provided with municipality water supply from Shallow Lake Water System and on-site septic system. The storm water management for the subdivision is to be provided by way of primarily roadside ditches, accompanied with storm sewer and culverts wherever needed, and discharging to an on-site runoff storage pond.

The report also includes highlights of Karst Assessment of the site, as required by the County of Grey.



Wednesday, August 6, 2025 3:38:01 PM

LEGEND

- 245 — Grey County Contours
- Watercourse
- Wetland
- Grey County Parcel Fabric
- Site Limits
- Body of Water

Site Location Plan

Part Lots 22 and 23, Concession 2 SCD (Keppel)

Township of Georgian Bluffs (Shallow Lake)

GSS ENGINEERING CONSULTANTS LTD

Design:	WBB
Drawn:	TDL/ALM
APPROVED:	WBB
Date:	APR. 2025
Scale:	1:10,000
FILE No.	21-112
FIG. No.	1.1

G:\GSS Common\2021\21-112 548 Princess Street Shallow Lake-Draft Plan of Subdivision\Drawings\Hydrogeology\21-112.dwg Aug 06, 2025 - 3:38pm

2.0 LAND USE, LOCATION AND ACCESS

The site is currently zoned as Planned Development Zone (PD). The current use of the site is primarily a mixture of agricultural crop land and a treed area. Refer to **Figure 2.1** for surrounding land use information. Also, refer to Section 4.0 for more description of land use information.

The proposed development is located near Howe Drive. When developed, the site will become accessible from Main Street & Howe Drive. Although the land parcel at the south end is accessible from Hwy 6 however, access from the highway is neither proposed nor permitted by the municipality or Grey County or by MTO. The proposed subdivision location is adjacent to an existing row of single detached homes along Howe Drive.

Lands legal description is Part of Lot 23, Concession 2 SCD (Keppel) and Part of Lot 1, Judge's Plan 857 (Keppel).

Thursday, August 7, 2025 4:20:39 PM

Surrounding Land Use
Part Lots 22 and 23, Concession 2 SCD (Keppel)
Township of Georgian Bluffs (Shallow Lake)

Design:	WBB
Drawn:	TDL/ALM
APPROVED:	WBB
Date:	APR. 2025
Scale:	1:5,000
FILE No.	21-112
FIG. No.	2.1

GSS ENGINEERING CONSULTANTS LTD

Reference:
Grey County Parcel Mapping
Image: Google Earth (May 28, 2021)

G:\GSS Common\2021\21-112 548 Princess Street Shallow Lake-Draft Plan of Subdivision\Drawings\Hydrogeology\21-112.dwg Aug 07, 2025 - 4:20pm

3.0 PURPOSE AND SCOPE OF WORK

This report has been prepared to apply for a Draft Plan Approval of the Nagel Subdivision Development.

The scope of work for sanitary servicing is developed based on Ministry of Environment, Conservation and Parks (MECP) Procedures D-5-4 Technical Guideline for Individual On-Site Sewage Systems. Water Servicing is by extension of municipal water supply to service the subdivision and creation of road access from Howe Drive and Main Street and storm water management.

The objective of this study therefore is to provide:

- Feasibility on-site sewage systems
- Feasibility of extension of municipality water supply systems
- Road connectivity
- Management of stormwater run-off from site.
- Karst Assessment

The necessary information for the required analysis was gathered by way of desktop (e.g., review of records on file) review and field study work. In general, the investigation pertained to:

- Background study regarding the geological and physiographic setting of the site
- Nitrate capacity attenuation estimation of the proposed development (as per Procedure D-5-4)
- Estimation of the sizing of the dispersal bed required
- Stormwater Management of runoff generated from impervious surfaces

Separate reports have been prepared for Hydrogeological Assessment for sewage disposal and Karst Assessment, which were prepared by GSS Engineering Consultants Ltd. They are:

- Karst Topography Report, Proposed Shallow Lake Development (Nagel), Georgian Bluffs
- Groundwater Quality Impact Assessment (D-5-4), Proposed Shallow Lake Development (Nagel), Georgian Bluffs.

4.0 SITE DESCRIPTION

The Site is located on the north side of Princess Street (Highway 6) near the west edge of the community of Shallow Lake, as shown on **Figure 2.1** Princess Street is oriented in a roughly northwest-southeast direction adjacent to the Site.

Based on the plan of survey for the proposed development (Callon Dietz Incorporated, September 2022), the area of the Site is 8.14 ha (20.1 ac). The majority of the Site is roughly rectangular-shaped, with a relatively narrow strip extending south to Princess Street where there is 34 m of frontage. Most of the Site is located within what was originally Lot 22, Concession 2 SCD of the Township of Keppel, within a parcel described as Lot 1, Judge's Plan 857. A 0.28-ha, rectangular-shaped area on the west side of the south portion of the Site extended westerly into Lot 23, Concession 2 SCD. All of the Site is located within the identified limit of settlement area for Shallow Lake. The Site has no assigned municipal address. Information on Grey County Maps indicated that the current zoning of the Site was Planned Development (PD). The Site Owner also owned the adjacent 24-ha (59-ac) property to the north and northwest of the Site in the west half of Lot 22 and east half of Lot 23.

Current land use in the vicinity of the Site is shown on the aerial image on **Figure 2.1.** Much of the western portion of the Site (approximately 4.9 ha) currently consists of cultivated farmland and can be accessed from Princess Street. The eastern portion of the Site (approximately 3.2 ha) is currently wooded and is identified as Significant Woodland on mapping from Appendix B of the Grey County OP.

Contours at 0.5 m intervals derived for the Site on Ontario AgMaps similarly indicated that the ground surface on the Site declined in an easterly direction, from elevation 241.5 m at the southwest corner, adjacent to the community centre, to elevation 237 m at the northeast corner, with an average slope of approximately 1 m per 100 m. Surface drainage across the Site is inferred to be in an easterly direction.

The Site is bordered to the north and northwest by additional cultivated farmland owned by the Site Owner. The southern portion of the Site is bordered to the west by the Shallow Lake & District Community Centre, which contained an arena, ball diamond, and recreational facilities. On the south side of the Site, closest to Princess Street, the west part is bordered by a wellness and fitness centre and the east part is bordered by residential properties fronting onto Princess Street. Residential properties and a commercial property are located on the south side of Princess Street, south of the Site. To the east, the Site is bordered by single-family residential properties fronting onto Howe Drive, constructed in the period between 2010 and 2020 approximately.

On the 2002 topographic mapping (MNRF OBM), the closest watercourse to the Site is Park Head Creek, shown approximately 310 m east-southeast of the northeast corner of the Site at the closest point. A relatively large wetland area is shown on the east side of Park Head Creek. The creek and associated wetland are shown at approximate elevation 223 m east of the Site. As previously noted, surface drainage on the Site is inferred to be in an easterly direction toward the creek. Drainage mapping generated using the MNRF Ontario Watershed Information Tool (OWIT) indicated that the entire Site was located within the drainage area for Park Head Creek north of Princess Street (Highway 6).

5.0 REGIONAL SETTING AND HYDROGEOLOGY

This section outlines some relevant information from Hydrogeology Report entitled "Karst Topography Report, Proposed Shallow Lake Development (Nagel), Georgian Bluffs", prepared by GSS. For a more detailed description, refer to the Hydrogeology Report.

5.1 Hydrogeological Setting

Approximately the southern two-thirds of the Site is located within an area identified as exposed bedrock, described as Amabel Formation dolostone (Eramosa Member – bituminous). The northern portion of the Site is shown to be located within an extensive deposit of Bruce till (stoney, sandy silt) that extended north and west of the Site. Immediately east of Howe Drive, opposite the south half of the Site, the Quaternary geology mapping identified a large glaciolacustrine (deep-water) deposit consisting of silty clay and clay.

The Grey and Bruce Counties Groundwater Study (Waterloo Hydrogeologic, Inc., 2003) indicated that the Shallow Lake Water System was comprised of two bedrock wells, Well #2 constructed in 1996 and Well #3 constructed in 1999. The record inferred to be associated with Well #3 (MECP Well ID 2514177) indicated that the 200-mm diameter well was drilled to a depth of 61.0 m (200 feet), encountering 2.7 m of till-like overburden underlain by limestone to a depth 56.4 m, where blue shale was encountered. Water-producing zones were reportedly encountered at depths of 27.4 to 30.5 m and 54.9 m. The static water level was at a depth of 10.7 m.

The MECP well record search identified records for thirty-three (33) wells located within approximately 300 m of the Site. All of the wells were completed in the bedrock, which was encountered at depths ranging from 0 to 9.1 m (0 to 30 feet). The total well depths ranged from 13.7 to 75.3 m (45 to 247 feet). In general, the elevation of the bedrock surface followed the ground surface topography and dipped to the east-southeast in the vicinity of the Site.

Nine of the 33 wells reportedly encountered at least 1.5 m of overburden above the bedrock. The overburden was typically described as clay, clay with stones, or hardpan with stones, with a maximum reported depth of 7.6 m. GSS inferred that those soils would have a relatively low hydraulic conductivity.

5.2 Karst Assessment Findings

The following highlights are included from the Karst Assessment report entitled "Karst Topography Report, Proposed Shallow Lake Development (Nagel), Georgian Bluffs". Refer to the report for detailed information.

- The Site for the proposed residential development was assessed for the presence of karst topography to address the relevant requirements identified in the Grey County Official Plan.

- A mapped karst area identified in Appendix A of the Grey County OP encompassed approximately the southwestern 70% of the Site.
- Review of available topographic mapping and historical imagery indicated that surface drainage on the Site was in an easterly direction toward Park Head Creek, which flowed in a southerly direction approximately 300 m east of the Site. Review of historical mapping and aerial imagery for the vicinity of the Site did not identify evidence of surface water flow on or in the immediate vicinity of the Site or evidence to suggest the presence of karst features.
- Review of available records indicated the presence of disappearing streams flowing underground at locations approximately 2.4 km northwest, 0.8 km south, and 2.5 km east-southeast of the Site. All of those streams were inferred to flow in a predominantly westerly direction and there was no evidence to suggest that the underground flow path from any of those streams passed beneath the Site. None of the identified disappearing streams were located within areas mapped as karst in the Grey County OP.
- Geological mapping indicated that approximately the southern 70% of the Site was located within an area identified as exposed bedrock, most recently identified as Guelph Formation dolostone. The exposed bedrock was shown extending off-Site to the west, south, and east. The northern portion of the Site was shown to be located within an extensive deposit of Bruce till (stoney, sandy silt) that extended north and west of the Site.
- Review of available water well records for the vicinity of the Site indicated that water-producing zones were typically encountered at depths greater than 18 m. There were no indications of the potential presence of a highly conductive, karstic fracture network within the bedrock in the vicinity of the Site. The water table beneath the Site was inferred to be at a depth of approximately 15 m.
- Eight test pits excavated in the accessible cultivated portion of the Site encountered bedrock at depths ranging from 0.5 to 1.3 m. At 6 of the 8 test pits, the depth to bedrock was less than 1 m. An interpreted stratigraphic section through the Site indicated that the depth to bedrock ranged from approximately 0.6 to 3.3 m. At three test pits, the upper bedrock was layered and fragmented and could be broken relatively easily with the excavator. No open fractures or evidence of solution weathering or widening of fractures were noted for the bedrock exposed in the test pits.
- The ground surface in the treed area in the eastern portion of the Site was hummocky with small depressions. The bedrock surface within the treed area was inferred to be near surface, as shallow holes advanced manually with a Dutch auger met refusal at depths ranging from 0.5 to 0.8 m. No fissures or sinkholes were observed. No defined channels or watercourses were observed and no standing water was present. There were numerous large rocks and boulders at surface, but no obvious exposed bedrock was observed.

- No evidence indicative of active karstification on the Site was identified. No surface water features were identified on the Site, and observations at the Site in the spring of 2023 and 2025 did not show indications of channelized surface runoff on the Site. It was considered that there was a potential for seasonal surface runoff to temporarily accumulate in small, localized depressions within the hummocky wooded area in the eastern portion of the Site, although only very minor evidence of that was observed. No evidence to suggest the potential presence of karst on the Site was observed.

- A 2008 report on field investigations of karst landscapes by Golder Associates Ltd. and the Ontario Geological Survey indicated that in general the influence of karst solution weathering was weak to absent where the bedrock surface was uniformly covered with overburden more than 0.5 to 1.0 m thick.

- Karst mapping derived from a 2008 study by the OGS identified an area of known karst in approximately the southern two-thirds of the Site and extending off-Site to the west, south and east. The mapped presence of known karst appeared to have been largely based on the presence of an area of Paleozoic bedrock that was originally mapped by the OGS in 1982. The identified karst area in the Grey County OP encompassed currently developed areas located west, south, and east of the Site, including the Shallow Lake community centre and residential developments on Maplewood Crescent and the west side of Howe Drive. GSS did not consider that mapping to be indicative of a specific karst hazard for the Site. None of the mapping reviewed for this assessment indicated the presence of karst features on or in the immediate vicinity of the Site.

- The information obtained confirmed that much of the Site is located in an area of shallow bedrock (less than 1 m depth). No evidence of karst topography (fissures, caves, sinkholes, or springs) was identified on the Site.

- The presence of shallow bedrock on the Site should be considered in the final design of the development, including the implications for the depths of foundations and underground services and for site grading to manage stormwater runoff.

- It is anticipated that the excavations for the footings for at least some of the houses will encounter bedrock. Where bedrock is encountered in the foundation excavations for construction of houses on the Site, it is recommended that the excavations be inspected by a qualified engineer to identify the presence of any weathered rock and/or open fractures. If open fractures are identified, it is recommended that they be filled with lean concrete.

- With respect to Site grading and drainage, appropriate measures should be implemented to minimize the potential for enhanced infiltration of surface runoff into shallow, fractured bedrock, as described in this report. Similarly, the SWMP should not be designed for enhanced infiltration. It is recommended that exposed soils in the excavation for the SWMP

be inspected by a qualified engineer, and/or be investigated in advance of the final design, to confirm that there is no hydraulic connection with the underlying bedrock.

- Based on the presence of relatively low-permeability native soils and shallow bedrock, construction of raised leaching beds for each house in the development will be necessary. The leaching beds must be designed to prevent direct infiltration of untreated sewage into the upper bedrock.
- A geotechnical investigation along the alignment of the proposed roadway through the development is recommended prior to completing the final design of underground services.

Considering the findings of the assessment and provided that the recommended investigation and mitigation measures are appropriately implemented, the Karst assessment report indicated that the proposed development at the Site was not considered to be at risk from the presence of unstable bedrock and was not regarded to be a threat to local groundwater resources from the presence of karst topography.

6.0 SERVICING OPTIONS STATEMENT

A review of water and sewage servicing for the site with reference to the MECP Guideline D-5-3 has been completed. Other services such as gas, cable and telephone, and electricity will be provided through extension of existing infrastructure, on Bruce Road 9.

6.1 Municipal Servicing

Based on standard planning principles, municipal servicing is the preferred approach. Shallow Lake as noted earlier has a municipal water supply and treatment system and it is proposed to be utilized to service the proposed subdivision. There is no municipal sewage system in Shallow Lake. The closest sewage treatment plant in Georgian Bluffs is Derby Lagoons, which is at a significant distance from Shallow Lake. It is not cost effective to utilize municipal sanitary servicing for this development, by way of extension of Derby Sewage System.

6.2 Communal Services

In the absence of municipal sewage servicing, communal servicing is the next “preferred” servicing option. Communal servicing, however, requires sharing of sanitary services, which is not likely for this development. Neighboring properties are already developed and have their own private sewage system and are not anticipated to enter shared services. The Municipality also may not support such shared services due to complexities involved in creating a responsibility agreement that involves existing developed properties. Furthermore, a communal sewage system may require a very large subsurface disposal system which will be complex and cost prohibitive. Communal sewage services, therefore, is not considered a viable option for this project.

6.3 Individual Private Sewage Services

The neighboring residents have private sewage systems consisting of septic beds. The proposed subdivision lots are also proposed to be serviced by the individual septic systems. Refer to Section 8.0 for Sewage System Assessment.

7.0 Water Servicing

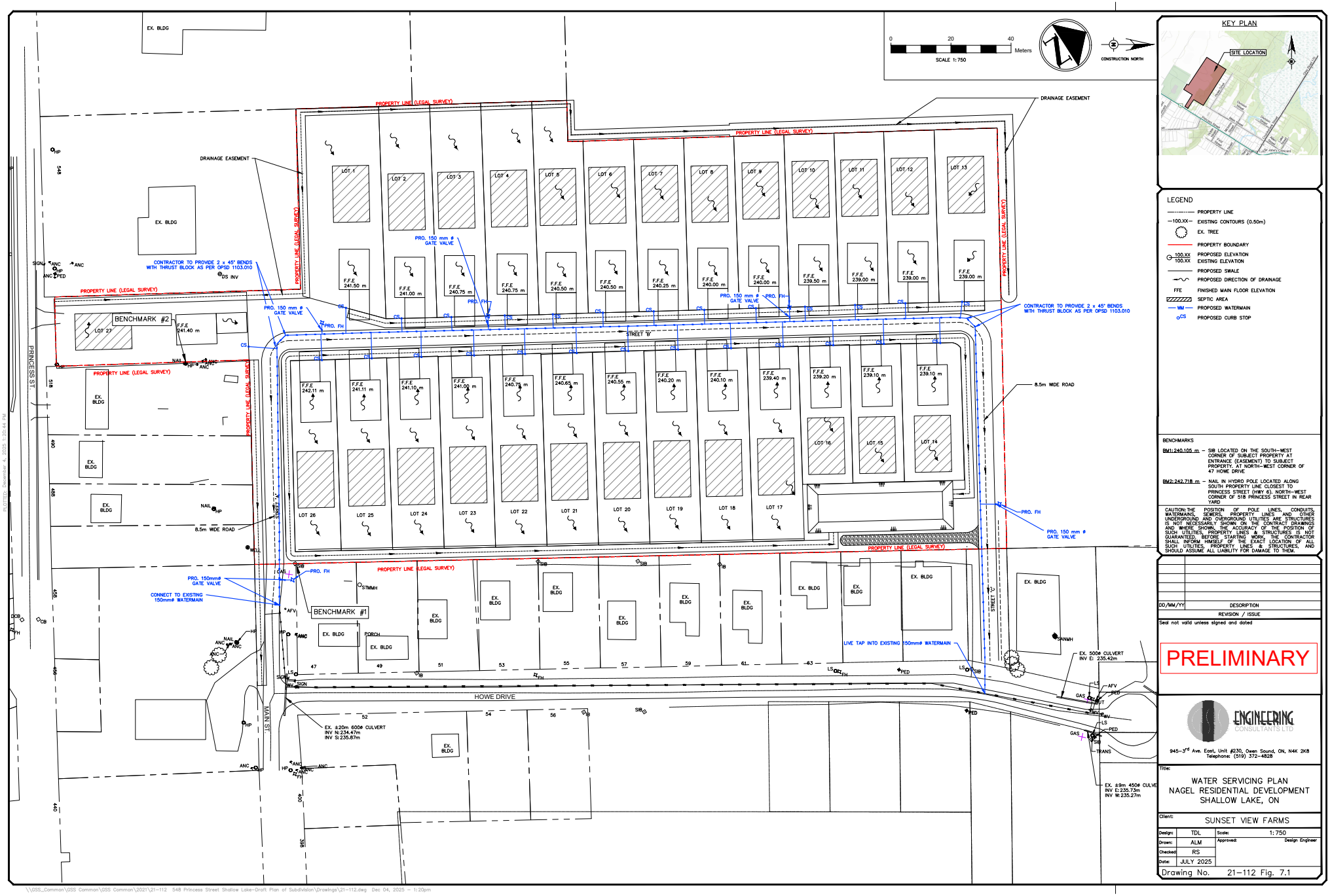
The municipal water servicing is available for the proposed development. There is 150 mm watermain available on Howe Drive.

7.1 Water Supply

The water main will be extended to street A that will loop around and connect to Howe Dive to eliminate dead end. **Refer to Figure 7.1**. The water main will be provided with water services and curb stops at each lot, all in accordance with Engineering Standards of Georgian Bluffs or Provincial Standards. All metallic appurtenances will be cathodically protected. Fire Hydrants will also be provided at a maximum spacing of 120 m in accordance with provincial design guidelines.

7.2 Estimated Water Demands

Refer to **Appendix A** for water supply needs of the subdivision. Average day, maximum day and peak hour flow demands calculations are included.



KEY PLAN

LEGEND

- PROPERTY LINE
- 100.XX EXISTING CONTOURS (0.50m)
- EX. TREE
- PROPERTY BOUNDARY
- 100.XX PROPOSED ELEVATION
- 100.XX EXISTING ELEVATION
- PROPOSED SWALE
- PROPOSED DIRECTION OF DRAINAGE
- FFE FINISHED MAIN FLOOR ELEVATION
- SEPTIC AREA
- WM PROPOSED WATERMAIN
- CS PROPOSED CURB STOP

BENCHMARKS

BM1: 240.105 m – SIB LOCATED ON THE SOUTH-WEST CORNER OF SUBJECT PROPERTY AT ENTRANCE (EASEMENT) TO SUBJECT PROPERTY, AT NORTH-WEST CORNER OF 47 HOWE DRIVE

BM2: 242.718 m – NAIL IN HYDRO POLE LOCATED ALONG SOUTH PROPERTY LINE CLOSEST TO PRINCESS STREET (HWY 6), NORTH-WEST CORNER OF 518 PRINCESS STREET IN REAR YARD

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD
945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828

Title:

WATER SERVICING PLAN
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client: SUNSET VIEW FARMS

Design:	TDL	Scale:	1:750
Drawn:	ALM	Approved:	Design Engineer
Checked:	RS		
Date:	JULY 2025		

Drawing No. 21–112 Fig. 7.1

8.0 SEWAGE SYSTEM ASSESSMENT

Sewage system assessment has been completed as per MECP D-5-4 Guideline. The guideline requires that investigation be completed in three (3) steps to determine attenuation by way of dilution.

The first step of the D-5-4 Guideline relates to "Lot Size Considerations" to assess whether the lot is greater than one hectare for each residence. In this case the lot is less than one hectare per residential unit, so further assessment is required.

The second step relates to System Isolation Considerations. When it can be shown that the water supply aquifers are isolated from the potential for impacts from sewage disposal, development may be supported. At this property, a degree of attenuation, or separation may not exist between the shallow overburden and deeper bedrock.

The assessment, therefore, utilizes the third step, "Contaminant Attenuation Considerations" approach to evaluate the potential for impacts. "Predictive Assessment" to estimate the amount of attenuation that will occur in the groundwater system under the proposed development has been utilized.

8.1 Predictive Assessment

An evaluation of the potential impacts on groundwater quality from the sewage systems for the proposed development of the Site was carried out in accordance with the method identified in MECP Procedure D-5-4 (1996) for individual on-site sewage systems: water quality impact risk assessment. The purpose of the guideline is to protect the environment and public health by ensuring that developments utilizing individual on-site sewage systems proceed at a density and scale that will not result in degradation of groundwater resources in exceedance of acceptable limits. Compliance with acceptable limits is to be demonstrated through a prediction of the nitrate impact from the development on the groundwater at the development site boundary. The requirements for a nitrate study outlined in Section 8.9.1 of the Grey County Official Plan indicates that new lot creation less than 0.4 ha in size on individual private Septic Systems shall only be considered with the successful completion of the nitrate study in accordance with MECP D-5 series guidelines. It also specifies that no development shall result in a nitrate concentration at the new property boundary, of more than 10 mg/L of nitrate.

Contaminant attenuation mechanisms were evaluated to assess the risk that the effluent from the individual sewage systems could cause on the concentration of nitrate-nitrogen in groundwater to exceed 10 mg/L at the new property boundary of the proposed development.

Procedure D-5-4 outlines a three-step assessment process, with the need to advance to the next step depending on the conditions defined in the previous step. For the proposed development at the Site, a predictive assessment was made in accordance with the considerations and assumptions identified in Step 3 of Procedure D-5-4. Two components were considered in the predictive assessment: contaminant source and contaminant attenuation.

Total nitrogen converted to nitrate-nitrogen was considered to be the critical contaminant. Procedure D-5-4 indicates that for the purpose of predicting the potential for groundwater impacts, a nitrate loading of at least 40 grams/lot/day per residential dwelling shall normally be used, based on discharge from a conventional Class 4 or Class 6 sewage system. Procedure D-5-4 also indicates that the guideline may not apply to non-standard individual on-site systems which are specifically designed to reduce nitrate loadings, although the document notes that the Ministry encourages development of new technologies for the treatment of domestic sewage waste and would entertain proposals for developments that incorporate new technologies. Contaminant attenuation and nitrate loading at the Site are described separately below.

Contaminant Attenuation

Procedure D-5-4 identifies that the following considerations be implemented when assessing contaminant attenuation.

- Only dilution from infiltrating precipitation is acceptable as a quantifiable attenuation mechanism for nitrate. Mixing with groundwater flowing through the site is normally not allowed.
- The available moisture surplus should normally be obtained from Environment Canada data. Where it is available, information from long-term, site specific, detailed water balance and/or groundwater studies can be used.
- Estimates of the amount of moisture surplus that infiltrates into the ground must be based on site-specific factors such as soil type, topography, surface geology, and impermeable areas.
- The volume of sewage effluent used as dilution water in mass balance equations should not exceed 1,000 L/day/lot.

8.2 Nitrate Calculation and Lot Sizing

With on-site sewage systems, the primary concern for environmental impacts is nitrogen, in the form of nitrate (and to a lesser extent nitrite) that can cause adverse impacts to potable groundwater supply and receiving surface waters. It is, therefore, necessary to ensure that the nitrogen (as nitrate) output of the proposed development be attenuated to concentrations of 10 mg/L, or lower, which is the health related Ontario Drinking Water Standard.

The assessment was based on the premise that each individual sewage treatment system would incorporate tertiary treatment that could reduce nitrate concentration in effluent by at least 50% resulting in estimated nitrate loading from sewage effluent to 20 g/day/lot.

The Hydrogeologist estimated that the annual infiltration rate in southeast portion of the site shall be 200 mm. The mass balance calculations indicated that predicted nitrate concentrations in groundwater at the development boundary was 9.1 mg/L which was less than 10 mg/L identified in Procedure D-5-4 as an indicator of potential groundwater impacts.

More detailed discussion, rationale and calculations are included in report "Groundwater Quality Impact Assessment Proposed Residential Development Part Lots 22 and 23, Concession 2 SCD (Keppel) Community of Shallow Lake, Township of Georgian Bluffs, Grey County, April 2025".

8.3 On-Site Sewage System

For the sizing of the sewage system, Table 8.2.1.3.A of the OBC is used to estimate the design daily sanitary sewage flow based on the number of bedrooms. The design daily sanitary sewage flow is the maximum daily sanitary sewage flow anticipated to be generated at each lot which shall be approximately 2,780 L/day. Refer to Sch 3 Calculation Sheet of Ontario Building Code (in **Appendix B**).

Ontario Code and Guide for Sewage Systems (2012) Table 8.2.1.6.A and 8.2.1.6.B indicates that the distribution bed must be at least 3 m from the property line, 5 m from any structures on the property and 15 m from any domestic drilled wells cased to at least 6 m depth. Other components of the sewage system comprising distribution piping and holding tanks are required to be 15 m from a well with a watertight casing to a depth of at least 6 m. OBC provides other specific requirements also, which are not included here.

Based on use of a tertiary system capable of reducing nitrate levels by 50%, the tile bed may be built as a Dispersal Bed (Type A or Type B) or Shallow Buried Trench. As per Section 8.7.7.1 and 8.7.8.3 in the OBC, the dispersal bed requires an area of:

- A=QT/850 (Type A Dispersal Bed per Section 8.7.7.1)
- A=Q/B (where B is 75 for sewage flows less than 3,000 L/day when stone layer issued per Section 8.7.7.1)
- A=QT/400 (Type B Dispersal Bed per Section 8.7.8.3)

The native soils have a T-time of 30 -40 mins/cm (based on one soil sample collected and lab report included in **Appendix C**). The lab report indicated that it would not be feasible to construct

an inground leaching bed in such soil. Accordingly, a preliminary assessment based on imported sand with T-time of 25, requires the following area for the construction of septic systems.

- Type A Dispersal Bed with stone bedding or leaching chamber option shall need approximately 7.5 m x 25 m area for subsurface disposal of treated effluent
- Type B Dispersal Bed shall require approximately 4 m x 30 m area for subsurface disposal of treated effluent.
- Shallow Buried Trench shall require approximately 5 m x 22 m area for subsurface disposal of treated effluent

Note that additional area is required for installation of septic bed, Type IV treatment units, pump chambers, etc. The total area indicated on Site Grading Plan is approximately 500 m² for leaching bed, which is adequate.

Additionally, Type A and Type B dispersal beds require placement of stone bedding or leaching chamber, a minimum of 600 mm above rock surface or soil with T-time greater than 50 minutes. Shallow Buried Trench design shall require placement of stone bedding, a minimum of 900 mm above rock surface or soil with T-time greater than 50 minutes.

The design and construction of the sewage system would be regulated under the requirements of the OBC with the application of associated setbacks, from buildings, wells, the water table and rock layer, etc.

8.4 Impact Assessment

As discussed in preceding sections, de-nitrification systems capable of reducing nitrate by 50% is proposed to be used. Such systems are offered by Norweco, Waterloo Biofilter and Premier Tech (utilizes Peatmoss based biofilter). OBC specifies certification to CAD/BNQ 3680-600 “Onsite Residential Wastewater Treatment Technologies” for such sewage systems. Premier Tech has NSF Standard 245 certification also. We are providing the highlights from the “Hydrogeology Study” in this section.

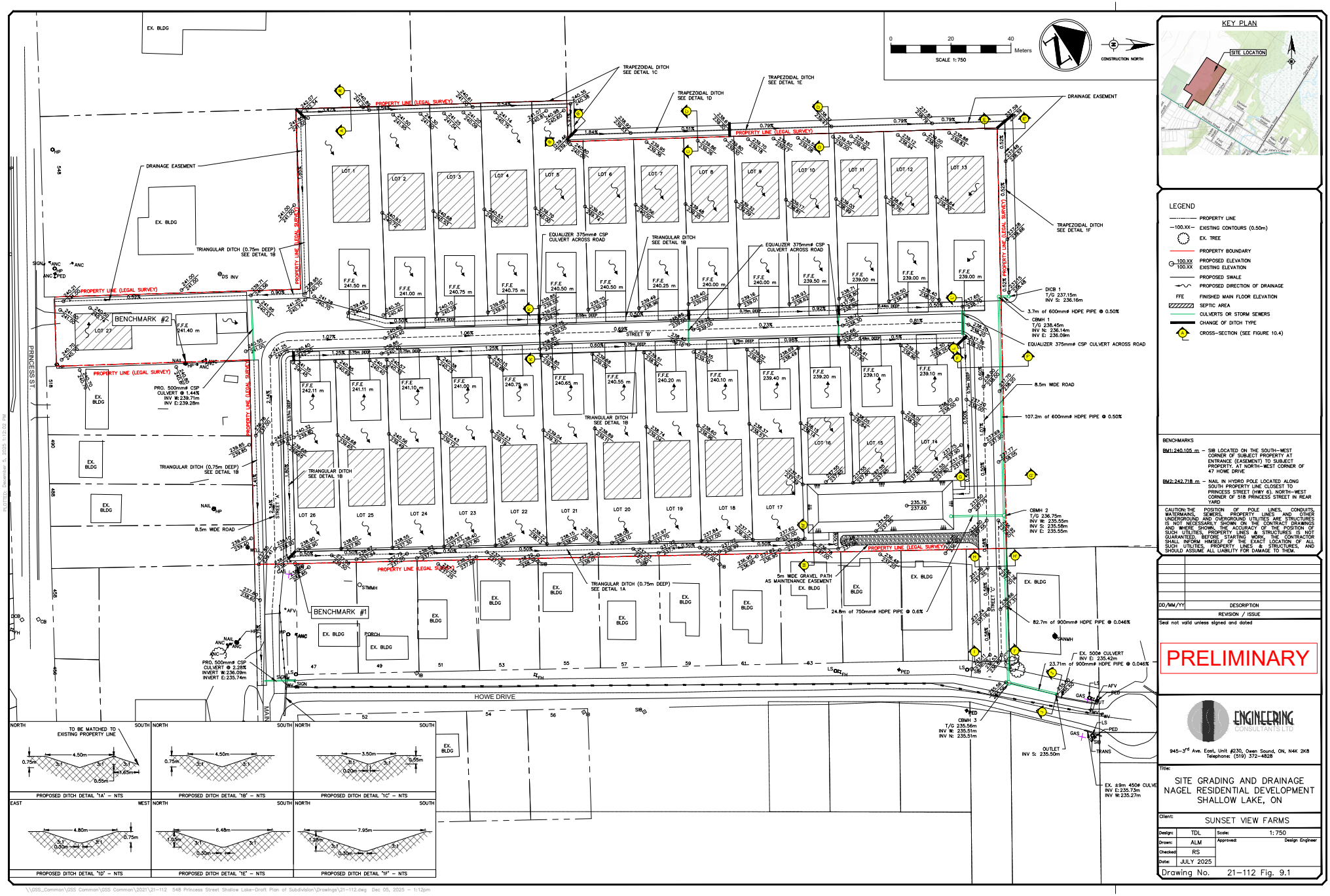
- A predictive assessment in general accordance with MECP Procedure D-5-4 indicated that the proposed development could be constructed on the Site while maintaining a nitrate concentration of less than 10 mg/L in groundwater at the property boundary as specified in the Grey County Official Plan, provided that a nitrate reduction of at least 50% in the sewage is achieved and consistently maintained with the use of suitable tertiary treatment systems on each individual property. Effective operation of those treatment systems will be required for the life of the development.

- The hydrogeological assessment indicates that the proposed development at the Site could be adequately serviced with private sewage systems with tertiary treatment for nitrate, without resulting in unacceptable impacts to local groundwater resources.

9.0 SITE GRADING AND DRAINAGE

Figure 9.1 provides a grading plan for the subdivision. Generally speaking, the grading has been completed in manner to allow drainage of post-development runoff in the same direction as pre-development runoff as much as possible. The proposed grading directs the runoff from the pervious and impervious areas towards the roadside ditches, the rear yard ditches as generally indicated by runoff direction arrows depicted in **Figure 9.1.** The collected runoff will be eventually collected and discharged to proposed stormwater management pond.

The land to the west of the subdivision lot has drainage in the easterly direction towards the subdivision development. It is proposed that a drainage ditch, as shown in **Figure 9.1,** is constructed along the westerly boundary of the subdivision lot to intercept, collect and direct the runoff. The ditch will flow in a northerly direction along the western boundary, turn 90 ° at the northwest corner and flow eastward towards Howe Drive ditch. An easement for the drainage ditch will be created. Near the pond location, the ditch will transfer runoff to a storm sewer via ditch inlet catch basins, which will carry the runoff to Howe Dr. along with pond outlet flow. An emergency overflow from the pond will be discharged to Howe Dr. ditch via a new ditch along Street A.


SCALE 1:750
0 20 40 Meters
CONSTRUCTION NORTH
KEY PLAN
SITE LOCATION
LEGEND
PROPERTY LINE
EXISTING CONTOURS (0.50m)
EX. TREE
PROPERTY BOUNDARY
PROPOSED ELEVATION
EXISTING ELEVATION
PROPOSED SWALE
PROPOSED DIRECTION OF DRAINAGE
FFE FINISHED MAIN FLOOR ELEVATION
SEPTIC AREA
CULVERTS OR STORM SEWERS
CHANGE OF DITCH TYPE
CROSS-SECTION (SEE FIGURE 10.4)
BENCHMARKS
BM1: 240.105 m – SIB LOCATED ON THE SOUTH-WEST CORNER OF SUBJECT PROPERTY AT ENTRANCE (EASEMENT) TO SUBJECT PROPERTY, AT NORTH-WEST CORNER OF 47 HOWE DRIVE
BM2: 242.718 m – NAIL IN HYDRO POLE LOCATED ALONG SOUTH PROPERTY LINE CLOSEST TO PRINCESS STREET (HWY 6), NORTH-WEST CORNER OF 518 PRINCESS STREET IN REAR YARD
CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
DD/MM/YY DESCRIPTION
REVISION / ISSUE
Seal not valid unless signed and dated
PRELIMINARY
ENGINEERING CONSULTANTS LTD
945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828
Title:
SITE GRADING AND DRAINAGE
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON
Client: SUNSET VIEW FARMS
Design: TDL
Drawn: ALM
Checked: RS
Date: JULY 2025
Scale: 1:750
Approved: Design Engineer
Drawing No. 21–112 Fig. 9.1
PROPOSED DITCH DETAIL '1A' – NTS
PROPOSED DITCH DETAIL '1B' – NTS
PROPOSED DITCH DETAIL '1C' – NTS
PROPOSED DITCH DETAIL '1D' – NTS
PROPOSED DITCH DETAIL '1E' – NTS
PROPOSED DITCH DETAIL '1F' – NTS
BENCHMARK #1
BENCHMARK #2
HOWE DRIVE
PRINCESS ST.
STREET 'A'
STREET 'B'
8.5m WIDE ROAD
DRAINAGE EASEMENT
TRAPEZOIDAL DITCH SEE DETAIL 1C
TRAPEZOIDAL DITCH SEE DETAIL 1D
TRAPEZOIDAL DITCH SEE DETAIL 1E
TRAPEZOIDAL DITCH SEE DETAIL 1F
TRIANGULAR DITCH (0.75m DEEP) SEE DETAIL 1B
TRIANGULAR DITCH SEE DETAIL 1B
TRIANGULAR DITCH (0.75m DEEP) SEE DETAIL 1A
EQUALIZER 375mmø CSP CULVERT ACROSS ROAD
PROPERTY LINE (LEGAL SURVEY)
PRO. 500mmø CSP CULVERT @ 1.44% INV W: 239.71m INV E: 239.28m
PRO. 500mmø CSP CULVERT @ 2.28% INVERT W: 236.09m INVERT E: 235.74m
DICB 1 T/G 237.15m INV S: 236.16m
3.7m of 600mmø HDPE PIPE @ 0.50%
CBMH 1 T/G 238.45m INV N: 236.14m INV E: 236.09m
EQUALIZER 375mmø CSP CULVERT ACROSS ROAD
107.2m of 600mmø HDPE PIPE @ 0.50%
CBMH 2 T/G 236.75m INV W: 235.55m INV S: 235.58m INV E: 235.55m
24.8m of 750mmø HDPE PIPE @ 0.6%
82.7m of 900mmø HDPE PIPE @ 0.046%
EX. 500ø CULVERT INV E: 235.42m
23.71m of 900mmø HDPE PIPE @ 0.046%
CBMH 3 T/G 235.56m INV W: 235.51m INV N: 235.51m
OUTLET INV S: 235.50m
EX. ±9m 450ø CULVERT INV E: 235.73m INV W: 235.27m
5m WIDE GRAVEL PATH AS MAINTENANCE EASEMENT
LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14
LOT 15
LOT 16
LOT 17
LOT 18
LOT 19
LOT 20
LOT 21
LOT 22
LOT 23
LOT 24
LOT 25
LOT 26
LOT 27
EX. BLDG
PORCH
\\GSS_Common\GSS Common\GSS Common\2021\21-112 548 Princess Street Shallow Lake-Draft Plan of Subdivision\Drawings\21-112.dwg Dec 05, 2025 – 1:12pm
PLOTTED: December 5, 2025 11:12:02 PM

10.0 STORM SERVICING

The storm water runoff from the site is anticipated to increase due to the conversion of pervious areas to impervious surfaces comprising of roof tops, driveways, roadways, etc. **Figure 10.1** shows existing conditions.

Surficial Geology indicated the presence of Bruce fill with stoney, sandy silt deposits. A significant portion of the lot has exposed rock surface.

10.1 Site Drainage

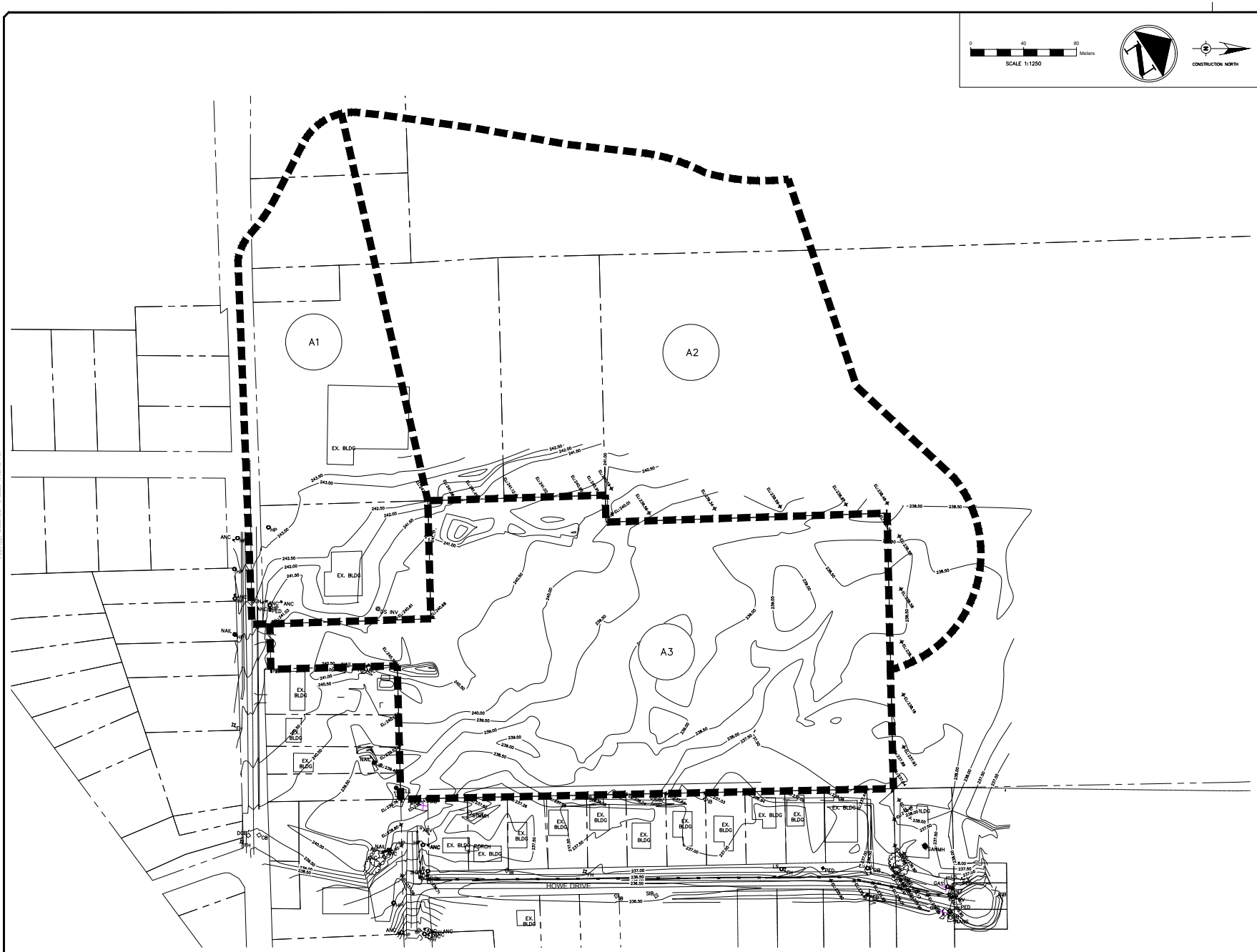
The site drainage in the existing conditions varies from moderate to very good. **Figure 10.1** depicts the pre-development catchment areas. The site has been broken into three (3) large basins along with prevalent runoff flow direction. It may be noted that for the basin A1, in the post development conditions, the runoff will be collected in the intercepting ditch and directed to Howe Dr. via Street A roadway ditch. Basin A2 runoff will be collected in another intercepting ditch along the western lot limit and eventually carried forward to Howe Dr. by way of ditch and storm sewer constructed along Street C. In Basins A3, where the development will occur, the runoff will be collected in the stormwater management pond for further handling.

Refer to **Figure 10.2** for the post-development catchment area layout and general drainage directions. In the post-development conditions the area that lie outside the subdivision boundary but drains towards the subdivision, as noted above, will be allowed to drain to the boundary ditches as shown, and eventually be carried off into the Howe Dr. ditch. This runoff will be kept outside of the collection system for stormwater management pond.

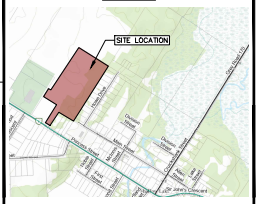
10.2 Stormwater Quantity Control

The stormwater quantity control strategy for the development as required by Township of Georgian Bluffs is to reduce post-development runoff to pre-development stormwater runoff quantity. The required stormwater flow reduction will be achieved within the proposed stormwater management pond.

The stormwater management hydrologic computer program, PC-SWMM, was used to model the proposed site conditions and stormwater system. Rainfall was simulated using Chicago 12 hour storm and Regional Rainfall Distributions. Rainfall depths and intensities were based on the IDF Curves for Shallow Lake area. The CN number for the post development area, used in the model are on the higher side to be conservative in runoff estimation.



KEY PLAN



PRE-DEVELOPMENT CATCHMENT AREAS	
ID #	AREA (HECTARES)
A1	4.07
A2	10.38
A3	8.13
TOTAL	27.43

BENCHMARKS

BM1: 240.105 m – SIB LOCATED ON THE SOUTH-WEST CORNER OF SUBJECT PROPERTY AT ENTRANCE (EASEMENT) TO SUBJECT PROPERTY. AT NORTH-WEST CORNER OF 47 HOWE DRIVE

BM2: 242.718 m – NAIL IN HYDRO POLE LOCATED ALONG SOUTH PROPERTY LINE CLOSEST TO PRINCESS STREET (HWY 6). NORTH-WEST CORNER OF 518 PRINCESS STREET IN REAR YARD

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD
945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828

Title:

PRE DEVELOPMENT CATCHMENT AREAS
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client: SUNSET VIEW FARMS

Design:	TDL	Scale:	1:1250
Drawn:	ALM	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. 21–112 Fig. 10.1

PLOTTED: December 4, 2025 11:16:45 PM

\\GSS_Common\GSS Common\GSS Common\2021\21-112 548 Princess Street Shallow Lake-Draft Plan of Subdivision\Drawings\21-112.dwg Dec 04, 2025 – 1:16pm

POST-DEVELOPMENT CATCHMENT AREAS	
ID #	AREA (HECTARES)
B1	0.876
B2	0.873
B3	0.744
B4	0.713
B5	0.770
B6	0.224
B7	0.316
B8	0.316
B9	0.316
B10	0.219
B11	0.427
B12	0.534
B13	0.534
B14	0.534
B15	0.394
Ra	0.122
Rb	0.110
Rc	0.112
TOTAL	8.13

KEY PLAN

LEGEND

- PROPERTY LINE
- 100.XX EXISTING CONTOURS (0.50m)
- EX. TREE
- PROPERTY BOUNDARY
- 100.XX PROPOSED ELEVATION
- 100.XX EXISTING ELEVATION
- PROPOSED SWALE
- PROPOSED DIRECTION OF DRAINAGE
- FFE FINISHED MAIN FLOOR ELEVATION
- SEPTIC AREA

BENCHMARKS

BM1: 240.105 m – SIB LOCATED ON THE SOUTH-WEST CORNER OF SUBJECT PROPERTY AT ENTRANCE (EASEMENT) TO SUBJECT PROPERTY, AT NORTH-WEST CORNER OF 47 HOWE DRIVE

BM2: 242.718 m – NAIL IN HYDRO POLE LOCATED ALONG SOUTH PROPERTY LINE CLOSEST TO PRINCESS STREET (HWY 6), NORTH-WEST CORNER OF 518 PRINCESS STREET IN REAR YARD

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD
945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828

Title:

POST DEVELOPMENT CATCHMENTS
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client: SUNSET VIEW FARMS

Design:	TDL	Scale:	1:750
Drawn:	ALM	Approved:	Design Engineer
Checked:	RS		
Date:	JULY 2025		

Drawing No. 21–112 Fig. 10.2

PLOTTED: December 4, 2025 11:17:05 PM

\\GSS_Common\GSS Common\GSS Common\2021\21-112 548 Princess Street Shallow Lake-Draft Plan of Subdivision\Drawings\21-112.dwg Dec 04, 2025 – 1:17pm

The outlet control structure for the pond shall be provided with 180 mm dia. and 360 mm dia. orifice plates and 400 mm x 700 mm overflow weir. The combination of orifice and overflow weir reduce the post development runoff to predevelopment runoff levels. The outlet 750 mm dia. pipe discharges the managed runoff to CBMH1, which eventually is carried off to Howe Dr. ditch.

10.3 Stormwater Quality Control

The stormwater quality control shall be achieved by lining the ditches with sod and by introducing check dams within the ditches at strategic locations. The combination of grass cover in the ditches and the check dam will slow down the runoff flow in the ditches and promote settling of the sediments thereby permitting silt and sand free runoff to enter the stormwater management pond.

10.4 Pre and Post Development Runoff and Analysis Details

As noted earlier, **Figure 10.1** depicts a pre-development runoff area whereas **Figure 10.2** depicts the post-development runoff areas. Pre and post-development basin were modelled for 2, 5, 10, 25, 50 and 100 year storm events using Chicago 12 hour Rainfall Distribution for IDF Curves obtained from MTO website for Shallow Lake area. A copy of the IDF Curve information is included in **Appendix D**.

Table 10.1 summarizes the modelling output data for pre and post-development conditions.

Refer to **Figure 10.3** for pond and pond outlet structure details.

Figure 10.4 shows ditches and road cross-sections at strategic locations. Estimated water depth at 100-year storm is also indicated in the cross-sections. It can be noted that runoff will not spill over the existing properties to the east of the proposed subdivision. **Figure 10.5** provides water level elevations in the pond at various storm events. An impact on adjacent lands during major storms was also investigated to ensure that the runoff does not spill over the adjacent property.

Pond outlet will discharge to CBMH1, which will also collect the runoff from pre-development basin A2. A 900 mm dia. storm sewer will transport the runoff from CBMH1 to Howe Drive's existing ditch.

TABLE 10.1

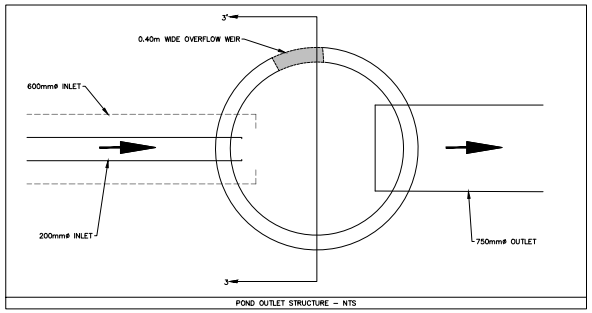
Summary of Pre and Post Development Runoff

Nagel Subdivision, Shallow Lake

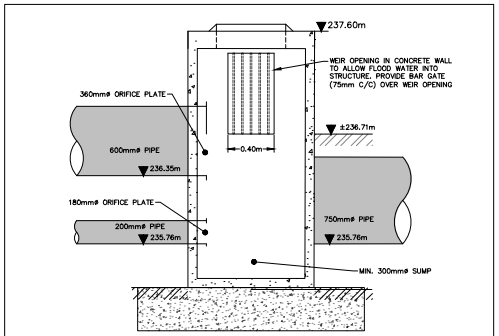
December 4, 2025 21-112

	Basin / Outlet	2 year	5 year	25 year	50 year	100 year	Remarks
		Flow (L/s)	Flow (L/s)	Flow (L/s)	Flow (L/s)	Flow (L/s)	
Pre-Deveopment	**A1**	70	120	260	330	410	Collected by intercept ditch and directed to Howe Drive.
	A2	90	170	370	480	610	Directed to Howe Drive untreated.
	A3	70	130	300	390	490	To be treated in storm management pond.
	TOTAL (A1+A2+A3)	230	420	930	1200	1510	
Post Development	RC	10	10	20	30	30	South end half of road to South ditch.
	RB	10	10	20	20	20	North end half of road to North ditch.
	Pond Inlet flow per PC Swmm Modelling (L/sec)	347	513	862	1034	1221	
	Target Pond Outlet Flow (L/sec)	50	110	260	340	440	A3 - (RC + RB)
	Actual Peak Pond Outlet Flow (L/sec)	49	106	251	337	433	
	Pond Volume Required Per Modelling (m^3)	535	804	1136	1257	1375	
	TOTAL POST DEVELOPMENT FLOW (RC+RB+POND OUTLET)	**69**	**126**	**291**	**387**	**483**	Equal to or less than A3 runoff.
	Water Level in Pond	236.31	236.54	236.80	236.89	236.97	
	Outlets Design	750 mm storm pipe, 180 mm orifice plate at 235.76 m, 360 mm orifice plate at 236.35 m and 0.40 m x 0.70 m rectangular weir at 236.71 m					

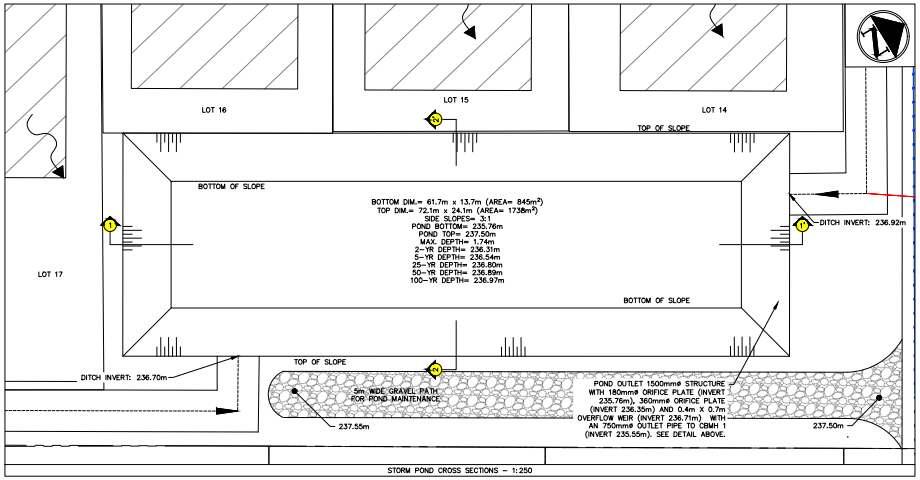
Note: all storms are based on 12-hour duration Chicago distribution



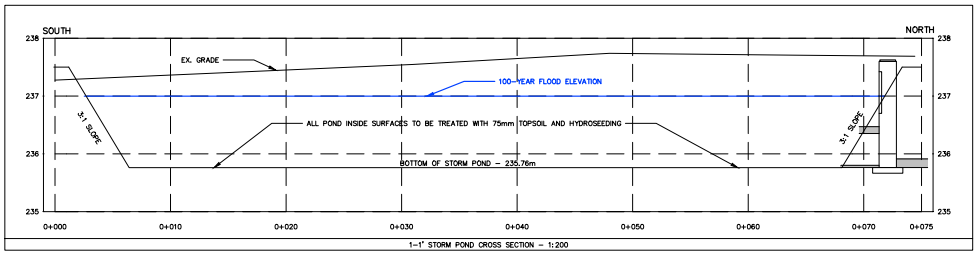
POND OUTLET STRUCTURE – NTS



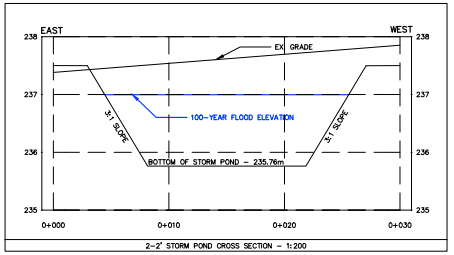
POND OUTLET STRUCTURE (1500mmø MH) – N.T.S.



STORM POND CROSS SECTIONS – 1:250

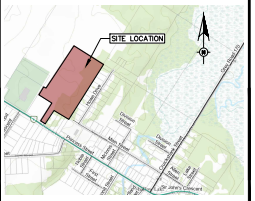


1-1' STORM POND CROSS SECTION – 1:200



2-2' STORM POND CROSS SECTION – 1:200

KEY PLAN



CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD
945-3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372-4828

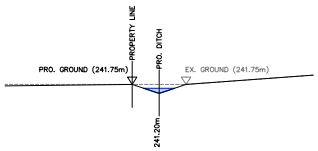
Title:
PROPOSED STORM POND STANDARDS & DETAILS
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client:
SUNSET VIEW FARMS

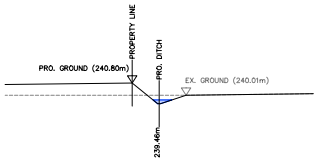
Design:	RS	Scale:	AS SHOWN
Drawn:	TDL	Approved:	Design Engineer
Checked:	RS		
Date:	JULY 2025		

Drawing No. 21-112 Fig. 10.3

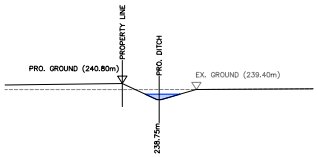
A–A' CROSS–SECTION



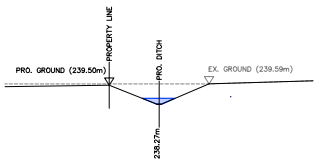
B–B' CROSS–SECTION



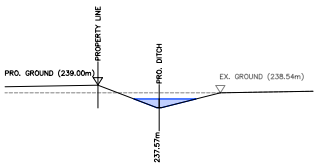
C–C' CROSS–SECTION



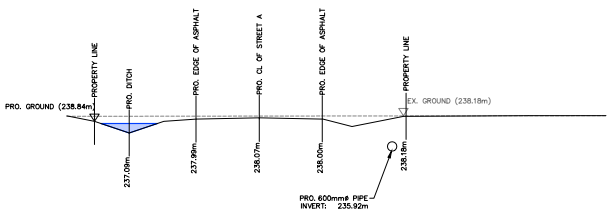
D–D' CROSS–SECTION



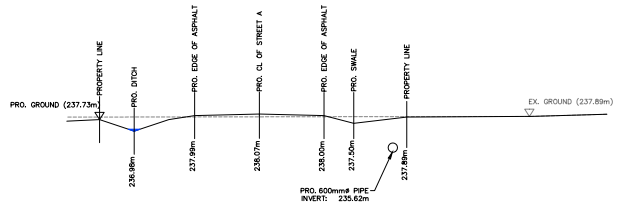
E–E' CROSS–SECTION



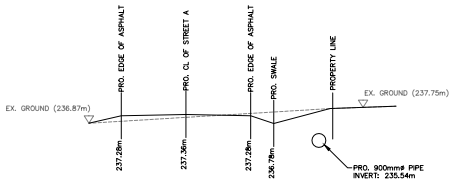
F–F' CROSS–SECTION



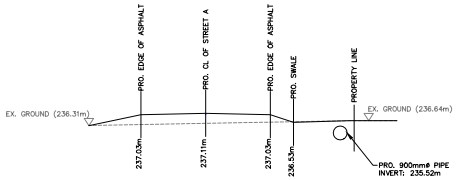
G–G' CROSS–SECTION



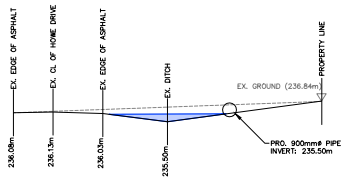
H–H' CROSS–SECTION



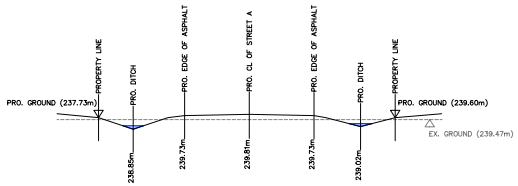
I–I' CROSS–SECTION



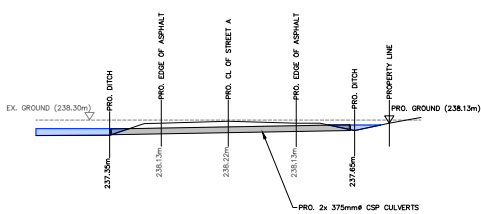
J–J' CROSS–SECTION



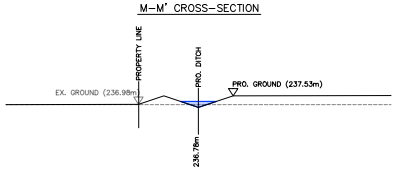
K–K' CROSS–SECTION



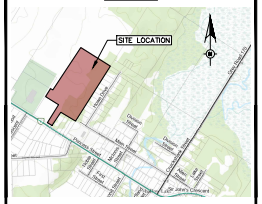
L–L' CROSS–SECTION



M–M' CROSS–SECTION



KEY PLAN



LEGEND

100–YEAR STORM HYDRAULIC GRADE LINE

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD

945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828

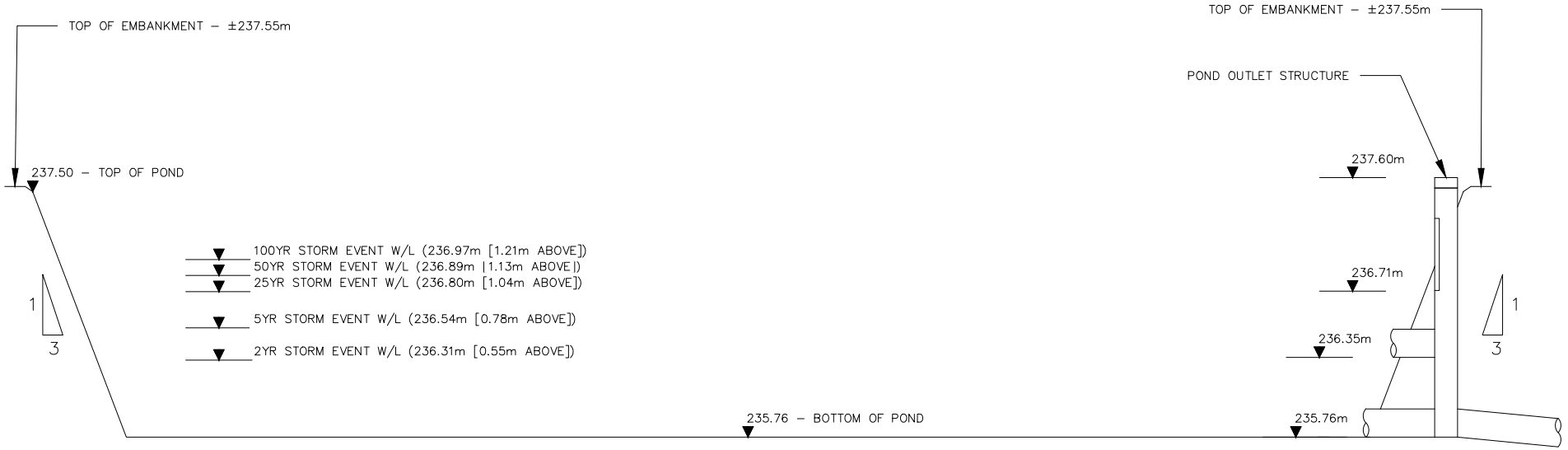
Title:

DITCH CROSS SECTIONS
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client: SUNSET VIEW FARMS

Design:	TDL	Scale:	1:200
Drawn:	ALM	Approved:	Design Engineer
Checked:	RS		
Date:	JULY 2025		

Drawing No. 21–112 Fig. 10.4



PRELIMINARY

STORMWATER MANAGEMENT POND
CROSS SECTION
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON
SUNSET VIEW FARMS

GSS ENGINEERING CONSULTANTS LTD

Design:	RS
Drawn:	ALM
APPROVED:	RS
Date:	JULY 2025
Scale:	N.T.S.
FILE No.	21-112
FIG. No.	Fig. 10.5

December 4, 2025 1:19:08 PM

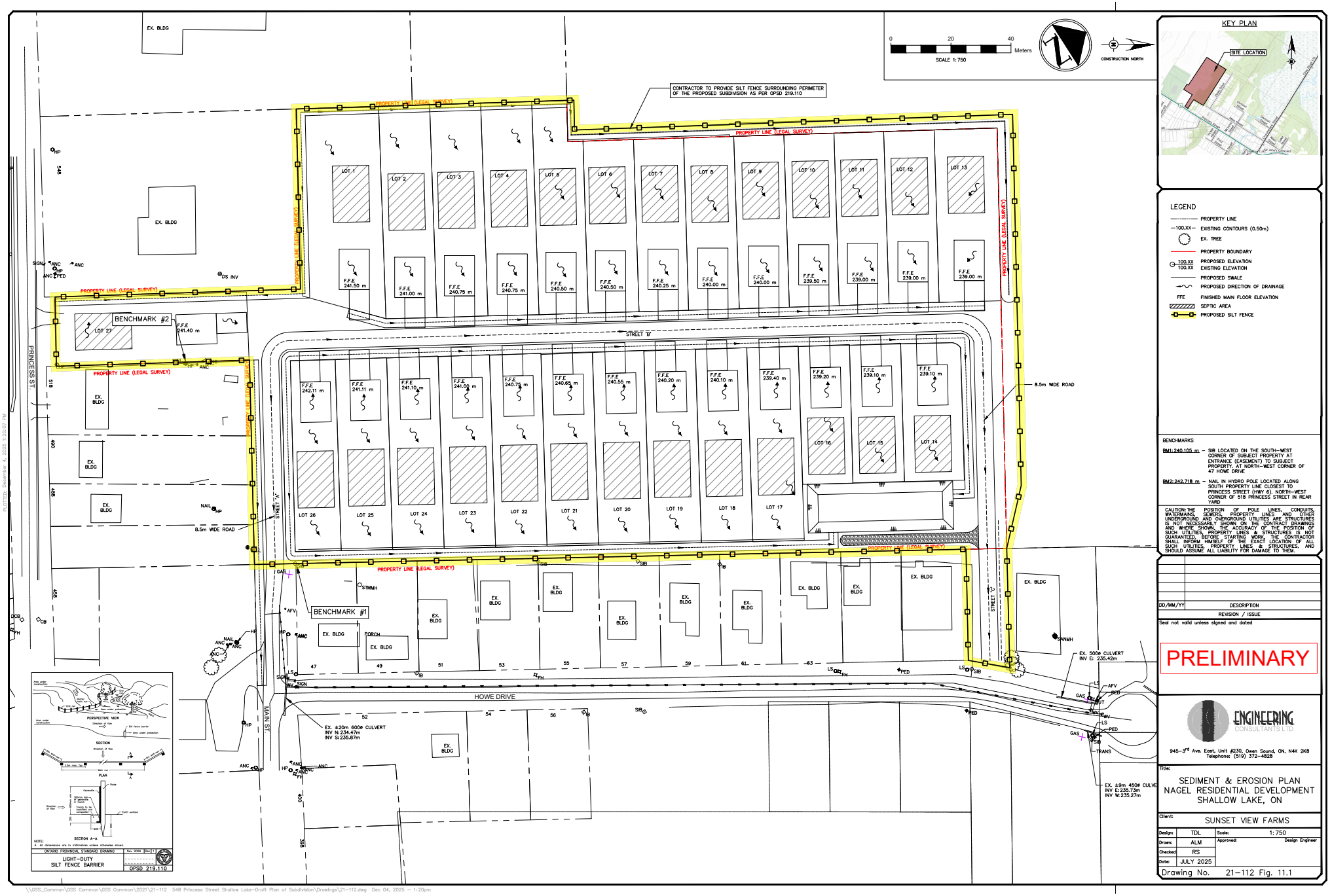
11.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls will be implemented prior to the commencement of any site servicing works and maintained throughout construction until the site is stabilized or as directed by the Engineer and/or Municipality. Erosion and sediment controls are to be inspected regularly, after each significant rainfall, and maintained in proper working condition.
The proposed erosion and sediment controls include sediment basins, silt fencing, flow check dams, mud mats and sediment traps. The need for additional controls will be based on the field conditions at the discretion of the Engineer and implemented as necessary.

- **Sediment Basins**: A temporary sediment basin will be constructed at the location indicated on **Figure 11.1**. The sediment basin will be installed to remove sediment from runoff prior to discharging from the site.
- **Silt Fencing**: Silt fence will be constructed in accordance with OPSD. It should be noted that additional silt fence may be added based on field decisions by the Engineer and Developer prior to, during and following the earth works.
- **Flow Check Dams**: Temporary straw bale and rock check dams will be utilized on-site in order to prevent any silt mitigation off site during and after construction activities. These dams will promote settling of suspended solids and will reduce flow velocities. Sediment accumulation will be monitored and removed as necessary.
- **Mud Mat**: A mud mat will be maintained at the site entrances until base asphalt is placed to limit mud tracking from the site onto Main Street West and the surrounding municipal roadway network. The Contractor shall ensure mud mat maintenance (cleaning/additional stone) is completed on an as needed basis to ensure proper operation.
- **Excavated Sediment Trap**: Excavated sediment trap(s) or basins will be installed to remove sediment from runoff before the runoff discharges to receiving conveyance routes.

Refer to **Figure 11.1** overleaf for proposed Erosion & Sediment Control Plan Layout.

The project engineer, during construction, acting on behalf of the Owner, shall monitor and maintain the Erosion & Sediment Control Plan.



KEY PLAN

LEGEND

- PROPERTY LINE
- 100.XX EXISTING CONTOURS (0.50m)
- EX. TREE
- PROPERTY BOUNDARY
- 100.XX PROPOSED ELEVATION
- 100.XX EXISTING ELEVATION
- PROPOSED SWALE
- PROPOSED DIRECTION OF DRAINAGE
- FFE FINISHED MAIN FLOOR ELEVATION
- SEPTIC AREA
- PROPOSED SILT FENCE

BENCHMARKS

BM1: 240.105 m – SIB LOCATED ON THE SOUTH-WEST CORNER OF SUBJECT PROPERTY AT ENTRANCE (EASEMENT) TO SUBJECT PROPERTY, AT NORTH-WEST CORNER OF 47 HOWE DRIVE

BM2: 242.718 m – NAIL IN HYDRO POLE LOCATED ALONG SOUTH PROPERTY LINE CLOSEST TO PRINCESS STREET (HWY 6), NORTH-WEST CORNER OF 518 PRINCESS STREET IN REAR YARD

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

PRELIMINARY

ENGINEERING CONSULTANTS LTD
945–3rd Ave. East, Unit #230, Owen Sound, ON, N4K 2K8
Telephone: (519) 372–4828

Title:

SEDIMENT & EROSION PLAN
NAGEL RESIDENTIAL DEVELOPMENT
SHALLOW LAKE, ON

Client: SUNSET VIEW FARMS

Design:	TDL	Scale:	1:750
Drawn:	ALM	Approved:	Design Engineer
Checked:	RS		
Date:	JULY 2025		

Drawing No. 21–112 Fig. 11.1

12.0 CONCLUSION & RECOMMENDATIONS

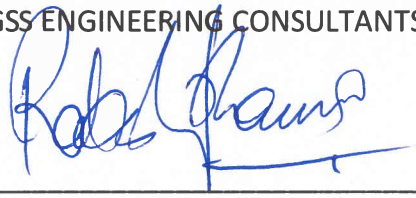
Based on foregoing discussions, it is concluded that Nagel Residential Subdivision can be developed by way of municipal water supply and distribution system and tertiary treatment based leaching beds.

The storm water runoff can be managed by way of an on-site stormwater management pond with outlet to the Howe Dr. ditch. The pond outlet structure will reduce post development runoff to pre development runoff levels. A drainage easement, as referenced in Section 9.0 and as indicated on **Figure 7.1**, needs to be created.

Accordingly, it is recommended that the proposed site servicing by way of municipal water supply and tertiary sewage treatment based beds, as well as the proposed storm water management system is accepted for draft plan approval of the subdivision.

Prepared by,

GSS ENGINEERING CONSULTANTS LTD.



Rakesh Sharma, P. Eng., Secretary-Treasurer
Designated Consulting Engineer

RS/gd

APPENDIX A

Water Demands

Appendix A
Water Demands

# of residences	=	26 + 4 plex
	=	30
# of population serviced		
at 4 pph (person per house)	=	30 x 4 = 120

Per provincial design guidelines, water demand is in range of 200 – 450 Lcpd. For this subdivision, assume a water demand of 400 Lcpd.

Average day water demand = 120 x 0.4 = 48 m^3/day

Shallow Lake Services a population in the range of 500 - 1000. Per MECP design guidelines, maximum day and peak rate factor as well as consequent water demands are as follows:

Max. Day Factor = 2.75	Max. Day Water Demand	=	2.75 x 48	=	132 m^3/day
Peak Rate Factor = 4.13	Peak Rate Water Demand	=	4.13 x 48	=	198 m^3/day

Since Shallow Lake Water Systems is operating at 35% rated capacity of existing water works as per 2024 Annual Report by OCWA, it has water supply capability to service the subdivision, which is also permitted by way of preconsultation comments.

APPENDIX B

Schedule 3 : Sewage System Design Specifications

Nagel Residential Development

Schedule 3: Sewage System Design Specifications

Proposed Sewage System ☐ Residential ☐ Commercial

☐ New Install ☐ Replacement ☐ Repair/Alteration

Proposed Type of Sewage System

☐ CLASS 2 – Greywater System ☐ CLASS 3 – Cesspool

☐ CLASS 4 – Leaching Bed System ☐ CLASS 5 – Holding Tank

Building Information

Plumbing Fixtures

Description	Existing	+	Proposed	=	Total	x	Fixture Units	=	Count
Example; Sink	0	+	1	=	1	x	1.5	=	1.5
Bathroom Group – Toilet/Sink/Shower		+	3	=	3	x	6	=	18
Sinks/Wash Basins		+	1	=	1	x	1.5	=	1.5
Bathtub/Showers		+		=		x	1.5	=	
Toilets (flush tank)		+	1	=	1	x	4	=	4
Dishwasher connected to kitchen sink		+		=		x	1.5	=	
Laundry Tub/Washing Machine		+	1	=	1	x	1.5	=	1.5
Other:		+		=		x		=	
							TOTAL FIXTURE UNITS	=	25

FINISHED FLOOR AREA = 278 m^2

Design Flow Calculations (Q)

BEDROOM FLOWS

	# of Bedrooms	Volume (Litres)	Total Flow
A	1 Bedroom	750	
	2 Bedrooms	1100	
	3 Bedrooms	1600	
	4 Bedrooms	2000	2000
	5 Bedrooms	2500	
ADDITIONAL FLOW FOR:			
B	Each Bedroom over 5 **OR***	500	
C	Each 10m^2 over 200m^2 - 400m^2	100 x 78	780
	Each 10m^2 over 400m^2 - 600m^2	75	
	Each 10m^2 over 600m^2 **OR***	50	
D	Each Fixture over 20 Fixture Units	50 x 5	250

DESIGN FLOW "Q"

Q = A + (B or C or D)

A = 2000

B = _____

C = 780

D = 250

EXPECTED DAILY DESIGN SEWAGE FLOW (Q) = 2,780 Liters Per Day

Septic Tank Size (Working Capacity) ☐ New ☐ Existing ☐ Replacement

Proposed/Existing Working Capacity = _____ Litres (2 x Q for Residential)

For Daily Water Demand, assume sewage flow @ 90% of water supplied

Water Demand = $\frac{2780}{0.9}$ = 3089 LPD

APPENDIX C

Soil Report for ‘T’ Time

May 16, 2023
Our File: 218194

Via Email: Bradbenson@gssengineering.ca

GSS Engineering Consultants Ltd.
1010-9th Ave West, Unit 104D
Owen Sound, ON N4K 5R7

Attention: Brad Benson P. Eng

Re: Soil Testing for Sewage System
GSS No. 21-112
Plan 857, Pt. Lot 1, Pt. Lot 22, Conc 2 SCD
Township of Georgian Bluffs

Dear Brad,

As requested, we have performed a grading analysis on the soil sample delivered to us on May 4, 2023. It is understood that the sample was collected from a testpit (TP-4) in the area where a leaching or filter bed is proposed to be constructed.

The sample from testpit TP-4 is a clayey gravel. From the attached Grain-Size Distribution Curve and based on the Hazen Formula, we estimate the co-efficient of permeability to be in the order of 6.4×10^{-5} cm/second. Based on this result and the relationship of soil types to percolation times as per the Ontario Building Code (OBC), we have assessed a percolation time, "T" of 30 to 40 minutes/cm for the sample.

Due to the amount of silt and clay in the soil in the sample, the "T" time is elevated and therefore it is not feasible to construct and in-ground system in such soil. A raised system constructed of approved imported material must be considered.

Increased amounts of silt and clay will negatively affect the percolation time and the performance of the leaching or filter bed. The percolation time is also dependent upon the density, structure, and moisture content of the soil and the installation methods utilized. Therefore, it is the responsibility of the owner, system designer, and contractor to monitor the quality of the soils across the site and any imported material to assure themselves that the design criteria are met and if necessary, adjust the design of the system.

Should you have any questions, please do not hesitate to contact me.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Wm. E. Dubeau, P.Eng.
WED/mr

Encl.

cc: File No: 218194

GM BluePlan Engineering Limited

Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA

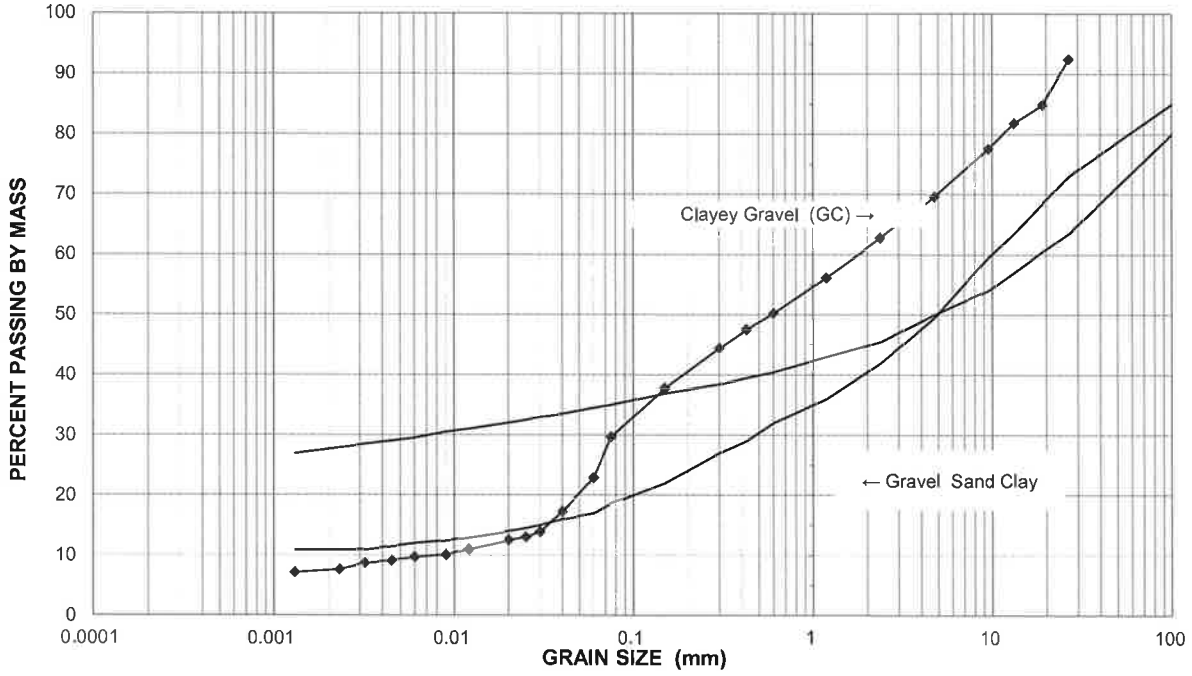
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3

Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

PARTICLE SIZE ANALYSIS

PROJECT:	M.T. GSS Engineering (#21-112)	FILE NO.:	218194
LOCATION:	Plan 857, Part lot 1; Part lot 22, concession 2 SCD, Township of G	LAB SAMPLE NO.:	S-4977
CLIENT :	GSS Engineering	SAMPLE DATE:	Apr-27 RCVD May-4
SOIL TYPE:	Clayey Gravel with Sand and some Silt	SAMPLED BY:	Client
GRAPH # :	4 - Clayey Gravels, Gravel Sand Clay Mixtures	SOURCE:	TH @2.7-4 ft

PARTICLE SIZE DISTRIBUTION



←		FINE	MEDIUM	COARSE	FINE	COARSE
CLAY	SILT	SAND			GRAVEL	

SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE
26.5	92.4	0.0600	23.0
19	84.9	0.0400	17.3
13.2	81.9	0.0300	13.9
9.5	77.6	0.0250	13.0
4.75	69.7	0.0200	12.5
2.36	62.6	0.0120	11.1
1.180	56.2	0.0090	10.1
0.600	50.3	0.0060	9.7
0.425	47.6	0.0045	9.2
0.300	44.4	0.0032	8.7
0.150	37.8	0.0023	7.8
0.075	29.7	0.0013	7.3

D_{10} : 0.008 mm **D_{60} : 1.87 mm** **Cu : 234**

Coefficient of Permeability: 6.4×10^{-5} cm/sec **"T" Time : 30 to 40 mins/cm**

Comments:

APPENDIX D

IDF Curve for Shallow Lake, ON

Ontario IDF CURVE LOOKUP

Active coordinate

44° 36' 45" N, 81° 5' 14" W (44.612500,-81.087500)

Retrieved: Tue, 06 Feb 2024 15:34:40 GMT

Location summary

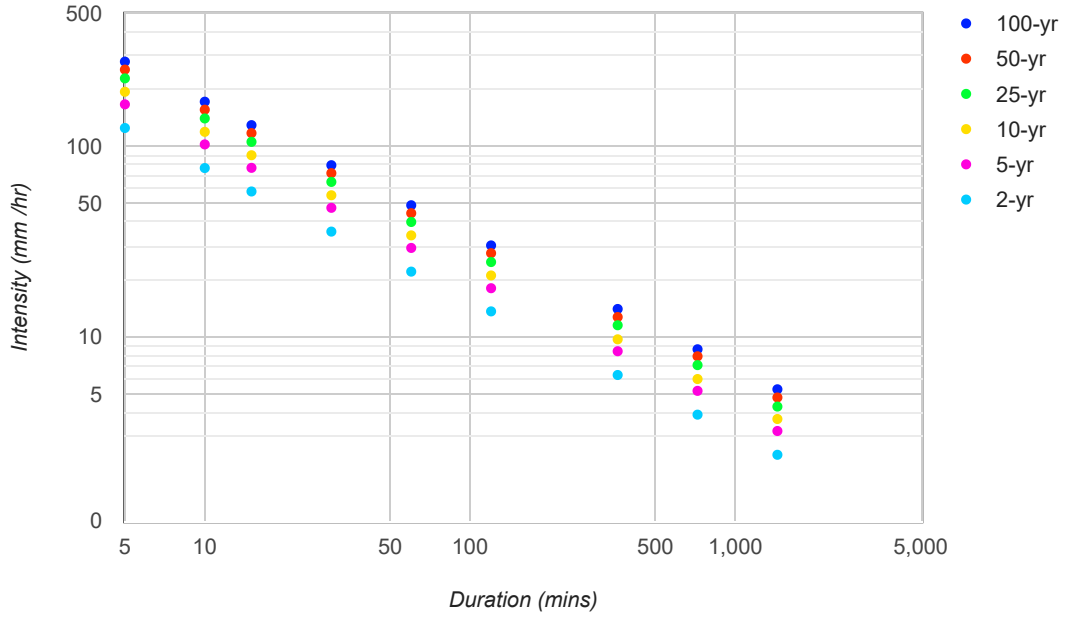
These are the locations in the selection.

IDF Curve: 44° 36' 45" N, 81° 5' 14" W (44.612500,-81.087500)

Results

An IDF curve was found.

Coordinate: 44.612500, -81.087500
IDF curve year: 2010



Coefficient summary

IDF Curve: 44° 36' 45" N, 81° 5' 14" W (44.612500,-81.087500)

Retrieved: Tue, 06 Feb 2024 15:34:40 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	22.0	29.3	34.1	40.1	44.6	49.1
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	125.0	77.0	58.0	35.7	22.0	13.6	6.3	3.9	2.4
5-yr	166.4	102.5	77.2	47.6	29.3	18.0	8.4	5.2	3.2
10-yr	193.7	119.3	89.9	55.4	34.1	21.0	9.7	6.0	3.7
25-yr	227.8	140.3	105.7	65.1	40.1	24.7	11.5	7.1	4.3
50-yr	253.3	156.0	117.5	72.4	44.6	27.5	12.7	7.9	4.8
100-yr	278.9	171.8	129.4	79.7	49.1	30.2	14.0	8.6	5.3

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.4	12.8	14.5	17.9	22.0	27.1	37.7	46.5	57.3
5-yr	13.9	17.1	19.3	23.8	29.3	36.1	50.2	61.9	76.3
10-yr	16.1	19.9	22.5	27.7	34.1	42.0	58.5	72.0	88.8
25-yr	19.0	23.4	26.4	32.5	40.1	49.4	68.8	84.7	104.4
50-yr	21.1	26.0	29.4	36.2	44.6	54.9	76.5	94.2	116.1
100-yr	23.2	28.6	32.3	39.9	49.1	60.5	84.2	103.7	127.8

Terms of Use

APPENDIX E

PCSWMM Output Data

1:2-Year, 12-hour Chicago Storm
PCSWMM Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/01/2000 00:00:00
Ending Date 01/01/2000 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:15:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 12
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	2.097	46.475
Evaporation Loss	0.000	0.000
Infiltration Loss	1.170	25.934
Surface Runoff	0.608	13.470
Final Storage	0.322	7.134
Continuity Error (%)	-0.138	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.606	6.060

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.567	5.665
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.006	0.056
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.026	0.262
Continuity Error (%)	1.257	

****
Highest Continuity Errors
****
Node 60 (1.86%)
Node 48 (1.44%)
Node 75 (1.37%)

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
Link C24 (2)

****
Most Frequent Nonconverging Nodes
****
Node DICB1 (0.07%)
Node 52 (0.07%)
Node O-A1 (0.07%)
Node O-A2 (0.07%)
Node O-A3 (0.07%)

****
Routing Time Step Summary
****
Minimum Time Step	:	0.28 sec
Average Time Step	:	29.96 sec
Maximum Time Step	:	30.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.02

```
% of Steps Not Converging   :     0.07
Time Step Frequencies       :
   30.000 - 13.228 sec      :   100.00 %
   13.228 -  5.833 sec      :     0.00 %
    5.833 -  2.572 sec      :     0.00 %
    2.572 -  1.134 sec      :     0.00 %
    1.134 -  0.500 sec      :     0.00 %


**************************
Subcatchment Runoff Summary
**************************
```

CA	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	46.47	0.00	0.00	25.37	4.54	10.04	14.57	0.59	0.07	0.314
A2	46.47	0.00	0.00	26.78	2.27	9.57	11.84	1.23	0.09	0.255
A3	46.47	0.00	0.00	26.78	2.27	9.66	11.92	0.97	0.07	0.257
B1	46.47	0.00	0.00	26.06	9.07	6.06	15.13	0.13	0.03	0.326
B10	46.47	0.00	0.00	9.77	31.76	2.59	34.34	0.08	0.02	0.739
B11	46.47	0.00	0.00	32.57	0.00	8.10	8.10	0.03	0.00	0.174
B12	46.47	0.00	0.00	32.57	0.00	8.13	8.13	0.04	0.00	0.175
B13	46.47	0.00	0.00	32.57	0.00	8.14	8.14	0.04	0.00	0.175
B14	46.47	0.00	0.00	32.57	0.00	8.13	8.13	0.03	0.00	0.175
B15	46.47	0.00	0.00	32.57	0.00	8.13	8.13	0.05	0.00	0.175
B16	46.47	0.00	0.00	27.00	4.53	7.82	12.36	0.50	0.07	0.266
B17	46.47	0.00	0.00	27.00	4.53	6.90	11.42	1.19	0.17	0.246
B2	46.47	0.00	0.00	21.17	15.87	5.18	21.05	0.18	0.05	0.453
B3	46.47	0.00	0.00	19.54	18.14	4.86	23.00	0.17	0.05	0.495
B4	46.47	0.00	0.00	19.54	18.14	4.87	23.01	0.16	0.05	0.495
B5	46.47	0.00	0.00	19.54	18.14	4.88	23.02	0.18	0.05	0.495
B6	46.47	0.00	0.00	9.77	31.76	2.59	34.35	0.08	0.02	0.739
B7	46.47	0.00	0.00	9.77	31.76	2.59	34.34	0.11	0.04	0.739
B8	46.47	0.00	0.00	9.77	31.76	2.59	34.34	0.11	0.04	0.739
B9	46.47	0.00	0.00	9.77	31.76	2.59	34.34	0.11	0.04	0.739
ra	46.47	0.00	0.00	13.03	27.15	3.30	30.45	0.04	0.01	0.655
rb	46.47	0.00	0.00	13.03	27.18	3.33	30.51	0.02	0.01	0.657
rc	46.47	0.00	0.00	13.03	27.15	3.30	30.45	0.03	0.01	0.655

```
******************
Node Depth Summary
******************
```

	Average Depth	Maximum Depth	Maximum HGL	Time of Max Occurrence	Reported Max Depth

Node	Type	Meters	Meters	Meters	days	hr:min	Meters
10	JUNCTION	0.06	0.14	242.21	0	04:00	0.14
14	JUNCTION	0.06	0.13	240.08	0	03:55	0.13
18	JUNCTION	0.03	0.10	239.12	0	03:53	0.10
19	JUNCTION	0.05	0.15	239.00	0	03:56	0.15
20	JUNCTION	0.05	0.15	238.78	0	03:58	0.15
21	JUNCTION	0.06	0.18	238.58	0	04:00	0.18
22	JUNCTION	0.06	0.18	238.21	0	04:01	0.18
23	JUNCTION	0.07	0.20	237.86	0	04:01	0.19
24	JUNCTION	0.07	0.20	237.71	0	04:03	0.19
33	JUNCTION	0.03	0.10	238.75	0	03:54	0.10
35	JUNCTION	0.02	0.09	238.05	0	03:56	0.09
48	JUNCTION	0.15	0.31	237.90	0	04:08	0.28
56	JUNCTION	0.09	0.26	237.61	0	04:03	0.25
60	JUNCTION	0.05	0.13	238.19	0	04:03	0.12
62	JUNCTION	0.05	0.13	238.10	0	04:07	0.11
65	JUNCTION	0.06	0.13	237.92	0	04:11	0.12
69	JUNCTION	0.06	0.13	237.72	0	04:16	0.13
71	JUNCTION	0.07	0.12	237.35	0	04:24	0.12
75	JUNCTION	0.08	0.16	237.22	0	04:31	0.15
77	JUNCTION	0.04	0.07	236.86	0	04:36	0.07
81	JUNCTION	0.02	0.10	237.75	0	03:54	0.10
CBMH1	JUNCTION	0.60	0.82	236.22	0	04:09	0.80
CBMH2	JUNCTION	0.17	0.33	235.88	0	04:11	0.32
cbmh3	JUNCTION	0.13	0.26	235.77	0	04:11	0.25
DICB1	JUNCTION	0.58	0.78	236.34	0	04:07	0.74
J1	JUNCTION	0.04	0.11	239.82	0	04:00	0.11
J11	JUNCTION	0.09	0.20	239.12	0	04:00	0.20
J12	JUNCTION	0.02	0.06	240.46	0	04:00	0.06
J13	JUNCTION	0.02	0.04	241.04	0	03:53	0.03
J15	JUNCTION	0.10	0.21	235.71	0	04:12	0.20
J16	JUNCTION	0.05	0.10	237.70	0	04:01	0.10
J17	JUNCTION	0.09	0.20	241.09	0	04:01	0.20
J18	JUNCTION	0.08	0.18	238.85	0	04:04	0.17
J19	JUNCTION	0.02	0.04	241.04	0	03:53	0.04
J2	JUNCTION	0.00	0.00	240.21	0	00:00	0.00
J20	JUNCTION	0.01	0.04	241.04	0	03:53	0.03
J3	JUNCTION	0.06	0.13	239.41	0	04:00	0.13
J4	JUNCTION	0.05	0.11	241.71	0	04:00	0.11
J5	JUNCTION	0.06	0.13	240.48	0	03:54	0.13
J6	JUNCTION	0.06	0.13	239.59	0	04:02	0.13
J7	JUNCTION	0.04	0.11	236.20	0	04:03	0.10
J8	JUNCTION	0.04	0.09	239.58	0	04:00	0.09
J9	JUNCTION	0.07	0.12	235.88	0	04:14	0.11
52	OUTFALL	0.09	0.20	235.70	0	04:14	0.18
O-A1	OUTFALL	0.01	0.03	235.03	0	03:56	0.03
O-A2	OUTFALL	0.02	0.04	235.04	0	03:55	0.03
O-A3	OUTFALL	0.02	0.03	235.03	0	03:55	0.03
OF1	OUTFALL	0.04	0.11	235.85	0	04:04	0.09

8 STORAGE 0.30 0.55 236.31 0 05:39 0.55

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Lateral Time of Max Occurrence days hr:min	Total Inflow Volume 10^6 ltr	Flow Inflow Volume 10^6 ltr	Balance Error Percent
10	JUNCTION	0.168	0.168	0 04:00	1.18	1.18	0.137
14	JUNCTION	0.000	0.066	0 04:00	0	0.5	0.539
18	JUNCTION	0.049	0.077	0 04:00	0.183	0.315	0.243
19	JUNCTION	0.036	0.087	0 04:00	0.11	0.347	0.469
20	JUNCTION	0.000	0.088	0 03:58	0	0.345	0.440
21	JUNCTION	0.036	0.175	0 03:59	0.11	0.647	0.301
22	JUNCTION	0.000	0.177	0 04:01	0	0.645	0.339
23	JUNCTION	0.036	0.253	0 04:01	0.11	0.917	0.273
24	JUNCTION	0.000	0.255	0 04:02	0	0.915	0.201
33	JUNCTION	0.048	0.084	0 03:55	0.17	0.276	0.199
35	JUNCTION	0.046	0.081	0 03:55	0.163	0.245	0.178
48	JUNCTION	0.000	0.165	0 04:05	0	1.16	1.464
56	JUNCTION	0.036	0.352	0 04:02	0.112	1.28	0.456
60	JUNCTION	0.002	0.015	0 04:00	0.0347	0.0814	1.892
62	JUNCTION	0.000	0.013	0 04:04	0	0.0799	0.761
65	JUNCTION	0.003	0.013	0 04:09	0.0429	0.122	0.883
69	JUNCTION	0.000	0.012	0 04:13	0	0.121	0.804
71	JUNCTION	0.003	0.013	0 04:20	0.043	0.163	0.912
75	JUNCTION	0.000	0.012	0 04:24	0	0.162	1.384
77	JUNCTION	0.002	0.012	0 04:34	0.0292	0.189	0.815
81	JUNCTION	0.050	0.085	0 04:00	0.177	0.258	0.145
CBMH1	JUNCTION	0.000	0.152	0 04:09	0	1.14	0.281
CBMH2	JUNCTION	0.008	0.193	0 04:09	0.0244	2.39	0.505
cbmh3	JUNCTION	0.000	0.190	0 04:11	0	2.38	0.322
DICB1	JUNCTION	0.000	0.149	0 04:08	0	1.14	0.350
J1	JUNCTION	0.000	0.067	0 03:58	0	0.498	0.411
J11	JUNCTION	0.000	0.165	0 04:03	0	1.17	0.557
J12	JUNCTION	0.025	0.025	0 04:00	0.0755	0.0755	-0.387
J13	JUNCTION	0.071	0.071	0 04:00	0.966	0.966	0.201
J15	JUNCTION	0.000	0.197	0 04:13	0	2.37	0.247
J16	JUNCTION	0.000	0.077	0 04:01	0	0.527	0.390
J17	JUNCTION	0.000	0.168	0 04:00	0	1.18	0.523
J18	JUNCTION	0.000	0.166	0 04:03	0	1.16	0.329
J19	JUNCTION	0.090	0.090	0 04:00	1.22	1.22	0.212
J2	JUNCTION	0.000	0.000	0 00:00	0	0	0.000
J20	JUNCTION	0.070	0.070	0 04:00	0.591	0.591	0.107
J3	JUNCTION	0.011	0.077	0 04:00	0.0334	0.529	0.347

J4	JUNCTION	0.066	0.066	0	04:00	0.501	0.501	0.171
J5	JUNCTION	0.000	0.166	0	04:01	0	1.17	0.262
J6	JUNCTION	0.000	0.166	0	04:02	0	1.17	0.345
J7	JUNCTION	0.000	0.077	0	04:01	0	0.525	0.366
J8	JUNCTION	0.028	0.028	0	04:00	0.133	0.133	0.197
J9	JUNCTION	0.000	0.049	0	05:39	0	1.24	0.218
52	OUTFALL	0.000	0.203	0	04:14	0	2.37	0.000
O-A1	OUTFALL	0.000	0.072	0	03:56	0	0.591	0.000
O-A2	OUTFALL	0.000	0.094	0	03:55	0	1.22	0.000
O-A3	OUTFALL	0.000	0.073	0	03:55	0	0.964	0.000
OF1	OUTFALL	0.000	0.080	0	04:04	0	0.523	0.000
8	STORAGE	0.003	0.347	0	04:04	0.0461	1.51	0.001

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
8	0.282	12.7	0.0	3.7	0.535	24.1	0 05:39	0.050

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
52	90.36	0.061	0.203	2.366

O-A1	99.65	0.014	0.072	0.591
O-A2	99.72	0.028	0.094	1.222
O-A3	99.72	0.022	0.073	0.964
OF1	94.59	0.013	0.080	0.523
System	96.81	0.138	0.338	5.665

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
25	CONDUIT	0.254	0 04:03	1.07	0.08	0.47
27	CONDUIT	0.041	0 04:00	1.30	0.15	0.33
28	CONDUIT	0.088	0 03:58	1.33	0.01	0.20
29	CONDUIT	0.089	0 03:59	1.14	0.01	0.22
30	CONDUIT	0.177	0 04:01	1.90	0.02	0.24
32	CONDUIT	0.255	0 04:02	1.42	0.09	0.40
36	CONDUIT	0.045	0 03:56	1.37	0.12	0.38
47	CONDUIT	0.149	0 04:08	0.70	0.07	0.36
57	CONDUIT	0.346	0 04:04	1.74	0.06	0.34
61	CONDUIT	0.013	0 04:04	0.28	0.01	0.17
64	CONDUIT	0.012	0 04:09	0.27	0.01	0.17
67	CONDUIT	0.012	0 04:13	0.27	0.01	0.17
70	CONDUIT	0.012	0 04:20	0.27	0.01	0.16
74	CONDUIT	0.012	0 04:24	0.24	0.01	0.18
76	CONDUIT	0.011	0 04:33	0.28	0.01	0.15
82	CONDUIT	0.059	0 04:00	1.36	0.16	0.47
C1	CONDUIT	0.000	0 00:00	0.00	0.00	0.08
C10	CONDUIT	0.012	0 04:38	0.76	0.00	0.10
C11	CONDUIT	0.015	0 04:00	0.70	0.00	0.16
C12	CONDUIT	0.176	0 04:01	1.72	0.02	0.25
C13	CONDUIT	0.037	0 03:54	0.96	0.01	0.17
C14	CONDUIT	0.035	0 03:54	1.33	0.00	0.13
C15	CONDUIT	0.036	0 03:56	0.76	0.01	0.22
C16	CONDUIT	0.028	0 04:00	0.83	0.01	0.16
C17	CONDUIT	0.051	0 04:15	0.75	0.05	0.28
C18	CONDUIT	0.190	0 04:11	1.07	0.38	0.33
C19	CONDUIT	0.165	0 04:03	1.62	0.02	0.30
C2	CONDUIT	0.067	0 03:58	1.62	0.01	0.16
C20	CONDUIT	0.166	0 04:03	1.60	0.03	0.25
C21	CONDUIT	0.009	0 04:00	0.32	0.00	0.14
C22	CONDUIT	0.073	0 03:55	6.44	0.00	0.02
C23	CONDUIT	0.197	0 04:13	1.52	0.39	0.26

C24	CONDUIT	0.203	0	04:14	1.08	0.08	0.21
C25	CONDUIT	0.050	0	03:55	1.46	0.15	0.37
C26	CONDUIT	0.077	0	04:01	2.38	0.00	0.14
C27	CONDUIT	0.168	0	04:00	2.14	0.02	0.31
C28	CONDUIT	0.072	0	03:56	6.43	0.00	0.02
C29	CONDUIT	0.094	0	03:55	7.02	0.00	0.02
C3	CONDUIT	0.067	0	04:00	1.86	0.11	0.24
C30	CONDUIT	0.152	0	04:09	1.40	0.29	0.42
C31	CONDUIT	0.152	0	04:09	1.70	0.27	0.36
C4	CONDUIT	0.077	0	04:01	2.02	0.01	0.15
C5	CONDUIT	0.066	0	04:00	1.74	0.01	0.16
C6	CONDUIT	0.166	0	04:01	2.00	0.06	0.30
C7	CONDUIT	0.166	0	04:02	3.15	0.02	0.24
C8	CONDUIT	0.165	0	04:05	1.12	0.02	0.33
C9	CONDUIT	0.080	0	04:04	2.47	0.11	0.22
extraculvert	CONDUIT	0.026	0	03:55	0.64	0.16	0.47
OR1	ORIFICE	0.000	0	00:00			0.00
OR2	ORIFICE	0.049	0	05:39			1.00
W1	WEIR	0.000	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	---------- Fraction of Time in Flow Class ----------								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
25	4.13	0.00	0.01	0.00	0.98	0.01	0.00	0.00	0.97	0.00
27	10.90	0.00	0.00	0.00	0.29	0.70	0.00	0.00	0.98	0.00
28	4.74	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.21	0.00
29	4.81	0.00	0.01	0.00	0.13	0.86	0.00	0.00	0.98	0.00
30	5.52	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.67	0.00
32	4.12	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.66	0.00
36	12.94	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.99	0.00
47	1.07	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
57	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
61	4.68	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.66	0.00
64	2.26	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.68	0.00
67	2.12	0.06	0.00	0.00	0.94	0.00	0.00	0.00	0.69	0.00
70	1.17	0.10	0.00	0.00	0.90	0.00	0.00	0.00	0.68	0.00
74	2.55	0.13	0.00	0.00	0.87	0.00	0.00	0.00	0.77	0.00
76	1.49	0.16	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00
82	12.96	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.99	0.00
C1	1.71	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	9.82	0.18	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00
C11	1.69	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.97	0.00
C12	5.52	0.00	0.01	0.00	0.04	0.95	0.00	0.00	0.97	0.00

C13	1.93	0.00	0.00	0.00	0.03	0.97	0.00	0.00	0.01	0.00
C14	2.69	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.02	0.00
C15	1.93	0.00	0.00	0.00	0.14	0.86	0.00	0.00	0.31	0.00
C16	1.54	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.03	0.00
C17	5.21	0.08	0.00	0.00	0.84	0.00	0.00	0.07	0.83	0.00
C18	1.37	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.00
C19	7.56	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.94	0.00
C2	7.47	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.01	0.00
C20	3.37	0.03	0.00	0.00	0.01	0.96	0.00	0.00	0.03	0.00
C21	1.82	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C22	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C23	4.77	0.01	0.00	0.00	0.34	0.66	0.00	0.00	0.00	0.00
C24	45.65	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C25	12.24	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.99	0.00
C26	8.66	0.02	0.00	0.00	0.02	0.96	0.00	0.00	0.03	0.00
C27	8.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C28	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C29	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.19	0.00
C3	5.25	0.00	0.01	0.00	0.10	0.88	0.00	0.00	0.97	0.00
C30	1.39	0.15	0.00	0.00	0.69	0.04	0.00	0.13	0.71	0.00
C31	9.31	0.12	0.00	0.00	0.00	0.00	0.00	0.88	0.00	0.00
C4	1.98	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.00	0.00
C5	2.94	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.96	0.00
C6	1.39	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C7	14.86	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.84	0.00
C8	1.40	0.04	0.00	0.00	0.92	0.04	0.00	0.00	0.92	0.00
C9	11.73	0.04	0.00	0.00	0.00	0.96	0.00	0.00	0.12	0.00
extraculvert	1.58	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Dec 4 13:59:17 2025
Analysis ended on: Thu Dec 4 13:59:18 2025
Total elapsed time: 00:00:01

1:5-Year, 12-hour Chicago Storm
PCSWMM Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/01/2000 00:00:00
Ending Date 01/01/2000 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:15:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 12
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	2.712	60.103
Evaporation Loss	0.000	0.000
Infiltration Loss	1.367	30.292
Surface Runoff	1.005	22.262
Final Storage	0.345	7.642
Continuity Error (%)	-0.154	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.002	10.021

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.947	9.471
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.006	0.060
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.040	0.398
Continuity Error (%)	0.928	

****
Highest Continuity Errors
****
Node 60 (1.53%)
Node 75 (1.09%)
Node 48 (1.02%)

****
Time-Step Critical Elements
****
Link C23 (1.87%)

****
Highest Flow Instability Indexes
****
Link C24 (2)
Link C23 (2)
Link C18 (1)
Link C22 (1)

****
Most Frequent Nonconverging Nodes
****
Node 52 (0.14%)
Node O-A1 (0.14%)
Node O-A2 (0.14%)
Node O-A3 (0.14%)
Node OF1 (0.14%)

****
Routing Time Step Summary
****
Minimum Time Step : 23.81 sec
Average Time Step : 29.94 sec

```
Maximum Time Step           :    30.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.04
% of Steps Not Converging   :     0.14
Time Step Frequencies       :
   30.000 - 13.228 sec      :   100.00 %
   13.228 -  5.833 sec      :     0.00 %
    5.833 -  2.572 sec      :     0.00 %
    2.572 -  1.134 sec      :     0.00 %
    1.134 -  0.500 sec      :     0.00 %


**************************
Subcatchment Runoff Summary
**************************
```

CA	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	60.10	0.00	0.00	29.41	5.90	17.94	23.84	0.97	0.12	0.397
A2	60.10	0.00	0.00	31.05	2.95	17.69	20.64	2.14	0.17	0.343
A3	60.10	0.00	0.00	31.05	2.95	17.80	20.75	1.69	0.13	0.345
B1	60.10	0.00	0.00	30.98	11.80	11.84	23.65	0.21	0.04	0.393
B10	60.10	0.00	0.00	11.62	41.31	4.85	46.16	0.10	0.04	0.768
B11	60.10	0.00	0.00	38.72	0.00	15.45	15.45	0.07	0.01	0.257
B12	60.10	0.00	0.00	38.72	0.00	15.49	15.49	0.08	0.01	0.258
B13	60.10	0.00	0.00	38.72	0.00	15.50	15.50	0.08	0.01	0.258
B14	60.10	0.00	0.00	38.72	0.00	15.49	15.49	0.06	0.01	0.258
B15	60.10	0.00	0.00	38.72	0.00	15.48	15.48	0.09	0.01	0.258
B16	60.10	0.00	0.00	31.64	5.90	14.99	20.89	0.85	0.10	0.347
B17	60.10	0.00	0.00	31.64	5.89	13.78	19.68	2.04	0.25	0.327
B2	60.10	0.00	0.00	25.17	20.65	9.94	30.59	0.27	0.07	0.509
B3	60.10	0.00	0.00	23.23	23.60	9.27	32.87	0.24	0.07	0.547
B4	60.10	0.00	0.00	23.23	23.60	9.29	32.89	0.23	0.07	0.547
B5	60.10	0.00	0.00	23.23	23.60	9.29	32.89	0.25	0.07	0.547
B6	60.10	0.00	0.00	11.62	41.31	4.85	46.16	0.10	0.04	0.768
B7	60.10	0.00	0.00	11.62	41.31	4.85	46.16	0.15	0.05	0.768
B8	60.10	0.00	0.00	11.62	41.31	4.85	46.16	0.15	0.05	0.768
B9	60.10	0.00	0.00	11.62	41.31	4.85	46.16	0.15	0.05	0.768
ra	60.10	0.00	0.00	15.49	35.35	6.26	41.61	0.05	0.02	0.692
rb	60.10	0.00	0.00	15.49	35.38	6.30	41.68	0.03	0.01	0.693
rc	60.10	0.00	0.00	15.49	35.35	6.26	41.61	0.05	0.01	0.692

```
******************
Node Depth Summary
******************
```

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
10	JUNCTION	0.08	0.16	242.23	0 04:00	0.16
14	JUNCTION	0.07	0.15	240.10	0 04:01	0.14
18	JUNCTION	0.04	0.12	239.14	0 04:00	0.12
19	JUNCTION	0.06	0.17	239.02	0 04:01	0.17
20	JUNCTION	0.06	0.17	238.80	0 03:58	0.16
21	JUNCTION	0.07	0.20	238.60	0 03:59	0.20
22	JUNCTION	0.07	0.20	238.23	0 04:00	0.20
23	JUNCTION	0.08	0.22	237.88	0 04:01	0.22
24	JUNCTION	0.07	0.23	237.74	0 04:02	0.22
33	JUNCTION	0.03	0.12	238.77	0 03:53	0.12
35	JUNCTION	0.03	0.11	238.07	0 04:00	0.11
48	JUNCTION	0.18	0.36	237.95	0 04:08	0.32
56	JUNCTION	0.10	0.30	237.65	0 04:03	0.28
60	JUNCTION	0.06	0.15	238.22	0 04:04	0.14
62	JUNCTION	0.06	0.15	238.12	0 04:08	0.14
65	JUNCTION	0.07	0.18	237.97	0 04:10	0.17
69	JUNCTION	0.07	0.17	237.76	0 04:17	0.16
71	JUNCTION	0.08	0.18	237.41	0 04:21	0.18
75	JUNCTION	0.10	0.23	237.29	0 04:26	0.22
77	JUNCTION	0.05	0.11	236.90	0 04:27	0.11
81	JUNCTION	0.03	0.13	237.78	0 03:54	0.13
CBMH1	JUNCTION	0.63	0.87	236.27	0 04:09	0.84
CBMH2	JUNCTION	0.20	0.39	235.94	0 04:12	0.37
cbmh3	JUNCTION	0.16	0.32	235.83	0 04:14	0.32
DICB1	JUNCTION	0.61	0.82	236.38	0 04:05	0.77
J1	JUNCTION	0.06	0.14	239.85	0 04:03	0.14
J11	JUNCTION	0.11	0.22	239.14	0 04:04	0.22
J12	JUNCTION	0.02	0.06	240.46	0 04:00	0.06
J13	JUNCTION	0.02	0.05	241.05	0 04:01	0.04
J15	JUNCTION	0.12	0.25	235.75	0 04:15	0.25
J16	JUNCTION	0.05	0.11	237.71	0 04:02	0.11
J17	JUNCTION	0.11	0.23	241.12	0 04:01	0.23
J18	JUNCTION	0.10	0.20	238.87	0 04:05	0.20
J19	JUNCTION	0.02	0.05	241.05	0 04:01	0.05
J2	JUNCTION	0.00	0.00	240.21	0 00:00	0.00
J20	JUNCTION	0.02	0.04	241.04	0 04:01	0.04
J3	JUNCTION	0.07	0.14	239.42	0 04:01	0.14
J4	JUNCTION	0.06	0.13	241.73	0 04:00	0.13
J5	JUNCTION	0.07	0.15	240.50	0 03:54	0.15
J6	JUNCTION	0.07	0.16	239.62	0 04:03	0.15
J7	JUNCTION	0.05	0.13	236.22	0 04:02	0.13
J8	JUNCTION	0.04	0.11	239.60	0 04:00	0.11
J9	JUNCTION	0.09	0.19	235.95	0 04:10	0.16
52	OUTFALL	0.12	0.24	235.74	0 04:16	0.22
O-A1	OUTFALL	0.02	0.04	235.04	0 04:02	0.04

O-A2	OUTFALL	0.02	0.05	235.05	0	04:02	0.04
O-A3	OUTFALL	0.02	0.04	235.04	0	04:02	0.04
OF1	OUTFALL	0.05	0.13	235.87	0	04:04	0.11
8	STORAGE	0.41	0.78	236.54	0	05:02	0.78

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Lateral Time of Max Occurrence days hr:min	Total Inflow Volume 10^6 ltr	Flow Inflow Volume 10^6 ltr	Balance Error Percent
10	JUNCTION	0.248	0.248	0 04:00	2.04	2.04	0.106
14	JUNCTION	0.000	0.102	0 04:01	0	0.847	0.385
18	JUNCTION	0.071	0.112	0 04:00	0.266	0.473	0.201
19	JUNCTION	0.052	0.119	0 04:00	0.148	0.486	0.398
20	JUNCTION	0.000	0.117	0 04:01	0	0.484	0.365
21	JUNCTION	0.052	0.237	0 03:59	0.148	0.91	0.251
22	JUNCTION	0.000	0.241	0 04:01	0	0.908	0.281
23	JUNCTION	0.052	0.354	0 04:00	0.148	1.29	0.225
24	JUNCTION	0.000	0.356	0 04:02	0	1.29	0.149
33	JUNCTION	0.069	0.124	0 04:00	0.243	0.416	0.164
35	JUNCTION	0.066	0.120	0 04:00	0.233	0.368	0.151
48	JUNCTION	0.000	0.236	0 04:06	0	2	1.033
56	JUNCTION	0.052	0.508	0 04:02	0.151	1.82	0.380
60	JUNCTION	0.007	0.026	0 04:01	0.0663	0.129	1.552
62	JUNCTION	0.000	0.021	0 04:05	0	0.127	0.576
65	JUNCTION	0.009	0.027	0 04:09	0.0819	0.208	0.572
69	JUNCTION	0.000	0.028	0 04:13	0	0.207	0.752
71	JUNCTION	0.009	0.035	0 04:17	0.0819	0.288	0.506
75	JUNCTION	0.000	0.034	0 04:21	0	0.286	1.104
77	JUNCTION	0.006	0.038	0 04:27	0.0556	0.339	0.509
81	JUNCTION	0.072	0.127	0 04:00	0.253	0.384	0.140
CBMH1	JUNCTION	0.000	0.222	0 04:09	0	1.98	0.185
CBMH2	JUNCTION	0.011	0.282	0 04:11	0.0333	3.84	0.381
CBMH3	JUNCTION	0.000	0.279	0 04:12	0	3.83	0.217
DICB1	JUNCTION	0.000	0.221	0 04:08	0	1.98	0.248
J1	JUNCTION	0.000	0.099	0 04:02	0	0.843	0.309
J11	JUNCTION	0.000	0.241	0 04:03	0	2.02	0.400
J12	JUNCTION	0.036	0.036	0 04:00	0.101	0.101	-0.521
J13	JUNCTION	0.132	0.132	0 04:00	1.68	1.68	0.157
J15	JUNCTION	0.000	0.282	0 04:13	0	3.82	0.198
J16	JUNCTION	0.000	0.109	0 04:01	0	0.884	0.283
J17	JUNCTION	0.000	0.247	0 04:00	0	2.03	0.375
J18	JUNCTION	0.000	0.238	0 04:05	0	2.01	0.244
J19	JUNCTION	0.166	0.166	0 04:00	2.14	2.14	0.166

J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
J20	JUNCTION	0.123	0.123	0	04:00	0.968	0.968	0.091
J3	JUNCTION	0.015	0.109	0	04:00	0.0457	0.887	0.244
J4	JUNCTION	0.103	0.103	0	04:00	0.848	0.848	0.129
J5	JUNCTION	0.000	0.243	0	04:01	0	2.03	0.197
J6	JUNCTION	0.000	0.244	0	04:02	0	2.02	0.250
J7	JUNCTION	0.000	0.109	0	04:02	0	0.882	0.271
J8	JUNCTION	0.042	0.042	0	04:00	0.208	0.208	0.164
J9	JUNCTION	0.000	0.106	0	05:03	0	1.84	0.177
52	OUTFALL	0.000	0.276	0	04:16	0	3.81	0.000
O-A1	OUTFALL	0.000	0.118	0	04:02	0	0.967	0.000
O-A2	OUTFALL	0.000	0.159	0	04:02	0	2.13	0.000
O-A3	OUTFALL	0.000	0.127	0	04:02	0	1.68	0.000
OF1	OUTFALL	0.000	0.114	0	04:04	0	0.88	0.000
8	STORAGE	0.009	0.514	0	04:04	0.088	2.24	0.011

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
8	0.405	18.3	0.0	2.7	0.804	36.3	0 05:02	0.108

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CMS	CMS	10^6 ltr
52	91.27	0.097	0.276	3.812
O-A1	99.72	0.022	0.118	0.967
O-A2	99.79	0.050	0.159	2.133
O-A3	99.72	0.039	0.127	1.679
OF1	94.94	0.021	0.114	0.880
System	97.09	0.229	0.608	9.471

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
25	CONDUIT	0.356	0	04:03	1.13	0.12	0.54
27	CONDUIT	0.054	0	04:01	1.44	0.20	0.38
28	CONDUIT	0.117	0	04:01	1.43	0.02	0.22
29	CONDUIT	0.120	0	03:59	1.23	0.02	0.24
30	CONDUIT	0.241	0	04:01	2.05	0.03	0.26
32	CONDUIT	0.356	0	04:02	1.52	0.12	0.46
36	CONDUIT	0.062	0	04:01	1.53	0.17	0.44
47	CONDUIT	0.221	0	04:08	0.78	0.11	0.41
57	CONDUIT	0.502	0	04:04	1.92	0.08	0.40
61	CONDUIT	0.021	0	04:05	0.32	0.01	0.20
64	CONDUIT	0.019	0	04:08	0.28	0.01	0.21
67	CONDUIT	0.028	0	04:13	0.34	0.02	0.22
70	CONDUIT	0.027	0	04:17	0.30	0.02	0.23
74	CONDUIT	0.034	0	04:21	0.32	0.02	0.27
76	CONDUIT	0.033	0	04:27	0.38	0.02	0.23
82	CONDUIT	0.086	0	03:56	1.55	0.24	0.56
C1	CONDUIT	0.000	0	00:00	0.00	0.00	0.09
C10	CONDUIT	0.038	0	04:29	1.01	0.01	0.15
C11	CONDUIT	0.022	0	04:01	0.75	0.00	0.19
C12	CONDUIT	0.242	0	04:01	1.85	0.03	0.28
C13	CONDUIT	0.056	0	04:01	1.06	0.01	0.20
C14	CONDUIT	0.054	0	03:54	1.49	0.01	0.15
C15	CONDUIT	0.056	0	04:01	0.81	0.02	0.27
C16	CONDUIT	0.041	0	04:00	0.89	0.01	0.18
C17	CONDUIT	0.106	0	05:03	0.94	0.09	0.36
C18	CONDUIT	0.279	0	04:12	1.23	0.55	0.39
C19	CONDUIT	0.241	0	04:03	1.76	0.03	0.34
C2	CONDUIT	0.099	0	04:02	1.70	0.01	0.19
C20	CONDUIT	0.238	0	04:05	1.75	0.04	0.29

C21	CONDUIT	0.013	0	04:01	0.35	0.00	0.15
C22	CONDUIT	0.127	0	04:02	7.82	0.00	0.02
C23	CONDUIT	0.282	0	04:13	1.69	0.56	0.31
C24	CONDUIT	0.276	0	04:16	1.17	0.11	0.24
C25	CONDUIT	0.068	0	04:01	1.61	0.21	0.42
C26	CONDUIT	0.109	0	04:02	2.48	0.01	0.17
C27	CONDUIT	0.247	0	04:00	2.30	0.04	0.36
C28	CONDUIT	0.118	0	04:02	7.66	0.00	0.02
C29	CONDUIT	0.159	0	04:02	8.33	0.00	0.02
C3	CONDUIT	0.098	0	04:03	2.18	0.17	0.28
C30	CONDUIT	0.223	0	04:09	1.58	0.42	0.51
C31	CONDUIT	0.222	0	04:09	1.89	0.40	0.44
C4	CONDUIT	0.109	0	04:01	2.21	0.01	0.17
C5	CONDUIT	0.102	0	04:01	1.86	0.01	0.18
C6	CONDUIT	0.243	0	04:01	2.20	0.09	0.35
C7	CONDUIT	0.244	0	04:02	3.48	0.03	0.28
C8	CONDUIT	0.236	0	04:06	1.23	0.03	0.37
C9	CONDUIT	0.114	0	04:04	2.73	0.15	0.27
extraculvert	CONDUIT	0.039	0	03:54	0.77	0.25	0.56
OR1	ORIFICE	0.048	0	05:03			0.53
OR2	ORIFICE	0.058	0	05:02			1.00
W1	WEIR	0.000	0	00:00			0.00

****
Flow Classification Summary
****

	Adjusted	---------- Fraction of Time in Flow Class ----------							
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
25	4.13	0.00	0.01	0.00	0.98	0.01	0.00	0.00	0.97	0.00
27	10.90	0.00	0.00	0.00	0.28	0.72	0.00	0.00	0.97	0.00
28	4.74	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.28	0.00
29	4.81	0.00	0.01	0.00	0.11	0.88	0.00	0.00	0.98	0.00
30	5.52	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.67	0.00
32	4.12	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.66	0.00
36	12.94	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.99	0.00
47	1.07	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
57	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
61	4.68	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.67	0.00
64	2.26	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.70	0.00
67	2.12	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.68	0.00
70	1.17	0.09	0.00	0.00	0.91	0.00	0.00	0.00	0.71	0.00
74	2.55	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.77	0.00
76	1.49	0.15	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00
82	12.96	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.98	0.00
C1	1.71	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C10	9.82	0.17	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00
C11	1.69	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.97	0.00
C12	5.52	0.00	0.01	0.00	0.04	0.95	0.00	0.00	0.97	0.00
C13	1.93	0.00	0.00	0.00	0.03	0.97	0.00	0.00	0.01	0.00
C14	2.69	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.02	0.00
C15	1.93	0.00	0.00	0.00	0.12	0.88	0.00	0.00	0.40	0.00
C16	1.54	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.03	0.00
C17	5.21	0.08	0.00	0.00	0.85	0.00	0.00	0.07	0.83	0.00
C18	1.37	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
C19	7.56	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.94	0.00
C2	7.47	0.01	0.00	0.00	0.01	0.99	0.00	0.00	0.01	0.00
C20	3.37	0.03	0.00	0.00	0.01	0.96	0.00	0.00	0.02	0.00
C21	1.82	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C22	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.19	0.00
C23	4.77	0.00	0.00	0.00	0.33	0.66	0.00	0.00	0.00	0.00
C24	45.65	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C25	12.24	0.00	0.00	0.00	0.79	0.21	0.00	0.00	0.98	0.00
C26	8.66	0.02	0.00	0.00	0.02	0.96	0.00	0.00	0.15	0.00
C27	8.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C28	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.19	0.00
C29	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.19	0.00
C3	5.25	0.00	0.01	0.00	0.09	0.90	0.00	0.00	0.97	0.00
C30	1.39	0.13	0.00	0.00	0.71	0.04	0.00	0.11	0.74	0.00
C31	9.31	0.11	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00
C4	1.98	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.00	0.00
C5	2.94	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.96	0.00
C6	1.39	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C7	14.86	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.83	0.00
C8	1.40	0.04	0.00	0.00	0.92	0.04	0.00	0.00	0.92	0.00
C9	11.73	0.04	0.00	0.00	0.00	0.96	0.00	0.00	0.17	0.00
extraculvert	1.58	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Dec 4 14:52:46 2025
Analysis ended on: Thu Dec 4 14:52:46 2025
Total elapsed time: < 1 sec

1:25-Year, 12-hour Chicago Storm
PCSWMM Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/01/2000 00:00:00
Ending Date 01/01/2000 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:15:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 12
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	3.823	84.711
Evaporation Loss	0.000	0.000
Infiltration Loss	1.641	36.351
Surface Runoff	1.795	39.784
Final Storage	0.394	8.731
Continuity Error (%)	-0.183	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.791	17.911

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.709	17.095
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.006	0.064
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.062	0.615
Continuity Error (%)	0.768	

****
Highest Continuity Errors
****
Node 60 (1.31%)

****
Time-Step Critical Elements
****
Link C23 (21.57%)
Link C24 (6.50%)
Link C18 (2.19%)

****
Highest Flow Instability Indexes
****
Link C23 (25)
Link C18 (16)
Link C24 (16)
Link C17 (5)

****
Most Frequent Nonconverging Nodes
****
Node 52 (3.38%)
Node O-A1 (3.38%)
Node O-A2 (3.38%)
Node O-A3 (3.38%)
Node OF1 (3.38%)

****
Routing Time Step Summary
****
Minimum Time Step : 6.17 sec
Average Time Step : 28.67 sec

```
Maximum Time Step           :    30.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.33
% of Steps Not Converging   :     3.38
Time Step Frequencies       :
   30.000 - 13.228 sec      :    99.93 %
   13.228 -  5.833 sec      :     0.07 %
    5.833 -  2.572 sec      :     0.00 %
    2.572 -  1.134 sec      :     0.00 %
    1.134 -  0.500 sec      :     0.00 %


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------
    Total   Total  Total  Total   Imperv  Perv    Total   Total     Peak   Runoff
    Precip  Runon  Evap   Infil   Runoff  Runoff  Runoff  Runoff    Runoff Coeff
CA  mm      mm     mm     mm      mm      mm      mm      10^6 ltr  CMS
-----------------------------------------------------------------------------------
A1  84.71   0.00   0.00   34.93   8.36    33.80   42.16   1.72      0.26   0.498
A2  84.71   0.00   0.00   36.87   4.18    34.04   38.22   3.97      0.37   0.451
A3  84.71   0.00   0.00   36.87   4.18    34.18   38.36   3.12      0.30   0.453
B1  84.71   0.00   0.00   38.11   16.72   23.93   40.65   0.36      0.07   0.480
B10 84.71   0.00   0.00   14.29   58.53   9.57    68.10   0.15      0.05   0.804
B11 84.71   0.00   0.00   47.64   0.00    30.83   30.83   0.13      0.02   0.364
B12 84.71   0.00   0.00   47.64   0.00    30.88   30.88   0.16      0.03   0.365
B13 84.71   0.00   0.00   47.64   0.00    30.90   30.90   0.16      0.03   0.365
B14 84.71   0.00   0.00   47.64   0.00    30.89   30.89   0.11      0.02   0.365
B15 84.71   0.00   0.00   47.64   0.00    30.87   30.87   0.18      0.03   0.364
B16 84.71   0.00   0.00   38.11   8.36    29.62   37.98   1.55      0.19   0.448
B17 84.71   0.00   0.00   38.11   8.36    28.00   36.36   3.77      0.42   0.429
B2  84.71   0.00   0.00   30.97   29.27   19.89   49.16   0.43      0.12   0.580
B3  84.71   0.00   0.00   28.58   33.45   18.50   51.95   0.38      0.11   0.613
B4  84.71   0.00   0.00   28.58   33.45   18.52   51.97   0.37      0.11   0.614
B5  84.71   0.00   0.00   28.58   33.45   18.53   51.98   0.40      0.12   0.614
B6  84.71   0.00   0.00   14.29   58.53   9.57    68.10   0.15      0.05   0.804
B7  84.71   0.00   0.00   14.29   58.53   9.56    68.10   0.22      0.08   0.804
B8  84.71   0.00   0.00   14.29   58.53   9.56    68.09   0.22      0.08   0.804
B9  84.71   0.00   0.00   14.29   58.53   9.56    68.09   0.22      0.08   0.804
ra  84.71   0.00   0.00   19.06   50.13   12.45   62.57   0.08      0.02   0.739
rb  84.71   0.00   0.00   19.06   50.15   12.51   62.66   0.05      0.02   0.740
rc  84.71   0.00   0.00   19.06   50.12   12.44   62.57   0.07      0.02   0.739


******************
Node Depth Summary
******************
```

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
10	JUNCTION	0.10	0.19	242.26	0 04:00	0.19
14	JUNCTION	0.09	0.19	240.14	0 04:01	0.18
18	JUNCTION	0.05	0.15	239.17	0 04:01	0.15
19	JUNCTION	0.07	0.19	239.04	0 04:01	0.19
20	JUNCTION	0.07	0.19	238.82	0 03:57	0.19
21	JUNCTION	0.08	0.23	238.63	0 03:59	0.23
22	JUNCTION	0.08	0.23	238.26	0 04:00	0.23
23	JUNCTION	0.09	0.26	237.92	0 04:01	0.26
24	JUNCTION	0.09	0.27	237.78	0 04:02	0.26
33	JUNCTION	0.04	0.15	238.80	0 04:01	0.15
35	JUNCTION	0.04	0.14	238.10	0 04:01	0.14
48	JUNCTION	0.23	0.43	238.02	0 04:07	0.38
56	JUNCTION	0.12	0.35	237.70	0 04:03	0.34
60	JUNCTION	0.08	0.21	238.27	0 04:03	0.19
62	JUNCTION	0.08	0.20	238.17	0 04:07	0.18
65	JUNCTION	0.09	0.24	238.03	0 04:07	0.23
69	JUNCTION	0.09	0.23	237.82	0 04:12	0.23
71	JUNCTION	0.10	0.26	237.49	0 04:14	0.26
75	JUNCTION	0.13	0.31	237.38	0 04:18	0.31
77	JUNCTION	0.06	0.16	236.95	0 04:18	0.16
81	JUNCTION	0.04	0.18	237.83	0 04:01	0.18
CBMH1	JUNCTION	0.69	0.98	236.38	0 04:09	0.91
CBMH2	JUNCTION	0.28	0.54	236.09	0 04:14	0.54
cbmh3	JUNCTION	0.22	0.50	236.01	0 04:20	0.47
DICB1	JUNCTION	0.66	0.93	236.49	0 04:08	0.84
J1	JUNCTION	0.08	0.19	239.90	0 04:03	0.18
J11	JUNCTION	0.14	0.27	239.19	0 04:04	0.26
J12	JUNCTION	0.02	0.07	240.47	0 04:00	0.07
J13	JUNCTION	0.03	0.07	241.07	0 04:01	0.07
J15	JUNCTION	0.17	0.34	235.84	0 04:18	0.33
J16	JUNCTION	0.07	0.14	237.74	0 04:05	0.13
J17	JUNCTION	0.14	0.28	241.17	0 04:01	0.28
J18	JUNCTION	0.13	0.25	238.92	0 04:05	0.24
J19	JUNCTION	0.03	0.08	241.08	0 04:01	0.07
J2	JUNCTION	0.00	0.00	240.21	0 00:00	0.00
J20	JUNCTION	0.02	0.06	241.06	0 04:01	0.06
J3	JUNCTION	0.09	0.18	239.46	0 04:04	0.17
J4	JUNCTION	0.08	0.16	241.76	0 04:00	0.16
J5	JUNCTION	0.09	0.19	240.54	0 04:01	0.18
J6	JUNCTION	0.10	0.19	239.65	0 04:03	0.18
J7	JUNCTION	0.07	0.17	236.26	0 04:02	0.16
J8	JUNCTION	0.05	0.13	239.62	0 04:00	0.13
J9	JUNCTION	0.12	0.34	236.10	0 04:13	0.30
52	OUTFALL	0.16	0.32	235.82	0 04:47	0.31
O-A1	OUTFALL	0.02	0.06	235.06	0 04:02	0.05

O-A2	OUTFALL	0.03	0.07	235.07	0	04:02	0.06
O-A3	OUTFALL	0.03	0.06	235.06	0	04:02	0.06
OF1	OUTFALL	0.07	0.17	235.91	0	04:06	0.14
8	STORAGE	0.54	1.04	236.80	0	04:38	1.03

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Lateral Time of Max Occurrence days hr:min	Total Inflow Volume 10^6 ltr	Flow Inflow Volume 10^6 ltr	Balance Error Percent
10	JUNCTION	0.423	0.423	0 04:00	3.76	3.76	0.081
14	JUNCTION	0.000	0.190	0 04:01	0	1.54	0.305
18	JUNCTION	0.117	0.190	0 04:00	0.427	0.783	0.180
19	JUNCTION	0.077	0.177	0 04:00	0.218	0.743	0.364
20	JUNCTION	0.000	0.173	0 04:01	0	0.74	0.330
21	JUNCTION	0.077	0.350	0 04:00	0.218	1.4	0.228
22	JUNCTION	0.000	0.354	0 04:01	0	1.4	0.256
23	JUNCTION	0.077	0.527	0 04:00	0.218	1.99	0.202
24	JUNCTION	0.000	0.532	0 04:01	0	1.98	0.122
33	JUNCTION	0.113	0.216	0 04:00	0.384	0.698	0.147
35	JUNCTION	0.109	0.215	0 04:00	0.368	0.619	0.127
48	JUNCTION	0.000	0.400	0 04:06	0	3.72	0.776
56	JUNCTION	0.078	0.802	0 04:02	0.225	2.85	0.346
60	JUNCTION	0.025	0.057	0 04:00	0.132	0.225	1.326
62	JUNCTION	0.000	0.046	0 04:04	0	0.222	0.706
65	JUNCTION	0.032	0.068	0 04:07	0.163	0.384	0.317
69	JUNCTION	0.000	0.070	0 04:09	0	0.383	0.761
71	JUNCTION	0.032	0.090	0 04:12	0.163	0.543	0.291
75	JUNCTION	0.000	0.088	0 04:14	0	0.541	0.967
77	JUNCTION	0.022	0.098	0 04:17	0.111	0.647	0.372
81	JUNCTION	0.118	0.228	0 04:00	0.399	0.643	0.158
CBMH1	JUNCTION	0.000	0.379	0 04:09	0	3.68	0.134
CBMH2	JUNCTION	0.017	0.520	0 04:08	0.05	6.78	0.243
CBMH3	JUNCTION	0.000	0.511	0 04:10	0	6.76	-0.052
DICB1	JUNCTION	0.000	0.375	0 04:07	0	3.69	0.185
J1	JUNCTION	0.000	0.186	0 04:02	0	1.54	0.262
J11	JUNCTION	0.000	0.412	0 04:03	0	3.74	0.310
J12	JUNCTION	0.053	0.053	0 04:00	0.15	0.15	-0.658
J13	JUNCTION	0.297	0.297	0 04:00	3.11	3.11	0.142
J15	JUNCTION	0.000	0.595	0 04:20	0	6.77	0.458
J16	JUNCTION	0.000	0.191	0 04:04	0	1.6	0.230
J17	JUNCTION	0.000	0.420	0 04:00	0	3.76	0.293
J18	JUNCTION	0.000	0.406	0 04:05	0	3.73	0.190
J19	JUNCTION	0.370	0.370	0 04:00	3.96	3.96	0.146

J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
J20	JUNCTION	0.258	0.258	0	04:00	1.71	1.71	0.100
J3	JUNCTION	0.023	0.191	0	04:03	0.0687	1.6	0.180
J4	JUNCTION	0.192	0.192	0	04:00	1.54	1.54	0.099
J5	JUNCTION	0.000	0.411	0	04:01	0	3.75	0.158
J6	JUNCTION	0.000	0.418	0	04:02	0	3.74	0.195
J7	JUNCTION	0.000	0.190	0	04:05	0	1.59	0.228
J8	JUNCTION	0.074	0.074	0	04:00	0.357	0.357	0.137
J9	JUNCTION	0.000	0.251	0	04:39	0	3.06	0.139
52	OUTFALL	0.000	0.529	0	04:47	0	6.74	0.000
O-A1	OUTFALL	0.000	0.254	0	04:02	0	1.71	0.000
O-A2	OUTFALL	0.000	0.372	0	04:02	0	3.95	0.000
O-A3	OUTFALL	0.000	0.299	0	04:02	0	3.11	0.000
OF1	OUTFALL	0.000	0.191	0	04:06	0	1.59	0.000
8	STORAGE	0.034	0.862	0	04:04	0.175	3.66	0.023

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
8	0.551	24.8	0.0	1.7	1.136	51.2	0 04:38	0.253

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CMS	CMS	10^6 ltr
52	93.23	0.178	0.529	6.737
O-A1	99.80	0.042	0.254	1.710
O-A2	99.80	0.097	0.372	3.951
O-A3	99.80	0.077	0.299	3.106
OF1	95.89	0.041	0.191	1.590
System	97.70	0.435	1.337	17.094

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
25	CONDUIT	0.535	0	04:03	1.21	0.18	0.64
27	CONDUIT	0.082	0	04:01	1.72	0.30	0.46
28	CONDUIT	0.173	0	04:01	1.58	0.03	0.26
29	CONDUIT	0.174	0	03:59	1.34	0.03	0.28
30	CONDUIT	0.354	0	04:01	2.25	0.04	0.31
32	CONDUIT	0.532	0	04:01	1.64	0.18	0.54
36	CONDUIT	0.098	0	04:01	1.72	0.27	0.53
47	CONDUIT	0.375	0	04:07	0.90	0.18	0.50
57	CONDUIT	0.799	0	04:03	2.16	0.13	0.47
61	CONDUIT	0.046	0	04:04	0.40	0.03	0.27
64	CONDUIT	0.043	0	04:07	0.29	0.03	0.29
67	CONDUIT	0.070	0	04:09	0.43	0.05	0.31
70	CONDUIT	0.067	0	04:12	0.37	0.04	0.33
74	CONDUIT	0.088	0	04:14	0.41	0.06	0.38
76	CONDUIT	0.084	0	04:18	0.49	0.06	0.32
82	CONDUIT	0.143	0	04:01	1.84	0.40	0.71
C1	CONDUIT	0.000	0	00:00	0.00	0.00	0.13
C10	CONDUIT	0.100	0	04:20	1.29	0.02	0.22
C11	CONDUIT	0.032	0	04:00	0.80	0.00	0.24
C12	CONDUIT	0.359	0	04:01	2.03	0.04	0.33
C13	CONDUIT	0.105	0	04:01	1.21	0.03	0.26
C14	CONDUIT	0.109	0	04:01	1.77	0.01	0.19
C15	CONDUIT	0.113	0	04:01	0.85	0.04	0.37
C16	CONDUIT	0.073	0	04:01	1.00	0.02	0.23
C17	CONDUIT	0.258	0	04:38	1.11	0.23	0.55
C18	CONDUIT	0.511	0	04:10	1.52	1.01	0.57
C19	CONDUIT	0.412	0	04:03	1.91	0.06	0.42
C2	CONDUIT	0.186	0	04:02	1.79	0.02	0.25
C20	CONDUIT	0.406	0	04:05	1.99	0.07	0.35

C21	CONDUIT	0.020	0	04:00	0.38	0.00	0.18
C22	CONDUIT	0.299	0	04:02	10.13	0.00	0.03
C23	CONDUIT	0.595	0	04:20	2.25	1.17	0.44
C24	CONDUIT	0.529	0	04:47	1.33	0.21	0.32
C25	CONDUIT	0.105	0	04:01	1.91	0.32	0.51
C26	CONDUIT	0.190	0	04:05	2.61	0.01	0.21
C27	CONDUIT	0.420	0	04:00	2.50	0.06	0.43
C28	CONDUIT	0.254	0	04:02	9.68	0.00	0.03
C29	CONDUIT	0.372	0	04:02	10.82	0.00	0.04
C3	CONDUIT	0.179	0	04:04	2.76	0.30	0.37
C30	CONDUIT	0.381	0	04:09	1.86	0.72	0.72
C31	CONDUIT	0.379	0	04:09	2.17	0.68	0.61
C4	CONDUIT	0.191	0	04:04	2.54	0.02	0.21
C5	CONDUIT	0.190	0	04:01	2.14	0.02	0.23
C6	CONDUIT	0.411	0	04:01	2.51	0.15	0.43
C7	CONDUIT	0.418	0	04:02	3.99	0.05	0.34
C8	CONDUIT	0.400	0	04:06	1.41	0.05	0.45
C9	CONDUIT	0.191	0	04:06	3.17	0.26	0.35
extraculvert	CONDUIT	0.076	0	04:01	0.97	0.49	0.71
OR1	ORIFICE	0.152	0	04:38			1.00
OR2	ORIFICE	0.064	0	04:39			1.00
W1	WEIR	0.035	0	04:38			0.13

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class							
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
25	4.13	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.96	0.00
27	10.90	0.00	0.00	0.00	0.24	0.76	0.00	0.00	0.97	0.00
28	4.74	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.29	0.00
29	4.81	0.00	0.01	0.00	0.08	0.91	0.00	0.00	0.98	0.00
30	5.52	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.67	0.00
32	4.12	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.66	0.00
36	12.94	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.98	0.00
47	1.07	0.04	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00
57	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
61	4.68	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.69	0.00
64	2.26	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.71	0.00
67	2.12	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.69	0.00
70	1.17	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.72	0.00
74	2.55	0.10	0.00	0.00	0.90	0.00	0.00	0.00	0.80	0.00
76	1.49	0.13	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00
82	12.96	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.98	0.00
C1	1.71	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C10	9.82	0.15	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00
C11	1.69	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.97	0.00
C12	5.52	0.00	0.01	0.00	0.03	0.96	0.00	0.00	0.97	0.00
C13	1.93	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.01	0.00
C14	2.69	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.02	0.00
C15	1.93	0.00	0.00	0.00	0.10	0.90	0.00	0.00	0.79	0.00
C16	1.54	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.04	0.00
C17	5.21	0.06	0.00	0.00	0.88	0.00	0.00	0.06	0.70	0.00
C18	1.37	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C19	7.56	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.94	0.00
C2	7.47	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.03	0.00
C20	3.37	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.02	0.00
C21	1.82	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C22	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C23	4.77	0.00	0.00	0.00	0.43	0.57	0.00	0.00	0.04	0.00
C24	45.65	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C25	12.24	0.00	0.00	0.00	0.61	0.38	0.00	0.00	0.98	0.00
C26	8.66	0.01	0.00	0.00	0.02	0.97	0.00	0.00	0.34	0.00
C27	8.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C28	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C29	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.15	0.00
C3	5.25	0.00	0.01	0.00	0.05	0.93	0.00	0.00	0.96	0.00
C30	1.39	0.11	0.00	0.00	0.77	0.04	0.00	0.08	0.80	0.00
C31	9.31	0.09	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00
C4	1.98	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C5	2.94	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C6	1.39	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C7	14.86	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.84	0.00
C8	1.40	0.03	0.00	0.00	0.93	0.04	0.00	0.00	0.93	0.00
C9	11.73	0.03	0.00	0.00	0.00	0.97	0.00	0.00	0.30	0.00
extraculvert	1.58	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C18	0.01	0.01	0.01	0.01	0.01
C23	0.01	0.01	0.01	0.25	0.01

Analysis begun on: Thu Dec 4 16:55:48 2025
Analysis ended on: Thu Dec 4 16:55:48 2025
Total elapsed time: < 1 sec

1:50-Year, 12-hour Chicago Storm
PCSWMM Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/01/2000 00:00:00
Ending Date 01/01/2000 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:15:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 12
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	4.252	94.217
Evaporation Loss	0.000	0.000
Infiltration Loss	1.726	38.239
Surface Runoff	2.125	47.095
Final Storage	0.409	9.066
Continuity Error (%)	-0.193	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.120	21.196

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.032	20.319
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.006	0.065
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.067	0.666
Continuity Error (%)	0.689	

****
Highest Continuity Errors
****
Node 60 (1.22%)

****
Time-Step Critical Elements
****
Link C23 (24.93%)
Link C24 (6.97%)
Link C18 (4.36%)
Link extraculvert (1.30%)

****
Highest Flow Instability Indexes
****
Link C23 (30)
Link C24 (21)
Link C18 (21)
Link C17 (5)
Link OR2 (1)

****
Most Frequent Nonconverging Nodes
****
Node 52 (3.45%)
Node O-A1 (3.45%)
Node O-A2 (3.45%)
Node O-A3 (3.45%)
Node OF1 (3.45%)

****
Routing Time Step Summary
****

```
Minimum Time Step           :    17.42 sec
Average Time Step           :    28.12 sec
Maximum Time Step           :    30.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.40
% of Steps Not Converging   :     3.45
Time Step Frequencies       :
   30.000 - 13.228 sec      :   100.00 %
   13.228 -  5.833 sec      :     0.00 %
    5.833 -  2.572 sec      :     0.00 %
    2.572 -  1.134 sec      :     0.00 %
    1.134 -  0.500 sec      :     0.00 %


**************************
Subcatchment Runoff Summary
**************************
```

CA	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	94.22	0.00	0.00	36.63	9.31	40.43	49.74	2.02	0.33	0.528
A2	94.22	0.00	0.00	38.66	4.65	40.91	45.57	4.73	0.48	0.484
A3	94.22	0.00	0.00	38.66	4.65	41.06	45.72	3.72	0.39	0.485
B1	94.22	0.00	0.00	40.40	18.63	29.11	47.73	0.42	0.09	0.507
B10	94.22	0.00	0.00	15.15	65.19	11.59	76.78	0.17	0.06	0.815
B11	94.22	0.00	0.00	50.50	0.00	37.40	37.40	0.16	0.04	0.397
B12	94.22	0.00	0.00	50.50	0.00	37.46	37.46	0.20	0.05	0.398
B13	94.22	0.00	0.00	50.50	0.00	37.47	37.47	0.20	0.05	0.398
B14	94.22	0.00	0.00	50.50	0.00	37.47	37.47	0.13	0.03	0.398
B15	94.22	0.00	0.00	50.50	0.00	37.45	37.45	0.21	0.05	0.398
B16	94.22	0.00	0.00	40.13	9.31	35.83	45.15	1.84	0.24	0.479
B17	94.22	0.00	0.00	40.13	9.31	34.09	43.40	4.50	0.51	0.461
B2	94.22	0.00	0.00	32.83	32.60	24.15	56.74	0.49	0.14	0.602
B3	94.22	0.00	0.00	30.30	37.25	22.44	59.70	0.44	0.13	0.634
B4	94.22	0.00	0.00	30.30	37.25	22.47	59.72	0.42	0.13	0.634
B5	94.22	0.00	0.00	30.30	37.25	22.48	59.73	0.46	0.14	0.634
B6	94.22	0.00	0.00	15.15	65.18	11.60	76.78	0.17	0.06	0.815
B7	94.22	0.00	0.00	15.15	65.19	11.59	76.78	0.25	0.09	0.815
B8	94.22	0.00	0.00	15.15	65.19	11.59	76.77	0.25	0.09	0.815
B9	94.22	0.00	0.00	15.15	65.19	11.59	76.77	0.25	0.09	0.815
ra	94.22	0.00	0.00	20.20	55.84	15.09	70.93	0.09	0.03	0.753
rb	94.22	0.00	0.00	20.20	55.86	15.16	71.02	0.06	0.02	0.754
rc	94.22	0.00	0.00	20.20	55.84	15.09	70.92	0.08	0.03	0.753

```
******************
Node Depth Summary
```

****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
10	JUNCTION	0.10	0.21	242.28	0 04:00	0.21
14	JUNCTION	0.10	0.20	240.15	0 04:01	0.20
18	JUNCTION	0.05	0.16	239.18	0 04:00	0.16
19	JUNCTION	0.08	0.20	239.05	0 04:01	0.20
20	JUNCTION	0.08	0.20	238.83	0 03:57	0.20
21	JUNCTION	0.09	0.24	238.64	0 03:59	0.24
22	JUNCTION	0.09	0.24	238.27	0 04:00	0.24
23	JUNCTION	0.10	0.27	237.94	0 04:01	0.27
24	JUNCTION	0.10	0.29	237.80	0 04:02	0.28
33	JUNCTION	0.04	0.17	238.82	0 04:01	0.16
35	JUNCTION	0.04	0.15	238.11	0 04:01	0.15
48	JUNCTION	0.25	0.46	238.05	0 04:07	0.41
56	JUNCTION	0.13	0.38	237.73	0 04:03	0.36
60	JUNCTION	0.08	0.23	238.29	0 04:03	0.21
62	JUNCTION	0.08	0.22	238.19	0 04:07	0.20
65	JUNCTION	0.10	0.27	238.06	0 04:06	0.24
69	JUNCTION	0.10	0.26	237.85	0 04:10	0.25
71	JUNCTION	0.11	0.29	237.52	0 04:12	0.28
75	JUNCTION	0.14	0.35	237.41	0 04:16	0.34
77	JUNCTION	0.07	0.18	236.96	0 04:15	0.18
81	JUNCTION	0.04	0.21	237.86	0 04:01	0.21
CBMH1	JUNCTION	0.71	1.05	236.45	0 04:09	0.95
CBMH2	JUNCTION	0.30	0.64	236.19	0 04:30	0.63
cbmh3	JUNCTION	0.25	0.60	236.11	0 04:36	0.56
DICB1	JUNCTION	0.68	0.98	236.54	0 04:08	0.88
J1	JUNCTION	0.08	0.22	239.93	0 04:03	0.20
J11	JUNCTION	0.15	0.30	239.22	0 04:04	0.28
J12	JUNCTION	0.02	0.08	240.48	0 04:00	0.08
J13	JUNCTION	0.03	0.08	241.08	0 04:01	0.08
J15	JUNCTION	0.18	0.40	235.90	0 04:43	0.37
J16	JUNCTION	0.07	0.15	237.75	0 04:05	0.14
J17	JUNCTION	0.15	0.30	241.19	0 04:01	0.30
J18	JUNCTION	0.13	0.27	238.94	0 04:05	0.26
J19	JUNCTION	0.04	0.09	241.09	0 04:01	0.09
J2	JUNCTION	0.00	0.00	240.21	0 00:00	0.00
J20	JUNCTION	0.02	0.07	241.07	0 04:01	0.07
J3	JUNCTION	0.09	0.19	239.47	0 04:04	0.18
J4	JUNCTION	0.08	0.17	241.77	0 04:00	0.17
J5	JUNCTION	0.10	0.20	240.55	0 04:01	0.20
J6	JUNCTION	0.10	0.20	239.66	0 04:03	0.19
J7	JUNCTION	0.08	0.19	236.28	0 04:06	0.18
J8	JUNCTION	0.06	0.14	239.63	0 04:00	0.14
J9	JUNCTION	0.14	0.42	236.18	0 04:11	0.41

52	OUTFALL	0.17	0.37	235.87	0	04:44	0.34
O-A1	OUTFALL	0.02	0.06	235.06	0	04:02	0.06
O-A2	OUTFALL	0.03	0.08	235.08	0	04:02	0.07
O-A3	OUTFALL	0.03	0.07	235.07	0	04:03	0.07
OF1	OUTFALL	0.08	0.19	235.93	0	04:07	0.16
8	STORAGE	0.58	1.13	236.89	0	04:31	1.13

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Lateral Time of Max Occurrence days hr:min	Total Inflow Volume 10^6 ltr	Flow Inflow Volume 10^6 ltr	Balance Error Percent
10	JUNCTION	0.514	0.514	0 04:00	4.49	4.49	0.074
14	JUNCTION	0.000	0.235	0 04:01	0	1.83	0.280
18	JUNCTION	0.140	0.228	0 04:00	0.492	0.911	0.169
19	JUNCTION	0.088	0.201	0 04:00	0.245	0.842	0.348
20	JUNCTION	0.000	0.198	0 04:01	0	0.839	0.316
21	JUNCTION	0.088	0.400	0 04:00	0.245	1.59	0.218
22	JUNCTION	0.000	0.405	0 04:00	0	1.59	0.247
23	JUNCTION	0.088	0.605	0 04:00	0.245	2.26	0.192
24	JUNCTION	0.000	0.611	0 04:01	0	2.26	0.122
33	JUNCTION	0.134	0.261	0 04:00	0.441	0.818	0.135
35	JUNCTION	0.129	0.262	0 04:00	0.423	0.728	0.109
48	JUNCTION	0.000	0.488	0 04:05	0	4.44	0.710
56	JUNCTION	0.089	0.941	0 04:02	0.253	3.26	0.330
60	JUNCTION	0.036	0.072	0 04:00	0.16	0.265	1.233
62	JUNCTION	0.000	0.059	0 04:04	0	0.262	0.728
65	JUNCTION	0.046	0.089	0 04:06	0.198	0.458	0.250
69	JUNCTION	0.000	0.091	0 04:08	0	0.457	0.744
71	JUNCTION	0.046	0.118	0 04:10	0.198	0.651	0.237
75	JUNCTION	0.000	0.115	0 04:12	0	0.65	0.925
77	JUNCTION	0.031	0.128	0 04:15	0.134	0.778	0.729
81	JUNCTION	0.140	0.280	0 04:00	0.459	0.756	0.157
CBMH1	JUNCTION	0.000	0.463	0 04:08	0	4.4	0.126
CBMH2	JUNCTION	0.019	0.640	0 04:24	0.0567	8.04	0.197
CBMH3	JUNCTION	0.000	0.658	0 04:14	0	8.03	-0.044
DICB1	JUNCTION	0.000	0.457	0 04:07	0	4.41	0.171
J1	JUNCTION	0.000	0.233	0 04:02	0	1.83	0.244
J11	JUNCTION	0.000	0.502	0 04:03	0	4.46	0.286
J12	JUNCTION	0.060	0.060	0 04:00	0.169	0.169	-0.696
J13	JUNCTION	0.387	0.387	0 04:00	3.71	3.71	0.132
J15	JUNCTION	0.000	0.809	0 04:37	0	8.03	0.369
J16	JUNCTION	0.000	0.237	0 04:04	0	1.9	0.213
J17	JUNCTION	0.000	0.508	0 04:00	0	4.49	0.267

J18	JUNCTION	0.000	0.495	0	04:04	0	4.45	0.174
J19	JUNCTION	0.483	0.483	0	04:00	4.72	4.72	0.135
J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
J20	JUNCTION	0.328	0.328	0	04:00	2.02	2.02	0.094
J3	JUNCTION	0.026	0.237	0	04:04	0.0778	1.9	0.166
J4	JUNCTION	0.240	0.240	0	04:00	1.83	1.83	0.089
J5	JUNCTION	0.000	0.498	0	04:01	0	4.48	0.145
J6	JUNCTION	0.000	0.509	0	04:02	0	4.47	0.177
J7	JUNCTION	0.000	0.235	0	04:05	0	1.89	0.221
J8	JUNCTION	0.091	0.091	0	04:00	0.419	0.419	0.128
J9	JUNCTION	0.000	0.337	0	04:31	0	3.59	0.126
52	OUTFALL	0.000	0.725	0	04:44	0	8	0.000
O-A1	OUTFALL	0.000	0.325	0	04:02	0	2.02	0.000
O-A2	OUTFALL	0.000	0.490	0	04:02	0	4.71	0.000
O-A3	OUTFALL	0.000	0.393	0	04:03	0	3.7	0.000
OF1	OUTFALL	0.000	0.235	0	04:07	0	1.89	0.000
8	STORAGE	0.049	1.034	0	04:04	0.213	4.24	-0.035

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
8	0.597	26.9	0.0	1.5	1.257	56.6	0 04:31	0.339

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
52	93.62	0.217	0.725	8.001
O-A1	99.80	0.051	0.325	2.017
O-A2	99.80	0.119	0.490	4.711
O-A3	99.80	0.094	0.393	3.702
OF1	96.16	0.050	0.235	1.888
System	97.84	0.532	1.760	20.319

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
25	CONDUIT	0.615	0 04:03	1.23	0.20	0.68
27	CONDUIT	0.094	0 04:01	1.84	0.35	0.49
28	CONDUIT	0.198	0 04:01	1.63	0.03	0.27
29	CONDUIT	0.198	0 03:59	1.38	0.03	0.30
30	CONDUIT	0.405	0 04:00	2.32	0.05	0.32
32	CONDUIT	0.611	0 04:01	1.69	0.20	0.57
36	CONDUIT	0.113	0 04:02	1.82	0.32	0.57
47	CONDUIT	0.457	0 04:07	0.95	0.22	0.53
57	CONDUIT	0.940	0 04:03	2.25	0.16	0.50
61	CONDUIT	0.059	0 04:04	0.43	0.04	0.29
64	CONDUIT	0.055	0 04:07	0.31	0.04	0.32
67	CONDUIT	0.091	0 04:08	0.46	0.06	0.35
70	CONDUIT	0.088	0 04:11	0.40	0.06	0.36
74	CONDUIT	0.115	0 04:12	0.44	0.08	0.42
76	CONDUIT	0.110	0 04:16	0.53	0.07	0.35
82	CONDUIT	0.174	0 04:02	1.99	0.48	0.78
C1	CONDUIT	0.000	0 00:00	0.00	0.00	0.14
C10	CONDUIT	0.131	0 04:17	1.38	0.02	0.24
C11	CONDUIT	0.037	0 04:00	0.80	0.01	0.26
C12	CONDUIT	0.412	0 04:01	2.09	0.05	0.34
C13	CONDUIT	0.131	0 04:01	1.27	0.03	0.28
C14	CONDUIT	0.138	0 04:01	1.87	0.02	0.21
C15	CONDUIT	0.145	0 04:01	0.86	0.06	0.41
C16	CONDUIT	0.089	0 04:00	1.04	0.02	0.25
C17	CONDUIT	0.357	0 04:34	1.19	0.32	0.67
C18	CONDUIT	0.658	0 04:14	1.61	1.30	0.68
C19	CONDUIT	0.502	0 04:03	1.99	0.07	0.45

C2	CONDUIT	0.233	0	04:02	1.83	0.03	0.28
C20	CONDUIT	0.495	0	04:04	2.09	0.08	0.37
C21	CONDUIT	0.023	0	04:00	0.39	0.00	0.19
C22	CONDUIT	0.393	0	04:03	11.10	0.00	0.04
C23	CONDUIT	0.809	0	04:37	2.47	1.60	0.52
C24	CONDUIT	0.725	0	04:44	1.42	0.28	0.38
C25	CONDUIT	0.121	0	04:01	2.05	0.37	0.54
C26	CONDUIT	0.235	0	04:05	2.66	0.01	0.23
C27	CONDUIT	0.508	0	04:00	2.62	0.07	0.46
C28	CONDUIT	0.325	0	04:02	10.42	0.00	0.03
C29	CONDUIT	0.490	0	04:02	11.86	0.00	0.04
C3	CONDUIT	0.224	0	04:04	3.01	0.38	0.41
C30	CONDUIT	0.463	0	04:09	1.96	0.88	0.82
C31	CONDUIT	0.463	0	04:08	2.25	0.83	0.70
C4	CONDUIT	0.237	0	04:04	2.69	0.02	0.23
C5	CONDUIT	0.235	0	04:01	2.25	0.02	0.25
C6	CONDUIT	0.498	0	04:01	2.64	0.18	0.46
C7	CONDUIT	0.509	0	04:02	4.19	0.07	0.37
C8	CONDUIT	0.488	0	04:05	1.49	0.06	0.48
C9	CONDUIT	0.235	0	04:07	3.35	0.32	0.39
extraculvert	CONDUIT	0.096	0	04:01	1.07	0.61	0.78
OR1	ORIFICE	0.175	0	04:31			1.00
OR2	ORIFICE	0.064	0	04:43			1.00
W1	WEIR	0.099	0	04:31			0.25

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class							
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
25	4.13	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.95	0.00
27	10.90	0.00	0.00	0.00	0.23	0.77	0.00	0.00	0.97	0.00
28	4.74	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.29	0.00
29	4.81	0.00	0.01	0.00	0.08	0.91	0.00	0.00	0.97	0.00
30	5.52	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.67	0.00
32	4.12	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.66	0.00
36	12.94	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.98	0.00
47	1.07	0.04	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00
57	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
61	4.68	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.69	0.00
64	2.26	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.72	0.00
67	2.12	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.70	0.00
70	1.17	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.73	0.00
74	2.55	0.10	0.00	0.00	0.90	0.00	0.00	0.00	0.81	0.00
76	1.49	0.12	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.00

82	12.96	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.97	0.00
C1	1.71	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	9.82	0.14	0.00	0.00	0.00	0.05	0.00	0.81	0.01	0.00
C11	1.69	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.97	0.00
C12	5.52	0.00	0.01	0.00	0.03	0.96	0.00	0.00	0.97	0.00
C13	1.93	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.01	0.00
C14	2.69	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.02	0.00
C15	1.93	0.00	0.00	0.00	0.10	0.90	0.00	0.00	0.94	0.00
C16	1.54	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.05	0.00
C17	5.21	0.05	0.00	0.00	0.89	0.00	0.00	0.06	0.66	0.00
C18	1.37	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C19	7.56	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.95	0.00
C2	7.47	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.10	0.00
C20	3.37	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.03	0.00
C21	1.82	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C22	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C23	4.77	0.00	0.00	0.00	0.43	0.56	0.00	0.00	0.04	0.00
C24	45.65	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C25	12.24	0.00	0.00	0.00	0.52	0.48	0.00	0.00	0.98	0.00
C26	8.66	0.01	0.00	0.00	0.01	0.97	0.00	0.00	0.40	0.00
C27	8.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C28	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C29	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.14	0.00
C3	5.25	0.00	0.01	0.00	0.04	0.95	0.00	0.00	0.93	0.00
C30	1.39	0.10	0.00	0.00	0.79	0.04	0.00	0.07	0.81	0.00
C31	9.31	0.09	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00
C4	1.98	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C5	2.94	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C6	1.39	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C7	14.86	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.85	0.00
C8	1.40	0.03	0.00	0.00	0.93	0.04	0.00	0.00	0.93	0.00
C9	11.73	0.03	0.00	0.00	0.00	0.97	0.00	0.00	0.35	0.00
extraculvert	1.58	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
82	0.01	0.01	0.02	0.01	0.01
C18	0.01	0.01	0.01	1.02	0.01
C23	0.01	0.01	0.01	0.90	0.01
extraculvert	0.01	0.01	0.02	0.01	0.01

```
Analysis begun on:  Fri Dec  5 08:46:56 2025
Analysis ended on:  Fri Dec  5 08:46:56 2025
Total elapsed time: < 1 sec
```

1:100-Year, 12-hour Chicago Storm
PCSWMM Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

  ****
  Analysis Options
  ****
  Flow Units ..... CMS
  Process Models:
    Rainfall/Runoff ..... YES
    RDII ..... NO
    Snowmelt ..... NO
    Groundwater ..... NO
    Flow Routing ..... YES
    Ponding Allowed ..... NO
    Water Quality ..... NO
  Infiltration Method ..... CURVE_NUMBER
  Flow Routing Method ..... DYNWAVE
  Surcharge Method ..... EXTRAN
  Starting Date 01/01/2000 00:00:00
  Ending Date 01/01/2000 12:00:00
  Antecedent Dry Days 0.0
  Report Time Step 00:15:00
  Wet Time Step 00:05:00
  Dry Time Step 01:00:00
  Routing Time Step ..... 30.00 sec
  Variable Time Step ..... YES
  Maximum Trials 8
  Number of Threads 12
  Head Tolerance ..... 0.001500 m

  *************************   Volume   Depth
  Runoff Quantity Continuity   hectare-m   mm
  *************************   ---------   -------
  Total Precipitation 4.681   103.723
  Evaporation Loss 0.000   0.000
  Infiltration Loss 1.802   39.933
  Surface Runoff 2.465   54.612
  Final Storage 0.424   9.385
  Continuity Error (%) .....   -0.199

  *************************   Volume   Volume
  Flow Routing Continuity   hectare-m   10^6 ltr
  *************************   ---------   ---------
  Dry Weather Inflow 0.000   0.000
  Wet Weather Inflow 2.458   24.578

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.365	23.654
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.007	0.066
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.070	0.705
Continuity Error (%)	0.626	

****
Highest Continuity Errors
****
Node 60 (1.14%)

****
Time-Step Critical Elements
****
Link C23 (27.53%)
Link C24 (6.93%)
Link C18 (5.59%)
Link extraculvert (1.65%)
Link C30 (1.59%)

****
Highest Flow Instability Indexes
****
Link C23 (35)
Link C24 (24)
Link C18 (23)
Link C17 (7)
Link OR2 (3)

****
Most Frequent Nonconverging Nodes
****
Node cbmh3 (3.75%)
Node 52 (3.75%)
Node O-A1 (3.75%)
Node O-A2 (3.75%)
Node O-A3 (3.75%)

****
Routing Time Step Summary

****

Minimum Time Step	: 10.55 sec
Average Time Step	: 27.46 sec
Maximum Time Step	: 30.00 sec
% of Time in Steady State	: 0.00
Average Iterations per Step	: 2.48
% of Steps Not Converging	: 3.75
Time Step Frequencies	:
30.000 - 13.228 sec	: 99.94 %
13.228 - 5.833 sec	: 0.06 %
5.833 - 2.572 sec	: 0.00 %
2.572 - 1.134 sec	: 0.00 %
1.134 - 0.500 sec	: 0.00 %

****

Subcatchment Runoff Summary

****

CA	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	103.72	0.00	0.00	38.14	10.26	47.25	57.51	2.34	0.41	0.554
A2	103.72	0.00	0.00	40.26	5.13	48.00	53.13	5.51	0.61	0.512
A3	103.72	0.00	0.00	40.26	5.13	48.16	53.29	4.33	0.49	0.514
B1	103.72	0.00	0.00	42.49	20.53	34.49	55.02	0.48	0.11	0.530
B10	103.72	0.00	0.00	15.93	71.84	13.68	85.52	0.19	0.07	0.825
B11	103.72	0.00	0.00	53.11	0.00	44.22	44.22	0.19	0.05	0.426
B12	103.72	0.00	0.00	53.11	0.00	44.29	44.29	0.23	0.06	0.427
B13	103.72	0.00	0.00	53.11	0.00	44.31	44.31	0.23	0.06	0.427
B14	103.72	0.00	0.00	53.11	0.00	44.30	44.30	0.16	0.04	0.427
B15	103.72	0.00	0.00	53.11	0.00	44.28	44.28	0.25	0.06	0.427
B16	103.72	0.00	0.00	41.95	10.26	42.26	52.53	2.14	0.29	0.506
B17	103.72	0.00	0.00	41.95	10.26	40.40	50.66	5.26	0.62	0.488
B2	103.72	0.00	0.00	34.52	35.93	28.57	64.49	0.56	0.16	0.622
B3	103.72	0.00	0.00	31.87	41.06	26.54	67.60	0.50	0.16	0.652
B4	103.72	0.00	0.00	31.87	41.06	26.57	67.63	0.48	0.15	0.652
B5	103.72	0.00	0.00	31.87	41.06	26.58	67.63	0.52	0.16	0.652
B6	103.72	0.00	0.00	15.93	71.84	13.68	85.52	0.19	0.07	0.825
B7	103.72	0.00	0.00	15.93	71.84	13.68	85.52	0.27	0.10	0.824
B8	103.72	0.00	0.00	15.93	71.84	13.67	85.52	0.27	0.10	0.824
B9	103.72	0.00	0.00	15.93	71.84	13.67	85.52	0.27	0.10	0.824
ra	103.72	0.00	0.00	21.25	61.55	17.83	79.38	0.10	0.03	0.765
rb	103.72	0.00	0.00	21.25	61.57	17.91	79.48	0.06	0.02	0.766
rc	103.72	0.00	0.00	21.25	61.55	17.83	79.38	0.09	0.03	0.765

****

Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
10	JUNCTION	0.11	0.22	242.29	0 04:00	0.22
14	JUNCTION	0.10	0.22	240.17	0 04:01	0.21
18	JUNCTION	0.06	0.17	239.19	0 04:00	0.17
19	JUNCTION	0.08	0.21	239.06	0 04:00	0.21
20	JUNCTION	0.08	0.21	238.84	0 03:57	0.21
21	JUNCTION	0.09	0.25	238.65	0 03:58	0.25
22	JUNCTION	0.09	0.25	238.29	0 04:00	0.25
23	JUNCTION	0.10	0.29	237.95	0 04:00	0.29
24	JUNCTION	0.10	0.31	237.81	0 04:02	0.30
33	JUNCTION	0.05	0.18	238.83	0 04:00	0.18
35	JUNCTION	0.04	0.16	238.12	0 04:01	0.16
48	JUNCTION	0.26	0.49	238.08	0 04:07	0.44
56	JUNCTION	0.14	0.40	237.75	0 04:02	0.38
60	JUNCTION	0.09	0.24	238.31	0 04:03	0.23
62	JUNCTION	0.09	0.24	238.21	0 04:06	0.21
65	JUNCTION	0.11	0.29	238.08	0 04:05	0.26
69	JUNCTION	0.11	0.28	237.87	0 04:09	0.27
71	JUNCTION	0.12	0.31	237.54	0 04:10	0.31
75	JUNCTION	0.15	0.38	237.44	0 04:14	0.38
77	JUNCTION	0.08	0.20	236.99	0 04:19	0.20
81	JUNCTION	0.05	0.24	237.89	0 04:01	0.23
CBMH1	JUNCTION	0.73	1.15	236.55	0 04:08	1.06
CBMH2	JUNCTION	0.33	0.73	236.28	0 04:34	0.72
cbmh3	JUNCTION	0.28	0.69	236.21	0 04:33	0.60
DICB1	JUNCTION	0.70	1.06	236.62	0 04:08	0.95
J1	JUNCTION	0.09	0.24	239.95	0 04:03	0.22
J11	JUNCTION	0.16	0.32	239.24	0 04:04	0.29
J12	JUNCTION	0.03	0.08	240.48	0 04:00	0.08
J13	JUNCTION	0.04	0.09	241.09	0 04:01	0.09
J15	JUNCTION	0.20	0.43	235.93	0 04:34	0.41
J16	JUNCTION	0.08	0.16	237.76	0 04:05	0.15
J17	JUNCTION	0.17	0.32	241.21	0 04:01	0.32
J18	JUNCTION	0.14	0.29	238.96	0 04:05	0.27
J19	JUNCTION	0.04	0.10	241.10	0 04:01	0.10
J2	JUNCTION	0.00	0.00	240.21	0 00:00	0.00
J20	JUNCTION	0.03	0.08	241.08	0 04:01	0.08
J3	JUNCTION	0.10	0.21	239.49	0 04:04	0.20
J4	JUNCTION	0.09	0.19	241.79	0 04:00	0.19
J5	JUNCTION	0.11	0.22	240.57	0 04:02	0.21
J6	JUNCTION	0.11	0.22	239.68	0 04:03	0.21
J7	JUNCTION	0.08	0.22	236.31	0 04:06	0.20
J8	JUNCTION	0.06	0.15	239.64	0 04:00	0.15

J9	JUNCTION	0.17	0.53	236.29	0	04:14	0.53
52	OUTFALL	0.19	0.40	235.90	0	04:14	0.40
O-A1	OUTFALL	0.03	0.07	235.07	0	04:02	0.07
O-A2	OUTFALL	0.04	0.09	235.09	0	04:03	0.08
O-A3	OUTFALL	0.03	0.08	235.08	0	04:03	0.07
OF1	OUTFALL	0.08	0.22	235.96	0	04:07	0.18
8	STORAGE	0.61	1.21	236.97	0	04:27	1.21

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Lateral Time of Max Occurrence days hr:min	Total Inflow Volume 10^6 ltr	Flow Inflow Volume 10^6 ltr	Balance Error Percent
10	JUNCTION	0.616	0.616	0 04:00	5.24	5.24	0.066
14	JUNCTION	0.000	0.290	0 04:00	0	2.13	0.262
18	JUNCTION	0.164	0.271	0 04:00	0.559	1.04	0.160
19	JUNCTION	0.098	0.227	0 04:00	0.273	0.941	0.335
20	JUNCTION	0.000	0.223	0 04:01	0	0.937	0.310
21	JUNCTION	0.098	0.451	0 04:00	0.273	1.79	0.209
22	JUNCTION	0.000	0.457	0 04:00	0	1.78	0.241
23	JUNCTION	0.098	0.685	0 04:00	0.273	2.54	0.182
24	JUNCTION	0.000	0.692	0 04:02	0	2.53	0.120
33	JUNCTION	0.156	0.312	0 04:00	0.499	0.943	0.127
35	JUNCTION	0.150	0.316	0 04:00	0.479	0.843	0.091
48	JUNCTION	0.000	0.589	0 04:05	0	5.19	0.651
56	JUNCTION	0.099	1.088	0 04:02	0.283	3.68	0.316
60	JUNCTION	0.047	0.088	0 04:00	0.19	0.306	1.154
62	JUNCTION	0.000	0.073	0 04:04	0	0.303	0.736
65	JUNCTION	0.060	0.112	0 04:04	0.234	0.534	0.193
69	JUNCTION	0.000	0.115	0 04:07	0	0.533	0.724
71	JUNCTION	0.061	0.149	0 04:08	0.234	0.764	0.193
75	JUNCTION	0.000	0.146	0 04:11	0	0.762	0.875
77	JUNCTION	0.041	0.162	0 04:14	0.159	0.914	0.894
81	JUNCTION	0.163	0.341	0 04:00	0.519	0.876	0.155
CBMH1	JUNCTION	0.000	0.554	0 04:08	0	5.14	0.050
CBMH2	JUNCTION	0.022	0.822	0 04:16	0.0634	9.36	0.183
CBMH3	JUNCTION	0.000	0.841	0 04:16	0	9.34	-0.161
DICB1	JUNCTION	0.000	0.551	0 04:07	0	5.16	0.257
J1	JUNCTION	0.000	0.287	0 04:02	0	2.12	0.233
J11	JUNCTION	0.000	0.606	0 04:03	0	5.21	0.269
J12	JUNCTION	0.067	0.067	0 04:00	0.188	0.188	-0.726
J13	JUNCTION	0.490	0.490	0 04:00	4.32	4.32	0.121
J15	JUNCTION	0.000	1.006	0 04:34	0	9.36	0.405
J16	JUNCTION	0.000	0.289	0 04:05	0	2.2	0.199

J17	JUNCTION	0.000	0.612	0	04:00	0	5.24	0.250
J18	JUNCTION	0.000	0.599	0	04:04	0	5.2	0.162
J19	JUNCTION	0.610	0.610	0	04:00	5.5	5.5	0.123
J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000
J20	JUNCTION	0.407	0.407	0	04:00	2.33	2.33	0.084
J3	JUNCTION	0.029	0.289	0	04:04	0.087	2.21	0.155
J4	JUNCTION	0.294	0.294	0	04:00	2.13	2.13	0.078
J5	JUNCTION	0.000	0.600	0	04:01	0	5.23	0.135
J6	JUNCTION	0.000	0.614	0	04:02	0	5.22	0.163
J7	JUNCTION	0.000	0.286	0	04:05	0	2.2	0.212
J8	JUNCTION	0.110	0.110	0	04:00	0.483	0.483	0.116
J9	JUNCTION	0.000	0.433	0	04:27	0	4.16	0.116
52	OUTFALL	0.000	0.898	0	04:14	0	9.32	0.000
O-A1	OUTFALL	0.000	0.404	0	04:02	0	2.33	0.000
O-A2	OUTFALL	0.000	0.626	0	04:03	0	5.49	0.000
O-A3	OUTFALL	0.000	0.504	0	04:03	0	4.32	0.000
OF1	OUTFALL	0.000	0.286	0	04:07	0	2.19	0.000
8	STORAGE	0.065	1.221	0	04:04	0.252	4.83	-0.081

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
8	0.642	28.9	0.0	1.4	1.375	62.0	0 04:27	0.435

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
52	94.09	0.260	0.898	9.317
O-A1	99.81	0.062	0.404	2.332
O-A2	99.87	0.144	0.626	5.494
O-A3	99.81	0.114	0.504	4.316
OF1	96.38	0.060	0.286	2.195
System	97.99	0.640	2.276	23.654

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
25	CONDUIT	0.697	0	04:03	1.25	0.23	0.72
27	CONDUIT	0.108	0	04:02	1.95	0.40	0.52
28	CONDUIT	0.223	0	04:01	1.69	0.03	0.28
29	CONDUIT	0.223	0	03:59	1.43	0.03	0.31
30	CONDUIT	0.457	0	04:00	2.39	0.05	0.34
32	CONDUIT	0.692	0	04:02	1.73	0.23	0.61
36	CONDUIT	0.130	0	04:02	1.94	0.36	0.60
47	CONDUIT	0.551	0	04:07	1.00	0.27	0.57
57	CONDUIT	1.090	0	04:03	2.33	0.18	0.53
61	CONDUIT	0.073	0	04:04	0.45	0.05	0.32
64	CONDUIT	0.068	0	04:06	0.33	0.05	0.35
67	CONDUIT	0.115	0	04:07	0.49	0.08	0.38
70	CONDUIT	0.110	0	04:09	0.42	0.07	0.40
74	CONDUIT	0.146	0	04:11	0.47	0.10	0.46
76	CONDUIT	0.140	0	04:14	0.57	0.09	0.38
82	CONDUIT	0.208	0	04:02	2.16	0.58	0.82
C1	CONDUIT	0.000	0	00:00	0.00	0.00	0.16
C10	CONDUIT	0.162	0	04:14	1.40	0.03	0.31
C11	CONDUIT	0.041	0	04:00	0.79	0.01	0.28
C12	CONDUIT	0.465	0	04:00	2.15	0.06	0.36
C13	CONDUIT	0.160	0	04:01	1.33	0.04	0.30
C14	CONDUIT	0.171	0	04:01	1.97	0.02	0.23
C15	CONDUIT	0.182	0	04:01	0.87	0.07	0.46
C16	CONDUIT	0.108	0	04:00	1.09	0.03	0.27
C17	CONDUIT	0.445	0	04:26	1.22	0.40	0.81
C18	CONDUIT	0.841	0	04:16	1.73	1.67	0.78

C19	CONDUIT	0.606	0	04:03	2.08	0.09	0.49
C2	CONDUIT	0.287	0	04:02	1.86	0.04	0.30
C20	CONDUIT	0.599	0	04:04	2.20	0.10	0.40
C21	CONDUIT	0.026	0	04:00	0.41	0.00	0.20
C22	CONDUIT	0.504	0	04:03	12.01	0.00	0.04
C23	CONDUIT	1.006	0	04:34	2.68	1.98	0.59
C24	CONDUIT	0.898	0	04:14	1.52	0.35	0.41
C25	CONDUIT	0.138	0	04:02	2.18	0.42	0.57
C26	CONDUIT	0.286	0	04:05	2.70	0.02	0.25
C27	CONDUIT	0.612	0	04:00	2.76	0.09	0.49
C28	CONDUIT	0.404	0	04:02	11.15	0.00	0.04
C29	CONDUIT	0.626	0	04:03	12.74	0.00	0.05
C3	CONDUIT	0.275	0	04:04	3.24	0.47	0.45
C30	CONDUIT	0.546	0	04:09	2.05	1.04	0.95
C31	CONDUIT	0.554	0	04:08	2.23	0.99	0.82
C4	CONDUIT	0.289	0	04:05	2.83	0.03	0.25
C5	CONDUIT	0.290	0	04:00	2.36	0.03	0.27
C6	CONDUIT	0.600	0	04:01	2.77	0.22	0.49
C7	CONDUIT	0.614	0	04:02	4.39	0.08	0.39
C8	CONDUIT	0.589	0	04:05	1.57	0.08	0.52
C9	CONDUIT	0.286	0	04:07	3.53	0.39	0.43
extraculvert	CONDUIT	0.117	0	04:01	1.20	0.75	0.82
OR1	ORIFICE	0.194	0	04:27			1.00
OR2	ORIFICE	0.063	0	04:23			1.00
W1	WEIR	0.176	0	04:27			0.37

****
Flow Classification Summary
****

	Adjusted	---------- Fraction of Time in Flow Class ----------							
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
25	4.13	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.93	0.00
27	10.90	0.00	0.00	0.00	0.21	0.78	0.00	0.00	0.96	0.00
28	4.74	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.30	0.00
29	4.81	0.00	0.01	0.00	0.07	0.92	0.00	0.00	0.97	0.00
30	5.52	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.67	0.00
32	4.12	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.66	0.00
36	12.94	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.98	0.00
47	1.07	0.04	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00
57	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
61	4.68	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.69	0.00
64	2.26	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.72	0.00
67	2.12	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.70	0.00
70	1.17	0.07	0.00	0.00	0.93	0.00	0.00	0.00	0.73	0.00
74	2.55	0.09	0.00	0.00	0.91	0.00	0.00	0.00	0.81	0.00

76	1.49	0.11	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.00
82	12.96	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.97	0.00
C1	1.71	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	9.82	0.13	0.00	0.00	0.06	0.02	0.00	0.78	0.01	0.00
C11	1.69	0.00	0.00	0.00	0.96	0.03	0.00	0.00	0.98	0.00
C12	5.52	0.00	0.01	0.00	0.03	0.96	0.00	0.00	0.97	0.00
C13	1.93	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.01	0.00
C14	2.69	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.02	0.00
C15	1.93	0.00	0.00	0.00	0.09	0.91	0.00	0.00	0.95	0.00
C16	1.54	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.05	0.00
C17	5.21	0.05	0.00	0.00	0.89	0.00	0.00	0.05	0.63	0.00
C18	1.37	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C19	7.56	0.02	0.00	0.00	0.01	0.98	0.00	0.00	0.94	0.00
C2	7.47	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.13	0.00
C20	3.37	0.02	0.00	0.00	0.01	0.97	0.00	0.00	0.11	0.00
C21	1.82	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C22	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.16	0.00
C23	4.77	0.00	0.00	0.00	0.44	0.55	0.00	0.00	0.05	0.00
C24	45.65	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C25	12.24	0.00	0.00	0.00	0.43	0.57	0.00	0.00	0.98	0.00
C26	8.66	0.01	0.00	0.00	0.01	0.97	0.00	0.00	0.46	0.00
C27	8.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C28	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.16	0.00
C29	176.97	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.12	0.00
C3	5.25	0.00	0.01	0.00	0.03	0.96	0.00	0.00	0.91	0.00
C30	1.39	0.10	0.00	0.00	0.81	0.03	0.00	0.06	0.77	0.00
C31	9.31	0.09	0.00	0.00	0.00	0.02	0.00	0.89	0.01	0.00
C4	1.98	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C5	2.94	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.97	0.00
C6	1.39	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.00	0.00
C7	14.86	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.86	0.00
C8	1.40	0.03	0.00	0.00	0.92	0.05	0.00	0.00	0.93	0.00
C9	11.73	0.03	0.00	0.00	0.00	0.97	0.00	0.00	0.36	0.00
extraculvert	1.58	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
82	0.01	0.01	0.11	0.01	0.01
C18	0.01	0.01	0.01	1.39	0.01
C23	0.01	0.01	0.01	1.34	0.01
C30	0.01	0.01	0.77	0.05	0.01
extraculvert	0.01	0.01	0.11	0.01	0.01

```
Analysis begun on:  Fri Dec  5 09:22:27 2025
Analysis ended on:  Fri Dec  5 09:22:27 2025
Total elapsed time: < 1 sec
```