
**30 SHAFTSBURY DRIVE, KITCHENER
HOPE LUTHERAN CHURCH
FUNCTIONAL SERVICING &
STORMWATER MANAGEMENT REPORT**

COOK HOMES

ZONING BY-LAW AMENDMENT
OFFICIAL PLAN AMENDMENT
SUBMISSION

Project No.: 2025-0580-10

December 2, 2025

WALTERFEDY

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FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT 30 Shaftsbury Drive, Kitchener

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1.0 INTRODUCTION

WalterFedy Inc. has been retained by Cook Homes to provide civil engineering consulting services in support of an Official Plan and Zoning By-law Amendment for the redevelopment of the lands at 30 Shaftsbury Drive in Kitchener.

The purpose of this functional servicing and stormwater management report is to identify how the development will be serviced, including water, sanitary, and storm connections to the existing municipal infrastructure. The report will discuss existing boundary servicing conditions and the availability in the municipal system to accommodate the development. Preliminary stormwater management design has been included, demonstrating consistency with the City of Kitchener, Region of Waterloo, and Grand River Conservation Authority (GRCA) guidelines and criteria.

1.1 Background

The 0.847 ha Site is located in Kitchener, Ontario, at 30 Shaftsbury Drive. The lands are situated next to an established residential area and are bounded by existing neighbourhoods to the west, south, and east, and commercial lands to the north. Access to the Site is currently provided via Ebydale Drive and Oldfield Drive, with existing municipal road connections supporting future development opportunities. The Site is currently occupied by Hope Lutheran Church, which operated as a place of worship and community gathering facility. The existing development consists of a single-storey institutional building with associated surface parking and landscaped open space areas.

A zone change application will be required to permit the uses of the proposed residential development. Please refer to Appendix A for the development concept.

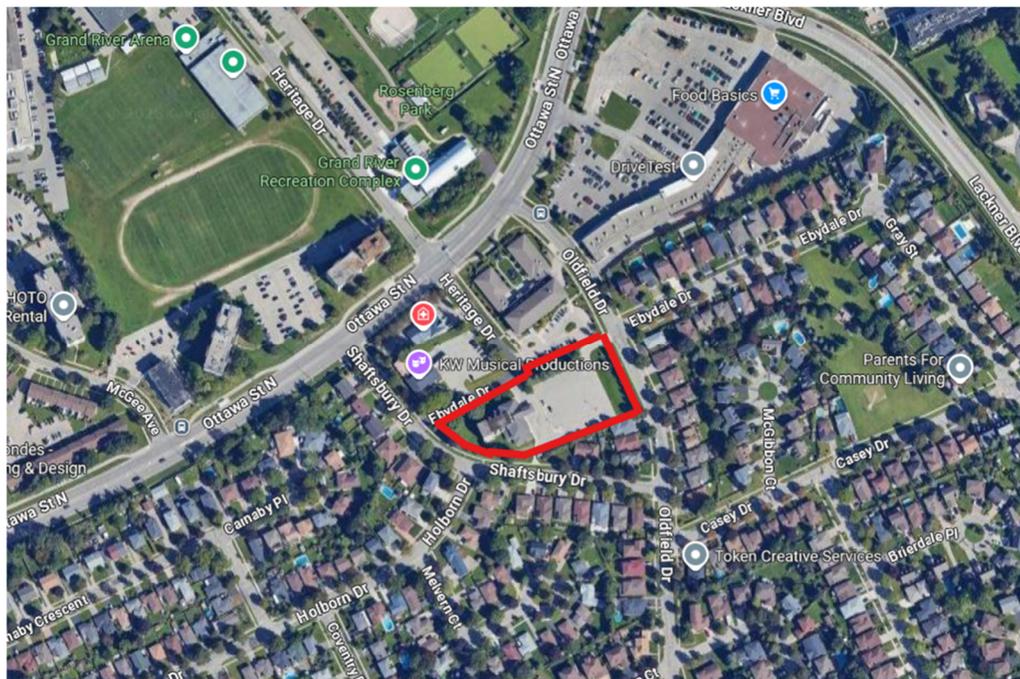


Figure 1: Site Location

1.2 Reference Reports and Drawings

In the preparation of this functional servicing and stormwater management report, the following reports/drawings were referenced:

1. *Design Guidelines and Supplemental Specifications for Municipal Services* (DGSSMS), Region of Waterloo and Area Municipalities, January 2025
2. *Site Plan Engineering Guidelines*, City of Kitchener, Engineering Division, January 2025
3. *City of Kitchener Development Manual*, City of Kitchener, Summer 2021
4. *Stormwater Management Planning and Design Manual*, Ministry of the Environment, Conservation and Parks (MECP), 2003
5. *Design Guidelines for Drinking-Water Systems*, Ministry of the Environment, Conservation and Parks, 2016
6. *Design Guidelines for Sewage Works*, Ministry of the Environment, Conservation and Parks, 2016
7. *Development Concept* MHBC, June 2025
8. *City of Kitchener Infrastructure Mapping*, City of Kitchener, accessed November 2025

2.0 EXISTING INFORMATION

2.1 Existing Topography and Land Use

The site is currently occupied by the Hope Lutheran Church, which operates as a place of worship and community gathering facility. Most of the property consists of a surface parking area with limited landscaped sections. Existing topography indicates a local high point near the church building, with surface drainage directed toward an on-site catch basin located in the south-west portion of the site. Excess stormwater is conveyed via overland flow toward Ebydale Drive. The site is located outside of GRCA regulation limits.

2.2 Geotechnical and Hydrogeological Conditions

Based on available background information and regional mapping, the subsurface conditions at 30 Shaftsbury Drive are expected to consist primarily of diamicton (glacial till), characterized by a dense mixture of clay, silt, sand, and gravel. This material generally exhibits low permeability and provides good bearing capacity for foundations, though it may limit opportunities for on-site infiltration. Bedrock in the area is anticipated to comprise dolostone of the Guelph Formation at moderate depth. Groundwater levels are expected to fluctuate seasonally but are typically found within the overburden above the bedrock interface. Overall, the site conditions are expected to be suitable for typical urban development with standard foundation and drainage design considerations. The geotechnical and hydrogeological conditions will be reviewed and confirmed once a site-subsurface investigation has been completed.

2.3 Existing Servicing and Utilities

Information on existing municipal infrastructure and utilities within and adjacent to the site was obtained from available record drawings, previous topographic surveys, and the City of Kitchener's online infrastructure mapping resources. This information was reviewed to identify the location and type of existing water, sanitary, and storm services, as well as other utilities that may influence the proposed development. The local municipal networks available to service the proposed development are summarized below

Utility information collected from various sources is provided in Appendix A.

2.3.1 Water Servicing

The municipal water supply in the area is provided by a 300 mm diameter ductile iron (DI) watermain located on the south side of Shaftsbury Drive. This watermain is fed by connections to the 200 mm diameter watermain at Oldfield Drive, located southeast of the site and the 600 mm-diameter watermain on Ottawa Street North. This local watermain network forms part of the City of Kitchener's municipal distribution system, providing adequate fire protection and domestic water supply to surrounding residential and institutional uses. A 750mm watermain also runs through the north-east corner of the site, continuing north within the Heritage Drive right away to Ottawa Street North.

The existing Hope Lutheran Church is serviced by a single water connection branching from the 300mm watermain to supply potable water to the building. Fire protection is provided by the existing hydrant located adjacent to the site. East of the intersection of Shaftsbury Drive and Holborn Drive.

2.3.2 Sanitary Servicing

The Site is currently serviced by a municipal sanitary sewer located within the Shaftsbury Drive right-of-way. The existing sanitary sewer is a 200 mm diameter PVC pipe running along the south side of Shaftsbury Drive, and a 250 mm diameter PVC pipe running along the west side. A service connection extends from each main toward the church property, providing sanitary service to the site. The sanitary system in the area ultimately conveys flows westward toward the municipal trunk system.

2.3.3 Storm Servicing

Storm runoff from the site is captured with a private catch basin and conveyed by the private storm network to the 450 mm diameter storm sewer located near the south-east corner of the property. Runoff in the 450 mm diameter pipe continues flowing southerly along Oldfield drive. Flow in the Oldfield storm sewer is conveyed south along Oldfield Drive to Edenbridge Drive, continuing west on Edenbridge Drive and outletting to the Springmount Park Natural Area. The northern portion of the site surface drains towards Ebydale Drive where it is captured via double-catch basins located in the municipal right-of-way.

3.0 REVIEW AGENCIES

3.1 City of Kitchener

The City of Kitchener will be responsible for the review and approval of the Draft Site Plan, as well as preliminary servicing, grading, and SWM designs for the overall development.

3.2 Region of Waterloo

The Region of Waterloo will be responsible for the review and approval of the Draft Site Plan as it relates to servicing and tying into Regional infrastructure.

3.3 Grand River Conservation Authority (GRCA)

The Grand River Conservation Authority (GRCA) will provide technical review and comments on matters related to natural hazards and watershed management. Formal approval of site plans and servicing designs will rest with the Township and Region.

3.4 Other Utilities

The development will require review by other utility providers for the supply and installation of services including, but not limited to, hydro, gas, and telecommunications (cable and fiber). As such, drawings will be

circulated to relevant agencies for their comment during detailed design.

4.0 PROPOSED PHASING AND DEVELOPMENT STRATEGY

Utilizing the proposed Site Concept Plan and survey information, WalterFedy has prepared preliminary grading and servicing plans for the property. The proponent intends to redevelop the lands into a residential infill project, consistent with the surrounding neighbourhood. The proposed development concept includes 6 townhouse units, a 6-storey apartment building with 82 units, associated surface parking, and landscaped space. Block A is the 6-storey apartment building, and Block B consists of the 2 storey townhouses.

A preliminary sanitary and watermain flow calculations are summarized below with calculations are provided in the appendices to support further design and municipal review. A preliminary Grading Plan has also been included in Appendix E addressing existing constraints, and providing a major overland flow route, ensuring runoff from the site is captured and conveyed to a suitable outlet for both minor and major events.

5.0 SOURCE WATER PROTECTION

According to the Province of Ontario's *Source Protection Information Atlas*, the Site is located within the Grand River Source Protection Area. Table 1 provides the source protection details for the Site.

Table 1: Source Protection Details

Source Protection Area	Grand River
Water Quality	
Wellhead Protection Area	2
Wellhead Protection Area E (GUDI):	No
Intake Protection Zone:	No
Issue Contributing Area:	No
Significant Groundwater Recharge Area:	No
Highly Vulnerable Aquifer:	No
Event Based Area:	No
Water Quantity	
Wellhead Protection Area Q1:	Yes
Wellhead Protection Area Q2:	Yes
Intake Protection Zone Q:	No

Figure 2 provides the mapping for the subject site as exported from the Source Protection Information Atlas.

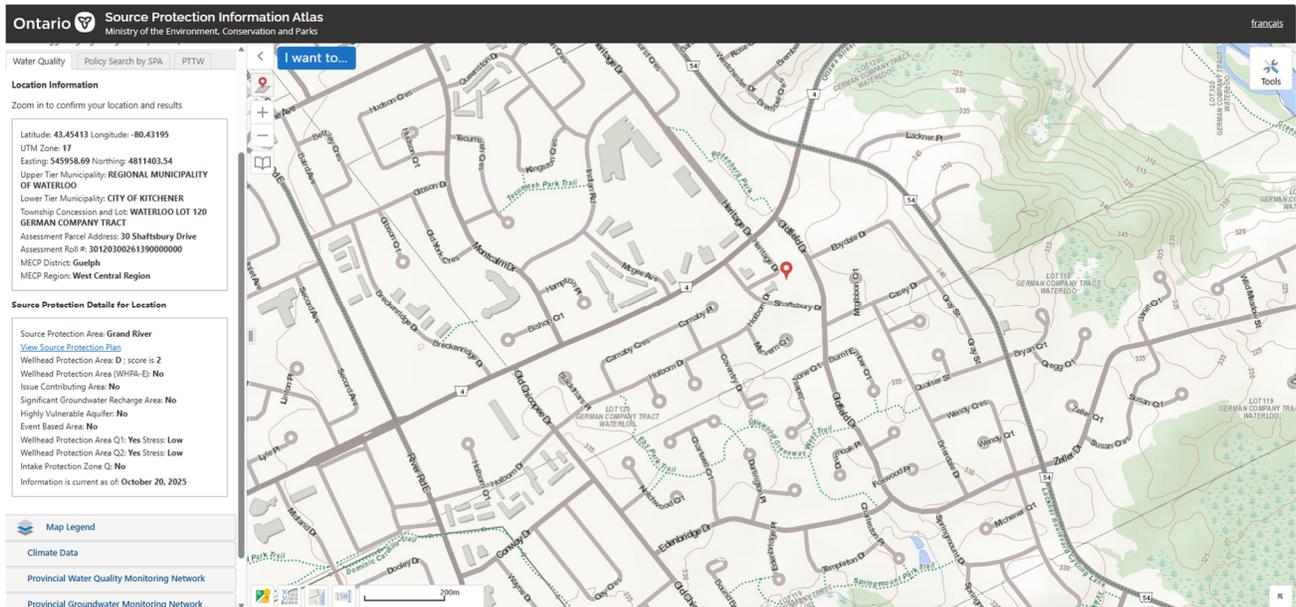


Figure 2 - Source Water Protection Mapping

Based on a review of applicable Source Protection Policies for the Region of Waterloo under the Grand River Source Protection Plan and a review of 2017-2018 Table of Drinking Water Threats, the activities proposed on this Site are not considered to be threats to drinking water at any risk level.

To ensure that infrastructure proposed as part of this development does not become a significant threat in the future, proposed infrastructure should be designed in accordance with MECP's publication titled Design Guidelines for Sewage Works 2008 (updated May 2019) and the Region of Waterloo's Design Guidelines and Supplementary Specifications for Municipal Services (DGSSMS, latest revision). The design of infrastructure to this standard is done to maximize expected life and reduce the incidence of failure.

6.0 SANITARY SERVICING

6.1 Proposed Sanitary Servicing

In accordance with the City of Waterloo Engineering Standards and the Design Guidelines and Supplementary Specifications for Municipal Services (DGSSMS) 2025 and City of Kitchener Site Plan Engineering Guidelines 2025, the sanitary flows from the subject development were calculated based on the number of residential units and the population density.

Sanitary flows for the residential component were calculated using an average daily flow of 305 L/c/day, peaked using the Harmon Formula for a design population of 1.77 persons per unit (ppu). The total flow was supplemented with an extraneous flow allowance of 0.25 L/s/ha.

Table 2 provides a summary of the total domestic flow expected to be generated from the overall development in accordance with DGSSMS.

Table 2: Proposed Sanitary Flow

Relevant Site Area	0.847 ha
Number of Apartment Units	82 units
Number of Townhouse Units	6 units
Apartment Population Density	1.77 ppu
Townhouse Population Density	2.70 ppu
Design Population	162 persons
Average Residential Daily Flow	305 L/c/d
Residential Peaking Factor	4.18
Total Residential Sanitary Peak Flow	2.39 L/s
Extraneous Flow Allowance	0.25 L/s/ha
Total Extraneous Flow	0.21 L/s
Total Sanitary Design Flow	2.6 L/s

Block A will be serviced via a 200 mm diameter sanitary sewer connecting to the existing sanitary manhole on Shaftsbury Drive. The townhouse units will be serviced by independent 100 mm sanitary services connecting to the existing 200mm sanitary sewer main on Oldfield Drive.

7.0 WATER SERVICING

The proposed Block A development will have a 200 mm watermain service connecting to the existing 300 mm diameter watermain on Shaftsbury Drive. Townhouse units in Block B will be serviced via individual 25 mm diameter water service connections to the existing 200 mm diameter watermain on Oldfield Drive. The separate, independent servicing for each Block is proposed to ensure compliance with the Safe Drinking Water Act. A fire hydrant is also proposed near the southern entrance of Block A.

7.1 Design Criteria

Although the project is located within the City of Kitchener, water distribution design must also follow the Region of Waterloo's standards because the Region is the governing authority for the overall water supply system. The Region sets the system-wide design requirements that ensure adequate capacity, pressure, and fire protection throughout all area municipalities.

Accordingly, the Region of Waterloo requires that watermain distribution systems be designed to convey the greater of maximum daily demand plus fire flow or peak hourly demand. The Region's DGSSMS further recommends that average day demands be supplied at a system pressure between 350 kPa (50 psi) and 550 kPa (80 psi).

The Region also stipulates that the minimum resultant pressure under any non-fire demand scenario shall not be less than 275 kPa (40 psi). With the inclusion of fire flows, the minimum residual pressure in the distribution system shall not be less than 140 kPa (20 psi) and shall not cause velocities in the system to be greater than 5 m/s.

Should static pressures in the system exceed 550 kPa (80 psi), the Region requires the use of individual pressure-reducing valves for new developments. The distribution system is also required to be designed to ensure that pressures do not exceed 700 kPa (100 psi) at any point in the system.

7.2 Domestic Demand

In accordance with the DGSSMS, the average residential demand for the proposed development was estimated using a demand of 225 L/c/day. A peaking factor of 4.9 was used to convert the average daily demand into a maximum day demand. This peaking factor is in accordance with the Tri-City Water Distribution Masterplan. Similarly, a peaking factor of 7.4 was used to convert the average daily demand into the peak hourly demand in accordance with Table 3-3 of the MECP guidelines for a design population close to 150 people.

7.3 Fire Flow Demand

In addition to the daily domestic demand for the proposed development, fire flow demands were calculated to assess the adequacy of the proposed watermain system. The Region of Waterloo specifies that all fire flow requirements shall be determined in accordance with the current issue of Water Supply for Public Fire Protection published by the Fire Underwriters Survey (FUS), and the Ontario Building Code.

A fire and life safety report was not available for review at the time of writing, however based on our experience, such buildings are typically classified as non-combustible construction in accordance with OBC 3.1.5. Such a building is also typically provided with:

- Floors constructed as fire separations with a resistance rating of 2 hours
- Roofs intended for occupancy, such as roofs having exterior amenity or terrace space, will be constructed as fire separations equal to the floor assembly (i.e. 2 hr).
- Load-bearing walls, columns and arches will have a fire-resistance rating not less than that required for the supported assembly.

The fire flows for the townhouse block and apartment building are estimated to be 4,000 L/min and 5,000 L/min, respectively, based on the FUS “short method”, resulting in an estimated flow rate of 67 L/s and 83 L/s. A 200 mm diameter watermain is sufficient to provide the required fire flow with a velocity of less than 5 m/s to the townhouses and apartment building. Fire flow demand calculations can be found in Appendix C.

The Fire Protection Water Supply Guidelines for Part 3 in the Ontario Building Code (October 1999) requires that the buildings shall be provided with a supply of water not less than the total volume of the building, multiplied by the water supply coefficient from Table 1 of the technical bulletin, and the spatial coefficient values obtained from Figure 1 of the technical bulletin. Regardless of the size of the building, the maximum fire flow resulting from this methodology is 9,000 L/min, or 150 L/s.

7.4 Service Design

As per the DGSSMS, the water service required shall be able to convey the combination of the Maximum Day Demand (MDD) and the Fire Demand, within the pressure and velocity ranges as specified. A service size was selected for each block to ensure that velocities in the MDD + Fire scenario do not exceed 5 m/s. This service size was increased as required to minimize hydraulic losses through the system to ensure the total demand can be delivered at acceptable pressure levels. A service size of 200 mm is sufficient to provide adequate water servicing, and details are provided in Appendix C.

Block A and each townhouse in Block B is proposed to have individual service connections to comply with the requirements of the *Safe Drinking Water Act* (SDWA). It is noted that, should any block contain multiple plans of condominiums, individual services to each condominium may be required resulting in additional water service connections to the municipal system as the registration of a condominium results in a separate property under the Land Titles Act.

To maintain compliance with the Safe Drinking Water Act, the water supply sources shall remain independent and at no point shall be interconnected between separate parcels of land.

8.0 STORM SERVICING AND STORMWATER MANAGEMENT

Under post-development conditions, all flows from the site will be routed to the municipal storm sewer system via catchbasins. An on-site infiltration galley will collect flows from all but one catchment on site (ID 1000), which will filter, infiltrate, and store flows before discharging into the municipal storm sewer. Refer to Drawing C310 for the Storm Catchment Area Plan.

8.1 Stormwater Management Criteria

In accordance with the City of Kitchener’s site plan engineering guidelines, stormwater management design must meet following criteria:

- Water Quantity: Post-development peak flows controlled to pre-development levels for the 5- to 100-year storm events
- Water Quality: Discharge from the site must meet long term average TSS removal of 80% (Enhanced Level 1 Protection)
- Volume Retention: the site is subject to a volume retention target of 12.5mm across the entire site.

8.2 Pre-Development Conditions

The current 0.85-ha site is composed of an existing church building, parking lot, and landscaped areas. The estimated impervious level for the existing site is approximately 60%.

The existing site has an approximate North-South drainage divide. The Existing Conditions Catchments Sketch illustrating the divide between these two catchments is included in Appendix D. The northern catchment (ID 100) includes drainage from the north side of the building roof as well as the landscaped areas north of the building, which drains uncontrolled to Ebydale Drive. The southern catchment (ID 102) collects drainage from the south side of the building, the parking lot, and remaining landscaped areas. All flow from the southern catchment is collected in an existing catchbasin in the southeastern corner of the parking lot. From this catchbasin, a 450 mm storm pipe traverses through an easement and connects to a 450 mm storm sewer on Shaftsbury drive, which collects flow from catchbasins along the road. The storm sewer on Shaftsbury then drains east to a concrete storm sewer on Oldfield Drive, which increases from 300 mm to 450 mm after confluence manhole.

Pre-development catchment areas and approximate impervious level are summarized in Table .

Table 3: Pre-Development Catchment Areas

Catchment ID	Description	Outlet	Area (ha)	Impervious (%)
101	Northern portion of the Site	Ebydale Drive	0.21	29
102	Southern portion of the Site	Catchbasin to Municipal Storm	0.64	70
Total			0.85	60

These catchments were modeled in MIDUSS for the 2- to 100-yr storm events, Storm events were based on the City of Kitchener’s IDF parameters, included in Appendix D. Resulting pre-development peak flows for each of the outlet locations are shown in Table . These flows will be used to compare with the post-development results.

Table 4: Pre-Development Peak Flows from Subject Lands to Outlet Locations

Storm Event	Towards Ebydale Dr. (m3/s)	To Catchbasin and Municipal Storm Network (m3/s)
2-Year	0.013	0.094
5-Year	0.018	0.132
10-Year	0.022	0.162
25-Year	0.027	0.188
50-Year	0.031	0.213
100-Year	0.036	0.237

8.3 Post-Development Conditions

Under post-development conditions, the subject lands will be redeveloped for residential uses consisting of an apartment building, townhouse block, associated parking, and surrounding landscaping. The proposed development will impact the existing drainage patterns and increase the overall imperviousness of the site.

The post-development conditions were discretized into nine catchment areas, as shown in the Catchment Area Plan (Sheet C310 in Appendix E) and summarized Table 5. Schematic of the pre- and post-development MIDUSS models, modeling parameters, and MIDUSS codes are provided in Appendix D. In the post-development condition, all stormwater on site will drain to the municipal storm sewers on Shaftsbury Drive and Oldfield drive via catch basins. No flow will be directed to Ebydale Drive in post-development conditions.

Table 5: Post-Development Catchments

Catchment ID	Description	Outlet	Area (ha)	Impervious (%)
112	Parking lot and landscape		0.07	50
111	Parking lot and landscape		0.05	75
110	Parking lot and landscape		0.05	50
130	Apartment roof	Municipal Storm	0.11	90
101	Parking lot and landscape	Sewer on Shaftsbury and Oldfield Drive	0.24	80
104	Landscape		0.08	25
103	Parking lot and landscape		0.11	90
100	Townhomes and landscape		0.09	75
1000	Townhomes and driveways		0.05	75
Total			0.85	72

Infiltration Gallery

Flow from all catchments, except for Catchment 1000, will be collected in on-site catch basins and directed to a proposed infiltration gallery beneath the southern parking lot. Flows from Catchment 1000, which includes the eastern portion of the townhouse block, cannot be collected in the infiltration gallery due to the slope of its

driveways conveying overflow towards Oldfield Drive. Catchbasins on Oldfield drive will collect outflow from Catchment 1000 and combine downstream with municipal storm sewer flows from Shaftsbury Drive.

The proposed infiltration gallery will serve to meet multiple criteria, including infiltration, water quality, and rate control. The current proposed design employs CULTEC's Recharger 280HD to provide additional storage in a limited footprint. Detailed specifications for the proposed infiltration gallery using the selected CULTEC chamber are included in Appendix D. Note that the soil type and percolation rate used to calculate infiltration gallery sizing is currently uncertain, and infiltration gallery sizing should be finalized after a detailed geotechnical investigation is complete.

8.4 Peak Flow Control

Table compares the total pre- and post-development peak flow rates from the subject lands to the municipal storm sewer. The results show that the proposed SWM measures are successful in reducing the total peak flows compared to pre-development conditions for all modeled storm events.

Table 6: Comparison of Pre- and Post-Development Peak Flows to Municipal Storm Sewer

Storm Event	Pre-Development (m ³ /s)	Post-Development (m ³ /s)	Change (%)
2-Year	0.094	0.008	-91%
5-Year	0.132	0.020	-85%
10-Year	0.162	0.037	-77%
25-Year	0.188	0.077	-59%
50-Year	0.213	0.100	-53%
100-year	0.237	0.125	-47%

8.5 Storm Sewer Servicing

The existing 450 mm storm pipe conveying flows from the infiltration gallery outlet to the municipal storm system has more than adequate capacity for the post-development flows for the 2- through 100-year storm events. The existing capacity of the storm sewer on Oldfield Drive should be confirmed to ensure that it can accommodate the anticipated flows in addition to flows from upstream sites.

8.6 Water Quality Control

To provide the required level of water quality treatment for the proposed development, a separator row, or isolator row, will be included in the proposed infiltration basin. A separator row is connected to the inlet pipe of the infiltration gallery and serves to prevent fine particles from continuing through the infiltration system. The single-chamber separator row is wrapped in non-woven geotextile, preventing sediment from entering the subsequent chambers. The CULTEC Separator Row is Environmental Technology Verification (ETV) certified to achieve 80% TSS removal, as required by the City of Kitchener Standards.

8.7 Volume Control

To achieve the minimum Volume Retention Target of 12.5 mm across the 0.85-ha site, 106 m³ must be infiltrated or retained on-site.

Infiltration gallery sizing was calculated using Equation 4.3 in the MECP Stormwater Management Planning and Design Manual, and it depends on the percolation rate of the surrounding native soil. Since limited soil data is currently available, the soil type on site was assumed to be a loam or sandy loam, which has an estimated

percolation rate of 20 mm/hr, based on coarse data from the GRCA Web Map. With this assumption, the estimated infiltration gallery footprint required to infiltrate the required volume is between 275 and 550 m² over a drawdown time of 24 to 48 hours. As shown in the CULTEC design sheet in Appendix D, the infiltration gallery footprint has a total bed area of approximately 500 m², with dimensions of 10 m by 50 m. Based on the stage-storage information for the selected infiltration gallery chambers, the storage volume available in the infiltration gallery before discharging through the 300 mm outlet is ~135m², exceeding the required infiltration volume of 106 m³. As previously stated, geotechnical investigations should be conducted to determine the site-specific percolation rate, which will likely impact the sizing of the infiltration gallery in future detailed design.

The current proposed outlet from the infiltration gallery is a 300 mm pipe connecting the gallery outlet to an on-site manhole, which then conveys flow to the existing municipal storm sewer system. The total available storage in the infiltration gallery is ~300 m³. In the event that this volume is exceeded, which may be the case for the 25-yr storm and greater, additional storage can be provided by pooling in the parking lot above to temporarily accommodate excess volume.

9.0 SITE GRADING

Proposed grading will conform with slopes outlined as part of the Accessibility for Ontarians with Disabilities Act (AODA) and Region of Waterloo Development Engineering Guidelines. The grading of the site will respect the existing grades along all property lines to generally address the following:

- to minimize grading and cut/fill
- to minimize changes to surface hydrology and hydrogeology of the area
- to match to existing elevations at the limits of development
- to provide major overland flow route(s) to the stormwater conveyance features and maintain existing drainage patterns
- to promote infiltration of rainwater runoff
- to maintain sheet flow and minimize concentrated flows

If applicable: The MBCA protects migratory birds and the nests and young of migratory birds in Canada. No clearing of vegetation should occur during the breeding bird window to prevent impacts to birds. Combining the breeding bird window with the bat roosting season (April to September; MNRF, 2015c), no clearing of vegetation should occur between April 1 and September 30 inclusive to prevent impacts to both birds and bats.

Excavations shall be conducted in accordance with the Occupational Health and Safety Act (OHSA) and the recommendations in the Geotechnical Investigation. In accordance with, O.Reg. 406/19 titled "On-Site and Excess Soil Management" under the Environmental Protection Act, the excavation of excess material, and subsequent off-site disposal of excess soils from this Site, will require compliance with this new regulation should it be in force during construction of the blocks. A Qualified Person (QP), as defined within the O.Reg, should be retained to provide site specific guidance related to the Excess Soil regulation.

Stockpiles and equipment on the site shall be managed to prevent wildlife from being attracted to artificial habitat. Piles of peat, fill, brush, rocks and other loose materials shall be covered, and ends of pipes capped where necessary to keep wildlife out. Ensure that trails, bins, boxes and vacant buildings are secured at the end of each workday to prevent access by wildlife. Stockpiles are also subject to the recommendations for erosion and sediment control outlined in Section.

10.0 ADDITIONAL CONSTRUCTION CONSIDERATIONS FOR SERVICING

10.1 Short-Term Construction Dewatering

The construction of underground parking structures may require dewatering of perched ground water under the surficial layers of the site. Should shallow perched groundwater be encountered, depending on the quantity to be dewatered, the dewatering activity could be considered a water taking requiring additional permits and approvals from the MECP.

In the short term, the dewatering can replace inflow to the storm sewer network from the relevant pre-development catchment area, as the contributing catchment is expected to be replaced with a large excavation. The groundwater will require treatment and sediment removal to provincial standards, and to comply with the City of Kitchener sewer use bylaw for discharge to storm sewers. Such a treatment system may also require an ECA from the MECP.

Further details of construction dewatering (if required) shall be made available at the Site Plan Approval stage for the various phases of the development.

10.2 Long-Term Dewatering

It is noted that the City and Region of Waterloo do not permit buildings that rely active dewatering systems for waterproofing. As such, should construction of underground levels encounter ground water, mitigation measures such as a caisson cut-off wall or “tanking” of the underground level to create a watertight system should be pursued.

11.0 EROSION AND SEDIMENT CONTROL

Sediment and erosion controls to be implemented during construction will include stabilized construction entrances and a perimeter silt fence. Prior to the start of any construction, all erosion and sediment control measures installed will be inspected by the Consultant. The controls will be maintained, and accumulated sediments removed once their capture capacity has been decreased by one-third. The measures will also be periodically inspected and upgraded/altered as Site conditions change. Periodic inspections will consist of visual observation of the effectiveness of the control measures and sediment migration offsite.

Any sediment tracked onto the roadway during the course of construction will be cleaned by the Contractor. To minimize the amount of mud tracked onto the roadway, a mud-mat will be installed at all construction exits and the Contractor will be required to ensure that vehicles leave through the exit. The mud-mat will be periodically inspected and cleaned/maintained as required to ensure it is functioning as intended.

To prevent sediment runoff from the Site, light-duty silt fencing (in accordance with OPSD 219.110) will be installed along the perimeter of the Site and at the base of all stockpiles. Stockpiles are to be visually monitored after rainfall events and will be hydraulically seeded if the stockpiles are to remain undisturbed for extended periods of time.

The outlets from the Site will be inspected for evidence of sediment migration offsite. In the event that sediments have migrated offsite, additional sediment controls shall be implemented as necessary to ensure that no additional sediment escapes from the Site. Any excessive sediment that has migrated offsite shall be removed and the area restored to pre-construction conditions.

As the servicing phase of the construction proceeds, each inlet structure will have an insert installed and/or filter fabric will be wrapped around the lids of all manholes to prevent intrusion of sediment into the storm sewer network. The inserts will be cleaned once they reach one-third their sediment accumulation capacity or as per the manufacturer’s recommendations.

The Contractor is ultimately responsible for controlling sediment & erosion within the construction site for the duration of construction. Sediment laden water will not be allowed to be discharged to the conveyance features of this site. Additional erosion and sediment control materials (such as silt fence, straw bales, clear stone etc.) are to be kept on site for emergencies and repairs.

Additionally, the following shall be considered:

- Limit the size of disturbed areas by minimizing non-essential clearing and grading with retention of existing vegetation for as long as possible
- Refueling of machinery should occur >30m from surface water features and all machinery shall remain on the project side of silt and construction fence
- Storing/stockpiling materials >30m away from surface water features
- Developing a response plan to be implemented immediately in the event of a spill of a deleterious substance;
- Keeping an emergency spill kit on the site;
- Stopping work and containing deleterious substances to prevent dispersal; and
- Reporting any spills of sewage, oil, fuel, or other deleterious material immediately.

All erosion and sediment control measures will be removed at the end of construction and any accumulated sediment shall be disposed offsite.

12.0 CONCLUSIONS

Based on the analysis presented in this report it is concluded that:

- The proposed Site can be adequately serviced through both existing and planned municipal infrastructure (sanitary, storm, and watermain) and utilities (gas/hydro/cable).
- Municipal servicing and roadworks can be constructed in accordance with the City of Kitchener and MECP standards.
- Stormwater management measures can be provided in accordance with various agency guidelines.
- Streets within the Subdivision will be constructed to the City of Kitchener Design Standards.
- 200 mm sanitary service will be installed within the proposed rights-of-way to service Block A. Block B will be serviced by individual 100 mm sanitary sewers for each townhouse. The Site will outlet to the existing 250 mm diameter sewer located on Shaftsbury Drive.
- Watermain connections to 300 mm diameter existing and proposed infrastructure abutting the site will service the Site.
- Watermain pipe sizes are such that velocities are generally less than 5 m/s under fire flow conditions.
- The infiltration gallery will help in achieving a water balance for the overall site.
- Sufficient storage volume is available in the proposed infiltration gallery to reduce overall post-development peak flows from the Site to less than pre-development levels. Post-development peak flows will be reduced to less than pre-development conditions and the Regional storm event can be safely conveyed through the infiltration gallery and to the municipal system.
- Erosion control measures will be required and will be reviewed and designed during the detailed design stage.

APPENDIX A

Development Concept - MHBC

CONCEPT PLAN

30 Shaftsbury Drive, City of Kitchener,
Ontario

21207F

KEY PLAN



Subject Lands



NOT TO SCALE

Source: ESRI

LEGEND

Subject Lands

SITE STATISTICS

Zoning By-law Medium Rise Residential Six Zone (RES-6)		
Regulation	Required	Provided
Multiple Dwelling - Apartment		
Total Units	-	82 Units
Lot Area (min)	495 m ²	7,172 m ² (0.717 ha)
Lot Width (min)	30.0 m	22.0 m
Front Yard and Exterior Yard (min)	3.0 m	14.1 m
Interior Side Yard (min)	4.5 m	28.8 m
Rear Yard (min)	7.5 m	14.8 m
Landscaped Open Space (min)	20 %	42 %
Floor Space Ratio (min-max)	0.6-2.0	0.93
Building Height (min-max)	11.0 m-25.0 m	TBD
Number of Storeys (max)	8	6
Parking Spaces (min)	1.0/unit (82)	1.0/unit (82)
Visitor Parking Spaces (min)	0.1/unit (8)	0.15/unit (13)
Barrier-Free Accessible Parking	4% (4 Spaces)	4 Spaces
Street Townhouse		
Total Units	-	6 Units
Lot Area (min)	495 m ²	1,298 m ² (0.130 ha)
Lot Width (min)	30.0 m	45.0 m
Front Yard and Exterior Yard (min)	3.0 m	5.7 m and 6 m to Garage
Interior Side Yard (min)	4.5 m	2.4 m
Rear Yard (min)	7.5 m	6.0 m
Landscaped Open Space (min)	42 %	42 %
Floor Space Ratio (min-max)	0.6-2.0	0.94
Building Height (min-max)	11.0 m-25.0 m	TBD
Number of Storeys (max)	8	2
Minimum Number of Dwelling Units	5	6
Parking Spaces (min)	1.0/unit (6)	1.0/unit (6)

Area Summary:	Apartment	Street Townhouse
Building Coverage	1,113 m ² 16%	636 m ² 49%
Landscaped Area	3,012 m ² 42%	548 m ² 42%
Asphalt Area	3,047 m ² 42%	114 m ² 9%
Total	7,172 m ² 100%	1,298 m ² 100%

NOTES

- All dimensions are in metres unless otherwise shown.
- Contains information licensed under the Open Government Licence - Ontario.
- City of Kitchener Imagery, 2022
- FC - Flush Curb

DATE: October 22, 2025



SCALE: 1:600



K:\21207F - Hope Lutheran Church\CIP\22002025.dwg



APPENDIX B

Sanitary Demand Calculations

- Sanitary Sewer Design Sheet

Project:		Hope Lutheran Church		Unit Population		Flow Calculations		Commercial		Industrial		Institutional		Infiltration		Sanitary Design Sheet																			
Project No:		2025-0580-10		House	3.35 ppu	Min Peak	1.50	Peaking Factor		Peaking Factor		Peaking Factor		Avg. Daily Flow		Maximum Permitted Full Flow Velocity (m/s)		3.00																	
Date:		03-Dec-25		Townhouse	2.70 ppu	Max Peak	4.50	0		2.5		1		0.25		Minimum Permitted Full Flow Velocity (m/s)		0.60																	
Designed By:		MA	Checked By:	Apartment	1.77 ppu	Avg. Daily Flow	305 L/s/pu	L/s/ha		L/s/ha		L/s/ha		L/s/ha																					
Pipe Data				Residential							Cumulative			Commercial			Industrial			Institutional			Infiltration			Total	Design Data								
Alignment	Phase	From	To	Area ID	Area (ha)	House (Units)	Townhouse (Units)	Apartment (Units)	Zoning	Density (p/ha)	Population (People)	Cumm. Area (ha)	Cumm. Pop (People)	Peak Factor	Peak Flow (L/s)	Area ID	Area (ha)	Cumm. Area (ha)	Area ID	Area (ha)	Cumm. Area (ha)	Area ID	Area (ha)	Cumm. Area (ha)	Total C+I Flow	Area (ha)	Cumm Area (ha)	Flow (L/s)	Total Flow (L/s)	Length (m)	Diameter (mm)	Slope (%)	Q _{FULL} (L/s)	V _{FULL} (m/s)	Q/Q _{FULL} (%)
		1	2		0.847	0	6	82	0	0	162	0.847	162	4.180	2.390		0.00	0.00							0.000	0.847	0.847	0.212	2.602	25.3	200	0.60%	25.41	0.81	0.8%

APPENDIX C

Water Demand Calculations

- Domestic Water Demand
- Fire Water Demand
- Region Modelling Information
- Calculations

REQUIRED DOMESTIC FLOW

ONTARIO BUILDING CODE

WALTERFEDY

Project	Hope Lutheran Church
Project #	2025-0580-10
Designer	MA
Description	Residential Domestic Flow

Building Description	Units	Persons/Unit	Population	Operating Hours	Demand	Max Daily Peak Factor	Max Hourly Peak Factor	Max Daily Demand (L/s)	Max Hourly Demand (L/s)
Townhouses	6	2.70	16	24					
Apartments	82	1.80	148	24					
Proposed building	88		164	24	225 L/cap/day	4.90	7.40	2.09	3.16
Total								2.09	3.16

Notes:

[1] Peaking Factors were taken from Table 3-1: Peaking Factors from MECP's Design Guidelines for Drinking-Water Systems.

REQUIRED FIRE FLOW**WALTERFEDY**

Water Supply for Public Fire Protection (FUS 2020)

Project	Hope Lutheran Church - Block A
Project #	2025-0580-10
Designer	MA
Address	30 Shaftsbury Dr., Kitchener
Description	Fire demand for new site plan

$$F = 220 \times C \times \sqrt{A}$$

F = Required fire flow (LPM)
 C = Coefficient related to type of construction
 A = Total floor area (including all storeys but excluding any basement levels at least 50% below grade)

Type of Construction	Non-Combustible Construction	C =	0.8
Description	Unprotected Metal Structural Components, Masonry or Metal Walls. All Structural Members are Non-Combustible but does not qualify as Fire-Resistive		

Total Floor Area	1113	m ²
# Storeys	6	
Fire Resistant Building?	NO	
Vertical Openings and Exterior Vertical Communications protected with minimum one (1) hr rating?	NO	
Area	3339	m ²
Description	Area of two largest floors + 50% of each of the floors above it	
Required Fire Flow	10000	L/min

Occupancy Charge	Limited-Combustible Contents
Fire Flow Reduction	-15% OR -1500 L/min
Required Fire Flow	8500 L/min

Automated Sprinkler Protection	YES	
Designed to NFPA 13 Standard	YES	-30%
Standard Water Supply to Sprinklers and Standpipes	YES	-10%
Fully Supervised System	YES	-10%
Fire Flow Adjustment		-4250 L/min

Exposure 1 (East)	Distance	30	m	Charge	10%
Description	Block B				
Exposure 2 (South)	Distance	40	m	Charge	0%
Description	Single Detached Dwelling				
Exposure 3 (North)	Distance	50	m	Charge	0%
Description	Single Detached Building				
Exposure 4 (West)	Distance	45	m	Charge	0%
Description	Single Detached Dwelling				

Total Exposure Charge	10%
Fire Flow Adjustment	850 L/min

Total Required Fire Flow	5000	L/min
Total Required Fire Flow	1321	U.S. GPM
Total Required Fire Flow	83	L/s

REQUIRED FIRE FLOW**WALTERFEDY**

Water Supply for Public Fire Protection (FUS 2020)

Project	Hope Lutheran Church - Block B
Project #	2025-0580-10
Designer	MA
Address	30 Shaftsbury Dr., Kitchener
Description	Fire demand for new site plan

$$F = 220 \times C \times \sqrt{A}$$

F = Required fire flow (LPM)
 C = Coefficient related to type of construction
 A = Total floor area (including all storeys but excluding any basement levels at least 50% below grade)

Type of Construction	Non-Combustible Construction	C =	0.8
Description	Unprotected Metal Structural Components, Masonry or Metal Walls. All Structural Members are Non-Combustible but does not qualify as Fire-Resistive		

Total Floor Area	636	m ²
# Storeys	2	
Fire Resistant Building?	NO	
Vertical Openings and Exterior Vertical Communications protected with minimum one (1) hr rating?	NO	
Area	1272	m ²
Description	Area of two largest floors + 50% of each of the floors above it	
Required Fire Flow	6000	L/min

Occupancy Charge	Limited-Combustible Contents
Fire Flow Reduction	-15% OR -900 L/min
Required Fire Flow	5100 L/min

Automated Sprinkler Protection	YES	
Designed to NFPA 13 Standard	YES	-30%
Standard Water Supply to Sprinklers and Standpipes	YES	-10%
Fully Supervised System	YES	-10%
Fire Flow Adjustment		-2550 L/min

Exposure 1 (East)	Distance	34	m	Charge	0%
Description	Single Detached Dwellings				
Exposure 2 (South)	Distance	6	m	Charge	20%
Description	Single Detached Dwelling				
Exposure 3 (North)	Distance	48	m	Charge	0%
Description	Women's Crisis Services - 2 storey building				
Exposure 4 (West)	Distance	30	m	Charge	10%
Description	Block A				

Total Exposure Charge	30%
Fire Flow Adjustment	1530 L/min

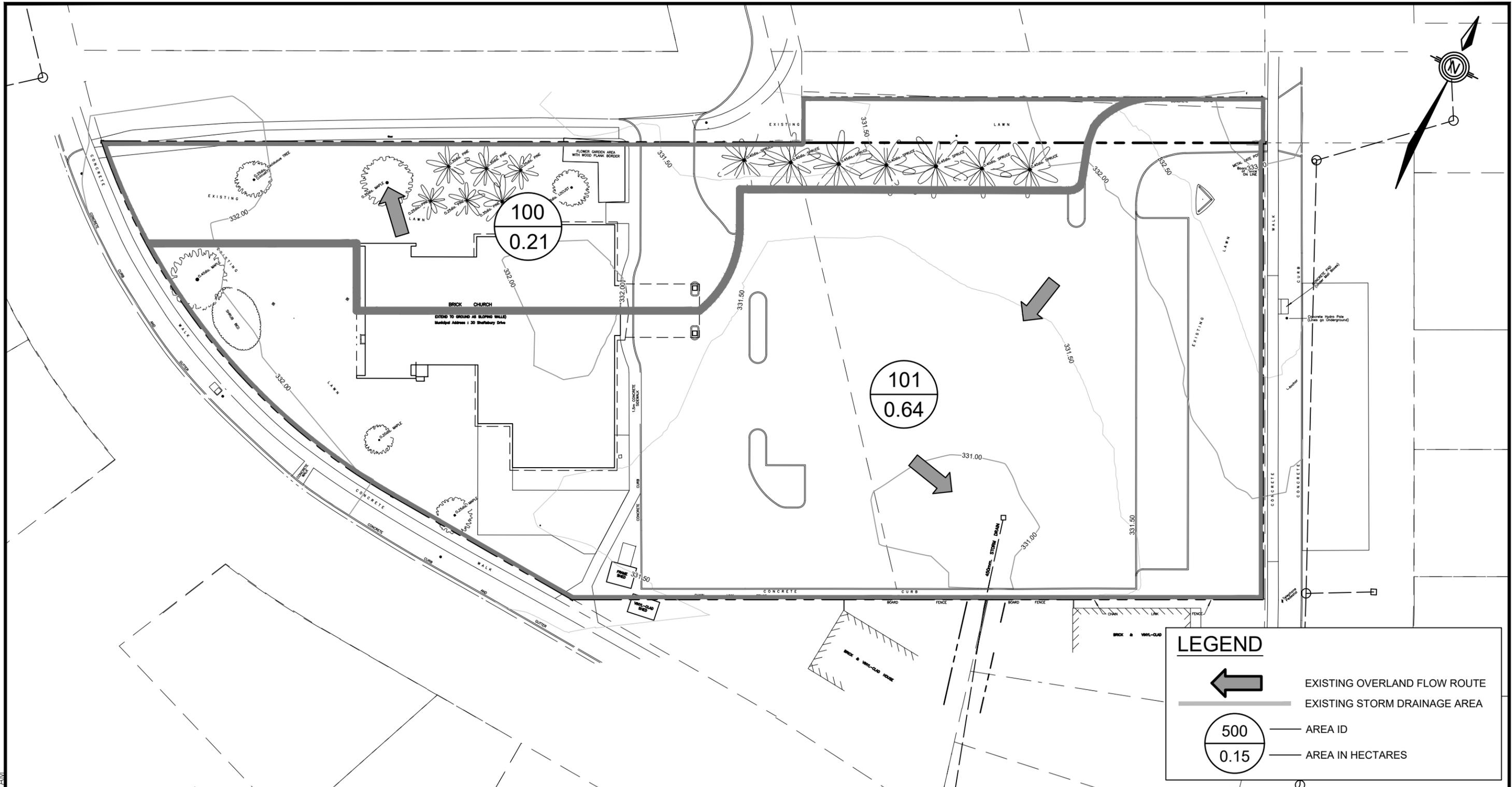
Total Required Fire Flow	4000	L/min
Total Required Fire Flow	1057	U.S. GPM
Total Required Fire Flow	67	L/s

APPENDIX D

Stormwater Management

- Existing Catchment Sketch
- Proposed Catchment Sketch
- CULTEC Design Sheets
- Infiltration Gallery Stage-Storage-Discharge
- MIDUSS Modeling Schematics, Pre and Post
- MIDUSS Parameters and Outputs, Pre and Post
- MIDUSS Codes, Pre and Post

C:\Users\kbrown\DC\ACCDocs\WalterFedy\2025-0580-10 Hope Lutheran Church\Project Files\1_Published\1.05_Civil\1.05.1_Plot_Files\1.05.1.1_Figures\EX_STM_FIG; EXISTING; None; Kevin Brown; 2025-11-25 11:22:04 AM



PROJECT:
HOPE LUTHERAN CHURCH

TITLE:
EXISTING CATCHMENT AREAS

REPRODUCTION OR DISTRIBUTION FOR PURPOSES OTHER THAN AUTHORIZED BY WALTERFEDY IS FORBIDDEN. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND REPORT ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN ON DRAWINGS TO WALTERFEDY. DO NOT SCALE THIS DRAWING.

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LEGEND

- EXISTING OVERLAND FLOW ROUTE
- EXISTING STORM DRAINAGE AREA
- AREA ID
- AREA IN HECTARES

WALTERFEDY

KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

SCALE: 1:500	DATE: 2025-11-25
DRAWN BY: KDB	PROJECT NO.: 2025-0580-10
CHECKED BY: MA	FILE: EX_STM_FIG

SHEET NO.:

FIG 2.0



CULTEC Stormwater Design Calculator

Please Fill in the Shaded Cells

Project Information:

Project Name: Hope Lutheran Church
 Address: 30 Shaftsbury Drive
 City: Kitchener
 State/Province: ON
 ZIP/Postal Code: N2A 1N6
 Country: Canada

Calculations Performed By:

Name: Samantha Fischer
 Company Name: WalterFedy
 Address:
 City:
 State/Province:
 ZIP/Postal Code:
 Country:
 Phone:
 Email:

Date:

November 17, 2025
Project Number:
 2025-0580-10

Input Project Requirements

Unit of Measure	Metric	
Select Model	Recharger 280HD	
Stone Porosity	40%	
Number of HVLV Internal Manifolds	1 Internal Manifold	
Stone Depth Above Chamber	152	mm
Stone Depth Below Chamber	300	mm
Stone Between Chamber rows	1000	mm
<input checked="" type="checkbox"/> Include Separator Row		
Workable Bed Depth	10.00	meters
Max. Bed Width	12.00	meters
Storage Volume Required	300.00	cu. meters
Stone Base Elevation	328.80	meters

Additional Information:

Other models are available if products above do not meet your requirements. Contact CULTEC for further design assistance. Call CULTEC at 203-775-4416 for pricing information.

Hyperlinks to product specific webpages:

Please visit our website for more information such as CAD details, spec information, brochures, installation instructions, and other design tools on certain models.

[Contactor Field Drain C-4HD](#)
 [Recharger 280HD](#)
 [HVLV SFCx2 Feed Connector](#)
 [CULTEC No. 4800 Woven Geotextile](#)
[Contactor 100HD](#)
 [Recharger 330XLHD](#)
 [HVLV FC-24 Feed Connector](#)
 [CULTEC No. 410 Non-Woven Geotextile](#)
[Recharger 150XLHD](#)
 [Recharger 360HD](#)
 [HVLV FC-48 Feed Connector](#)
[Recharger 180HD](#)
 [Recharger 902HD](#)

For design assistance, drawings and pricing send these calculations to:
<mailto:tech@cultec.com>

Website:
www.cultec.com



CULTEC Stormwater Design Calculator

Date:	November 17, 2025
Project Information:	
Hope Lutheran Church 30 Shaftsbury Drive Kitchener ON Canada	

Project Number:	2025-0580-10
Calculations Performed By:	
Samantha Fischer WalterFedy	

RECHARGER 280HD

Recharger 280HD Chamber Specifications		
Height	673	mm
Width	1194	mm
Length	2.44	meters
Installed Length	2.13	meters
Bare Chamber Volume	1.20	cu. meters
Installed Chamber Volume	2.83	cu. meters



Breakdown of Storage Provided by Recharger 280HD Stormwater System		
Within Chambers	133.41	cu. meters
Within Feed Connectors	0.34	cu. meters
Within Stone	174.56	cu. meters
Total Storage Provided	308.3	cu. meters
Total Storage Required	300.00	cu. meters

Materials List

Recharger 280HD		
Total Number of Chambers Required	110	pieces
Separator Row Chambers	22	pieces
Starter Chambers	5	pieces
Intermediate Chambers	100	pieces
End Chambers	5	pieces
HVLV FC-24 Feed Connectors	4	pieces
CULTEC No. 410 Non-Woven Geotextile	1426	sq. meters
CULTEC No. 4800 Woven Geotextile	60	meters
Stone	436	cu. meters

Separator Row Qty Included in Total

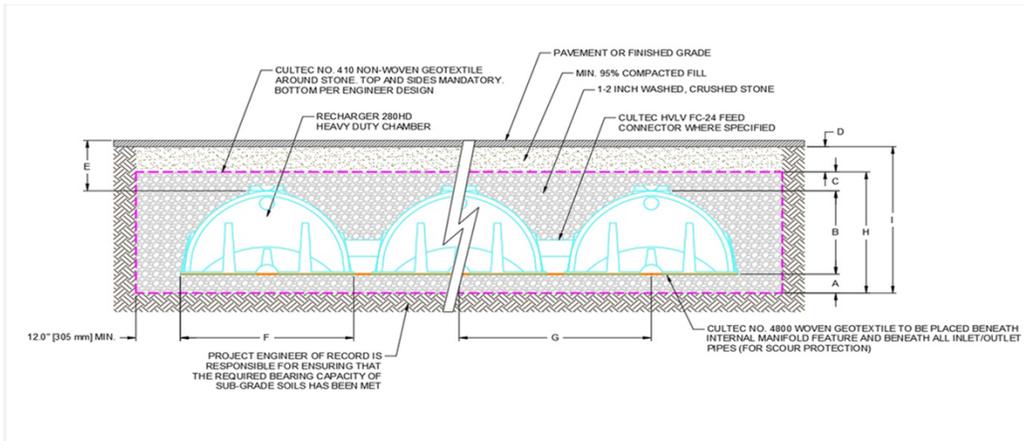
Based on 1 Internal Manifold

Bed Detail



Bed Layout Information		
Number of Rows Wide	5	pieces
Number of Chambers Long	22	pieces
Chamber Row Width	9.93	meters
Chamber Row Length	47.24	meters
Bed Width	10.54	meters
Bed Length	47.85	meters
Bed Area Required	504.42	sq. meters
Length of Separator Row	47.24	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	300	mm
B	Chamber Height	673	mm
C	Depth of Stone Above Units	152	mm
D	Depth of 95% Compacted Fill	254	mm
E	Max. Depth Allowed Above the Chamber	3.66	meters
F	Chamber Width	1194	mm
G	Center to Center Spacing	2.18	meters
H	Effective Depth	1.13	meters
I	Bed Depth	1.38	meters



CULTEC Stage-Storage Calculations

Date: November 17, 2025

Project Information:
 Hope Lutheran Church
 30 Shaftsbury Drive
 Kitchener
 ON N2A 1N6
 Canada

Project Number:
 2025-0580-10

Chamber Model -	Recharger 280HD	
Number of Rows-	5	units
Total Number of Chambers -	110	units
HVLV FC-24 Feed Connectors-	4	units
Stone Void -	40	%
Stone Base -	300	mm
Stone Above Units -	152	mm
Area -	504.42	m2
Base of Stone Elevation -	328.80	

Recharger 280HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft ³	m ³	ft3	m3	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft	m
44.5	1130	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	10882.04	308.14	332.51	329.93
43.5	1105	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	10701.05	303.02	332.43	329.90
42.5	1080	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	10520.07	297.89	332.34	329.88
41.5	1054	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	10339.08	292.77	332.26	329.85
40.5	1029	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	10158.09	287.64	332.18	329.83
39.5	1003	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	9977.11	282.52	332.09	329.80
38.5	978	0.1	0.0	0.0	0.0	90.5	2.6	90.540	2.6	9796.12	277.39	332.01	329.78
38.0	965	14.0	0.4	0.0	0.0	175.4	5.0	189.356	5.4	9705.58	274.83	331.97	329.77
37.0	940	36.4	1.0	0.0	0.0	166.4	4.7	202.841	5.7	9516.23	269.47	331.88	329.74
36.0	914	77.5	2.2	0.0	0.0	150.0	4.2	227.486	6.4	9313.39	263.73	331.80	329.71
35.0	889	103.9	2.9	0.0	0.0	139.4	3.9	243.296	6.9	9085.90	257.28	331.72	329.69
34.0	864	123.2	3.5	0.0	0.0	131.7	3.7	254.921	7.2	8842.60	250.39	331.63	329.66
33.0	838	138.7	3.9	0.0	0.0	125.5	3.6	264.221	7.5	8587.68	243.18	331.55	329.64
32.0	813	151.1	4.3	0.0	0.0	120.5	3.4	271.661	7.7	8323.46	235.69	331.47	329.61
31.0	787	162.0	4.6	0.0	0.0	116.2	3.3	278.171	7.9	8051.80	228.00	331.38	329.59
30.0	762	171.3	4.8	0.0	0.0	112.5	3.2	283.751	8.0	7773.63	220.12	331.30	329.56
29.0	737	179.8	5.1	0.0	0.0	109.1	3.1	288.866	8.2	7489.88	212.09	331.22	329.54
28.0	711	186.8	5.3	0.0	0.0	106.3	3.0	293.051	8.3	7201.01	203.91	331.13	329.51
27.0	686	193.0	5.5	0.0	0.0	103.8	2.9	296.771	8.4	6907.96	195.61	331.05	329.49
26.0	660	203.8	5.8	0.0	0.0	99.5	2.8	303.281	8.6	6611.19	187.21	330.97	329.46
25.0	635	206.9	5.9	0.0	0.0	98.2	2.8	305.141	8.6	6307.91	178.62	330.88	329.44
24.0	610	210.0	5.9	0.2	0.0	97.0	2.7	307.186	8.7	6002.77	169.98	330.80	329.41
23.0	584	213.1	6.0	0.2	0.0	95.7	2.7	309.012	8.8	5695.58	161.28	330.72	329.38
22.0	559	216.2	6.1	0.1	0.0	94.5	2.7	310.866	8.8	5386.57	152.53	330.63	329.36
21.0	533	222.4	6.3	0.1	0.0	92.0	2.6	314.584	8.9	5075.70	143.73	330.55	329.33
20.0	508	226.3	6.4	0.1	0.0	90.5	2.6	316.906	9.0	4761.12	134.82	330.47	329.31
19.0	483	227.9	6.5	0.1	0.0	89.8	2.5	317.829	9.0	4444.21	125.85	330.38	329.28
18.0	457	236.4	6.7	0.1	0.0	86.4	2.4	322.935	9.1	4126.39	116.85	330.30	329.26
17.0	432	237.2	6.7	0.1	0.0	86.1	2.4	323.395	9.2	3803.45	107.70	330.22	329.23
16.0	406	238.7	6.8	0.1	0.0	85.5	2.4	324.310	9.2	3480.05	98.54	330.13	329.21
15.0	381	240.3	6.8	0.1	0.0	84.9	2.4	325.213	9.2	3155.74	89.36	330.05	329.18
14.0	356	241.8	6.8	0.0	0.0	84.3	2.4	326.100	9.2	2830.53	80.15	329.97	329.16
13.0	330	252.7	7.2	0.0	0.0	79.9	2.3	332.598	9.4	2504.43	70.92	329.88	329.13
12.0	305	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	2171.83	61.50	329.80	329.10
11.0	279	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1990.85	56.37	329.72	329.08
10.0	254	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1809.86	51.25	329.63	329.05
9.0	229	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1628.88	46.12	329.55	329.03
8.0	203	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1447.89	41.00	329.47	329.00
7.0	178	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1266.90	35.87	329.38	328.98
6.0	152	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	1085.92	30.75	329.30	328.95
5.0	127	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	904.93	25.62	329.22	328.93
4.0	102	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	723.94	20.50	329.13	328.90
3.0	76	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	542.96	15.37	329.05	328.88
2.0	51	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	361.97	10.25	328.97	328.85
1.0	25	0.0	0.0	0.0	0.0	181.0	5.1	180.986	5.1	180.99	5.12	328.88	328.83
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	328.80	328.80
-1.0													
-2.0													
-3.0													
-4.0													
-5.0													
-6.0													
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-35.0													
-36.0													
-37.0													
-38.0													

Top of Stone Elevation

Top of Chamber Elevation

Bottom of Chamber Elevation

Bottom of Stone Elevation

Stage-Storage-Discharge Table

Elevation (m)	H (m)	Storage Volume (m ³)	Discharge from
			Orifice (m ³ /s)
328.80	-0.50	0.00	0.0000
328.83	-0.47	5.12	0.0000
328.85	-0.45	10.25	0.0000
328.88	-0.42	15.37	0.0000
328.90	-0.40	20.50	0.0000
328.93	-0.37	25.62	0.0000
328.95	-0.35	30.75	0.0000
328.98	-0.32	35.87	0.0000
329.00	-0.30	41.00	0.0000
329.03	-0.27	46.12	0.0000
329.05	-0.25	51.25	0.0000
329.08	-0.22	56.37	0.0000
329.10	-0.20	61.50	0.0000
329.13	-0.17	70.92	0.0000
329.16	-0.14	80.15	0.0000
329.18	-0.12	89.36	0.0000
329.21	-0.09	98.54	0.0000
329.23	-0.07	107.70	0.0000
329.26	-0.04	116.85	0.0000
329.28	-0.02	125.85	0.0000
329.31	0.01	134.82	0.0000
329.33	0.03	143.73	0.0002
329.36	0.06	152.53	0.0020
329.38	0.08	161.28	0.0044
329.41	0.11	169.98	0.0074
329.44	0.13	178.62	0.0109
329.46	0.16	187.21	0.0149
329.49	0.19	195.61	0.0193
329.51	0.21	203.91	0.0240
329.54	0.24	212.09	0.0292
329.56	0.26	220.12	0.0347
329.59	0.29	228.00	0.0405
329.61	0.31	235.69	0.0652
329.64	0.34	243.18	0.0721
329.66	0.36	250.39	0.0785
329.69	0.39	257.28	0.0844
329.71	0.41	263.73	0.0899
329.74	0.44	269.47	0.0950
329.77	0.47	274.83	0.0999
329.78	0.48	277.39	0.1023
329.80	0.50	282.52	0.1069
329.83	0.53	287.64	0.1113
329.85	0.55	292.77	0.1155
329.88	0.58	297.89	0.1196
329.90	0.60	303.02	0.1235
329.93	0.63	308.14	0.1273

Orifice 1:	
Type:	Circular Plate
Diameter:	300 mm
Area:	0.070686 m ²
Invert Elev:	329.3 m
CL Elev:	329.45 m
Discharge Coeff.:	0.62

$$Q = C_d A \sqrt{2gh}$$

where Q = flow (cubic metres per second)

C_d = coefficient of discharge

A = area of orifice (square metres)

g = acceleration from gravity (9.81 m/s²)

h = head acting on the centreline (m)?

LEGEND



MIDUSS CATCHMENT ID



TO EBYDALE DR.



TO MUNICIPAL
STM ON
OLDFIELD DR.

PROJECT:

COOK HOMES
30 Shaftsbury Dr., Kitchener

WALTERFEDY

KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

TITLE:

**MIDUSS PRE-DEVELOPMENT
SWM MODELING SCHEMATIC**

SCALE: NTS

DATE: 2025-11-18

DRAWN BY: SF

PROJECT NO.: 2025-0580-10

CHECKED BY: XX

FILE: MIDUSS SCHEMATIC

SHEET NO.:

FIG D-1

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LEGEND



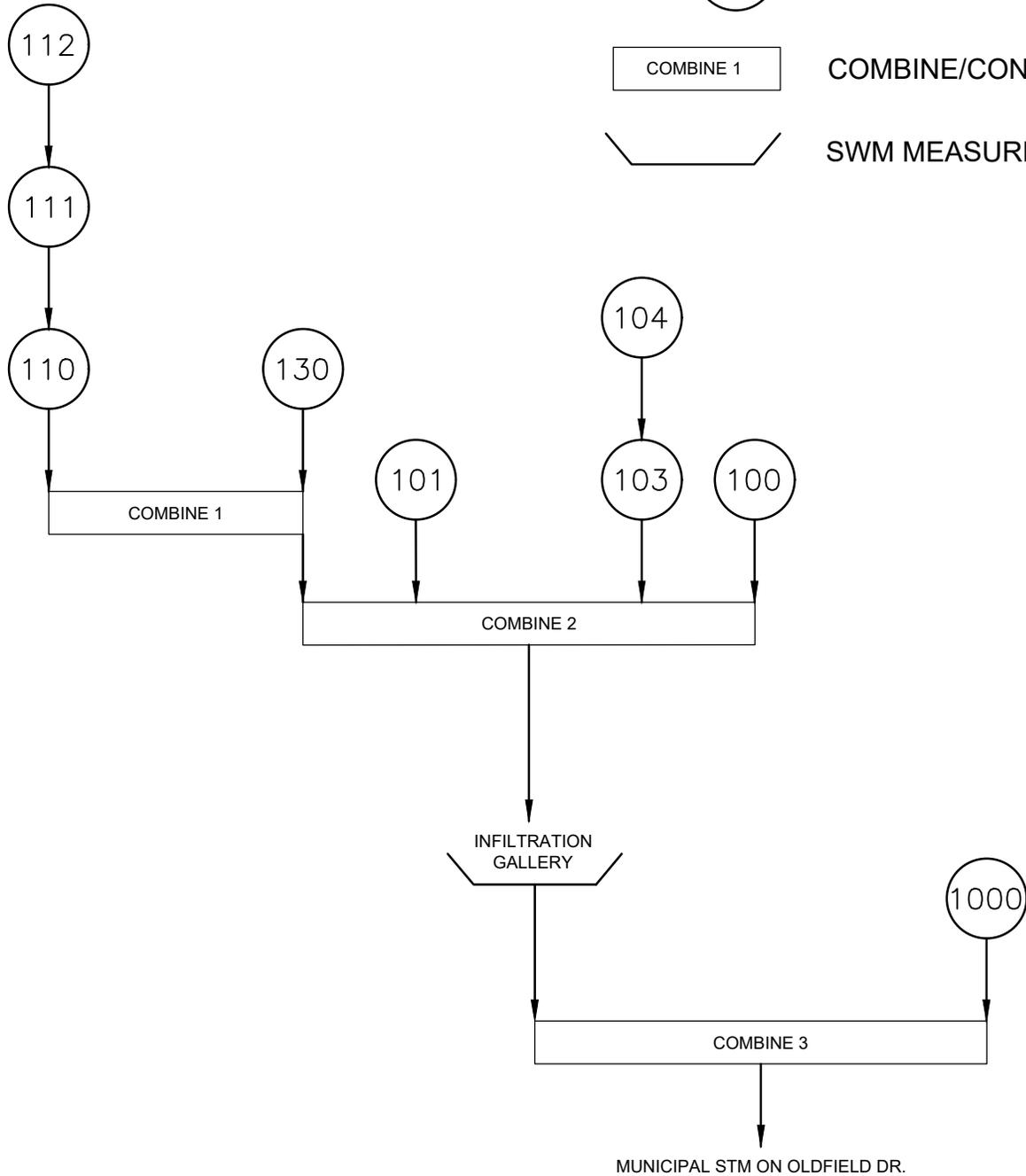
MIDUSS CATCHMENT ID



COMBINE/CONFLUENCE



SWM MEASURE



C:\Users\sfischer\DC\ACCDocs\WalterFedy\2025-0580-10 Hope Lutheran Church\Project Files\1. Published\1.05. CIVIL\1.05.1 Plot_Files\1.05.1.1 Figures\MIDUSS SCHEMATIC; Post-Dev; None; Samantha Fischer; 2025-11-18 12:01:56 PM

PROJECT:
COOK HOMES
 30 Shaftsbury Dr., Kitchener

WALTERFEDY

KITCHENER OFFICE
 675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
 T: 519.576.2150 F: 519.576.5499 walterfedy.com

TITLE:
**MIDUSS POST-DEVELOPMENT
 SWM MODELING SCHEMATIC**

SCALE: NTS	DATE: 2025-11-18
DRAWN BY: SF	PROJECT NO.: 2025-0580-10
CHECKED BY: XX	FILE: MIDUSS SCHEMATIC
SHEET NO.:	

FIG D-2

COPYRIGHT © 2025 WalterFedy

TABLE 1

DESIGN STORM PARAMETERS
FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

<i>Design Storm</i>	<i>Parameters</i>			<i>r</i>	<i>Duration (min)</i>
	<i>a</i>	<i>b</i>	<i>c</i>		
2-Year	743	6	0.799	0.4	180
5-Year	1593	11	0.879	0.4	180
10-Year	2221	12	0.908	0.4	180
25-Year	3158	15	0.936	0.4	180
50-Year	3886	16	0.95	0.4	180
100-Year	4688	17	0.962	0.4	180

TABLE 2
SUMMARY OF INPUT PARAMETERS
FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

Existing Conditions Catchment Parameters

Catchment	Percent Impervious	Total Area (hectares)	Flow Length (metres)	Overland Slope (%)	Pervious Area (hectares)	Pervious Flow Length (metres)	Pervious Slope (%)	Impervious Area (hectares)	Impervious Flow Length (metres)	Impervious Slope (%)	Pervious Manning's Number (n)	Pervious SCS Runoff Curve No.	Pervious Ia/S Coefficient	Pervious Initial Abstraction	Impervious Manning's Number (n)	Impervious SCS Runoff Curve No.	Impervious Ia/S Coefficient	Impervious Initial Abstraction
101	29	0.21	71	1.3	0.149	71	1.3	0.061	71	1.3	0.25	75	0.1	8.467	0.013	98	0.1	0.518
102	70	0.64	120	1.2	0.192	120	1.2	0.448	120	1.2	0.25	75	0.1	8.467	0.013	98	0.1	0.518

TABLE 3

SUMMARY OF CALCULATED RUNOFF VOLUMES
 FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

Existing Conditions Runoff Volumes

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
	<i>(m³)</i>	<i>(m³)</i>	<i>(m³)</i>	<i>(m³)</i>	<i>(m³)</i>	<i>(m³)</i>
101	26.48	43.29	56.23	74.43	89.36	104.93
102	142.17	210.35	259.82	326.58	379.6	432.72

TABLE 4

SUMMARY OF CALCULATED PEAK FLOW RATES
 FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

Existing Conditions Peak Flow Rates

	<u>2-Year</u>	<u>5-Year</u>	<u>10-Year</u>	<u>25-Year</u>	<u>50-Year</u>	<u>100-Year</u>
	<u>(m³/s)</u>	<u>(m³/s)</u>	<u>(m³/s)</u>	<u>(m³/s)</u>	<u>(m³/s)</u>	<u>(m³/s)</u>
101	0.013	0.018	0.022	0.027	0.031	0.036
102	0.094	0.132	0.162	0.188	0.213	0.237

TABLE 1

DESIGN STORM PARAMETERS
FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

<i>Design Storm</i>	<i>Parameters</i>			<i>r</i>	<i>Duration (min)</i>
	<i>a</i>	<i>b</i>	<i>c</i>		
2-Year	743	6	0.799	0.4	180
5-Year	1593	11	0.879	0.4	180
10-Year	2221	12	0.908	0.4	180
25-Year	3158	15	0.936	0.4	180
50-Year	3886	16	0.95	0.4	180
100-Year	4688	17	0.962	0.4	180

TABLE 2
SUMMARY OF INPUT PARAMETERS
FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

Proposed Conditions Catchment Parameters

Catchment	Percent Impervious	Total Area (hectares)	Flow Length (metres)	Overland Slope (%)	Pervious Area (hectares)	Pervious Flow Length (metres)	Pervious Slope (%)	Impervious Area (hectares)	Impervious Flow Length (metres)	Impervious Slope (%)	Pervious Manning's Number (n)	Pervious SCS Runoff Curve No.	Pervious Ia/S Coefficient	Pervious Initial Abstraction	Impervious Manning's Number (n)	Impervious SCS Runoff Curve No.	Impervious Ia/S Coefficient	Impervious Initial Abstraction
112	50	0.07	35	1.5	0.035	35	1.5	0.035	35	1.5	0.25	75	0.1	8.467	0.013	98	0.1	0.518
111	75	0.05	17.5	6.7	0.012	17.5	6.7	0.038	17.5	6.7	0.25	75	0.1	8.467	0.013	98	0.1	0.518
110	50	0.05	21.5	6.4	0.025	21.5	6.4	0.025	21.5	6.4	0.25	75	0.1	8.467	0.013	98	0.1	0.518
130	90	0.11	52	2	0.011	52	2	0.099	52	2	0.25	75	0.1	8.467	0.013	98	0.1	0.518
101	80	0.24	40	1.3	0.048	40	1.3	0.192	40	1.3	0.25	75	0.1	8.467	0.013	98	0.1	0.518
104	25	0.08	50	1	0.06	50	1	0.02	50	1	0.25	75	0.1	8.467	0.013	98	0.1	0.518
103	90	0.11	53	3.2	0.011	53	3.2	0.099	53	3.2	0.25	75	0.1	8.467	0.013	98	0.1	0.518
100	75	0.09	50	4.3	0.023	50	4.3	0.068	50	4.3	0.25	75	0.1	8.467	0.013	98	0.1	0.518
1000	75	0.05	43	2.7	0.012	43	2.7	0.038	43	2.7	0.25	75	0.1	8.467	0.013	98	0.1	0.518

TABLE 3

**SUMMARY OF CALCULATED RUNOFF VOLUMES
FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT**

Proposed Conditions Runoff Volumes

Catchment ID	2-Year <i>(m³)</i>	5-Year <i>(m³)</i>	10-Year <i>(m³)</i>	25-Year <i>(m³)</i>	50-Year <i>(m³)</i>	100-Year <i>(m³)</i>
112	12.17	18.77	23.65	30.37	35.85	41.44
111	11.36	16.67	20.38	25.43	29.39	33.39
110	8.63	13.25	16.6	21.28	25	28.8
130	29.18	42.2	51.59	64.08	73.92	83.79
101	58.15	85.2	104.69	130.94	151.63	172.75
104	9.36	15.57	20.34	27.16	32.84	38.71
103	29.12	42.33	51.74	64.14	74.05	83.98
100	20.81	30.77	37.87	47.5	55.14	62.88
1000	11.54	17.09	21.03	26.39	30.64	34.95
Total	53.37	150.44	216.27	304.85	376.25	449.55

TABLE 4

SUMMARY OF CALCULATED PEAK FLOW RATES
 FUNCTIONAL SERVICING AND STORM WATER MANAGEMENT ASSESSMENT REPORT

Proposed Conditions Peak Flows

Catchment ID	2-Year (m ³ /s)	5-Year (m ³ /s)	10-Year (m ³ /s)	25-Year (m ³ /s)	50-Year (m ³ /s)	100-Year (m ³ /s)
112	0.007	0.011	0.013	0.016	0.018	0.021
111	0.009	0.012	0.015	0.018	0.02	0.023
110	0.006	0.008	0.01	0.012	0.014	0.016
130	0.02	0.029	0.036	0.043	0.049	0.054
101	0.039	0.056	0.071	0.083	0.095	0.107
104	0.004	0.006	0.007	0.009	0.011	0.013
103	0.021	0.029	0.037	0.043	0.049	0.056
100	0.015	0.02	0.026	0.03	0.035	0.039
1000	0.008	0.011	0.014	0.017	0.019	0.022
Total	0.01	0.02	0.04	0.08	0.10	0.13

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"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
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"          05.02.Analysis\SW\MIDUSS\Pre-Development\2-yr Existing"
"          Output filename:                   2yr-Ex.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-17 at 2:48:51 PM"

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"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          743.000 Coefficient A"
"          6.000  Constant B"
"          0.799  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          109.374  mm/hr"
"          Total depth                34.259  mm"
"          6  002hyd  Hydrograph extension used in this file"

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```

" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101 No description"
"          29.000 % Impervious"
"          0.210  Total Area"
"          71.000 Flow length"
"          1.300  Overland Slope"
"          0.149  Pervious Area"
"          71.000 Pervious length"
"          1.300  Pervious slope"
"          0.061  Impervious Area"
"          71.000 Impervious length"
"          1.300  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.176  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.839  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"		0.013	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	50.171	3.869	19.568		minutes"
"	Time to Centroid	164.392	93.885	117.789		minutes"
"	Rainfall depth	34.259	34.259	34.259		mm"
"	Rainfall volume	51.08	20.86	71.94		c.m"
"	Rainfall losses	28.238	5.523	21.651		mm"
"	Runoff depth	6.021	28.736	12.608		mm"
"	Runoff volume	8.98	17.50	26.48		c.m"
"	Runoff coefficient	0.176	0.839	0.368		"
"	Maximum flow	0.001	0.013	0.013		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.013	0.013	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.013	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.176	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.851	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.094	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	70.411	5.430	10.715		minutes"
"	Time to Centroid	189.030	96.147	103.701		minutes"
"	Rainfall depth	34.259	34.259	34.259		mm"
"	Rainfall volume	65.78	153.48	219.25		c.m"

"	Rainfall losses	28.236	5.105	12.044	mm"
"	Runoff depth	6.022	29.154	22.214	mm"
"	Runoff volume	11.56	130.61	142.17	c.m"
"	Runoff coefficient	0.176	0.851	0.648	"
"	Maximum flow	0.001	0.093	0.094	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.094	0.094	0.000	0.000"
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			0.850	hectare"
"	Total Impervious area			0.509	hectare"
"	Total % impervious			59.871"	
" 19	EXIT"				

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"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
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"          05.02.Analysis\SW\MIDUSS\Pre-Development\5-yr Existing"
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"          Licensee name:                      Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:              2025-11-17 at 2:50:39 PM"

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"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1593.000 Coefficient A"
"          11.000  Constant B"
"          0.879  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
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"          Total depth                47.265  mm"
"          6  005hyd  Hydrograph extension used in this file"

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" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  No description"
"          29.000 % Impervious"
"          0.210  Total Area"
"          71.000 Flow length"
"          1.300  Overland Slope"
"          0.149  Pervious Area"
"          71.000 Pervious length"
"          1.300  Pervious slope"
"          0.061  Impervious Area"
"          71.000 Impervious length"
"          1.300  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.258  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.872  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"		0.018	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	36.505	3.468	17.339		minutes"
"	Time to Centroid	143.257	91.069	112.982		minutes"
"	Rainfall depth	47.265	47.265	47.265		mm"
"	Rainfall volume	70.47	28.78	99.26		c.m"
"	Rainfall losses	35.075	6.030	26.652		mm"
"	Runoff depth	12.190	41.234	20.613		mm"
"	Runoff volume	18.18	25.11	43.29		c.m"
"	Runoff coefficient	0.258	0.872	0.436		"
"	Maximum flow	0.004	0.017	0.018		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.018	0.018	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.018	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.258	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.883	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.132	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	51.231	4.867	10.025		minutes"
"	Time to Centroid	161.446	93.076	100.683		minutes"
"	Rainfall depth	47.265	47.265	47.265		mm"
"	Rainfall volume	90.75	211.75	302.49		c.m"

"	Rainfall losses	35.075	5.535	14.397	mm"
"	Runoff depth	12.190	41.729	32.867	mm"
"	Runoff volume	23.40	186.95	210.35	c.m"
"	Runoff coefficient	0.258	0.883	0.695	"
"	Maximum flow	0.004	0.131	0.132	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.132 0.132 0.000 0.000"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.850	hectare"	
"	Total Impervious area		0.509	hectare"	
"	Total % impervious		59.871"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\2025-11-11 Pre-Dev\10-yr Existing"
"          Output filename:                   Existing_10yr.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-11 at 3:17:38 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          2221.000 Coefficient A"
"          12.000  Constant B"
"          0.908   Exponent C"
"          0.400   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity                   169.551   mm/hr"
"          Total depth                         56.290   mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  No description"
"          29.000 % Impervious"
"          0.210  Total Area"
"          71.000 Flow length"
"          1.300  Overland Slope"
"          0.149  Pervious Area"
"          71.000 Pervious length"
"          1.300  Pervious slope"
"          0.061  Impervious Area"
"          71.000 Impervious length"
"          1.300  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.306  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.890  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"		0.022	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	30.781	3.190	15.812		minutes"
"	Time to Centroid	134.465	89.654	110.153		minutes"
"	Rainfall depth	56.290	56.290	56.290		mm"
"	Rainfall volume	83.93	34.28	118.21		c.m"
"	Rainfall losses	39.038	6.195	29.514		mm"
"	Runoff depth	17.252	50.095	26.777		mm"
"	Runoff volume	25.72	30.51	56.23		c.m"
"	Runoff coefficient	0.306	0.890	0.476		"
"	Maximum flow	0.007	0.021	0.022		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.022	0.022	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.022	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.307	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.899	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.162	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	43.199	4.477	9.416		minutes"
"	Time to Centroid	150.077	91.493	98.965		minutes"
"	Rainfall depth	56.290	56.290	56.290		mm"
"	Rainfall volume	108.08	252.18	360.26		c.m"

"	Rainfall losses	39.031	5.691	15.693	mm"
"	Runoff depth	17.259	50.599	40.597	mm"
"	Runoff volume	33.14	226.68	259.82	c.m"
"	Runoff coefficient	0.307	0.899	0.721	"
"	Maximum flow	0.007	0.161	0.162	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.162 0.162 0.000 0.000"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.850	hectare"	
"	Total Impervious area		0.509	hectare"	
"	Total % impervious		59.871"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\2025-11-11 Pre-Dev\25-yr Existing"
"          Output filename:                    Existing_25yr.out"
"          Licensee name:                      Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:              2025-11-11 at 3:22:53 PM"

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" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          3158.000 Coefficient A"
"          15.000  Constant B"
"          0.936  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          191.557  mm/hr"
"          Total depth                68.266  mm"
"          6  025hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  No description"
"          29.000 % Impervious"
"          0.210  Total Area"
"          71.000 Flow length"
"          1.300  Overland Slope"
"          0.149  Pervious Area"
"          71.000 Pervious length"
"          1.300  Pervious slope"
"          0.061  Impervious Area"
"          71.000 Impervious length"
"          1.300  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.362  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.903  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"		0.027	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	26.949	3.026	14.885		minutes"
"	Time to Centroid	128.198	88.881	108.371		minutes"
"	Rainfall depth	68.266	68.266	68.266		mm"
"	Rainfall volume	101.78	41.57	143.36		c.m"
"	Rainfall losses	43.522	6.637	32.825		mm"
"	Runoff depth	24.744	61.629	35.441		mm"
"	Runoff volume	36.89	37.53	74.43		c.m"
"	Runoff coefficient	0.362	0.903	0.519		"
"	Maximum flow	0.011	0.025	0.027		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.027	0.027	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.027	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.362	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.913	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.188	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	37.821	4.247	9.130		minutes"
"	Time to Centroid	141.761	90.614	98.053		minutes"
"	Rainfall depth	68.266	68.266	68.266		mm"
"	Rainfall volume	131.07	305.83	436.90		c.m"

"	Rainfall losses	43.529	5.971	17.239	mm"
"	Runoff depth	24.737	62.295	51.028	mm"
"	Runoff volume	47.50	279.08	326.58	c.m"
"	Runoff coefficient	0.362	0.913	0.747	"
"	Maximum flow	0.011	0.186	0.188	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.188 0.188 0.000 0.000"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.850	hectare"	
"	Total Impervious area		0.509	hectare"	
"	Total % impervious		59.871"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\2025-11-11 Pre-Dev\50-yr Existing"
"          Output filename:                    Existing_50yr.out"
"          Licensee name:                      Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:              2025-11-11 at 3:24:22 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          3886.000 Coefficient A"
"          16.000  Constant B"
"          0.950  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    215.802  mm/hr"
"          Total depth                          77.647  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  No description"
"          29.000  % Impervious"
"          0.210  Total Area"
"          71.000  Flow length"
"          1.300  Overland Slope"
"          0.149  Pervious Area"
"          71.000  Pervious length"
"          1.300  Pervious slope"
"          0.061  Impervious Area"
"          71.000  Impervious length"
"          1.300  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious SCS Curve No."
"          0.400  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.909  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

"		0.031	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	24.451	2.879	14.071		minutes"
"	Time to Centroid	124.233	88.265	106.926		minutes"
"	Rainfall depth	77.647	77.647	77.647		mm"
"	Rainfall volume	115.77	47.29	163.06		c.m"
"	Rainfall losses	46.555	7.044	35.097		mm"
"	Runoff depth	31.092	70.603	42.551		mm"
"	Runoff volume	46.36	43.00	89.36		c.m"
"	Runoff coefficient	0.400	0.909	0.548		"
"	Maximum flow	0.015	0.028	0.031		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.031	0.031	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.031	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.400	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.920	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.213	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	34.315	4.041	8.801		minutes"
"	Time to Centroid	136.576	89.920	97.256		minutes"
"	Rainfall depth	77.647	77.647	77.647		mm"
"	Rainfall volume	149.08	347.86	496.94		c.m"

"	Rainfall losses	46.558	6.239	18.335	mm"
"	Runoff depth	31.089	71.408	59.312	mm"
"	Runoff volume	59.69	319.91	379.60	c.m"
"	Runoff coefficient	0.400	0.920	0.764	"
"	Maximum flow	0.015	0.210	0.213	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.213	0.213	0.000	0.000"
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			0.850	hectare"
"	Total Impervious area			0.509	hectare"
"	Total % impervious			59.871"	
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\2025-11-11 Pre-Dev\100-yr Existing"
"          Output filename:                   Existing_100yr.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-11 at 3:25:48 PM"

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" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          4688.000 Coefficient A"
"          17.000  Constant B"
"          0.962  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          239.354  mm/hr"
"          Total depth                87.079  mm"
"          6  100hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101 No description"
"          29.000 % Impervious"
"          0.210 Total Area"
"          71.000 Flow length"
"          1.300 Overland Slope"
"          0.149 Pervious Area"
"          71.000 Pervious length"
"          1.300 Pervious slope"
"          0.061 Impervious Area"
"          71.000 Impervious length"
"          1.300 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.434 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          8.467 Pervious Initial abstraction"
"          0.013 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.916 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

"		0.036	0.000	0.000	0.000	c.m/sec"
"	Catchment 101		Pervious	Impervious	Total Area	"
"	Surface Area	0.149	0.061	0.210		hectare"
"	Time of concentration	22.540	2.758	13.377		minutes"
"	Time to Centroid	121.087	87.771	105.655		minutes"
"	Rainfall depth	87.079	87.079	87.079		mm"
"	Rainfall volume	129.84	53.03	182.87		c.m"
"	Rainfall losses	49.302	7.273	37.113		mm"
"	Runoff depth	37.777	79.806	49.966		mm"
"	Runoff volume	56.33	48.60	104.93		c.m"
"	Runoff coefficient	0.434	0.916	0.574		"
"	Maximum flow	0.019	0.032	0.036		c.m/sec"
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"		0.036	0.036	0.000	0.000	"
" 40	HYDROGRAPH Start - New Tributary"					
"	2	Start - New Tributary"				
"		0.036	0.000	0.000	0.000	"
" 33	CATCHMENT 102"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	102	South side"				
"	70.000	% Impervious"				
"	0.640	Total Area"				
"	120.000	Flow length"				
"	1.200	Overland Slope"				
"	0.192	Pervious Area"				
"	120.000	Pervious length"				
"	1.200	Pervious slope"				
"	0.448	Impervious Area"				
"	120.000	Impervious length"				
"	1.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.434	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.923	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.237	0.000	0.000	0.000	c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.192	0.448	0.640		hectare"
"	Time of concentration	31.633	3.871	8.530		minutes"
"	Time to Centroid	132.497	89.359	96.598		minutes"
"	Rainfall depth	87.079	87.079	87.079		mm"
"	Rainfall volume	167.19	390.11	557.31		c.m"

"	Rainfall losses	49.260	6.698	19.467	mm"
"	Runoff depth	37.819	80.381	67.612	mm"
"	Runoff volume	72.61	360.11	432.72	c.m"
"	Runoff coefficient	0.434	0.923	0.776	"
"	Maximum flow	0.020	0.232	0.237	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.237	0.237	0.000	0.000"
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			0.850	hectare"
"	Total Impervious area			0.509	hectare"
"	Total % impervious			59.871"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\be11\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\2-yr"
"          Output filename:                   Post-2yr.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-17 at 4:52:26 PM"

```

```

" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          743.000 Coefficient A"
"          6.000  Constant B"
"          0.799  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                109.374  mm/hr"
"          Total depth                       34.259  mm"
"          6  002hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 112"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          112 No description"
"          50.000 % Impervious"
"          0.070  Total Area"
"          35.000 Flow length"
"          1.500  Overland Slope"
"          0.035  Pervious Area"
"          35.000 Pervious length"
"          1.500  Pervious slope"
"          0.035  Impervious Area"
"          35.000 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.176  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.839  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

	0.007	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	31.441	2.425	7.446	minutes"
"	Time to Centroid	141.600	91.591	100.245	minutes"
"	Rainfall depth	34.259	34.259	34.259	mm"
"	Rainfall volume	11.99	11.99	23.98	c.m"
"	Rainfall losses	28.241	5.507	16.874	mm"
"	Runoff depth	6.017	28.752	17.384	mm"
"	Runoff volume	2.11	10.06	12.17	c.m"
"	Runoff coefficient	0.176	0.839	0.507	"
"	Maximum flow	0.000	0.007	0.007	c.m/sec"

" 40 HYDROGRAPH Add Runoff "
 " 4 Add Runoff "

" 0.007 0.007 0.000 0.000"

33	CATCHMENT 111"
"	1 Triangular SCS"
"	1 Equal length"
"	1 SCS method"
"	111 No description"
"	75.000 % Impervious"
"	0.050 Total Area"
"	17.500 Flow length"
"	6.700 Overland Slope"
"	0.012 Pervious Area"
"	17.500 Pervious length"
"	6.700 Pervious slope"
"	0.038 Impervious Area"
"	17.500 Impervious length"
"	6.700 Impervious slope"
"	0.250 Pervious Manning 'n'"
"	75.000 Pervious SCS Curve No."
"	0.175 Pervious Runoff coefficient"
"	0.100 Pervious Ia/S coefficient"
"	8.467 Pervious Initial abstraction"
"	0.013 Impervious Manning 'n'"
"	98.000 Impervious SCS Curve No."
"	0.826 Impervious Runoff coefficient"
"	0.100 Impervious Ia/S coefficient"
"	0.518 Impervious Initial abstraction"

" 0.009 0.007 0.000 0.000 c.m/sec"

	0.009	0.007	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	13.240	1.021	1.829	minutes"
"	Time to Centroid	119.472	89.337	91.329	minutes"
"	Rainfall depth	34.259	34.259	34.259	mm"
"	Rainfall volume	4.28	12.85	17.13	c.m"
"	Rainfall losses	28.252	5.970	11.541	mm"
"	Runoff depth	6.007	28.288	22.718	mm"
"	Runoff volume	0.75	10.61	11.36	c.m"

"	Runoff coefficient	0.175	0.826	0.663	"
"	Maximum flow	0.000	0.009	0.009	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.009	0.016	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.175 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.833 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.006	0.016	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	15.188	1.171	3.611	minutes"
"	Time to Centroid	121.824	89.628	95.232	minutes"
"	Rainfall depth	34.259	34.259	34.259	mm"
"	Rainfall volume	8.56	8.56	17.13	c.m"
"	Rainfall losses	28.247	5.732	16.990	mm"
"	Runoff depth	6.012	28.526	17.269	mm"
"	Runoff volume	1.50	7.13	8.63	c.m"
"	Runoff coefficient	0.175	0.833	0.504	"
"	Maximum flow	0.001	0.006	0.006	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.006	0.022	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.006	0.022	0.022	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.022   c.m/sec"
"      Hydrograph volume     32.162   c.m"
"      0.006   0.022   0.022   0.022"
" 40    HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.006   0.000   0.022   0.022"
" 33    CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130 No description"
"      90.000 % Impervious"
"      0.110 Total Area"
"      52.000 Flow length"
"      2.000 Overland Slope"
"      0.011 Pervious Area"
"      52.000 Pervious length"
"      2.000 Pervious slope"
"      0.099 Impervious Area"
"      52.000 Impervious length"
"      2.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.176 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.841 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"      0.020   0.000   0.022   0.022 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011    0.099    0.110    hectare"
"      Time of concentration 36.575    2.821    3.587    minutes"
"      Time to Centroid 147.842    92.227    93.490    minutes"
"      Rainfall depth    34.259    34.259    34.259    mm"
"      Rainfall volume    3.77     33.92    37.68    c.m"
"      Rainfall losses    28.237    5.457    7.735    mm"
"      Runoff depth       6.021    28.802    26.524    mm"
"      Runoff volume      0.66     28.51    29.18    c.m"
"      Runoff coefficient  0.176    0.841    0.774    "
"      Maximum flow      0.000    0.020    0.020    c.m/sec"
" 40    HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.020   0.020   0.022   0.022"
" 40    HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.020	0.020	0.020	0.022"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow		0.043	c.m/sec"
"		Hydrograph volume		61.338	c.m"
"		0.020	0.020	0.020	0.043"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow		0.043	c.m/sec"
"		Hydrograph volume		61.338	c.m"
"		0.020	0.043	0.020	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.020	0.043	0.043	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow		0.043	c.m/sec"
"		Hydrograph volume		61.338	c.m"
"		0.020	0.043	0.043	0.043"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.020	0.000	0.043	0.043"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.176	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

"	0.840	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.039	0.000	0.043	0.043 c.m/sec"
"		Catchment 101	Pervious	Impervious	Total Area "
"		Surface Area	0.048	0.192	0.240 hectare"
"		Time of concentration	35.558	2.742	4.373 minutes"
"		Time to Centroid	146.604	92.099	94.807 minutes"
"		Rainfall depth	34.259	34.259	34.259 mm"
"		Rainfall volume	16.44	65.78	82.22 c.m"
"		Rainfall losses	28.239	5.475	10.028 mm"
"		Runoff depth	6.020	28.784	24.231 mm"
"		Runoff volume	2.89	55.26	58.15 c.m"
"		Runoff coefficient	0.176	0.840	0.707 "
"		Maximum flow	0.001	0.039	0.039 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"		4 Add Runoff "			
"		0.039	0.039	0.043	0.043"
" 40		HYDROGRAPH Copy to Outflow"			
"		8 Copy to Outflow"			
"		0.039	0.039	0.039	0.043"
" 40		HYDROGRAPH Combine 2"			
"		6 Combine "			
"		2 Node #"			
"		"			
"		Maximum flow		0.082	c.m/sec"
"		Hydrograph volume		119.493	c.m"
"		0.039	0.039	0.039	0.082"
" 40		HYDROGRAPH Start - New Tributary"			
"		2 Start - New Tributary"			
"		0.039	0.000	0.039	0.082"
" 33		CATCHMENT 104"			
"		1 Triangular SCS"			
"		1 Equal length"			
"		1 SCS method"			
"		104 No description"			
"	25.000	% Impervious"			
"	0.080	Total Area"			
"	50.000	Flow length"			
"	1.000	Overland Slope"			
"	0.060	Pervious Area"			
"	50.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.020	Impervious Area"			
"	50.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.176	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			

"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.838	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.004	0.000	0.039	0.082 c.m/sec"	
"		Catchment 104	Pervious	Impervious	Total Area	"
"		Surface Area	0.060	0.020	0.080	hectare"
"		Time of concentration	43.981	3.392	19.062	minutes"
"		Time to Centroid	156.860	93.151	117.747	minutes"
"		Rainfall depth	34.259	34.259	34.259	mm"
"		Rainfall volume	20.56	6.85	27.41	c.m"
"		Rainfall losses	28.238	5.539	22.564	mm"
"		Runoff depth	6.020	28.719	11.695	mm"
"		Runoff volume	3.61	5.74	9.36	c.m"
"		Runoff coefficient	0.176	0.838	0.341	"
"		Maximum flow	0.001	0.004	0.004	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"		4 Add Runoff "				
"		0.004	0.004	0.039	0.082"	
" 33		CATCHMENT 103"				
"		1 Triangular SCS"				
"		1 Equal length"				
"		1 SCS method"				
"		103 No description"				
"	90.000	% Impervious"				
"	0.110	Total Area"				
"	53.000	Flow length"				
"	3.200	Overland Slope"				
"	0.011	Pervious Area"				
"	53.000	Pervious length"				
"	3.200	Pervious slope"				
"	0.099	Impervious Area"				
"	53.000	Impervious length"				
"	3.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.176	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.839	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.021	0.004	0.039	0.082 c.m/sec"	
"		Catchment 103	Pervious	Impervious	Total Area	"
"		Surface Area	0.011	0.099	0.110	hectare"
"		Time of concentration	32.130	2.478	3.152	minutes"

"	Time to Centroid	142.435	91.672	92.826	minutes"
"	Rainfall depth	34.259	34.259	34.259	mm"
"	Rainfall volume	3.77	33.92	37.68	c.m"
"	Rainfall losses	28.241	5.514	7.787	mm"
"	Runoff depth	6.018	28.744	26.472	mm"
"	Runoff volume	0.66	28.46	29.12	c.m"
"	Runoff coefficient	0.176	0.839	0.773	"
"	Maximum flow	0.000	0.021	0.021	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.021 0.025 0.039 0.082"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.021 0.025 0.025 0.082"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow	0.107			c.m/sec"
"	Hydrograph volume	157.968			c.m"
"	0.021 0.025 0.025 0.107"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.021 0.000 0.025 0.107"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.176 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.841 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.015 0.000 0.025 0.107 c.m/sec"				

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	28.394	2.190	3.895	minutes"
"	Time to Centroid	137.889	91.233	94.269	minutes"
"	Rainfall depth	34.259	34.259	34.259	mm"
"	Rainfall volume	7.71	23.12	30.83	c.m"
"	Rainfall losses	28.242	5.441	11.141	mm"
"	Runoff depth	6.017	28.817	23.117	mm"
"	Runoff volume	1.35	19.45	20.81	c.m"
"	Runoff coefficient	0.176	0.841	0.675	"
"	Maximum flow	0.000	0.015	0.015	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.015	0.015	0.025	0.107"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.015	0.015	0.015	0.107"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"					
"		Maximum flow	0.121		c.m/sec"
"		Hydrograph volume	178.773		c.m"
"		0.015	0.015	0.015	0.121"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"					
"		Maximum flow	0.121		c.m/sec"
"		Hydrograph volume	178.773		c.m"
"		0.015	0.121	0.015	0.000"
" 54	POND DESIGN"				
"	0.121	Current peak flow	c.m/sec"		
"	0.094	Target outflow	c.m/sec"		
"	178.8	Hydrograph volume	c.m"		
"	46.	Number of stages"			
"	328.800	Minimum water level	metre"		
"	329.930	Maximum water level	metre"		
"	328.800	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	328.800	0.000	0.000"		
"	328.830	1.00E-07	5.120"		
"	328.850	1.00E-07	10.250"		
"	328.880	1.00E-07	15.370"		
"	328.900	1.00E-07	20.500"		
"	328.930	1.00E-07	25.620"		
"	328.950	1.00E-07	30.750"		
"	328.980	1.00E-07	35.870"		
"	329.000	1.00E-07	41.000"		

"	329.030	1.00E-07	46.120"		
"	329.050	1.00E-07	51.250"		
"	329.080	1.00E-07	56.370"		
"	329.100	1.00E-07	61.500"		
"	329.130	1.00E-07	70.920"		
"	329.160	1.00E-07	80.150"		
"	329.180	1.00E-07	89.360"		
"	329.210	1.00E-07	98.540"		
"	329.230	1.00E-07	107.700"		
"	329.260	1.00E-07	116.850"		
"	329.280	1.00E-07	125.850"		
"	329.310	1.00E-07	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.005	c.m/sec"	
"	Maximum level		329.381	metre"	
"	Maximum storage		161.635	c.m"	
"	Centroidal lag		5.369	hours"	
"	0.015	0.121	0.005	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.005	c.m/sec"	
"	Hydrograph volume		41.824	c.m"	
"	0.015	0.121	0.005	0.005"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.015      0.000      0.005      0.005"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050  Total Area"
"      43.000  Flow length"
"      2.700  Overland Slope"
"      0.012  Pervious Area"
"      43.000  Pervious length"
"      2.700  Pervious slope"
"      0.038  Impervious Area"
"      43.000  Impervious length"
"      2.700  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious SCS Curve No."
"      0.176  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      8.467  Pervious Initial abstraction"
"      0.013  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.840  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"              0.008      0.000      0.005      0.005 c.m/sec"
"      Catchment 1000      Pervious      Impervious      Total Area      "
"      Surface Area      0.012      0.038      0.050      hectare"
"      Time of concentration      29.823      2.300      4.095      minutes"
"      Time to Centroid      139.631      91.395      94.540      minutes"
"      Rainfall depth      34.259      34.259      34.259      mm"
"      Rainfall volume      4.28      12.85      17.13      c.m"
"      Rainfall losses      28.238      5.485      11.173      mm"
"      Runoff depth      6.021      28.773      23.085      mm"
"      Runoff volume      0.75      10.79      11.54      c.m"
"      Runoff coefficient      0.176      0.840      0.674      "
"      Maximum flow      0.000      0.008      0.008      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"              0.008      0.008      0.005      0.005"
" 40      HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"
"              0.008      0.008      0.008      0.005"
" 40      HYDROGRAPH Combine 3"
"      6  Combine "
"      3  Node #"
"      "
"      Maximum flow      0.008      c.m/sec"

```

"	Hydrograph volume	53.367	c.m"	
"	0.008 0.008	0.008	0.008"	
" 40	HYDROGRAPH Confluence	3"		
"	7 Confluence "			
"	3 Node #"			
"	"			
"	Maximum flow	0.008	c.m/sec"	
"	Hydrograph volume	53.367	c.m"	
"	0.008 0.008	0.008	0.000"	
" 38	START/RE-START TOTALS 3"			
"	3 Runoff Totals on EXIT"			
"	Total Catchment area	0.850	hectare"	
"	Total Impervious area	0.613	hectare"	
"	Total % impervious	72.059"		
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\be11\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\5-yr"
"          Output filename:                   5-yr-POST.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-17 at 5:22:43 PM"

```

```

" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1593.000 Coefficient A"
"          11.000  Constant B"
"          0.879  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          139.288  mm/hr"
"          Total depth                47.265  mm"
"          6  005hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 112"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          112  No description"
"          50.000 % Impervious"
"          0.070  Total Area"
"          35.000 Flow length"
"          1.500  Overland Slope"
"          0.035  Pervious Area"
"          35.000 Pervious length"
"          1.500  Pervious slope"
"          0.035  Impervious Area"
"          35.000 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.258  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.877  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

	0.011	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	22.877	2.173	6.875	minutes"
"	Time to Centroid	126.432	89.056	97.543	minutes"
"	Rainfall depth	47.265	47.265	47.265	mm"
"	Rainfall volume	16.54	16.54	33.09	c.m"
"	Rainfall losses	35.088	5.818	20.453	mm"
"	Runoff depth	12.177	41.447	26.812	mm"
"	Runoff volume	4.26	14.51	18.77	c.m"
"	Runoff coefficient	0.258	0.877	0.567	"
"	Maximum flow	0.001	0.010	0.011	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.011	0.011	0.000	0.000"
--	-------	-------	-------	--------

" 33 CATCHMENT 111"

" 1 Triangular SCS"

" 1 Equal length"

" 1 SCS method"

" 111 No description"

" 75.000 % Impervious"

" 0.050 Total Area"

" 17.500 Flow length"

" 6.700 Overland Slope"

" 0.012 Pervious Area"

" 17.500 Pervious length"

" 6.700 Pervious slope"

" 0.038 Impervious Area"

" 17.500 Impervious length"

" 6.700 Impervious slope"

" 0.250 Pervious Manning 'n'"

" 75.000 Pervious SCS Curve No."

" 0.256 Pervious Runoff coefficient"

" 0.100 Pervious Ia/S coefficient"

" 8.467 Pervious Initial abstraction"

" 0.013 Impervious Manning 'n'"

" 98.000 Impervious SCS Curve No."

" 0.855 Impervious Runoff coefficient"

" 0.100 Impervious Ia/S coefficient"

" 0.518 Impervious Initial abstraction"

	0.012	0.011	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	9.633	0.915	1.708	minutes"
"	Time to Centroid	110.103	87.262	89.339	minutes"
"	Rainfall depth	47.265	47.265	47.265	mm"
"	Rainfall volume	5.91	17.72	23.63	c.m"
"	Rainfall losses	35.145	6.864	13.934	mm"
"	Runoff depth	12.120	40.401	33.330	mm"
"	Runoff volume	1.51	15.15	16.67	c.m"

"	Runoff coefficient	0.256	0.855	0.705	"
"	Maximum flow	0.001	0.012	0.012	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.012	0.023	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.258 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.864 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.008	0.023	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	11.051	1.050	3.347	minutes"
"	Time to Centroid	111.822	87.458	93.054	minutes"
"	Rainfall depth	47.265	47.265	47.265	mm"
"	Rainfall volume	11.82	11.82	23.63	c.m"
"	Rainfall losses	35.092	6.437	20.765	mm"
"	Runoff depth	12.173	40.827	26.500	mm"
"	Runoff volume	3.04	10.21	13.25	c.m"
"	Runoff coefficient	0.258	0.864	0.561	"
"	Maximum flow	0.001	0.008	0.008	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.008	0.031	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.008	0.031	0.031	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.031  c.m/sec"
"      Hydrograph volume     48.684  c.m"
"      0.008    0.031    0.031    0.031"
" 40  HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.008    0.000    0.031    0.031"
" 33  CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130  No description"
"      90.000  % Impervious"
"      0.110  Total Area"
"      52.000  Flow length"
"      2.000  Overland Slope"
"      0.011  Pervious Area"
"      52.000  Pervious length"
"      2.000  Pervious slope"
"      0.099  Impervious Area"
"      52.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious SCS Curve No."
"      0.258  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      8.467  Pervious Initial abstraction"
"      0.013  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.873  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"      0.029    0.000    0.031    0.031 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011    0.099    0.110    hectare"
"      Time of concentration  26.612    2.528    3.293    minutes"
"      Time to Centroid    131.032    89.652    90.966    minutes"
"      Rainfall depth      47.265    47.265    47.265    mm"
"      Rainfall volume     5.20     46.79    51.99    c.m"
"      Rainfall losses     35.082    5.992    8.901    mm"
"      Runoff depth        12.183    41.273    38.364    mm"
"      Runoff volume       1.34     40.86    42.20    c.m"
"      Runoff coefficient   0.258    0.873    0.812    "
"      Maximum flow       0.000    0.029    0.029    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.029    0.029    0.031    0.031"
" 40  HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.029	0.029	0.029	0.031"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow		0.060	c.m/sec"
"		Hydrograph volume		90.884	c.m"
"		0.029	0.029	0.029	0.060"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow		0.060	c.m/sec"
"		Hydrograph volume		90.884	c.m"
"		0.029	0.060	0.029	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.029	0.060	0.060	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow		0.060	c.m/sec"
"		Hydrograph volume		90.884	c.m"
"		0.029	0.060	0.060	0.060"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.029	0.000	0.060	0.060"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.258	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

"	0.874	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.056	0.000	0.060	0.060 c.m/sec"	
"		Catchment 101	Pervious	Impervious	Total Area	"
"		Surface Area	0.048	0.192	0.240	hectare"
"		Time of concentration	25.872	2.458	4.064	minutes"
"		Time to Centroid	130.127	89.534	92.319	minutes"
"		Rainfall depth	47.265	47.265	47.265	mm"
"		Rainfall volume	22.69	90.75	113.44	c.m"
"		Rainfall losses	35.087	5.934	11.765	mm"
"		Runoff depth	12.177	41.331	35.500	mm"
"		Runoff volume	5.85	79.35	85.20	c.m"
"		Runoff coefficient	0.258	0.874	0.751	"
"		Maximum flow	0.002	0.056	0.056	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.056	0.056	0.060	0.060"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.056	0.056	0.056	0.060"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"		"				
"		Maximum flow		0.116	c.m/sec"	
"		Hydrograph volume		176.084	c.m"	
"		0.056	0.056	0.056	0.116"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.056	0.000	0.056	0.116"	
" 33		CATCHMENT 104"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	104	No description"				
"	25.000	% Impervious"				
"	0.080	Total Area"				
"	50.000	Flow length"				
"	1.000	Overland Slope"				
"	0.060	Pervious Area"				
"	50.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.020	Impervious Area"				
"	50.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.258	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				

"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.874	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.006	0.000	0.056	0.116 c.m/sec"	
"		Catchment 104	Pervious	Impervious	Total Area	"
"		Surface Area	0.060	0.020	0.080	hectare"
"		Time of concentration	32.001	3.040	16.632	minutes"
"		Time to Centroid	137.698	90.410	112.604	minutes"
"		Rainfall depth	47.265	47.265	47.265	mm"
"		Rainfall volume	28.36	9.45	37.81	c.m"
"		Rainfall losses	35.084	5.949	27.801	mm"
"		Runoff depth	12.180	41.315	19.464	mm"
"		Runoff volume	7.31	8.26	15.57	c.m"
"		Runoff coefficient	0.258	0.874	0.412	"
"		Maximum flow	0.002	0.006	0.006	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"		4 Add Runoff "				
"		0.006	0.006	0.056	0.116"	
" 33		CATCHMENT 103"				
"		1 Triangular SCS"				
"		1 Equal length"				
"		1 SCS method"				
"		103 No description"				
"	90.000	% Impervious"				
"	0.110	Total Area"				
"	53.000	Flow length"				
"	3.200	Overland Slope"				
"	0.011	Pervious Area"				
"	53.000	Pervious length"				
"	3.200	Pervious slope"				
"	0.099	Impervious Area"				
"	53.000	Impervious length"				
"	3.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.258	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.876	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.029	0.006	0.056	0.116 c.m/sec"	
"		Catchment 103	Pervious	Impervious	Total Area	"
"		Surface Area	0.011	0.099	0.110	hectare"
"		Time of concentration	23.378	2.221	2.890	minutes"

"	Time to Centroid	127.053	89.127	90.327	minutes"
"	Rainfall depth	47.265	47.265	47.265	mm"
"	Rainfall volume	5.20	46.79	51.99	c.m"
"	Rainfall losses	35.085	5.858	8.780	mm"
"	Runoff depth	12.180	41.407	38.484	mm"
"	Runoff volume	1.34	40.99	42.33	c.m"
"	Runoff coefficient	0.258	0.876	0.814	"
"	Maximum flow	0.000	0.029	0.029	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.029	0.035	0.056	0.116"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.029	0.035	0.035	0.116"
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow		0.151		c.m/sec"
"	Hydrograph volume		233.988		c.m"
"		0.029	0.035	0.035	0.151"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.029	0.000	0.035	0.151"
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.258 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.878 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"		0.020	0.000	0.035	0.151 c.m/sec"

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	20.660	1.963	3.628	minutes"
"	Time to Centroid	123.681	88.759	91.869	minutes"
"	Rainfall depth	47.265	47.265	47.265	mm"
"	Rainfall volume	10.63	31.90	42.54	c.m"
"	Rainfall losses	35.086	5.744	13.080	mm"
"	Runoff depth	12.179	41.521	34.185	mm"
"	Runoff volume	2.74	28.03	30.77	c.m"
"	Runoff coefficient	0.258	0.878	0.723	"
"	Maximum flow	0.001	0.020	0.020	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.020	0.020	0.035	0.151"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.020	0.020	0.020	0.151"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"		"			
"			0.172		c.m/sec"
"			264.755		c.m"
"		0.020	0.020	0.020	0.172"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"		"			
"			0.172		c.m/sec"
"			264.755		c.m"
"		0.020	0.172	0.020	0.000"
" 54	POND DESIGN"				
"	0.172	Current peak flow			c.m/sec"
"	0.094	Target outflow			c.m/sec"
"	264.8	Hydrograph volume			c.m"
"	46.	Number of stages"			
"	328.800	Minimum water level			metre"
"	329.930	Maximum water level			metre"
"	328.800	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge			Volume"
"	328.800	0.000			0.000"
"	328.830	1.01E-05			5.120"
"	328.850	2.01E-05			10.250"
"	328.880	3.01E-05			15.370"
"	328.900	4.01E-05			20.500"
"	328.930	5.01E-05			25.620"
"	328.950	6.01E-05			30.750"
"	328.980	7.01E-05			35.870"
"	329.000	8.01E-05			41.000"

"	329.030	9.01E-05	46.120"		
"	329.050	0.00010	51.250"		
"	329.080	0.00011	56.370"		
"	329.100	0.00012	61.500"		
"	329.130	0.00013	70.920"		
"	329.160	0.00014	80.150"		
"	329.180	0.00015	89.360"		
"	329.210	0.00016	98.540"		
"	329.230	0.00017	107.700"		
"	329.260	0.00018	116.850"		
"	329.280	0.00019	125.850"		
"	329.310	0.00020	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.019	c.m/sec"	
"	Maximum level		329.486	metre"	
"	Maximum storage		194.485	c.m"	
"	Centroidal lag		75.995	hours"	
"	0.020	0.172	0.019	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.019	c.m/sec"	
"	Hydrograph volume		133.346	c.m"	
"	0.020	0.172	0.019	0.019"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.020    0.000    0.019    0.019"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050 Total Area"
"      43.000 Flow length"
"      2.700 Overland Slope"
"      0.012 Pervious Area"
"      43.000 Pervious length"
"      2.700 Pervious slope"
"      0.038 Impervious Area"
"      43.000 Impervious length"
"      2.700 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.258 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.878 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.011    0.000    0.019    0.019 c.m/sec"
"      Catchment 1000      Pervious      Impervious Total Area "
"      Surface Area      0.012      0.038      0.050      hectare"
"      Time of concentration 21.700      2.061      3.811      minutes"
"      Time to Centroid 124.982      88.896      92.111      minutes"
"      Rainfall depth 47.265      47.265      47.265      mm"
"      Rainfall volume 5.91      17.72      23.63      c.m"
"      Rainfall losses 35.083      5.752      13.085      mm"
"      Runoff depth 12.182      41.512      34.180      mm"
"      Runoff volume 1.52      15.57      17.09      c.m"
"      Runoff coefficient 0.258      0.878      0.723      "
"      Maximum flow 0.000      0.011      0.011      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.011    0.011    0.019    0.019"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              0.011    0.011    0.011    0.019"
" 40      HYDROGRAPH Combine 3"
"          6  Combine "
"          3  Node #"
"          "
"      Maximum flow      0.020      c.m/sec"

```

"	Hydrograph volume	150.435	c.m"	
"	0.011 0.011	0.011	0.020"	
" 40	HYDROGRAPH Confluence	3"		
"	7 Confluence "			
"	3 Node #"			
"	"			
"	Maximum flow	0.020	c.m/sec"	
"	Hydrograph volume	150.435	c.m"	
"	0.011 0.020	0.011	0.000"	
" 38	START/RE-START TOTALS 3"			
"	3 Runoff Totals on EXIT"			
"	Total Catchment area	0.850	hectare"	
"	Total Impervious area	0.613	hectare"	
"	Total % impervious	72.059"		
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\10-yr"
"          Output filename:                   10-yr-POST.out"
"          Licensee name:                     Sami Fischer"
"          Company                           WalterFedy"
"          Date & Time last used:            2025-11-17 at 5:25:13 PM"

```

```

" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          2221.000 Coefficient A"
"          12.000  Constant B"
"          0.908   Exponent C"
"          0.400   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          169.551  mm/hr"
"          Total depth                56.290  mm"
"          6  010hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 112"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          112 No description"
"          50.000 % Impervious"
"          0.070  Total Area"
"          35.000 Flow length"
"          1.500  Overland Slope"
"          0.035  Pervious Area"
"          35.000 Pervious length"
"          1.500  Pervious slope"
"          0.035  Impervious Area"
"          35.000 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.306  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.895  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

	0.013	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	19.290	1.999	6.406	minutes"
"	Time to Centroid	120.030	87.817	96.027	minutes"
"	Rainfall depth	56.290	56.290	56.290	mm"
"	Rainfall volume	19.70	19.70	39.40	c.m"
"	Rainfall losses	39.066	5.937	22.502	mm"
"	Runoff depth	17.224	50.353	33.789	mm"
"	Runoff volume	6.03	17.62	23.65	c.m"
"	Runoff coefficient	0.306	0.895	0.600	"
"	Maximum flow	0.002	0.013	0.013	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.013	0.013	0.000	0.000"
--	-------	-------	-------	--------

" 33 CATCHMENT 111"

" 1 Triangular SCS"

" 1 Equal length"

" 1 SCS method"

" 111 No description"

" 75.000 % Impervious"

" 0.050 Total Area"

" 17.500 Flow length"

" 6.700 Overland Slope"

" 0.012 Pervious Area"

" 17.500 Pervious length"

" 6.700 Pervious slope"

" 0.038 Impervious Area"

" 17.500 Impervious length"

" 6.700 Impervious slope"

" 0.250 Pervious Manning 'n'"

" 75.000 Pervious SCS Curve No."

" 0.306 Pervious Runoff coefficient"

" 0.100 Pervious Ia/S coefficient"

" 8.467 Pervious Initial abstraction"

" 0.013 Impervious Manning 'n'"

" 98.000 Impervious SCS Curve No."

" 0.864 Impervious Runoff coefficient"

" 0.100 Impervious Ia/S coefficient"

" 0.518 Impervious Initial abstraction"

	0.015	0.013	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	8.123	0.842	1.611	minutes"
"	Time to Centroid	106.041	86.235	88.326	minutes"
"	Rainfall depth	56.290	56.290	56.290	mm"
"	Rainfall volume	7.04	21.11	28.15	c.m"
"	Rainfall losses	39.078	7.681	15.530	mm"
"	Runoff depth	17.212	48.609	40.760	mm"
"	Runoff volume	2.15	18.23	20.38	c.m"

"	Runoff coefficient	0.306	0.864	0.724	"
"	Maximum flow	0.001	0.015	0.015	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.015	0.028	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.305 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.874 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.010	0.028	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	9.318	0.966	3.127	minutes"
"	Time to Centroid	107.496	86.396	91.855	minutes"
"	Rainfall depth	56.290	56.290	56.290	mm"
"	Rainfall volume	14.07	14.07	28.15	c.m"
"	Rainfall losses	39.117	7.083	23.100	mm"
"	Runoff depth	17.173	49.208	33.190	mm"
"	Runoff volume	4.29	12.30	16.60	c.m"
"	Runoff coefficient	0.305	0.874	0.590	"
"	Maximum flow	0.002	0.010	0.010	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.010	0.039	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.010	0.039	0.039	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.039   c.m/sec"
"      Hydrograph volume     60.627   c.m"
"      0.010   0.039   0.039   0.039"
" 40  HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.010   0.000   0.039   0.039"
" 33  CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130  No description"
"      90.000  % Impervious"
"      0.110  Total Area"
"      52.000  Flow length"
"      2.000  Overland Slope"
"      0.011  Pervious Area"
"      52.000  Pervious length"
"      2.000  Pervious slope"
"      0.099  Impervious Area"
"      52.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious SCS Curve No."
"      0.306  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      8.467  Pervious Initial abstraction"
"      0.013  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.892  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"      0.036   0.000   0.039   0.039 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011    0.099    0.110    hectare"
"      Time of concentration  22.439    2.326    3.064    minutes"
"      Time to Centroid    123.982   88.327   89.637   minutes"
"      Rainfall depth      56.290    56.290   56.290   mm"
"      Rainfall volume     6.19     55.73    61.92    c.m"
"      Rainfall losses     39.062    6.090    9.387    mm"
"      Runoff depth        17.228    50.200   46.903   mm"
"      Runoff volume       1.90     49.70    51.59    c.m"
"      Runoff coefficient   0.306    0.892    0.833    "
"      Maximum flow       0.001    0.036    0.036    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.036   0.036   0.039   0.039"
" 40  HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.036	0.036	0.036	0.039"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow	0.075	c.m/sec"	
"		Hydrograph volume	112.221	c.m"	
"		0.036	0.036	0.036	0.075"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow	0.075	c.m/sec"	
"		Hydrograph volume	112.221	c.m"	
"		0.036	0.075	0.036	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.036	0.075	0.075	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow	0.075	c.m/sec"	
"		Hydrograph volume	112.221	c.m"	
"		0.036	0.075	0.075	0.075"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.036	0.000	0.075	0.075"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.306	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

"	0.892	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.071	0.000	0.075	0.075 c.m/sec"	
"		Catchment 101	Pervious	Impervious	Total Area	"
"		Surface Area	0.048	0.192	0.240	hectare"
"		Time of concentration	21.816	2.261	3.807	minutes"
"		Time to Centroid	123.206	88.224	90.990	minutes"
"		Rainfall depth	56.290	56.290	56.290	mm"
"		Rainfall volume	27.02	108.08	135.10	c.m"
"		Rainfall losses	39.043	6.075	12.669	mm"
"		Runoff depth	17.247	50.215	43.622	mm"
"		Runoff volume	8.28	96.41	104.69	c.m"
"		Runoff coefficient	0.306	0.892	0.775	"
"		Maximum flow	0.003	0.070	0.071	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.071	0.071	0.075	0.075"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.071	0.071	0.071	0.075"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"		"				
"		Maximum flow		0.146	c.m/sec"	
"		Hydrograph volume		216.913	c.m"	
"		0.071	0.071	0.071	0.146"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.071	0.000	0.071	0.146"	
" 33		CATCHMENT 104"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	104	No description"				
"	25.000	% Impervious"				
"	0.080	Total Area"				
"	50.000	Flow length"				
"	1.000	Overland Slope"				
"	0.060	Pervious Area"				
"	50.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.020	Impervious Area"				
"	50.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.307	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				

```

"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"     98.000 Impervious SCS Curve No."
"      0.887 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.007      0.000      0.071      0.146 c.m/sec"
"      Catchment 104      Pervious      Impervious      Total Area  "
"      Surface Area      0.060      0.020      0.080      hectare"
"      Time of concentration 26.983      2.797      15.110      minutes"
"      Time to Centroid 129.684      89.057      109.740      minutes"
"      Rainfall depth 56.290      56.290      56.290      mm"
"      Rainfall volume 33.77      11.26      45.03      c.m"
"      Rainfall losses 39.032      6.364      30.865      mm"
"      Runoff depth 17.258      49.926      25.425      mm"
"      Runoff volume 10.35      9.99      20.34      c.m"
"      Runoff coefficient 0.307      0.887      0.452      "
"      Maximum flow 0.003      0.007      0.007      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.007      0.007      0.071      0.146"
" 33      CATCHMENT 103"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      103      No description"
"     90.000 % Impervious"
"      0.110 Total Area"
"     53.000 Flow length"
"      3.200 Overland Slope"
"      0.011 Pervious Area"
"     53.000 Pervious length"
"      3.200 Pervious slope"
"      0.099 Impervious Area"
"     53.000 Impervious length"
"      3.200 Impervious slope"
"      0.250 Pervious Manning 'n'"
"     75.000 Pervious SCS Curve No."
"      0.306 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"     98.000 Impervious SCS Curve No."
"      0.894 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.037      0.007      0.071      0.146 c.m/sec"
"      Catchment 103      Pervious      Impervious      Total Area  "
"      Surface Area      0.011      0.099      0.110      hectare"
"      Time of concentration 19.712      2.043      2.690      minutes"

```

"	Time to Centroid	120.548	87.878	89.075	minutes"
"	Rainfall depth	56.290	56.290	56.290	mm"
"	Rainfall volume	6.19	55.73	61.92	c.m"
"	Rainfall losses	39.059	5.947	9.258	mm"
"	Runoff depth	17.231	50.343	47.032	mm"
"	Runoff volume	1.90	49.84	51.74	c.m"
"	Runoff coefficient	0.306	0.894	0.836	"
"	Maximum flow	0.001	0.037	0.037	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.037	0.044	0.071	0.146"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.037	0.044	0.044	0.146"
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow		0.190		c.m/sec"
"	Hydrograph volume		288.988		c.m"
"		0.037	0.044	0.044	0.190"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.037	0.000	0.044	0.190"
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.306 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.895 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"		0.026	0.000	0.044	0.190 c.m/sec"

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	17.420	1.805	3.405	minutes"
"	Time to Centroid	117.670	87.548	90.633	minutes"
"	Rainfall depth	56.290	56.290	56.290	mm"
"	Rainfall volume	12.67	38.00	50.66	c.m"
"	Rainfall losses	39.050	5.935	14.214	mm"
"	Runoff depth	17.240	50.355	42.077	mm"
"	Runoff volume	3.88	33.99	37.87	c.m"
"	Runoff coefficient	0.306	0.895	0.747	"
"	Maximum flow	0.001	0.025	0.026	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.026	0.026	0.044	0.190"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.026	0.026	0.026	0.190"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"		"			
"			0.216		c.m/sec"
"			326.857		c.m"
"		0.026	0.026	0.026	0.216"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"		"			
"			0.216		c.m/sec"
"			326.857		c.m"
"		0.026	0.216	0.026	0.000"
" 54	POND DESIGN"				
"	0.216	Current peak flow			c.m/sec"
"	0.094	Target outflow			c.m/sec"
"	326.9	Hydrograph volume			c.m"
"	46.	Number of stages"			
"	328.800	Minimum water level			metre"
"	329.930	Maximum water level			metre"
"	328.800	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge			Volume"
"	328.800	0.000			0.000"
"	328.830	1.01E-05			5.120"
"	328.850	2.01E-05			10.250"
"	328.880	3.01E-05			15.370"
"	328.900	4.01E-05			20.500"
"	328.930	5.01E-05			25.620"
"	328.950	6.01E-05			30.750"
"	328.980	7.01E-05			35.870"
"	329.000	8.01E-05			41.000"

"	329.030	9.01E-05	46.120"		
"	329.050	0.00010	51.250"		
"	329.080	0.00011	56.370"		
"	329.100	0.00012	61.500"		
"	329.130	0.00013	70.920"		
"	329.160	0.00014	80.150"		
"	329.180	0.00015	89.360"		
"	329.210	0.00016	98.540"		
"	329.230	0.00017	107.700"		
"	329.260	0.00018	116.850"		
"	329.280	0.00019	125.850"		
"	329.310	0.00020	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.035	c.m/sec"	
"	Maximum level		329.561	metre"	
"	Maximum storage		220.339	c.m"	
"	Centroidal lag		3.442	hours"	
"	0.026	0.216	0.035	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.035	c.m/sec"	
"	Hydrograph volume		195.238	c.m"	
"	0.026	0.216	0.035	0.035"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.026      0.000      0.035      0.035"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050 Total Area"
"      43.000 Flow length"
"      2.700 Overland Slope"
"      0.012 Pervious Area"
"      43.000 Pervious length"
"      2.700 Pervious slope"
"      0.038 Impervious Area"
"      43.000 Impervious length"
"      2.700 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.306 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.894 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.014      0.000      0.035      0.035 c.m/sec"
"          Catchment 1000      Pervious      Impervious      Total Area      "
"          Surface Area      0.012      0.038      0.050      hectare"
"          Time of concentration      18.297      1.896      3.578      minutes"
"          Time to Centroid      118.763      87.675      90.861      minutes"
"          Rainfall depth      56.290      56.290      56.290      mm"
"          Rainfall volume      7.04      21.11      28.15      c.m"
"          Rainfall losses      39.045      5.959      14.230      mm"
"          Runoff depth      17.245      50.331      42.060      mm"
"          Runoff volume      2.16      18.87      21.03      c.m"
"          Runoff coefficient      0.306      0.894      0.747      "
"          Maximum flow      0.001      0.014      0.014      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.014      0.014      0.035      0.035"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              0.014      0.014      0.014      0.035"
" 40      HYDROGRAPH Combine 3"
"          6  Combine "
"          3  Node #"
"          "
"          Maximum flow      0.037      c.m/sec"

```

"	Hydrograph volume	216.268	c.m"	
"	0.014 0.014	0.014	0.037"	
" 40	HYDROGRAPH Confluence	3"		
"	7 Confluence "			
"	3 Node #"			
"	"			
"	Maximum flow	0.037	c.m/sec"	
"	Hydrograph volume	216.268	c.m"	
"	0.014 0.037	0.014	0.000"	
" 38	START/RE-START TOTALS 3"			
"	3 Runoff Totals on EXIT"			
"	Total Catchment area	0.850	hectare"	
"	Total Impervious area	0.613	hectare"	
"	Total % impervious	72.059"		
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10  Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\25-yr"
"          Output filename:                   25-yr-POST.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:             2025-11-17 at 5:26:55 PM"

```

```

" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1      Chicago storm"
"          3158.000 Coefficient A"
"          15.000  Constant B"
"          0.936  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                191.557  mm/hr"
"          Total depth                       68.266  mm"
"          6  025hyd  Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 112"
"          1      Triangular SCS"
"          1      Equal length"
"          1      SCS method"
"          112   No description"
"          50.000 % Impervious"
"          0.070  Total Area"
"          35.000 Flow length"
"          1.500  Overland Slope"
"          0.035  Pervious Area"
"          35.000 Pervious length"
"          1.500  Pervious slope"
"          0.035  Impervious Area"
"          35.000 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.362  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          8.467  Pervious Initial abstraction"
"          0.013  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.909  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"

```

	0.016	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	16.888	1.896	6.163	minutes"
"	Time to Centroid	115.635	87.180	95.278	minutes"
"	Rainfall depth	68.266	68.266	68.266	mm"
"	Rainfall volume	23.89	23.89	47.79	c.m"
"	Rainfall losses	43.571	6.181	24.876	mm"
"	Runoff depth	24.695	62.085	43.390	mm"
"	Runoff volume	8.64	21.73	30.37	c.m"
"	Runoff coefficient	0.362	0.909	0.636	"
"	Maximum flow	0.003	0.015	0.016	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.016	0.016	0.000	0.000"
--	-------	-------	-------	--------

" 33 CATCHMENT 111"

" 1 Triangular SCS"

" 1 Equal length"

" 1 SCS method"

" 111 No description"

" 75.000 % Impervious"

" 0.050 Total Area"

" 17.500 Flow length"

" 6.700 Overland Slope"

" 0.012 Pervious Area"

" 17.500 Pervious length"

" 6.700 Pervious slope"

" 0.038 Impervious Area"

" 17.500 Impervious length"

" 6.700 Impervious slope"

" 0.250 Pervious Manning 'n'"

" 75.000 Pervious SCS Curve No."

" 0.360 Pervious Runoff coefficient"

" 0.100 Pervious Ia/S coefficient"

" 8.467 Pervious Initial abstraction"

" 0.013 Impervious Manning 'n'"

" 98.000 Impervious SCS Curve No."

" 0.873 Impervious Runoff coefficient"

" 0.100 Impervious Ia/S coefficient"

" 0.518 Impervious Initial abstraction"

	0.018	0.016	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	7.112	0.799	1.561	minutes"
"	Time to Centroid	103.583	85.752	87.905	minutes"
"	Rainfall depth	68.266	68.266	68.266	mm"
"	Rainfall volume	8.53	25.60	34.13	c.m"
"	Rainfall losses	43.693	8.636	17.401	mm"
"	Runoff depth	24.573	59.630	50.866	mm"
"	Runoff volume	3.07	22.36	25.43	c.m"

"	Runoff coefficient	0.360	0.873	0.745	"
"	Maximum flow	0.002	0.017	0.018	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.018	0.033	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.362 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.885 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.012	0.033	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	8.158	0.916	3.017	minutes"
"	Time to Centroid	104.809	85.877	91.369	minutes"
"	Rainfall depth	68.266	68.266	68.266	mm"
"	Rainfall volume	17.07	17.07	34.13	c.m"
"	Rainfall losses	43.573	7.838	25.706	mm"
"	Runoff depth	24.693	60.428	42.561	mm"
"	Runoff volume	6.17	15.11	21.28	c.m"
"	Runoff coefficient	0.362	0.885	0.623	"
"	Maximum flow	0.003	0.011	0.012	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.012	0.045	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.012	0.045	0.045	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.045   c.m/sec"
"      Hydrograph volume     77.086   c.m"
"      0.012   0.045   0.045   0.045"
" 40  HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.012   0.000   0.045   0.045"
" 33  CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130 No description"
"      90.000 % Impervious"
"      0.110 Total Area"
"      52.000 Flow length"
"      2.000 Overland Slope"
"      0.011 Pervious Area"
"      52.000 Pervious length"
"      2.000 Pervious slope"
"      0.099 Impervious Area"
"      52.000 Impervious length"
"      2.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.362 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.908 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"      0.043   0.000   0.045   0.045 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011    0.099    0.110    hectare"
"      Time of concentration 19.646    2.206    2.946    minutes"
"      Time to Centroid 119.086    87.632    88.966    minutes"
"      Rainfall depth 68.266    68.266    68.266    mm"
"      Rainfall volume 7.51    67.58    75.09    c.m"
"      Rainfall losses 43.558    6.281    10.009    mm"
"      Runoff depth 24.708    61.985    58.258    mm"
"      Runoff volume 2.72    61.37    64.08    c.m"
"      Runoff coefficient 0.362    0.908    0.853    "
"      Maximum flow 0.001    0.042    0.043    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.043   0.043   0.045   0.045"
" 40  HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.043	0.043	0.043	0.045"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow		0.088	c.m/sec"
"		Hydrograph volume		141.170	c.m"
"		0.043	0.043	0.043	0.088"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow		0.088	c.m/sec"
"		Hydrograph volume		141.170	c.m"
"		0.043	0.088	0.043	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.043	0.088	0.088	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow		0.088	c.m/sec"
"		Hydrograph volume		141.170	c.m"
"		0.043	0.088	0.088	0.088"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.043	0.000	0.088	0.088"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.362	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

```

"      0.909  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"          0.083      0.000      0.088      0.088 c.m/sec"
"      Catchment 101      Pervious  Impervious Total Area  "
"      Surface Area      0.048      0.192      0.240      hectare"
"      Time of concentration  19.100      2.145      3.680      minutes"
"      Time to Centroid      118.414      87.537      90.334      minutes"
"      Rainfall depth      68.266      68.266      68.266      mm"
"      Rainfall volume      32.77      131.07      163.84      c.m"
"      Rainfall losses      43.560      6.246      13.709      mm"
"      Runoff depth      24.706      62.020      54.558      mm"
"      Runoff volume      11.86      119.08      130.94      c.m"
"      Runoff coefficient      0.362      0.909      0.799      "
"      Maximum flow      0.004      0.082      0.083      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.083      0.083      0.088      0.088"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.083      0.083      0.083      0.088"
" 40      HYDROGRAPH  Combine  2"
"      6      Combine  "
"      2      Node #"
"      "
"      Maximum flow      0.171      c.m/sec"
"      Hydrograph volume      272.108      c.m"
"          0.083      0.083      0.083      0.171"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.083      0.000      0.083      0.171"
" 33      CATCHMENT 104"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      104      No description"
"      25.000      % Impervious"
"      0.080      Total Area"
"      50.000      Flow length"
"      1.000      Overland Slope"
"      0.060      Pervious Area"
"      50.000      Pervious length"
"      1.000      Pervious slope"
"      0.020      Impervious Area"
"      50.000      Impervious length"
"      1.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"      75.000      Pervious SCS Curve No."
"      0.362      Pervious Runoff coefficient"
"      0.100      Pervious Ia/S coefficient"

```

"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.902	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.009	0.000	0.083	0.171 c.m/sec"	
"		Catchment 104	Pervious	Impervious	Total Area	"
"		Surface Area	0.060	0.020	0.080	hectare"
"		Time of concentration	23.624	2.653	14.111	minutes"
"		Time to Centroid	124.055	88.327	107.849	minutes"
"		Rainfall depth	68.266	68.266	68.266	mm"
"		Rainfall volume	40.96	13.65	54.61	c.m"
"		Rainfall losses	43.529	6.658	34.312	mm"
"		Runoff depth	24.737	61.608	33.955	mm"
"		Runoff volume	14.84	12.32	27.16	c.m"
"		Runoff coefficient	0.362	0.902	0.497	"
"		Maximum flow	0.005	0.008	0.009	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"		4 Add Runoff "				
"		0.009	0.009	0.083	0.171"	
" 33		CATCHMENT 103"				
"		1 Triangular SCS"				
"		1 Equal length"				
"		1 SCS method"				
"		103 No description"				
"	90.000	% Impervious"				
"	0.110	Total Area"				
"	53.000	Flow length"				
"	3.200	Overland Slope"				
"	0.011	Pervious Area"				
"	53.000	Pervious length"				
"	3.200	Pervious slope"				
"	0.099	Impervious Area"				
"	53.000	Impervious length"				
"	3.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.362	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.909	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.043	0.009	0.083	0.171 c.m/sec"	
"		Catchment 103	Pervious	Impervious	Total Area	"
"		Surface Area	0.011	0.099	0.110	hectare"
"		Time of concentration	17.258	1.938	2.587	minutes"

"	Time to Centroid	116.109	87.235	88.459	minutes"
"	Rainfall depth	68.266	68.266	68.266	mm"
"	Rainfall volume	7.51	67.58	75.09	c.m"
"	Rainfall losses	43.557	6.223	9.956	mm"
"	Runoff depth	24.710	62.044	58.310	mm"
"	Runoff volume	2.72	61.42	64.14	c.m"
"	Runoff coefficient	0.362	0.909	0.854	"
"	Maximum flow	0.001	0.043	0.043	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.043 0.052 0.083 0.171"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.043 0.052 0.052 0.171"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow		0.223		c.m/sec"
"	Hydrograph volume		363.413		c.m"
"	0.043 0.052 0.052 0.223"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.043 0.000 0.052 0.223"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.362 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.910 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.030 0.000 0.052 0.223 c.m/sec"				

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	15.252	1.713	3.298	minutes"
"	Time to Centroid	113.615	86.910	90.037	minutes"
"	Rainfall depth	68.266	68.266	68.266	mm"
"	Rainfall volume	15.36	46.08	61.44	c.m"
"	Rainfall losses	43.546	6.138	15.490	mm"
"	Runoff depth	24.720	62.128	52.776	mm"
"	Runoff volume	5.56	41.94	47.50	c.m"
"	Runoff coefficient	0.362	0.910	0.773	"
"	Maximum flow	0.002	0.030	0.030	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.030	0.030	0.052	0.223"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.030	0.030	0.030	0.223"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"		"			
"			0.253		c.m/sec"
"			410.912		c.m"
"		0.030	0.030	0.030	0.253"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"		"			
"			0.253		c.m/sec"
"			410.912		c.m"
"		0.030	0.253	0.030	0.000"
" 54	POND DESIGN"				
"	0.253	Current peak flow			c.m/sec"
"	0.094	Target outflow			c.m/sec"
"	410.9	Hydrograph volume			c.m"
"	46.	Number of stages"			
"	328.800	Minimum water level			metre"
"	329.930	Maximum water level			metre"
"	328.800	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge			Volume"
"	328.800	0.000		0.000	"
"	328.830	1.01E-05		5.120	"
"	328.850	2.01E-05		10.250	"
"	328.880	3.01E-05		15.370	"
"	328.900	4.01E-05		20.500	"
"	328.930	5.01E-05		25.620	"
"	328.950	6.01E-05		30.750	"
"	328.980	7.01E-05		35.870	"
"	329.000	8.01E-05		41.000	"

"	329.030	9.01E-05	46.120"		
"	329.050	0.00010	51.250"		
"	329.080	0.00011	56.370"		
"	329.100	0.00012	61.500"		
"	329.130	0.00013	70.920"		
"	329.160	0.00014	80.150"		
"	329.180	0.00015	89.360"		
"	329.210	0.00016	98.540"		
"	329.230	0.00017	107.700"		
"	329.260	0.00018	116.850"		
"	329.280	0.00019	125.850"		
"	329.310	0.00020	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.073	c.m/sec"	
"	Maximum level		329.642	metre"	
"	Maximum storage		244.068	c.m"	
"	Centroidal lag		2.972	hours"	
"	0.030	0.253	0.073	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.073	c.m/sec"	
"	Hydrograph volume		278.465	c.m"	
"	0.030	0.253	0.073	0.073"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.030    0.000    0.073    0.073"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050 Total Area"
"      43.000 Flow length"
"      2.700 Overland Slope"
"      0.012 Pervious Area"
"      43.000 Pervious length"
"      2.700 Pervious slope"
"      0.038 Impervious Area"
"      43.000 Impervious length"
"      2.700 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.362 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.910 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.017    0.000    0.073    0.073 c.m/sec"
"          Catchment 1000      Pervious      Impervious      Total Area  "
"          Surface Area      0.012      0.038      0.050      hectare"
"          Time of concentration 16.019      1.799      3.463      minutes"
"          Time to Centroid      114.601      87.040      90.265      minutes"
"          Rainfall depth      68.266      68.266      68.266      mm"
"          Rainfall volume      8.53      25.60      34.13      c.m"
"          Rainfall losses      43.567      6.133      15.492      mm"
"          Runoff depth      24.700      62.133      52.775      mm"
"          Runoff volume      3.09      23.30      26.39      c.m"
"          Runoff coefficient      0.362      0.910      0.773      "
"          Maximum flow      0.001      0.016      0.017      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.017    0.017    0.073    0.073"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              0.017    0.017    0.017    0.073"
" 40      HYDROGRAPH Combine 3"
"          6  Combine "
"          3  Node #"
"          "
"          Maximum flow      0.077      c.m/sec"

```

"	Hydrograph volume	304.853	c.m"	
"	0.017 0.017	0.017	0.077"	
" 40	HYDROGRAPH Confluence	3"		
"	7 Confluence "			
"	3 Node #"			
"	"			
"	Maximum flow	0.077	c.m/sec"	
"	Hydrograph volume	304.853	c.m"	
"	0.017 0.077	0.017	0.000"	
" 38	START/RE-START TOTALS 3"			
"	3 Runoff Totals on EXIT"			
"	Total Catchment area	0.850	hectare"	
"	Total Impervious area	0.613	hectare"	
"	Total % impervious	72.059"		
" 19	EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10 Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\50-yr"
"          Output filename:                   50-yr-POST.out"
"          Licensee name:                     Sami Fischer"
"          Company                            WalterFedy"
"          Date & Time last used:            2025-11-17 at 5:28:38 PM"

```

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" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          3886.000 Coefficient A"
"          16.000 Constant B"
"          0.950 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                215.802 mm/hr"
"          Total depth                      77.647 mm"
"          6 050hyd Hydrograph extension used in this file"

```

```

" 33      CATCHMENT 112"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          112 No description"
"          50.000 % Impervious"
"          0.070 Total Area"
"          35.000 Flow length"
"          1.500 Overland Slope"
"          0.035 Pervious Area"
"          35.000 Pervious length"
"          1.500 Pervious slope"
"          0.035 Impervious Area"
"          35.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.400 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          8.467 Pervious Initial abstraction"
"          0.013 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.919 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

	0.018	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	15.323	1.804	5.905	minutes"
"	Time to Centroid	112.807	86.656	94.589	minutes"
"	Rainfall depth	77.647	77.647	77.647	mm"
"	Rainfall volume	27.18	27.18	54.35	c.m"
"	Rainfall losses	46.576	6.288	26.432	mm"
"	Runoff depth	31.072	71.359	51.216	mm"
"	Runoff volume	10.88	24.98	35.85	c.m"
"	Runoff coefficient	0.400	0.919	0.660	"
"	Maximum flow	0.005	0.017	0.018	c.m/sec"

" 40 HYDROGRAPH Add Runoff "
 " 4 Add Runoff "

	0.018	0.018	0.000	0.000"
--	-------	-------	-------	--------

33	CATCHMENT 111"
"	1 Triangular SCS"
"	1 Equal length"
"	1 SCS method"
"	111 No description"
"	75.000 % Impervious"
"	0.050 Total Area"
"	17.500 Flow length"
"	6.700 Overland Slope"
"	0.012 Pervious Area"
"	17.500 Pervious length"
"	6.700 Pervious slope"
"	0.038 Impervious Area"
"	17.500 Impervious length"
"	6.700 Impervious slope"
"	0.250 Pervious Manning 'n'"
"	75.000 Pervious SCS Curve No."
"	0.397 Pervious Runoff coefficient"
"	0.100 Pervious Ia/S coefficient"
"	8.467 Pervious Initial abstraction"
"	0.013 Impervious Manning 'n'"
"	98.000 Impervious SCS Curve No."
"	0.877 Impervious Runoff coefficient"
"	0.100 Impervious Ia/S coefficient"
"	0.518 Impervious Initial abstraction"

	0.020	0.018	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	6.453	0.760	1.505	minutes"
"	Time to Centroid	101.796	85.342	87.497	minutes"
"	Rainfall depth	77.647	77.647	77.647	mm"
"	Rainfall volume	9.71	29.12	38.82	c.m"
"	Rainfall losses	46.854	9.550	18.876	mm"
"	Runoff depth	30.793	68.097	58.771	mm"
"	Runoff volume	3.85	25.54	29.39	c.m"

"	Runoff coefficient	0.397	0.877	0.757	"
"	Maximum flow	0.002	0.019	0.020	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.020	0.038	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.398 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.890 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.014	0.038	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	7.402	0.872	2.891	minutes"
"	Time to Centroid	102.984	85.449	90.871	minutes"
"	Rainfall depth	77.647	77.647	77.647	mm"
"	Rainfall volume	19.41	19.41	38.82	c.m"
"	Rainfall losses	46.728	8.577	27.653	mm"
"	Runoff depth	30.919	69.070	49.995	mm"
"	Runoff volume	7.73	17.27	25.00	c.m"
"	Runoff coefficient	0.398	0.890	0.644	"
"	Maximum flow	0.005	0.013	0.014	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.014	0.053	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.014	0.053	0.053	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.053   c.m/sec"
"      Hydrograph volume    90.234   c.m"
"      0.014   0.053   0.053   0.053"
" 40  HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.014   0.000   0.053   0.053"
" 33  CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130 No description"
"      90.000 % Impervious"
"      0.110 Total Area"
"      52.000 Flow length"
"      2.000 Overland Slope"
"      0.011 Pervious Area"
"      52.000 Pervious length"
"      2.000 Pervious slope"
"      0.099 Impervious Area"
"      52.000 Impervious length"
"      2.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.400 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.917 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"      0.049   0.000   0.053   0.053 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011    0.099    0.110    hectare"
"      Time of concentration 17.825    2.099    2.826    minutes"
"      Time to Centroid 115.921    87.081    88.415    minutes"
"      Rainfall depth 77.647    77.647    77.647    mm"
"      Rainfall volume 8.54    76.87    85.41    c.m"
"      Rainfall losses 46.560    6.432    10.445    mm"
"      Runoff depth 31.088    71.215    67.202    mm"
"      Runoff volume 3.42    70.50    73.92    c.m"
"      Runoff coefficient 0.400    0.917    0.865    "
"      Maximum flow 0.001    0.048    0.049    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.049   0.049   0.053   0.053"
" 40  HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.049	0.049	0.049	0.053"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow		0.101	c.m/sec"
"		Hydrograph volume		164.156	c.m"
"		0.049	0.049	0.049	0.101"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow		0.101	c.m/sec"
"		Hydrograph volume		164.156	c.m"
"		0.049	0.101	0.049	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.049	0.101	0.101	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow		0.101	c.m/sec"
"		Hydrograph volume		164.156	c.m"
"		0.049	0.101	0.101	0.101"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.049	0.000	0.101	0.101"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.400	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

```

"      0.917  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"          0.095      0.000      0.101      0.101 c.m/sec"
"      Catchment 101      Pervious      Impervious Total Area  "
"      Surface Area      0.048      0.192      0.240      hectare"
"      Time of concentration 17.329      2.041      3.544      minutes"
"      Time to Centroid 115.307      86.994      89.777      minutes"
"      Rainfall depth 77.647      77.647      77.647      mm"
"      Rainfall volume 37.27      149.08      186.35      c.m"
"      Rainfall losses 46.586      6.437      14.467      mm"
"      Runoff depth 31.062      71.210      63.180      mm"
"      Runoff volume 14.91      136.72      151.63      c.m"
"      Runoff coefficient 0.400      0.917      0.814      "
"      Maximum flow 0.006      0.094      0.095      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.095      0.095      0.101      0.101"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.095      0.095      0.095      0.101"
" 40      HYDROGRAPH Combine  2"
"      6      Combine  "
"      2      Node #"
"      "
"      Maximum flow      0.196      c.m/sec"
"      Hydrograph volume      315.789      c.m"
"          0.095      0.095      0.095      0.196"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.095      0.000      0.095      0.196"
" 33      CATCHMENT 104"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      104      No description"
"      25.000      % Impervious"
"      0.080      Total Area"
"      50.000      Flow length"
"      1.000      Overland Slope"
"      0.060      Pervious Area"
"      50.000      Pervious length"
"      1.000      Pervious slope"
"      0.020      Impervious Area"
"      50.000      Impervious length"
"      1.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"      75.000      Pervious SCS Curve No."
"      0.400      Pervious Runoff coefficient"
"      0.100      Pervious Ia/S coefficient"

```

```

"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.913 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.011      0.000      0.095      0.196 c.m/sec"
"      Catchment 104      Pervious      Impervious      Total Area  "
"      Surface Area      0.060      0.020      0.080      hectare"
"      Time of concentration  21.435      2.524      13.266      minutes"
"      Time to Centroid      120.452      87.726      106.315      minutes"
"      Rainfall depth      77.647      77.647      77.647      mm"
"      Rainfall volume      46.59      15.53      62.12      c.m"
"      Rainfall losses      46.561      6.726      36.603      mm"
"      Runoff depth      31.086      70.922      41.045      mm"
"      Runoff volume      18.65      14.18      32.84      c.m"
"      Runoff coefficient      0.400      0.913      0.529      "
"      Maximum flow      0.007      0.010      0.011      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.011      0.011      0.095      0.196"
" 33      CATCHMENT 103"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      103      No description"
"    90.000      % Impervious"
"      0.110      Total Area"
"    53.000      Flow length"
"      3.200      Overland Slope"
"      0.011      Pervious Area"
"    53.000      Pervious length"
"      3.200      Pervious slope"
"      0.099      Impervious Area"
"    53.000      Impervious length"
"      3.200      Impervious slope"
"      0.250      Pervious Manning 'n'"
"    75.000      Pervious SCS Curve No."
"      0.400      Pervious Runoff coefficient"
"      0.100      Pervious Ia/S coefficient"
"      8.467      Pervious Initial abstraction"
"      0.013      Impervious Manning 'n'"
"    98.000      Impervious SCS Curve No."
"      0.919      Impervious Runoff coefficient"
"      0.100      Impervious Ia/S coefficient"
"      0.518      Impervious Initial abstraction"
"          0.049      0.011      0.095      0.196 c.m/sec"
"      Catchment 103      Pervious      Impervious      Total Area  "
"      Surface Area      0.011      0.099      0.110      hectare"
"      Time of concentration  15.659      1.844      2.481      minutes"

```

"	Time to Centroid	113.241	86.713	87.937	minutes"
"	Rainfall depth	77.647	77.647	77.647	mm"
"	Rainfall volume	8.54	76.87	85.41	c.m"
"	Rainfall losses	46.578	6.300	10.328	mm"
"	Runoff depth	31.069	71.348	67.320	mm"
"	Runoff volume	3.42	70.63	74.05	c.m"
"	Runoff coefficient	0.400	0.919	0.867	"
"	Maximum flow	0.001	0.049	0.049	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.049 0.060 0.095 0.196"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.049 0.060 0.060 0.196"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow	0.256			c.m/sec"
"	Hydrograph volume	422.677			c.m"
"	0.049 0.060 0.060 0.256"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.049 0.000 0.060 0.256"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.400 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.919 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.035 0.000 0.060 0.256 c.m/sec"				

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	13.838	1.629	3.177	minutes"
"	Time to Centroid	110.952	86.412	89.522	minutes"
"	Rainfall depth	77.647	77.647	77.647	mm"
"	Rainfall volume	17.47	52.41	69.88	c.m"
"	Rainfall losses	46.592	6.317	16.386	mm"
"	Runoff depth	31.055	71.331	61.262	mm"
"	Runoff volume	6.99	48.15	55.14	c.m"
"	Runoff coefficient	0.400	0.919	0.789	"
"	Maximum flow	0.003	0.034	0.035	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.035	0.035	0.060	0.256"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.035	0.035	0.035	0.256"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"		"			
"			0.290		c.m/sec"
"			477.812		c.m"
"		0.035	0.035	0.035	0.290"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"		"			
"			0.290		c.m/sec"
"			477.812		c.m"
"		0.035	0.290	0.035	0.000"
" 54	POND DESIGN"				
"	0.290	Current peak flow			c.m/sec"
"	0.094	Target outflow			c.m/sec"
"	477.8	Hydrograph volume			c.m"
"	46.	Number of stages"			
"	328.800	Minimum water level			metre"
"	329.930	Maximum water level			metre"
"	328.800	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge			Volume"
"	328.800	0.000			0.000"
"	328.830	1.01E-05			5.120"
"	328.850	2.01E-05			10.250"
"	328.880	3.01E-05			15.370"
"	328.900	4.01E-05			20.500"
"	328.930	5.01E-05			25.620"
"	328.950	6.01E-05			30.750"
"	328.980	7.01E-05			35.870"
"	329.000	8.01E-05			41.000"

"	329.030	9.01E-05	46.120"		
"	329.050	0.00010	51.250"		
"	329.080	0.00011	56.370"		
"	329.100	0.00012	61.500"		
"	329.130	0.00013	70.920"		
"	329.160	0.00014	80.150"		
"	329.180	0.00015	89.360"		
"	329.210	0.00016	98.540"		
"	329.230	0.00017	107.700"		
"	329.260	0.00018	116.850"		
"	329.280	0.00019	125.850"		
"	329.310	0.00020	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.094	c.m/sec"	
"	Maximum level		329.735	metre"	
"	Maximum storage		268.434	c.m"	
"	Centroidal lag		2.747	hours"	
"	0.035	0.290	0.094	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.094	c.m/sec"	
"	Hydrograph volume		345.611	c.m"	
"	0.035	0.290	0.094	0.094"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.035    0.000    0.094    0.094"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050  Total Area"
"      43.000  Flow length"
"      2.700  Overland Slope"
"      0.012  Pervious Area"
"      43.000  Pervious length"
"      2.700  Pervious slope"
"      0.038  Impervious Area"
"      43.000  Impervious length"
"      2.700  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious SCS Curve No."
"      0.399  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      8.467  Pervious Initial abstraction"
"      0.013  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.919  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"              0.019    0.000    0.094    0.094 c.m/sec"
"          Catchment 1000      Pervious      Impervious      Total Area  "
"          Surface Area      0.012      0.038      0.050      hectare"
"          Time of concentration  14.535      1.712      3.334      minutes"
"          Time to Centroid      111.816      86.520      89.721      minutes"
"          Rainfall depth      77.647      77.647      77.647      mm"
"          Rainfall volume      9.71      29.12      38.82      c.m"
"          Rainfall losses      46.629      6.289      16.374      mm"
"          Runoff depth      31.019      71.358      61.273      mm"
"          Runoff volume      3.88      26.76      30.64      c.m"
"          Runoff coefficient      0.399      0.919      0.789      "
"          Maximum flow      0.002      0.019      0.019      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.019    0.019    0.094    0.094"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              0.019    0.019    0.019    0.094"
" 40      HYDROGRAPH Combine  3"
"          6  Combine "
"          3  Node #"
"          "
"          Maximum flow      0.100      c.m/sec"

```

"	Hydrograph volume	376.247	c.m"
"	0.019 0.019	0.019	0.100"
" 40	HYDROGRAPH Confluence	3"	
"	7 Confluence "		
"	3 Node #"		
"	"		
"	Maximum flow	0.100	c.m/sec"
"	Hydrograph volume	376.247	c.m"
"	0.019 0.100	0.019	0.000"
" 38	START/RE-START TOTALS 3"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	0.850	hectare"
"	Total Impervious area	0.613	hectare"
"	Total % impervious	72.059"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 467"
"          MIDUSS created                      July 6, 2008"
"          10 Units used:                      ie METRIC"
"          Job folder:                        \\bel1\Job_Files\2025\0580\10\05.Design\
"          05.02.Analysis\SWM\MIDUSS\Post-Development - Copy\100-yr"
"          Output filename:                   100-yr-POST.out"
"          Licensee name:                     Sami Fischer"
"          Company                           WalterFedy"
"          Date & Time last used:            2025-11-17 at 5:30:14 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          4688.000 Coefficient A"
"          17.000 Constant B"
"          0.962 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                  239.354 mm/hr"
"          Total depth                        87.079 mm"
"          6 100hyd Hydrograph extension used in this file"
" 33      CATCHMENT 112"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          112 No description"
"          50.000 % Impervious"
"          0.070 Total Area"
"          35.000 Flow length"
"          1.500 Overland Slope"
"          0.035 Pervious Area"
"          35.000 Pervious length"
"          1.500 Pervious slope"
"          0.035 Impervious Area"
"          35.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          75.000 Pervious SCS Curve No."
"          0.434 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          8.467 Pervious Initial abstraction"
"          0.013 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.926 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

	0.021	0.000	0.000	0.000	c.m/sec"
"	Catchment 112	Pervious	Impervious	Total Area	"
"	Surface Area	0.035	0.035	0.070	hectare"
"	Time of concentration	14.125	1.729	5.682	minutes"
"	Time to Centroid	110.543	86.230	93.984	minutes"
"	Rainfall depth	87.079	87.079	87.079	mm"
"	Rainfall volume	30.48	30.48	60.96	c.m"
"	Rainfall losses	49.320	6.437	27.878	mm"
"	Runoff depth	37.759	80.643	59.201	mm"
"	Runoff volume	13.22	28.22	41.44	c.m"
"	Runoff coefficient	0.434	0.926	0.680	"
"	Maximum flow	0.006	0.020	0.021	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.021	0.021	0.000	0.000"
--	-------	-------	-------	--------

" 33 CATCHMENT 111"

" 1 Triangular SCS"

" 1 Equal length"

" 1 SCS method"

" 111 No description"

" 75.000 % Impervious"

" 0.050 Total Area"

" 17.500 Flow length"

" 6.700 Overland Slope"

" 0.012 Pervious Area"

" 17.500 Pervious length"

" 6.700 Pervious slope"

" 0.038 Impervious Area"

" 17.500 Impervious length"

" 6.700 Impervious slope"

" 0.250 Pervious Manning 'n'"

" 75.000 Pervious SCS Curve No."

" 0.430 Pervious Runoff coefficient"

" 0.100 Pervious Ia/S coefficient"

" 8.467 Pervious Initial abstraction"

" 0.013 Impervious Manning 'n'"

" 98.000 Impervious SCS Curve No."

" 0.879 Impervious Runoff coefficient"

" 0.100 Impervious Ia/S coefficient"

" 0.518 Impervious Initial abstraction"

	0.023	0.021	0.000	0.000	c.m/sec"
"	Catchment 111	Pervious	Impervious	Total Area	"
"	Surface Area	0.012	0.038	0.050	hectare"
"	Time of concentration	5.948	0.728	1.460	minutes"
"	Time to Centroid	100.374	85.009	87.164	minutes"
"	Rainfall depth	87.079	87.079	87.079	mm"
"	Rainfall volume	10.88	32.65	43.54	c.m"
"	Rainfall losses	49.608	10.521	20.293	mm"
"	Runoff depth	37.471	76.558	66.787	mm"
"	Runoff volume	4.68	28.71	33.39	c.m"

"	Runoff coefficient	0.430	0.879	0.767	"
"	Maximum flow	0.003	0.021	0.023	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.023	0.044	0.000	0.000"	
" 33	CATCHMENT 110"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	110 No description"				
"	50.000 % Impervious"				
"	0.050 Total Area"				
"	21.500 Flow length"				
"	6.400 Overland Slope"				
"	0.025 Pervious Area"				
"	21.500 Pervious length"				
"	6.400 Pervious slope"				
"	0.025 Impervious Area"				
"	21.500 Impervious length"				
"	6.400 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.430 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.892 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.016	0.044	0.000	0.000 c.m/sec"	
"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	0.025	0.025	0.050	hectare"
"	Time of concentration	6.823	0.835	2.783	minutes"
"	Time to Centroid	101.506	85.102	90.439	minutes"
"	Rainfall depth	87.079	87.079	87.079	mm"
"	Rainfall volume	21.77	21.77	43.54	c.m"
"	Rainfall losses	49.607	9.367	29.487	mm"
"	Runoff depth	37.472	77.712	57.592	mm"
"	Runoff volume	9.37	19.43	28.80	c.m"
"	Runoff coefficient	0.430	0.892	0.661	"
"	Maximum flow	0.006	0.014	0.016	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.016	0.060	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.016	0.060	0.060	0.000"	
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				

```

"      1  Node #"
"      "
"      Maximum flow          0.060   c.m/sec"
"      Hydrograph volume    103.630   c.m"
"      0.016   0.060   0.060   0.060"
" 40  HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.016   0.000   0.060   0.060"
" 33  CATCHMENT 130"
"      1  Triangular SCS"
"      1  Equal length"
"      1  SCS method"
"      130 No description"
"      90.000 % Impervious"
"      0.110 Total Area"
"      52.000 Flow length"
"      2.000 Overland Slope"
"      0.011 Pervious Area"
"      52.000 Pervious length"
"      2.000 Pervious slope"
"      0.099 Impervious Area"
"      52.000 Impervious length"
"      2.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      75.000 Pervious SCS Curve No."
"      0.433 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      8.467 Pervious Initial abstraction"
"      0.013 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.924 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"      0.054   0.000   0.060   0.060 c.m/sec"
"      Catchment 130      Pervious  Impervious  Total Area  "
"      Surface Area      0.011   0.099   0.110   hectare"
"      Time of concentration 16.431   2.011   2.725   minutes"
"      Time to Centroid    113.428  86.625  87.954  minutes"
"      Rainfall depth      87.079   87.079  87.079  mm"
"      Rainfall volume     9.58     86.21   95.79   c.m"
"      Rainfall losses     49.339   6.631   10.902  mm"
"      Runoff depth        37.741   80.448  76.177  mm"
"      Runoff volume       4.15     79.64   83.79   c.m"
"      Runoff coefficient   0.433    0.924   0.875   "
"      Maximum flow       0.002    0.054   0.054   c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.054   0.054   0.060   0.060"
" 40  HYDROGRAPH Copy to Outflow"
"      8  Copy to Outflow"

```

"		0.054	0.054	0.054	0.060"
" 40	HYDROGRAPH	Combine	1"		
"	6	Combine "			
"	1	Node #"			
"	"				
"		Maximum flow		0.114	c.m/sec"
"		Hydrograph volume		187.425	c.m"
"		0.054	0.054	0.054	0.114"
" 40	HYDROGRAPH	Confluence	1"		
"	7	Confluence "			
"	1	Node #"			
"	"				
"		Maximum flow		0.114	c.m/sec"
"		Hydrograph volume		187.425	c.m"
"		0.054	0.114	0.054	0.000"
" 40	HYDROGRAPH	Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.054	0.114	0.114	0.000"
" 40	HYDROGRAPH	Combine	2"		
"	6	Combine "			
"	2	Node #"			
"	"				
"		Maximum flow		0.114	c.m/sec"
"		Hydrograph volume		187.425	c.m"
"		0.054	0.114	0.114	0.114"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.054	0.000	0.114	0.114"
" 33	CATCHMENT	101"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	101	No description"			
"	80.000	% Impervious"			
"	0.240	Total Area"			
"	40.000	Flow length"			
"	1.300	Overland Slope"			
"	0.048	Pervious Area"			
"	40.000	Pervious length"			
"	1.300	Pervious slope"			
"	0.192	Impervious Area"			
"	40.000	Impervious length"			
"	1.300	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	75.000	Pervious SCS Curve No."			
"	0.434	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	8.467	Pervious Initial abstraction"			
"	0.013	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			

"	0.925	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.107	0.000	0.114	0.114	c.m/sec"
"		Catchment 101	Pervious	Impervious	Total Area	"
"		Surface Area	0.048	0.192	0.240	hectare"
"		Time of concentration	15.975	1.955	3.426	minutes"
"		Time to Centroid	112.876	86.546	89.309	minutes"
"		Rainfall depth	87.079	87.079	87.079	mm"
"		Rainfall volume	41.80	167.19	208.99	c.m"
"		Rainfall losses	49.317	6.545	15.100	mm"
"		Runoff depth	37.762	80.534	71.980	mm"
"		Runoff volume	18.13	154.63	172.75	c.m"
"		Runoff coefficient	0.434	0.925	0.827	"
"		Maximum flow	0.008	0.106	0.107	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.107	0.107	0.114	0.114"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.107	0.107	0.107	0.114"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"		"				
"		Maximum flow		0.221		c.m/sec"
"		Hydrograph volume		360.175		c.m"
"		0.107	0.107	0.107	0.221"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.107	0.000	0.107	0.221"	
" 33		CATCHMENT 104"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	1	SCS method"				
"	104	No description"				
"	25.000	% Impervious"				
"	0.080	Total Area"				
"	50.000	Flow length"				
"	1.000	Overland Slope"				
"	0.060	Pervious Area"				
"	50.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.020	Impervious Area"				
"	50.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.434	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				

"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.921	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.013	0.000	0.107	0.221 c.m/sec"	
"		Catchment 104	Pervious	Impervious	Total Area	"
"		Surface Area	0.060	0.020	0.080	hectare"
"		Time of concentration	19.759	2.418	12.573	minutes"
"		Time to Centroid	117.598	87.230	105.013	minutes"
"		Rainfall depth	87.079	87.079	87.079	mm"
"		Rainfall volume	52.25	17.42	69.66	c.m"
"		Rainfall losses	49.299	6.871	38.692	mm"
"		Runoff depth	37.780	80.209	48.387	mm"
"		Runoff volume	22.67	16.04	38.71	c.m"
"		Runoff coefficient	0.434	0.921	0.556	"
"		Maximum flow	0.008	0.011	0.013	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"		4 Add Runoff "				
"		0.013	0.013	0.107	0.221"	
" 33		CATCHMENT 103"				
"		1 Triangular SCS"				
"		1 Equal length"				
"		1 SCS method"				
"		103 No description"				
"	90.000	% Impervious"				
"	0.110	Total Area"				
"	53.000	Flow length"				
"	3.200	Overland Slope"				
"	0.011	Pervious Area"				
"	53.000	Pervious length"				
"	3.200	Pervious slope"				
"	0.099	Impervious Area"				
"	53.000	Impervious length"				
"	3.200	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	75.000	Pervious SCS Curve No."				
"	0.433	Pervious Runoff coefficient"				
"	0.100	Pervious Ia/S coefficient"				
"	8.467	Pervious Initial abstraction"				
"	0.013	Impervious Manning 'n'"				
"	98.000	Impervious SCS Curve No."				
"	0.926	Impervious Runoff coefficient"				
"	0.100	Impervious Ia/S coefficient"				
"	0.518	Impervious Initial abstraction"				
"		0.056	0.013	0.107	0.221 c.m/sec"	
"		Catchment 103	Pervious	Impervious	Total Area	"
"		Surface Area	0.011	0.099	0.110	hectare"
"		Time of concentration	14.435	1.766	2.393	minutes"

"	Time to Centroid	110.921	86.278	87.497	minutes"
"	Rainfall depth	87.079	87.079	87.079	mm"
"	Rainfall volume	9.58	86.21	95.79	c.m"
"	Rainfall losses	49.346	6.446	10.736	mm"
"	Runoff depth	37.733	80.634	76.343	mm"
"	Runoff volume	4.15	79.83	83.98	c.m"
"	Runoff coefficient	0.433	0.926	0.877	"
"	Maximum flow	0.002	0.055	0.056	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.056	0.068	0.107	0.221"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.056	0.068	0.068	0.221"
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow		0.289		c.m/sec"
"	Hydrograph volume		482.863		c.m"
"		0.056	0.068	0.068	0.289"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.056	0.000	0.068	0.289"
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	100 No description"				
"	75.000 % Impervious"				
"	0.090 Total Area"				
"	50.000 Flow length"				
"	4.300 Overland Slope"				
"	0.023 Pervious Area"				
"	50.000 Pervious length"				
"	4.300 Pervious slope"				
"	0.068 Impervious Area"				
"	50.000 Impervious length"				
"	4.300 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	75.000 Pervious SCS Curve No."				
"	0.433 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	8.467 Pervious Initial abstraction"				
"	0.013 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.925 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"		0.039	0.000	0.068	0.289 c.m/sec"

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.023	0.068	0.090	hectare"
"	Time of concentration	12.756	1.561	3.073	minutes"
"	Time to Centroid	108.817	85.994	89.076	minutes"
"	Rainfall depth	87.079	87.079	87.079	mm"
"	Rainfall volume	19.59	58.78	78.37	c.m"
"	Rainfall losses	49.349	6.508	17.218	mm"
"	Runoff depth	37.730	80.572	69.861	mm"
"	Runoff volume	8.49	54.39	62.88	c.m"
"	Runoff coefficient	0.433	0.925	0.802	"
"	Maximum flow	0.004	0.038	0.039	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.039	0.039	0.068	0.289"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.039	0.039	0.039	0.289"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"		"			
"			0.328		c.m/sec"
"			545.738		c.m"
"		0.039	0.039	0.039	0.328"
" 40	HYDROGRAPH Confluence 2"				
"	7	Confluence "			
"	2	Node #"			
"		"			
"			0.328		c.m/sec"
"			545.738		c.m"
"		0.039	0.328	0.039	0.000"
" 54	POND DESIGN"				
"	0.328	Current peak flow			c.m/sec"
"	0.094	Target outflow			c.m/sec"
"	545.7	Hydrograph volume			c.m"
"	46.	Number of stages"			
"	328.800	Minimum water level			metre"
"	329.930	Maximum water level			metre"
"	328.800	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge			Volume"
"	328.800	0.000		0.000	"
"	328.830	1.01E-05		5.120	"
"	328.850	2.01E-05		10.250	"
"	328.880	3.01E-05		15.370	"
"	328.900	4.01E-05		20.500	"
"	328.930	5.01E-05		25.620	"
"	328.950	6.01E-05		30.750	"
"	328.980	7.01E-05		35.870	"
"	329.000	8.01E-05		41.000	"

"	329.030	9.01E-05	46.120"		
"	329.050	0.00010	51.250"		
"	329.080	0.00011	56.370"		
"	329.100	0.00012	61.500"		
"	329.130	0.00013	70.920"		
"	329.160	0.00014	80.150"		
"	329.180	0.00015	89.360"		
"	329.210	0.00016	98.540"		
"	329.230	0.00017	107.700"		
"	329.260	0.00018	116.850"		
"	329.280	0.00019	125.850"		
"	329.310	0.00020	134.820"		
"	329.330	0.00020	143.730"		
"	329.360	0.00200	152.530"		
"	329.380	0.00440	161.280"		
"	329.410	0.00740	169.980"		
"	329.440	0.01090	178.620"		
"	329.460	0.01490	187.210"		
"	329.490	0.01930	195.610"		
"	329.510	0.02400	203.910"		
"	329.540	0.02920	212.090"		
"	329.560	0.03470	220.120"		
"	329.590	0.04050	228.000"		
"	329.610	0.06520	235.690"		
"	329.640	0.07210	243.180"		
"	329.660	0.07850	250.390"		
"	329.690	0.08440	257.280"		
"	329.710	0.08990	263.730"		
"	329.740	0.09500	269.470"		
"	329.770	0.09990	274.830"		
"	329.780	0.1023	277.390"		
"	329.800	0.1069	282.520"		
"	329.830	0.1113	287.640"		
"	329.850	0.1155	292.770"		
"	329.880	0.1196	297.890"		
"	329.900	0.1235	303.020"		
"	329.930	0.1273	308.140"		
"	Peak outflow		0.116	c.m/sec"	
"	Maximum level		329.860	metre"	
"	Maximum storage		294.446	c.m"	
"	Centroidal lag		2.590	hours"	
"	0.039	0.328	0.116	0.000	c.m/sec"
" 40	HYDROGRAPH	Combine	3"		
"	6	Combine	"		
"	3	Node #"			
"	"				
"	Maximum flow		0.116	c.m/sec"	
"	Hydrograph volume		414.604	c.m"	
"	0.039	0.328	0.116	0.116"	
" 40	HYDROGRAPH	Start - New Tributary"			

```

"          2  Start - New Tributary"
"              0.039    0.000    0.116    0.116"
" 33      CATCHMENT 1000"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"      1000  No description"
"      75.000 % Impervious"
"      0.050  Total Area"
"      43.000  Flow length"
"      2.700  Overland Slope"
"      0.012  Pervious Area"
"      43.000  Pervious length"
"      2.700  Pervious slope"
"      0.038  Impervious Area"
"      43.000  Impervious length"
"      2.700  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious SCS Curve No."
"      0.434  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      8.467  Pervious Initial abstraction"
"      0.013  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.926  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"              0.022    0.000    0.116    0.116 c.m/sec"
"      Catchment 1000      Pervious  Impervious  Total Area  "
"      Surface Area      0.012    0.038    0.050    hectare"
"      Time of concentration  13.398    1.640    3.228    minutes"
"      Time to Centroid    109.636    86.115    89.292    minutes"
"      Rainfall depth      87.079    87.079    87.079    mm"
"      Rainfall volume     10.88     32.65     43.54     c.m"
"      Rainfall losses     49.319    6.471     17.183    mm"
"      Runoff depth        37.760    80.608    69.896    mm"
"      Runoff volume       4.72     30.23     34.95     c.m"
"      Runoff coefficient   0.434    0.926     0.803     "
"      Maximum flow       0.002    0.021     0.022     c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.022    0.022    0.116    0.116"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              0.022    0.022    0.022    0.116"
" 40      HYDROGRAPH Combine  3"
"          6  Combine "
"          3  Node #"
"          "
"      Maximum flow      0.125    c.m/sec"

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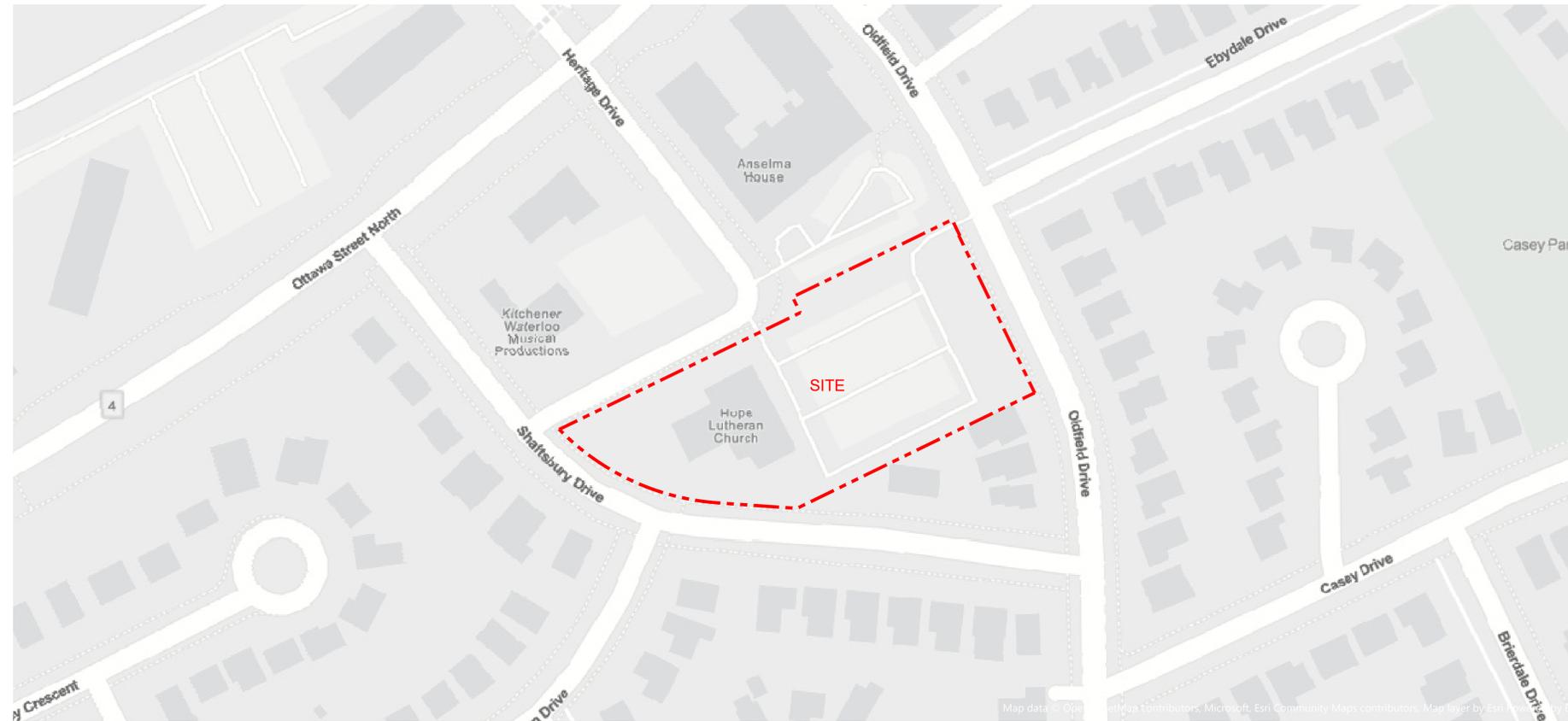
"	Hydrograph volume		449.552	c.m"
"	0.022	0.022	0.022	0.125"
" 40	HYDROGRAPH	Confluence	3"	
"	7	Confluence "		
"	3	Node #"		
"	"			
"	Maximum flow		0.125	c.m/sec"
"	Hydrograph volume		449.552	c.m"
"	0.022	0.125	0.022	0.000"

APPENDIX E

Drawings

COOK LANDS GROUP

Unit B - 695 Rupert Street, Waterloo



#	Title	Description
C000	COVER	SHEET 1 OF 1
C001	LEGEND	SHEET 1 OF 1
C100	EXISTING CONDITIONS & REMOVALS	SHEET 1 OF 1
C200	GRADING PLAN	SHEET 1 OF 1
C300	GENERAL SERVICING PLAN	SHEET 1 OF 1
C310	STORM CATCHMENT AREA PLAN	SHEET 1 OF 1
C320	SANITARY CATCHMENT AREA PLAN	SHEET 1 OF 1
C330	WATERMAIN DISTRIBUTION PLAN	SHEET 1 OF 1
C500	DETAILS & NOTES PLAN	SHEET 1 OF 1
C700	EROSION & SEDIMENT CONTROL PLAN	SHEET 1 OF 2
C701	EROSION & SEDIMENT CONTROL DETAILS	SHEET 2 OF 2

HOPE LUTHERAN CHURCH

30 Shaftsbury Drive, Kitchener, ON

2025-0580-10

Issued for ZONING BY-LAW AMENDMENT SUBMISSION December 2025

PROPOSED LINIER SERVICING

- PROPOSED SANITARY SEWER/SERVICE
- PROPOSED STORM SEWER/SERVICE
- PROPOSED WATERMAIN/SERVICE
- PROPOSED GASMAIN
- PROPOSED UNDERGROUND HYDRO LINE
- PROPOSED SUBDRAIN
- PROPOSED PIPE INSULATION

PROPOSED STANARD STRUCTURES

- CB CATCHBASIN
- DCB DOUBLE CATCHBASIN
- DICB DITCH INLET CATCHBASIN
- DICB(A) DITCH INLET CATCHBASIN (TYPE A)
- DICB(B) DITCH INLET CATCHBASIN (TYPE B)
- CBMH CATCHBASIN MANHOLE
- DCBMH DOUBLE CATCHBASIN MANHOLE
- DICBMH(A) DITCH INLET CATCHBASIN MANHOLE (TYPE A)
- DICBMH(B) DITCH INLET CATCHBASIN MANHOLE (TYPE B)
- MH STORM MANHOLE
- MH SANITARY MANHOLE

PROPOSED STORM HEADWALLS

- OPSD 800.040 - 6000
- OPSD 800.040 - 6750
- OPSD 800.040 - 7500
- OPSD 800.040 - 8250
- OPSD 800.040 - 9000
- OPSD 800.040 - 9750
- OPSD 800.040 - 10500
- OPSD 800.040 - 12000
- OPSD 800.040 - 13500
- OPSD 800.040 - 15000
- OPSD 800.040 - 16500
- OPSD 800.040 - 18000
- OPSD 800.040 - 24000

PROPOSED WATERMAIN FITTINGS

- FIRE HYDRANT
- WATERMAIN VALVE
- CURB STOP
- FIRE DEPARTMENT CONNECTION
- TEE
- CROSS
- 90° BEND
- 45° BEND
- 22.5° BEND
- 11.25° BEND
- PLUG
- REDUCER

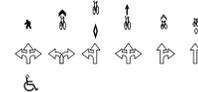
PROPOSED ELECTRICAL STRUCTURES

- LAMP STANDARD
- HYDRO TRANSFORMER
- UTILITY/HYDRO POLE

MATCHLINES



ROAD MARKINGS



SURFACE FEATURES

- PROPOSED GUARDRAIL
- PROPOSED CHAINLINK FENCE
- PROPOSED BOARD FENCE
- PROPOSED CONCRETE
- PROPOSED GRAVEL
- PROPOSED CURB
- PROPOSED CURB AND GUTTER
- PROPOSED DROP CURB
- PROPOSED DROP CURB AND GUTTER
- PROPOSED BUILDING
- PROPOSED BUILDING OVERHANG

SURFACE FEATURES

- PROPOSED DRIVEWAY
- PROPOSED SIGN
- SIDEWALK C&W TACTILE WARNING PLATES AS PER OPSD 310.033 (TYP)
- STEEL BEAM DEAD END BARRICADE
- PROPOSED NATURAL GAS METER
- PROPOSED FLOW CONTROL ROOF DRAIN

LEGAL FEATURES

- PROPERTY LINE
- LOT LINE
- LEGAL EASEMENT
- SETBACKS

EROSION

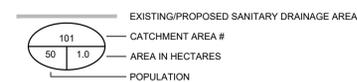
- HEAVY DUTY SILT FENCE
- LIGHT DUTY SILT FENCE
- CONSTRUCTION FENCING
- HAY BALES/ COIR LOGS
- TEMPORARY INTERCEPTOR SWALE
- EXISTING CATCHBASIN TO BE PROTECTED
- PROPOSED CATCHBASIN TO BE PROTECTED
- PROPOSED OVERLAND FLOW ROUTE

- ACCESS ROAD CONSTRUCTION
- PARKING AREAS
- STAGING / STORAGE AREA

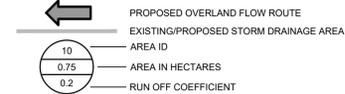
REMOVALS

- LINIER REMOVALS
- SINGULAR REMALS
- AREA REMOVAL

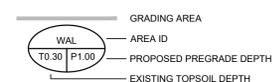
SANITARY AREAS



STORM AREAS



CUT/FILL



MISCELLANEOUS SYMBOLS

- PROPOSED SECTION ARROW
- PROPOSED REVISION BLOCK TRIANGLE
- PICTURE DIRECTION AND LOCATION

EXISTING SURVEY

- IB IRON BAR
- IP IRON PIPE
- SIB STANDARD IRON BAR
- RIB ROUND IRON BAR
- SSIB SHORT STANDARD IRON BAR
- CC CUT CROSS
- TBM TEMPORARY BENCHMARK
- EX DOOR ENTRANCE/EXIST
- EX LS EXISTING LAMP STANDARD
- EX UP EXISTING UTILITY POLE
- EX HP EXISTING HYDRO POLE
- EX T EXISTING GUY WIRE
- EX SIGN EXISTING SIGN
- EX BELL MH EXISTING BELL MANHOLE
- EX BELL PED EXISTING BELL PEDESTAL
- EX CTV PED EXISTING CTV PEDESTAL
- EX HYDRO TRANSFORMER EXISTING HYDRO TRANSFORMER
- EX GV EXISTING GAS VALVE
- EX CB EXISTING CATCHBASIN
- EX DCB EXISTING DOUBLE CATCHBASIN
- EX DI EXISTING DITCH INLET CATCHBASIN
- EX MH EXISTING STORM MANHOLE
- EX CBMH EXISTING CATCHBASIN MANHOLE
- EX DCBMH EXISTING DOUBLE CATCHBASIN MANHOLE
- EX SAM MH EXISTING SANITARY MANHOLE
- EX HYD EXISTING FIRE HYDRANT
- EX WV EXISTING WATERMAIN VALVE
- EX CS EXISTING CURB STOP
- EX FIRE EXISTING FIRE DEPARTMENT CONNECTION
- EX WELL EXISTING WELL
- BOREHOLE No. EXISTING BOREHOLE LOCATION
- TEST PIT No. EXISTING TEST PIT LOCATION
- PIEZOMETER No. EXISTING PIEZOMETER LOCATION
- EXISTING GATE
- EXISTING SPOT ELEVATION
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING ADJUSTED LIDAR CONTOUR (SOURCE FROM THE ONTARIO DIGITAL TERRIAN MODEL (LIDAR DERIVED))
- EXISTING EMBANKMENT
- EXISTING VEGETATION
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- EXISTING SHRUB
- EXISTING TREE DRIPLINE AND/OR VEGETATION LINE
- EXISTING SANITARY SERVICE
- EXISTING STORM SERVICE
- EXISTING WATERMAIN
- EXISTING GASMAIN
- EXISTING OVERHEAD HYDRO LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING BELL LINE
- EXISTING CABLE LINE
- EXISTING COMMUNICATION LINE
- EXISTING FIBER OPTIC LINE
- EXISTING DITCH CENTRELINE
- EXISTING SILT FENCE
- EXISTING CHAINLINK FENCE
- EXISTING BOARD FENCE
- EXISTING GUARDRAIL
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING CURB
- EXISTING CURB AND GUTTER
- EXISTING CURB AND GUTTER WITH DROP CURB
- EXISTING GRAVEL
- EXISTING LINEPAINT
- EXISTING INTERLOCK
- EXISTING SWAMP SYMBOL
- EXISTING EDGE OF WATER
- EXISTING GRADE BREAK

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GRADING

- PROPOSED GRADE
- EXISTING GRADE
- APPROX. FRONT/REAR HOUSE ELEVATION
- CENTERLINE HIGH POINT ELEVATION
- CENTERLINE LOW POINT ELEVATION
- CENTERLINE VERTICAL GRADE CHANGE
- PROPOSED DRAINAGE ARROW/SLOPE
- PROPOSED SWALE
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
- PROPOSED CHAINLINK FENCE
- EXISTING CONTOUR
- EXISTING LIDAR CONTOUR
- DRAINAGE TYPE (REFER TO DETAILS DWG)
- STRUCTURAL FILL REQUIRED

FLOOD LINES

- EXISTING FLOODLINE
- PROPOSED FLOODLINE

SURFACE COVERAGE

- PROPOSED CONCRETE SURFACE
- PROPOSED GRAVEL SURFACE
- PROPOSED RIPRAP
- PROPOSED TURFSTONE
- PROPOSED LIGHT DUTY ASPHALT SURFACE
- PROPOSED HEAVY DUTY ASPHALT SURFACE

SECTIONS AND PROFILES

- PROPOSED PERMANENT POOL ELEVATION OR ADDITIONAL POND LEVEL INFORMATION

VERTICAL GEOMETRY POINTS

- VERTICAL GEOMETRY STATION
- VERTICAL GEOMETRY ELEVATION
- VERTICAL GEOMETRY ABBREVIATION
- BVP PROFILE START
- EVP PROFILE END
- PVI POINT OF VERTICAL INTERSECTION
- BVC/BCV VERTICAL TANGENT CURVE INTERSECT
- HP HIGH POINT
- LP LOW POINT



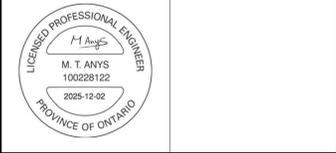
DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
30 Shaftsbury Drive, Kitchener, ON

TITLE
LEGEND
SHEET 1 OF 1

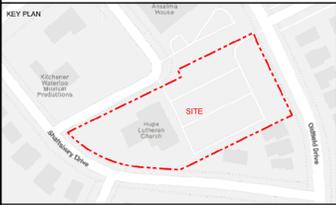
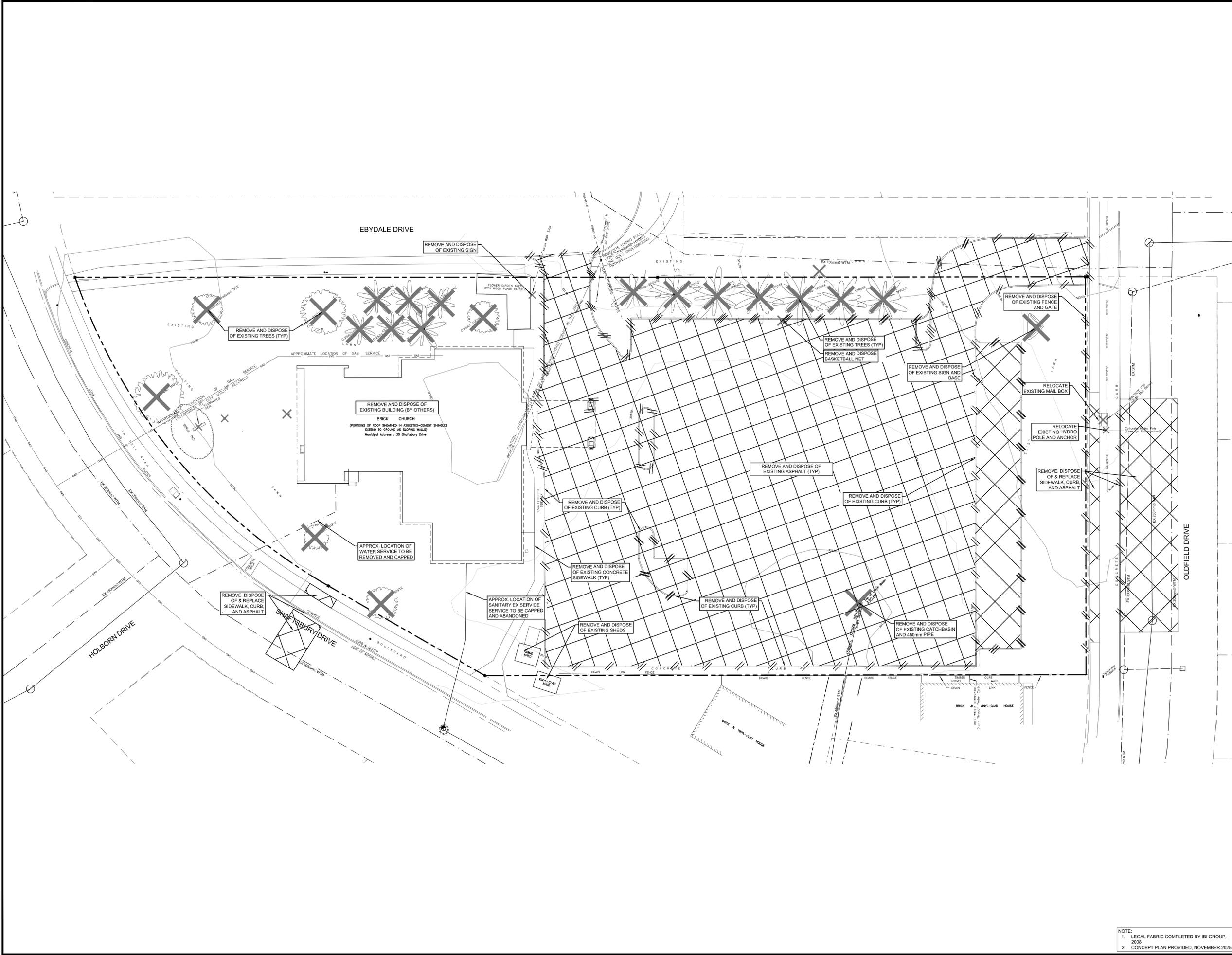
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1. LEGAL FABRIC COMPLETED BY IBI GROUP, 2008	C001
2. CONCEPT PLAN PROVIDED, NOVEMBER 2025	



DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND

	EXISTING BOREHOLE LOCATION
	EXISTING TEST PIT LOCATION
	EXISTING PIEZOMETER LOCATION
	EXISTING DECIDUOUS / CONIFEROUS TREE
	EXISTING TREE DRIPLINE AND/OR VEGETATION LINE
	EXISTING LIDAR CONTOUR
	REMOVALS
	EXISTING EDGE OF WATER
	AREA REMOVAL

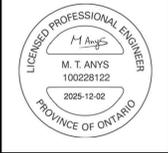


CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
30 Shaftsbury Drive, Kitchener, ON

TITLE
EXISTING CONDITIONS & REMOVALS
SHEET 1 OF 1

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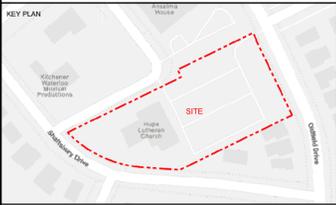


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SCALE: 1:250	SHEET NO.:
DATE: 2025-11-20	C100
PROJECT NO.: 2025-0580-10	
DRAWN BY: KDB	
CHECKED BY: MA	

- NOTE:
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 - CONCEPT PLAN PROVIDED, NOVEMBER 2025

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DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND	
• [123.45]	PROPOSED GRADE
• [123.45]EX	EXISTING GRADE
→ 2.0%	PROPOSED DRAINAGE ARROWS/SLOPE
~	PROPOSED SWALE
←	PROPOSED OVERLAND FLOW ROUTE
▬	PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
▬	PROPOSED CHAINLINK FENCE
---	EXISTING LIDAR CONTOUR
▬	PROPOSED CONCRETE SURFACE
▬	PROPOSED LIGHT DUTY ASPHALT SURFACE



CLIENT
COOK LANDS GROUP

Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH

30 Shaftsbury Drive, Kitchener, ON

TITLE
**GRADING PLAN
SHEET 1 OF 1**

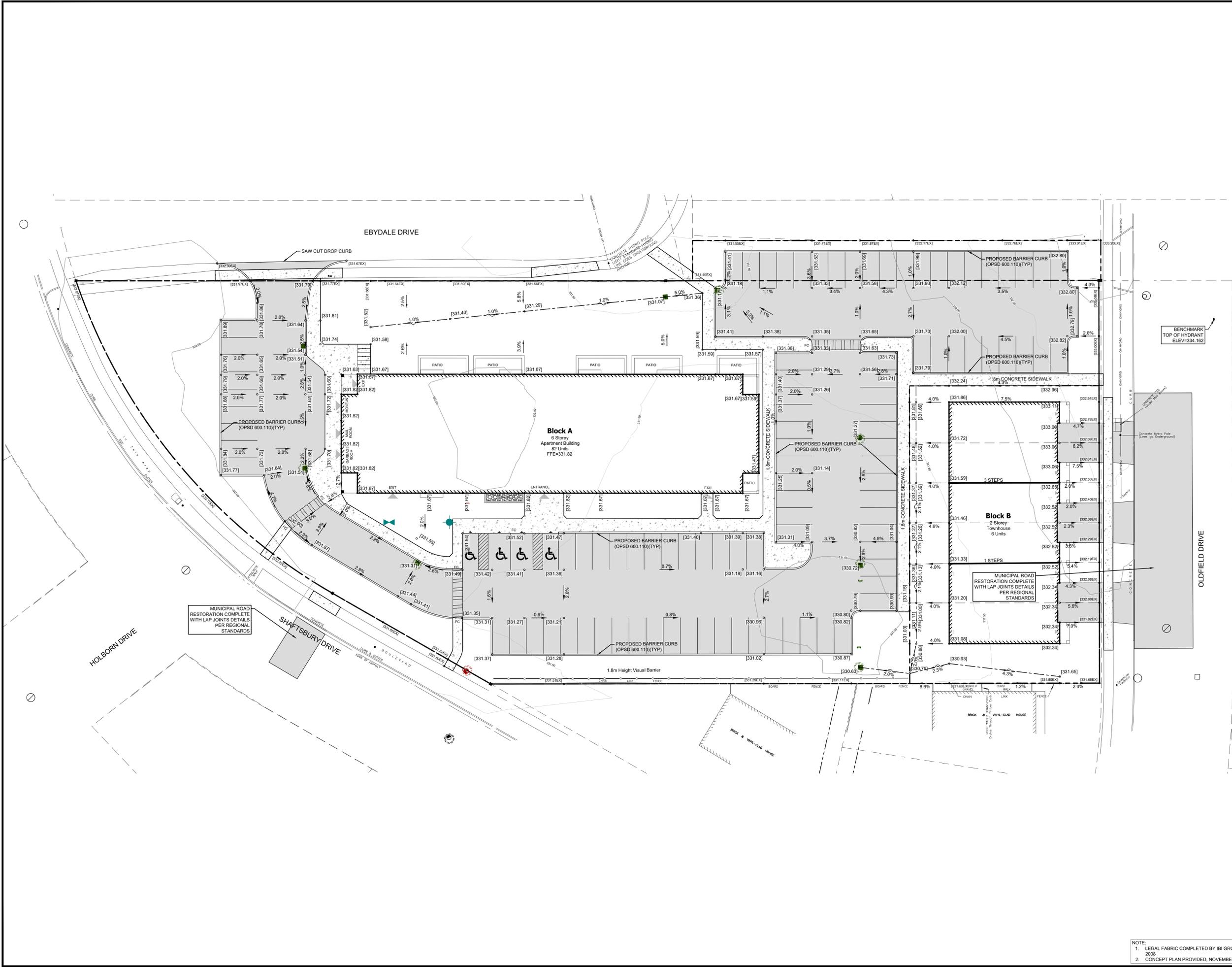
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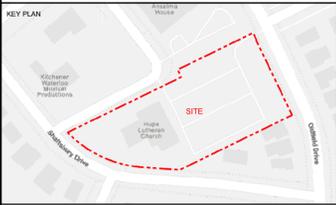
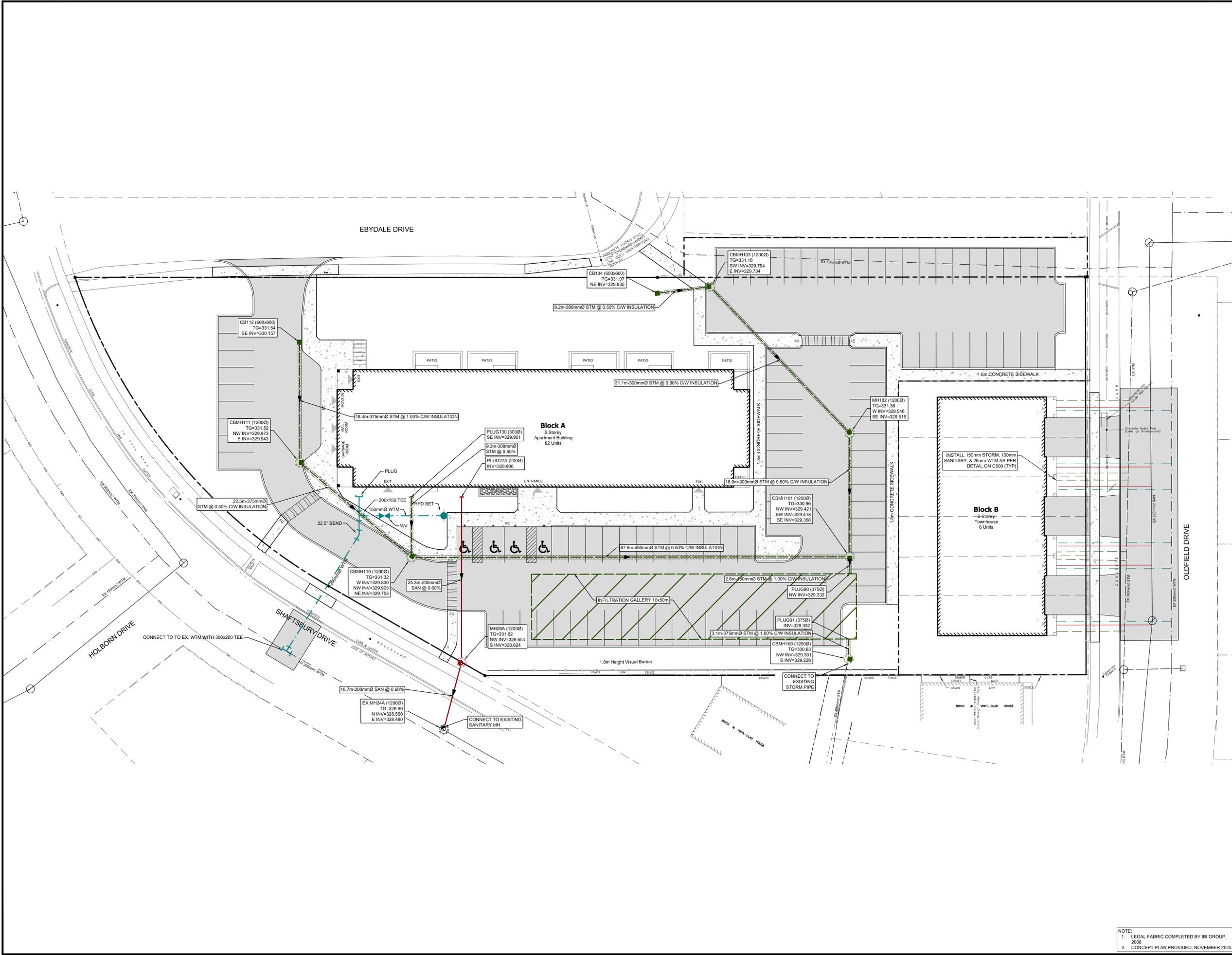
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1:250	2025-12-03	2025-0580-10	KDB	MA	C200

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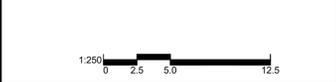


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DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND	
	PROPOSED CATCHBASIN / DOUBLE CATCHBASIN
	PROPOSED DITCH INLET
	PROPOSED CATCHBASIN MANHOLE / DOUBLE CATCHBASIN MANHOLE
	PROPOSED DITCH INLET CATCHBASIN MANHOLE (TYPE A) / (TYPE B)
	PROPOSED STORM MANHOLE
	PROPOSED SANITARY MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATERMAIN VALVE
	PROPOSED CURB STOP
	PROPOSED REDUCER
	PROPOSED FIRE DEPARTMENT CONNECTION
	EXISTING CATCHBASIN / DOUBLE CATCHBASIN
	EXISTING DITCH INLET CATCHBASIN
	EXISTING STORM MANHOLE
	EXISTING CATCHBASIN MANHOLE / DOUBLE CATCHBASIN MANHOLE
	EXISTING SANITARY MANHOLE
	EXISTING FIRE HYDRANT
	EXISTING WATERMAIN VALVE
	EXISTING CURB STOP
	EXISTING FIRE DEPARTMENT CONNECTION
	EXISTING WELL
	PROPOSED SANITARY SEWER/SERVICE
	PROPOSED WATERMAIN SERVICE
	EXISTING SANITARY SERVICE
	EXISTING STORM SERVICE
	EXISTING WATERMAIN
	PROPOSED SUBDRAIN
	PROPOSED LAMP STANDARD
	PROPOSED UTILITY / HYDRO POLE
	PROPOSED SIGN
	PROPOSED HYDRO TRANSFORMER

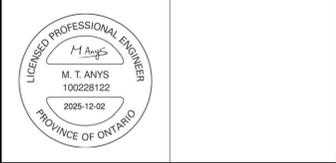


CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
30 Shaftsbury Drive, Kitchener, ON

TITLE
GENERAL SERVICING PLAN
SHEET 1 OF 1

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DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND

- MH PROPOSED SANITARY MANHOLE
- EX SAN MH EXISTING SANITARY MANHOLE
- PROPOSED SANITARY SEWER/SERVICE
- EXISTING SANITARY SERVICE
- SANITARY DRAINAGE AREA
- CATCHMENT AREA #
- AREA IN HECTARES
- POPULATION



CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
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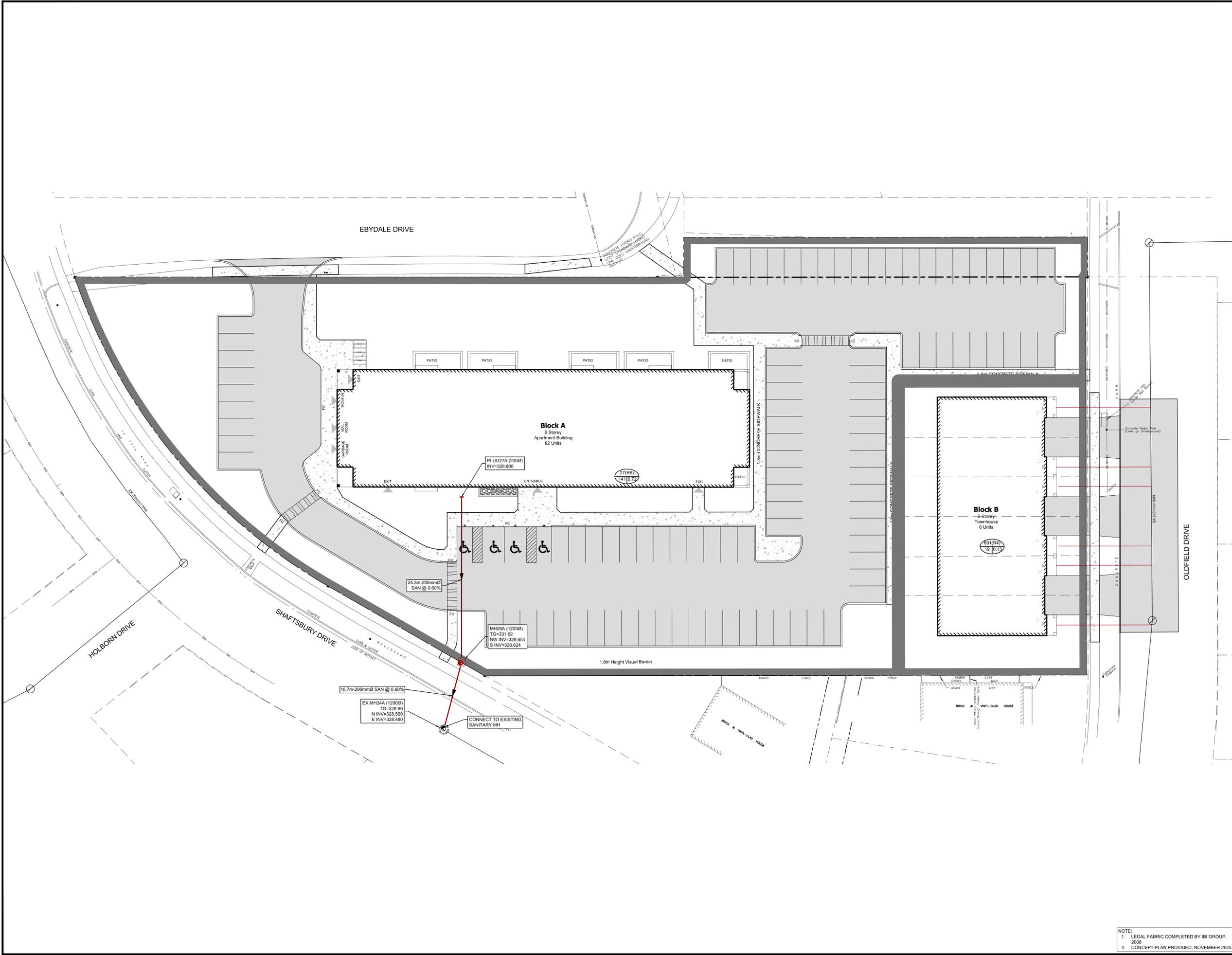
TITLE
SANITARY CATCHMENT AREA PLAN
SHEET 1 OF 1

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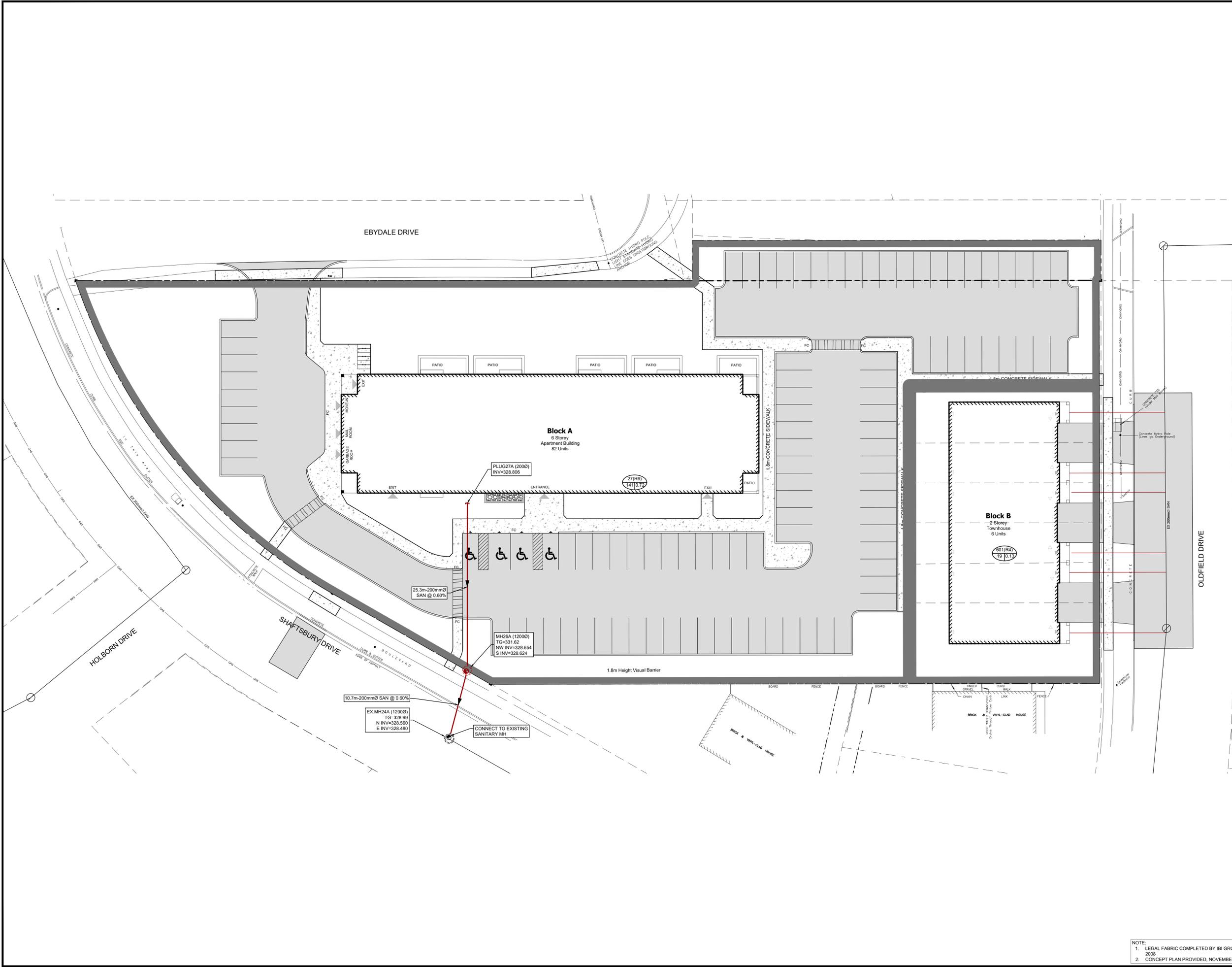
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SCALE	DATE	PROJECT NO.	DRAWN BY	CHECKED BY	SHEET NO.
1:250	2025-11-04	2025-0580-10	KDB	MA	C320

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DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND

- MH: PROPOSED SANITARY MANHOLE
- EX SAN MH: EXISTING SANITARY MANHOLE
- PROPOSED SANITARY SEWER/SERVICE
- EXISTING SANITARY SEWER/SERVICE
- SANITARY DRAINAGE AREA
- CATCHMENT AREA #
- AREA IN HECTARES
- POPULATION

Scale: 1:250

0 2.5 5.0 12.5

CLIENT: COOK LANDS GROUP
 Unit B - 695 Rupert Street, Waterloo

PROJECT: HOPE LUTHERAN CHURCH
 30 Shaftsbury Drive, Kitchener, ON

TITLE: SANITARY CATCHMET AREA PLAN SHEET 1 OF 1

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LICENSED PROFESSIONAL ENGINEER
 M. T. ANYS
 100228122
 2025-12-02
 PROVINCE OF ONTARIO

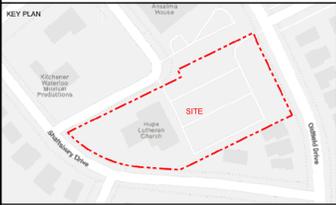
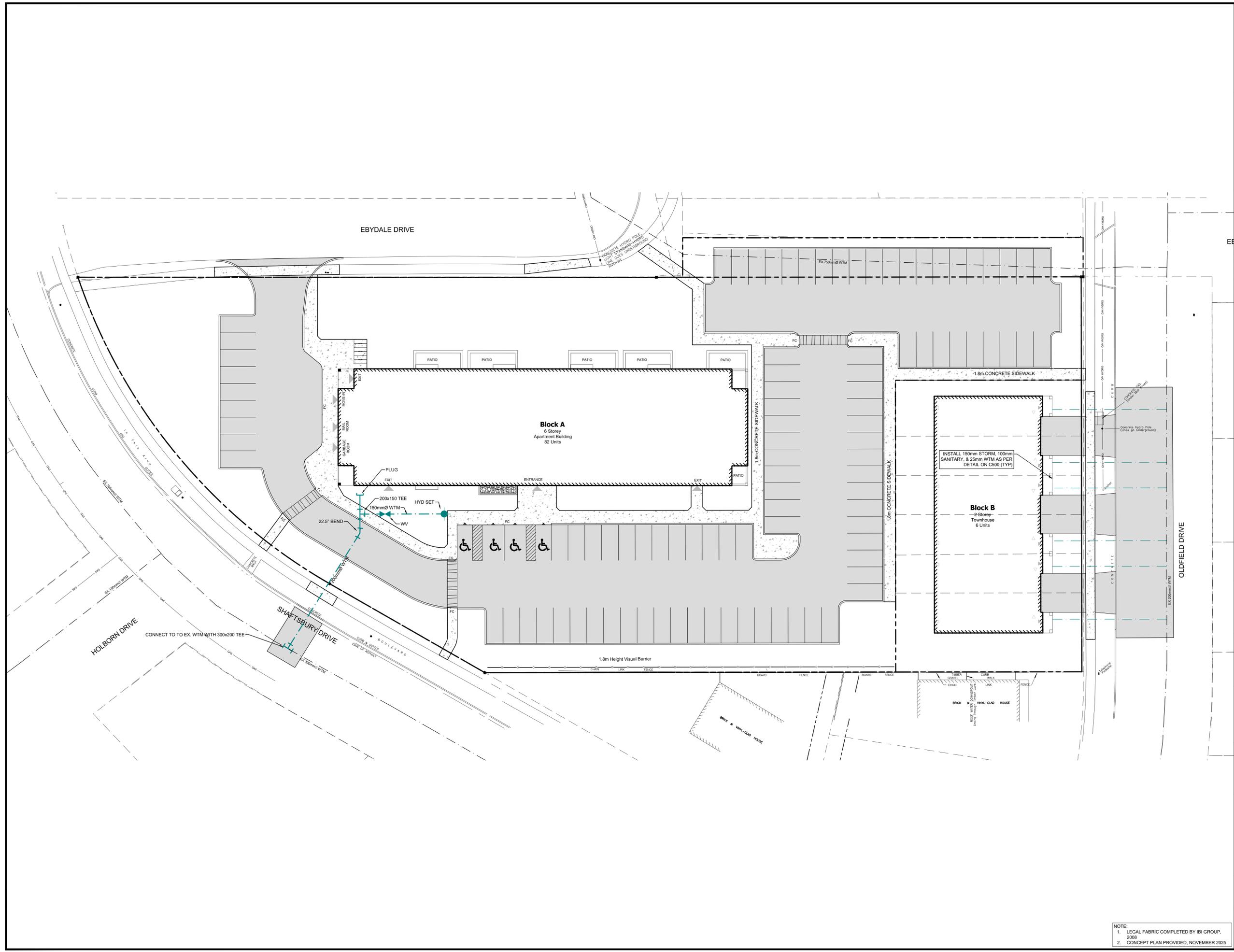
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DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

LEGEND

	PROPOSED FIRE HYDRANT
	PROPOSED WATERMAIN VALVE
	PROPOSED CURB STOP
	PROPOSED REDUCER
	PROPOSED FIRE DEPARTMENT CONNECTION
	EXISTING FIRE HYDRANT
	EXISTING WATERMAIN
	EXISTING CURB STOP
	EXISTING FIRE DEPARTMENT CONNECTION
	EXISTING WELL
	PROPOSED WATERMAIN/SERVICE
	EXISTING WATERMAIN

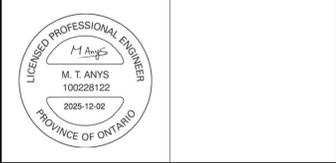


CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
30 Shaftsbury Drive, Kitchener, ON

TITLE
**WATERMAIN DISTRIBUTION PLAN
SHEET 1 OF 1**

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DATE: 2025-11-04	C330
PROJECT NO.: 2025-0580-10	
DRAWN BY: KDB	
CHECKED BY: MA	

- NOTE:
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GENERAL NOTES

- LEGAL BOUNDARY DATA AND TOPOGRAPHIC INFORMATION OBTAINED FROM SURBY BY ARCADIS ENGINEERING.
- THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
- SITE PLAN CREATED BY MHBC DATED OCTOBER 2025
- NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
- THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
- THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWERS, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
- ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CONSULTANT AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO MUNICIPAL STANDARDS.
- ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
- REFER TO LANDSCAPE PLANS FOR SURFACE FINISHES AND PLANTINGS
- REFER TO STRUCTURAL PLANS FOR FOUNDATION AND PORCH DESIGNS AND ELEVATIONS
- REFER TO ARCHITECTURAL PLANS FOR FOUNDATION AND PORCH DESIGNS AND ELEVATIONS
- AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE CONSULTANT WITH A DIGITAL FILE OF AS-CONSTRUCTED DRAWINGS. THE DRAWINGS MUST REFLECT THE CONSTRUCTED STATE OF THE WORK. SUBMISSION OF UNALTERED DESIGN DRAWINGS AND CONTRACT CHANGES WILL NOT BE ACCEPTED.

GRADING NOTES

- MATCH EXISTING GRADES AT ALL PROPERTY LINES AND/OR LIMITS OF CONSTRUCTION EXCEPT WHERE PROPOSED GRADES ARE NOTED.
- MANAGEMENT OF EXCESS MATERIALS SHALL BE IN ACCORDANCE WITH OPSS 180. ENVIRONMENTALLY IMPACTED SOILS, WHERE AND WHEN ENCOUNTERED, SHALL BE MANAGED ON SITE AS REQUIRED UNTIL SUCH TIME THAT LABORATORY TESTING RESULTS HAVE CONFIRMED THE NATURE OF THE IMPACTS AND A SUITABLE DISPOSAL METHOD.
- SURPLUS MATERIAL OF ALL TYPES NOT REQUIRED FOR BACKFILL, GRADING OR LANDSCAPING SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE REMOVED FROM THE SITE AS DIRECTED BY THE CONSULTANT. THE COSTS OF ALL OFFSITE DISPOSAL SHALL BE BORNE BY THE CONTRACTOR UNLESS A SPECIFIC PROVISION IS MADE IN THE CONTRACT DOCUMENTS FOR PAYMENT FROM DISPOSAL OF A SPECIFIC SURPLUS MATERIAL.
- MATERIALS TO BE REMOVED SHALL BE NEATLY SAW-CUT ALONG ITS LIMITS, IN ADVANCE OF THE REMOVAL. THE LIMITS OF REMOVAL SHALL BE AS NOTED ON THE PLANS UNLESS AN EXTENSION OR REDUCTION OF THE MATERIAL TO BE REMOVED IS APPROVED IN ADVANCE BY THE CONSULTANT. AS SUCH, THE COSTS OF ANY OVER-EXCAVATION NOT APPROVED IN ADVANCE SHALL BE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY SHALL ALSO EXTEND TO RESTORATION OR REPLACEMENT OF DISTURBED FEATURES AND SURFACES DUE TO UNAUTHORIZED EXCAVATION.
- ALL FILL PLACED ON SITE SHALL BE COMPACTED TO A MINIMUM 95% SPMD0 (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER OR ON THE DRAWINGS AND IN THE SPECIFICATIONS). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
- MAXIMUM SLOPE IN GRASSED AREAS TO BE 3:1. SLOPES GREATER THAN 3:1 TO BE LANDSCAPED WITH LOW MAINTENANCE GROUND COVER. MINIMUM SLOPE IN GRASSED AREAS TO BE 1% GRASS SWALES WITH A SLOPE LESS THAN 1% TO BE UNDERLAIN WITH A FRENCH DRAIN.
- FINISH GRADE AT FOUNDATION WALLS TO BE MINIMUM 150mm BELOW THE TOP OF FOUNDATION WALL/BRICK LINE UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
- CONTRACTOR TO PROVIDE POSITIVE DRAINAGE ON ALL SURFACES TO THE APPROPRIATE OUTLET STRUCTURE. AREAS OF PONDING CAUSED BY CONSTRUCTION ERROR WILL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT AT THE CONTRACTORS EXPENSE.
- SHOULD THE NATURE OF THE SOIL AT THE DEPTH INDICATED PROVE UNSATISFACTORY AS DETERMINED BY THE GEOTECHNICAL ENGINEER, THE EXCAVATION SHALL BE CARRIED DOWN TO SUCH A DEEPER LEVEL AS THE GEOTECHNICAL ENGINEER MAY REQUIRE UNTIL A SATISFACTORY BEARING STRATUM IS REACHED.
- THIS CONTRACTOR SHALL BE PAID THE COST OF SUCH EXTRA EXCAVATION AS ESTABLISHED IN THE CONTRACT.
- ALL EXTRA DEPTHS OF EXCAVATION AND FILLING MUST HAVE THEIR AREA AND VOLUME DOCUMENTED BY AN INDEPENDENT INSPECTION AND TESTING COMPANY OR THE CONSULTANT TO QUALIFY FOR PAYMENT.
- QUANTITIES USED FOR PAYMENT OF EXCAVATION AND FILLING AT EXTRA DEPTHS TO BE DETERMINED BY THE GEOTECHNICAL CONSULTANT.

GENERAL SERVICING

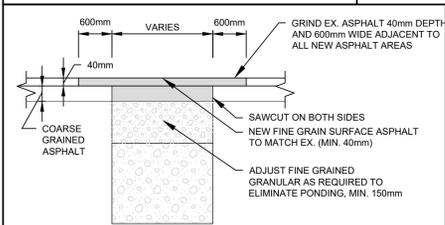
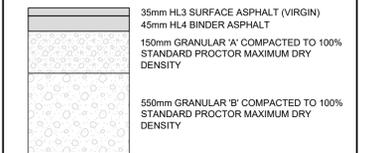
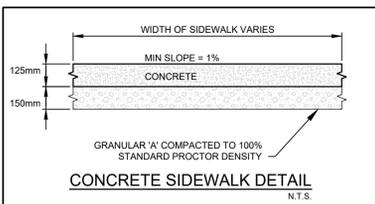
- ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE REGULATIONS SET OUT BY THE MUNICIPALITY HAVING JURISDICTION.
- RIGID PIPE BEDDING, CLASS 'B' AS PER OPSD 802.030 (EARTH EXCAVATION, TYPE 1 OR 2 SOIL), OPSD 802.031 (EARTH EXCAVATION, TYPE 3 SOIL), OPSD 802.032 (EARTH EXCAVATION, TYPE 4 SOIL) ROW: SSMS E1-01
- FLEXIBLE PIPE BEDDING: AS PER OPSD 802.010 (EARTH) ROW: SSMS E1-01)
- NATIVE FILL MATERIAL OR GRANULAR FILL IN ACCORDANCE WITH GEOTECHNICAL RECOMMENDATIONS SHALL BE DEPOSITED IN THE TRENCH. FOR THE GULL WIDTH OF THE TRENCH COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY IN LAYERS NOT OVER 300mm DEPTH, EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
- SITE SERVICING CONTRACTOR TO TERMINATE ALL SERVICES 1.0m FROM FOUNDATION WALL AND COORDINATE WITH THE GENERAL OR MECHANICAL CONTRACTOR AS REQUIRED TO FACILITATE THE CONNECTION.
- WHEN BELL AND SPIGOT PIPE IS LAID, THE BELL END OF THE PIPE SHALL BE LAID UPGRADE.
- PIPE SHALL BE KEPT CLEAN AND DRY AS WORK PROGRESSES. THE TRENCH SHALL BE KEPT DRY.
- A REMOVABLE WATERTIGHT BULKHEAD SHALL BE INSTALLED DAILY AT THE OPEN END OF THE LAST PIPE LAID.
- PIPE SHALL NOT BE LAID UNTIL THE PRECEDING PIPE JOINT HAS BEEN COMPLETED AND THE PIPE IS BEDDED AND SECURED IN PLACE.
- ALL PIPE ENDS SHALL BE THOROUGHLY CLEANED PRIOR TO THE INSTALLATION OF GASKETS. ALL GASKETS TO BE LUBRICATED PRIOR TO BEING INSTALLED OR AS RECOMMENDED BY THE PIPE MANUFACTURER.
- A TEMPORARY LOCATION MARKER 50x75mm SHALL BE PLACED AT THE END OF ALL CAPPED SERVICE CONNECTIONS. THE MARKER SHALL BE PLACED 300mm ABOVE THE PLUGGED END OF THE SERVICE PIPE, CUT AT LEAST 500mm ABOVE THE FINISHED GRADE, AND MARKED WITH BRIGHT PAINT.
- ALL MANHOLES, BASINS, CHAMBERS ETC. TO BE INSTALLED LEVEL AND PLUMB TO THE SATISFACTION OF THE CONSULTANT.

STORM AND SANITARY SEWER

- POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS: SMOOTH PROFILES, TO OPSS 1841 AND CSA B182.2, WITH SEPARATE GASKET AND INTEGRAL BELL SYSTEM, IN 6.0m NOMINAL LENGTHS AS FOLLOWS:
 - 100-150mm OD: SDR28 PVC, WITH 625 kPa STIFFNESS.
 - 200mm OD AND LARGER: SDR35 PVC WITH 320 kPa STIFFNESS.
- SUBSURFACE DRAINAGE PIPE AND FITTINGS: TO OPSS 405, PERFORATED PVC PIPE TO OPSS 1841 OR PE PIPE TO OPSS MUNI 1840, TO CANCSA-B182.1, COMPLETE WITH KNITTED SOCK GEOTEXTILE AS REQUIRED (TERRAFIX 270R OR EQUIVALENT).
- CORRUGATED STEEL PIPE (CSP), TO OPSS 1801 AND CSA G401, COMPLETE WITH COUPLINGS, NEOPRENE GASKETS, BENDS AND OTHER FITTINGS; JOINING TO BE 2PIECE BAND WITH ANGLES COMPLETE WITH NEOPRENE GASKETS FOR NON-PERFORATED PIPE.
- MANHOLES AND CATCHBASIN MANHOLES TO BE PRECAST 1200mm DIAMETER WITH ALUMINUM STEPS AT 300mm SPACING AS PER OPSD 701.010 UNLESS SPECIFIED OTHERWISE.
- CATCHBASINS TO BE 600mm SQUARE PRECAST AS PER OPSD 705.010, DOUBLE CATCHBASINS TO BE 600x1450mm PRECAST AS PER OPSD 705.020, DITCH INLET CATCHBASINS TO BE 600mmx600mm PRECAST PER OPSD 705.030.
- CATCHBASIN MANHOLES, CATCHBASINS, AND DOUBLE CATCHBASINS TO HAVE A MINIMUM 600mm DEEP SUMP. WHEN THE STRUCTURE INCLUDES THE INSTALLATION OF A SNOOT (OR APPROVED EQUIVALENT) THE SUMP DEPTH TO BE A MIN 2.5 TIMES THE OUTLET PIPE DIAMETER SIZE.
- MANHOLE AND CATCHBASIN, FRAMES, GRATES, CASTINGS, LIDS TO BE AS PER OPSS 1850.
- CAST IRON FRAMES AND COVERS OR GRATES- STORM SEWERS: TO OPSS 1850 AND OPSD 401.020, OPSD 401.010 A, CLOSED.
- CAST IRON FRAMES AND COVERS OR GRATES - SANITARY SEWERS: TO OPSS 1850, OPSD 401.010 A, CLOSED.
- ALL SANITARY MANHOLES LOCATED IN STORM WATER PONDING AREAS TO HAVE WATERTIGHT FRAME AND COVERS AS PER OPSD 401.030
- STORM SEWERS AND SERVICES TO HAVE MINIMUM 1.2m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE IN ACCORDANCE WITH APPLICABLE 'SEWER PIPE INSULATION DETAIL' INDICATED IN DRAWING DETAILS.
- SANITARY SEWERS AND SERVICES TO HAVE A MINIMUM 1.8m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE IN ACCORDANCE WITH APPLICABLE 'SEWER PIPE INSULATION DETAIL' INDICATED IN DRAWING DETAILS.
- ALL PIPES, TO BE INSTALLED FLUSH WITH THE INSIDE WALLS OF THE STRUCTURE AND PARGED TO A SMOOTH FINISH.
- ALL SANITARY MANHOLES TO BE PRE-BENCHED OR BENCHED WITH 30MPa CONCRETE AS PER OPSD 701.021. BENCHING SHALL EXTEND TO THE SPRING LINE OF LARGEST PIPE IN THE MANHOLE AND SHALL HAVE A SLOPE OF 1:8.
- CONTRACTOR TO SUPPLY AND PAY FOR CCTV INSPECTION OF ALL SEWER LINES AND STRUCTURES.
- ACCEPTANCE OF SEWER LINES AND STRUCTURES SHALL BE MADE AFTER THE CONSULTANT HAS REVIEWED THE CCTV DOCUMENTATION AND VIDEOS, AND EXPRESSED IN WRITING THAT THE SEWER LINES AND STRUCTURES ARE ACCEPTABLE.
- IF CCTV INSPECTIONS SHOW ADDITIONAL CLEANING IS REQUIRED, CLEAN AND RE-INSPECT THE SEWER UNTIL ACCEPTED BY THE CONSULTANT.
- A MINIMUM OF ONE (1) AND MAXIMUM OF THREE (3) ADJUSTMENT UNITS SHALL BE INSTALLED ON EACH STRUCTURE TO A MINIMUM HEIGHT OF 75mm AND MAXIMUM OF 300mm. THE FIRST ADJUSTMENT UNIT SHALL BE LAID IN A FULL BED OF MORTAR AND ALIGNED WITH THE OPENING IN THE STRUCTURE. SUCCESSIVE ADJUSTMENT UNITS SHALL BE LAID PLUMB TO THE FIRST ADJUSTMENT UNIT AND SEALED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. FRAMES WITH GRATES OR COVERS SHALL BE SET IN A FULL BED OF MORTAR ON THE ADJUSTMENT UNITS AND SUPPORTED USING SHIMS, ROCKS, STONES AND DEBRIS WILL NOT BE PERMITTED FOR USE AS SHIMS.

WATERMANS

- POLYVINYL CHLORIDE (PVC) PIPE: MANUFACTURED TO CAST IRON OD (CIOD); COLOUR CODED BLUE, WITH INTEGRAL WALL THICKENED BELL DESIGNED FOR JOINT ASSEMBLY USING AN ELASTOMERIC GASKET CONFORMING TO ASTM D3139 AND CSA B137.3, TO CSA B137.3, COMPLETE WITH TRACER WIRE.
 - 100 TO 300mm: TO AWWA C900, DR 18, IPEX OR APPROVED EQUAL.
 - 350 TO 600mm: TO AWWA C905, DR 25, IPEX OR APPROVED EQUAL.
- MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE: MANUFACTURED TO CIOD; COLOUR CODED BLUE, BIAXIALLY ORIENTED, WITH INTEGRAL WALL THICKENED BELL DESIGNED FOR JOINT ASSEMBLY USING AN ELASTOMERIC GASKET CONFORMING TO ASTM D3139 AND CSA B137.3.1, COMPLETE WITH TRACER WIRE.
 - 100 TO 300mm: TO AWWA C900, PC 1620 kPa, BIONAX OR APPROVED EQUAL.
- ALL WATER SERVICING TO HAVE MINIMUM 2.0m COVER.
- ALL WATER SERVICING PROVIDING FIRE FLOWS MUST BE PRESSURE TESTED TO 200 PSI AS PER THE OBC PLUMBING CODE.
- FITTINGS: FOR POLYVINYL CHLORIDE (PVC) AND MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE SHALL BE EITHER:
 - GRAY IRON ACCORDING TO AWWA C110/A21.10.
 - DUCTILE IRON ACCORDING TO C110/A21.10 OR AWWA C153 AND SHALL BE CEMENT LINED ACCORDING TO AWWA C104/A21.4.
 - INJECTION MOULDED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C907 AND CSA B137.2.
 - PREFABRICATED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C905 AND CSA B137.3.
- JOINT RESTRAINTS:
 - FOR PVC PIPE AND FITTINGS: TO ASTM F1674 AND AWWA C111, SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1300, 1350 & 1360), EBAA (SERIES 1600, 2500 & 2800) OR CLOW (SERIES 300 & 350), OR WEDGE ACTION TYPE AS MANUFACTURED BY EBAA (SERIES 2000PV), OR UNIFLANGE (SERIES 1500) AND STAR STARGRIP 4000, 4100P.
 - FOR PVCO PIPE AND FITTINGS: SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1300), EBAA (SERIES 2500), WEDGE ACTION TYPE AS MANUFACTURED BY CLOW (SERIES 2000 TUF GRIP), STAR (STARGRIP 3500).
- ALL MECHANICAL JOINTS IN TEMPORARY AND PERMANENT CONNECTIONS TO INCLUDE MECHANICAL JOINT RESTRAINTS.
- WATERMAIN FITTINGS WHICH CHANGE DIRECTIONS VERTICALLY OR HORIZONTALLY TO BE FULLY RESTRAINED BY MECHANICAL JOINT RESTRAINT OR THRUST BLOCKS (OPSD 1103.01 AND 1103.02). THREADED ROD WILL NOT BE PERMITTED.
- WATERMAIN FITTINGS TO BE SUPPLIED WITH MECHANICAL JOINT RESTRAINTS. FOR WATERMAIN PIPE SIZES 150mmØ OR LESS ALL PIPE JOINTS TO BE RESTRAINED WITHIN 5.0m FROM ALL FITTINGS, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. FOR WATERMAIN PIPE SIZES GREATER THAN 150mmØ ALL PIPE JOINTS TO BE RESTRAINED WITHIN 10.0m FROM ALL FITTING, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. ALL TEES TO HAVE MINIMUM 2.0m SOLID PIPE LENGTH ON EACH RUN OF THE TEE, OR PROVIDE A THRUST BLOCK PER OPSD 1103.010.
- TRACER WIRE:
 - T.W.U. #8 GAUGE MULTI-STRANDED COPPER WIRE.
 - PVC WATERMAIN SHALL HAVE TWO STRANDED COPPER, AWG #8 TRACER WIRE STRAPPED TO TOP AT 5.0m INTERVALS. TRACER WIRE SHALL BE BROUGHT TO THE SURFACE AT ALL HYDRANTS AND CONNECTED TO THE LOWER FLANGE OF THE HYDRANT.
 - DO NOT CONNECT THE TRACER WIRE ON NON-METALLIC SYSTEMS TO NEW OR EXISTING METALLIC WATERMAIN PIPING AND/OR ASSOCIATED FITTINGS.
- WATERMAIN VALVES, 100mm and LARGER, SHALL BE AS PER AWWA C509-MUELLER A2360-23 OR APPROVED EQUIVALENT (OPEN LEFT) INCLUDING VALVE BOX AND 2.3kg ANODE.
- HYDRANTS: CONFORM TO AWWA C502 FOR DRY-BARREL HYDRANTS, WITH TWO 63.5mm HOSE NOZZLES AT 180 DEGREES AND A 114.3mm PUMPER NOZZLE WITH A 100mm ULC APPROVED STORTZ CONNECTION, 32mm SQUARE OPERATING NUT, OPEN COUNTER-CLOCKWISE AND HAVE MECHANICAL JOINT END, COMPLETE WITH 150mm LEAD, 150mm GATE VALVE, ANCHOR TEE, VALVE AND BOX PROVIDED IN ACCORDANCE WITH CITY OF KITCHENER AND KITCHENER UTILITIES REQUIREMENTS.
- SERVICE PIPE:
 - SERVICES LESS THAN 100mm: TYPE K SOFT COPPER, TO ASTM B88 OR POLYETHYLENE TO CSA B137.1 WITH INSERTS (STIFFENER) USED AT CONNECTIONS. COPPER SERVICE SHALL HAVE 5.5kg ANODE.
 - SERVICES 100mm OR GREATER: PVC CLASS 150 TO CSA B137.3.
- ANODES TO BE PROVIDED AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND AS INDICATED ON THE DRAWINGS (WRITER TO SHOW, IF REQUIRED) TO THE REQUIREMENTS OUTLINED IN THE CONTRACT SPECIFICATIONS.
- PETROLATUM TAPE SYSTEMS: TO BE COMPRISED OF THREE COMPONENTS: PASTE, MASTIC, AND TAPE THAT MEET AWWA C217-09, SUPPLIED BY DENSO NORTH AMERICA INC. OR PETRO COATING SYSTEMS LTD. OR RUSTROL SYSTEMS (INTERPROVINCIAL CORROSION CONTROL COMPANY LTD.), ONLY MATERIAL FROM SUPPLIERS LISTED SHALL BE USED. AT NO TIME SHALL MATERIALS FROM EITHER SYSTEM BE UTILISED WITH ONE AND OTHER.
- ALL MECHANICAL JOINT RESTRAINTS TO BE WRAPPED WITH APPROVED PETROLEUM TAPE SYSTEM.
- PROVIDE ADEQUATE SUMP BELOW CONNECTION, AND PUMPING IF REQUIRED, TO PREVENT CONTAMINATION OF NEW WATERMAIN WITH TRENCH GROUND WATER OR ANY OTHER FOREIGN MATTER.
- ALL WATERMAIN AND SERVICE COMMISSIONING, PRESSURE/LEAKAGE TESTING, DISINFECTION, BACTERIOLOGICAL ANALYSIS AND FLUSHING TO BE SUCCESSFULLY COMPLETED BY THE CONTRACTOR AND ACCEPTED BY KITCHENER UTILITIES AND CONSULTANT PRIOR TO PERMANENT CONNECTION TO WATER DISTRIBUTION SYSTEM. REFER TO CONTRACT SPECIFICATIONS FOR REQUIREMENTS.
- CONTRACTOR TO SUBMIT A WATERMAIN COMMISSIONING PLAN TO KITCHENER UTILITIES AND CONSULTANT AT LEAST TWO WEEKS PRIOR TO CHLORINE RESIDUAL & BACTERIOLOGICAL TESTING.



DATE	ISSUANCE	NO.
2025.12.02	ISSUED FOR ZONING BY-LAW AMENDMENT	

CLIENT
COOK LANDS GROUP

Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH

30 Shaftsbury Drive, Kitchener, ON

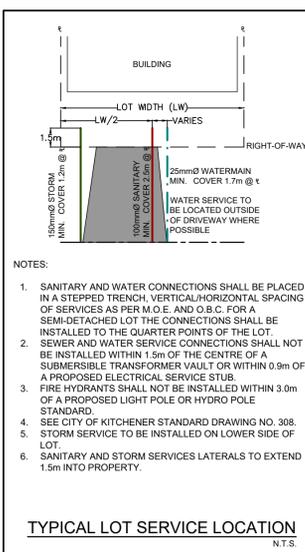
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DETAILS & NOTES PLAN SHEET 1 OF 1

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NOTES:
1. SANITARY AND WATER CONNECTIONS SHALL BE PLACED IN A STEPPED TRENCH, VERTICAL/HORIZONTAL SPACING OF SERVICES AS PER M.O.E. AND O.B.C. FOR A SEMI-DETACHED LOT THE CONNECTIONS SHALL BE INSTALLED TO THE QUARTER POINTS OF THE LOT.
2. SEWER AND WATER SERVICE CONNECTIONS SHALL NOT BE INSTALLED WITHIN 1.5m OF THE CENTRE OF A SUBMERSIBLE TRANSFORMER VAULT OR WITHIN 0.9m OF A PROPOSED ELECTRICAL SERVICE STUB.
3. FIRE HYDRANTS SHALL NOT BE INSTALLED WITHIN 3.0m OF A PROPOSED LIGHT POLE OR HYDRO POLE STANDARD.
4. SEE CITY OF KITCHENER STANDARD DRAWING NO. 308.
5. STORM SERVICE TO BE INSTALLED ON LOWER SIDE OF LOT.
6. SANITARY AND STORM SERVICES LATERALS TO EXTEND 1.5m INTO PROPERTY.

SCALE:	SHEET NO.:
DATE: 2025-11-04	
PROJECT NO.: 2025-0580-10	
DRAWN BY: KDB	
CHECKED BY: MA	

C500

EROSION CONTROL NOTES

EROSION CONTROL MEASURES TO BE IMPLEMENTED IN ACCORDANCE WITH GRAND RIVER CONSERVATION AUTHORITY (GRCA) GUIDELINES, TITLED "EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION DECEMBER 2006." THE SITE WILL REQUIRE DIVERSION SWALES AND TEMPORARY SEDIMENTATION BASINS UNLESS IT IS SHOWN THAT THE EROSION INDEX FACTOR IS LOW ENOUGH THAT SUCH A FACILITY IS NOT WARRANTED.

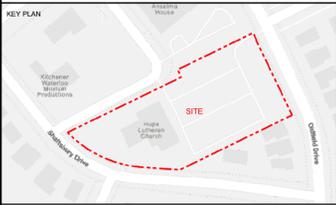
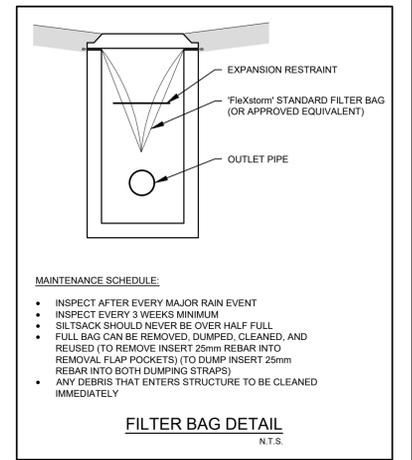
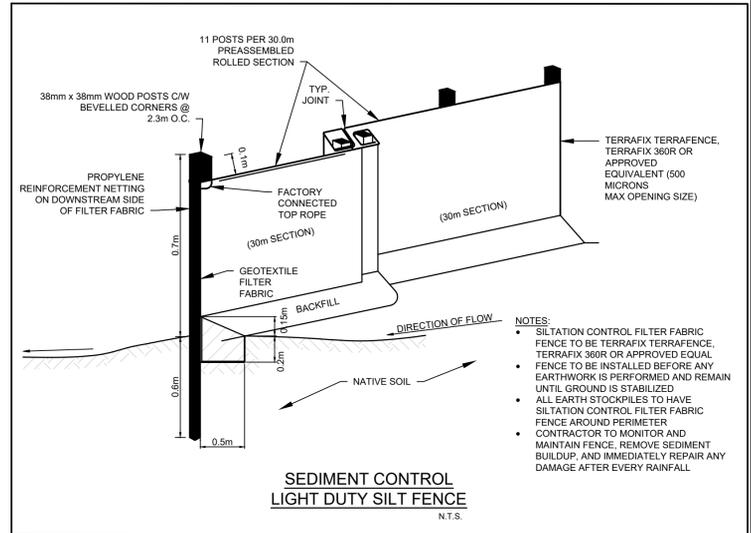
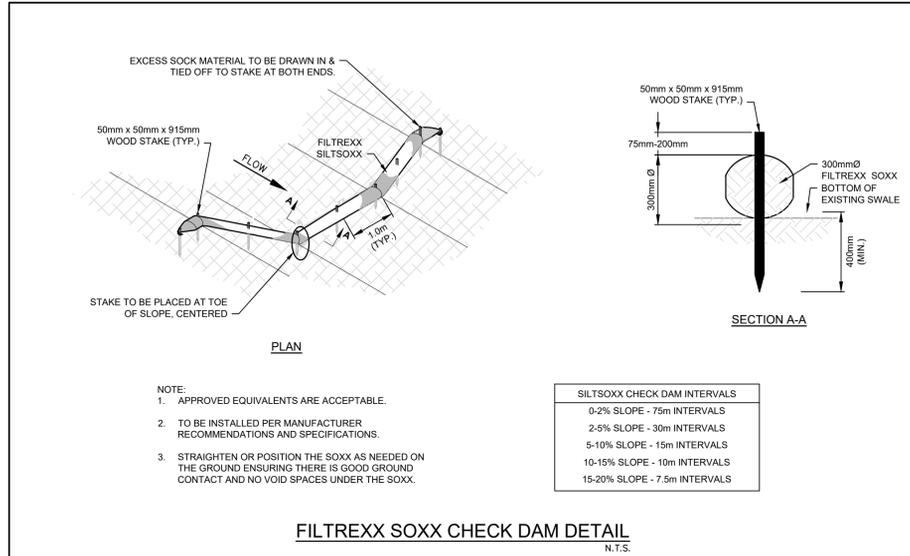
- ALL EROSION CONTROL FENCING, TEMPORARY FILTRATION, MUD MATS AND SEDIMENT BASINS MUST BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE CONSULTANT PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATING, OR DEMOLITION. CONTRACTOR TO NOTIFY CONSULTANT FOR INSPECTION.
- EROSION CONTROL FENCING TO BE PLACED AROUND THE BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT A MINIMUM OF 2.5m FROM PROPERTY LINES.
- FILTER FABRIC TO BE TERRAFIX 360R OR APPROVED EQUIVALENT.
- MUD MATS TO BE PROVIDED ON SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES ENTER/EXIT THE SITE. MUD MATS SHALL BE SUPPLIED AND INSTALLED AS PER THE DETAIL ON THIS SHEET. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES.
- ALL DITCH INLET CATCHBASINS, CATCHBASINS AND CATCHBASIN MANHOLES TO HAVE TEMPORARY FILTRATION INSTALLED AND MAINTAINED AS PER THE DETAIL ON THIS SHEET.
- NO ALTERNATE METHODS OF EROSION CONTROL PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY CONSULTANT AND THE AUTHORITY HAVING JURISDICTION.
- ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE-STABILIZED EITHER BY PAVING OR RESTORATION WITH VEGETATIVE GROUND COVER.
- THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE PUBLIC ROADWAY AND SIDEWALKS AT THE END OF EACH WORK DAY OR AS DIRECTED BY THE CONSULTANT.
- ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED BY THE CONTRACTOR AFTER MAJOR RAINFALL/SNOWMELT EVENTS AND CLEANED OR REPLACED AS REQUIRED TO MEET THEIR INTENDED FUNCTION. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/3) THE STRUCTURE CAPACITY.
- THE CONSULTANT SHALL MONITOR SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO CITY OF KITCHENER REQUIREMENTS. CONTRACTOR TO COMPLY WITH THE CONSULTANT'S INSTRUCTIONS TO INSTALL, MODIFY, OR MAINTAIN EROSION CONTROL WORKS.
- EROSION AND SEDIMENT CONTROL REPORTS SHALL BE PREPARED MONTHLY AND AFTER EVENTS 25mm OR GREATER. (QUARTERLY DURING PERIODS OF INACTIVITY OR HOUSE CONSTRUCTION) ARE TO BE KEPT UNTIL THE SITE HAS BEEN BUILT OUT 90-100% AND STABILIZED.
- PLAN TO BE READ IN CONJUNCTION WITH SWM REPORT.

CONSTRUCTION NOTES

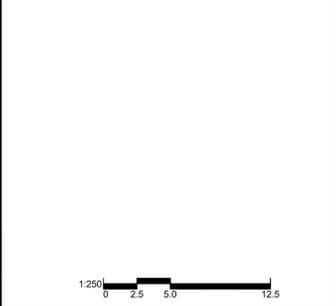
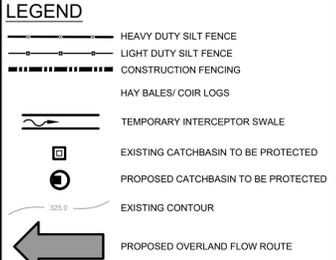
- CONTRACTOR TO PROTECT ALL TREES TO REMAIN.
- THE CONTRACTOR SHALL ASSUME ALL LIABILITY TO EXISTING WORKS.
- ALL WORK ADJACENT TO EXISTING TREES TO REMAIN SHALL BE SUPERVISED BY LANDSCAPE ARCHITECT OR ENGINEER.
- ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS EXISTING CONDITION OR BETTER. THIS INCLUDES TOPSOIL AND SOO, ASPHALT, GRANULAR BASE ETC.
- ALL CONSTRUCTION FENCING TO BE MAINTAINED DURING CONSTRUCTION PERIOD AND REMOVED AFTER COMPLETION OF PROJECT AND ANY DISTURBED AREAS TO BE RESTORED WITH TOPSOIL AND VEGETATION.
- CONTRACTOR TO KEEP DUST TO A MINIMUM DURING CONSTRUCTION.
- CONTRACTOR TO CLEAN AND SWEEP ROADS AFTER EACH WORKING DAY.
- SILT FENCE TO BE INSTALLED AS NOTED OR AS DIRECTED BY ENGINEER.
- ALL CATCHBASINS AND CATCHBASIN MANHOLES TO HAVE FILTER BAG INSTALLED IMMEDIATELY AFTER INSTALLATION AS PER FILTER BAG DETAIL. THIS FILTER SHALL NOT BE REMOVED UNTIL PRIOR TO PAVING.
- LOTS TO BE FINISHED WITH MINIMUM 300mm TOPSOIL. BOULEVARDS TO BE FINISHED WITH MINIMUM 900mm TOPSOIL.
- BOULEVARDS AND SLOPES SHALL BE REVEGETATED PER O.P.S.S. 572 AT THE COMPLETION OF GRADING.
- PRIOR TO CONSTRUCTION, CONTRACTOR TO DETERMINE LOCATION AND INSTALLATION OF CONSTRUCTION FENCING.
- CONTRACTOR TO PROVIDE THE CITY OF KITCHENER WITH MINIMUM 48 HOURS (2 BUSINESS DAYS) NOTICE PRIOR TO TESTING OF INSTALLED WORKS.
- EXISTING HYDRO POLES ARE LOCATED WITHIN THE WORKING AREA AND ANY TEMPORARY SUPPORT OF THESE HYDRO POLES MUST BE APPROVED BY KITCHENER WILMOT HYDRO. ALL ASSOCIATED COSTS WILL BE THE RESPONSIBILITY OF CONTRACTOR.

GRADING NOTES

- MATCH EXISTING GRADES AT ALL PROPERTY LINES AND/OR LIMITS OF CONSTRUCTION EXCEPT WHERE PROPOSED GRADES ARE NOTED.
- MANAGEMENT OF EXCESS MATERIALS SHALL BE IN ACCORDANCE WITH OPSS 180, ENVIRONMENTALLY IMPACTED SOILS, WHERE AND WHEN ENCOUNTERED, SHALL BE MANAGED ON SITE AS REQUIRED UNTIL SUCH TIME THAT LABORATORY TESTING RESULTS HAVE CONFIRMED THE NATURE OF THE IMPACTS AND A SUITABLE DISPOSAL METHOD.
- SURPLUS MATERIAL OF ALL TYPES NOT REQUIRED FOR BACKFILL, GRADING OR LANDSCAPING SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE REMOVED FROM THE SITE AS DIRECTED BY THE CONSULTANT. THE COSTS OF ALL OFFSITE DISPOSAL SHALL BE BORNE BY THE CONTRACTOR UNLESS A SPECIFIC PROVISION IS MADE IN THE CONTRACT DOCUMENTS FOR PAYMENT FROM DISPOSAL OF A SPECIFIC SURPLUS MATERIAL.
- MATERIALS TO BE REMOVED SHALL BE NEATLY SAW CUT ALONG ITS LIMITS, IN ADVANCE OF THE REMOVAL. THE LIMITS OF REMOVAL SHALL BE AS NOTED ON THE PLANS UNLESS AN EXTENSION OR REDUCTION OF THE MATERIAL TO BE REMOVED IS APPROVED IN ADVANCE BY THE CONSULTANT. AS SUCH, THE COSTS OF ANY OVER-EXCAVATION NOT APPROVED IN ADVANCE SHALL BE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY SHALL ALSO EXTEND TO RESTORATION OR REPLACEMENT OF DISTURBED FEATURES AND SURFACES DUE TO UNAUTHORIZED EXCAVATION.
- ALL FILL PLACED ON SITE SHALL BE COMPACTED TO A MINIMUM 95% SPMD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER OR ON THE DRAWINGS AND IN THE SPECIFICATIONS). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
- MAXIMUM SLOPE IN GRASSED AREAS TO BE 3:1. SLOPES GREATER THAN 3:1 TO BE LANDSCAPED WITH LOW MAINTENANCE GROUND COVER.
- ALL SIDE SLOPES OF STOCKPILES, WINDROWS OR EXCAVATED AREAS ARE TO BE LESS THAN 70 DEGREES AT THE END OF EACH WORKING DAY TO RENDER THE AREA AS UNSUITABLE HABITAT FOR BANK SWALLOW NESTING.
- FINISH GRADE AT FOUNDATION WALLS TO BE MINIMUM 150mm BELOW THE TOP OF FOUNDATION WALL/BRICK LINE UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
- CONTRACTOR TO PROVIDE POSITIVE DRAINAGE ON ALL SURFACES TO THE APPROPRIATE OUTLET STRUCTURE. AREAS OF PONDING CAUSED BY CONSTRUCTION ERROR WILL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT AT THE CONTRACTOR'S EXPENSE.
- SHOULD THE NATURE OF THE SOIL AT THE DEPTH INDICATED PROVE UNSATISFACTORY AS DETERMINED BY THE GEOTECHNICAL ENGINEER, THE EXCAVATION SHALL BE CARRIED DOWN TO SUCH A DEEPER LEVEL AS THE GEOTECHNICAL ENGINEER MAY REQUIRE UNTIL A SATISFACTORY BEARING STRATUM IS REACHED.
- THIS CONTRACTOR SHALL BE PAID THE COST OF SUCH EXTRA EXCAVATION AT THE UNIT PRICE ESTABLISHED IN THE CONTRACT.
- ALL EXTRA DEPTHS OF EXCAVATION AND FILLING MUST HAVE THEIR AREA AND VOLUME DOCUMENTED BY THE CONSULTANT TO QUALIFY FOR PAYMENT.
- QUANTITIES USED FOR PAYMENT OF EXCAVATION AND FILLING AT EXTRA DEPTHS TO BE DETERMINED BY THE CONSULTANT.



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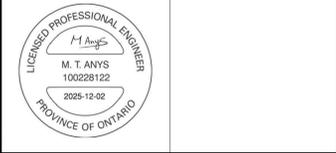
CLIENT
COOK LANDS GROUP
Unit B - 695 Rupert Street, Waterloo

PROJECT
HOPE LUTHERAN CHURCH
30 Shaftsbury Drive, Kitchener, ON

TITLE
EROSION & SEDIMENT CONTROL DETAILS
SHEET 2 OF 2

WALTERFEDY

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IMPLEMENTATION SCHEDULE AND DETAILS FOR EROSION AND SEDIMENTATION CONTROL MEASURES	
PRIOR TO ANY SITE WORKS:	<ul style="list-style-type: none"> INSTALL CONSTRUCTION MUD MATS AT ALL ENTRANCES AND SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION. EROSION AND SEDIMENT CONTROL REPORTS SHALL BE PREPARED MONTHLY AND AFTER EVENTS 25mm OR GREATER. (QUARTERLY DURING PERIODS OF INACTIVITY OR HOUSE CONSTRUCTION) ARE TO BE KEPT UNTIL THE SITE HAS BEEN BUILT OUT 90-100% AND STABILIZED.
DURING TOPSOIL STRIPPING	<ul style="list-style-type: none"> CONSTRUCT DIVERSIONS SWALES & BERMS. SURPLUS TOPSOIL IS TO BE STOCKPILED IN LOCATIONS SHOWN.
DURING AREA GRADING	<ul style="list-style-type: none"> ALL DIVERSION BERMS/SWALES TO BE CHECKED REGULARLY AND AFTER EACH SIGNIFICANT RAINFALL AS GRADING PROCEEDS. DIVERSION BERMS/SWALES TO BE RECONSTRUCTED/RELOCATED AS NECESSARY TO ENSURE THAT THEY DIRECT FLOWS INTO BASINS. DIVERSION SWALES AND DITCHES ARE TO BE MAINTAINED BY CONTRACTOR DURING ACTIVE CONSTRUCTION. SILT FENCE TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSIT IS REACHES ONE THIRD OF THE WAY TO THE TOP OF THE BARRIER. SEDIMENT CONTROL BASINS TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL AND CLEANED OUT WHEN THE LEVEL OF SEDIMENT BUILDUP HAS REDUCED THE VOLUME OF THE DEAD STORAGE BY HALF. STORMWATER MANAGEMENT FACILITY IS TO BE CONSTRUCTED (FOREBAY AND MAIN CELL) EARLY IN GRADING OPERATIONS. SEDIMENT LEVEL IN FOREBAY IS TO BE MONITORED AND CLEANED OUT IF STORAGE IS REDUCED BY HALF. TEMPORARY OUTLET FROM QUANTITY CELL IS TO BE CONSTRUCTED AND OPERATIONAL PRIOR TO CONSTRUCTION OF PIPE TO COOLING TRENCH. THE PIPE TO THE COOLING TRENCH IS TO BE PLUGGED IMMEDIATELY FOLLOWING INSTALLATION.
AFTER AREA GRADING	<ul style="list-style-type: none"> ALL AREAS (INCLUDING STOCKPILES) WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 30 DAYS OR MORE, SHALL BE HYDROSEEDED IN ACCORDANCE WITH OPSS 572.
DURING SERVICING AND ROADWORKS CONSTRUCTION	<ul style="list-style-type: none"> MAINTAIN FUNCTION OF SEDIMENT CONTROLS. ENSURE GRADED AREAS DRAIN TO SEDIMENT BASINS. INSTALL ROCK CHECK DAMS IN LOW POINT OF AREAS CUT OFF BY ROADS AS DIRECTED BY THE ENGINEER. INSTALL STORM SERVICE OUTLETS AT ALL LOW POINTS (SEE DETAILS). INSTALL SILTATION CONTROL DEVICES IN CATCH-BASINS AND MONITOR DEVICE CAPACITY MONTHLY OR AS NECESSARY AND CLEAN OUT PER MANUFACTURER RECOMMENDATIONS. UPON DECOMMISSIONING SEDIMENT BASINS LOCATED ON FUTURE LOTS, CERTIFICATION FROM A SOILS ENGINEER IS REQUIRED TO CONFIRM STRUCTURAL BEARING CAPACITY AND IF STRUCTURAL FILL IS REQUIRED. CONTRACTOR TO ENSURE COOLING TRENCH AND INFILTRATION GALLERIES RECEIVING ROAD RUNOFF ARE PLUGGED DURING CONSTRUCTION AND HEAVY SEDIMENT LOADING.
DURING HOUSE CONSTRUCTION	<ul style="list-style-type: none"> STREETS TO BE KEPT CLEAN. UPON DECOMMISSIONING OF SEDIMENT BASINS LOCATED ON FUTURE LOTS, CERTIFICATION FROM A SOILS ENGINEER IS REQUIRED TO CONFIRM STRUCTURAL BEARING CAPACITY AND IF STRUCTURAL FILL IS REQUIRED.
FOLLOWING SITE STABILIZATION	<ul style="list-style-type: none"> REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90-100%) AND SITE STABILIZATION. PULVIS TO INFILTRATION GALLERIES AND COOLING TRENCH TO BE REMOVED FOLLOWING SITE STABILIZATION AND SEDIMENT LOADING FROM CONSTRUCTION ACTIVITY.

