PUSLINCH

Comment Summary – November 21, 2024 (4th Submission)

Zoning By-law Amendment Application – WDD Main St. Inc.

Consultant	Comments
NPG – Township Planning Consultant	See letter attached
GEI (formerly GM BluePlan) - Engineers	See letter attached
County of Wellington Planning	The County Planning Department will provide comments on this proposal, if required, through the Draft Plan of Subdivision application. No objections to deeming complete with the understanding that additional comments may be forthcoming once we've reviewed the Draft Plan submission.
Township Ecologist	Revised EIS Addendum has been prepared to address NPG policy-related comments pertaining to the new PPS. No new ecological comments for this submission.
Township Hydrogeologist	See letter attached
Township of Puslinch Fire Department – Brent Smith	Comments pending
Township of Puslinch Building Department – Andrew Hartholt	No comments
Township of Puslinch Public Works – Mike Fowler	No comments
Township of Puslinch By-law – Jacob Normore	No comments
GRCA Comments	No comments

Halton Conservation	Waiting for comments
MTO	See letter attached
Township Traffic Consultant	I am in agreement with the November 13, 2024 letter prepared by GHD reviewing the transportation considerations for additional dwelling unit and home-based business uses on the site.
County of Wellington Transportation	The Wellington Roads comments are unchanged from previous submissions • No Objection with the zoning bylaw amendment application and further comments will be provided during once the draft plan of subdivision application is submitted.
Source Water	Since this property is not located in a vulnerable area (wellhead protection area, issues contributing area, intake protection zone etc.), the application can be screened out and it does not require a Section 59 notice under the Clean Water Act.

December 13, 2024

Lynne Banks
7404 Wellington Road 34,
Puslinch, Ontario

Dear Lynne Banks,

RE: **NPG Comments**
Main St
RE: Application for Zoning By-law Amendment & Draft Plan of Subdivision

NPG Planning Solutions Inc. (NPG) has been retained to provide comments regarding a Zoning By-law Amendment Application and a Draft Plan of Subdivision Application proposing a residential subdivision consisting of 21 detached dwelling lots, environmental protection lands, a stormwater management pond and a municipal road. The Subject Lands are approximately 23.10 hectares in size and have frontage along Highway 6, Main St and Ochs St. The Subject Lands are currently vacant and are in proximity to residential uses to the north and west, and agricultural and natural lands to the east and south.

This is the fourth submission for this application.

NPG has reviewed the following items:

- Draft Plan of Subdivisions prepared by Weston Consulting, dated September 3, 2024;
- Draft Zoning By-law Amendment prepared by Weston Consulting;
- Planning Justification Report Addendum Letter prepared by Weston Consulting dated November 20,2024;
- Environmental Impact Study Addendum Letter prepared by Colville, dated November 14,2024;
- Functional Servicing and Preliminary Stormwater Management Report prepared Colville dated September 2024;
- Servicing Review Letter for additional Residential Units and Home-Based Businesses prepared by Crozier, dated November 15, 2024;
- Traffic Review Letter for Additional Residential Units and Home-Based Businesses prepared by GHD, dated November 13, 2024;
- Hydrogeological Letter for Additional Residential Units and Home-based Businesses prepared by Englobe, dated November 19,2024;

- Comment-Response Matrix prepared by Weston Consulting, dated November 2024.

Comments for Complete Application:

1. We have no issues with the Township deeming the Zoning By-law Amendment Application complete subject to the Township's Engineering and Hydrogeological Consultant confirming that sufficient information has been provided to make a determination as to whether the site conditions are suitable for the long-term provision of individual on-site sewage services and individual on-site water services without negative impacts.

Preliminary Comments on Application

2. As previously noted, the Zoning By-law should address the exclusion of uses on the proposed stormwater management pond block. The revised Zoning By-law does not include any language addressing this matter.

3. The Schedule submitted by the Applicant should be revised to make the Environmental Protection Zone Overlay more visible since the overlay hatching is not legible.

4. Conservation Halton recommends their regulated area (wetland features plus the 30-m regulatory setback) be zoned appropriately and be conveyed to public ownership. The current Zoning By-law Amendment Application proposes to zone the wetland features and part of the 30-metre regulatory setback as Natural Environment Zone (NE) and the remaining part of the 30-metre regulatory setback as a site-specific Urban Residential Zone (UR(spXX)). The appropriate zones and their extent will need to be reviewed through the application process.

Sincerely,

[redacted]

Jesse Auspitz, MCIP, RPP
Principal Planner
NPG Planning Solutions Inc.
jauspitz@npgsolutions.ca

December 13, 2024
Project No. 2402578 / 122006-002

VIA EMAIL: lbanks@puslinch.ca

Lynne Banks
Township of Puslinch
4704 Wellington Road 34
Puslinch, ON N0B 2J0

Re: Zoning By-Law Amendment 4th Submission
11 Main Street (Morriston)
Puslinch, ON

Dear Ms. Banks:

Following our review of fourth submission documents for Zoning By-Law Amendment and Draft Plan of Subdivision Application received on November 22, 2024, we are providing comments related to the proposed residential subdivision on the subject lands located at 11 Main Street in the Township of Puslinch. The Draft Plan of Subdivision submitted identifies twenty-one (21) residential lots. Twenty (20) of the lots front a proposed right-of-way, connected to an extension of Ochs Street, while one (1) lot fronts Main Street.

The third submission was received on September 5, 2024, with review comments provided on September 27, 2024.

The following fourth submission documents were received and reviewed:

- Fourth Submission Cover Letter, prepared by Weston Consulting, dated November 20, 2024.
- Comments Response Matrix, prepared by Weston Consulting, dated November 2024.
- Draft Plan of Subdivision, prepared by Weston Consulting, dated September 9, 2024.
- Functional Servicing and Preliminary Stormwater Management Report, prepared by Crozier Consulting, dated November 2024.
- Engineering Plans (Rev. 3), prepared by Crozier Consulting, dated November 15, 2024, including:
    - Fig. 1 - Preliminary Site Servicing Plan (East)
    - Fig. 2 - Preliminary Site Servicing Plan (West)
    - Fig. 3 - Site Grading Plan (East)
    - Fig. 4 - Site Grading Plan (West)
    - Fig. 5 - External Grading Plan (Ochs Street)
    - Fig. 6 - Pre-Development Drainage Plan
    - Fig. 7 - Post-Development Drainage Plan

We defer detailed review of the remaining documents to Township staff and other consultants.

Based on our third submission comments and review of fourth submission documents identified above, we provide the following comments for Zoning By-Law Amendment and Draft Plan of Subdivision:

Deficiencies/Outstanding Matters

No.	Matter	Document	Date Identified	Comment
4.	Infiltration Water Quality	Functional Servicing & Preliminary SWM Report	April 20, 2023, February 9, 2024, September 27, 2024, and December 13, 2024	<u>GEI Comment (April 20, 2023)</u> The proponent should be cognizant of any potential impacts of infiltrating road runoff which contains chlorides and other pollutants. There could be a potential for contaminant spills or oils to be infiltrated in the ground via the proposed infiltration trenches (no oil/grit separator is proposed in the FSR). We recommend infiltration of 'clean' runoff only (i.e. infiltration of building rooftop runoff and/or grassed areas only). In addition, the proposed drinking water wells are located at the front of the lot in close proximity to the infiltration trenches which introduces further concerns regarding infiltration of possible roadway contaminants. We defer to the Township Hydrogeologist and Wellington Source Water Protection for comments on the infiltration water quality and the effect on drinking water wells. <u>Crozier Response (January 2024)</u> Based on the Hydrogeological Report the soils on-site are not conducive to infiltration (10 mm/hr infiltration rates); therefore, lot level infiltration has not been proposed. All infiltration trenches have been removed and replace with storm sewer and an end of pipe stormwater management facility. <u>GEI Comment (February 9, 2024)</u> The response to this comment states that infiltration is not proposed while the Hydrogeological Report recommends lot level soakaway pits for roof runoff. Please coordinate and revise reports accordingly. <u>Crozier Response (September 2024)</u> The in-situ hydraulic conductivity of the soils on-site ranged from 1.18 x 10-6 to 1.21 x 10-6 m/s which correlates to an infiltration rate of approximately 10 mm/hr. Therefore, the soils onsite are not conducive to infiltration, and it is recommended that end of pipe LID practices are not implemented onsite to meet the water balance objectives.

No.	Matter	Document	Date Identified	Comment
				Additional topsoil over the lots could also be implemented to increase void storage within the lots without having directing stormwater to a specific infiltration system. Lot level soak away pits are not being proposed for this subdivision. However, the design has been revised to include an infiltration facility downstream of the dry SWM facility to address the water balance. Details will be provided at detailed design but the footprint shown on the attached Figures is based on sufficient retention to balance the water budget for the site. <u>GEI Comment (September 27, 2024)</u> Infiltration facilities require 1.2 m frost cover depth and 1 m separation with groundwater per MOE SWMPD Manual criteria. The proposed facility is 1 m in depth while the maximum depth is 0.6 m per MOE SWMPD Manual criteria. Please show relevant **elevations** on the Servicing Plan including top of infiltration facility, bottom of infiltration facility, frost cover depth, groundwater separation, inlet elevation and outlet elevation. Clearly show how flow is to be transferred from the pond outlet to the infiltration facility. <u>Crozier Response (November 2024)</u> Relevant elevations have been provided on the updated servicing plan. Given the available space and required infiltration volume, 0.6 m depth is not achievable. Given the MOE SWMPD Manual is outdated, it is our opinion that the 1.0 m storage depth is acceptable and has been approved for other projects in Ontario. Please provide rationale for the 0.6 m request. <u>GEI Comment (December 13, 2024)</u> Please provide a detail for the infiltration facility to show frost cover depth, groundwater separation, inlet and outlet elevations. If using a 1.0 m storage depth, please provide a reference to an alternate guideline/best practice to support the proposed design.
10.	Quantity Control of Stormwater	Functional Servicing & Preliminary SWM Report	April 20, 2023, September 27, 2024, and December 13, 2024	<u>GEI Comment (April 20, 2023)</u> The post-development 2-year storm event does not appear to match pre-development flow rates. Please revise. <u>Crozier Response (January 2024)</u> The stormwater management modelling has been revised to incorporate the quantity controls within the proposed stormwater management facility. Based on the modelling

No.	Matter	Document	Date Identified	Comment
				the post-development flows have been reduced to the pre-development flows for all storm events. Details of the outlet control structure will be included during the detailed design stage. GEI Comment (February 9, 2024) The design of the outlet control structure will impact volume of storage required. Please provide preliminary design of the structure or provide discussion on the volume of storage provided versus storage required. Crozier Response (September 2024) Detailed outlet control structure sizing has been completed and is included in Appendix D. GEI Comment (September 2024) Please indicate the size, location and elevation of the proposed orifice on the Servicing Plan. Based on Appendix D calculations, the proposed orifice size is to be 50 mm. Per Table 4.8 in the MOE SWMPD Manual, the minimum orifice size for a dry pond is 75 mm with a preferred diameter of 100 mm, as small orifices can be clogged easily. Please revise calculations to adhere to **MECP criteria** or describe how a 50 mm diameter orifice would be protected. At detailed design, please provide a detail for the outlet control structure. Crozier Response (November 2024) Noted. Orifice size has been increased to a diameter of 75 mm. Additionally, a CSP guard has been proposed to minimize clogging of the orifice. Please see revised drawings for details. GEI Comment (December 13, 2024) The top of grate/lid elevation on Detail 3 on the Preliminary Site Servicing Plan (East) does not appear to match the plan view on the drawing, or the Storage-Outflow Calculations Table in Appendix D. The outlet pipe in the detail does not match the plan view drawing. Additionally, the Emergency Overflow Detail shows a crest elevation of 314.25, whereas tables in the report and Appendix D state that the overflow weir elevation is at 313.90. It is also not clear on the Preliminary Site Servicing Plan (East) where the emergency overflow weir is located.

No.	Matter	Document	Date Identified	Comment
31.	Values in Tables	Functional Servicing & Preliminary SWM Report	December 13, 2024	GEI Comment (December 13, 2024) The following inconsistencies/errors should be reviewed: 1. In Table 6, the area of EX1 is shown as 5.22 ha but elsewhere it is shown as 5.17 ha. 2. The percent imperviousness of EX2 (pre-development) is modelled as 36.9%, but Table 6 and the figures show 37.2% imperviousness. 3. All pre-development peak flow rates in Table 8 do not appear to match the model outputs. 4. The required storage for the regional high water level should be updated from 1127 m^3 to 1149 m^3 in Table 10.

Additional Commentary

No.	Comment
1.	GEI Comment (February 9, 2024) Please provide a copy of the review comments as received by Conservation Halton. Crozier Comment (September 2024) Acknowledged.
2.	GEI Comment (September 2024) As there is no quality control for Catchment 202, the Township and future homeowners should be made aware that it will not be acceptable for driveways, parking areas etc. to be extended into the rear parts of the proposed lots in the future. Crozier Comment (November 2024) Acknowledged.

Completed/Approved Matters

No.	Matter	Document	Date Identified	Comment
1.	Right-of-way Profiles	Grading Plans	April 20, 2023	GEI Comment (April 20, 2023) The proposed development proposes an 18m wide rural cross section complete with roadside ditches and reduced pavement widths. A 20m wide urban cross-section complete with curb and gutter, storm sewer system and sidewalk is required per Township of Puslinch Municipal Development Standards and Township of Puslinch Standard Drawing 102 (STD-102). Please revise for the next submission. Crozier Response (January 2024) All drawings have been updated with a 20 m urban right-of-way per Standard Drawing 102 (STD-102). Storm sewer has been incorporated to direct stormwater runoff to the proposed stormwater management facility. GEI Comment (February 9, 2024) Accepted, no further comment.
2.	Cul-de-sac Radius	Grading Plans	April 20, 2023	GEI Comment (April 20, 2023) As per Township of Puslinch Municipal Development Standards, the cul-de-sac bulb right-of-way radius shall be revised from 18m to 20m. Crozier Response (January 2024) The cul-de-sac radius has been revised from 18m to 20m. GEI Comment (February 9, 2024) Accepted, no further comment.
3.	Quality Control	Functional Servicing & Preliminary SWM Report	April 20, 2023, February 9, 2024, September 27, 2024	GEI Comment (April 20, 2023) The FSR needs to demonstrate how Enhanced quality control is met (i.e. 80% total suspended solid removal). It appears that a treatment train is not created as grassed swales are the only method of quality control for the runoff being infiltrated. An additional mechanism such as but not limited to an oil/grit separator would be required to have a treatment train. Crozier Response (January 2024) Enhanced quality control will be met through the implementation of an oil grit separator upstream of the proposed stormwater management facility. The stormwater management facility will provide additional settling to meet the enhanced quality control requirements.

No.	Matter	Document	Date Identified	Comment
				GEI Comment (February 9, 2024) The Functional Servicing & Preliminary SWM Report states that quality control will be provided by an oil grit separator in series with dry pond settling. However, the MOE SWMPD Manual states that dry ponds should not be used for combined quantity and quality control unless a forebay is included. Table 4.8 lists the forebay requirement for dry ponds. Conversely, Puslinch Municipal Development Standards support the use of oil-grit separators as part of a treatment train, not the only method of treatment. Please provide additional discussion on the treatment train proposed. Crozier Response (September 2024) Enhanced quality control will be met through the implementation of an oil grit separator upstream of the proposed stormwater management facility. The stormwater management facility will provide additional settling to meet the enhanced quality control requirements based on MOE criteria. Additional design sheets have been prepared to show the combination of the dry pond and oil-grit separator. Based on the New Jersey Stormwater Best Management Practices Manual Table 4.1 extended detentions (dry ponds) provide a TSS removal rate of 60%. Through a combination of the dry pond (60% TSS) and oil-grit separator (50% TSS) a total TSS removal of 80% will be met. Additionally, following treatment from the OGS and Dry Pond treated stormwater will outlet through a level spreader and then travel at least 30 meters overland through the existing woodlot prior to discharging to the watercourse. This flow path will provide additional TSS removal. Details will be provided through detailed design of the subdivision. GEI Comment (September 27, 2024) Please revise the stormwater quality control section using **local design criteria** (Ontario MECP criteria rather than New Jersey). MOE SWMPD Manual Table 3.2 provides the storage volumes required for dry ponds to provide 60% TSS removal, and while this calculation is used in the Extended Detention calculation in Appendix D, Appendix F should also be updated accordingly. Please provide calculations based on an MECP approved methodology to support that 80% TSS removal is provided by a combination of the dry pond and OGS.

No.	Matter	Document	Date Identified	Comment
				The Erosion Control Volume Calculations in Appendix D should be based on a drainage area of 3.50 ha plus the areas of EX2 and EX3, which also contribute. During the detailed design stage, information should be provided to support the TSS removal capabilities of the Stormceptor EFO8 system based on specific site conditions. <u>Crozier Response (November 2024)</u> We have provided the Stormceptor sizing report to provide more details on the TSS removal efficiency of the OGS. We have assumed 50% removal rate with the OGS. Additionally, the dry pond has been designed with an extended detention to provide 60% TSS removal per MOE design criteria. Following treatment from the dry pond, stormwater will outlet through a level spreader and will travel overland through existing woodlot, which will provide additional TSS removal. Through the combination of these quality controls measures, 80% removal has been provided. The MECP does not provide methodology for treatment train efficiency, please advise if GEI is aware of methodology to apply, if the provided method is not acceptable. <u>GEI Comment (December 13, 2024)</u> No further comment.
5.	Infiltration Trenches / Galleries	Servicing Plans / FSR	April 20, 2023	<u>GEI Comment (April 20, 2023)</u> The FSR proposes surface ponding up to 0.3m in the roadside ditches and subsurface storage/infiltration in a series of longitudinal infiltration galleries located below the proposed roadside ditches. While this concept could work in principle for a flat area, we express concerns in the ability to capture and store the runoff when some of the roads are graded at close to an 8% slope. The stormwater management calculations assume that 0.3m ponding is available throughout the roadside ditches and that the sub-surface galleries can fill up with water. Even with the construction of check dams, terracing or elevated culverts as mentioned in the FSR, due to the steepness of the roads, the volume potential outlined in the stormwater management calculations would be extremely challenging to achieve.

No.	Matter	Document	Date Identified	Comment
				Furthermore, it is unclear how the 0.3m ponding in the ditch is proposed to work with driveway culverts. The Town is not in support of a roadside ditch system in urban centers and hamlets, let alone a roadside ditch system that has the potential to pond water for prolonged periods of time. Additional concerns with the location of infiltration galleries and utility infrastructure – this will introduce a maintenance concern for the Township. Crozier Response (January 2024) Acknowledged. All infiltration trenches have been removed and replace with storm sewer and an end of pipe stormwater management facility. GEI Comment (February 9, 2024) Accepted, no further comment.
6.	Post-Development Drainage Plan	FSR	April 20, 2023	GEI Comment (April 20, 2023) Please label the imperviousness of the external areas on the Post-Development Plan for consistency. Crozier Response (January 2024) The Post-development Drainage Plan has been revised to include the imperviousness of the external drainage catchments. GEI Comment (February 9, 2024) Accepted, no further comment.
7.	Roadway Grade	Grading Plan	April 20, 2023	GEI Comment (April 20, 2023) Please note that the maximum allowable roadway grade is 6% in the Township of Puslinch. Crozier Response (January 2024) Maximum allowable roadway grades have been maintained everywhere possible. There are a few minor locations where the maximum grade exceeds 6%. GEI Comment (February 9, 2024) The proposed “Street B” contains a grade of 7.6%. Please revise. Ochs Street contains grades of 8%. Please revise or provide cross-sections to justify deviation from the Township standard (see comment #19). Crozier Response (September 2024) The grading of the internal roadway has been revised.

No.	Matter	Document	Date Identified	Comment
				GEI Comment (September 27, 2024) Accepted, no further comment.
8.	Ochs Street Labels	Plans	April 20, 2023	GEI Comment (April 20, 2023) Please label Ochs Street on all plans. Crozier Response (January 2024) Ochs Street has been labelled on all plans. GEI Comment (February 9, 2024) Accepted, no further comment.
9.	Infiltration Gallery Detail	Grading Plan	April 20, 2023	GEI Comment (April 20, 2023) The function of the 150mm diameter perforated pipe and surface ponding capability of the system is questionable. It appears that the 150mm diameter perforated pipe would convey the drainage prior to the ability of the system to pond on the surface or use the last 150mm of storage in the gallery. Inconsistencies between the FSR and infiltration gallery detail with respect to gallery and overflow pipe dimensions. (i.e. FSR states 1.0m deep gallery with 100mm diameter overflow pipe, detail shows 0.9m deep gallery with 150mm diameter overflow pipe). The notes regarding placing sod on top of geotextile wrapped media need further clarification as the topsoil is not proposed to be wrapped in geotextile. Crozier Response (January 2024) Acknowledged. All infiltration trenches have been removed and replace with storm sewer and an end of pipe stormwater management facility. GEI Comment (February 9, 2024) Accepted, no further comment.
11.	External Areas	Functional Servicing & Preliminary SWM Report	April 20, 2023	GEI Comment (April 20, 2023) Please confirm if the external catchments are to be conveyed through the site in the proposed development. In the Visual OTTHYMO (VO) model, the external catchments are added in at the end of the model while the report text it states that the catchments will drain through the site to Bronte Creek. If these areas are conveyed through the site, the stormwater management calculations (quality and quantity control) need to demonstrate that the proposed stormwater management system can handle the

No.	Matter	Document	Date Identified	Comment
				conveyance of the two external areas without surcharging the system. Crozier Response (January 2024) The VO model and Functional Servicing and Stormwater Management Report have been updated to discuss the external catchment flows in greater detail. All storm events from Catchment EX1 are directed to a low-lying depression area located in the eastern corner of the Old Morriston Baseball Diamond. An earth berm along the south and east property limits of the baseball diamond allows stormwater to pond within the park limits. If the storage limits are reached, stormwater will drain southwest between the Lot 1 and Lot 2 towards the Bronte Creek tributary via sheet flow, consistent with predevelopment conditions. Note, a figure has been prepared and included in Appendix D of the revised report outlining this scenario. All storm events from Catchment EX2 are to be conveyed through the site by the proposed storm sewer infrastructure and internal roadway towards the proposed stormwater management facility, ultimately outletting to the Bronte Creek tributary. The stormwater modelling has been updated to reflect this scenario. Storm sewer design sheets will be completed at the detailed design stage to ensure the proposed storm sewer network can accept the additional external flows. GEI Comment (February 9, 2024) Based on the grades shown in the Site Grading Plan at the property line along external catchment EX1, stormwater ponding at the corner of this external catchment will flow onto the site and enter the proposed storm sewer network. Additionally, Ochs Street in external catchment EX2 appears to be draining towards the existing Badenoch Street right-of-way rather than the proposed site. Please review and account for in stormwater management calculations. For clarity, add overland flow arrows to both external catchments in the drainage area plans (Figures 6 and 7). Crozier Response (September 2024) Acknowledged. The external catchment areas have been refined and are illustrated on Figures 6 and 7. SWM calculations have been updated accordingly. Overland flow arrows are also provided to demonstrate overland flow direction. GEI Comment (September 27, 2024) No further comment.

No.	Matter	Document	Date Identified	Comment
12.	Stormwater Model – Visual OTTHYMO	FSR – VO Schematics	April 20, 2023	GEI Comment (April 20, 2023) Please replace the wording of the "Post-Development" schematic title to reflect a post-development uncontrolled scenario. Please replace the wording of the "Post-Development w/ Mitigation" to be "Post Development Controlled". This will make it consistent with Table 8 in the report and will make ultimate conditions clear. Crozier Response (January 2024) The Visual OTTHYMO and schematics has been updated to reflected Table 8. GEI Comment (February 9, 2024) Accepted, no further comment.
13.	Fire Storage Tank	Servicing Plans	April 20, 2023	GEI Comment (April 20, 2023) Please give representation to the location of the fire storage tank on the Servicing Plans. Crozier Response (January 2024) The location of the fire storage tank has been represented on the Site Servicing Plans (Figure 1). GEI Comment (February 9, 2024) Accepted, no further comment.
14.	FSR Text	FSR	April 20, 2023	GEI Comment (April 20, 2023) Please review the text presented in Section 7.3 paragraph four describing imperviousness. Crozier Response (January 2024) Section 7.3 has been reviewed and revised to account for the removal of the infiltration trenches and the implementation of the end of pipe stormwater management facility. GEI Comment (February 9, 2024) Accepted, no further comment.
15.	External Area Topography	Engineering Plans	February 9, 2024	GEI Comment (February 9, 2024) The FSR states that, based on existing LiDAR contour mapping, runoff from external catchment EX1 ponds along existing berms and then drains southwest towards Bronte Creek. Please show these existing contours and berms on the Engineering Plans to confirm that this flow route will be

No.	Matter	Document	Date Identified	Comment
				maintained. Additional topographic survey may be required on the adjacent lands. <u>Crozier Response (September 2024)</u> The existing contour mapping (LiDAR) has been added to the engineering drawing set to show the external runoff drainage conditions. <u>GEI Comment (September 2024)</u> The LiDAR mapping does not appear to show the berms. Please provide **topographic data** for the existing ball diamond area (EX1) to show the low-lying depression area where ponding reportedly currently occurs per the report, and the existing berms. Please demonstrate the conditions under which it can be expected that the existing storage limits will be exceeded, and stormwater will flow onto the subject lands. Please clearly show how these flows will be routed around the development, specifically lots 1 and 2, to the Bronte Creek outlet. Please demonstrate that flows from EX1 will not enter the proposed stormwater facility. As previously discussed, site visit photos may be helpful to show the extents of existing surface ponding in the park area under typical conditions. <u>Crozier Response (November 2024)</u> Refer to FIG 4 a proposed a swale within the drainage easement to control flows from EX1 and route between Lots 1 and 2 has been added. We suggest that a topographic survey to be completed on the Morriston Ball Park during the detailed design phase and not as part of Draft Plan Approval. We also note that access to approval will be required by the Township prior to completion of any survey on adjacent lands. We have provided site photos of the park in Appendix H to demonstrate existing topography and drainage conditions. <u>GEI Comment (December 13, 2024)</u> The topographic survey should be completed at detailed design and the Grading Plans updated accordingly to clearly identify top of berm, bottom of berm and ponding limits. The Township has already granted access approval to the Ball Diamond and any other Township lands for surveying purposes. No further comment at this time.

No.	Matter	Document	Date Identified	Comment
16.	Drainage Easement	Engineering Plans	February 9, 2024, and September 27, 2024	GEI Comment (February 9, 2024) Please confirm ownership of the small rectangular parcel in the south corner of catchment EX1. Please note that a drainage easement will be required between Lots 1 and 2 for the overland flow route from EX1 to the Bronte Creek tributary. Crozier Response (September 2024) Acknowledged. GEI Comment (September 27, 2024) Please indicate any required **drainage easements** on the engineering plans. Crozier Response (November 2024) Drainage easements have been identified on the drawings. GEI Comment (December 13, 2024) No further comment.
17.	Ponding at Catchbasin	Engineering Plans	February 9, 2024, September 27, 2024	GEI Comment (February 9, 2024) The Site Grading Plan shows that proposed catchbasin CB 36 has a T/G elevation of 316.89, which is 1.5m lower than the adjacent curb elevation proposed. Considering the proximity of CB 36 to the property line, there is concern that stormwater will pond onto the neighbouring property at catchment EX2. Please show that the storm sewer leaving CB 36 will have the capacity to convey the flow generated by EX2 with ponding contained to the subject property up to and including the 100yr storm event. Additional topographic survey may be required on the adjacent lands. Crozier Response (September 2024) CB 27 (formerly CB 36) and the receiving storm sewer system have been designed to convey the 100-year storm event. The sizing was complete utilizing Visual Otthymo and Flowmaster. Further details will be provided at detailed design. GEI Comment (September 2024) Per Puslinch development standards, storm sewers are to be designed using the rational method and a **storm sewer design sheet** is to be provided to demonstrate that the 100-year storm can be conveyed. The first reach of the storm sewer in the cul-de-sac bulb should have a slope of

No.	Matter	Document	Date Identified	Comment
				at least 1%, currently it is shown as 0.5%. All other storm sewer should have a slope of at least 0.5%. As discussed with Crozier staff, additional topographic data may be required to show the 100-year storm event ponding limits at detailed design. <u>Crozier Response (November 2024)</u> Sewers have been designed to convey the minor system (5-year event). Major storms are proposed to be conveyed via overland flow within the right-of-way and will spill into the pond at low point in the development. The first reach of storm sewer in the cul-de-sac bulb has been adjusted to 1%. <u>GEI Comment (December 13, 2024)</u> We note that one stretch of storm sewer (CBMH 11 – DCBMH 12) has a slope of 0.4%, which is lower than Township standards, however the flow velocity is within the allowable range per Township Standards. No further comment.
18.	Proposed Sidewalk	Engineering Plans	February 9, 2024	<u>GEI Comment (February 9, 2024)</u> The Badenoch Street right-of-way includes an existing sidewalk that should be continued into the proposed development. Sidewalk is required on one side of local residential streets per Township of Puslinch Municipal Development standards. Please indicate proposed sidewalk on the Engineering Plans, including Ochs Street. <u>Crozier Response (September 2024)</u> Acknowledged. The proposed sidewalk is indicated on the draft plan and engineering plans. <u>GEI Comment (September 27, 2024)</u> No further comment.
19.	Ochs Street Cross-Section	Engineering Plans	February 9, 2024	<u>GEI Comment (February 9, 2024)</u> Please provide cross-sections for the proposed Ochs Street right-of-way, including proposed retaining walls and swales due to their close proximity to existing buildings. <u>Crozier Response (September 2024)</u> Cross-sections of the proposed Ochs Street right-of-way have been prepared and can be referenced on Figure 5.

No.	Matter	Document	Date Identified	Comment
				GEI Comment (September 27, 2024) No further comment.
20.	Well Setback	Engineering Plans	February 9, 2024	GEI Comment (February 9, 2024) The well location shown in Lot 21 does not appear to meet the 15m minimum setback from the septic bed in Lot 17. Additionally, OBC 8.2.1.6.A specifies a 5m setback from structures and 3m setback from property lines. Please revise. Crozier Response (September 2024) Acknowledged. The well has been relocated. GEI Comment (September 27, 2024) No further comment.
21.	Conservation Regulation Limit	Engineering Plans	February 9, 2024, and September 27, 2024	GEI Comment (February 9, 2024) Please show the approximate regulation limit of Conservation Halton on the Engineering Plans. Crozier Response (September 2024) Conservation Halton regulation limits are available on their online portal. The Engineering Plans indicate the linework associated with the natural hazards only. Considering their regulation limits can change, we suggest leaving this information off of the engineered plans. GEI Comment (September 27, 2024) Engineering Plans should show all relevant property and regulatory limits. Please show the latest **Conservation Halton regulation limit** on the plans. Crozier Response (November 2024) Property and regulatory limits are shown on the revised engineering materials. GEI Comment (December 13, 2024) No further comment.
22.	Storm Parameters	Functional Servicing & Preliminary SWM Report	February 9, 2024	GEI Comment (February 9, 2024) The IDF curve parameters are outdated. Please revise stormwater quantity control calculations using the latest City of Guelph Development Engineering Manual. Crozier Response (September 2024) Acknowledged. The updated Guelph IDF parameters have been used.

No.	Matter	Document	Date Identified	Comment
				GEI Comment (September 27, 2024) No further comment.
23.	Qualified Professional	Engineering Plans	February 9, 2024	GEI Comment (February 9, 2024) All reports and drawings are to be signed and sealed by a qualified professional for future submissions. Crozier Response (September 2024) Acknowledged. GEI Comment (September 27, 2024) No further comment.
24.	Internal Road Geometry Figure	Traffic Impact Study	February 9, 2024	GEI Comment (February 9, 2024) Section 10 of the TIS needs to be revised using the Township of Puslinch 20m wide urban road cross-section. Additionally, the TIS states that the proposed right-of-way is 18m wide. Please revise to 20m to be consistent with the engineering reports and drawings. Crozier Response (September 2024) Report has been updated to reflect the proposed 20 metre right-of way for Street A. GEI Comment (September 27, 2024) No further comment.
25.	Proposed Streets	Draft Plan	September 27,2024	GEI Comment (September 27, 2024) The Draft Plan in previous submissions showed two proposed streets while the latest submission shows only one proposed street. Why has Street B been removed? How will emergency access be provided to the subdivision if Street A is blocked? The Township Public Works department should be consulted regarding the feasibility of a cul-de-sac of this length. The Catchment 201 and 202 paragraphs of Section 6.2 of the FSSWM report still refer to Street B and may need to be updated. Crozier Comment (November 2024) The cul-de-sac and public road has been designed according to Town standards. Town fire reviewed the draft plan and did not advise of any concerns. GEI Comment (December 13, 2024)

No.	Matter	Document	Date Identified	Comment
				We note that a second fire water storage tank has been added to the Preliminary Site Servicing Plans per Township Fire Service requirements. No further comment.
26.	Inconsistencies	Functional Servicing & Preliminary SWM Report	September 27, 2024	<u>GEI Comment (September 27, 2024)</u> The following inconsistencies should be corrected in future submissions: 1. Third paragraph of page 1 refers to first and second submissions but should refer to second and third submissions respectively in this case. 2. The volume in Table 1 should be 2160 m^3 per the appendix and not 5400 m^3. 3. Per the appendix, the additional flow area – floor area in Table 2 should be 1800 L/day, for a total flow per unit of 3800 L/day. The flow per day should also be updated in the following paragraph. 4. Table 3 should be updated per the appendix. Using a flow per day of 3800 L/day, a minimum stone area of 76 m^2 is calculated in the appendix, rather than 72 m^2. As 72 m^2 is the reported provided amount, this will need to be increased slightly. Likewise, the minimum sand area calculated in the appendix is 190 m^2. The provided sand area is shown as 368 m^2 on drawings but reported as 352 m^2 in the appendix. 5. There are inconsistencies between the catchment names used in Tables 6 and 7, the model and drainage plans, i.e. catchments 101A and 101B modelled as catchments 101 and 103, EX3 and EX4 not included on the pre-development plan, labelling for EX catchments are different in the model. Can these names be made more consistent? 6. Notes 1 and 2 below Table 8 should state that runoff from EX3 is also included. 7. In Table 9 the total contributing area to the dry pond should also include the areas of EX2 and EX3. The labelling of this table needs to be clearer – the required volume of 384 m^3 calculated is based on a quality requirement of 110 m^3/ha and not an extended detention requirement of 40 m^3/ha. Likewise, it should be clearer what the provided volume of 462 m^3 represents. 8. In Table 11 it states that the required storage is 93 m^3, whereas the appendix seems to differ. 9. Please confirm that the infiltration target in bullet 5 of the Stormwater Management section on page 15 matches the appendix.

No.	Matter	Document	Date Identified	Comment
				10. The top of grade elevations for HW1 and HW2 on the Servicing Plan do not match the grading plan. 11. Some of the labels for the areas of the Type A dispersion beds on the drawings do not match the calculations and information provided in the report appendix. <u>Crozier Response (November 2024)</u> 1. Acknowledged. 2. Acknowledged, 3. Noted. Report and appendix have been updated to be accurate. 4. Noted. Report and appendix have been updated to be accurate. 5. Noted. Report and appendix have been updated for consistency. 6. Noted. 7. Extended detention calculation has been updated to include EX2 and EX3 and report updated accordingly. 8. Noted. Table 11 has been updated. 9. Infiltration target has been confirmed. 10. Grade elevations have been corrected. 11. Calculations and labels have been updated for consistency. <u>GEI Comment (December 13, 2024)</u> No further comment.
27.	Flow Directions	Functional Servicing & Preliminary SWM Report	September 27, 2024	<u>GEI Comment (September 27, 2024)</u> 1. The Catchment EX4 paragraph of Section 6.2 describes post-development flows from this catchment being conveyed via proposed storm sewer infrastructure and internal roadway within the Ochs Street extension to existing storm sewer on Badenoch Street. There does not appear to be proposed storm sewer on Ochs Street within EX4, and flows are directed towards Badenoch Street via the roadway. 2. The second last paragraph of page 7 states that 100-year flows from catchment 201 are conveyed to the SWM facility. Catchments EX2 and EX3 are also conveyed to the SWM facility. 3. The EX4 row of Table 5 states the outlet for these flows is the Bronte Creek Tributary. Is this true for flows conveyed to Badenoch Street? 4. Bullet 2 of the Stormwater Management section on page 15 should reference that EX3 is also conveyed to the SWM facility.

No.	Matter	Document	Date Identified	Comment
				Crozier Response (November 2024) 1. Section 6.2 has been updated accordingly. 2. Noted. 3. Flows from EX4 will be conveyed to Badenoch Street. Table 5 has been updated accordingly. 4. Noted. GEI Comment (December 13, 2024) No further comment.
28.	Model Outputs	Functional Servicing & Preliminary SWM Report	September 27, 2024	GEI Comment (September 27, 2024) For future submissions can model outputs for all storms including the 25 mm storm be provided? The pre-development peak flows for the 50- and 100-year storms and uncontrolled post-development peak flows for the 10-to-100-year storms appear to be less than for the regional events. It would be useful to review the model outputs to see why this is the case. The regional storm controlled post-development peak flow is greater than the pre-development peak flow. Can this be addressed briefly in terms of impacts to the downstream receiver, and how stormwater control measures being taken will help mitigate the impacts. Crozier Response (November 2024) Model output files have been provided for all storm events. An emergency overflow spillway has been proposed to convey the regional event to the Bronte Creek tributary. GEI Comment (December 13, 2024) No further comment.
29.	Percolation Time	Functional Servicing & Preliminary SWM Report	September 27,2024	GEI Comment (September 27, 2024) A percolation time of 20min./cm., is used in the septic system sizing calculations in Appendix B, whereas the report states that a value of 30min./cm. was to be used. At detailed design, please use a value justified in the report. Crozier Response (November 2024) Noted. Material has been updated to be consistent. GEI Comment (December 13, 2024) No further comment.

No.	Matter	Document	Date Identified	Comment
30.	Construction North	Drawing Set	September 27,2024	GEI Comment (September 27, 2024) At detailed design, it may be helpful to label construction north on the drawing set as the report refers to directions on the subject lands that aren't necessarily accurate. Crozier Comment (November 2024) Noted. GEI Comment (December 13, 2024) No further comment.

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

GEI Consultants Canada Ltd.

[redacted]

Parth Lad, E.I.T.
Technical Specialist

[redacted]

Andrea Reed, P.Eng.
Project Engineer

Wellington Hydrogeology File No. 24001.001

December 13, 2024

Township of Puslinch
7404 Wellington Road 34
Puslinch, Ontario N0B 2J0

Attention: Lynne Banks
Development and Legislative Coordinator

RE: Hydrogeological Review Comments – 4th Submission
WDD Main Street Inc. – 11 Main Street, Morriston (Puslinch), Ontario
Proposed Residential Subdivision
Zoning By-law Amendment / Draft Plan of Subdivision Application

Wellington Hydrogeology Ltd. is pleased to provide hydrogeological comments on the above-noted submission for 11 Main Street (Lot 31, Concession 8) in the hamlet of Morriston, Township of Puslinch, Ontario (the site).

Previous hydrogeological review comments were provided by Harden Environmental Services Ltd., dated April 13, 2023 (1st Submission) and February 2, 2024 (2nd Submission), and by Wellington Hydrogeology Ltd., dated September 20, 2024 (3rd Submission).

Revised hydrogeological review comments are provided herein based on the 4th submission responses and documents.

Wellington Hydrogeology Ltd.
Mailing Address: 4662 Sideroad 20N, Guelph, ON N1H 6J3
Phone 519-831-9696 **Email:** amason@wellingtonhydrogeology.com **Website:** www.wellingtonhydrogeology.com

Documents Reviewed

We reviewed the following documents in preparation of these hydrogeological comments:

1. Englobe Corp. (Englobe). 2024. Addendum to Hydrogeological Investigation, Results of O. Reg. 169/03 Schedule 2 Sampling, Proposed Residential Development – 11 Main Street, Puslinch, Ontario. Project T1220482.003, dated December 2, 2024.
2. Englobe. 2024. Results of Test Well Drilling and Aquifer Testing, Proposed Residential Subdivision – 11 Main Street, Puslinch, Ontario. Project T1220482.003, dated November 19, 2024.
3. Englobe. 2024. Additional Dwelling Units and Home Based Businesses, Proposed Residential Subdivision – 11 Main Street, Puslinch, Ontario. Project T1220482.003, dated November 19, 2024.
4. MECP Regulation 903 Well Records for Test Well 1 (MECP Well Tag Number A321825), Test Well 2 (MECP Well Tag Number A399867) and Test Well 3 (MECP Well Tag Number A321827).
5. C.F. Crozier & Associates Inc. (Crozier). 2024. Functional Servicing & Preliminary Stormwater Management Report, 11 Main Street, Estate Residential Development, Township of Puslinch, County of Wellington. CFCA File No. 2366-6537, dated November 2024.
6. Englobe Corp. (Englobe). 2024. Hydrogeological Assessment, 11 Main Street, Puslinch, ON. Project No. T1220482.003, dated August 28, 2024, signed by Paul L. Raepple, P.Geo. and R. Baker Wohayeb, P.Eng.
7. Terraprobe Inc. (Terraprobe). 2023a. Hydrogeological Assessment, Proposed Residential Development, 11 Main Street, Puslinch, Ontario. File No. 1-22-0482-46, dated February 23, 2023, signed by Alaa Alborno, EIT and Narjes Alijani, P.Geo.
8. Terraprobe. 2023b. Addendum – Hydrogeological Assessment, Proposed Residential Development, 11 Main Street, Puslinch, Ontario. Project No. A1220482.002, dated December 21, 2023, signed by Paul L. Raepple, P.Geo.
9. Niagara Soil Solutions Ltd. 2022. Phase One Environmental Site Assessment, Vacant Lot, Northside Hwy 6, Morriston, ON. NSSL File No. NS2212-01, dated March 2022, signed by John Monkman, P.Eng. and Jodie Glasier, EP.

10. Niagara Soil Solutions Ltd. 2024. Phase One Environmental Site Assessment-rev, Vacant Lot, Northside Hwy 6, Morriston, ON. NSSL File No. 2212-01, dated August 2024, signed by Jodie Glasier, EP and Philip Adene, P.Geo.

Background – Site and Proposed Development

Based on our review, we understand that:

- The site is an irregularly shaped parcel with a total area of 23.1 ha (57.1 acres).
- Surrounding properties include residential subdivision developments to the north and west, vacant lands (wooded lots) to the south and agricultural/residential property to the east.
- The proposed subdivision on the site includes 21 single detached dwellings with lot sizes from 0.197 to 0.382 ha and one level of basement for each dwelling.
- The development will be serviced with individual private supply wells and septic systems.
- A stormwater management block will manage runoff from the site.

Hydrogeological Comments – Priority (Water Supply)

Three test wells were drilled by Aardvark Drilling Inc. on the site between September 24 and 26, 2024. The test wells TW1 (BH2), TW2 (BH1) and TW3 (BH4) were installed to depths of 22.6 to 30.8 mbgs within the top of the limestone bedrock (Guelph Formation), and were cased and grouted to approximately 0.3 m into the bedrock. Overburden was reported as sand and gravel overlying clay and gravel deposits.

Englobe completed a pumping test of each of the three test wells at rates of 37.8 L/min over a 6-hour duration. The pumping test was completed as an individual test for TW1 on October 7, 2024 and at TW2 and TW3 pumped concurrently on October 8, 2024.

Englobe also completed a well survey of nearby private/residential wells. Water quality sampling (E. coli., total coliforms, nitrate, nitrite and sodium only) was completed at 4 nearby private residential wells on October 7, 2024 and manual groundwater levels were measured at 3 of the private wells before and after the pumping test on October 7, 2024.

The drawdown assessment completed by Englobe indicates that the test wells installed in the top of the bedrock (Guelph Formation) are capable of producing sufficient water supply for typical household use without significant interference effects with nearby wells.

Comment 1: We concur with the drawdown assessment completed by Englobe that indicates adequate water supply from the upper bedrock aquifer for residential use.

Water quality results from the nearby private wells (for E. coli., total coliforms, nitrate, nitrite and sodium only) indicated total coliforms in two of the private wells. Elevated nitrates were also present at levels up to 3.43 mg/L, but did not exceed the Ontario Drinking Water Quality Standard (ODWS) Maximum Acceptable Concentration (MAC) of 10 mg/L.

Comment 2: Please confirm that the results were provided to individual well owners with recommendations for results exceeding the ODWS MAC.

Water quality results from the three test wells indicated the presence of total coliforms within two of the test wells. The ODWS MAC for total coliforms is 0.

Comment 3: Please discuss the presence of total coliforms in the test well samples, and whether the total coliform detections were a result of inadequate disinfection of the new supply wells (at the detailed design stage).

The O. Reg. 169/03 Schedule 2 results did not evaluate microcystins "since the source is groundwater of which cyanobacteria do not pose an issue (i.e., surface water)."

Comment 3: The MECP have identified the potential presence of cyanobacteria in groundwater within the shallow bedrock aquifer in Puslinch just south of Morriston. Please run the sample for microcystins to confirm that the concentration is below the O.Reg.169/03 standard at the site.

The water quality results also exceeded the ODWS aesthetic objectives and operational guidelines for hardness, total dissolved solids (TDS), total iron, total manganese and colour. Nitrates were present at levels up to 1.88 mg/L, but were below the ODWS MAC of 10 mg/L. Elevated chloride was present at levels up to 193 mg/L (below the ODWS aesthetic objective of 250 mg/L), with sodium levels of up to 90.2 mg/L (below the ODWS aesthetic objective of 250 mg/L but exceeding the Medical Officer of Health Reporting Limit of 20 mg/L). The extended O. Reg. 169/03 Schedule 2 results for TW3 (BH4) did not exceed the regulation limits.

Comment 4: Although local geology suggests isolation of the upper bedrock (Guelph Formation) aquifer on the site, the water quality results from the test wells in the upper bedrock aquifer suggest anthropogenic impacts (e.g., from septic systems, road salt application, etc.). Elevated nitrate and chloride levels were present, though below the appliable standards, and several

other chemical parameters in the extended water quality analysis for TW3 (BH4) were elevated (e.g., naphthalene, phenol, o-cresol, m&p-cresol, barium). The addition of individual septic systems on each lot in the proposed development is expected to further concentrate parameters that are already elevated. From a groundwater quality perspective, we are unsure of the feasibility of the upper bedrock aquifer to support the density proposed for this development as well as future development in the surrounding area. It is our recommendation to the Township/County that water supply for this development and other high-density developments on private servicing in Morriston be sourced from the lower bedrock aquifer to ensure isolation from surface contaminants and provide safe and sustainable water supply now and in future. Wells installed in the lower bedrock must be cased and sealed into the lower unit; multiaquifer wells (i.e., wells that are constructed with a screen or open hole extending through both the upper and lower bedrock aquifers) are not permitted.

Englobe also provided an assessment of potential additional supply demands for additional dwelling units and home-based businesses and determined that private residential supply wells are expected to be capable of supporting additional dwelling units and/or home-based businesses.

Comment 5: The letter on water supply for additional dwelling units (ADUs) and/or home-based businesses was related to water supply availability. A separate assessment should be completed for sewage impacts to groundwater and surface water quality resulting from potential ADUs and/or home-based businesses. Lot sizes for the proposed development are already considered small for a rural development on private servicing. Please evaluate the feasibility of further increasing density from a water quality perspective. Within the letter for sewage impacts, please consider that treatment systems are designed to treat for nitrate and/or phosphorus, but that other contaminants may be present within household sewage that may have negative impacts to groundwater and/or surface water (e.g., pharmaceuticals, artificial sweeteners, PFAS, salt, etc.). This will need to be carefully considered by the Township/County for potential future ADUs.

The remaining hydrogeological comments are to be addressed at the detailed design stage (comments unchanged from previous submission; provided again for reference).

Hydrogeological Comments – Detailed Design Stage

Topography and drainage: Section 3.1 of the Hydrogeological Assessment report indicates that "topography of the site is sloping downwards in a northwest direction. As such, it is anticipated that generated runoff (if not managed) will flow in a northwesterly direction." This interpretation is incorrect based on the Topography Map (Figure 5).

Please revise/clarify (at the detailed design submission stage).

High groundwater table: Groundwater monitoring was completed within the four onsite monitoring wells between August 24 and September 19, 2022. Additional groundwater monitoring was completed on July 18 and August 6, 2024. The highest groundwater elevation measured to date was 312.86 masl at BH3 on July 18, 2024. In the absence of spring freshet monitoring data, the project hydrogeologist interprets the July 2024 measurements as representative of the seasonal high groundwater table due to significant precipitation events preceding the July measurements.

The proponent should complete monthly groundwater level monitoring for at least 12 consecutive months, including the spring freshet, prior to detailed design submission. The design elevations of building foundations, septic leaching beds, SWM facilities and LIDs (e.g., infiltration facilities) must be evaluated in relation to the high water table (required at the detailed design submission stage).

Groundwater contribution to Bronte Creek: Terraprobe (2023a) indicated that further field investigations would be completed to assess the presence of groundwater seepage during seasonal high groundwater conditions. Englobe (2024) did not include details of groundwater seepage or vertical gradients within the updated report.

We recommend the installation of shallow piezometers to monitor baseline conditions and vertical gradients within Bronte Creek on the site, with monitoring completed at the same frequency to groundwater level monitoring on the site (i.e., monthly for at least one year, including the spring groundwater high) (required at the detailed design submission stage).

Groundwater flow direction: Englobe interpreted that a shallow groundwater flow divide was present with the highest groundwater elevation at BH3, with groundwater flow to both the west (toward Bronte Creek) and to the east (toward the tributary of Bronte Creek and associated wetlands). Englobe also noted that residential properties to the north were considered upgradient, suggesting local flow to the south (toward the site) toward surface water features.

We generally concur with this assessment of shallow groundwater flow. On a regional scale, deeper groundwater flow is typically to the south-southeast within Puslinch in the general vicinity

of the site – it is recommended that the project hydrogeologist confirm and interpret deeper/regional groundwater flow as well (at the detailed design submission stage).

Shallow groundwater quality: Groundwater quality samples were collected in 2022 from three shallow monitoring wells on the site as part of the nitrate impact assessment report, which were analyzed for nitrate, nitrite, phosphorus, ammonia/ammonium, and pH. Additional analysis was requested to characterize the shallow groundwater quality, including general chemistry, metals and nutrients, with comparison to the Ontario Drinking Water Quality Standards (ODWS).

Englobe collected additional groundwater quality samples from all four monitoring wells on August 6, 2024 for general groundwater chemistry characterization analysis including nutrients, dissolved metals and inorganic parameters, with the results compared to the ODWS. The results showed elevated hardness in all monitoring wells. The sample from BH3 also had elevated total dissolved solids (TDS), sodium, chloride and nitrate relative to the samples from other wells.

Can the project hydrogeologist provide an explanation for the elevated TDS, sodium, chloride and nitrate at BH3? (at the detailed design submission stage)

Surface water quality: Englobe collected a surface water quality sample from Bronte Creek on August 6, 2024, with the results compared to the ODWS. The surface water sample contained elevated concentrations of chloride, sodium, manganese, iron, hardness, TDS, turbidity and colour. The results are indicative of impacts from road deicing salt. We recommend that the surface water quality results also be compared to the Provincial Water Quality Objectives (at the detailed design submission stage) as they are more applicable for evaluating surface water quality.

Bronte Creek impact assessment: Englobe (2024) evaluated the impact of phosphorus and nitrate loading to Bronte Creek. Nitrate concentrations were quantified using a mass balance calculation and are expected to be below the CWQG limit of 2.93 mg/L. Impacts from total phosphorus were not quantified but were not expected to have significant impacts to surface water.

We recommend that the project hydrogeologist quantify the predicted phosphorus concentration at the surface water feature (e.g., using the Robertson attenuation method, dilution or equivalent) (at the detailed design submission stage).

Groundwater recharge facilities: The soakaway pits were designed by Crozier (December 2023) based on the hydraulic conductivity estimates determined by Terraprobe (2023). The infiltration estimates should be confirmed with soil infiltration testing at representative locations and appropriate depths based on the proposed septic beds and soakaway pits. Infiltration testing will confirm soil conditions and field saturated hydraulic conductivity/infiltration rates. The proposed depths/elevations of subsurface infiltration structures must also be evaluated alongside the annual

high groundwater table elevation across the site (required at the detailed design submission stage).

Construction dewatering: The project hydrogeologist must consider the high groundwater table in the assessment of construction dewatering requirements. If groundwater dewatering is required, management of discharge water quantity and quality must be discussed (required at the detailed design submission stage).

Phase One ESA: The Phase One Environmental Site Assessment (ESA) completed by Niagara Soils Solutions Ltd. (March 2022) was updated (August 2024) and the previous recommendation for a Phase Two ESA was changed. The previously identified Areas of Potential Environmental Concern (APEC) related to off-site Potentially Contaminating Activities (PCA) related to metal fabrication and commercial autobody shops was changed to remove the on-site APEC as the off-site welding activities were more than 30 m from the property boundary therefore not interpreted as an APEC. A Phase Two ESA is no longer recommended.

Excess soil management: Any import/export of fill/soil from the site must be conducted in accordance with O. Reg. 406/19: On-Site and Excess Soil Management, the Rules for Soil Management and Excess Soil Quality Standards (Soil Rules) and O. Reg. 153/04, as amended.

We appreciate the opportunity to provide these comments. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

WELLINGTON HYDROGEOLOGY LTD.

Angela Mason, M.Sc., P.Geo., QP_{ESA}
Senior Hydrogeologist and CEO
Cell: 519-831-9696
Email: amason@wellingtonhydrogeology.com

Johnston, Jeremiah (MTO)

From: Johnston, Jeremiah (MTO)
Sent: December 6, 2024 1:26 PM
To: Lynne Banks
Subject: RE: New circulation request

Hello Lynne,

The Ministry of Transportation (MTO) has completed our review of the 4th submission of the draft plan of subdivision prepared by Weston Consulting dated received November 22nd, 2024, and associated package for 11 Highway 6, Morriston ON. The following outlines MTO comments:

The MTO does not oppose the proposed zoning amendments, however the following comments will need to be addressed as conditions of draft plan approval or MTO permit.

Blocks and Land Use:

MTO has no objections with the proposed block configuration and access as proposed from Ochs Street.

Stormwater Management:

- To ensure that stormwater runoff from this property does not adversely affect our highway drainage system or highway corridor, MTO requires the owner to submit a Storm Water Management Report (SWMR) along with the above-noted grading/drainage plans for the proposed development for our review and approval. MTO Stormwater Management Requirements for Land Development Proposals can be obtained from the following website: https://www.ontario.ca/page/resources-transportation-planners#section-5
  - The owner's drainage consultant should refer to the ministry website for applicable IDF curves and the ministry's Stormwater Management Requirements for Land Development Proposals. http://www.mto.gov.on.ca/IDF_Curves/terms.shtml
  - The owner's drainage consultant shall ensure that all return periods are assessed (2yr, 5yr, 10yr, 25yr, 50yr, 100yr and Regional).
- Stormwater Management Blocks are to be assumed and owned by the Township of Puslinch.

Traffic Impact Review

MTO has reviewed the Traffic Impact Study prepared by GHD, dated June 28, 2024, MTO has no further comments on the document.

Proposed Conditions of Draft Plan Approval

The following are MTO's conditions of Draft Approval:

1. That prior to final approval, the owner(s) to submit to the Ministry of Transportation for review and approval, a copy of a Traffic Impact Study.

2. That prior to final approval, the owner(s) to submit to the Ministry of Transportation for review and acceptance a stormwater management report along with grading/drainage plan..

3. That Prior to final approval, the owner shall submit to the Ministry of Transportation for review and approval a draft copy of the M-Plan for this subdivision.

4. That prior to final approval, the owners shall provide the Ministry of Transportation for review and approval, the Conditions of Draft Plan Approval and Draft Subdivision Agreement to ensure our requirements have been incorporated.

Notes to Draft Plan Approval - Conditions of MTO Permits:

The owner should be made aware that under the *Public Transportation and Highway Improvement Act* (PTHIA), MTO permits are required prior to development of the subject property. The owner shall submit site plans, site-servicing plans, grading plans, and drainage plans for the proposed development to MTO for review and approval.

1. MTO Building and Land Use permit(s) will be required prior to any bulk grading, and subdivision servicing.

2. MTO Building and Land Use permit(s) for will be required for individual residential lots, that fall within the MTO Permit Control Area.

If any further clarification is required regarding the MTO comments or if any issues are encountered during the MTO consultation or application phases, please feel free to contact the undersigned.

Thank you,

Jeremiah Johnston
Corridor Management Planner | Highway Operations Branch
Ministry of Transportation | Ontario Public Service
(226)-980-6407 | jeremiah.johnston@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

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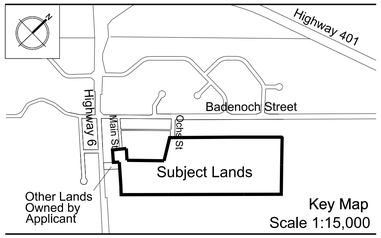
From: no-reply@mg.cloudpermit.com <no-reply@mg.cloudpermit.com>
Sent: Friday, November 22, 2024 2:24 PM
To: Johnston, Jeremiah (MTO) <Jeremiah.Johnston@ontario.ca>
Subject: New circulation request

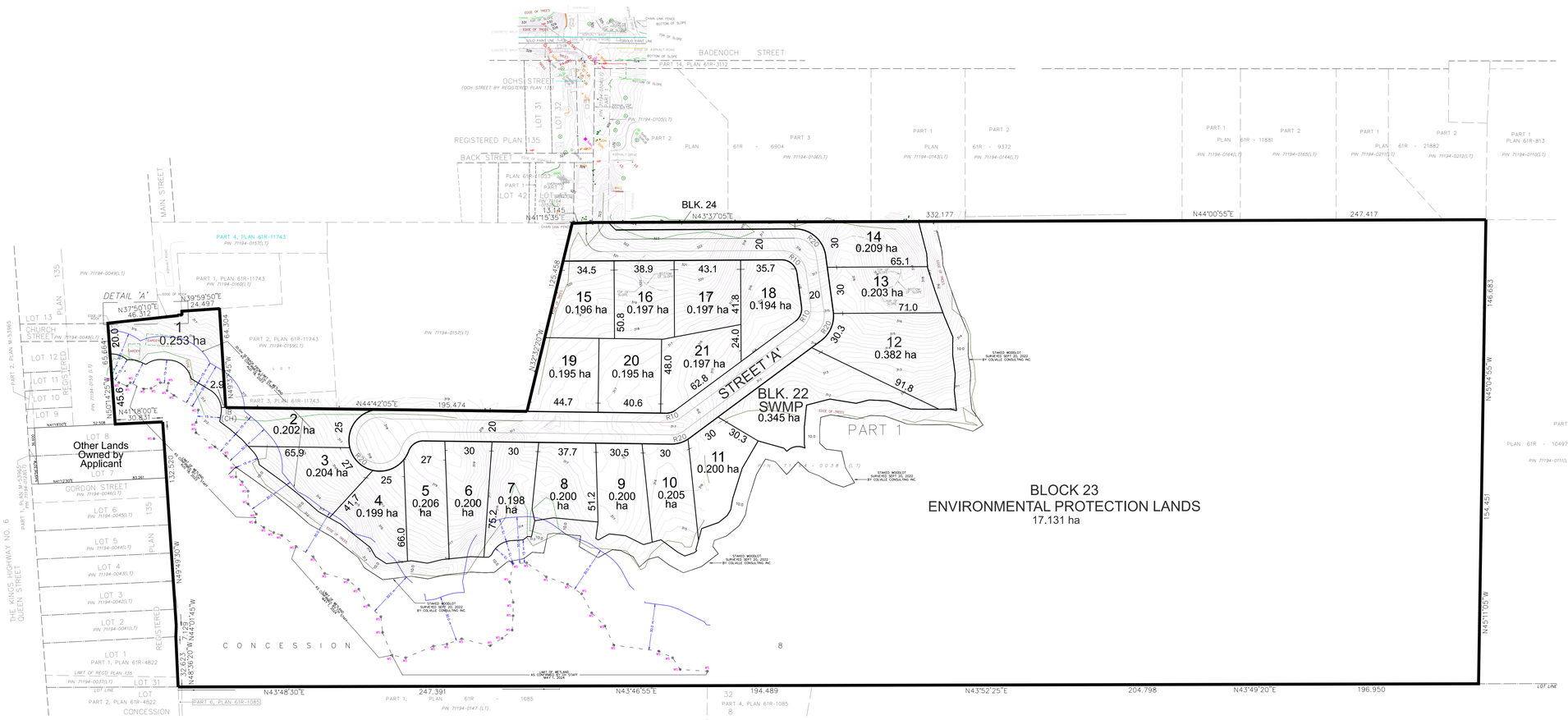
DRAFT PLAN OF SUBDIVISION

PART OF LOTS 7 & 8
NORTH OF QUEEN STREET
REGISTERED PLAN 135

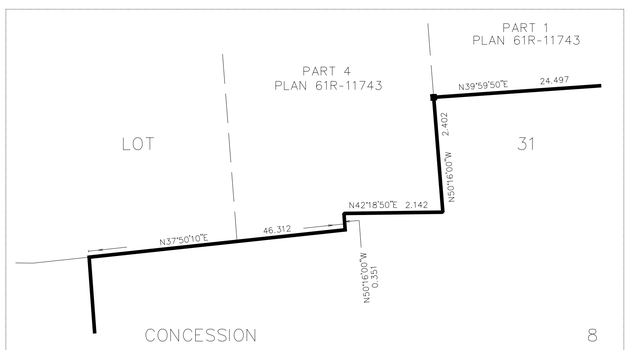
AND PART OF LOT 31
CONCESSION 8
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON



Key Map
Scale 1:15,000



DETAIL 'A'
NOT TO SCALE



INTEGRATION DATA		
OBSERVED REFERENCE POINTS (ORPs): UTM ZONE 17, NAD83 (CSRS) (2010.0). COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O.REG 216/10.		
POINT ID	EASTING	NORTHING
ORP (A)	571 819.11	4 810 772.76
ORP (B)	572 189.46	4 811 593.30
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

THE RESULTANT TIE BETWEEN ORP (A) AND ORP (B) IS 900.588 N24°17'31"E

OWNER'S CERTIFICATE:

I authorize Weston Consulting Group Inc. to prepare and submit this plan for draft approval.

Date: ___ ___ ___

WDD MAIN STREET Inc. c/o FAISAL HAMADI
499 BRANT STREET
BURLINGTON, ONTARIO L7R 2G5
PHONE: 905-453-7399
info@wddinternational.com

SURVEYOR'S CERTIFICATE:

I hereby certify that the boundaries of the lands being subdivided and their correct relationship to the adjacent lands are accurately and correctly shown on this plan.

Date: ___ ___ ___

RAYMOND J. SIBTHORP, OLS
J.D. BARNES LIMITED
257 WOODLAWN ROAD WEST, UNIT 101
GUELPH, ONTARIO N1H 8J1
PHONE: (519) 822-4031 www.jdarnes.com

ADDITIONAL INFORMATION:

[Section 51(17) of the Planning Act, R.S.O. 1990, c. P.13], as amended to August 26, 2024.
a), b), e), f), g), j) & l) - on plan.
c) - on key plan
d) - see statistics
h) - piped water to be installed by developer
i) - silty sand, sand and silt, and clayey silt
k) - all services to be made available by developer

DEVELOPMENT STATISTICS:

LOTS/BLOCKS	LOTS	AREA
Single Detached Lots (20 m+) [Lots 1-21]:	21	4.436 ha
SWMP [Blk. 22]:		0.345 ha
Environmental Protection Lands [Blk 23]:		17.131 ha
Additional lands [Blk. 24]:		0.059 ha
Roads:		1.133 ha
Total:	21	23.104 ha

SCALE
0 80m

WESTON CONSULTING

Vaughan: 201 Millway Ave, Suite 19
Vaughan, Ontario L4K 5K8
T. 905.738.8080 F. 905.738.6637

Toronto: 268 Berkeley St,
Toronto, Ontario M5A 2X1
T. 416.640.9917 F. 905.738.6637

1-800.363.3558 westonconsulting.com

REVISIONS LIST

03 SEP 2024	Revise survey text and Detail 'A'.
09 JUN 2024	Modify Lots 1-3,7 per 15m wetland setback. Outline/measure enhanced buffer area
14 MAY 2024	Update using new topo survey with 30m wetland setback. Modify SWM & Lots 1-14.
02 MAY 2024	Revise Lots 1-14 & SWM Block. Remove walkway and revise Lots 15-21
20 DEC 2023	Revise cul-de-sac to R=20 m & lots 3-5.
03 OCT 2023	Remove wetland limits by Colville Sept 20, 2022. Remove original edge of trees & staked limit. Insert Staked Woodlot Surveyed Sept 20, 2022 by Colville Consulting Inc.
20 SEP 2023	Remove old treeline, Regulated Limits. Update using 2023-09-11 topo file
15 SEP 2023	Revise ROW width to 20m & revert back to north-east access
23 FEB-11 APR 2023	Revise per topo plan Revise per updated survey plan & survey text
14 DEC 2022	Revise St. B per grading plan (Crozier) & revise Lots 17-23
11 NOV 2022	Revise ROW width to 18 metres & design lots (min 0.2 ha)
20 OCT 2022	Update drawing using 2022-10-12 survey

Drawing Number:

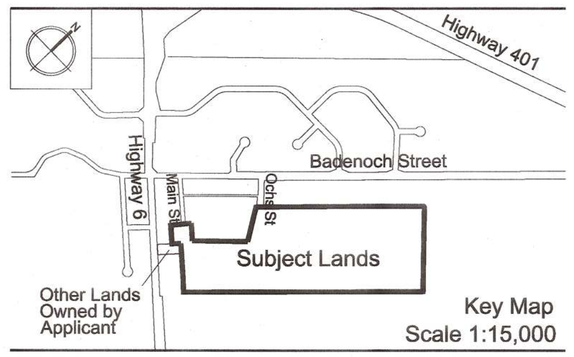
File Number:	10779
Drawn By:	SM
Planner:	PT
Scale:	1:1500
CAD:	10040 Draft Plan D14 2024-09-03.dgn

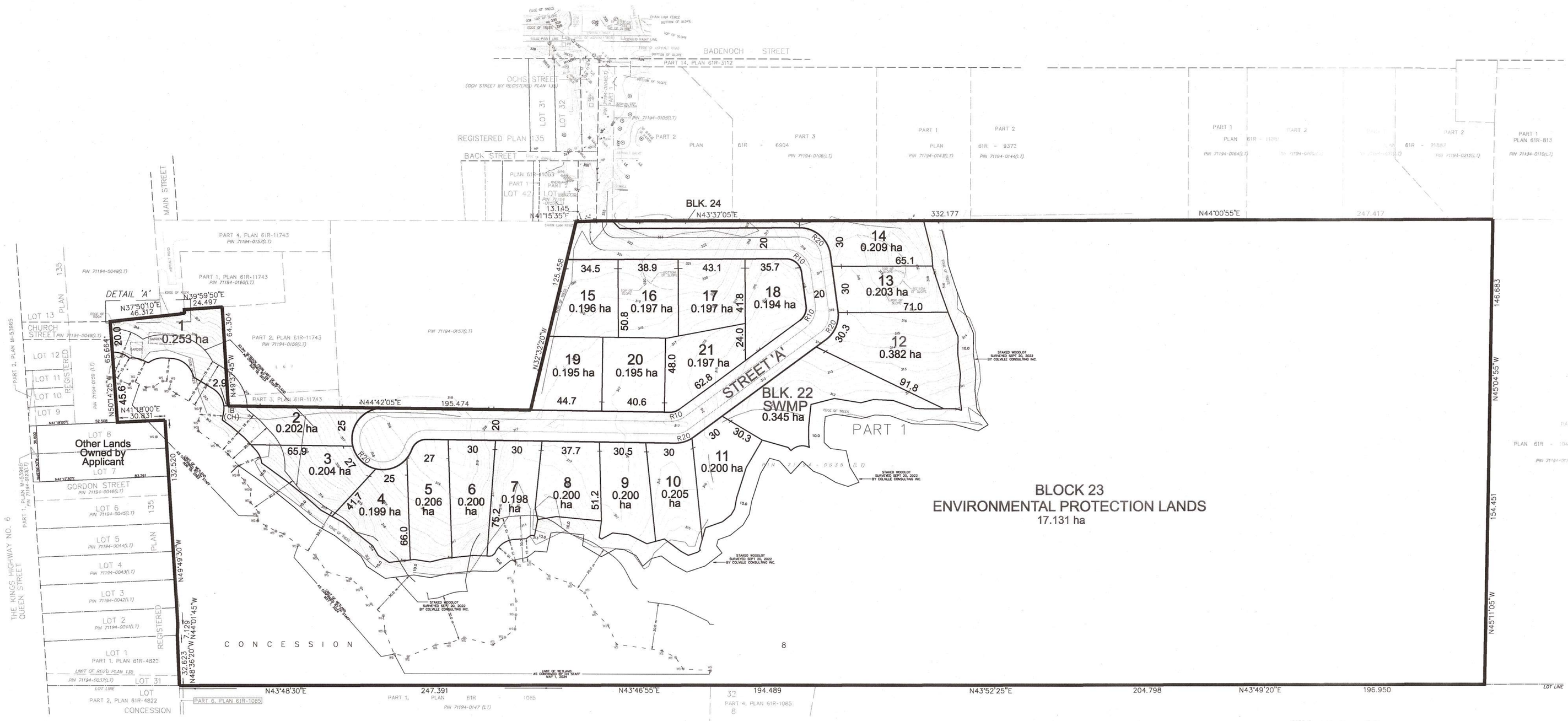
D14

DRAFT PLAN OF SUBDIVISION

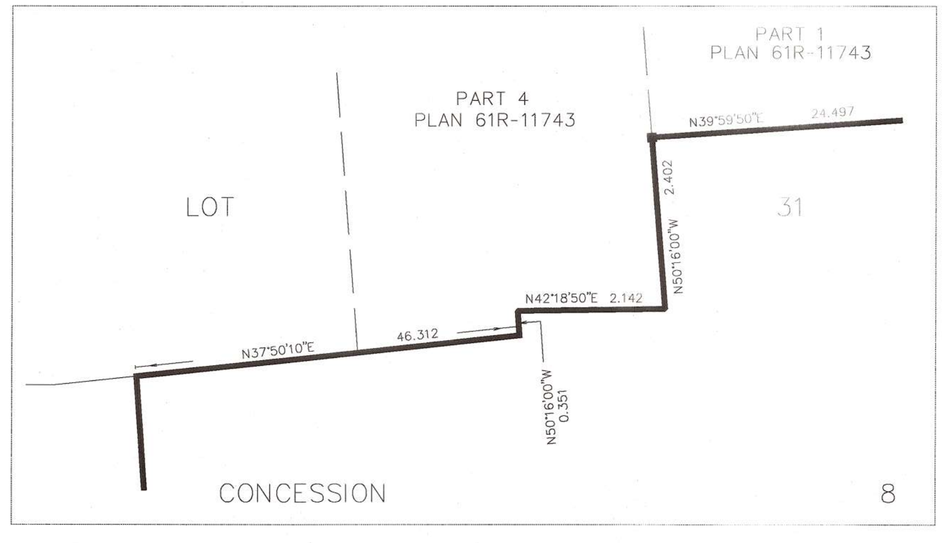
PART OF LOTS 7 & 8
NORTH OF QUEEN STREET
REGISTERED PLAN 135

AND PART OF LOT 31
CONCESSION 8
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON





DETAIL 'A'
NOT TO SCALE



INTEGRATION DATA		
OBSERVED REFERENCE POINTS (ORPs): UTM ZONE 17, NAD83 (CSRS) (2010.0). COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O.REG 216/10.		
POINT ID	EASTING	NORTHING
ORP (A)	571 819.11	4 810 772.76
ORP (B)	572 189.46	4 811 593.30
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

THE RESULTANT TIE BETWEEN ORP (A) AND ORP (B) IS 900.588 N24°17'31"E

OWNER'S CERTIFICATE:

I authorize Weston Consulting Group Inc. to prepare and submit

[redacted]

Date: Sept 5, 2024

WDD MAIN STREET Inc. c/o FAISAL HAMADI
499 BRANT STREET
BURLINGTON, ONTARIO L7R 2G5
PHONE: 905-483-7399
info@wddinternational.com

SURVEYOR'S CERTIFICATE:

I hereby certify that the boundaries of the lands being subdivided and their correct relationship to the adjacent lands are accurately

[redacted]

Date: Sept 4, 2024

J.D. BARNES LIMITED
257 WOODLAWN ROAD WEST, UNIT 101
GUELPH, ONTARIO N1H 8J1
PHONE: (519) 822-4031 www.jdarnes.com

ADDITIONAL INFORMATION:

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Drawing Number:

File Number:	10779
Drawn By:	SM
Planner:	PT
Scale:	1:1500
CAD:	10040 Draft Plan D14 2024-09-03.dgn

D14

ZONING BY-LAW AMENDMENT to By-law 023/18

for

WDD Main Street Inc.
11 Main Street, Puslinch

Township Rezoning Application D14/___

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER _____

A BY-LAW TO AMEND BY-LAW NUMBER 023/18, AS AMENDED, BEING THE ZONING BY-LAW OF THE TOWNSHIP OF PUSLINCH

WHEREAS, the Council of the Corporation of the Township of Puslinch deem it appropriate and in the public interest to amend By-Law Number 023/18 pursuant to Sections 34 of the Planning Act, R.S.O. 1990 as amended;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF PUSLINCH ENACTS AS FOLLOWS:

1. That Schedule "A" of By-law 023/18 is hereby amended by rezoning lands legally known as PT LOT 31, CONCESSION 8, TOWNSHIP OF PUSLINCH, AS IN RO722846 & MS8894; LOTS 7 & 8, PLAN 135, DONALD MCEDWARDS PORTION, NORTH OF QUEEN ST, SAVE AND EXCEPT MS53965; S/T THE RIGHTS OF OWNERS OF ADJOINING PARCELS, IF ANY, UNDER IS13908 & ROS585925; TOWNSHIP OF PUSLINCH, within the Township of Puslinch, and municipally referred to as 11 Main Street, from *Urban Residential (UR), Future Development 2 (FD2) and Natural Environment (NE)* zone to *Urban Residential Site-Specific Special Provisions XX (UR-XX)* ZONE and *Natural Environmental (NE) ZONE* with an "*Environmental Protection (EP)*" overlay as shown on Schedule "A" of this By-law.

2. That Section 14 Site-Specific Special Provisions is amended by adding the following site-specific provision:

No.	Zone Designation	Permitted Uses	Prohibited Uses	Site Specific Special Provision
1	Urban Residential (UR-XX)	Single Detached Dwellings Additional Residential Unit (Attached Detached) Home Business and Private Home Daycare	N/A	Minimum Required Lot Area = 0.19 ha

3. That the subject land as shown on Schedule "A" to this By-Law shall be subject to all applicable regulations of Zoning By-Law 023/18, as amended.

4. This By-law shall become effective from the date of passage by Council and come into force in accordance with the requirements of the Planning Act, R.S.O. 1990, as amended.

READ A FIRST AND SECOND TIME THIS _____ OF _____, 20__.

_____ _____

MAYOR CLERK

READ A THIRD TIME AND PASSED THIS_____OF_____20__.

_____ _____

MAYOR CLERK

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

EXPLANATION OF BY-LAW NO. _____

By-law Number _____ amends the Township of Puslinch Zoning By-law 23/18 by rezoning PT LOT 31, CONCESSION 8 , TOWNSHIP OF PUSLINCH, AS IN RO722846 & MS88941 ; LOTS 7 & 8, PLAN 135 , DONALD MCEDWARDS PORTION, NORTH OF QUEEN ST, SAVE AND EXCEPT MS53965 ; S/T THE RIGHTS OF OWNERS OF ADJOINING PARCELS, IF ANY, UNDER IS13908 & ROS585925 ; TOWNSHIP OF PUSLINCH, within the Township of Puslinch, and municipally referred to as 11 Main Street from *Urban Residential (UR), Future Development 2 (FD2) and Natural Environment (NE)* zone to *Urban Residential Site-Specific Special Provisions XX (UR-XX)* zone and *Natural Environmental (NE) zone* with *Environmental Protection (EP) overlay* to permit a 21-lot residential subdivision and conserve the natural features.

The subject property is approximately 23.48 hectares (58.03 acres) in size and is currently vacant.

Within the County's Official Plan, the subject lands are designated as "Residential", "Greenlands" and "Core Greenlands" lands. The Residential designation permits a variety of housing types.

THIS IS "SCHEDULE A"
TO ZONING BY-LAW AMENDMENT NO. _____

- Subject Lands
- Environmental Protection Overlay
- Natural Environment
- Site Specific Exemption
- Urban Residential (spxx)

0 125 250m

N

WESTON CONSULTING

Township of Puslinch
Planning and Development
7404 Wellington Road 34,
Puslinch, ON
N0B 2J0

November 20, 2024
File: 10779

County of Wellington
Planning and Development
74 Woolwich Street
Guelph, ON
N1H 3T9

Attn: Lynne Banks, Development and Legislative Coordinator, Township of Puslinch
Meagan Ferris, Manager of Planning and Environment, County of Wellington
Zach Prince, Senior Planner, County of Wellington

Re: Planning Justification Report Addendum
11 Main Street, Morriston
Township of Puslinch

Weston Consulting has been retained by WDD Main Street Inc, the registered owner of the lands municipally known as 11 Main Street (Lot 31, Concession 8) in the Township of Puslinch (herein referred to as the "subject lands") to provide planning assistance for a proposed residential subdivision. This Letter is an addendum to the Planning Justification Report prepared by Weston Consulting on March 4, 2023, updated in September 2024, and has been prepared in support of Zoning By-law Amendment and Draft Plan of Subdivision applications to permit a residential subdivision consisting of 21 detached dwelling lots, environmental protection lands, a stormwater management pond and municipal roads. This Letter is based on the comments received on September 19, 2024 from NPG Planning Solutions to provide analysis of the new Provincial Planning Statement, 2024 and to provide further detail and justification for the additional permitted uses being additional residential units and home businesses. This Letter is to be read in conjunction with the Planning Justification Report updated September 2024.

Based on the analysis contained herein the proposed Zoning By-law Amendment and Draft Plan of Subdivision Applications are consistent with the Provincial Planning Statement, 2024. Furthermore, additional dwelling units and home businesses are desirable and appropriate accessory uses for the proposed single detached dwelling units. Additional letters have been submitted to assess whether the additional dwelling units and home businesses are supportable from a technical perspective. As per the letters prepared by Crozier, GHD, Colville, and Englobe, there are no expected adverse impacts in permitting additional dwelling units and home businesses, as detailed below.

Provincial Planning Statement, 2024

The Provincial Planning Statement (PPS) came into effect on October 20, 2024 and replaced the Provincial Policy Statement, 2020 and the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020 Consolidation). The PPS applies to all decisions in respect of the exercise of any authority that affects a planning matter made on or after October 20, 2024. Section 3 of the Planning Act requires that decisions affecting planning matters shall be consistent with policy statements issued under the Act.

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TORONTO OFFICE | 268 Berkeley Street, Toronto, Ontario, M5A 2X5 | T. 416.640.9917
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The policies of the PPS direct growth to settlement areas, encourage intensification and the creation of complete communities, and support the efficient use and management of land, resources and infrastructure to meet current and future needs. These land use patterns promote a mix of housing, including affordable housing, and a full range of employment, recreation, parks and open spaces and transportation choices. The PPS provides for and promotes appropriate development while protecting resources of provincial interest, such as public health and safety and the quality of the natural and built environment. In addition, the PPS supports intensification and redevelopment where applicable to promote the efficient use of land where infrastructure and public services are available.

On May 26, 2022 the County of Wellington Council approved Official Plan Amendment 119 ('**OPA 119'**) which was subsequently approved by the Ministry of Municipal Affairs and Housing (MMAH) on April 11, 2023 with modifications. Part of the modifications made by the MMAH, included modifications to urban boundary expansions and employment area conversions; however, these modifications were reversed through Bill 150 which received Royal Assent on December 6, 2023. The in-effect version of OPA 119 designates the subject lands as a part of the Morriston *Rural Settlement Area (Secondary Urban Centre)*; as such, the subject lands are considered to be part of Rural Areas and a Settlement Area.

Building Homes, Sustaining Strong and Competitive Communities

Chapter 2 of the PPS provides direction related to Building Homes, Sustaining Strong and Competitive Communities and is applicable to the subject lands. It generally encourages a variety of land uses within communities and encourages the efficient use of land and infrastructure.

Planning for People and Homes

Section 2.1 contains policies pertaining to maintaining an appropriate supply of residential units as well as employment opportunities within a compatible mix of land uses. The following policies are of relevance to the subject lands;

2.1.4. To provide for an appropriate range and mix of housing options and densities required to meet projected requirements of current and future residents of the regional market area, planning authorities shall:

a) maintain at all times the ability to accommodate residential growth for a minimum of 15 years through lands which are designated and available for residential development; and

b) maintain at all times where new development is to occur, land with servicing capacity sufficient to provide at least a three-year supply of residential units available through lands suitably zoned, including units in draft approved or registered plans.

2.1.6. Planning authorities should support the achievement of complete communities by:

a) accommodating an appropriate range and mix of land uses, housing options, transportation options with multimodal access, employment, public service facilities and other institutional uses (including schools and associated child care facilities, longterm care facilities, places of worship and cemeteries), recreation, parks and open space, and other uses to meet long-term needs;

b) improving accessibility for people of all ages and abilities by addressing land use barriers which restrict their full participation in society; and

c) improving social equity and overall quality of life for people of all ages, abilities, and incomes, including equity-deserving groups.

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The proposed development is consistent with the aforementioned policies by promoting growth and adding to the current housing supply of the area for current and future residents. The proposed development also provides for the efficient expansion of existing local roads.

Housing

Section 2.2 of the PPS provides more specific policy direction regarding Housing. The PPS encourages a range and a mixture of housing types and densities in order to meet the current and projected needs of residents. The following policies are relevant:

2.2.1 Planning authorities shall provide for an appropriate range and mix of housing options and densities to meet projected needs of current and future residents of the regional market area by:

a) establishing and implementing minimum targets for the provision of housing that is affordable to low and moderate income households, and coordinating land use planning and planning for housing with Service Managers to address the full range of housing options including affordable housing needs;

b) permitting and facilitating:
   1. *all housing options required to meet the social, health, economic and wellbeing requirements of current and future residents, including additional needs housing and needs arising from demographic changes and employment opportunities; and*
   2. *all types of residential intensification, including the development and redevelopment of underutilized commercial and institutional sites (e.g., shopping malls and plazas) for residential use, development and introduction of new housing options within previously developed areas, and redevelopment, which results in a net increase in residential units in accordance with policy 2.3.1.3;*

c) promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation; and

The PPS directs the development of new housing towards locations where an appropriate level of infrastructure and public service facilities exist. The subject lands have direct access to community services including an adjacent park, and restaurants at the intersection of Badenoch Street and Highway 6. The proposed lots and associated dwellings reinforce the surrounding area context and the level of servicing available to the subject lands, while providing for appropriate compact development by way of reducing the lot sizes to provide additional housing.

Settlement Areas

Section 2.3.1 of the PPS provides directions on future growth and development within Settlement Areas. The PPS promotes efficient development patterns within settlement areas, which are locations where growth and development is to be focused. The subject lands are located within the Settlement Area of Morriston. The following policies are relevant to the applications:

2.3.1.1 Settlement areas shall be the focus of growth and development. Within settlement areas, growth should be focused in, where applicable, strategic growth areas, including major transit station areas.

2.3.1.2 Land use patterns within settlement areas should be based on densities and a mix of land uses which:

a) efficiently use land and resources;
b) optimize existing and planned infrastructure and public service facilities;
c) support active transportation;

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d) are transit-supportive, as appropriate

2.3.1.3 Planning authorities shall support general intensification and redevelopment to support the achievement of complete communities, including by planning for a range and mix of housing options and prioritizing planning and investment in the necessary infrastructure and public service facilities.

The proposed development supports the policies of the PPS regarding the efficient use of land and resources by developing an underutilized parcel within a settlement area which is adjacent to similar low density uses and a municipal park. Furthermore, the proposed lot sizes are smaller than the *Urban Residential* zone permits, to increase the density and provide for appropriate compact built form while also respecting the limitations for lot sizes to accommodate private services.

Rural Areas in Municipalities

Section 2.5 of the PPS provides policies related to rural areas which include rural settlement areas. OPA 119 designates Morriston as a *Rural Settlement Area*, as such, the Rural Areas policies in the PPS are applicable. The following policies pertain to the subject lands:

2.5.1. Healthy, integrated and viable rural areas should be supported by:

- *a) building upon rural character, and leveraging rural amenities and assets;*
- *c) accommodating an appropriate range and mix of housing in rural settlement areas;*
- *d) using rural infrastructure and public service facilities efficiently;*
- *e) promoting diversification of the economic base and employment opportunities through goods and services, including value-added products and the sustainable management or use of resources;*
- *g) conserving biodiversity and considering the ecological benefits provided by nature;*

2.5.2. In rural areas, rural settlement areas shall be the focus of growth and development and their vitality and regeneration shall be promoted.

2.5.3. When directing development in rural settlement areas in accordance with policy 2.3, planning authorities shall give consideration to locally appropriate rural characteristics, the scale of development and the provision of appropriate service levels.

The proposed development provides for a low-density subdivision, in keeping with the existing character of Morriston and preserves the environmental features within the eastern and southern portion of the subject lands. The proposed lot sizes are also informed by the provision of private services required for development in Morriston.

Energy Conservation, Air Quality and Climate Change

The following energy conservation and climate change policies within Section 2.9 of the PPS are relevant to the proposed development:

2.9.1. Planning authorities shall plan to reduce greenhouse gas emissions and prepare for the impacts of a changing climate through approaches that:

- *a) support the achievement of compact, transit-supportive, and complete communities;*

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b) *incorporate climate change considerations in planning for and the development of infrastructure, including stormwater management systems, and public service facilities;*

d) *promote green infrastructure, low impact development, and active transportation, protect the environment and improve air quality; and*

The applications are consistent with the PPS with regards to energy conservation, air quality, and climate change. The proposed development includes a more compact lot size than currently permitted on the lands. Furthermore, the Functional Servicing and Stormwater Management Report identify that low impact development features are incorporated to mitigate stormwater impacts from the proposed development.

Infrastructure and Facilities

Chapter 3 of the PPS outlines policies pertaining to infrastructure and facilities. General policies for infrastructure and public service facilities that pertain to the subject lands are as follows:

3.1.1. Infrastructure and public service facilities shall be provided in an efficient manner while accommodating projected needs.

Planning for infrastructure and public service facilities shall be coordinated and integrated with land use planning and growth management so that they:

a) *are financially viable over their life cycle, which may be demonstrated through asset management planning;*

b) *leverage the capacity of development proponents, where appropriate; and*

c) *are available to meet current and projected needs.*

3.1.3. Infrastructure and public service facilities should be strategically located to support the effective and efficient delivery of emergency management services, and to ensure the protection of public health and safety in accordance with the policies in Chapter 5: Protecting Public Health and Safety.

Sewage, Water and Stormwater

Section 3.6 of the PPS provides direction for sewage, water and stormwater infrastructure, including the provision of private servicing where necessary:

3.6.1. Planning for sewage and water services shall:

b) *ensure that these services are provided in a manner that:*
   1. *can be sustained by the water resources upon which such services rely;*
   2. *is feasible and financially viable over their life cycle;*
   3. *protects human health and safety, and the natural environment, including the quality and quantity of water; and*
   4. *aligns with comprehensive municipal planning for these services, where applicable.*

c) *promote water and energy conservation and efficiency;*

d) *integrate servicing and land use considerations at all stages of the planning process;*

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3.6.4. Where municipal sewage services and municipal water services or private communal sewage services and private communal water services are not available, planned or feasible, individual on-site sewage services and individual on-site water services may be used provided that site conditions are suitable for the long-term provision of such services with no negative impacts.

At the time of the official plan review or update, planning authorities should assess the long-term impacts of individual on-site sewage services and individual on-site water services on environmental health and the financial viability or feasibility of other forms of servicing set out in policies 3.6.2 and 3.6.3.

3.6.8. Planning for stormwater management shall:

a) be integrated with planning for sewage and water services and ensure that systems are optimized, retrofitted as appropriate, feasible and financially viable over their full life cycle;
b) minimize, or, where possible, prevent or reduce increases in stormwater volumes and contaminant loads;
c) minimize erosion and changes in water balance including through the use of green infrastructure;
d) mitigate risks to human health, safety, property and the environment;
e) maximize the extent and function of vegetative and pervious surfaces;
f) promote best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development; and
g) align with any comprehensive municipal plans for stormwater management that consider cumulative impacts of stormwater from development on a watershed scale.

The proposed development will be provided with individual private sewage and water services in a manner consistent with the applicable policies and guidelines. Furthermore, a Functional Servicing and Stormwater Management Report has been prepared by Crozier which identifies the proposed development will provide for stormwater quality and quantity control via swales and infiltration trenches. For further details please refer to the Report provided by Crozier Consulting Engineers.

<u>Wise Use and Management of Resources</u>
Chapter 4 of the PPS guides the Wise Use and Management of Resources, including natural heritage and water.

Section 4.1 of the PPS provides policies related to natural heritage features and ensuring natural areas are protected for the long-term. Due to the natural features on the subject lands, the following policies are relevant:

4.1.1. Natural features and areas shall be protected for the long term.

4.1.2. The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

4.1.3. Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

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4.1.4. Development and site alteration shall not be permitted in:

a) significant wetlands in Ecoregions 5E, 6E and 7E1; and
b) significant coastal wetlands.

4.1.5. Development and site alteration shall not be permitted in:
a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E1;
b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)1;
c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)1;
d) significant wildlife habitat;
e) significant areas of natural and scientific interest; and
f) coastal wetlands in Ecoregions 5E, 6E and 7E1 that are not subject to policy 4.1.4.b),

unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

4.1.6. Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

4.1.7. Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

4.1.8. Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 4.1.4, 4.1.5, and 4.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

A wetland, significant woodland, and watercourse are present on the subject lands. There are no bodies of water or watercourses on the lands that are considered to be providing fish habitat. Three endangered species were documented on the subject lands by Colville Consulting. Mitigation measures are proposed in accordance with the Environmental Impact Study prepared by Colville Consulting, December 2023. The natural features and associated buffers will be protected via conveyance to the Township and with the rezoning of this portion of the subject lands to "Natural Environment" and the "Environmental Protection" overlay. Eight mitigation measures are proposed to assist in avoiding any impacts associated with the proposed development and concludes that are no expected negative impact on the natural areas. Accordingly, the proposed development is consistent with the PPS.

Water

Section 4.2 of the PPS includes policies regarding the protection and improvement of quality and quantity of water.

4.2.1. Planning authorities shall protect, improve or restore the quality and quantity of water by:

a) *using the watershed as the ecologically meaningful scale for integrated and long-term planning, which can be a foundation for considering cumulative impacts of development;*
b) *minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts;*

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c) *identifying water resource systems;*
d) *maintaining linkages and functions of water resource systems;*
e) *implementing necessary restrictions on development and site alteration to:*
    1. *protect all municipal drinking water supplies and designated vulnerable areas; and*
    2. *protect, improve or restore vulnerable surface and ground water, and their hydrologic functions;*
f) *planning for efficient and sustainable use of water resources, through practices for water conservation and sustaining water quality; and*
g) *ensuring consideration of environmental lake capacity, where applicable.*

2. Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored, which may require mitigative measures and/or alternative development approaches.

The subject lands consist of proposed lots that are appropriately sized to accommodate private water and wastewater services (well and septic) as municipal services are not available. The depth, size, and locations of the wells will be determined during the detailed design of each individual lot. Privately owned individual on-site sewage systems are proposed for this development. This servicing approach is consistent with the greater community and is suitable for rural settlement area subdivisions. Privately owned sewage systems are owned and operated by the property owner and there is no requirement for additional maintenance from the municipality.

Summary

The proposed development is consistent with the Provincial Planning Statement as it demonstrates efficient development within an existing settlement area, provides for increased housing opportunities and protects natural heritage features. The proposed development provides for 21 detached dwelling lots that add to the existing housing supply in Morriston and Puslinch with a built form that is contextually appropriate for the area and servicing availability. The reduced lot sizes promote a more compact form of development while respecting the surrounding context and servicing levels. The proposed development provides for the appropriate extension of the municipal road network with the expansion of Ochs Street and the introduction of a new municipal road to service the detached dwellings.

Furthermore, the proposed development provides for the protection of the natural heritage features in the eastern and southern portion of the site with the appropriate rezoning to an Environmental Protection zone and providing a sufficient buffer to development. Lastly, stormwater management is to be provided via infiltration trenches and swales in accordance with the submitted Functional Servicing and Stormwater Management Report. In summary, it is our opinion that the proposed development is consistent with the Provincial Planning Statement.

Proposed Zoning By-law Amendment

The subject lands are currently zoned as “Urban Residential (UR)”, “Future Development 2 (FD2)” and “Natural Environment (NE)” with an “Environmental Protection Overlay” per Schedule A5 of Zoning ByLaw No. 023-18. A Zoning By-law Amendment is being submitted to rezone the subject lands from “Future Development 2 – FD2” and “Natural Environment – NE” to “Urban Residential - XX (UR - XX)” and “Natural Environment (NE)” with “Environmental Protection (EP)” overlay to facilitate the proposed development.

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The following is a table which summarizes the zone requirements as well as the proposed standards (Table 1):

Zoning Standard	UR Requirement	Proposed
Minimum Required Lot Area	0.4 ha	0.19 ha (minimum)
Minimum Required Lot Frontage	18 m	25 m
Minimum Required Front Yard	3 m	3 m
Minimum Required Interior Side Yard	2 m	2 m
Minimum Required Exterior Side Yard	3m	3 m
Minimum Required Rear Yard	6 m	6 m
Maximum Permitted Lot Coverage	45%	45 %
Maximum Permitted Building Height	11 m	11m
Minimum Required Open Space	15%	15%

Table 1. Required and Proposed Zoning Standards

Based on Table 1, the following table provides the site-specific provision for the proposed development which includes additional residential uses, home businesses and private home daycare as permitted uses. These permitted uses are evaluated below.

Zone Designation	Permitted Uses	Prohibited Uses	Site Specific Provision
Urban Residential (UR-XX)	Single Detached Dwellings Additional Residential Units Home Businesses Private Home Daycare	N/A	Minimum Required Lot Area = 0.19 ha

Table 2. Proposed Zoning By-law Amendment Site Specific Provision

Additional Residential Units and Home Businesses

The permitted uses identified in the Zoning By-law Amendment being additional residential units and home businesses (including private home daycare) are evaluated below.

County of Wellington Official Plan

The County Official Plan was approved by the Ministry of Municipal Affairs on April 13, 1999 and came into effect on May 6, 1999. The latest Office Consolidation was released in July 2024. In accordance with Schedule A7 – County Growth Structure – Puslinch and Schedule B7 – Puslinch Land Use, the subject lands are designated as a *Secondary Urban Centre* within the *Rural System*.

Secondary Urban Centres are intended to provide a range of land use opportunities including *residential uses of various types and densities, commercial, industrial and institutional uses….* As per policy 6.10.6 *An Additional Residential Unit may be allowed subject to the provisions of Section 4.4.6 of this Plan.* Section 4.4.6 states:

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It is the policy of this Plan to authorize:

a) The use of two residential units in a single detached dwelling, semi-detached dwelling or rowhouse; and

b) The use of a residential unit in a building or structure ancillary to a single detached dwelling, semi-detached dwelling or rowhouse.

For additional clarity the intent of this policy is to allow up to a total of three residential units, which includes the primary dwelling unit, on eligible properties.

An Additional Residential Unit within a main residence or within an ancillary building on a property will not be permitted within hazardous lands as defined and regulated by the Local Conservation Authority.

An Additional Residential Unit will be required to be serviced by appropriate water and wastewater services in a manner that is acceptable to the local municipality. Additional Residential Units located within vulnerable areas designated under the Clean Water Act may be permitted subject to the applicable Source Protection Plan policies and the policies in section 4.9.5 of this Plan.

Additional residential units are permitted within a single detached dwelling in accordance with the County Official Plan. As stated in the letter prepared by Crozier dated November 15, 2024 additional residential units and home businesses are not expected to significantly increase sanitary flows and would be dependent on the number of additional fixtures required for a home business. If no additional fixtures are required, there would be no need to increase the sanitary capacity. The proposed lot fabric also allows for larger sanitary systems or sanitary improvements if necessary. Private servicing capacity will need to be reviewed at the building permit stage to ensure is it acceptable to the Town's Standards.

Section 4.2.6 provides *General County Policies* that are relevant to the proposed development.

4.2.6 Home Business

Wellington County supports the trend towards more home-based businesses and will facilitate new home business through planning policy. The opportunity to work from home will be encouraged.

In the Urban System, home businesses will be small in size and normally restricted to the occupants of the property. These uses will be oriented towards providing services rather than retail functions. Compatibility with surrounding residential development is a primary consideration.

In the Rural System, home businesses similar to those allowed in the Urban System are encouraged.

Section 6.4.4 also regulates home businesses within the *Rural System*. The following policies are relevant to the proposed development:

6.4.4 Home Businesses and Farm Businesses

Home businesses are home occupations and home industries that are secondary to the principal use of the property and may be allowed, subject to zoning provisions, as a means of supplementing farm incomes and providing services in agricultural areas and may include:

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- *small home occupations conducted from the main residence with employment normally limited to the occupants of the property – examples include bed and breakfast, day care, hairdresser, and professional services;*

In accordance with the County OP additional dwelling units and home businesses are encouraged and permitted within the *Secondary Urban Centre* designation. The letters provided by Crozier and Englobe demonstrate that the additional dwelling units and home businesses are not expected to have a significant effect on private water and sewage facilities which can be further reviewed through the building permit process, should a future homeowner have a desire to provide an additional residential unit or establish a home business. Additionally, the addendum letter prepared by Colville, November 13, 2024 highlights that these additional uses are not expected to have adverse effects to environmental features on the subject lands. The letter prepared by GHD, dated November 13, 2024 shows that there are no concerns from a traffic or parking perspective. Therefore, the proposed development conforms to the County of Wellington Official Plan.

Township of Puslinch Zoning By-law 023-18

The proposed Zoning By-law Amendment seeks to rezone the subject lands from *FD2* and *NE* to *UR - XX* and *NE* with *EP* overlay. As per table 6.1 *Residential Zone Permitted Uses* the *UR* zone permits accessory apartments, home businesses, single-detached dwellings, and more.

The following provisions regulate accessory dwelling units and home businesses within the Township Zoning By-law:

4.2 Accessory Apartments

a. Where permitted by this By-law, a maximum of one accessory apartment shall be permitted per single detached, semi-detached, or townhouse dwelling, provided that:

i. the maximum floor area shall not exceed 40 percent of the floor area of the principal dwelling unit to a maximum of 130 m2; and

ii. individual on-site sewage and water services are approved for the lot and have adequate capacity for the accessory apartment and any other uses on the lot.

4.11 Home Businesses

a. Where permitted, home businesses shall be permitted in accordance with the following provisions:

i. At no time shall any home business employ more than one on-site employee who does not reside in the dwelling unit to which such home business is accessory;

ii. A maximum of two home businesses may be permitted in a dwelling unit provided each home business can meet the requirements of this By-law;

iv. The maximum total floor area dedicated to all home businesses on a lot shall not exceed the lessor of 25 percent of the floor area of the dwelling unit on the lot or 50 m2. The maximum total

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floor area dedicated to home businesses includes any home business operated in an accessory structure in accordance with subsection (iii).

v. The home business shall be clearly incidental and secondary to the principal residential use to which it is accessory and shall not change the residential character of the dwelling unit.

vi. No home business shall create or become a public nuisance, particularly with regard to noise, traffic, emissions, parking or radio or television interference.

vii. The following uses are specifically prohibited as home businesses: 1) adult entertainment establishment; 2) animal clinic or agricultural animal clinic; 3) any use involving the storage, repair, maintenance and/or towing of vehicles or engines; 4) bed and breakfast establishment; 5) contractor's yard; 6) hospital; 7) industrial use; 8) warehouse; 9) kennel; 10) restaurant; 11) retail store; 12) salvage yard; 13) truck terminal; or 14) funeral establishment.

Accessory apartments and home businesses are permitted within the *Urban Residential* zone. Any additional residential units or home businesses would be subject to the provisions within the Town's Comprehensive Zoning By-law 023-18. For these reasons, we believe that the proposed development complies with the provisions of Zoning By-law 023-18.

Conclusion

The proposed development is consistent with the Provincial Planning Statement by promoting efficient development within an existing Settlement Area, increasing housing opportunities, and protecting natural heritage features. The development features reduced lot sizes for a more compact form while respecting the surrounding area and service levels. Additionally, the development protects natural heritage features in the eastern and southern parts of the subject lands by rezoning these areas to Environmental Protection zone and providing adequate buffers. Overall, the development is consistent with the new Provincial Planning Statement.

The proposed Zoning By-law Amendment has since been updated to include additional residential units, home businesses, and private home daycares as permitted uses. These additional uses are not expected to have negative impacts on the overall development or surrounding lands. The supplementary letters prepared by Crozier, Englobe, GHD, and Colville express how these uses can be accommodated without adverse impacts to a servicing, traffic, and natural features and functions.

Based on the analysis contained in both the Planning Justification Report prepared by Weston Consulting dated March 4, 2023, updated September 2024 and this Addendum Letter, it is our opinion that the proposed Zoning By-law Amendment and Draft Plan of Subdivision Application are justified and represent good planning.

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Yours Truly,
Weston Consulting
Per:

Kayly Robbins, MPL, MCIP, RPP
Senior Planner

c. WDD Main Street Inc.

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November 19, 2024

Project T1220482.003

Weston Consulting
201 Millway Avenue, Unit 19
Concord, ON L4K 5K8
Attention: Kayly Robbins, MPL, MCIP, RPP, Senior Planner

Subject: **Results of Test Well Drilling and Aquifer Testing**
Proposed Residential Subdivision – 11 Main Street
Puslinch, Ontario

Dear Ms. Robbins:

This letter report provides the results and analysis of the test well drilling and aquifer testing program completed for the above noted residential development.

1.0 Introduction

The Site is identified at the municipal address of 11 Main Street, Morriston (Puslinch), Ontario. The Site is irregular in shape with a total area of approximately 231,040 m^2 (57.1 acres) currently consisting of vacant open space. A Site location plan is provided in Figure 1. The Site is bounded by vacant lands to the south, Residential properties and Badenoch Street to the north, residential buildings to the west and a mixed residential and agricultural property to the east.

Based on a review of the Draft Plan of Subdivision, drawing D14 dated June 9, 2024, prepared by Weston Consulting, it is understood that the proposed development would include a residential subdivision proposed within the north portion of the Site. The proposed subdivision consists of 21 single detached dwellings, a storm water management block, and internal roadways. Plan review indicates that residential lots will range in size from 0.197 ha to 0.382 ha. It is understood that each proposed dwelling will rest on a single basement level extending to the footprint of the proposed building.

The proposed development will be privately serviced with individual groundwater supply wells, and individual subsurface sewage disposal systems. An assessment of septic impacts resulting from the proposed development have been assessed under separate cover, as part of the report titled: *Hydrogeological Assessment, Proposed Residential Development, 11 Main Street, Puslinch, Ontario, prepared by Englobe, dated August 28, 2024, project reference T1220482.003*.

2.0 Scope of Work

The following scope of work was carried out as part of the test well drilling and aquifer testing program:

- *Test Well Drilling Program* - In accordance with Procedure D-5-5 a series of three test wells were drilled across the Site. Test wells were sited in the field within proposed residential Lots 5, 12, and 14. Wells were installed by a licensed well drilling contractor in compliance with O. Reg. 903.

- *Private Well Survey* – A private well survey was completed for properties within a 250 m radius of the property limits. A private well survey was completed to notify residents and property owners about the completed well testing and to request permission to monitor and sample private wells over the duration of well testing. The survey was also completed to obtain an operational history of private well in use, including past water quantity issues, and any issues with water quality, and to determine the construction of private wells including the depth, type, location, and pump details.

- *Aquifer Testing* – Aquifer tests were conducted for the completed test wells. Testing was completed as a constant rate test at the rate of 37.8 L/min over the duration of 6 hours to confirm adequate groundwater supply for residential demand. An individual test was completed for test well TW1, followed by cumulative testing for the three installed test wells.

- *Groundwater Monitoring Program* – Groundwater monitoring was carried out in advance of the start and throughout the completed aquifer testing. Monitoring included the completed test wells, if not used as a pumping well, on-site 50 mm diameter monitoring wells, and off-site private wells where permission was provided by the property owner and wells were accessible.

- *Groundwater Quality Sampling* – Groundwater quality sampling was completed for Schedule 1 and partial Schedule 2 of the Ontario Drinking Water Standards (O. Reg. 169/03). Full Schedule 2 analysis was completed for one of the test wells installed on-site. Groundwater quality sampling was completed for private groundwater supply wells prior to and following completion of aquifer testing for nitrate, phosphorus, sodium, chloride, and e-coli.

The results of the above completed scope are provided herein with analysis of the results of aquifer testing and servicing recommendations for the proposed residential development based on the results of completed testing.

3.0 Local Geology and Hydrogeology

The Site is located within physiographic regions of Southern Ontario known as the Horseshoe Moraines (within the north, central, and west portions) and partially in Flamborough Plain (within the southeast and east portions). The Horseshoe Moraines within the vicinity of the Site comprises a Till Moraines, and Flamborough Plain consists of Limestone Plains physiographic feature.

The Horseshoe Moraines consist of the largest concentration of sand and gravel in Southern Ontario. Structurally, within the southwestern portion of the region, the Horseshoe Moraines consist of two to three morainic ridges composed of pale brown, hard, calcareous, fine-textured till, with moderate degrees of stoniness (Chapman and Putnam, 1984).

The major underlying geologic units consist of grey coloured limestone/dolostone of the Guelph Formation followed by brown to black limestone/dolostone of the Amabel Formation, white and gray sandstones and shale of the Clinton and Cataract Groups and red shale of the Queenston Formation.

The Guelph formation is characterized with a relatively massive dolostone cap rock, followed by fractures water bearing limestones. The Guelph formation is expected to provide a confined to semi-confined groundwater aquifer. The underlying Amabel Formation also provides a water bearing aquifer for local residential and agricultural uses. It is expected that the contact between the Guelph and Amabel Formations consists of a highly fractured contact providing adequate water quantity and quality for residential use. Underlying sandstones of the Clinton/Cataract Group and shale of the Queenston Formation are not used for water supply.

The Site is located within Bronte Creek Watershed within the jurisdiction of Conservation Halton. The headwaters of the Bronte Creek are generated to the northwest of the Site and flows southeasterly direction crossing the southwest portion of the Site. Record review indicates that there are wetland features and wooded areas near the Site. Records of wetland features, evaluated provincial as per Ontario Wetland Evaluation System (OWES), are scattered around the Site with a closest record (Beverly Swamp Wetland Complex) mapped near the southwest limits of the Site (approximately 260 m away from the Site boundary).

4.0 Results of Test Well Drilling

Test wells were installed by Aardvark Drilling and are summarized in the following table:

Summary of Installed Test Wells

	Well Tag ID	Easting	Northing	Ground Elevation (m)	Well Depth (m)	Bedrock Depth (m)	Screened Depth (m)
TW1	A321825	571820	4811152	322.5	29.6 (292.9)	22.9 (299.6)	23.2 - 29.6
TW2	A399867	571941	4811252	316.4	22.6 (293.8)	18.9 (297.5)	19.2 - 22.6
TW3	A321827	571882	4811001	316.1	30.8 (285.3)	28.0 (285.3)	28.3 - 30.8

Test wells were all completed within limestone bedrock (Guelph Formation) with well casings grouted approximately 0.3 m within bedrock followed by open hole to the completed depth. Well records for the completed test wells are included in the attached Appendix A, well locations are provided on the site plan included under Appendix B. All wells were grouted approximately 0.3 m into limestone bedrock. Overburden deposits were reported to consist of sand to sand and gravel overlying clay and gravel deposits and limestone bedrock.

5.0 Summary of Aquifer Testing

The following sections provide a summary of the field work completed as part of the aquifer testing for the above noted test wells.

5.1 Private Well Survey and Well Monitoring Program

A private well survey was completed through a letter distributed to all properties within a 250 m radius of the site. The letter provided the purpose of the well survey, detailed of the proposed

development, and timing for the aquifer testing and contact information should the resident wish to participate in the monitoring program.

It is understood that residential properties surrounding the Site are privately serviced, and that municipal water and sewer services are not currently available within to village of Morriston.

The following table provides a summary of the addresses who responded to the well survey and participated within the monitoring program carried out as part of the aquifer testing based on well records available for each address. Well records are included in the attached Appendix A.

Summary of Monitored Private Wells

	Well ID	Easting	Northing	Ground Elevation (m)	Well Depth (m)	Bedrock Depth (m)	Screened Depth (m)
12 Main St.	6709771	571607	4810941	319.4	27.4 (292.0)	24.1 (295.3)	24.1 - 27.4
17 Badenoch St.	6709100	571546	4811115	329.5	32.0 (297.5)	27.4 (302.1)	27.7 - 32.0
	7342709	571543	4811107		Well Casing Extension		
2.118 Badenoch St.	6708922	571 574	4811073	329.2	33.8 (295.4)	31.7 (297.5)	31.7 - 33.8
7501 Wellington Rd. 36	6714759	571775	4811241	324.9	30.5 (295.4)	27.0 (297.9)	27.0 - 30.5

In addition to the above noted private off-site monitoring wells four completed 50 mm diameter monitoring wells completed on-site were monitored as part of the completed monitoring program. Borehole logs are included in the attached Appendix A. These well locations are summarized in the following table:

Summary of On-Site Monitoring Wells

	Easting	Northing	Ground Elevation (m)	Well Depth (m)	Screened Materials	Screened Depth (m)
MW1	572000	4811253	313.0	6.6 (306.4)	Silty Sand/Clayey Silt	3.6 - 6.6
MW2	571881	4811204	318.2	7.6 (310.6)	Silty Sand to Sand and Silt	6.1 - 7.6
MW3	571901	4811091	317.1	7.6 (309.5)	Silty Sand to Sand and Silt	4.6 - 7.6
MW5	571785	4810955	316.8	6.1 (310.7)	Gravelly Silty Sand	4.6 - 6.1

The above summarized well locations were monitored manually in advance of the start of, during and following completed aquifer testing. The following tale provides a summary of the distances between each test well and monitoring locations included as part of the monitoring program:

Distance to	TW1	TW2	TW3
MW1	210 m	60 m	280 m
MW2	80 m	80 m	200 m
MW3	100 m	170 m	90 m
MW5	200 m	340 m	110 m
12 Main St.	300 m	460 m	290 m
17 Badenoch St.	275 m	420 m	360 m
18 Badenoch St.	260 m	405 m	330 m
7501 Wellington Rd. 36	100 m	170 m	270 m
TW1	N/A	160 m	160 m
TW2	160 m	N/A	260 m
TW3	160 m	260 m	N/A

The private well located at the municipal address of 17 Badenoch Street was monitored through the installation of a data logger by the resident. The results of monitoring were not available at

the time of reporting. Groundwater quality samples were obtained from a tap bypassing treatment system(s) in use for the residence as summarized in Section 5.3 below.

5.2 Results of Aquifer Testing

Aquifer testing was carried out as constant rate tests with each test well pumped at a rate of approximately 37.8 L/min over the duration of 6 hours. Aquifer testing was completed for TW1 on October 7, 2024, and testing on October 8, 2024, was completed for TW2 and TW3 consecutively. The volume of groundwater pumped from each test well over the duration of testing was approximately 13,608 L. A cumulative total of 40,824 L was pumped from TW1, TW2, and TW3 on October 8, 2024.

Discharge during pumping was directed approximately 10 m from each well head. Each discharge location was monitored over the duration of pumping to confirm discharged groundwater was draining away from the wellhead and was not resulting in ponding or erosion.

Groundwater levels were manually measured within pumping wells over the duration of testing, and selected monitoring wells were monitored prior to the start of testing and at the end of pumping. Available drawdown was summarized based on pump depth information provided within well records for wells included within the monitoring program. The following table provides a summary of measured groundwater levels and observed drawdown for aquifer testing completed on October 7, 2024.

Summary of Groundwater Monitoring – October 7, 2024

Location	Static Groundwater Depth (m)	Final Groundwater Depth (m)	Total Drawdown (m)	Height of Pump from Bottom (m)	Available Drawdown (m)	% Available Drawdown
TW1	9.36	9.60	0.24	1.5	18.74	1.3
TW2	7.20	7.41	0.21	1.5	13.90	1.5
MW3	5.40	5.60	0.20	n/a	2.20	9.1
12 Main	6.85	6.45	+0.40	0.9	19.65	Nil
18 Badenoch	17.34	17.30	+0.04	1.2	15.26	Nil
7501 WR 36	16.66	16.60	+0.06	5.5	8.34	Nil

Aquifer testing for TW1 was completed on October 7, 2024, with manual groundwater measurements obtained prior to the start and at the end of pumping for the following wells: TW2, MW3, 12 Main Street, 18 Badenoch Street, and 7501 Wellington Road 36. A reduction of approximately 1.5% of available drawdown was observed within TW1 over the duration of testing. Drawdown was not observed within off-site private wells monitored, with drawdown observed on-site for TW2 (160 m from pumping well), and MW3 (100 m from pumping well) of approximately 0.2 m.

Summary of Groundwater Monitoring – October 8, 2024

Location	Static Groundwater Depth (m)	Final Groundwater Depth (m)	Total Drawdown (m)	Height of Pump from Bottom (m)	Available Drawdown (m)	% Available Drawdown
TW2	7.28	7.65	0.37	1.5	13.82	2.7
TW3	9.63	12.16	2.53	1.5	19.67	12.9
MW1	5.73	5.81	0.08	n/a	0.87	9.2

Aquifer testing for TW2 and TW3 was completed concurrently on October 8, 2024, with monitoring completed prior to and at the end of testing for MW1. Additional monitoring was competed for on-site wells MW3 and MW5, and private wells at 12 Main Street, 18 Badenoch Street, and 7501 Wellington Road 36. Monitoring for these wells was completed prior to the start of testing, however further groundwater monitoring was not completed by the on-site technicians.

Recovery within each of the three tested wells was observed within one minute of the completion of testing to a minimum of 95% of observed static groundwater conditions prior to the start of testing.

The results of pumping tests and measured groundwater depths are provided in the attached Appendix B. A discussion regarding the analysis of the results of aquifer testing is provided under Section 6.0 below.

The following table provides a summary of the observed drawdown during aquifer testing completed on October 8, 2024.

5.3 Results of Groundwater Quality Sampling

Groundwater quality sampling was completed for installed test wells and off-site private monitoring wells during the conducted aquifer testing the following sampling regimen was completed as part of the aquifer testing:

- Private Off-Site Wells 12 Main, 17 and 18 Badenoch, and 7501 Wellington Rd 36: **E-coli, nitrate, nitrite, and sodium**. Samples were taken on October 7 prior to the start of testing with additional samples taken on October 8, 2024, prior to the end of testing.
- Test Wells TW1, TW2, and TW3: **O. Reg. 169/03 Schedule 1, Partial Schedule 2 (metals, inorganics)**, three samples were obtained over the duration of testing for each well.
- Additional Sampling for TW2: **Full O. Reg. 169/03 Schedule 2** sampling was completed on October 31, 2024.

All groundwater samples were collected in laboratory supplied bottles appropriate for the analysis completed (i.e., preservative, glass jar/plastic bottle) and stored on ice for transport to Agart Laboratories of Mississauga, ON, a CALA Accredited third party laboratory, for analysis. Sample temperatures were confirmed within acceptable ranges upon receipt at the laboratory. Sampling notation for on-site test wells is noted as follows: TW1 (BH2), TW2 (BH1), and TW3 (BH4).

5.3.1 Results of Private Groundwater Sampling

Groundwater samples from off-site private wells were sampled from an outside tap that was identified to bypass any water treatment systems in use and should be considered indicative of raw water quality. The tap was left running for approximately 5 minutes to purge standing water from within the distribution system (i.e. pressure tanks/water lines) prior to sampling.

The following table provides a summary of the results of private well sampling:

	Units	12 Main St.		17 Badenoch St.		18 Badenoch St.		7501 Wellington Rd 36	
		7-Oct	8-Oct	7-Oct	8-Oct	7-Oct	8-Oct	7-Oct	8-Oct
E-coli	CFU/100 mL	0	0	0	0	0	0	0	0
Total Coliforms	CFU/100mL	29	29	0	0	35	65	0	0
Nitrate	mg/L	2.75	3.02	0.79	1.01	2.86	3.11	3.14	3.43
Nitrite	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sodium	mg/L	73.1	73.4	56.1	59.3	73.2	72.7	77.7	78.1

Private wells were sampled for e-coli/total coliforms, nitrate/nitrite, and sodium to evaluate baseline groundwater quality with respect to potential contaminants from sewage disposal and local land use practices, including the potential for mobilization of contaminants with regards to water taking at the Site. The results of sampling did not result in substantial increases in concentrations of sampled parameters. Groundwater quality results of private off-site wells are provided within the laboratory certificates of analysis included as Appendix C.

5.3.2 Results of On-Site Groundwater Sampling

Groundwater samples from on-site test wells were taken during testing following approximately 1 hour, 3 hours, and 6 hours into completed constant rate tests. Full Schedule 2 testing was completed at TW2 on October 31, 2024. Testing was completed using the test pump installed for aquifer testing. The well was pumped for approximately one hour at 37.7 L/min and samples were collected from the discharge outlet.

Summary tables are included within the provided enclosures summarizing the results of groundwater quality analysis for TW1, TW2, and TW3. In summary health related standards exceedances was noted for total coliform only. Of the results, low levels of total coliform were detected at 1 CFU/100 mL within TW2, concentrations of 9 CFU/100 mL were observed within the first sample of TW1 with the following samples non-detect. Wells were chlorinated in advance of aquifer testing. A field colourimeter (HATCH 890) was utilized to confirm a zero-chlorine residual prior to collecting the first set of samples for microbiology.

Groundwater quality sampling indicated groundwater is elevated for hardness, between 378 mg/L to 453 mg/L (operational objective limit 18-100 mg/L), and total dissolved solids between 544 mg/L to 734 mg/L (aesthetic objective of 500 mg/L) for each test well. Groundwater sampling indicated total iron concentrations (aesthetic objective of 0.300 mg/L) within sample 1 at 0.574 mg/L falling to 0.340 mg/L by the end of testing, and total colour (aesthetic objective of 5 TCU) within sample 1 at 13.1 TCU falling to 9.64 TCU by the end of testing. Sample 1 for TW3 had an measured pH of 4.65 (operational limit between 6.5 to 8.5) and TW2, sample 2 measured total manganese at 0.051 mg/L (aesthetic objective of 0.05 mg/L).

Further to the above sampling additional groundwater sampling was completed from TW2 for full O. Reg. 169/03 Schedule 2 sampling including herbicides, pesticides, VOC, PCB, metals, and inorganics. Exceedances under the O. Reg. 169/03 Schedule 2 sampling were not noted with non-detectable results for herbicides, pesticides, PCB, and VOC. Certificates of analysis are included within Appendix C. It is noted that the attached results for O. Reg. 169/03 sampling from TW2 are considered a partial analysis with pending results for Dioxins and Furans, and Nitrilotriacetic Acid, Nitrosodimethylamine and Microcystin. These results will be provided as an addendum once available.

6.0 Analysis and Discussion

6.1 Site Hydrogeological Function

The hydrogeological function of the site was evaluated as part of previous investigations completed for the Site. The hydrogeological function of the site to provide recharge for shallow groundwater, with groundwater discharge expected to Bronte Creek, and associated tributaries and wetland areas. Bedrock for the Guelph formation is expected to form a confined to semi-confined aquifer underlying surficial sands and clayey silt soils.

6.2 Drawdown Assessment

Semi-log time vs. drawdown plots were completed for the three test wells and a Theis analysis was completed for water level information recorded over the duration of the aquifer testing. Analysis was completed using Aquifer Test software licenced by Waterloo Hydrogeologic. Aquifer testing analysis is provided in the attached Appendix B.

The following table provides a summary of the results of analysis and the expected aquifer properties for the shallow bedrock aquifer, consisting of limestones from the Guelph Formation:

	Hydrualic Conductivity (m/s)	Transmissivity (m^2/s)	Storativity
TW1	8.3×10^{-5}	1.0×10^{-3}	1.0×10^{-4}
TW2	5.6×10^{-5}	1.0×10^{-3}	1.0×10^{-4}
TW3	5.9×10^{-5}	1.0×10^{-3}	1.0×10^{-4}

Based on the above aquifer properties determined for the shallow bedrock aquifer a drawdown assessment was completed for proposed groundwater taking considering peak residential demand under Procedure D-5-5 which states that per person water demand of 450 L/day is considered for residential use with a peak demand period of 3.75 L/min per person over a period of 120 minutes. Given a four-bedroom dwelling (number of residents equal to the number of bedrooms plus one) would be expected at 2,250 L, with a peak demand rate of 18.75 L/min. the drawdown assessment considered a rate of water taking of 18.75 L/min (3.1×10^{-4} m^3/s).

Based on the completed drawdown assessment the expected drawdown for pumping at a rate of 18.75 L/min is expected to result in a total drawdown of approximately 0.28 m to 0.17 m for distances extending from 100 m to 900 m from the wellhead. Since residential water taking is

proposed to be intermittent based on demand it is expected that impacts because of water taking will be negligible. Conceptual drawdown curves were plotted following the completed Theis analysis and evaluated aquifer properties and is provided in the attached Appendix B.

6.3 Potential Impacts on Water Quality

Water quality analysis was completed to assess the potability of groundwater available for private water servicing and to assess the potential for mobilization of potential groundwater contamination due to the additional water taking for the proposed residential development. Given the rural residential setting of the site surrounding groundwater contamination is expected from surrounding private subsurface sewage disposal, with primary parameters for concern being nitrate, e-coli, and sodium.

Full O. Reg. 169/03 analysis indicated non-detectable concentrations for all measured herbicides, pesticides, and hydrocarbons. Land uses are not identified as potentially contaminating with regards to these parameters. Nitrate impacts to groundwater sampled from within bedrock wells were observed to have non-detectable levels of e-coli bacteria. While low levels of total coliform bacteria were detected, it is expected that through on-going well maintenance, including routine disinfection of the water distribution system or water treatment methodology, including UV filtration that total coliform concentrations can be effectively managed.

It is expected that clayey silt deposits noted overlying bedrock deposits will provide a level of geologic isolation for groundwater within bedrock from surficial land use practices. Concentrations of measured parameters both within on-site completed test wells and off-site monitored private wells, did not notably degrade over the duration of aquifer testing.

Groundwater is considered suitable for residential use, exceedances of operational objectives and aesthetic parameters of the Ontario Drinking Water Standards were noted for hardness and total dissolved solids with exceedances noted for total iron, total manganese, and colour. These parameters are considered reasonably treatable through commercial treatment including water softeners and membrane filtration. Sodium was noted within completed test wells at concentrations above 20 mg/L, which should be noted for those patients with cardiac issues including hypertension and relayed to health care practitioners for consideration for sodium restricted diets.

6.4 Servicing Recommendations

Based on the results of the completed test well drilling and aquifer testing program it is recommended that wells for proposed lots be drilled within the shallow bedrock where suitable groundwater yield is encountered. It is expected that the shallow limestone bedrock will provide suitable groundwater yield and quality of residential demand. Significant interference effects between wells are not expected, with drawdown ranging from 0.24 m to 2.0 m within test wells at a constant rate of 37.8 L/min. Given the expected peak demand for a four-bedroom dwelling of 18.75 L/min significant impacts because of water taking are not expected.

7.0 Summary and Conclusions

The following provide a summary of the results of aquifer testing, monitoring, sampling and analysis, including recommendations for water servicing for the proposed residential development:

- It is understood that the proposed development would include a residential subdivision proposed within the north portion of the Site. The proposed subdivision consists of 21 privately serviced single detached dwellings, a storm water management block, and internal roadways.
- The Site is located within physiographic regions of Southern Ontario known as the Horseshoe Moraines and partially in Flamborough Plain. The Horseshoe Moraines within the vicinity of the Site comprises a Till Moraines, and Flamborough Plain consists of Limestone Plains physiographic feature.
- The major underlying geologic units consist of grey coloured limestone/dolostone of the Guelph Formation followed by brown to black limestone/dolostone of the Amabel Formation, white and gray sandstones and shale of the Clinton and Cataract Groups and red shale of the Queenston Formation. The supply aquifer for the test well program was the Guelph Formation.
- A series of three test wells were installed across the site within limestone bedrock to depths between 22.6 m to 30.8 m below existing grades. Constant rate testing was completed for each well at a rate of 37.8 L/min over 6 hours. Testing for TW1 was completed on October 7, 2024, with testing for TW2 and TW3 completed concurrently on October 8, 2024.
- Drawdown within pumping wells over the duration of testing was observed to range between 0.24 m to 2.53 m. Observed drawdown resulted in a reduction of between 1% to 12% of the available drawdown within test wells.
- Groundwater quality sampling was completed over a series of three sampling events during each respective pumping test for microbiology, metals and inorganic parameters of the Ontario Drinking Water Standards. Low levels of total coliform were noted within TW1 (1 CFU/100 mL) over the duration of testing.
- Exceedances of the operational guidelines and aesthetic objectives were noted for hardness, total dissolved solids, total iron, total manganese, and colour. These exceedances are reasonably treatable using commercially available treatment units.
- Private well sampling was completed for e-coli, nitrate, nitrite, and sodium. Total coliform was detected within two of the sampled private wells, considered due to well maintenance and disinfection requirements. Private water quality was noted consistent between sampling events prior to and following completion of aquifer testing. Significant degradation of water quality with testing was not observed.
- A drawdown assessment was completed using evaluated aquifer parameters given the expected drawdown for pumping at a rate of 18.75 L/min. It is expected that water taking will result in a total drawdown of approximately 0.28 m to 0.17 m for distances extending

from 100 m to 900 m from the wellhead. Since residential water taking is proposed to be intermittent based on demand it is expected that impacts because of water taking will be negligible.

- Based on the results of the completed test well drilling and aquifer testing program it is recommended that wells for proposed lots be drilled within the shallow bedrock where suitable groundwater yield is encountered. It is expected that groundwater will provide adequate yield and quality for residential demand with negligible impacts to existing private residential supply wells.

If you require additional information, please do not hesitate to contact the undersigned.

Yours very truly,

Englobe Corp.

[redacted]

[redacted]

Paul Raepple, P.Geo.
Senior Hydrogeologist

ENCLOSURES

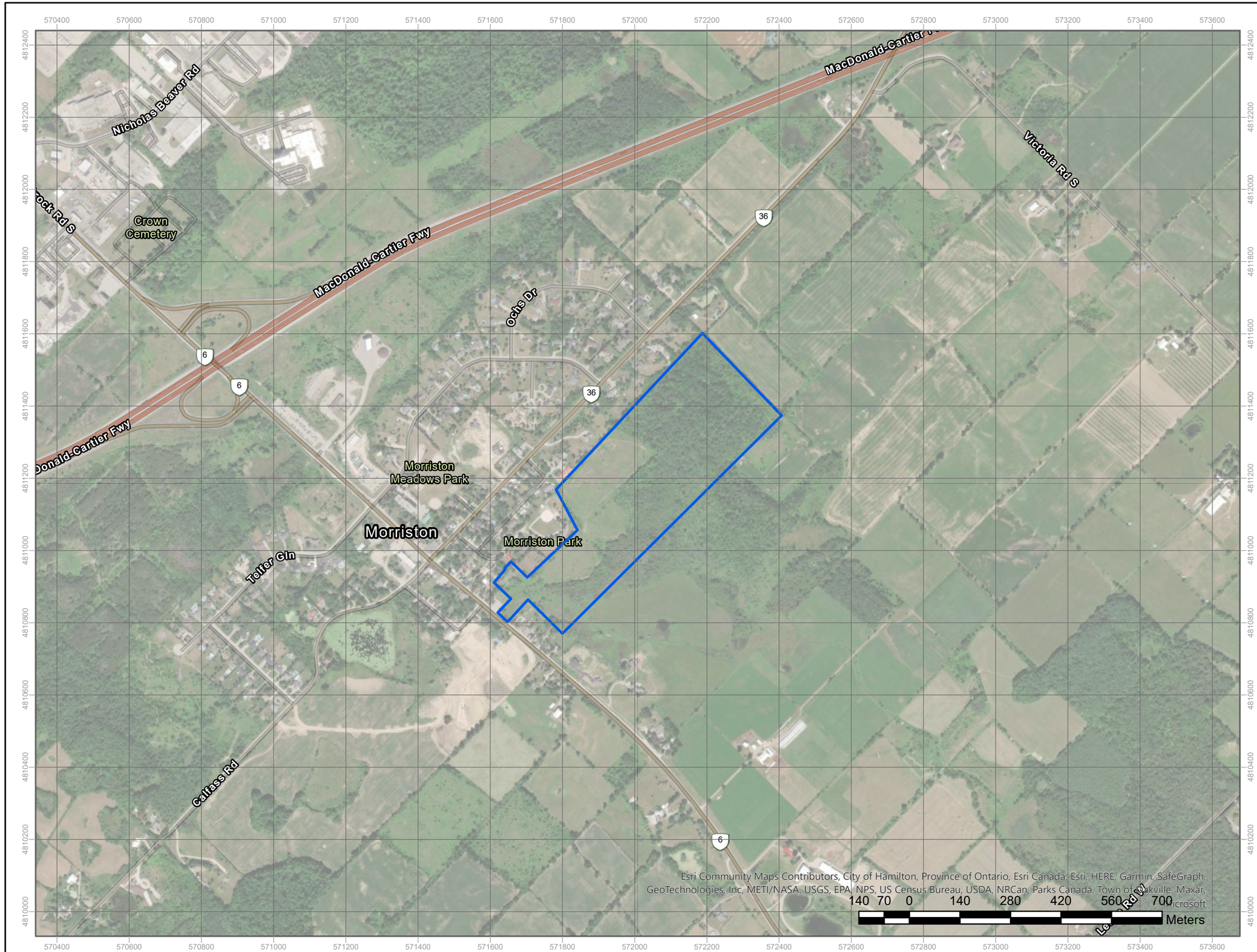
Figure 1: Site Location Plan

Table 1: Summary of On-Site Groundwater Quality Analysis

Appendix A: Well Records
Appendix B: Aquifer Testing Analysis
Appendix C: Laboratory Certificates of Analysis

Enclosures

ENGLOBE

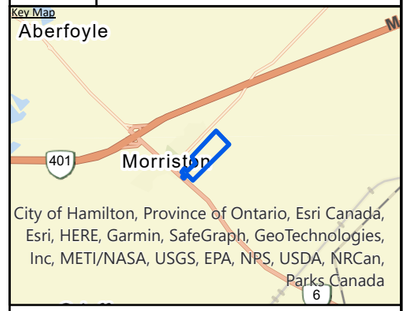


Terraprobe Inc.
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing

References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community.Basemaps

Key Map



Notes:

Legend:

Approximate Site Boundary

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Site Location Plan

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 1
Date: October 2022	

Table 1: Results of Groundwater Quality Analysis
Test Well TW1
Proposed Residential Subdivision
11 Main Street
Puslinch, Ontario

Sample Description				BH2-10:30	BH2-12:30	BH2-2:15
Date Sampled				10/07/2024	10/07/2024	10/07/2024
Parameter	Unit	MAC	AO/OG	6211035	6211036	6211037
Inorganics						
Electrical Conductivity	µS/cm			1250	1240	1240
pH	pH Units		6.5-8.5	7.85	7.86	7.81
Hardness (as CaCO3) (Calculated)	mg/L		80-100	453	439	449
Total Dissolved Solids	mg/L		500	734	730	700
Alkalinity (as CaCO3)	mg/L		30-500	320	334	329
Fluoride	mg/L	1.5		<0.05	<0.05	<0.05
Chloride	mg/L		250	193	190	190
Nitrate as N	mg/L	10.0		1.74	1.82	1.88
Nitrite as N	mg/L	1.0		<0.05	<0.05	<0.05
Bromide	mg/L			<0.05	<0.05	<0.05
Sulphate	mg/L		500	34.4	34.3	34.4
Ortho Phosphate as P	mg/L			<0.10	<0.10	<0.10
Ammonia as N	mg/L			<0.02	<0.02	<0.02
Total Phosphorus	mg/L			<0.02	<0.02	<0.02
Total Organic Carbon	mg/L		5	0.8	0.8	0.7
Apparent Colour	TCU		5	3.21	2.7	<2.50
Turbidity	NTU		5	0.9	0.8	0.6
Total Calcium	mg/L			118	113	116
Total Magnesium	mg/L			38.5	38	38.8
Total Potassium	mg/L			1.82	1.4	1.86
Total Sodium	mg/L		20/200	90.2	86.8	87.6
Total Metals						
Total Aluminum	mg/L		0.1	0.011	<0.010	0.017
Total Antimony	mg/L	0.006		<0.003	<0.003	<0.003
Total Arsenic	mg/L	0.025		<0.003	<0.003	<0.003
Total Barium	mg/L	1		0.191	0.188	0.191
Total Beryllium	mg/L			<0.001	<0.001	<0.001
Total Boron	mg/L			0.019	0.017	0.017
Total Cadmium	mg/L	0.005		0.0002	0.0003	<0.0001
Total Chromium	mg/L			<0.003	<0.003	<0.003
Total Cobalt	mg/L			<0.0005	<0.0005	<0.0005
Total Copper	mg/L		1	<0.002	<0.002	<0.002
Total Iron	mg/L		0.3	0.214	0.078	0.062
Total Lead	mg/L	0.01		0.004	0.0029	0.003
Total Manganese	mg/L		0.05	0.003	<0.002	<0.002
Total Mercury	mg/L			<0.0001	<0.0001	<0.0001
Total Molybdenum	mg/L			<0.002	<0.002	<0.002
Total Nickel	mg/L			0.003	<0.003	<0.003
Total Selenium	mg/L	0.01		<0.002	<0.002	<0.002
Total Silver	mg/L			<0.0001	<0.0001	<0.0001
Total Strontium	mg/L			0.143	0.146	0.151
Total Thallium	mg/L			<0.0003	<0.0003	<0.0003
Total Tin	mg/L			<0.002	<0.002	<0.002
Total Titanium	mg/L			<0.010	<0.010	<0.010
Total Tungsten	mg/L			<0.010	<0.010	<0.010
Total Uranium	mg/L	0.02		0.0009	0.0009	0.0009
Total Vanadium	mg/L			<0.002	<0.002	<0.002
Total Zinc	mg/L		5	0.317	0.329	0.303
Total Zirconium	mg/L			<0.004	<0.004	<0.004
Microbiology						
Escherichia coli	CFU/100mL	0		0	0	0
Total Coliforms	CFU/100mL	0		1	1	1

Table 1: Results of Groundwater Quality Analysis
Test Well TW2
Proposed Residential Subdivision
11 Main Street
Puslinch, Ontario

Sample Description				BH1-10:30	BH1-12:30	BH1-2:30
Date Sampled				10/08/2024	10/08/2024	10/08/2024
Parameter	Unit	MAC	AO/OG	6211018	6211033	6211034
Inorganics						
Electrical Conductivity	µS/cm			1180	1180	1180
pH	pH Units		6.5-8.5	7.8	7.78	7.79
Hardness (as CaCO3) (Calculated)	mg/L		80-100	433	430	434
Total Dissolved Solids	mg/L		500	680	694	684
Alkalinity (as CaCO3)	mg/L		30-500	319	329	321
Fluoride	mg/L	1.5		<0.05	<0.05	<0.05
Chloride	mg/L		250	171	175	173
Nitrate as N	mg/L	10.0		0.94	0.92	0.88
Nitrite as N	mg/L	1.0		<0.05	<0.05	<0.05
Bromide	mg/L			<0.05	<0.05	<0.05
Sulphate	mg/L		500	36.7	37.6	37.3
Ortho Phosphate as P	mg/L			<0.10	<0.10	<0.10
Ammonia as N	mg/L			<0.02	<0.02	<0.02
Total Phosphorus	mg/L			<0.02	<0.02	<0.02
Total Organic Carbon	mg/L		5	0.6	0.6	0.7
Apparent Colour	TCU		5	3.59	<2.50	<2.50
Turbidity	NTU		5	1.4	1.8	1.5
Total Calcium	mg/L			111	111	111
Total Magnesium	mg/L			37.8	37.2	38
Total Potassium	mg/L			1.89	2.2	2.22
Total Sodium	mg/L		20/200	78	77.1	77.2
Total Metals						
Total Aluminum	mg/L		0.1	0.029	<0.010	<0.010
Total Antimony	mg/L	0.006		<0.003	<0.003	<0.003
Total Arsenic	mg/L	0.025		<0.003	<0.003	<0.003
Total Barium	mg/L	1		0.194	0.191	0.187
Total Beryllium	mg/L			<0.001	<0.001	<0.001
Total Boron	mg/L			0.025	0.024	0.022
Total Cadmium	mg/L	0.005		0.0001	0.0002	<0.0001
Total Chromium	mg/L			<0.003	<0.003	<0.003
Total Cobalt	mg/L			<0.0005	<0.0005	<0.0005
Total Copper	mg/L		1	<0.002	<0.002	<0.002
Total Iron	mg/L		0.3	0.093	0.063	0.063
Total Lead	mg/L	0.01		<0.0005	<0.0005	<0.0005
Total Manganese	mg/L		0.05	0.048	0.051	0.045
Total Mercury	mg/L			<0.0001	<0.0001	<0.0001
Total Molybdenum	mg/L			<0.002	<0.002	0.006
Total Nickel	mg/L			<0.003	0.004	0.008
Total Selenium	mg/L	0.01		<0.002	<0.002	<0.002
Total Silver	mg/L			<0.0001	<0.0001	<0.0001
Total Strontium	mg/L			0.135	0.16	0.149
Total Thallium	mg/L			<0.0003	<0.0003	<0.0003
Total Tin	mg/L			<0.002	<0.002	<0.002
Total Titanium	mg/L			<0.010	<0.010	<0.010
Total Tungsten	mg/L			<0.010	<0.010	<0.010
Total Uranium	mg/L	0.02		0.001	0.001	0.001
Total Vanadium	mg/L			<0.002	<0.002	<0.010
Total Zinc	mg/L		5	0.215	0.207	0.204
Total Zirconium	mg/L			<0.004	<0.004	<0.004
Microbiology						
Escherichia coli	CFU/100mL	0		0	0	0
Total Coliforms	CFU/100mL	0		9	0	0

Table 1: Results of Groundwater Quality Analysis
Test Well TW3
Proposed Residential Subdivision
11 Main Street
Puslinch, Ontario

Sample Description					BH4-1HR	BH4-3HR	BH4-5HR
Date Sampled					10/08/2024	10/08/2024	10/08/2024
Parameter	Unit	MAC	AO/OG	G / S	6211087	6211088	6211089
Inorganics							
Electrical Conductivity	µS/cm				970	963	967
pH	pH Units		6.5-8.5		4.65	7.79	7.77
Hardness (as CaCO3) (Calculated)	mg/L		80-100		393	387	378
Total Dissolved Solids	mg/L		500		554	564	544
Alkalinity (as CaCO3)	mg/L		30-500		299	301	310
Fluoride	mg/L	1.5			<0.05	<0.05	<0.05
Chloride	mg/L		250		108	106	105
Nitrate as N	mg/L	10.0			0.79	0.73	0.72
Nitrite as N	mg/L	1.0			<0.05	<0.05	<0.05
Bromide	mg/L				<0.05	<0.05	<0.05
Sulphate	mg/L		500		38.6	38.1	37.7
Ortho Phosphate as P	mg/L				<0.10	<0.10	<0.10
Ammonia as N	mg/L				<0.02	<0.02	<0.02
Total Phosphorus	mg/L				<0.02	<0.02	<0.02
Total Organic Carbon	mg/L		5		0.70	0.70	0.70
Apparent Colour	TCU		5		13.1	10.4	9.64
Turbidity	NTU		5		1.80	1.70	1.10
Total Calcium	mg/L				97.0	94.9	93.2
Total Magnesium	mg/L				36.6	36.4	35.3
Total Potassium	mg/L				1.40	1.34	1.60
Total Sodium	mg/L		20/200		47.8	46.7	45.5
Total Metals							
Total Aluminum	mg/L		0.1		<0.010	<0.010	<0.010
Total Antimony	mg/L	0.006			<0.003	<0.003	<0.003
Total Arsenic	mg/L	0.025			<0.003	<0.003	<0.003
Total Barium	mg/L	1			0.24	0.22	0.20
Total Beryllium	mg/L				<0.001	<0.001	<0.001
Total Boron	mg/L				0.03	0.02	0.02
Total Cadmium	mg/L	0.005			0.00	<0.0001	<0.0001
Total Chromium	mg/L				<0.003	<0.003	<0.003
Total Cobalt	mg/L				<0.0005	<0.0005	<0.0005
Total Copper	mg/L		1		<0.002	<0.002	0.01
Total Iron	mg/L		0.3		0.57	0.45	0.34
Total Lead	mg/L	0.01			0.00	0.00	0.00
Total Manganese	mg/L		0.05		0.01	0.01	0.01
Total Mercury	mg/L				<0.0001	<0.0001	<0.0001
Total Molybdenum	mg/L				<0.002	<0.002	<0.002
Total Nickel	mg/L				<0.003	<0.003	<0.003
Total Selenium	mg/L	0.01			<0.002	<0.002	<0.002
Total Silver	mg/L				<0.0001	<0.0001	<0.0001
Total Strontium	mg/L				0.31	0.23	0.22
Total Thallium	mg/L				<0.0003	<0.0003	<0.0003
Total Tin	mg/L				<0.002	<0.002	<0.002
Total Titanium	mg/L				<0.010	<0.010	<0.010
Total Tungsten	mg/L				<0.010	<0.010	<0.010
Total Uranium	mg/L	0.02			0.00	0.00	0.00
Total Vanadium	mg/L				<0.002	<0.010	<0.010
Total Zinc	mg/L		5		0.12	0.11	0.11
Total Zirconium	mg/L				<0.004	<0.004	<0.004
Microbiology							
Escherichia coli	CFU/100mL	0			0	0	0
Total Coliforms	CFU/100mL	0			0	0	0

Appendix A
MECP Well Records

ENGLOBE

12 Main Street

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 6709771 MUNICIP 6701 2 CON C.O.N. 08

COUNTY OR DISTRICT: WELLINGTON S
TOWNSHIP BOROUGH CITY TOWN VILLAGE: PUSLINCH
CON BLOCK TRACT SURVEY ETC: CON.8
LOT: 31
[redacted] RISTON, P.O. ONT. N0B 2C0
DATE COMPLETED: DAY 8 MO 6 YR 89
ELEVATION
BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	SAND &	GRAVEL	LOOSE	0	14
BROWN	SANDY CLAY		LOOSE	14	31
BROWN	CLAY		LOOSE	31	54
GREY	SAND &	GRAVEL	LOOSE	54	79
GREY	LIMESTONE		HARD	79	90

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
81	1 FRESH 2 SALTY 3 SULPHUR 4 MINERALS 5 GAS
87	1 FRESH 2 SALTY 3 SULPHUR 4 MINERALS 5 GAS
	1 FRESH 2 SALTY 3 SULPHUR 4 MINERALS 5 GAS
	1 FRESH 2 SALTY 3 SULPHUR 4 MINERALS 5 GAS
	1 FRESH 2 SALTY 3 SULPHUR 4 MINERALS 5 GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 STEEL 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE 5 PLASTIC	.188	+2	79
	1 STEEL 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE 5 PLASTIC		79	90
	1 STEEL 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE 5 PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER (INCHES) | LENGTH (FEET)
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN (FEET)

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)

71 PUMPING TEST

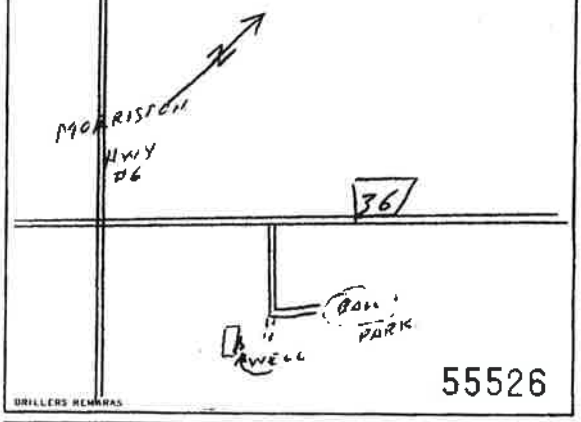
PUMPING TEST METHOD: 1 PUMP 2 BAILER
PUMPING RATE: 24 GPM
DURATION OF PUMPING: 1 HOURS MINS
WATER LEVELS DURING: 1 PUMPING 2 RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
24 FEET	34 FEET	24 FEET	24 FEET	24 FEET	24 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 CLEAR 2 CLOUDY
RECOMMENDED PUMP TYPE: SHALLOW DEEP
RECOMMENDED PUMP SETTING: 87 FEET
RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



DRILLERS REMARKS: 55526

FINAL STATUS OF WELL

1 WATER SUPPLY 2 OBSERVATION WELL 3 TEST HOLE 4 RECHARGE WELL 5 ABANDONED, INSUFFICIENT SUPPLY 6 ABANDONED, POOR QUALITY 7 UNFINISHED 8 DEWATERING

WATER USE

1 DOMESTIC 2 STOCK 3 IRRIGATION 4 INDUSTRIAL 5 COMMERCIAL 6 MUNICIPAL 7 PUBLIC SUPPLY 8 COOLING OR AIR CONDITIONING 9 NOT USED OTHER

METHOD OF CONSTRUCTION

1 CABLE TOOL 2 ROTARY (CONVENTIONAL) 3 ROTARY (REVERSE) 4 ROTARY (AIR) 5 AIR PERCUSSION 6 BORING 7 DIAMOND 8 JETTING 9 DRIVING DIGGING OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: O'CONNOR WELL DRILLING LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 4005
ADDRESS: RR # 1 MILLGROVE, ONT. L0R 1V0
NAME OF WELL TECHNICIAN: J.B. O'CONNOR
WELL TECHNICIAN'S LICENCE NUMBER: T-0148
[redacted]
SUBMISSION DATE: DAY MO YR

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR: 4005 | DATE RECEIVED: JUN 20 1989
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

17 Badenoch St.

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag (Yellow) **A 090039**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
17 Badinoch St.		30	8
County/District/Municipality	**City/Town/Village**	**Province**	**Postal Code**
Wellington	Morriston	Ontario	N0B2C0
UTM Coordinates Zone / Easting / Northing	**Municipal Plan and Sublot Number**	**Other**	
NAD 8 3 — 17 517154 4811107			

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Well Tagged & Record Generated Following Completion of Casing Extention on Previously Drilled 6" Well w 6" Steel Casing To 2ft Above Ground Surface.				

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☑ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6"	Steel	0.188	6'8"	+2'
6"	Steel	0.188	—	6'8"

Status of Well

☑ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

		Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify			
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify			
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

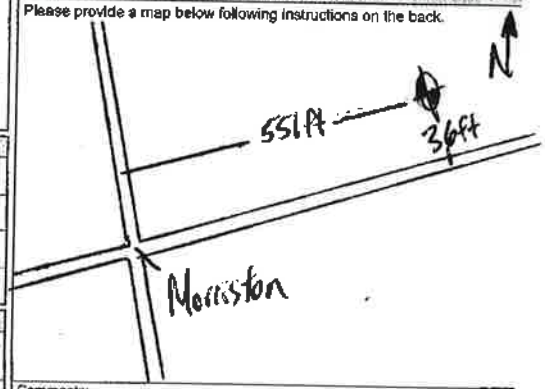
Well production (l/min / GPM)

Disinfected? ☑ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Well Initiatives Ltd.	7121
Business Address (Street Number/Name)	**Municipality**
15 Townline Rd	Orangeville
Province	**Postal Code**	**Business E-mail Address**
Ont	L9W3R4	info@wellinitiatives.com
Bus. Telephone No. (inc. area code)	**Name of Well Technician (Last Name, First Name)**
5198468289	[redacted]
Well Technician's Licence No.	**Submitted**
3923	190917

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☐ No	Y Y Y Y M M D D	Audit No. Z316731
	Date Work Completed 20190910	SEP 20 2019 Received

0506E (2018/12)

Ministry's Copy

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

114/87

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 6709100

MUNICIP CON

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Puslinch
CON: 8
LOT: 30
[redacted] LAKES RR#3 Guelph, ONT.
DATE COMPLETED: DAY 026 MO 011 YR 87

ELEVATION BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	GRAVEL	STONES		0	30
"	CLAY	GRAVEL		30	90
"	ROCK			90	105
			TOTAL DEPTH	105	FT.

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
105	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	91
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		91	105
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

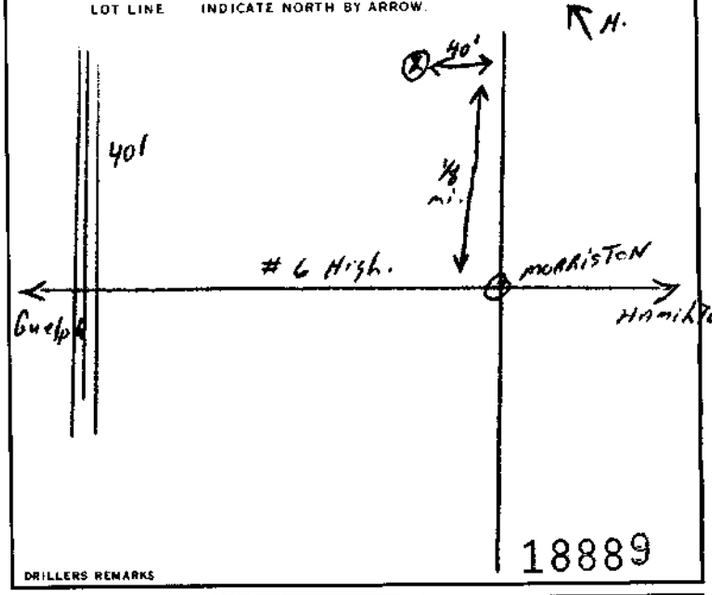
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 25 GPM
DURATION OF PUMPING: 1 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
51 FEET	70 FEET	51 FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: — GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 80 FEET
RECOMMENDED PUMPING RATE: 15 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



18889

DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 8 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 9 ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: GRAHAM WELL DRILLING LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 2336
ADDRESS: RR#5, Rockwood, ONT. N0B-2K0
NAME OF WELL TECHNICIAN: R. GRAHAM
WELL TECHNICIAN'S LICENCE NUMBER:
SIGNATURE OF TECHNICIAN/CONTRACTOR: [redacted]
SUBMISSION DATE: DAY 030 MO 012 YR 87

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED: JAN 11 1988
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

18 Badenoch St.

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1 PRINT ONLY IN SPACES PROVIDED
2 CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 6708922

COUNTY OR DISTRICT: WELLINGTON S.
[redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: PUSLINCH
MORRISTON P.O.
CON, BLOCK, TRACT, SURVEY, ETC: CON.8
LOT: 31
DATE COMPLETED: DAY 27 MO 8 YR 87

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY	SAND	LOOSE	0	5
BROWN	SAND &	GRAVEL	LOOSE	5	19
BROWN	CLAY	SAND	LOOSE	19	75
BROWN	CLAY &	SAND	PACKED	75	92
GREY	SAND &	GRAVEL	LOOSE	92	104
GREY	LIMESTONE		HARD	104	111

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
109	1 ☐ FRESH 2 ☒ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	1	104
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		104	111
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE/S. OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, SAND PACKER, ETC.)

71 PUMPING TEST

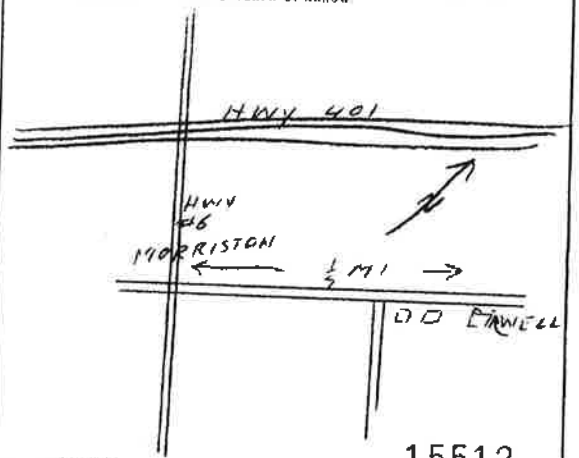
PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 24 GPM
DURATION OF PUMPING: 1 HOURS
STATIC LEVEL: 55 FEET
WATER LEVEL END OF PUMPING: 60 FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
55 FEET	55 FEET	55 FEET	55 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 107 FEET
RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS: 15512

FINAL STATUS OF WELL

2 ☒ WATER SUPPLY 3 ☐ OBSERVATION WELL 4 ☐ TEST HOLE 5 ☐ RECHARGE WELL 6 ☐ ABANDONED, INSUFFICIENT SUPPLY 7 ☐ ABANDONED, POOR QUALITY 8 ☐ UNFINISHED 9 ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED ☐ OTHER

METHOD OF CONSTRUCTION

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: OCONNOR WELL DRILLING LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 4005
ADDRESS: RR # 1 MILLGROVE, ONT. LOR IVO
NAME OF WELL TECHNICIAN: W. HOWE
WELL TECHNICIAN'S LICENCE NUMBER:
[redacted]
SUBMISSION DATE: DAY MO YR

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED: SEP 30 1987
DATE OF INSPECTION | INSPECTOR
REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

7501 Wellington Rd 36

Ontario Ministry of the Environment

90-03

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Well Tag No. (Sticker below) A 001796

A 001796

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality): WELLINGTON

Township: PUSLINCH

Lot: 31 Concession: 8

RR#/Street Number/Name: 7501 BADENOCH ST. COUNTY RD #36

City/Town/Village: MORRISTON

Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 Zone 17 Easting 0571774 Northing 4811242

Unit Make/Model: GARMIN ETREX

Mode of Operation: Undifferentiated ☒ Averaged Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
BROWN	CLAY	STONES		0	6.1
BROWN	SAND	GRAVEL		6.1	15
GREY	CLAY	GRAVEL		15	27
BROWN	ROCK			27	30.5

6" DRNE SHOE

Hole Diameter

Depth From	Depth To	Diameter Centimetres
0	6m	22cm
6m	30.5m	16cm

Water Record

Water found at 31 Metres

	Kind of Water		
m	☑ Fresh	Sulphur	
Gas	Salty	Minerals	
Other:			
m	Fresh	Sulphur	
Gas	Salty	Minerals	
Other:			
m	Fresh	Sulphur	
Gas	Salty	Minerals	
Other:			

After test of well yield, water was ☒ Clear and sediment free ☐ Other, specify

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To
Casing				
16cm	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	0.5	46cm	27m.
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☒ Open hole		27m	30.5

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres) 25m	Static Level	17m		
Pumping rate - (litres/m.n) 61	1	18m	1	18m
Duration of pumping 1 hrs + 0 min	2	18m	2	17m
Final water level end of pumping 18 metres	3	18m	3	17m
Recommended pump type: ☐ Shallow ☒ Deep	4	18m	4	17m
Recommended pump depth. 25 metres	5	18m	5	17m
Recommended pump rate. (litres/min) 61	10	18m	10	17m.
If flowing give rate - (litres/min)	15	18m	15	
If pumping discontinued, give reason	20	18m	20	
	25	18m	25	
	30	18m	30	
	40	18m	40	
	50	18m	50	
	60	18m	60	

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.1	BENTONITE	0.1

Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

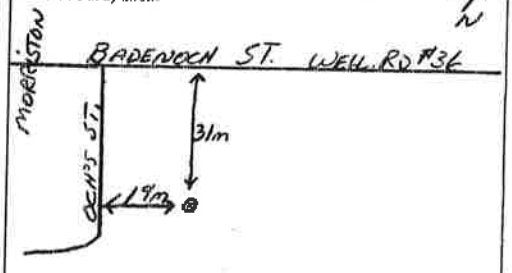
☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☒ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Audit No. Z 01886

Date Well Completed: 03 11 17

Was the well owner's information package delivered? ☒ Yes ☐ No

Date Delivered: 03 11 19

Well Contractor/Technician Information

Name of Well Contractor: GRAHAM WELL DRILLING LTD

Well Contractor's Licence No.: 2336

Business Address (street name, number, city etc.): RR#5 ROCKWOOD, ONT. N0B-2K0

Name of Well Technician (last name, first name): WILSON Jim

Well Technician's Licence No.: T-1924

Signature: X [redacted]

Date Submitted: 03 12 28

Ministry Use Only

Data Source: Contractor

Date Received: DEC 08 2003

Date of Inspection:

Remarks:

Well Record Number: 6714759

2336

0506E (09

Contractor's Copy ☐ Ministry's Copy ☒ Well Owner's Copy ☐

Cette formule est disponible en français

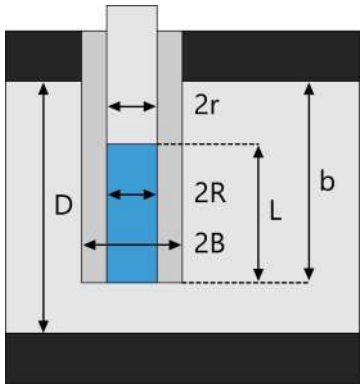
Appendix B
Aquifer Test Analysis

ENGLOBE

	Site Plan	Appendix B
	Project: 11 Main Street	
	Number: T1220482.003	
	Client: WDD Internatuional	
Location: Puslinch	Scale 1:5000	Origin [m] X: 571521 Y: 4810373

	Wells Appendix B
	Project: 11 Main Street
	Number: T1220482.003
	Client: WDD Internatuional

Location: Puslinch



	Name	X [m]	Y [m]	Elevation (amsl) [m]	Benchmark [m]	Penetration	L [m]	B [m]
1	TW1	571820	4811152	322.5		Partially	6.4	0.08
2	TW2	571941	4811252	316.4		Partially	3.4	0.08
3	TW3	571882	4811001	316.1		Partially	2.3	0.08
4	MW1	572000	4811253	313		Fully	3	0.05
5	MW2	571881	4811204	318.2		Fully	1.5	0.05
6	MW3	571901	4811091	317.1		Fully	3	0.05
7	MW5	571785	4810955	316.8		Fully	1.5	0.05
8	12 Main	571607	4810398	319.4		Fully	3.3	0.08
9	17 Badenoch	571546	4811115	329.5		Fully	2.1	0.08
10	18 Badenoch	571574	4811073	329.2		Fully	3.5	0.08
11	7501 WR No 36	571775	4811241	324.9		Fully		

Pumping Test - Water Level Data

Project: 11 Main Street

Number: T1220482.003

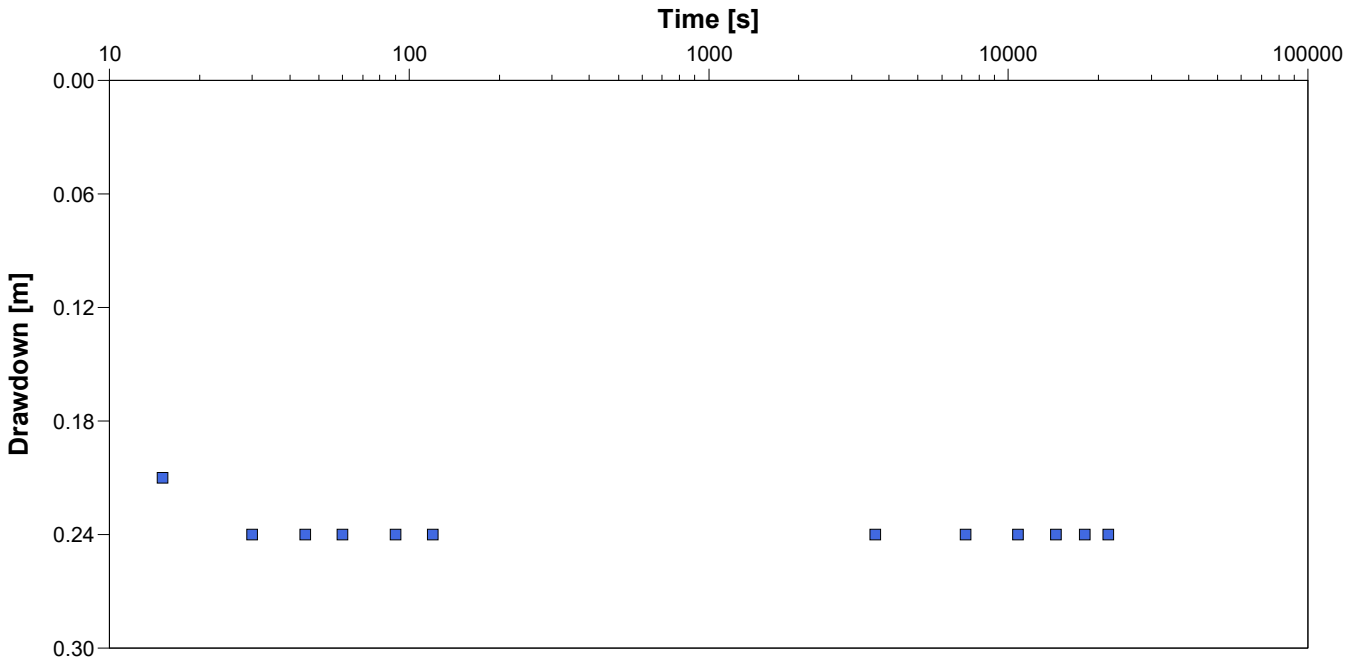
Client: WDD Internatuional

Location: Puslinch	Pumping Test: Field Test TW1	Pumping Well: TW1
Test Conducted by: NB	Test Date: 10/7/2024	Discharge Rate: 0.00063 [m³/s]
Observation Well: TW1	Static Water Level [m]: 9.36	Radial Distance to PW [m]: -

	Time [s]	Water Level [m]	Drawdown [m]
1	15	9.57	0.21
2	30	9.60	0.24
3	45	9.60	0.24
4	60	9.60	0.24
5	90	9.60	0.24
6	120	9.60	0.24
7	3600	9.60	0.24
8	7200	9.60	0.24
9	10800	9.60	0.24
10	14400	9.60	0.24
11	18000	9.60	0.24
12	21600	9.60	0.24

	Pumping Test Analysis Report	Appendix B
	Project: 11 Main Street	
	Number: T1220482.003	
	Client: WDD Internatuional	

Location: Puslinch	Pumping Test: Field Test TW1	Pumping Well: TW1
Test Conducted by: NB		Test Date: 10/7/2024
Analysis Performed by: PR	Theis Analysis TW1	Analysis Date: 10/21/2024
Aquifer Thickness: 12.00 m	Discharge Rate: 0.00063 [m³/s]	



Calculation using Theis

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	Radial Distance to PW [m]	
TW1	1.00×10^{-3}	8.33×10^{-5}	1.00×10^{-4}	0.08	

Pumping Test - Water Level Data

Project: 11 Main Street

Number: T1220482.003

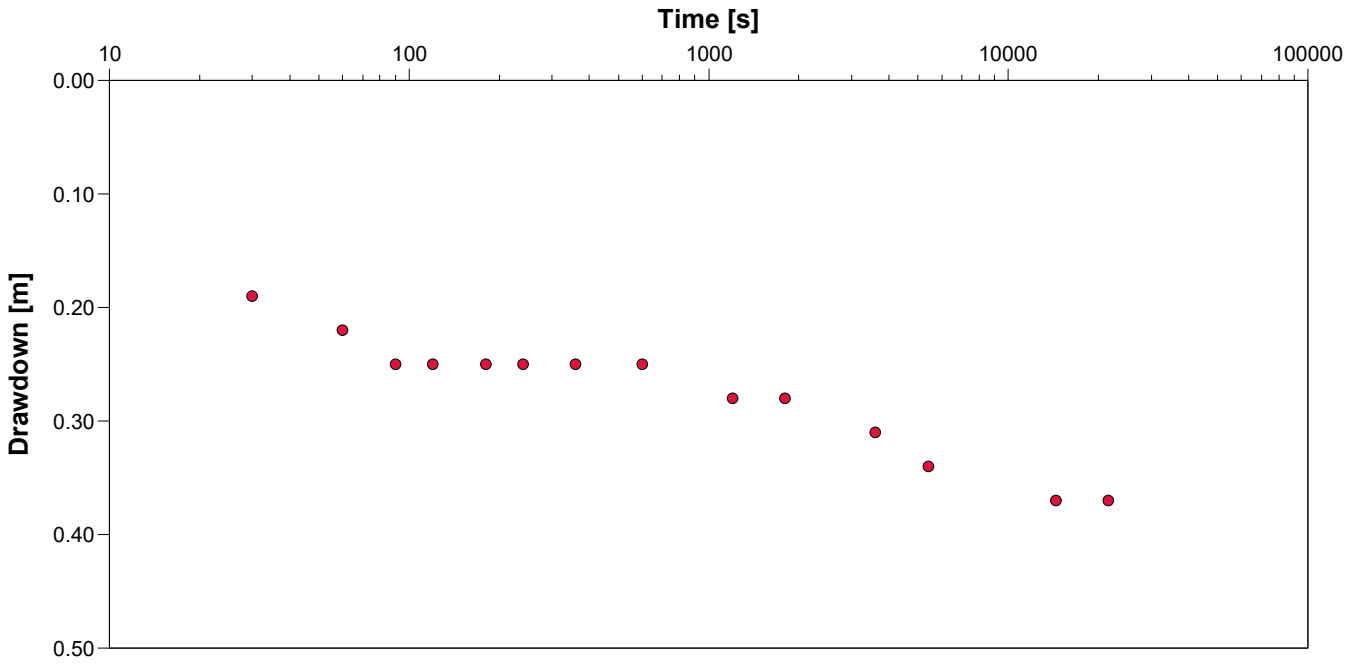
Client: WDD Internatuional

Location: Puslinch	Pumping Test: Field Test TW2	Pumping Well: TW1, TW2, TW3
Test Conducted by: NB	Test Date: 10/8/2024	
Observation Well: TW2	Static Water Level [m]: 7.28	Radial Distance to PW [m]: -

	Time [s]	Water Level [m]	Drawdown [m]
1	30	7.47	0.19
2	60	7.50	0.22
3	90	7.53	0.25
4	120	7.53	0.25
5	180	7.53	0.25
6	240	7.53	0.25
7	360	7.53	0.25
8	600	7.53	0.25
9	1200	7.56	0.28
10	1800	7.56	0.28
11	3600	7.59	0.31
12	5400	7.62	0.34
13	14400	7.65	0.37
14	21600	7.65	0.37

	Pumping Test Analysis Report	Appendix B
	Project: 11 Main Street	
	Number: T1220482.003	
	Client: WDD Internatuional	

Location: Puslinch	Pumping Test: Field Test TW2	Pumping Well: TW1, TW2, TW3
Test Conducted by: NB		Test Date: 10/8/2024
Analysis Performed by: PR	Theis Analysis TW2	Analysis Date: 10/21/2024
Aquifer Thickness: 18.00 m		



Calculation using Theis

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	
TW2	1.00×10^{-3}	5.56×10^{-5}	1.00×10^{-4}	

Pumping Test - Water Level Data

Project: 11 Main Street

Number: T1220482.003

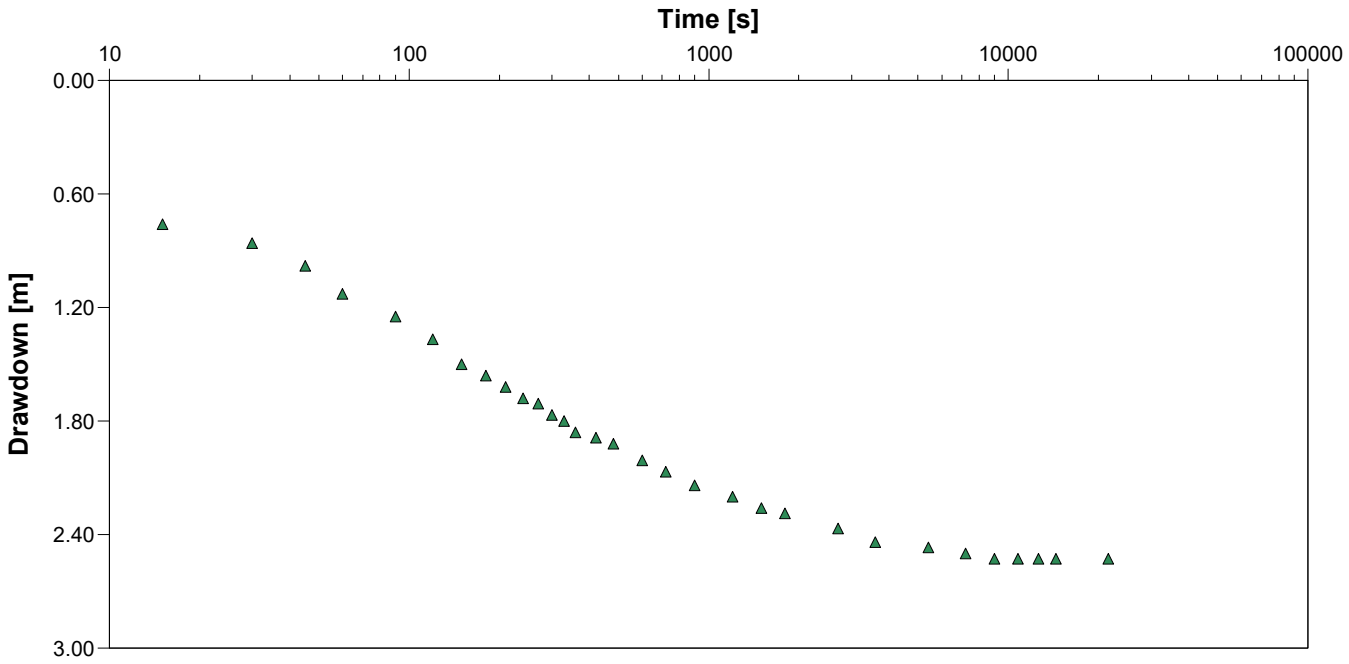
Client: WDD Internatuional

Location: Puslinch	Pumping Test: Field Test TW3	Pumping Well: TW1, TW2, TW3
Test Conducted by: NB	Test Date: 10/1/2024	
Observation Well: TW3	Static Water Level [m]: 9.63	Radial Distance to PW [m]: -

	Time [s]	Water Level [m]	Drawdown [m]
1	15	10.39	0.76
2	30	10.49	0.86
3	45	10.61	0.98
4	60	10.76	1.13
5	90	10.88	1.25
6	120	11.00	1.37
7	150	11.13	1.50
8	180	11.19	1.56
9	210	11.25	1.62
10	240	11.31	1.68
11	270	11.34	1.71
12	300	11.40	1.77
13	330	11.43	1.80
14	360	11.49	1.86
15	420	11.52	1.89
16	480	11.55	1.92
17	600	11.64	2.01
18	720	11.70	2.07
19	900	11.77	2.14
20	1200	11.83	2.20
21	1500	11.89	2.26
22	1800	11.92	2.29
23	2700	12.00	2.37
24	3600	12.07	2.44
25	5400	12.10	2.47
26	7200	12.13	2.50
27	9000	12.16	2.53
28	10800	12.16	2.53
29	12600	12.16	2.53
30	14400	12.16	2.53
31	21600	12.16	2.53

	Pumping Test Analysis Report	Appendix B
	Project: 11 Main Street	
	Number: T1220482.003	
	Client: WDD Internatuional	

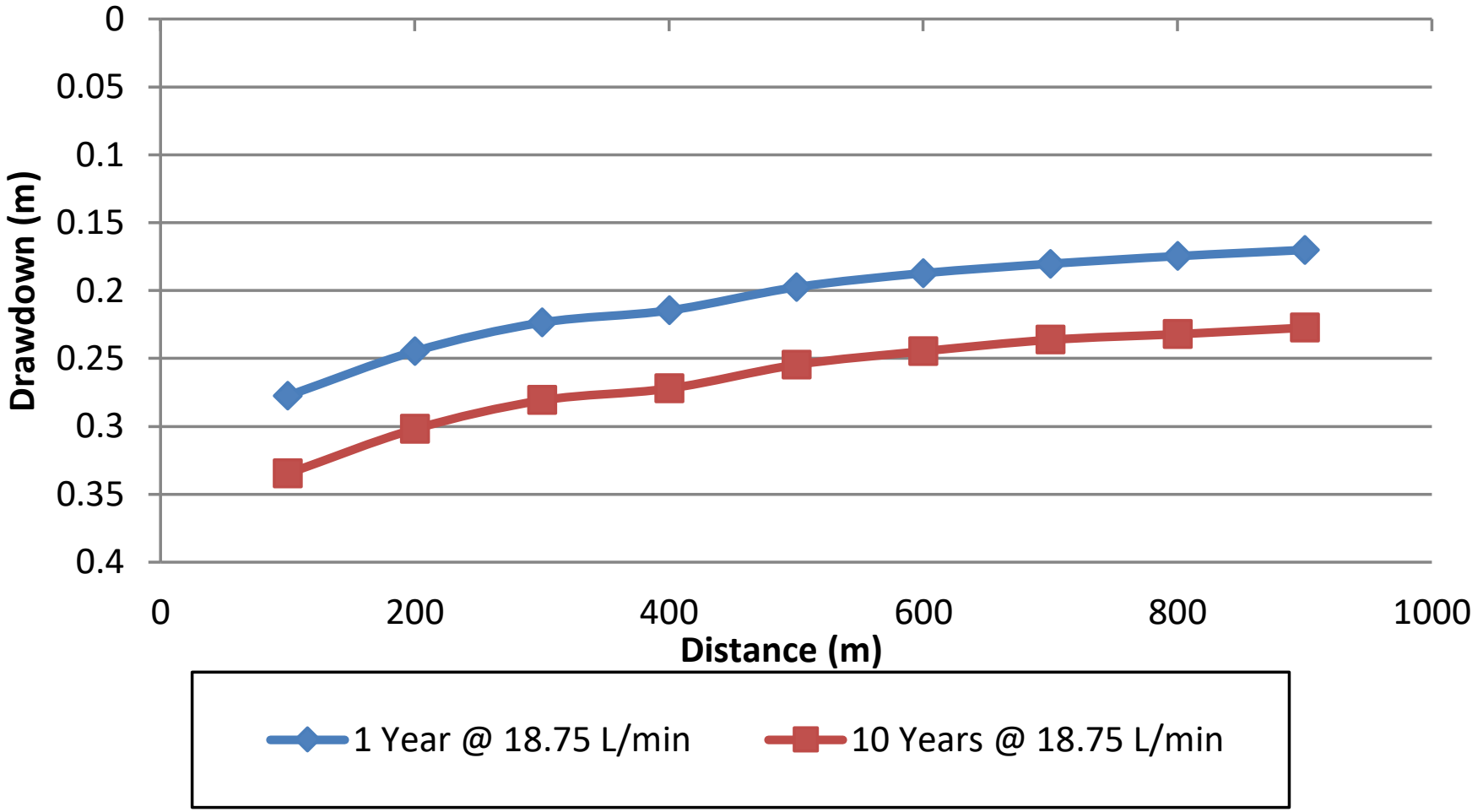
Location: Puslinch	Pumping Test: Field Test TW3	Pumping Well: TW1, TW2, TW3
Test Conducted by: NB		Test Date: 10/1/2024
Analysis Performed by: PR	Theis Analysis TW3	Analysis Date: 10/21/2024
Aquifer Thickness: 17.00 m		



Calculation using Theis

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	
TW3	1.00×10^{-3}	5.88×10^{-5}	1.00×10^{-4}	

Drawdown Analysis
Proposed Residential Development
11 Main Street
Puslinch, Ontario



Englobe Corp.

Project No. T1220482.00

Appendix C
Laboratory Certificates of Analysis

ENGLOBE

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: ENGLOBE CORP.
903, BARTON CREEK
STONEY CREEK, ON L8E5P5
(905) 643-7560
ATTENTION TO: Nicole Burke
PROJECT: T-1-22-0482-46.003
AGAT WORK ORDER: 24H207057
MICROBIOLOGY ANALYSIS REVIEWED BY: Nivine Basily, Inorganic Team Lead
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead
DATE REPORTED: Oct 16, 2024
PAGES (INCLUDING COVER): 20
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Total Coliforms & E.Coli (MI-Agar)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

		SAMPLE DESCRIPTION:		BH1-10:30	BH1-12:30	BH1-2:30	BH2-10:30	BH2-12:30	BH2-2:15	7501 WELLINGTON	17 BADENOCH
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-10-08 10:30	2024-10-08 12:30	2024-10-08 14:30	2024-10-07 10:30	2024-10-07 12:30	2024-10-07 14:15	2024-10-08 14:30	2024-10-08 14:30
Parameter	Unit	G / S	RDL	6211018	6211033	6211034	6211035	6211036	6211037	6211038	6211076
Escherichia coli	CFU/100mL			0	0	0	0	0	0	0	0
Total Coliforms	CFU/100mL			9	0	0	1	1	1	0	0

		SAMPLE DESCRIPTION:		18 BADENOCH	12 MAIN ST.	18 BADENOCH	BH4-1HR	BH4-3HR	BH4-5HR	12 MAIN ST.	17 BADENOCH
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-10-08 14:45	2024-10-08 14:20	2024-10-07 10:00	2024-10-08 10:30	2024-10-08 12:30	2024-10-08 14:30	2024-10-07 10:30	2024-10-07 09:30
Parameter	Unit	G / S	RDL	6211077	6211078	6211080	6211087	6211088	6211089	6211144	6211145
Escherichia coli	CFU/100mL			0	0	0	0	0	0	0	0
Total Coliforms	CFU/100mL			65	29	35	0	0	0	29	0

		SAMPLE DESCRIPTION:		7501 WELLINGTON
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-07 13:30
Parameter	Unit	G / S	RDL	6211146
Escherichia coli	CFU/100mL			0
Total Coliforms	CFU/100mL			0

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Total Coliforms & E.Coli (MI-Agar)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6211018-6211034 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

6211035-6211037 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

The time from sample collection to initiation of analysis exceeded 48 hours. Review data with discretion.

6211038-6211078 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

6211080 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

The time from sample collection to initiation of analysis exceeded 48 hours. Review data with discretion.

6211087-6211089 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

6211144 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.
unknown bacterial growth was observed on the plate.

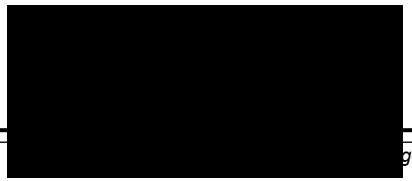
The time from sample collection to initiation of analysis exceeded 48 hours. Review data with discretion.

6211145-6211146 Escherichia coli, Total Coliforms RDL = 1 CFU/100mL.

The time from sample collection to initiation of analysis exceeded 48 hours. Review data with discretion.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

DRINKING WATER - Water Quality Assessment (mg/L)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

SAMPLE DESCRIPTION:				BH1-10:30	BH1-12:30		BH1-2:30		BH2-10:30	BH2-12:30	BH2-2:15
SAMPLE TYPE:				Water	Water		Water		Water	Water	Water
DATE SAMPLED:				2024-10-08 10:30	2024-10-08 12:30		2024-10-08 14:30		2024-10-07 10:30	2024-10-07 12:30	2024-10-07 14:15
Parameter	Unit	G / S	RDL	6211018	6211033	RDL	6211034	RDL	6211035	6211036	6211037
Electrical Conductivity	µS/cm		2	1180	1180	2	1180	2	1250	1240	1240
pH	pH Units		NA	7.80	7.78	NA	7.79	NA	7.85	7.86	7.81
Hardness (as CaCO3) (Calculated)	mg/L		0.5	433	430	0.5	434	0.5	453	439	449
Total Dissolved Solids	mg/L		10	680	694	10	684	10	734	730	700
Alkalinity (as CaCO3)	mg/L		5	319	329	5	321	5	320	334	329
Fluoride	mg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05
Chloride	mg/L		0.12	171	175	0.12	173	0.12	193	190	190
Nitrate as N	mg/L		0.05	0.94	0.92	0.05	0.88	0.05	1.74	1.82	1.88
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05
Bromide	mg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	36.7	37.6	0.10	37.3	0.10	34.4	34.3	34.4
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	0.10	<0.10	0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02
Total Phosphorus	mg/L		0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02
Total Organic Carbon	mg/L		0.5	0.6	0.6	0.5	0.7	0.5	0.8	0.8	0.7
Apparent Colour	TCU		2.50	3.59	<2.50	2.50	<2.50	2.50	3.21	2.70	<2.50
Turbidity	NTU		0.5	1.4	1.8	0.5	1.5	0.5	0.9	0.8	0.6
Total Calcium	mg/L		0.32	111	111	0.32	111	0.32	118	113	116
Total Magnesium	mg/L		0.34	37.8	37.2	0.34	38.0	0.34	38.5	38.0	38.8
Total Potassium	mg/L		1.15	1.89	2.20	1.15	2.22	1.15	1.82	1.40	1.86
Total Sodium	mg/L		0.45	78.0	77.1	0.45	77.2	0.45	90.2	86.8	87.6
Total Aluminum	mg/L		0.010	0.029	<0.010	0.010	<0.010	0.010	0.011	<0.010	0.017
Total Antimony	mg/L		0.003	<0.003	<0.003	0.003	<0.003	0.003	<0.003	<0.003	<0.003
Total Arsenic	mg/L		0.003	<0.003	<0.003	0.003	<0.003	0.003	<0.003	<0.003	<0.003
Total Barium	mg/L		0.002	0.194	0.191	0.002	0.187	0.002	0.191	0.188	0.191
Total Beryllium	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001
Total Boron	mg/L		0.010	0.025	0.024	0.010	0.022	0.010	0.019	0.017	0.017
Total Cadmium	mg/L		0.0001	0.0001	0.0002	0.0001	<0.0001	0.0001	0.0002	0.0003	<0.0001
Total Chromium	mg/L		0.003	<0.003	<0.003	0.003	<0.003	0.003	<0.003	<0.003	<0.003

Certified By: [redacted]

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

DRINKING WATER - Water Quality Assessment (mg/L)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

		SAMPLE DESCRIPTION:		BH1-10:30	BH1-12:30		BH1-2:30		BH2-10:30	BH2-12:30	BH2-2:15
		SAMPLE TYPE:		Water	Water		Water		Water	Water	Water
		DATE SAMPLED:		2024-10-08 10:30	2024-10-08 12:30		2024-10-08 14:30		2024-10-07 10:30	2024-10-07 12:30	2024-10-07 14:15
Parameter	Unit	G / S	RDL	6211018	6211033	RDL	6211034	RDL	6211035	6211036	6211037
Total Cobalt	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005
Total Copper	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002
Total Iron	mg/L		0.050	0.093	0.063	0.050	0.063	0.050	0.214	0.078	0.062
Total Lead	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	0.0040	0.0029	0.0030
Total Manganese	mg/L		0.002	0.048	0.051	0.002	0.045	0.002	0.003	<0.002	<0.002
Total Mercury	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Total Molybdenum	mg/L		0.002	<0.002	<0.002	0.002	0.006	0.002	<0.002	<0.002	<0.002
Total Nickel	mg/L		0.003	<0.003	0.004	0.003	0.008	0.003	0.003	<0.003	<0.003
Total Selenium	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002
Total Silver	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Total Strontium	mg/L		0.005	0.135	0.160	0.005	0.149	0.005	0.143	0.146	0.151
Total Thallium	mg/L		0.0003	<0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	<0.0003	<0.0003
Total Tin	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002
Total Titanium	mg/L		0.010	<0.010	<0.010	0.010	<0.010	0.010	<0.010	<0.010	<0.010
Total Tungsten	mg/L		0.010	<0.010	<0.010	0.010	<0.010	0.010	<0.010	<0.010	<0.010
Total Uranium	mg/L		0.0005	0.0010	0.0010	0.0005	0.0010	0.0005	0.0009	0.0009	0.0009
Total Vanadium	mg/L		0.002	<0.002	<0.002	0.010	<0.010	0.002	<0.002	<0.002	<0.002
Total Zinc	mg/L		0.020	0.215	0.207	0.020	0.204	0.020	0.317	0.329	0.303
Total Zirconium	mg/L		0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.004	<0.004	<0.004

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

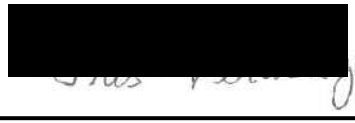
DRINKING WATER - Water Quality Assessment (mg/L)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

		SAMPLE DESCRIPTION:		BH4-1HR		BH4-3HR	BH4-5HR
		SAMPLE TYPE:		Water		Water	Water
		DATE SAMPLED:		2024-10-08 10:30		2024-10-08 12:30	2024-10-08 14:30
Parameter	Unit	G / S	RDL	6211087	RDL	6211088	6211089
Electrical Conductivity	µS/cm		2	970	2	963	967
pH	pH Units		NA	4.65	NA	7.79	7.77
Hardness (as CaCO3) (Calculated)	mg/L		0.5	393	0.5	387	378
Total Dissolved Solids	mg/L		10	554	10	564	544
Alkalinity (as CaCO3)	mg/L		5	299	5	301	310
Fluoride	mg/L		0.05	<0.05	0.05	<0.05	<0.05
Chloride	mg/L		0.12	108	0.12	106	105
Nitrate as N	mg/L		0.05	0.79	0.05	0.73	0.72
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	<0.05
Bromide	mg/L		0.05	<0.05	0.05	<0.05	<0.05
Sulphate	mg/L		0.10	38.6	0.10	38.1	37.7
Ortho Phosphate as P	mg/L		0.10	<0.10	0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	0.02	<0.02	<0.02
Total Phosphorus	mg/L		0.02	<0.02	0.02	<0.02	<0.02
Total Organic Carbon	mg/L		0.5	0.7	0.5	0.7	0.7
Apparent Colour	TCU		2.50	13.1	2.50	10.4	9.64
Turbidity	NTU		0.5	1.8	0.5	1.7	1.1
Total Calcium	mg/L		0.32	97.0	0.32	94.9	93.2
Total Magnesium	mg/L		0.34	36.6	0.34	36.4	35.3
Total Potassium	mg/L		1.15	1.40	1.15	1.34	1.60
Total Sodium	mg/L		0.45	47.8	0.45	46.7	45.5
Total Aluminum	mg/L		0.010	<0.010	0.010	<0.010	<0.010
Total Antimony	mg/L		0.003	<0.003	0.003	<0.003	<0.003
Total Arsenic	mg/L		0.003	<0.003	0.003	<0.003	<0.003
Total Barium	mg/L		0.002	0.240	0.002	0.216	0.199
Total Beryllium	mg/L		0.001	<0.001	0.001	<0.001	<0.001
Total Boron	mg/L		0.010	0.027	0.010	0.024	0.023
Total Cadmium	mg/L		0.0001	0.0001	0.0001	<0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003	0.003	<0.003	<0.003

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

DRINKING WATER - Water Quality Assessment (mg/L)

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

		SAMPLE DESCRIPTION:		BH4-1HR		BH4-3HR	BH4-5HR
		SAMPLE TYPE:		Water		Water	Water
		DATE SAMPLED:		2024-10-08 10:30		2024-10-08 12:30	2024-10-08 14:30
Parameter	Unit	G / S	RDL	6211087	RDL	6211088	6211089
Total Cobalt	mg/L		0.0005	<0.0005	0.0005	<0.0005	<0.0005
Total Copper	mg/L		0.002	<0.002	0.002	<0.002	0.005
Total Iron	mg/L		0.050	0.574	0.050	0.448	0.340
Total Lead	mg/L		0.0005	0.0015	0.0005	0.0014	0.0014
Total Manganese	mg/L		0.002	0.010	0.002	0.006	0.007
Total Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	<0.0001
Total Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	<0.002
Total Nickel	mg/L		0.003	<0.003	0.003	<0.003	<0.003
Total Selenium	mg/L		0.002	<0.002	0.002	<0.002	<0.002
Total Silver	mg/L		0.0001	<0.0001	0.0001	<0.0001	<0.0001
Total Strontium	mg/L		0.005	0.308	0.005	0.231	0.216
Total Thallium	mg/L		0.0003	<0.0003	0.0003	<0.0003	<0.0003
Total Tin	mg/L		0.002	<0.002	0.002	<0.002	<0.002
Total Titanium	mg/L		0.010	<0.010	0.010	<0.010	<0.010
Total Tungsten	mg/L		0.010	<0.010	0.010	<0.010	<0.010
Total Uranium	mg/L		0.0005	0.0006	0.0005	0.0006	0.0005
Total Vanadium	mg/L		0.002	<0.002	0.010	<0.010	<0.010
Total Zinc	mg/L		0.020	0.123	0.020	0.112	0.112
Total Zirconium	mg/L		0.004	<0.004	0.004	<0.004	<0.004

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6211018-6211089 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Sodium, Nitrate, and Nitrite in Water

DATE RECEIVED: 2024-10-09

DATE REPORTED: 2024-10-16

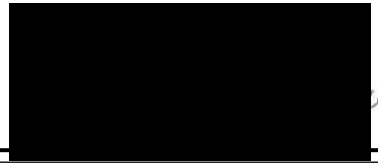
				7501							7501
			SAMPLE DESCRIPTION:	WELLINGTON	17 BADENOCH	18 BADENOCH	12 MAIN ST.	18 BADENOCH	12 MAIN ST.	17 BADENOCH	WELLINGTON
			SAMPLE TYPE:	Water	Water	Water	Water	Water	Water	Water	Water
			DATE SAMPLED:	2024-10-08 14:30	2024-10-08 14:30	2024-10-08 14:45	2024-10-08 14:20	2024-10-07 10:00	2024-10-07 10:30	2024-10-07 09:30	2024-10-07 13:30
Parameter	Unit	G / S	RDL	6211038	6211076	6211077	6211078	6211080	6211144	6211145	6211146
Nitrate as N	mg/L		0.05	3.43	1.01	3.11	3.02	2.86	2.75	0.79	3.14
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Sodium	mg/L		0.45	78.1	59.3	72.7	75.4	73.2	73.1	56.1	77.7

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6211038-6211146 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Microbiology Analysis

RPT Date: Oct 16, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Coliforms & E.Coli (MI-Agar)															
Escherichia coli	6211018	6211018	0	0	NA										
Total Coliforms	6211018	6211018	9	8	11.8%										

Comments: NA - % RPD Not Applicable.

Total Coliforms & E.Coli (MI-Agar)															
Escherichia coli	6211035	6211035	0	0	NA										
Total Coliforms	6211035	6211035	0	0	NA										

Comments: NA - % RPD Not Applicable.

Certified By:

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Water Analysis

RPT Date: Oct 16, 2024

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
DRINKING WATER - Water Quality Assessment (mg/L)																
Electrical Conductivity	6211087	6211087	957	956	0.1%	< 2	99%	90%	110%							
pH	6211087	6211087	7.61	7.71	1.3%	NA	99%	90%	110%							
Total Dissolved Solids	6211018	6211018	680	696	2.3%	< 10	100%	80%	120%							
Alkalinity (as CaCO3)	6211087	6211087	299	309	3.3%	< 5	100%	80%	120%							
Fluoride	6211088	6211088	<0.05	<0.05	NA	< 0.05	100%	70%	130%	96%	80%	120%	96%	70%	130%	
Chloride	6211088	6211088	106	105	0.9%	< 0.10	95%	70%	130%	100%	80%	120%	99%	70%	130%	
Nitrate as N	6211088	6211088	0.73	0.74	1.4%	< 0.05	95%	70%	130%	95%	80%	120%	94%	70%	130%	
Nitrite as N	6211088	6211088	<0.05	<0.05	NA	< 0.05	96%	70%	130%	96%	80%	120%	95%	70%	130%	
Bromide	6211088	6211088	<0.05	<0.05	NA	< 0.05	98%	70%	130%	98%	80%	120%	96%	70%	130%	
Sulphate	6211088	6211088	38.1	37.8	0.8%	< 0.10	92%	70%	130%	94%	80%	120%	94%	70%	130%	
Ortho Phosphate as P	6211088	6211088	<0.10	<0.10	NA	< 0.10	98%	70%	130%	95%	80%	120%	95%	70%	130%	
Ammonia as N	6211018	6211018	<0.02	<0.02	NA	< 0.02	111%	70%	130%	102%	80%	120%	109%	70%	130%	
Total Phosphorus	6211018	6211018	<0.02	<0.02	NA	< 0.02	96%	70%	130%	105%	80%	120%	93%	70%	130%	
Total Organic Carbon	6211018	6211018	0.6	0.5	NA	< 0.5	97%	90%	110%	94%	90%	110%	98%	80%	120%	
Apparent Colour	6211018	6211018	3.59	3.43	NA	< 2.5	107%	90%	110%							
Turbidity	6211087	6211087	1.5	2.3	NA	< 0.5	84%	80%	120%							
Total Calcium	6211018	6211018	111	109	1.8%	< 0.20	103%	70%	130%	105%	80%	120%	106%	70%	130%	
Total Magnesium	6211018	6211018	37.8	36.9	2.4%	< 0.10	104%	70%	130%	103%	80%	120%	104%	70%	130%	
Total Potassium	6211018	6211018	1.89	2.13	NA	< 0.50	102%	70%	130%	104%	80%	120%	103%	70%	130%	
Total Sodium	6211018	6211018	78.0	76.1	2.5%	< 0.10	102%	70%	130%	103%	80%	120%	104%	70%	130%	
Total Aluminum	6211018	6211018	0.029	0.030	NA	< 0.010	90%	70%	130%	103%	80%	120%	96%	70%	130%	
Total Antimony	6211018	6211018	<0.003	<0.003	NA	< 0.003	101%	70%	130%	100%	80%	120%	102%	70%	130%	
Total Arsenic	6211018	6211018	<0.003	<0.003	NA	< 0.003	98%	70%	130%	99%	80%	120%	101%	70%	130%	
Total Barium	6211018	6211018	0.194	0.198	2.0%	< 0.002	98%	70%	130%	101%	80%	120%	101%	70%	130%	
Total Beryllium	6211018	6211018	<0.001	<0.001	NA	< 0.001	96%	70%	130%	99%	80%	120%	95%	70%	130%	
Total Boron	6211018	6211018	0.025	0.027	NA	< 0.010	99%	70%	130%	100%	80%	120%	96%	70%	130%	
Total Cadmium	6211018	6211018	0.0001	<0.0001	NA	< 0.0001	101%	70%	130%	101%	80%	120%	99%	70%	130%	
Total Chromium	6211018	6211018	<0.003	<0.003	NA	< 0.003	103%	70%	130%	107%	80%	120%	108%	70%	130%	
Total Cobalt	6211018	6211018	<0.0005	<0.0005	NA	< 0.0005	104%	70%	130%	106%	80%	120%	107%	70%	130%	
Total Copper	6211018	6211018	<0.002	<0.002	NA	< 0.002	99%	70%	130%	101%	80%	120%	101%	70%	130%	
Total Iron	6211018	6211018	0.093	0.101	NA	< 0.050	95%	70%	130%	101%	80%	120%	105%	70%	130%	
Total Lead	6211018	6211018	<0.0005	<0.0005	NA	< 0.0005	95%	70%	130%	99%	80%	120%	95%	70%	130%	
Total Manganese	6211018	6211018	0.048	0.050	4.1%	< 0.002	100%	70%	130%	100%	80%	120%	104%	70%	130%	
Total Mercury	6211018	6211018	<0.0001	<0.0001	NA	< 0.0001	102%	70%	130%	101%	80%	120%	99%	70%	130%	
Total Molybdenum	6211018	6211018	<0.002	<0.002	NA	< 0.002	100%	70%	130%	86%	80%	120%	106%	70%	130%	
Total Nickel	6211018	6211018	<0.003	0.004	NA	< 0.003	110%	70%	130%	101%	80%	120%	110%	70%	130%	
Total Selenium	6211018	6211018	<0.002	<0.002	NA	< 0.002	98%	70%	130%	106%	80%	120%	100%	70%	130%	
Total Silver	6211018	6211018	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	102%	80%	120%	98%	70%	130%	
Total Strontium	6211018	6211018	0.135	0.148	9.2%	< 0.005	95%	70%	130%	94%	80%	120%	95%	70%	130%	

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

Water Analysis (Continued)

RPT Date: Oct 16, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Thallium	6211018	6211018	<0.0003	<0.0003	NA	< 0.0003	94%	70%	130%	97%	80%	120%	92%	70%	130%
Total Tin	6211018	6211018	<0.002	<0.002	NA	< 0.002	105%	70%	130%	104%	80%	120%	106%	70%	130%
Total Titanium	6211018	6211018	<0.010	<0.010	NA	< 0.010	106%	70%	130%	117%	80%	120%	117%	70%	130%
Total Tungsten	6211018	6211018	<0.010	<0.010	NA	< 0.010	94%	70%	130%	104%	80%	120%	96%	70%	130%
Total Uranium	6211018	6211018	0.0010	0.0011	NA	< 0.0005	90%	70%	130%	102%	80%	120%	104%	70%	130%
Total Vanadium	6211018	6211018	<0.002	<0.002	NA	< 0.002	101%	70%	130%	105%	80%	120%	105%	70%	130%
Total Zinc	6211018	6211018	0.215	0.215	0.0%	< 0.020	101%	70%	130%	104%	80%	120%	98%	70%	130%
Total Zirconium	6211018	6211018	<0.004	<0.004	NA	< 0.004	93%	70%	130%	97%	80%	120%	91%	70%	130%
Sodium, Nitrate, and Nitrite in Water															
Nitrate as N	6211088	6211088	0.73	0.74	1.4%	< 0.05	95%	70%	130%	95%	80%	120%	94%	70%	130%
Nitrite as N	6211088	6211088	<0.05	<0.05	NA	< 0.05	96%	70%	130%	96%	80%	120%	95%	70%	130%
Total Sodium	6211018	6211018	78.0	76.1	2.5%	< 0.10	102%	70%	130%	103%	80%	120%	104%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By: [redacted]

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration
Total Coliforms	MIC-93-7010	EPA 1604	Membrane Filtration

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Method Summary

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AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
Apparent Colour	INOR-93-6074	modified from SM 2120 B	LACHAT FIA
Turbidity	INOR-93-6000	modified from SM 2130 B	PC TITRATE
Total Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Aluminum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24H207057

PROJECT: T-1-22-0482-46.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:

SAMPLED BY:NICOLE BURKE

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tungsten	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zirconium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

AGAT Laboratories RUSH!

5835 Coopers Avenue
Mississauga, ON
L4Z 1Y2

Drinking Water Chain of Custody Record

P: 905.712.5100 • F: 905.712.5122 • TF: 1.800.856.6261

Laboratory Use Only Miss: please see attached.

Arrival Condition: ☐ Good ☐ Poor (complete notes)
Arrival Temperature: 3.6 3.8 4.0
AGAT Job Number: 24H207057
Notes: 3 LG BAGGED ICE
#2 4.0 4.4 4.8 #3 2.8 3.0 3.2

Client Information

Company: Englobe
Contact: Nicole Burke
Address: 903 Barton St.E, #22 Stoney creek, ont
Phone: 905-379-8259 Fax:
PO #:
Client Project #: T-1-22-0482-46.003
AGAT Quotation #:

Report Information

1. Name: Paul Raepple
Email: paul.raepple@englobecorp.com
2. Name: Nicole Burke
Email: nicole.burke@englobecorp.com

Report Format

☒ Single Sample per page
☐ Multiple Samples per page

Turnaround Time Required (TAT) *

Regular TAT: 7 to 14 business days ☐ Sch 23/24 only; 5 to 7 business days ☒
Rush TAT (please provide prior notification): 3 to 4 business days ☒; 2 business days ☐; 1 business days ☐ — Rush surcharges apply
Date Required (Rush surcharges may apply):

Facility Type (Check all that are applicable)

☐ Large OR ☐ Small
☐ Residential OR ☐ Non-Residential
☐ Municipal OR ☒ Non-Municipal

+ Water Type

(Specify in column below)
Raw (R), Treated (TR), Distribution (D), Tap (TP) Private Well (P)

Requirements (Check one)

☐ O. Regulation 170 ☐ Not Applicable
☐ O. Regulation 243 ☐ Federal
☐ O. Regulation 318/319 ☐ Other

IS THIS WATER BEING CONSUMED BY HUMANS? ☒ Yes ☐ No
DO THE RESULTS REQUIRE REPORTING TO THE MECP OR LOCAL PUBLIC HEALTH UNIT? ☐ Yes ☒ No
FOR RAW WATER (E.G. UNTREATED), IS THE SAMPLE COLLECTED FROM A POINT OF HUMAN CONSUMPTION? ☐ Yes ☒ No
CLIENT IS RESPONSIBLE TO COMPLETE AND SUBMIT LAB SERVICE NOTIFICATION (LSN) FORM TO THE MOECC/PHU. FAILURE TO DO SO MAY DELAY REPORTING
"NOTIFICATION INFORMATION" MUST BE COMPLETE BELOW UPON SUBMISSION OF SAMPLES. LABORATORY ANALYSIS WILL NOT COMMENCE UNTIL ALL INFORMATION HAS BEEN PROVIDED.

SAMPLE IDENTIFICATION/LOCATION	DATE SAMPLED	TIME SAMPLED	WATER TYPE +	# OF CONTAINERS	CHLORINE RESIDUAL (incl. Units)	STANDING	FLUSHED	COMMENTS/STANDING TIME (IN MINUTES)	Inorganics (Sch. 23)	Organics (Sch. 24)	Lead	Fluoride	Sodium	Turbidity	Nitrate, Nitrite	Trihalomethanes / HAAs	E.coli, Total Coliforms	Water Quality Assessment Package	
BH1 - 10:30	Oct 8/24	10:30 AM	R	7	n/a		X						X		X		X	X	
BH1 - 12:30	↓	12:30 PM	↓	↓	↓		↓						↓		↓		↓	↓	
BH1 - 2:30	↓	2:30 PM	↓	↓	↓		↓						↓		↓		↓	↓	
BH2 - 10:30	↓	10:30 AM	↓	↓	↓		↓						↓		↓		↓	↓	
BH2 - 12:30	↓	12:30 PM	↓	↓	↓		↓						↓		↓		↓	↓	
BH2 - 2:30	↓	2:30 PM	↓	↓	↓		↓						↓		↓		↓	↓	
750 Wellington	↓	2:30 PM	↓	↓	↓		↓						X		X		X		

Samples Taken By (Print Name and Sign): Nicole Burke

* TAT is exclusive of weekends and statutory holidays. Prior arrangements must be made with the laboratory in order to submit Microbiology samples on Fridays

NOTIFICATION INFORMATION - (required to report adverse results as per the *Safe Drinking Water Act*) - Laboratory analysis will not commence until all information is received.

INFORMATION FOR ADVERSE REPORTING			MEDICAL OFFICER OF HEALTH (MOH)	
Waterworks Name:	Phone:	Fax:	Region:	
MOECC# (ie: Waterworks #):	After Hours Phone:		PHU Contact:	
Contact:	Address/Location (if different from client above)		Phone:	Fax:
Email:			Email:	

[redacted] Date/Time: Oct 9.24 [redacted] Date/Time: Oct 9/24 2pm
Samples Relinquished By (Print Name and Sign): Date/Time: Oct 9/24 3pm Date/Time: Oct 9 3:45

Pink Copy - Client
Yellow/Golden Copy - AGAT
White Copy - AGAT

Page 1 of 3

Nº: DW 09443

Document #: DIV-78-1512.011 Date Revised: March 18, 2021

AGAT Laboratories

5835 Coopers Avenue
Mississauga, ON
L4Z 1Y2

P: 905.712.5100 • F: 905.712.5122 • TF: 1.800.856.6261

Drinking Water Chain of Custody Record

Laboratory Use Only

Arrival Condition: ☐ Good ☐ Poor (complete notes)
Arrival Temperature: 3.6 3.8 4.0
AGAT Job Number: 24H207057
Notes: 3 LG BAGGED ICE
#2404448 #325-3032

Client Information

Company: Englobe
Contact: Nicole Burke
Address: 903 Barton St E, #22
Stoney Creek, Ont
Phone: 905-379-8859 Fax:
PO #:
Client Project #: T-22-0492-46.003
AGAT Quotation #:

Report Information

1. Name: Paul Raepple
Email: paul.raepple@englobecorp.com
2. Name: Nicole Burke
Email: nicole.burke@englobecorp.com

Report Format

☒ Single Sample per page
☐ Multiple Samples per page

Facility Type (Check all that are applicable)

☐ Large OR ☐ Small
☐ Residential OR ☐ Non-Residential
☐ Municipal OR ☒ Non-Municipal

+ Water Type (Specify in column below)

Raw (R), Treated (TR), Distribution (D), Tap (TP) Private Well (P)

Turnaround Time Required (TAT) *

Regular TAT	7 to 14 business days	☐	Sch 23/24 only
	5 to 7 business days	☒	
Rush TAT (please provide prior notification)	3 to 4 business days	☐	Rush
	2 business days	☐	surcharges
	1 business days	☐	apply

Date Required (Rush surcharges may apply):

Requirements (Check one)

☐ O. Regulation 170 ☐ Not Applicable
☐ O. Regulation 243 ☐ Federal
☐ O. Regulation 318/319 ☐ Other

IS THIS WATER BEING CONSUMED BY HUMANS? ☒ Yes ☐ No
DO THE RESULTS REQUIRE REPORTING TO THE MECP OR LOCAL PUBLIC HEALTH UNIT? ☐ Yes ☒ No
FOR RAW WATER (E.G. UNTREATED), IS THE SAMPLE COLLECTED FROM A POINT OF HUMAN CONSUMPTION? ☐ Yes ☒ No

CLIENT IS RESPONSIBLE TO COMPLETE AND SUBMIT LAB SERVICE NOTIFICATION (LSN) FORM TO THE MOECC/PHU. FAILURE TO DO SO MAY DELAY REPORTING.
"NOTIFICATION INFORMATION" MUST BE COMPLETE BELOW UPON SUBMISSION OF SAMPLES. LABORATORY ANALYSIS WILL NOT COMMENCE UNTIL ALL INFORMATION HAS BEEN PROVIDED.

SAMPLE IDENTIFICATION/LOCATION	DATE SAMPLED	TIME SAMPLED	WATER TYPE	# OF CONTAINERS	CHLORINE RESIDUAL (incl. Units)	STANDING	FLUSHED	COMMENTS/STANDING TIME (IN MINUTES)	Inorganics (Sch. 23)	Organics (Sch. 24)	Lead	Fluoride	Sodium	Turbidity	Nitrate, Nitrite	Trihalomethanes / HAAs	E.coli, Total Coliforms	Water Quality Assessment Package
17 Badenoch	Oct 8, 24	2:30 AM/PM	R	7	N/A		X						X		X		X	
18 Badenoch	Oct 8, 24	2:45 AM/PM	↓	↓	↓		↓						↓		↓		↓	
12 Main St.	Oct 8, 24	2:20 AM/PM																
17 Badenoch	Oct 7, 24	9:30 AM/PM																
18 Badenoch	Oct 7, 24	10:00 AM/PM																
12 Badenoch	Oct 7 24	10:30 AM/PM																
7501 Wellington	Oct 7, 24	1:30 AM/PM																

Samples Taken By (Print Name and Sign): Nicole Burke

* TAT is exclusive of weekends and statutory holidays. Prior arrangements must be made with the laboratory in order to submit Microbiology samples on Fridays

NOTIFICATION INFORMATION - (required to report adverse results as per the *Safe Drinking Water Act*) - **Laboratory analysis will not commence until all information is received.**

INFORMATION FOR ADVERSE REPORTING			MEDICAL OFFICER OF HEALTH (MOH)
Waterworks Name:	Phone:	Fax:	Region:
MOECC# (ie: Waterworks #):	After Hours Phone:		PHU Contact:
Contact:	Address/Location (if different from client Above)		Phone: Fax:
Email:			Email:

Samples Relinquished By (Print Name and Sign): [redacted]	Date/Time 2:20pm Oct 9/24	Samples Received By (Print Name and Sign): [redacted]	Date/Time Oct 9/24 2pm	Pink Copy - Client	Page 2 of 3
Samples Relinquished By (Print Name and Sign):	Date/Time Oct 9/24 3pm	Samples Received By (Print Name and Sign):	Date/Time Oct 9 3:45	Yellow/Golden Copy - AGAT	N°: DW 09441
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time	White Copy - AGAT	

Document #: DW-78-1512-011

Date Revised: March 18, 2021

AGAT Laboratories

5835 Coopers Avenue
Mississauga, ON
L4Z 1Y2

P: 905.712.5100 • F: 905.712.5122 • TF: 1.800.856.6261

Drinking Water Chain of Custody Record

Laboratory Use Only

Arrival Condition: ☐ Good ☐ Poor (complete notes)
Arrival Temperature: 3.6 3.8 4.0
AGAT Job Number:
Notes: 3 LG BAGGED ICE #2 4.0 4.4 4.8 #3 2.8 3.0 3.2

Client Information

Company: AGAT Guelph
Contact: Nicole Burke
Address: 903 Barton St. #22
Stoney Creek, Ont
Phone: 905-379-8259 Fax:
PO #:
Client Project #: T-1-22-0482-46.003
AGAT Quotation #:

Report Information

1. Name: Paul Raeppe
Email: Paul.raeppe@agatlabs.com
2. Name: Nicole Burke
Email: nicole.burke

Report Format

☒ Single Sample per page
☐ Multiple Samples per page

Facility Type *(Check all that are applicable)*

☐ Large OR ☐ Small
☐ Residential OR ☐ Non-Residential
☐ Municipal OR ☒ Non-Municipal

+ Water Type *(Specify in column below)*

Raw (R), Treated (TR), Distribution (D), Tap (TP) Private Well (P)

Turnaround Time Required (TAT) *

Regular TAT	7 to 14 business days	☐ Sch 23/24 only
	5 to 7 business days	☒
Rush TAT (please provide prior notification)	3 to 4 business days	☐ Rush
	2 business days	☐ surcharges
	1 business days	☐ apply

Date Required (Rush surcharges may apply):

Requirements *(Check one)*

☐ O. Regulation 170 ☐ Not Applicable
☐ O. Regulation 243 ☐ Federal
☐ O. Regulation 318/319 ☐ Other

IS THIS WATER BEING CONSUMED BY HUMANS? ☒ Yes ☐ No
DO THE RESULTS REQUIRE REPORTING TO THE MECP OR LOCAL PUBLIC HEALTH UNIT? ☐ Yes ☒ No
FOR RAW WATER (E.G. UNTREATED), IS THE SAMPLE COLLECTED FROM A POINT OF HUMAN CONSUMPTION? ☐ Yes ☒ No

CLIENT IS RESPONSIBLE TO COMPLETE AND SUBMIT LAB SERVICE NOTIFICATION (LSN) FORM TO THE MOECC/PHU. FAILURE TO DO SO MAY DELAY REPORTING.
"NOTIFICATION INFORMATION" MUST BE COMPLETE BELOW UPON SUBMISSION OF SAMPLES. LABORATORY ANALYSIS WILL NOT COMMENCE UNTIL ALL INFORMATION HAS BEEN PROVIDED.

SAMPLE IDENTIFICATION/LOCATION	DATE SAMPLED	TIME SAMPLED	WATER TYPE *	# OF CONTAINERS	CHLORINE RESIDUAL (incl. Units)	STANDING	FLUSHED	COMMENTS/STANDING TIME (IN MINUTES)	Inorganics (Sch. 23)	Organics (Sch. 24)	Lead	Fluoride	Sodium	Turbidity	Nitrate, Nitrite	Trihalomethanes / HAAs	E.coli, Total Coliforms	Water Quality Assessment Package
BH4	10.08.24	10:30 AM/PM	R	7	N/A		X										X	X
BH4	10.08.24	12:30 AM/PM	R	7	N/A		X										X	X
BH4	10.08.24	2:30 AM/PM	R	7	N/A		X										X	X
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																

Samples Taken By (Print Name and Sign): Nicole Burke

* TAT is exclusive of weekends and statutory holidays. Prior arrangements must be made with the laboratory in order to submit Microbiology samples on Fridays

NOTIFICATION INFORMATION - (required to report adverse results as per the *Safe Drinking Water Act*) - **Laboratory analysis will not commence until all information is received.**

INFORMATION FOR ADVERSE REPORTING			MEDICAL OFFICER OF HEALTH (MOH)	
Waterworks Name:	Phone:	Fax:	Region:	
MOECC# (ie: Waterworks #):	After Hours Phone:		PHU Contact:	
Contact:	Address/Location (if different from client above):		Phone:	Fax:
Email:			Email:	

[redacted] Date/Time: Oct 9/24 3:00pm Oct 9/24 3pm [redacted] Oct 9/24 2pm Oct 9 3:45pm

Black Copy - Client
Yellow/Golden Copy - AGAT
White Copy- AGAT

Page 3 of 3

Nº: DW 09442

Document #: DW-78-1512 011

Date Revised: March 18, 2021

AGAT Laboratories

Sample Temperature Log

Client: Englobe

COC# or Work Order #: 24H207057

# of Coolers: 3 Large

# of Submissions:

Arrival Temperatures - Branch/Driver

Loose ice

Cooler #1:	5.4	5.5	5.9
Cooler #2:	6.3	6.2	6.6
Cooler #3:	5.9	5.5	5.8
Cooler #4:			
Cooler #5:			
Cooler #6:			
Cooler #7:			
Cooler #8			
Cooler #9:			
Cooler #10:			

IR Gun ID:

Taken B[redacted]

Date (yyyy/mm/dd): 2024/10/09 Time: 3:45 AM / PM

Arrival Temperatures - Laboratory

Cooler #1:			
Cooler #2:			
Cooler #3:			
Cooler #4:			
Cooler #5:			
Cooler #6:			
Cooler #7:			
Cooler #8			
Cooler #9:			
Cooler #10:			

IR Gun ID:

Taken By:

Date (yyyy/mm/dd): Time: : AM / PM

Instructions for use of this form: 1) complete all fields of info including total # of coolers and # of submissions rec'd, 2) photocopy and place in each submission prior to giving a WO#, 3) Proceed as normal, write the WO# and scan (please make sure to scan along with the COC)

AGAT Laboratories

Non-Reportable Drinking Water Sample Inquiry Form

This form is to ensure your water is tested and reported in accordance with Ontario Regulation 248/03 for testing of Drinking Water under the Safe Drinking Water Act. We require the information below to help uphold our high standard of regulatory compliance, for both AGAT as a laboratory and you, as our valued customer. Please ensure all information is filled out completely and accurately. If you have any questions, please do not hesitate to contact your AGAT Client Project Manager at 905-712-5100.

(1) What is the purpose for your testing? Please provide details below.

Confirmation of potability of completed test wells.

(2) Please answer the following questions.

(a) Is there a request from a Public Health Inspector or a Ministry of Environment Drinking Water Inspector to complete this testing? ☐ Yes ☑ No
If Yes, please contact an AGAT Client Project Manager at 905-712-5100

(b) Is there a provincial order in effect for your water system? ☐ Yes ☑ No
If Yes, please provide details below including limit for the test parameter if not listed with a standard under O.Reg.169/03

(c) Does your facility have a drinking water system (DWS) number provided by either MECP or MOHLTC? ☐ Yes ☑ No

(i) If yes, why is the sample not reportable to either MECP or MOHLTC? Please provide details below.

(ii) If yes, is the test for sodium and/or fluoride? ☐ Yes ☑ No

- If the test is for sodium and/or fluoride, was sodium and/or fluoride testing completed and reported to the ***MECP*** in the last 57 months or ***MOHLTC*** in the last 60 months?
  ☐ Yes ☑ No

As per the SWDA, Sodium and fluoride (if required by DWS) are required to be tested every 5 years (60 months) by the operator. The sodium and/or fluoride adverse are not required to be reported if two samples are less than 5 years apart.

Document #: ADM-78-2533.004
Issued Date: 2020-08-25

(d) Is the water collected from a Federally owned, operated or regulated property or water source? ☐ Yes ☑ No

If Yes, please indicate this on the COC under Requirements

(3) If you are private home owner looking to test your drinking water, please answer the following questions:

(i) Are you consuming this water from the point of sample collection? ☐ Yes ☐ No

(ii) Do you have a water treatment unit installed in your system? ☐ Yes ☐ No

(iii) Is your water collected before or after treatment?

☐ Before ☐ After ☑ Not Applicable

(iv) Are you testing your water due to concerns regarding your plumbing?

☐ Yes ☐ No

If Yes, have you done any improvements to your plumbing recently? Please provide details below.

For further assistance, please contact the MECP at the following phone and email:

(1) For inquiries related to O.Reg.170 or O.Reg.318/319

Email: waterforms@ontario.ca

Phone Number: 1-866-793-2588

(2) For inquiries related to O.Reg.243 (Schools and Daycares)

Phone Number: 1-855-515-1331.

Company Name: Englobe

DWCOC#: (if applicable)

Name: Nicole Burke for Paul Raepple (please print name)

Date: 2024-10-10 (yyyy-mm-dd)

Signature: [redacted]

AGAT WorkOrder #: (To be entered by AGAT CPM)

Document #: ADM-78-2533.004
Issued Date: 2020-08-25

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: ENGLOBE CORP.
903, BARTON CREEK
STONEY CREEK, ON L8E5P5
(905) 643-7560
ATTENTION TO: Nicole Burke
PROJECT: T-1-22-0482.003
AGAT WORK ORDER: 24T215439
TRACE ORGANICS REVIEWED BY: Radhika Chakraberty, Trace Organics Lab Manager
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead
DATE REPORTED: Nov 06, 2024
PAGES (INCLUDING COVER): 32
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Base Neutrals and Acids [Water]

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-05

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243
Naphthalene	µg/L		0.30	1.22
Acenaphthylene	µg/L		0.31	<0.31
Acenaphthene	µg/L		0.30	<0.30
Fluorene	µg/L		0.31	<0.31
Phenanthrene	µg/L		0.32	<0.32
Anthracene	µg/L		0.30	<0.30
Fluoranthene	µg/L		0.27	<0.27
Pyrene	µg/L		0.20	<0.20
Benzo(a)anthracene	µg/L		0.20	<0.20
Chrysene	µg/L		0.27	<0.27
Benzo(b)fluoranthene	µg/L		0.20	<0.20
Benzo(k)fluoranthene	µg/L		0.20	<0.20
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.20	<0.20
Dibenzo(a,h)anthracene	µg/L		0.20	<0.20
Benzo(g,h,i)perylene	µg/L		0.20	<0.20
Phenol	µg/L		1.0	60.0
Bis(2-chloroethyl)ether	µg/L		0.5	<0.5
2-Chlorophenol	µg/L		0.5	<0.5
o-Cresol	µg/L		0.5	6.4
Bis(2-chloroisopropyl)ether	µg/L		0.5	<0.5
m&p-Cresol	µg/L		0.5	10.6
Hexachloroethane	µg/L		0.5	<0.5
2,4-Dimethylphenol	µg/L		0.5	<0.5
2,4-Dichlorophenol	µg/L		0.3	<0.3
1,2,4-Trichlorobenzene	µg/L		0.5	<0.5
p-Chloroaniline	µg/L		1.0	<1.0
Hexachlorobutadiene	µg/L		0.4	<0.4
2-and 1-methyl Napthalene	µg/L		0.5	<0.5

Certified By: [redacted]

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Base Neutrals and Acids [Water]

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-05

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
2,4,6-Trichlorophenol	µg/L		0.2	<0.2
2,4,5-Trichlorophenol	µg/L		0.2	<0.2
1,1-Biphenyl	µg/L		0.5	<0.5
Dimethyl phthalate	µg/L		0.5	<0.5
2,6-Dinitrotoluene	µg/L		0.5	<0.5
2,4-Dinitrotoluene	µg/L		0.5	<0.5
2,3,4,6-Tetrachlorophenol	µg/L		0.5	<0.5
Diethyl phthalate	µg/L		0.5	<0.5
Hexachlorobenzene	µg/L		0.5	<0.5
Pentachlorophenol	µg/L		0.5	<0.5
3,3'-dichlorobenzidine	µg/L		0.5	<0.5
Bis(2-Ethylhexyl)phthalate	µg/L		0.5	<0.5
2,4-Dinitrophenol	µg/L		10	<10
Sediment				1
Surrogate	**Unit**	**Acceptable Limits**		
2-Fluorophenol	%	50-140		75
phenol-d6 surrogate	%	50-140		70
2,4,6-Tribromophenol	%	50-140		67
Chrysene-d12	%	50-140		77

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amounts

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Carbamate Pesticides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-01

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243
Aldicarb	µg/L		2.0	<2.0
Bendiocarb	µg/L		2	<2
Carbofuran	µg/L		5	<5
Carbaryl	µg/L		5	<5
Diuron	µg/L		10	<10
Triallate	µg/L		1	<1
Temephos	µg/L		10	<10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Glyphosate in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-06

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243Zh**	
Glyphosate	µg/L		20	<20	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: [redacted]

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Haloacetic Acids in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-04

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Monobromoacetic Acid	ug/L		0.5	<0.5
Monochloroacetic Acid	ug/L		0.5	<0.5
Dichloroacetic Acid	ug/L		0.5	<0.5
Dibromoacetic Acid	ug/L		0.5	<0.5
Trichloroacetic Acid	ug/L		0.5	1.2
Haloacetic Acids (HAA5)	ug/L		2.0	<2.0
Bromochloroacetic Acid	ug/L		0.5	<0.5
Surrogate	**Unit**	**Acceptable Limits**		
2-Bromopropionic Acid	%	70-130		95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Haloacetic Acids (HAA5) is a calculated parameter. The calculated value is the sum of Monobromoacetic Acid, Monochloroacetic Acid, Dichloroacetic Acid, Dibromoacetic Acid and Trichloroacetic Acid.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

OP Pesticides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-06

		SAMPLE DESCRIPTION:		**BH4**
		SAMPLE TYPE:		**Water**
		DATE SAMPLED:		**2024-10-31 09:45**
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Phorate	µg/L		0.5	<0.5
Dimethoate	µg/L		2.5	<2.5
Terbufos	µg/L		0.5	<0.5
Diazinon	µg/L		1	<1
Malathion	µg/L		5	<5
Chlorpyrifos	µg/L		1	<1
Parathion	µg/L		1	<1
Azinphos-methyl	µg/L		2	<2
Surrogate	**Unit**	**Acceptable Limits**		
Triphenyl phosphate (surr)	%	50-140		92

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ODWS - Table D
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Paraquat/Diquat (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-01

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Paraquat	µg/L		1	<1
Diquat	µg/L		5	<5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Phenoxy Acid Herbicides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-06

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
2,4-D	µg/L		0.5	<0.5
2,4,5-T	µg/L		0.5	<0.5
2,4,5-TP	µg/L		0.5	<0.5
Dicamba	µg/L		0.5	<0.5
Dichlorprop	µg/L		0.5	<0.5
Dinoseb	µg/L		0.5	<0.5
Picloram	µg/L		0.5	<0.5
Diclofop-methyl	µg/L		0.5	<0.5
2,3,4,6-Tetrachlorophenol	µg/L		0.5	<0.5
2,4-Dichlorophenol	µg/L		0.2	<0.2
2,4,5-Trichlorophenol	µg/L		0.5	<0.5
2,4,6-Trichlorophenol	µg/L		0.5	<0.5
Bromoxynil	µg/L		0.3	<0.3
MCPA	µg/L		5.0	<5.0
MCPP	µg/L		5.0	<5.0
Pentachlorophenol	µg/L		0.1	<0.1
Surrogate	**Unit**	**Acceptable Limits**		
DCAA	%	50-140		80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Total PCBs (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-06

		SAMPLE DESCRIPTION:		**BH4**
		SAMPLE TYPE:		**Water**
		DATE SAMPLED:		**2024-10-31 09:45**
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
PCBs	µg/L		0.1	<0.1
Surrogate	**Unit**	**Acceptable Limits**		
Decachlorobiphenyl	%	60-130		112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Triazine Pesticides [Water]

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-06

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Trifluralin	µg/L		1.0	<1.0
Simazine	µg/L		1.0	<1.0
Atrazine	µg/L		0.5	<0.5
Metribuzin	µg/L		0.25	<0.25
Prometryne	µg/L		0.25	<0.25
Metolachlor	µg/L		0.11	<0.11
Alachlor	µg/L		0.5	<0.5
Cyanazine	µg/L		1.0	<1.0
Surrogate	**Unit**	**Acceptable Limits**		
Triphenyl phosphate (surr)	%	30-130		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ODWS - Table D
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-02

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243
Dichlorodifluoromethane	µg/L		0.40	<0.40
Chloromethane	µg/L		0.20	<0.20
Vinyl Chloride	µg/L		0.17	<0.17
Bromomethane	µg/L		0.20	<0.20
Chloroethane	µg/L		0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40
Acetone	µg/L		1.0	<1.0
1,1-Dichloroethylene	µg/L		0.2	<0.2
Methylene Chloride	µg/L		0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20
Chloroform	µg/L		0.20	<0.20
1,2-Dichloroethane	µg/L		0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20
Benzene	µg/L		0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20
cis-1,3-Dichloropropene	µg/L		0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20
Toluene	µg/L		0.20	<0.20
2-Hexanone	µg/L		1.0	<1.0
Dibromochloromethane	µg/L		0.10	<0.10

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2024-10-31 **DATE REPORTED: 2024-11-02**

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Ethylene Dibromide	µg/L		0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20
Bromoform	µg/L		0.10	<0.10
Styrene	µg/L		0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10
o-Xylene	µg/L		0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30
Xylenes (Total)	µg/L		0.20	<0.20
n-Hexane	µg/L		0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	50-140		106
4-Bromofluorobenzene	% Recovery	50-140		90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

(Water) Inorganic Chemistry

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-05

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Fluoride	mg/L		0.05	<0.05
Nitrate as N	mg/L		0.05	0.91
Nitrite as N	mg/L		0.05	<0.05
Cyanide, WAD	mg/L		0.002	<0.002
Total Antimony	mg/L		0.003	<0.003
Total Arsenic	mg/L		0.003	<0.003
Total Barium	mg/L		0.002	0.408
Total Boron	mg/L		0.010	0.017
Total Cadmium	mg/L		0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003
Total Lead	mg/L		0.0005	0.0010
Total Mercury	mg/L		0.0001	<0.0001
Total Selenium	mg/L		0.002	<0.002
Total Uranium	mg/L		0.0005	0.0007

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Chloramines

DATE RECEIVED: 2024-10-31 **DATE REPORTED: 2024-11-05**

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**	
Chloramines - Total	mg/L		0.1	<0.1	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Chloramines is a calculated parameter. The calculated parameter is non-accredited. The component parameters of the calculation are accredited.
TRC and Chloramines have been analyzed past the recommended holding time of 15 minutes from sampling. Field measurement recommended for most accurate result

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Water Analysis - Anion Scan in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-02

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243Zi
Chloride	mg/L		1.0	88.9
Nitrate	mg/L		0.5	2.3
Nitrite	mg/L		0.05	<0.05
Sulfate	mg/L		1.0	34.3
Fluoride	mg/L		0.01	<0.01
Bromide	mg/L		0.1	<0.1
Reporting- W				

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in Water (ug/L)															
Dichlorodifluoromethane	6279538		<0.40	<0.40	NA	< 0.40	106%	50%	140%	118%	50%	140%	110%	50%	140%
Chloromethane	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	73%	50%	140%	68%	50%	140%
Vinyl Chloride	6279538		<0.17	<0.17	NA	< 0.17	120%	50%	140%	107%	50%	140%	118%	50%	140%
Bromomethane	6279538		<0.20	<0.20	NA	< 0.20	95%	50%	140%	110%	50%	140%	92%	50%	140%
Chloroethane	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	107%	50%	140%	115%	50%	140%
Trichlorofluoromethane	6279538		<0.40	<0.40	NA	< 0.40	102%	50%	140%	115%	50%	140%	111%	50%	140%
Acetone	6279538		<1.0	<1.0	NA	< 1.0	107%	50%	140%	88%	50%	140%	79%	50%	140%
1,1-Dichloroethylene	6279538		<0.2	<0.2	NA	< 0.2	103%	50%	140%	91%	60%	130%	86%	50%	140%
Methylene Chloride	6279538		<0.30	<0.30	NA	< 0.30	105%	50%	140%	94%	60%	130%	104%	50%	140%
trans- 1,2-dichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	84%	60%	130%	85%	50%	140%
Methyl tert-butyl ether	6279538		<0.20	<0.20	NA	< 0.20	72%	50%	140%	73%	60%	130%	60%	50%	140%
1,1-Dichloroethane	6279538		<0.30	<0.30	NA	< 0.30	74%	50%	140%	79%	60%	130%	85%	50%	140%
Methyl Ethyl Ketone	6279538		<1.0	<1.0	NA	< 1.0	97%	50%	140%	96%	50%	140%	92%	50%	140%
cis- 1,2-Dichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	76%	50%	140%	87%	60%	130%	72%	50%	140%
Chloroform	6279538		<0.20	<0.20	NA	< 0.20	67%	50%	140%	60%	60%	130%	71%	50%	140%
1,2-Dichloroethane	6279538		<0.20	<0.20	NA	< 0.20	94%	50%	140%	103%	60%	130%	85%	50%	140%
1,1,1-Trichloroethane	6279538		<0.30	<0.30	NA	< 0.30	87%	50%	140%	93%	60%	130%	71%	50%	140%
Carbon Tetrachloride	6279538		<0.20	<0.20	NA	< 0.20	84%	50%	140%	85%	60%	130%	89%	50%	140%
Benzene	6279538		<0.20	<0.20	NA	< 0.20	108%	50%	140%	112%	60%	130%	104%	50%	140%
1,2-Dichloropropane	6279538		<0.20	<0.20	NA	< 0.20	99%	50%	140%	102%	60%	130%	98%	50%	140%
Trichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	113%	60%	130%	109%	50%	140%
Bromodichloromethane	6279538		<0.20	<0.20	NA	< 0.20	80%	50%	140%	82%	60%	130%	86%	50%	140%
cis-1,3-Dichloropropene	6279538		<0.20	<0.20	NA	< 0.20	62%	50%	140%	63%	60%	130%	60%	50%	140%
Methyl Isobutyl Ketone	6279538		<1.0	<1.0	NA	< 1.0	100%	50%	140%	100%	50%	140%	103%	50%	140%
trans-1,3-Dichloropropene	6279538		<0.30	<0.30	NA	< 0.30	66%	50%	140%	63%	60%	130%	62%	50%	140%
1,1,2-Trichloroethane	6279538		<0.20	<0.20	NA	< 0.20	100%	50%	140%	106%	60%	130%	105%	50%	140%
Toluene	6279538		<0.20	<0.20	NA	< 0.20	109%	50%	140%	119%	60%	130%	113%	50%	140%
2-Hexanone	6279538		<1.0	<1.0	NA	< 1.0	106%	50%	140%	75%	50%	140%	77%	50%	140%
Dibromochloromethane	6279538		<0.10	<0.10	NA	< 0.10	63%	50%	140%	66%	60%	130%	72%	50%	140%
Ethylene Dibromide	6279538		<0.10	<0.10	NA	< 0.10	90%	50%	140%	95%	60%	130%	96%	50%	140%
Tetrachloroethylene	6279538		<0.20	<0.20	NA	< 0.20	114%	50%	140%	109%	60%	130%	118%	50%	140%
1,1,1,2-Tetrachloroethane	6279538		<0.10	<0.10	NA	< 0.10	69%	50%	140%	80%	60%	130%	80%	50%	140%
Chlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	103%	50%	140%	103%	60%	130%	99%	50%	140%
Ethylbenzene	6279538		<0.10	<0.10	NA	< 0.10	97%	50%	140%	106%	60%	130%	98%	50%	140%
m & p-Xylene	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	114%	60%	130%	110%	50%	140%
Bromoform	6279538		<0.10	<0.10	NA	< 0.10	64%	50%	140%	67%	60%	130%	51%	50%	140%
Styrene	6279538		<0.10	<0.10	NA	< 0.10	94%	50%	140%	96%	60%	130%	93%	50%	140%
1,1,2,2-Tetrachloroethane	6279538		<0.10	<0.10	NA	< 0.10	83%	50%	140%	93%	60%	130%	98%	50%	140%
o-Xylene	6279538		<0.10	<0.10	NA	< 0.10	108%	50%	140%	114%	60%	130%	110%	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	111%	50%	140%	113%	60%	130%	110%	50%	140%
1,4-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	109%	50%	140%	107%	60%	130%	106%	50%	140%
1,2-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	109%	50%	140%	107%	60%	130%	105%	50%	140%
1,2,4-Trichlorobenzene	6279538		<0.30	<0.30	NA	< 0.30	110%	50%	140%	91%	60%	130%	99%	50%	140%
n-Hexane	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	96%	60%	130%	112%	50%	140%
Total PCBs (Water)															
PCBs	6275762		< 0.1	< 0.1	NA	< 0.1	96%	50%	140%	99%	50%	140%	98%	50%	140%
OP Pesticides (Water)															
Phorate	6246873		< 0.5	< 0.5	NA	< 0.5	87%	50%	140%	86%	50%	140%	87%	50%	140%
Dimethoate	6246873		< 2.5	< 2.5	NA	< 2.5	108%	50%	140%	101%	50%	140%	101%	50%	140%
Terbufos	6246873		< 0.5	< 0.5	NA	< 0.5	100%	50%	140%	73%	50%	140%	72%	50%	140%
Diazinon	6246873		< 1	< 1	NA	< 1	101%	50%	140%	94%	50%	140%	113%	50%	140%
Malathion	6246873		< 5	< 5	NA	< 5	106%	50%	140%	83%	50%	140%	71%	50%	140%
Chlorpyrifos	6246873		< 1	< 1	NA	< 1	103%	50%	140%	78%	50%	140%	90%	50%	140%
Parathion	6246873		< 1	< 1	NA	< 1	94%	50%	140%	90%	50%	140%	96%	50%	140%
Azinphos-methyl	6246873		< 2	< 2	NA	< 2	93%	50%	140%	79%	50%	140%	99%	50%	140%
Carbamate Pesticides (Water)															
Aldicarb	1		< 2.0	< 2.0	NA	< 2.0	99%	50%	140%	108%	50%	140%	NA	50%	140%
Bendiocarb	1		< 2	< 2	NA	< 2	64%	50%	140%	62%	50%	140%	NA	50%	140%
Carbofuran	1		< 5	< 5	NA	< 5	64%	50%	140%	62%	50%	140%	NA	50%	140%
Carbaryl	1		< 5	< 5	NA	< 5	81%	50%	140%	122%	50%	140%	NA	50%	140%
Diuron	1		< 10	< 10	NA	< 10	93%	50%	140%	86%	50%	140%	NA	50%	140%
Triallate	1		< 1	< 1	NA	< 1	99%	50%	140%	97%	50%	140%	NA	50%	140%
Temephos	1		< 10	< 10	NA	< 10	74%	60%	130%	81%	60%	130%	NA	60%	130%
Phenoxy Acid Herbicides (Water)															
2,4-D	1		< 0.5	< 0.5	NA	< 0.5	90%	50%	140%	85%	50%	140%	NA	50%	140%
2,4,5-T	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	82%	50%	140%	NA	50%	140%
2,4,5-TP	1		< 0.5	< 0.5	NA	< 0.5	80%	50%	140%	86%	50%	140%	NA	50%	140%
Dicamba	1		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	84%	50%	140%	NA	50%	140%
Dichlorprop	1		< 0.5	< 0.5	NA	< 0.5	102%	50%	140%	75%	50%	140%	NA	50%	140%
Dinoseb	1		< 0.5	< 0.5	NA	< 0.5	80%	50%	140%	76%	50%	140%	NA	50%	140%
Picloram	1		< 0.5	< 0.5	NA	< 0.5	84%	50%	140%	82%	50%	140%	NA	50%	140%
Diclofop-methyl	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	86%	50%	140%	NA	50%	140%
2,3,4,6-Tetrachlorophenol	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	88%	50%	140%	NA	50%	140%
2,4-Dichlorophenol	1		< 0.2	< 0.2	NA	< 0.2	90%	50%	140%	90%	50%	140%	NA	50%	140%
2,4,5-Trichlorophenol	1		< 0.5	< 0.5	NA	< 0.5	89%	50%	140%	85%	50%	140%	NA	50%	140%
2,4,6-Trichlorophenol	1		< 0.5	< 0.5	NA	< 0.5	86%	50%	140%	87%	50%	140%	NA	50%	140%
Bromoxynil	1		< 0.3	< 0.3	NA	< 0.3	90%	50%	140%	85%	50%	140%	NA	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
MCPA	1		< 5.0	< 5.0	NA	< 5.0	98%	50%	140%	95%	50%	140%	NA	50%	140%
MCPP	1		< 5.0	< 5.0	NA	< 5.0	96%	50%	140%	81%	50%	140%	NA	50%	140%
Pentachlorophenol	1		< 0.1	< 0.1	NA	< 0.1	94%	50%	140%	98%	50%	140%	NA	50%	140%
Triazine Pesticides [Water]															
Trifluralin	6246873		< 1.0	< 1.0	NA	< 1.0	110%	50%	140%	67%	50%	140%	85%	50%	140%
Simazine	6246873		< 1.0	< 1.0	NA	< 1.0	97%	50%	140%	83%	50%	140%	100%	50%	140%
Atrazine	6246873		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	100%	50%	140%	114%	50%	140%
Metribuzin	6246873		< 0.25	< 0.25	NA	< 0.25	124%	50%	140%	107%	50%	140%	104%	50%	140%
Prometryne	6246873		< 0.25	< 0.25	NA	< 0.25	91%	50%	140%	81%	50%	140%	79%	50%	140%
Metolachlor	6246873		< 0.11	< 0.11	NA	< 0.11	98%	50%	140%	79%	50%	140%	101%	50%	140%
Alachlor	6246873		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	78%	50%	140%	107%	50%	140%
Cyanazine	6246873		< 1.0	< 1.0	NA	< 1.0	112%	50%	140%	87%	50%	140%	108%	50%	140%
Base Neutrals and Acids [Water]															
Naphthalene	6275685		< 0.30	< 0.30	NA	< 0.30	91%	50%	140%	71%	50%	140%	73%	50%	140%
Acenaphthylene	6275685		< 0.31	< 0.31	NA	< 0.31	82%	50%	140%	72%	50%	140%	76%	50%	140%
Acenaphthene	6275685		< 0.30	< 0.30	NA	< 0.30	88%	50%	140%	69%	50%	140%	69%	50%	140%
Fluorene	6275685		< 0.31	< 0.31	NA	< 0.31	110%	50%	140%	88%	50%	140%	78%	50%	140%
Phenanthrene	6275685		< 0.32	< 0.32	NA	< 0.32	111%	50%	140%	84%	50%	140%	72%	50%	140%
Anthracene	6275685		< 0.30	< 0.30	NA	< 0.30	108%	50%	140%	87%	50%	140%	78%	50%	140%
Fluoranthene	6275685		< 0.27	< 0.27	NA	< 0.27	100%	50%	140%	98%	50%	140%	94%	50%	140%
Pyrene	6275685		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	99%	50%	140%	95%	50%	140%
Benzo(a)anthracene	6275685		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	100%	50%	140%	98%	50%	140%
Chrysene	6275685		< 0.27	< 0.27	NA	< 0.27	112%	50%	140%	108%	50%	140%	102%	50%	140%
Benzo(b)fluoranthene	6275685		< 0.20	< 0.20	NA	< 0.20	113%	50%	140%	78%	50%	140%	84%	50%	140%
Benzo(k)fluoranthene	6275685		< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	90%	50%	140%	93%	50%	140%
Benzo(a)pyrene	6275685		< 0.01	< 0.01	NA	< 0.01	112%	50%	140%	82%	50%	140%	80%	50%	140%
Indeno(1,2,3-cd)pyrene	6275685		< 0.20	< 0.20	NA	< 0.20	77%	50%	140%	103%	50%	140%	63%	50%	140%
Dibenzo(a,h)anthracene	6275685		< 0.20	< 0.20	NA	< 0.20	78%	50%	140%	67%	50%	140%	71%	50%	140%
Benzo(g,h,i)perylene	6275685		< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	97%	50%	140%	76%	50%	140%
Phenol	6275685		< 1.0	< 1.0	NA	< 1.0	80%	50%	140%	62%	50%	140%	75%	50%	140%
Bis(2-chloroethyl)ether	6275685		< 0.5	< 0.5	NA	< 0.5	82%	50%	140%	68%	50%	140%	74%	50%	140%
2-Chlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	93%	50%	140%	112%	50%	140%	115%	50%	140%
o-Cresol	6275685		< 0.5	< 0.5	NA	< 0.5	78%	50%	140%	65%	50%	140%	73%	50%	140%
Bis(2-chloroisopropyl)ether	6275685		< 0.5	< 0.5	NA	< 0.5	74%	50%	140%	66%	50%	140%	68%	50%	140%
m&p-Cresol	6275685		< 0.5	< 0.5	NA	< 0.5	108%	50%	140%	120%	50%	140%	75%	50%	140%
Hexachloroethane	6275685		< 0.5	< 0.5	NA	< 0.5	81%	50%	140%	67%	50%	140%	70%	50%	140%
2,4-Dimethylphenol	6275685		< 0.5	< 0.5	NA	< 0.5	77%	30%	130%	102%	30%	130%	110%	30%	130%
2,4-Dichlorophenol	6275685		< 0.3	< 0.3	NA	< 0.3	98%	50%	140%	97%	50%	140%	93%	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.
AGAT WORK ORDER: 24T215439
PROJECT: T-1-22-0482.003
ATTENTION TO: Nicole Burke
SAMPLING SITE:11 Main St.
SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2,4-Trichlorobenzene	6275685		< 0.5	< 0.5	NA	< 0.5	98%	50%	140%	77%	50%	140%	75%	50%	140%
p-Chloroaniline	6275685		< 1.0	< 1.0	NA	< 1.0	94%	50%	140%	71%	50%	140%	69%	50%	140%
Hexachlorobutadiene	6275685		< 0.4	< 0.4	NA	< 0.4	114%	50%	140%	90%	50%	140%	84%	50%	140%
2,4,6-Trichlorophenol	6275685		< 0.2	< 0.2	NA	< 0.2	106%	50%	140%	97%	50%	140%	108%	50%	140%
2,4,5-Trichlorophenol	6275685		< 0.2	< 0.2	NA	< 0.2	101%	50%	140%	66%	50%	140%	69%	50%	140%
1,1-Biphenyl	6275685		< 0.5	< 0.5	NA	< 0.5	95%	50%	140%	75%	50%	140%	76%	50%	140%
Dimethyl phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	98%	50%	140%	71%	50%	140%	75%	50%	140%
2,6-Dinitrotoluene	6275685		< 0.5	< 0.5	NA	< 0.5	108%	50%	140%	74%	50%	140%	79%	50%	140%
2,4-Dinitrotoluene	6275685		< 0.5	< 0.5	NA	< 0.5	87%	50%	140%	65%	50%	140%	73%	50%	140%
2,3,4,6-Tetrachlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	64%	50%	140%	70%	50%	140%	69%	50%	140%
Diethyl phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	109%	50%	140%	89%	50%	140%	78%	50%	140%
Hexachlorobenzene	6275685		< 0.5	< 0.5	NA	< 0.5	111%	50%	140%	104%	50%	140%	88%	50%	140%
Pentachlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	91%	50%	140%	108%	50%	140%	107%	50%	140%
3,3'-dichlorobenzidine	6275685		< 0.5	< 0.5	NA	< 0.5	107%	30%	130%	92%	30%	130%	80%	30%	130%
Bis(2-Ethylhexyl)phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	107%	50%	140%	93%	50%	140%	98%	50%	140%
2,4-Dinitrophenol	6275685		< 10	< 10	NA	< 10	106%	30%	130%	70%	30%	130%	100%	30%	130%
Paraquat/Diquat (Water)															
Paraquat	1		< 1	< 1	NA	< 1	101%	50%	140%	104%	50%	140%	NA	50%	140%
Diquat	1		< 5	< 5	NA	< 5	110%	50%	140%	110%	50%	140%	NA	50%	140%
Haloacetic Acids in Water															
Monobromoacetic Acid	6277992	6277992	0.7	0.6	NA	< 0.5	97%	70%	130%	60%	60%	130%	70%	70%	130%
Monochloroacetic Acid	6277992	6277992	< 0.5	< 0.5	NA	< 0.5	104%	70%	130%	60%	60%	130%	70%	70%	130%
Dichloroacetic Acid	6277992	6277992	< 0.5	< 0.5	NA	< 0.5	99%	70%	130%	84%	60%	130%	102%	70%	130%
Dibromoacetic Acid	6277992	6277992	1.3	1.2	NA	< 0.5	87%	70%	130%	76%	60%	130%	96%	70%	130%
Trichloroacetic Acid	6277992	6277992	1.3	1.3	NA	< 0.5	89%	70%	130%	71%	60%	130%	90%	70%	130%
Bromochloroacetic Acid	6277992	6277992	< 0.5	< 0.5	0.0%	< 0.5	116%	70%	130%	103%	60%	130%	115%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Glyphosate in Water															
Glyphosate	992	6278243	< 20	< 20	NA	< 20	115%	50%	140%	108%	50%	140%	108%	50%	140%

Comments: Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.
The sample spikes and dups are not from the same sample ID.

Certified By: R. Chakraberty

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
(Water) Inorganic Chemistry															
Fluoride	6280571		<0.05	<0.05	NA	< 0.05	100%	70%	130%	102%	80%	120%	99%	70%	130%
Nitrate as N	6280571		<0.07	<0.07	NA	< 0.05	93%	70%	130%	95%	80%	120%	95%	70%	130%
Nitrite as N	6280571		<0.05	<0.05	NA	< 0.05	95%	70%	130%	96%	80%	120%	95%	70%	130%
Cyanide, WAD	6269091		<0.002	<0.002	NA	< 0.002	99%	70%	130%	96%	80%	120%	100%	70%	130%
Total Antimony	6278243	6278243	<0.003	<0.003	NA	< 0.003	102%	70%	130%	104%	80%	120%	107%	70%	130%
Total Arsenic	6278243	6278243	<0.003	<0.003	NA	< 0.003	106%	70%	130%	106%	80%	120%	109%	70%	130%
Total Barium	6278243	6278243	0.408	0.436	6.6%	< 0.002	104%	70%	130%	101%	80%	120%	81%	70%	130%
Total Boron	6278243	6278243	0.017	0.037	NA	< 0.010	105%	70%	130%	126%	80%	120%	115%	70%	130%
Total Cadmium	6278243	6278243	<0.0001	0.0002	NA	< 0.0001	100%	70%	130%	98%	80%	120%	105%	70%	130%
Total Chromium	6278243	6278243	<0.003	<0.003	NA	< 0.003	100%	70%	130%	98%	80%	120%	100%	70%	130%
Total Lead	6278243	6278243	0.0010	0.0017	NA	< 0.0005	101%	70%	130%	102%	80%	120%	102%	70%	130%
Total Mercury	6278243	6278243	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	101%	80%	120%	96%	70%	130%
Total Selenium	6278243	6278243	<0.002	<0.002	NA	< 0.002	102%	70%	130%	101%	80%	120%	100%	70%	130%
Total Uranium	6278243	6278243	0.0007	0.0013	NA	< 0.0005	99%	70%	130%	90%	80%	120%	103%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Water Analysis - Anion Scan in Water															
Chloride	1	6278243	88.9	92.3	3.7%	< 1.0	90%	70%	130%	86%	80%	120%	NA	70%	130%
Nitrate	1	6278243	2.8	2.5	10.2%	< 0.5	88%	70%	130%	88%	80%	120%	82%	70%	130%
Nitrite	1	6278243	<0.20	<0.20	NA	< 0.05	84%	70%	130%	81%	80%	120%	79%	70%	130%
Sulfate	1	6278243	31.1	34.0	8.9%	< 1.0	88%	70%	130%	87%	80%	120%	83%	70%	130%
Fluoride	1	6278243	<0.06	<0.06	NA	< 0.01	90%	70%	130%	93%	80%	120%	85%	70%	130%
Bromide	1	6278243	<0.2	<0.2	NA	< 0.1	88%	70%	130%	89%	80%	120%	89%	70%	130%

Comments: Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.
Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.

Nitrate and Nitrite: The regulatory hold time for the analysis of nitrate and/or nitrite in water is 72 hours.

Certified By:

[redacted]

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QC Exceedance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

RPT Date:		REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
(Water) Inorganic Chemistry										
Total Boron	6278243	105%	70%	130%	126%	80%	120%	115%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Acenaphthylene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Acenaphthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Fluorene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Phenanthrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Anthracene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(a)anthracene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(b)fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(k)fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(a)pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Phenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-chloroethyl)ether	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-Chlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
o-Cresol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-chloroisopropyl)ether	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
m&p-Cresol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Hexachloroethane	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dimethylphenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
1,2,4-Trichlorobenzene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
p-Chloroaniline	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Hexachlorobutadiene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-and 1-methyl Napthalene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,6-Trichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,5-Trichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
1,1-Biphenyl	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Dimethyl phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,6-Dinitrotoluene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dinitrotoluene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,3,4,6-Tetrachlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Diethyl phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Hexachlorobenzene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Pentachlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
3,3'-dichlorobenzidine	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dinitrophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
phenol-d6 surrogate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Sediment			N/A
Aldicarb	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Bendiocarb	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Carbofuran	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Carbaryl	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Diuron	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Triallate	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Temephos	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Glyphosate	TO-1320	"In house" method based on OSHA Method # PV2067	HPLC
Monobromoacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Monochloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Dichloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Dibromoacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Trichloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Haloacetic Acids (HAA5)	ORG-91-5121	EPA 552.3	GC ECD

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromochloroacetic Acid	ORG-91-5121	EPA 552.3	GC/ECD
2-Bromopropionic Acid	ORG-91-5121	EPA 552.3	GC/ECD
Phorate	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Dimethoate	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Terbufos	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Diazinon	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Malathion	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Chlorpyrifos	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Parathion	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Azinphos-methyl	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Triphenyl phosphate (surr)	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Paraquat	ORG-91-5102	EPA 549.1	HPLC
Diquat	ORG-91-5102	EPA 549.1	HPLC
2,4-D	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-T	ORG-91-5510	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-TP	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dicamba	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dichlorprop	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dinoseb	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Picloram	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Diclofop-methyl	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,3,4,6-Tetrachlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4-Dichlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-Trichlorophenol	ORG-91-5100	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,6-Trichlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Bromoxynil	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
MCPA	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
MCPP	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Pentachlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
DCAA	ORG-91-5110	EPA SW-846 8151	GC/ECD
PCBs	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Trifluralin	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Simazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Atrazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Metribuzin	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Prometryne	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Metolachlor	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Alachlor	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Cyanazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Triphenyl phosphate (surr)	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Dichlorodifluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
2-Hexanone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ultra Trace Analysis			
2,3,7,8-Tetra CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,7,8-Tetra CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,7,8-Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,6,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8,9-Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Tetra CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Penta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hepta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDDs	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Tetra CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDFs	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2,3,7,8-Tetra CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDD (TEQ	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,7,8-Tetra CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,7,8-Penta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,6,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8,9-Hepta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDDs and PCDFs (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
13C-2,3,7,8-TCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,7,8-PeCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,4,7,8-PeCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,6,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,4,6,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,7,8,9-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,6,7,8-HpCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8,9-HpCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,7,8-TCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC

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Method Summary

CLIENT NAME: ENGLOBE CORP. **AGAT WORK ORDER: 24T215439**

PROJECT: T-1-22-0482.003 **ATTENTION TO: Nicole Burke**

SAMPLING SITE:11 Main St. **SAMPLED BY:N. Burke**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
13C-1,2,3,7,8-PeCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8-HxCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,6,7,8-HxCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,6,7,8-HpCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-OCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
Water Analysis			
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Cyanide, WAD	INOR-93-6052	modified from ON MOECC E3015,SM 4500-CN- I, G-387	SEGMENTED FLOW ANALYSIS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Chloramines - Total			CALCULATION
Chloride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrite	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Sulfate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Bromide	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Reporting- W			N/A

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Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 24T215439

Cooler Quantity: 2 large

Arrival Temperatures: 9.2 | 9.5 | 9.8

~~Depot~~ Temperatures: 9.6 | 9.2 | 9.9

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: no ice

Report Information:

Company: Englobe

Contact: Nicole Burke

Address: 963 Barton St E, #22
Stoney Creek, ont

Phone: 905-379-8059 Fax:

Reports to be sent to:

1. Email: nicole.burke@englobecorp.com

2. Email: paul.raepple@englobecorp.com

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ (Indicate One)
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture (Check One)
☐ Coarse
☐ Fine

☐ Regulation 406
Table ___ (Indicate One)
☐ Ind/Com
☐ Res/Park
☐ Agriculture
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☒ Other O Reg 169/03 Sheet 2
(Indicate Other)

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CSR

Project Information:

Project: T-1-22-0482.003

Site Location: 11 Main St. Uxbridge

Sampled By: N. Burke

AGAT Quote #: PO:

Please note: if quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition (RSC)? ☐ Yes ☐ No

Report Guideline on Certificate of Analysis ☒ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: Englobe

Contact:

Address:

Email:

Legal Sample ☐

Sample Matrix Legend

GW	Ground Water	SD	Sediment
O	Oil	SW	Surface Water
P	Paint	R	Rock/Shale
S	Soil		

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N	O. Reg 153: Metals & Inorganics	Metals - ☐ CrVI ☐ Hg ☐ HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Arocolors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	EC, SAR	Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	OC/PCB/Arocolors	Dioxins + Furans	Paraquat/Diquat	ABN	Glyphosate	HAA	Potentially Hazardous or High Concentration (Y/N)
1. BH4	10.31.24	9:45 AM PM	3	GW	As per tests request			X	X	X								X	X	X	X	X	X	
2.		AM PM																						
3.		AM PM																						
4.		AM PM																						
5.		AM PM																						
6.		AM PM																						
7.		AM PM																						
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
[redacted]	11.3Sam 10.31.24		[redacted]		

24OCT31 11:36 AM

Page 1 of 1

№: T-163837

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the "Comments" area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check "Other (specify)" and record the type of equipment, check each equipment that applies.

Well Use

If the well's use is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well's status is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing "Depth From" as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing "Depth From" as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A "well screen" means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is "Untested," "Fresh" (i.e., not salty), or "Other (specify)." If "Other (specify)" is recorded, use the "Other (specify)" dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off "Gas" if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off "Pumping Discontinued" if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off "Pumping Discontinued" on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off "Flowing Well" (i.e., static water level above the ground surface).

In the "Results of Well Yield Testing" section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the "Map of Well Location" section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on "Add Map (+)" to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: "I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate".

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from "**Incomplete**" to an assigned audit number. The signature field will then be available. Click on "signature" to enter the well technician's electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A321825

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
WDD Main Street	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	499	Brant Street	Burlington

Country	Province	Postal Code	Telephone Number
Canada	Ontario	L7R 2G5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	0	Main Street	Puslinch

Lot	Concession	County/District/Municipality
		Wellington

City/Town	Province	Postal Code
Morriston - Township of Puslinch	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	571820	4811152	Test UTM in Map	

Other
Test Well 1

3. Overburden and Bedrock Material *

Well Depth * 97 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Topsoil			0	1
Brown	Sand	Gravel		1	20
Brown	Gravel			20	23
Brown	Gravel	Sand		23	32
Brown	Clay	Gravel		32	43
Brown	Clay			43	75
Brown	Limestone			75	82
Brown	Limestone			82	97

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Grout and Bentonite Chips	6.96

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☑ Other (specify) DR

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☐ Monitoring
☐ Irrigation ☑ Test Hole ☐ Dewatering
☑ Other (specify) Test Well

7. Status of Well *

☐ Water Supply ☐ Replacement Well ☑ Test Hole
☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole
☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality
☐ Abandoned, other (specify)
☑ Other (specify) Test Well

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6	Steel	0.188	-2	76
6	Open Hole		76	97

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)

10. Water Details

Water found at Depth (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	10
20	76	6.63
76	97	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2024/09/24	2024/09/24

Comments
Section 3, Overburden and Bedrock Materials further details:
(1-20') Other Materials: gravel and boulders.
(75-82') Tan.

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Aardvark Drilling Inc.	7675

Business Address

Unit Number	Street Number	Street Name *
C	25	Lewis Road

City/Town/Village *	Province	Postal Code *
Guelph	ON	N1H 1E9

Business Telephone Number	Business Email Address
519-826-9340	info@aardvarkdrillinginc.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Gerrits	David	3864

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com

Signature	Date Submitted (yyyy/mm/dd)
	2024/10/16

17. Ministry Use Only

Audit Number

RIQ6 29GJ

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the "Comments" area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check "Other (specify)" and record the type of equipment, check each equipment that applies.

Well Use

If the well's use is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well's status is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing "Depth From" as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing "Depth From" as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A "well screen" means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is "Untested," "Fresh" (i.e., not salty), or "Other (specify)." If "Other (specify)" is recorded, use the "Other (specify)" dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off "Gas" if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off "Pumping Discontinued" if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off "Pumping Discontinued" on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off "Flowing Well" (i.e., static water level above the ground surface).

In the "Results of Well Yield Testing" section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the "Map of Well Location" section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on "Add Map (+)" to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: "I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate".

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from "**incomplete**" to an assigned audit number. The signature field will then be available. Click on "signature" to enter the well technician's electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A399867

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
WDD Main Street	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	499	Brant Street	Burlington

Country	Province	Postal Code	Telephone Number
Canada	Ontario	L7R 2G5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	0	Main Street	Puslinch

Lot	Concession	County/District/Municipality
		Wellington

City/Town	Province	Postal Code
Morriston - Township of Puslinch	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	571941	4811252	Test UTM in Map	

Other
Test Well 2

3. Overburden and Bedrock Material *

Well Depth * 74 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Fine Sand			0	9
Brown	Sand	Gravel		9	23
Brown	Clay	Gravel		23	32
Brown	Gravel			32	35
Brown	Clay			35	46
Brown	Gravel	Sand		46	62
Brown	Limestone			62	74

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Grout and Bentonite Chips	6.96

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☑ Other (specify) DR

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☐ Monitoring
☐ Irrigation ☑ Test Hole ☐ Dewatering
☑ Other (specify) Test Well

7. Status of Well *

☐ Water Supply ☐ Replacement Well ☑ Test Hole
☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole
☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality
☐ Abandoned, other (specify)
☑ Other (specify) Test Well

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole or Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6	Steel	0.188	-2	63
6	Open Hole		63	74

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)

10. Water Details

Water found at Depth (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	10
20	63	6.63
63	74	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2024/09/25	2024/09/25

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Aardvark Drilling Inc.	7675

Business Address

Unit Number	Street Number	Street Name *
C	25	Lewis Road

City/Town/Village *	Province	Postal Code *
Guelph	ON	N1H 1E9

Business Telephone Number	Business Email Address
519-826-9340	info@aardvarkdrillinginc.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Gerrits	David	3864

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com

Signature	Date Submitted (yyyy/mm/dd)
	2024/10/16

17. Ministry Use Only

Audit Number

4LZ9 MBH9

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

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Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the "Comments" area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check "Other (specify)" and record the type of equipment, check each equipment that applies.

Well Use

If the well's use is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well's status is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing "Depth From" as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing "Depth From" as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A "well screen" means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is "Untested," "Fresh" (i.e., not salty), or "Other (specify)." If "Other (specify)" is recorded, use the "Other (specify)" dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off "Gas" if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off "Pumping Discontinued" if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off "Pumping Discontinued" on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off "Flowing Well" (i.e., static water level above the ground surface).

In the "Results of Well Yield Testing" section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the "Map of Well Location" section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on "Add Map (+)" to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: "I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate".

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from "**incomplete**" to an assigned audit number. The signature field will then be available. Click on "signature" to enter the well technician's electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A321827

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
WDD Main Street	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	499	Brant Street	Burlington

Country	Province	Postal Code	Telephone Number
Canada	Ontario	L7R 2G5	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	0	Main Street	Puslinch

Lot	Concession	County/District/Municipality
		Wellington

City/Town	Province	Postal Code
Morriston - Township of Puslinch	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	571882	4811001	Test UTM in Map	

Other
Test Well 3

3. Overburden and Bedrock Material *

Well Depth * 101 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Topsoil			0	1
Brown	Sand	Boulders		1	3
Brown	Fine Sand			3	22
Brown	Sand	Gravel		22	42
Brown	Clay			42	86
Brown	Clay	Gravel		86	89
Brown	Gravel			89	92
Brown	Limestone			92	101

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Grout and Bentonite Chips	6.96

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☑ Other (specify) DR

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☐ Monitoring
☐ Irrigation ☑ Test Hole ☐ Dewatering
☑ Other (specify) Test Well

7. Status of Well *

☐ Water Supply ☐ Replacement Well ☑ Test Hole
☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole
☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality
☐ Abandoned, other (specify)
☑ Other (specify) Test Well

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole or Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6	Steel	0.188	-2	93
6	Open Hole		93	101

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)

10. Water Details

Water found at Depth (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	10
20	93	6.63
93	101	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

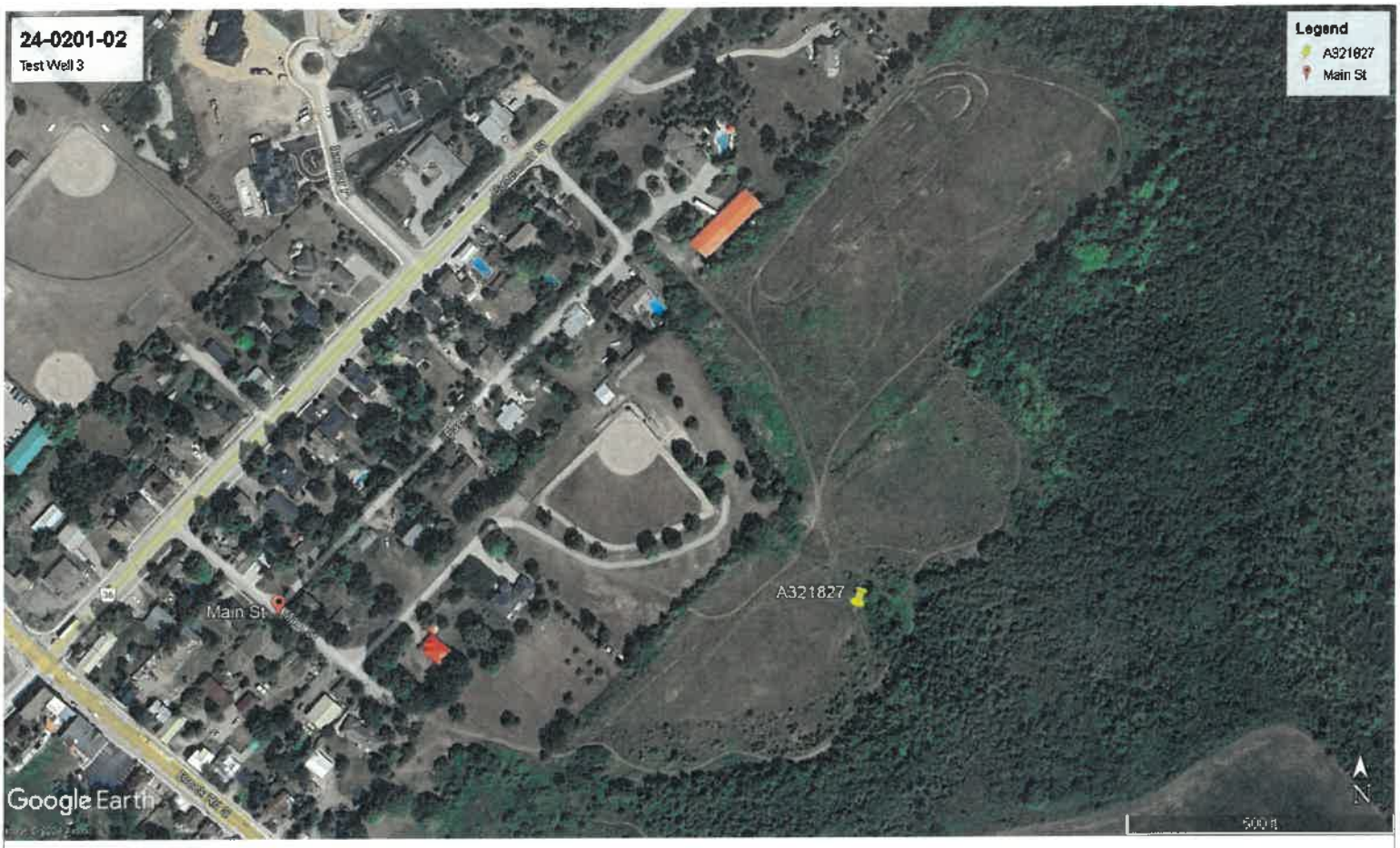
☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☑ Yes ☐ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2024/09/26	2024/09/26

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Aardvark Drilling Inc.	7675

Business Address

Unit Number	Street Number	Street Name *
C	25	Lewis Road

City/Town/Village *	Province	Postal Code *
Guelph	ON	N1H 1E9

Business Telephone Number	Business Email Address
519-826-9340	info@aardvarkdrillinginc.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Gerrits	David	3864

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com
Signature		Date Submitted (yyyy/mm/dd) 2024/10/16

17. Ministry Use Only

Audit Number

K9UA RCLZ

MEMORANDUM

To: Kayly Robbins – Weston Consulting

From: Brett Espensen

Date: November 14, 2024

Re: Addendum to 11 Main Street, Morriston, Township of Puslinch Environmental Impact Study

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Hello Kayly,

This addendum has been prepared to address comments received as part of the peer review of the EIS completed for 11 Main Street, Morriston, Township of Puslinch. Comments were provided by NPG Planning Solutions on September 19, 2024 that requested the EIS be revised to address policies of the Provincial Planning Statement (2024).

The Provincial Planning Statement (2024) write up provided below has been prepared to replace the existing Provincial Policy Statement (2020) write up in Section 2.1 of the EIS (August 2024) in its entirety. The intent of this addendum is to update the EIS to be consistent with the current PPS (2024) that came into effect on October 20, 2024.

2.1 PROVINCIAL PLANNING STATEMENT (2024)

In 2022, the province initiated a review on approaches for leveraging the housing supportive policies of the *Provincial Policy Statement* and A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Growth Plan), removing barriers and continuing to protect the environment through a streamlined province-wide land use planning policy framework. The feedback from this review contributed to the development of the *Provincial Planning Statement.* The *PPS* was issued under Section 3 of the Planning Act and came into effect on October 20, 2024. The *PPS* replaces the policies of the *Provincial Policy Statement* and the Growth Plan. This EIS has been prepared in compliance with Chapter 4, Policy 4.1 of the PPS, which deals specifically with the long-term protection and management of natural heritage features and areas.

The intent of the PPS is to ensure that natural features and areas be protected for the long term. The PPS indicates that diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

Natural heritage features and areas are defined in the PPS as those which are important for their environmental and social values as a legacy of the natural landscapes of an area and include: significant wetlands, significant coastal wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant valleylands south and east of the Canadian Shield, significant habitat of endangered species and threatened species, significant wildlife habitat and significant areas of natural and scientific interest.

Unless it can be demonstrated that there will be no negative impacts on the natural heritage features or their ecological functions, development and site alteration is not permitted in or adjacent to:

- significant woodlands and valleylands south and east of the Canadian Shield;
- significant wildlife habitat;
- significant fish habitat; and
- significant areas of natural and scientific interest.

Furthermore, development and site alteration shall not be permitted on adjacent lands to the natural heritage features identified above, unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

SUMMARY

Policy updates in the Provincial Planning Statement (2024) do not change the conclusions reached or recommendation provided in the EIS. Natural heritage policies included in the Provincial Planning Statement (2024) are not substantially different from policies of the PPS (2020), which were considered as satisfied through the completion of the August 2024 EIS.

Although natural heritage polices of the Provincial Planning Statement (2024) have not substantially changed, it is understood that other policy sections have been updated to allow for additional housing and employment opportunities, such as additional dwelling units and home-based businesses. Additional potential opportunities provided by these policies to not change the impact assessment sections of the EIS. Lot boundaries have been established to achieve ecologically appropriate setbacks from natural heritage features and any additional residential units or home-based businesses that could be established on these lots will not impact adjacent natural areas.

I trust this addendum is sufficient to address the peer review comments on updating the PPS policy section of the EIS.

Yours sincerely,

[redacted]A, EP

Colville Consulting Inc.

FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

11 MAIN STREET
ESTATE RESIDENTIAL DEVELOPMENT

TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON

PREPARED FOR:

WDD MAIN STREET

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
55 WYNDHAM STREET NORTH SUITE 215
GUELPH, ON N1H 7T8

NOVEMBER 2024

CFCA FILE NO. 2366-6537

CELEBRATING 20 YEARS SINCE 2004 CROZIER

Revision Number	Date	Comments
Rev. 0	February 2023	Issued for First Submission (ZBA)
Rev. 1	December 2023	Issued for Second Submission (ZBA)
Rev. 2	September 2024	Issued for Third Submission (ZBA)
Rev. 3	November 2024	Issued for Fourth Submission (ZBA)

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by WDD Main Street (Owner) to prepare a Functional Servicing and Preliminary Stormwater Management Report in support of Draft Plan Approval for the estate residential development located at 11 Main Street in the Township of Puslinch (Site). The purpose of this report is to demonstrate the proposed development is feasible from a functional servicing and stormwater management perspective and conforms with the requirements of the Township of Puslinch (Town), County of Wellington (County), and Conservation Halton (Conservation Authority).

This report has been completed in accordance with the appropriate design guidelines and Township of Puslinch Pre-consultation Comment Summary dated October 21, 2022. The relevant background studies and reports used in preparation of this report include:

- Conservation Halton Guidelines for Stormwater Management Engineering Submissions (November 2021)
- Fluvial Geomorphological and Meander Belt Width Assessment (February 13, 2023)
- Geotechnical Investigation (Terraprobe Inc., October 3, 2023)
- Hydrogeological Assessment (Englobe, August 28, 2024)
- Ministry of the Environment Design Guidelines for Drinking-Water Systems (2008)
- Ministry of Environment Stormwater Management Planning and Design Manual (March 2003)
- The Ontario Geologic Survey (OGS) database, accessed February 2023
- The Ontario Building Code (OBC) (2012)
- The Township of Puslinch Municipal Development Standards (September 2019)
- Well Record Database, Ministry of the Environment, Conservation and Parks, accessed February 2023

This report has been prepared to address the third submission comments received from the reviewing agencies (September 27, 2024) and to support the fourth submission of the Zoning By-Law Amendment Application for the proposed development.

2.0 Site Description

The site encompasses an area of approximately 23.60 ha and currently consists of vacant agricultural fields and forested areas. Most of the site is designated as woodlot and wetlands which leaves approximately 5.98 ha of developable area. The site, located in a residential and agricultural area, is bounded by residential dwellings to the north and west, agricultural lands to the east, and forested and agricultural lands to the south.

According to the Development Concept prepared by Weston Consulting dated May 14, 2024, the proposed estate residential development will consist of the following elements:

- Twenty-one (21) estate residential lots with lot sizes ranging from 0.19 ha to 0.38 ha.
- A 20.0 m wide urban municipal right-of-way with road access to Ochs Street.
- Associated forest, landscaped, stormwater management and amenity areas.

The development limits for the proposed development were established based on the following environmental constraints:

- South-western channel 38 m meander belt per the Meander Belt Assessment prepared by Geo Morphix Ltd.
- 10 m offset from the woodlot, staked, and surveyed by Colville Consulting Inc. (September 20, 2022)
- 15 m offset from Regional Floodplain Limits per Conservation Halton HEC-RAS Modelling (BronteReach5, May 14, 2012)

3.0 Soil and Groundwater Conditions

Englobe (formerly Terraprobe) was retained by the Owner to complete a hydrogeological assessment for the proposed residential development. Five (5) boreholes were advanced across the site in August 2022. The boreholes were drilled to depths between 6.1 m and 8.1 m below ground surface (mbgs).

As reported by Terraprobe, the soils encountered consisted of earth fill materials, comprised of sand, with some gravel and trace amounts of rootlets to a depth of 0.8 mbgs.

Underlying the earth fill, silty sand to sand and silt deposits, with trace amounts of clay and gravel was encountered and extended to depths ranging from 0.8 mbgs to the full depth of the borehole. In BH1, a clayey silt deposit with trace amounts of sand was encountered beneath the silty sand to sand and silt layer between 6.1 and 6.6 mbgs. Refer to the Geotechnical Investigation (Terraprobe Inc., October 3, 2023) for the borehole logs and locations.

Referring to Supplementary Standard SB-6 of the 2012 Ontario Building Code (OBC) and the results of the grain size distribution analysis for the soil samples obtained from BH41, BH3, and BH5, the predominant soil is classified as SM-ML soil as described by the Unified Soil Classification System. An SM-ML soil is a silty sand, or sand silt mix with a percolation rate ranging from 8 min/cm to 50 min/cm. Based on the percentage of silt and clay in the soil samples, Crozier assigned a percolation rate of 30 min/cm for this sewage system design.

Monitoring wells were installed in four (4) of the five (5) borehole locations (BH1, BH2, BH3 and BH5) to allow for the measurement of the groundwater levels. Groundwater levels were measured between August 24, 2022 and September 19, 2022. The stabilized groundwater levels ranged from approximately 5.21 m to 6.76 mbgs (311.82 m to 311.42 m above sea level). Refer to the Hydrogeological Assessment (Englobe, August 28, 2024) for additional details.

4.0 Water Servicing

4.1 Water Supply

As the property is in a rural area, there is no municipal water infrastructure available to service the proposed development. The water servicing needs for the proposed development will be provided via private drilled drinking water wells. The depth, size, and locations of the wells will be determined during the detailed design of each individual lot. It should be noted that the groundwater in the area is mostly used by privately drilled groundwater wells.

As part of the response to the Township's comments, Englobe completed a pumping test to determine well capacities within the property. The pumping test was completed in October 2024, the results of which are provided under separate cover.

4.2 Fire Flow Calculations

Preliminary calculations were completed to estimate the required fire storage volume for the proposed development, as there is no municipal water supply for firefighting purposes. The fire storage volume was calculated using the Ontario Fire Marshalls Fire Protection Water Supply Guideline (1999), as is required in Part 3 of the Ontario Building Code.

The fire storage volume was calculated assuming a maximum house footprint of 360 m^2, appropriate separation distances, and assuming a Group C (residential) occupancy. The largest calculated fire storage volume will be provided on-site. **Table 1** below summarizes the preliminary fire storage volumes calculated for the proposed development.

Table 1: Fire Storage Volume Requirements

Lot	Total Area[1] (m^2)	Height (m)	Volume (m^3)	K[1]	S_{side}[2]	Required Fire Storage Volume, Q (L)
Lot 19	360	6.0	2,160	23	1.8	89,400

1. K values for the proposed residential dwellings are assumed based on past similar residential projects.
2. S_{side} values determined from distance to other structures using Figure 1 in Section 6.3 of the Ontario Fire Marshalls Guidelines.

As can be seen from **Table 1**, a storage volume of 89,400 L is the required minimum fire storage volume, and it must be supplied at a rate of 45 L/s for a duration of 0.5 hours. Refer to **Appendix A** for preliminary fire storage volume calculations.

Two fire cisterns have been shown at this preliminary stage to meet the required fire storage volumes and necessary spacing and distribution for the proposed development. The location and size of the fire cisterns can be refined throughout the design process through consultation with the Fire Chief and the Township. Refer to **Figure 1** for the location of the fire cistern.

5.0 Sanitary Servicing

The site is located in a rural area that does not currently have municipal sanitary services available and the Township of Puslinch does not anticipate municipal sanitary servicing for this area in the near future. Therefore, the proposed development will be serviced by individual onsite sewage systems.

5.1 Sanitary Design Calculations

It is understood the proposed development will consist of twenty-one (21) residential lots with private servicing and that the proposed residential dwellings will have three (3) to four (4) bedrooms. For the purpose of this assessment, preliminary sewage system design flows were calculated for a typical four (4) bedroom dwelling with 360 m^2 of finished floor area, three (3) bathroom groups and additional fixtures for a total of 45 fixture units.

The preliminary sewage system design flows were calculated in accordance with the Ontario Building Code, Part 8 and are presented below in **Table 2**. Detailed sanitary servicing calculations are found in **Appendix B**.

Table 2: Preliminary Sewage System Design Flows

Unit Type	Number of Bedrooms	Floor Area (m^2)	Number of Fixture Units	Base Flow (L/day)	Additional Flow – Floor Area (L/day)	Additional Flow – Fixture Units (L/day)	Total Flow Per Unit (L/day)
360 m^2 Residential Dwelling	4	360	45	2,000	1,600	1,250	3,600

As shown, the preliminary sewage system design flow for a typical unit will be approximately 3,600 L/day. These flows were calculated based on the information available at the time of this report. If details of the proposed dwellings change (e.g., number of bedrooms, fixtures, and floor area) during detailed design, the sewage system design flows might change, which may affect the size of the onsite sewage systems.

The detailed design of the onsite sewage systems will be confirmed during the building permit stage and building permits will be required for each sewage system prior to construction. Properties with a total daily design sanitary sewage flow exceeding 10,000 L/day are subject to Section 53 of the Ontario Water Resources Act and require an Environmental Compliance Approval (ECA) issued by the Ministry of Environment, Conservation and Parks. Given the preliminary sewage system design flow is less than 10,000 L/day per individual lot, an ECA is not required.

5.2 Proposed Individual Sanitary Servicing Strategy

Sanitary servicing for the proposed development will be provided through individual Class 4 onsite sewage systems. The onsite sewage system will consist of an advanced treatment unit discharging to a leaching bed constructed as a Type A dispersal bed. Due to space limitations, ,Lot 1 of the development is proposed to be serviced through a shallow buried trench as shown on FIG 2.

5.3 Proposed Sewage System

Nitrate loading calculations were prepared by Terraprobe to determine the effluent concentration of nitrate-nitrogen each sewage system must achieve for the proposed development to meet MECP Guideline D-5-4. Terraprobe has indicated that at least a 62.5% reduction of nitrate-nitrogen (effluent concentration of 15 mg/L) is required. A typical conventional onsite sewage system produces an effluent concentration of nitrate-nitrogen of approximately 40 mg/L. This is insufficient to meet D-5-4 requirements, therefore, advanced treatment with denitrification will be required.

The proposed sewage system will consist of a Level IV treatment unit meeting the CAN/BNQ 3680-600 standard with 62.5% nitrate-nitrogen reduction, discharging treated effluent to a Type A dispersal bed. A Waterloo Biofilter system (or equivalent) with recirculation is proposed. Sewage will flow from the dwelling to a Waterloo Biofilter anaerobic digester tank. Effluent from the digester tank is pumped to the Waterloo Biofilter basket tank, which is equipped with a patented foam media that effectively treats wastewater prior to discharge to the leaching bed. A portion of the treated effluent is recirculated to the anaerobic digester, providing a 62.5% nitrate-nitrogen reduction. Refer to **Appendix C** for additional information and testing results for this technology.

Treated effluent from the Waterloo Biofilter will be discharged to a Type A dispersal bed sized in accordance with Section 8.7.7. of the OBC (with the exception of Lot 1). The Type A dispersal bed consists of a stone layer equipped with perforated distribution pipe, underlain by a sand layer. **Table 3** summarizes the preliminary sizing of the Type A Dispersal Bed.

Table 3: Preliminary Type A Dispersal Bed Sizing

Unit Type	Total Flow Per Unit (L/day)	Minimum Stone Area (m^2)	Provided Stone Area (m^2)	Minimum Sand Area (m^2)	Provided Sand Area (m^2)
360 m^2 Residential Dwelling	3,600	72	72	270	270 - 368

The Preliminary Site Servicing Plans (**Figure 1** and **Figure 2**) illustrate the proposed onsite sewage servicing for the proposed development. The conceptual figure illustrates a Waterloo Biofilter configuration; however, it is noted that any treatment unit meeting CAN/BNQ certification requirements with 62.5% nitrate-nitrogen removal may be considered. The details, size, and location of the onsite sewage systems will be determined once individual home designs and building permit applications are prepared.

6.0 Drainage Conditions

The drainage conditions for the site in both pre-development and post-development conditions are outlined in the following sections.

6.1 Existing Drainage Conditions

According to the topographic survey (J.D. Barnes Limited, September 16, 2022) and site reconnaissance, the site currently consists of vacant agricultural fields and forested areas. The site has a drainage split which divides the site into an eastern and western catchment based on this topographic survey.

The western catchment (Catchment 101A) consists primarily of vacant agricultural lands and generally slopes northeast to southwest. Runoff from Catchment 101A is directed via sheet flow to a tributary of Bronte Creek located along the western development limits of the site.

The central catchment (Catchment 101B) consists primarily of vacant agricultural lands and generally slopes northwest to southeast. Runoff from Catchment 101B is directed via sheet flow to a tributary of Bronte Creek located along the western development limits of the site.

The eastern catchment (Catchment 102) consists primarily of vacant agricultural lands and generally slopes northwest to southeast. Runoff from Catchment 101A and 101B is directed via sheet flow to the eastern drainage feature. Correspondence with Geo Morphix (November 23, 2022) indicated the eastern drainage feature does not exhibit a defined channel and outlets to the Bronte Creek tributary located along the southern portion of the site.

There are two (2) external catchments that drain towards the site via overland flow from the north (Catchment EX1 and EX2). Catchment EX1 and EX2 consist of existing residential properties, roadways, landscaped areas, and Old Morriston Baseball Diamond (Catchment EX1 exclusively). Based on existing LiDAR contour mapping and a site visit complete on January 11, 2023, runoff from Catchment EX1 flows from north to south and is directed to a low-lying depression area located in the eastern corner of the Old Morriston Baseball Diamond. An earthen berm along the south and east property limits of the baseball diamond retains stormwater within the park limits. Please refer to Appendix H for site photos illustrating the berm. If the storage limits are reached, stormwater will drain southwest towards the Bronte Creek tributary via sheet flow. Runoff from Catchment EX2 runs from north to south and is directed to the eastern drainage feature via sheet flow through Catchment 102, ultimately outletting to the Bronte Creek tributary. It is recommended that at detailed design, permission from the owner of the Baseball Diamond be obtained to complete a topographic survey to confirm the elevation of the berm.

Table 4 summarizes the pre-development catchment areas and **Figure 6** illustrates the Pre-Development Drainage Plan.

Table 4: Pre-Development Catchment Areas and Percent Impervious

Catchment ID	Land-Use Description	Impervious Area[1] (ha)	Pervious Area (ha)	Total Area (ha)	Percent Impervious (%)	Outlet
101A	Vacant agricultural land and forested area	-	1.26	1.26	0	Bronte Creek Tributary
101B		-	0.76	0.76	0	
102		-	3.96	3.96	0	
Site Total		**-**	**5.98**	**5.98**	**0**	
EX1	Residential properties, roadways, landscaped areas, and a baseball diamond	1.55	3.62	5.17	30.0	Bronte Creek Tributary
EX2	Residential properties, roadways, and landscaped areas	0.52	0.89	1.41	37.2	
External Total		**2.07**	**4.51**	**6.58**	**31.5**	

Note: 1. Impervious area measurements based on Google Earth aerial imaging and is approximate only.

6.2 Proposed Drainage Conditions

Based on the Development Concept prepared by Weston Consulting (October 3, 2023), the proposed development will consist of twenty-one (21) estate residential lots, associated paved internal roadway, and landscaped areas. Access to the proposed development will be provided from the proposed entrance on Ochs Street.

The proposed site grading divides the site into two (2) internal and four (4) external post-development drainage catchment areas as shown on the Post-Development Drainage Plan (**Figure 7**). Details of each drainage catchment are provided in the following section.

- Catchment 201 (A = 3.50 ha) consists of drainage from the proposed building footprints, front yards fronting Street A, landscaped areas and the internal roadways (Street A). Storm events up to and including the 5-year event (minor storm events) will be collected and conveyed by the internal storm sewer system to the proposed stormwater management facility. Storm events greater than the 5-year event (major storm events) will be conveyed overland within the internal roadways (Street A) to the proposed stormwater management facility. The proposed stormwater management facility will provide quantity, quality, and erosion controls for the stormwater runoff from Catchment 201 prior to outletting to the Bronte Creek Tributary, consistent with existing conditions.

- Catchment 202 (A = 2.48 ha) consists of uncontrolled drainage from the proposed building footprints and rear yards along the east side of Street A. All storm events from this catchment are proposed to be conveyed uncontrolled via overland flow towards the Bronte Creek tributary south of the site, consistent with existing conditions.

- Catchment EXT1 (A = 5.22 ha) consists of uncontrolled external drainage from the existing residential properties, roadways, landscaped areas, and a baseball diamond north of the site. Drainage from this catchment is directed to the southwest corner of the park. An earth berm along the south and east property limits of the park, will prevent drainage from this catchment to enter the proposed lots and will be conveyed to the southwest through the drainage easement and proposed swale between Lot 1 and Lot 2 towards the Bronte Creek tributary, consistent with existing conditions. Site photos have been provided in **Appendix H** to show existing earth berm and drainage conditions.

- Catchment EXT2 (A = 0.26 ha) consists of uncontrolled external drainage from the existing residential properties, roadways, and landscaped areas north of the site. All storm events from these catchments are conveyed by the proposed storm sewer infrastructure and internal roadway within the development towards the proposed stormwater management facility, ultimately outletting to the Bronte Creek tributary.

- Catchment EXT3 (A = 0.26 ha) consists of uncontrolled external drainage from the existing residential properties, roadways, and landscaped areas north of the site. All storm events from these catchments are conveyed by the proposed storm sewer infrastructure and internal roadway within the development towards the proposed stormwater management facility, ultimately outletting to the Bronte Creek tributary.

- Catchment EXT4 (A = 0.46 ha) consists of uncontrolled external drainage from the existing residential properties, Ochs Street expansion, and landscaped areas north of the site. All storm events from this catchment are conveyed towards the existing Badenoch Street storm sewer via sheetflow along Ochs Street.

Under the proposed drainage conditions, all storm events up to the 100-year storm from Catchments 201, EXT2, and EXT3 will be conveyed to the proposed stormwater management facility. Following quantity and quality control, stormwater is to be conveyed to the Bronte Creek Tributary.

Table 5 provides details of the catchment areas and percent imperviousness for the post-development conditions.

Table 5: Post-Development Catchment Areas and Percent Impervious

Catchment ID	Catchment Area (ha)	Land Use(s)	Percent Impervious	Outlet
201	3.50	Building footprints, front yards, and internal roadway	58.0	Bronte Creek Tributary
202	2.48	Building footprints and rear yards	36.7	
EXT1	5.22	Residential properties, roadways, landscaped areas, and a baseball diamond	30.0	
EXT2	0.26	Residential properties, roadways, and landscaped areas	42.0	
EXT3	0.26		30.8	
EXT4	0.46		30.4	Badenoch Street Right-of-Way

Refer to the Post-Development Drainage Plan (**Figure 7**) for proposed drainage conditions and the Preliminary Site Servicing and Preliminary Site Grading Plans (**Figures 1-4**) that illustrate the proposed preliminary site servicing and drainage designs.

7.0 Stormwater Management

Stormwater management and site drainage for the proposed development must adhere to the policies and standards of the Township of Puslinch, Conservation Halton, and Ministry of Environment, Conservation, and Parks (MECP).

The stormwater management criteria for the development have been summarized below:

Water Quantity Control

According to the Township of Puslinch Municipal Development Standards (September 2019), water quantity controls are required for the site. The water quantity requirements include controlling the post-development peak runoff rates to the pre-development peak runoff rates for storms up to and including the 100-year event (i.e., 2, 5, 10, 50, 100-year return periods).

Water Quality Control

At least 80% removal of Total Suspended Solids will be provided with "Enhanced Protection" as outlined in the Stormwater Management Planning and Design Manual (MOE, 2003).

Water Balance

Infiltration facilities shall be designed to ensure that, under post-development conditions, infiltration volumes match the pre-development condition.

Erosion Control

According to Conservation Halton Guidelines for Stormwater Management Engineering Submissions (November 2021), erosion control is recommended such that the 25 mm design storm is retained over at least a 24-hour period.

7.1 Stormwater Modelling Parameters

The Township of Puslinch stormwater management guidelines were referenced to determine the hydrologic parameters for the various catchment areas within the site. The topographic survey prepared by J.D. Barnes Limited (September 16, 2022) and the Hydrogeological Assessment prepared by Englobe (August 28, 2024) were referenced to confirm the land cover, drainage pattern, and on-site soil conditions.

Based on these sources, the hydrologic parameters for pre-development and post-development conditions were determined and are summarized in **Table 6** and **Table 7** below. The detailed hydrologic parameter sheets for each catchment area are included in **Appendix D**.

Table 6: Pre-Development Hydrologic Parameters

Catchment Description	101A[N]	101B[N]	102[N]	EX1[S]	EX2[S]
Drainage Area (ha)	1.26	0.76	3.96	5.22	1.41
Total Imperviousness (%)	-	-	-	30.0	37.2
Directly Connected Imperviousness (%)	-	-	-	20.7	29.1
Curve Number (CN)[1]	67.6	66.9	67.9	80.0	80.0
Time to Peak (hours)	0.14	0.05	0.08	-	-

1. Curve number presented as utilized in VO modeling. CN reflects composite curve number for rural catchments modeled using NASHYD routine and curve number for pervious areas only for urban catchments using STANDHYD routine.
2. Superscript N represents the catchment was modelled using a NASHYD and a superscript S, represents the catchment was modelled using a STANHYD.

Table 7: Post-Development Hydrologic Parameters

Catchment Description	201[S]	202[S]	EXT1[S]	EXT2[S]	EXT3[S]	EXT4[S]
Drainage Area (ha)	3.50	2.48	5.22	0.26	0.26	0.46
Total Imperviousness (%)	58.0	36.7	30.0	42.0	30.8	30.4
Directly Connected Imperviousness (%)	19.9	5.0	20.7	30.5	15.4	21.7
Curve Number (CN)[1]	80.0	80.0	80.0	80.0	80.0	80.0
Time to Peak (hours)	-	-	-	-	-	-

1. Curve number presented as utilized in VO modeling. CN reflects composite curve number for rural catchments modeled using NASHYD routine and curve number for pervious areas only for urban catchments using STANDHYD routine.
2. Superscript N represents the catchment was modelled using a NASHYD and a superscript S, represents the catchment was modelled using a STANDHYD.

7.2 Stormwater Quantity Control

As discussed in Section 7.0, stormwater quantity control requirements for the site include controlling the post-development peak runoff to the pre-development peak runoff for storm events up to and including the 100-year event. According to the Township of Puslinch Municipal Development Standards, the City of Guelph's intensity-duration-frequency data for a 2-year to 100-year Chicago Storm event must be used as the hydraulic parameters for stormwater management modelling with a duration of 3 hours.

Visual OTTHYMO (VO) was used to create pre-development, post-development, and post-development with mitigation scenarios to quantify the site's peak stormwater flows. The associated hydrologic parameters are outlined in **Table 6** and **Table 7**. The pre-development and post-development stormwater flows directed to the Bronte Creek Tributary and the storage requirements are summarized below in **Table 8**. The VO model schematics, modelling results, and output files are included in **Appendix E**.

Table 8: Peak Flows and Target Flows Summary (Discharge towards Bronte Creek Tributary)

Storm (Year)	**Pre-Dev. Peak Flow Rate[1]** (m^3/s)	**Post-Dev. Uncontrolled Peak Flow Rate[2]** (m^3/s)	**Post-Dev. Controlled Peak Flow Rate[2]** (m^3/s)	**Storage Volume Required** (m^3)	**Storage Volume Provided[3]** (m^3)
2	0.239	0.478	0.144	554	1,143
5	0.411	0.754	0.249	642	
10	0.561	0.967	0.329	726	
25	0.767	1.283	0.488	823	
50	0.924	1.511	0.632	896	
100	1.087	1.740	0.833	973	
Regional	0.769	0.922	0.915	1,149	

Notes: 1. Includes runoff from Catchment 101A, 101B, 102, and EX2.
2. Includes runoff from Catchment 201, 202, EXT2, and EXT3.
3. 1,143 m^3 of storage is available in the SWM facility.

A *RouteReservoir* component was used in Visual OTTHYMO to model the proposed stormwater management facility and determine the active storage volumes required to control the peak flows for the 2-year to 100-year storm events. The 3-hour Chicago design storm was modelled using the City of Guelph's IDF parameters. To meet quantity control criteria, 973 m^3 of active storage volume is required to control the 100-year 3-hour Chicago design storm. Required active storage volumes for each storm event are summarized above in **Table 8**. The total active storage provided in the stormwater management pond is 1,143 m^3, providing an additional 0.3 m of freeboard to the top of berm (not included in active storage). An emergency overflow weir has been proposed to outlet to the Bronte Creek tributary to convey the expected peak flow from the Regional event. The Visual OTTHYMO input and output files and model schematics have been provided in **Appendix E** and the details of the weir are illustrated on **Figure 1**.

A storm sewer design sheet has been prepared to determine storm pipe sizes throughout the development and has been provided in **Appendix D**.

The proposed stormwater management facility will be a stormwater management dry pond located near the southeast corner of the proposed development and will control post-development peak flows to their pre-development levels or lower ('Post-to-Pre control'). The ultimate receiver of the stormwater from the proposed development is the Bronte Creek Tributary which is located east of the proposed development.

Catchment 202 will consist of rooftop and rear-yard drainage from the lots located along the southern and eastern property limits. Drainage from Catchment 201 will be overcontrolled to allow for Catchment 202 to drain uncontrolled to the Bronte Creek Tributary; however, the proposed dry pond will overcontrol the remainder of the site so the total peak flow rate from the site to the Bronte Creek Tributary will remain less than existing conditions.

7.3 Stormwater Quality Control

Stormwater quality controls for the proposed development must incorporate measures to provide "enhanced protection" as outlined by the Township of Puslinch Municipal Development Standards. Enhanced water quality protection involves the removal of at least 80% of the total suspended solids (TSS) from 90% of the annual runoff volume.

Water quality control for Catchment 201 will be provided using an oil-grit separator (Stormceptor EFO8 or approved equivalent) and dry pond in series. The oil-grit-separator is located upstream of the proposed stormwater management dry pond to provide quality control for runoff before discharging into the pond. It is understood the Township recognizes that an OGS unit provides 50% TSS removal. The proposed dry pond will provide 60% TSS removal per MECP standards. Together, the oil-grit separator and dry pond in series will provide 80% TSS removal (50% + 60%x50% = 80%). The water treatment train calculations and OGS sizing report can be found in **Appendix F**.

Catchment 202 will produce only clean runoff (i.e., landscaped and rooftop runoff). Therefore, quality controls are not proposed.

7.4 Stormwater Management Erosion Control

As outlined above, the proposed development is required to provide erosion control in the form of extended detention. The extended detention includes a minimum of 24-hour detention for the 25 mm storm event, per the Conservation Halton Stormwater Management Guidelines.

Erosion control for the proposed stormwater management facility is proposed to be provided by the active storage component of the proposed dry pond. A 25 mm 3-Hour Chicago storm event was executed in the proposed conditions VO model. The computed runoff depth and required extended detention volume for the SWM dry pond is summarized in **Table 9**.

Table 9: Required Extended Detention Volume

Stormwater Management Facility	Total Contributing Drainage Area (ha)	Criteria	Required Volume (m^3)	Provided Volume (m^3)
Dry Pond	4.02	MECP Extended Detention (150 m^3/ha)	603	603
		Erosion Control (25mm Runoff Volume)	465	

Note: 1. Required storage volumes from Table 3.2 of MECP SWM Planning and Design Manual (2003) based on 150 m^3/ha for extended detention.
2. 25 mm runoff volume obtained from VO model

As presented in **Table 9**, the MECP Extended Detention volume requirements exceed the Erosion Control volume requirements requested by Conservation Halton. Therefore, the MECP standards govern the required volume for extended detention in the proposed stormwater management dry pond. The governing volume of 603 m^3 must be detained over a period of 24-hour to 48-hours. Drawdown calculations have been provided in **Appendix D**.

7.5 Stormwater Management Facility Design Requirements

The proposed stormwater management dry pond will provide stormwater quantity, quality, and erosion controls to meet the relevant stormwater criteria outlined in Section 7.0 for the proposed development. The dry pond will provide an active storage component equipped with an outlet structure sized to meet stormwater quantity control and erosion control criteria.

The pond design was prepared to achieve the following Ministry of Environment, Conservation, and Parks design requirements as outline in Table 4.8 of the MECP Stormwater Management Manual:

- The proposed pond will have 4:1 side slopes.
- Mean depth between 1 m – 3 m.
- The dry pond will be designed with an emergency overflow weir to direct flows towards the Bronte Creek tributary.

7.6 Stormwater Management Facility Operating Characteristics

A preliminary stormwater management dry pond design has been completed, demonstrating that the stormwater management block is adequately sized to meet the requirements set by the various regulatory bodies. A summary of the preliminary stormwater management pond's characteristics is shown below in **Table 10**.

Table 10: Stormwater Management Pond Operating Characteristics

Component	Elevation (m)	Storage Required (m^3)	Storage Provided (m^3)
Bottom of Pond	312.35	-	-
Extended Detention	313.52	603	603
Regional High Water Level	314.05	1,127	1,143
Top of Berm	314.35	-	1,536

As shown above in **Table 10**, the stormwater management facility presented within this report is sufficiently sized to meet all design criteria. Refer to **Appendix D** for detailed stormwater management facility calculations.

7.7 Water Balance

The water balance parameters were established based on the climate data from various Kitchener-Waterloo Weather Stations near the Region of Waterloo International between 1990 – 2020, as well as site topography, soil type, and land cover infiltration factors. The results of the water balance indicate that there is an infiltration deficit of approximately 3,148 m^3/year (3.2 mm storm event) due to an increase in impervious surfaces.

Based on communications with the Hydrogeological Consultant (Englobe, formerly Terraprobe), when applying a safety factor of 2.5, the existing soils at the location of the end-of-pipe LID can facilitate a preliminary infiltration rate of 30 mm/hr. The infiltration rate is to be confirmed with site testing (i.e., test pits and Guelph permeameter or double-ring infiltrometer testing) at the detailed design stage.

An end-of-pipe LID feature is proposed to meet pre-development infiltration volumes. This end-of-pipe LID will be a 367 m^2 underground gravel infiltration trench with a depth of 1 m. This LID is designed to infiltrate 5,292 m^3/year (5 mm storm event), which is designed to infiltrate 34% of the average cumulative precipitation between the months of April and October. It has been assumed that the months of October to March are not conducive for infiltration due to frozen conditions. Refer to **Table 11** which outlines the storage volume requirements for each lot to meet the water balance requirements on the site should LIDs be required.

Table 11: Water Balance Volume Requirements

Storage Requirements	Gravel Diaphragm Area (m^2)	Void Ratio	Required Storage (m^3)	Provided Storage (m^3)
Water Balance	367	0.4	147	147

As outlined above in **Table 11**, if the Conservation Authority would like the water balance objectives to be met under post-development conditions, this will require an infiltration trench to store and infiltrate a volume of at least 147 m^3, which will be provided through a proposed infiltration trench. The detailed water balance calculations are presented in **Appendix D**.

7.8 Floodplain Assessment

The Conservation Halton HEC-RAS floodplain modelling for the Bronte Creek Tributary (March 14, 2012) was obtained and reviewed by Crozier. Review of the modeling and the staked wetland and woodlot environmental constraints on the property ultimately determined the wetland and woodlot setbacks that govern the overall development limits for the site.

The Regional floodplain from the Conservation Halton HEC-RAS floodplain model has been delineated on the civil engineering drawings and a 15 m floodplain setback was established based on the Conservation Halton Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document April 27, 2006 (last amended, November 6, 2020). The wetland and woodlot were determined to be the governing development setbacks for the proposed development and, therefore, a detailed floodplain assessment has not been completed at this time. Furthermore, a meeting was held with Conservation Halton staff on July 4th to discuss if the Conservation Halton HEC-RAS floodplain model delineation was sufficient for the floodplain delineation for the proposed development. Following the meeting, it was noted the Conservation Halton HEC-RAS floodplain model delineation was sufficient for the proposed development. Email excerpts with Conservation Halton staff have been included in **Appendix F**.

8.0 Erosion and Sediment Controls During Construction

The design of the erosion and sediment controls will be completed during the detailed design of the proposed development. The erosion and sediment controls will be required to be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Township of Puslinch. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

Further details on the erosion and control measures that may be implemented have been summarized below:

Sediment Control Silt Fence

Sediment Control Silt Fence will be installed on the perimeter of the site to intercept sheet flow. Additional Sediment Control Silt Fence may be added based on field decisions by the Site Engineer and Owner prior to, during, and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

Rock Check Dams

Rock check dams installed according to OPSD 219.210 should be installed in the proposed swale to protect from erosion conveyance during construction.

The Removals, Erosion and Sediment Control Plan will be refined throughout the planning application process with consultation with the Township and Conservation Authority to ensure potential environmental hazards during construction are minimized.

9.0 Conclusions & Recommendations

This report was prepared in support of the Zoning By-Law Amendment Application for the property located at 11 Main Street in the Township of Puslinch. The proposed development can be serviced for sanitary, water, and stormwater management in accordance with the Township of Puslinch, County of Wellington, and Conservation Halton requirements and standards. Our conclusions and recommendations include:

Proposed Water and Sanitary Servicing

1. Municipal servicing infrastructure is not available for the Site, therefore, the proposed development will be serviced by individual onsite sewage systems and drilled wells.

2. On-site soils are primarily classified as silty sand to sand and silt deposits. The anticipated T-time for the soils is 30 min/cm. This T-time is an assumed average for the entire site based on the findings outlined in the Hydrogeological Assessment (Englobe, August 28, 2024). At detailed design, it is recommended that detailed groundwater studies are conducted to provide location specific T-Time estimates to support the detailed design of the sewage systems throughout the development. Groundwater was observed to be 5.21 mbgs to 6.76 mbgs. Additional groundwater information is provided in the Hydrogeological Assessment (Englobe, August 28, 2024).

3. The preliminary sewage system design flows are expected to be approximately 3,600 L/d for each lot. Given the preliminary sewage system design flow is less than 10,000 L/day per individual lot, an ECA issued by the MECP will not be required. Each onsite sewage system will consist of an advanced treatment unit discharging to a leaching bed constructed as a Type A dispersal bed with a footprint of approximately at least 270 m^2. The advanced treatment system will consist of a Level IV treatment unit meeting the CAN/BNQ 3680-600 standard and must achieve the denitrification requirement of at least 62.5% nitrate-nitrogen reduction to meet MECP Guideline D-5-4.

4. Individual lots will be serviced with private drilled wells in accordance with O. Reg. 903 for potable water supply.

Stormwater Management

1. The site's stormwater runoff from the developable area (Catchment 201) will be collected and conveyed towards the proposed stormwater management facility by the proposed storm sewer network and internal road network. The proposed dry pond will control the post-development peak flows to the pre-development peak flows prior to outletting towards the Bronte Creek Tributary. Stormwater runoff the Catchment 202 will flow uncontrolled towards to the Bronte Creek Tributary.

2. Stormwater runoff from Catchment EXT1 will continue to be directed around the proposed development towards the Bronte Creek Tributary and stormwater runoff from Catchment EXT2 and EXT3 will be conveyed through the proposed development by the proposed storm sewer system and internal road network to the dry pond.

3. Stormwater quality controls for Catchment 201 will be provided by an oil-grit separator in series with the proposed dry pond to achieve 80% TSS removal.

4. The stormwater management facility will be designed to meet the erosion control requirements and provide a minimum of 24-hour detention for the 25 mm storm event.

5. The preliminary infiltration rate for soils onsite is 30 mm/yr. Therefore, an underground gravel infiltration trench has been proposed with a storage of 147 m^3 per storm event, which meets the infiltration target of 5,292 m^3/year.

Erosion and Sediment Controls

1. Erosion and sediment controls will be implemented prior to construction and maintained to the satisfaction of the Township and Site Engineer until the site is stabilized.

Based on the above conclusions, we recommend the approval of the Zoning By-Law Amendment Application from the perspective of functional servicing and preliminary stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Cole Martin
Engineering Intern, Land Development

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Trevor Fraser, P.Eng.
Project Manager, Land Development

TF/tc:rl

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APPENDIX A

Fire Flow Calculations

CROZIER CONSULTING ENGINEERS

Project: 11 Main Street
Project NO.: 2366-6537
Date: 2023-01-09
Designed By: BP
Checked By: BW

Adequate Water Supply Calculations (OFM Version)
Part 3 Fire Protection, Occupant Safety and Accessibility of the Ontario Building Code

Building:	Type C (Residential)	360 m²	6 m

References

1. Part 3 of the Ontario Building Code (2012)
2. Fire Protection Water Supply Guideline For Part 3 Of The Ontario Building Code, TG-03-1999 (October 1999)
3. Draft Plan of Subdivision, Weston Consulting (February 6, 2023)

Equation

$$Q = KVS_{Total}$$

Q	Minimum supply of water in litres.
K	Water supply coefficient based upon building occupancy.
V	Total building volume in cubic metres.
S_{TOT}	Total of spatial coefficient values from property line exposures on all sides

Minimum Supply of Water

K =	23.0	C Classification	(reference 1.)
V =	2160 m³		
S_{TOT} =	1.8		

Exposure	Distance (m)	S_{side}
North	40.0	0.0
East	6.0	0.4
South	6.0	0.4
West	30.0	0.0

Q = 89,424 L

Minimum Water Flow Supply Flow Rate

Required minimum water supply flow rate (L/min) (reference 2.)

Floor area ≤ 600 m²:		Yes	
		2700 L/min	Required flow rate
		0.5 hr	Required duration
Q =	**81,000 L**		

Conclusion

Therefore, the minimum water supply for proposed Building Type C (Residential) is **89,424 L**

CROZIER CONSULTING ENGINEERS

Project: 11 Main Street, Puslinch
Project No.: 2366-6537
Created By: AL
Checked By: BW
Date: 2023.02.07
Updated: 2024-07-31

Domestic Water Demand - Ontario Building Code

Peak Sewage Flow	3,600	L/day	
Avg. Daily Demand =	450	L/day	
	0.31	**L/min**	
Peaking Factors			
Max Day =	8.0		
Peak Hour =	12.1		
Average Day =	**0.31**	L/min	
Max Day =	**2.50**	L/min	
Peak Hour =	**3.77**	L/min	

Notes & References

Ontario Building Code - Table 8.2.1.3.B

24-hr day

Based on MECP suggested factor from Table 3-3 MOE Design Guidelines for Drinking Water Systems fewer than 500 people (2008)

Max Day = (Average Day Demand) * (Max Day Factor)

Peak Hour = (Average Day Demand) * (Peak Hour Factor)

Criteria	Average Daily Water Demand (L/min)	Max Day Demand (L/min)	Peak Hourly Demand (L/min)
OBC and MECP Design Guidelines	0.31	2.50	3.77

CROZIER CONSULTING ENGINEERS

Project: 11 Main Street, Puslinch
Project No.: 2124-6029
Prepared By: BP
Checked By: BW
Date: 2022.05.11
Updated: 2024.07.31

WATER DEMAND CALCULATIONS

11 Main Street, Township of Puslinch

Note: Based on Development Concept prepared by Weston Consulting dated February 6, 2023

			References
Population Density	4	persons/unit	Per jobs of similar scope.
Number of Units	23		
Total Population	92	persons	
Average Daily Demand	450	L/cap/day	MOE Design Guidelines for Drinking Water Systems (2008), Section 3.4.2.
	41,400	L/day	
	0.48	**L/s**	
Maximum Daily Demand Peaking Factor	3.6		MOE Design Guidelines for Drinking Water Systems (2008), Section 3.4.5.1, Table 3-3.
Maximum Hourly Demand Peaking Factor	5.4		
Maximum Daily Flow	149,040	L/day	
	1.73	**L/s**	
Peak Hour Flow	223,560	L/day	
	2.59	**L/s**	
Maximum Daily per Unit	6,480	L/day	
	0.08	**L/s**	
Peak Hour Flow per Unit	9,720	L/day	
	0.11	**L/s**	

APPENDIX B

Sanitary Servicing Calculations

ONSITE SEWAGE SYSTEM RESIDENTIAL CALCULATION SHEET

Project Name: 11 Main Street
Project Number: 2366-6537

######## 2024-11-07
Designed By: AL
Checked By: KR

input required

Fixtures	Number of Fixtures	Fixture Units per Fixture	Total Fixture Units
Bathroom Group (flush tank)	3	6	18.0
2 Piece Bathroom	2	5.5	11.0
Basement Rough-in	0	6	0.0
Sinks (Domestic Lavatory w. 1/2" trap, kitchen sink, single compartment laundry tray)	5	1.5	7.5
Clothes Washer	1	1.5	1.5
Dishwasher (if not connected to kitchen sink)	1	1	1.0
Shower (from 1 head)	1	1.5	2
Floor drain	1	3	3
Laundry Tub	1	1.5	2
		Total Fixture Units	**45.0**

Assumed fixture units based on similar house sizes

ONSITE SEWAGE SYSTEM RESIDENTIAL CALCULATION SHEET

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2024-11-07
Designed By: AL
Checked By: KR

input required

House Details: 4 bedroom
360.00 m2

References

Description		Number of Units	Additional Flow per Unit (L)	Total Flow (L/day)
Base Flow				2000
Additional Flow				
i) Each bedroom over 5		0	500	0
ii) Area over $200m^2$,				
A) Each $10m^2$ over $200m^2$ to $400m^2$		16	100	1600
B) Each $10m^2$ over $400m^2$ to $600m^2$		0	75	0
C) Each $10m^2$ over $600m^2$		0	50	0
	Total Additional Sewage Flow from Area			1600
iii) Fixture Units over 20		25	50	1250
			Addition flow (greatest of i,ii,iii)	**1600**
			Total Daily Design Sanitary Sewage Flow (L/day):	**3600**

Pre-Treatment Options

Treatment: **WBP Model AD40**, 4000 L/d
Treatment: **ADIPC-11250**
Basket Biofilter Tank: **BT-11250**
Orangeville Precast Concrete Ltd.

Required septic tank size = 7200 L minimum

Propose Level IV Treatment (Y/N): Y

Native Percolation time, T = 30 min/cm — T-time estimated by Crozier

Imported Sand Percolation time = 30 min/cm

Option #1 - Type A Dispersal Bed

	Required		Provided	
Stone area =	72 m^2	(Q/50)	72 m^2	12m x 6m
Sand area =	270 m^2	(QT/400)	368 m^2	16m x 23m

APPENDIX C

Waterloo Biofilter Third-party Verification Studies

WaterNOx-LS Third Party Testing Summary

In the fall of 2016, Waterloo Biofilter Systems Inc. installed their WaterNOx-LS™ denitrification unit at the Bureau de Normalisation du Quebec (BNQ) test site located in Quebec City. The system underwent BNQ 3680-600 test protocol which includes two parts - Period A and Period B. Period A is based on the methodology of NSF/ANSI Standards 40 and 245, containing the same flow patterns and stress tests. Period B provides for a further 6 months of seasonal reliability testing to ensure that the test includes cold weather results.

The WaterNOx-LS is a passive autotrophic denitrification process using sulphur-limestone minerals in a submerged, up-flow configuration. The WaterNOx-LS, which was sized for 1,600 L/day (350 gpd) followed a Waterloo Biofilter nitrifying treatment unit.

Period A Test Results

During Period A wastewater is dosed according to the hydraulic loading specified in NSF-40. Period A includes the wash-day, working-parent, power failure, and vacation period stress tests. All sample results taken during stress tests are included in the analysis. Influent wastewater temperature values ranged from 10.0 °C (50 °F) to 16.5 °C (62 °F) with an average value of 13.3 °C (56 °F). Influent pH averaged 7.9 and effluent pH averaged 7.2.

Table 1 – Period A Results for the WaterNOx-LS

Parameters	Influent	Effluent	Removal
(c)BOD_5	260	6	97.6%
TSS	312	3	99.2%
Fecal Coliforms	2,403,000	4,900	99.8%
$NO_{2,3}$	-	0.20	-
TKN	57.1	4.6	92.0%
TN ($NO_{2,3}$ + TKN)	57.1	4.8	91.6%

n = 123; n = 357 for fecals
All parameters in mg/L except Fecal Coliforms in cfu/100mL
All values arithmetic averages except Fecal Coliforms in geometric average

Weekly influent total nitrogen concentrations ranged from 43.0 mg/L to 68.8 mg/L with a six-month average concentration of 57.1 mg/L.

Weekly effluent $NO_{2,3}$ concentrations ranged from < 0.02 mg/L to 3.33 mg/L with a six-month average of 0.20 mg/L. Weekly effluent TKN concentrations ranged from 1.5 mg/L to 16.9 mg/L with a six-month average of 4.6 mg/L. Weekly effluent total nitrogen concentrations ranged from 1.7 mg/L to 17.1 mg/L with a six-month average of 4.8 mg/L. The total nitrogen reduction over the six-month period was 91.6%.

65 Massey Road, Suite C, Guelph ON N1H 7M6 T: 519 856-0757 1-866-366-4329 F: 519 856-0759 www.waterloo-biofilter.com

Period B Test Results

Weekday hydraulic loading is modified during Period B to a strenuous 'working parent' schedule where 40% of the flow is delivered over three hours in the morning, and 60% is delivered over three hours in the evening. All samples taken during Period B are included in the analysis. Influent wastewater temperature values ranged from 10.1 °C (50 °F) to 15.8 °C (60 °F) with an average value of 12.3 °C (54 °F). Influent pH averaged 8.0 and effluent pH averaged 7.1.

Table 2 – Period B Results for the WaterNOx-LS

Parameters	Influent	Effluent	Removal
(c)BOD_5	248	4	98.2%
TSS	304	3	99.1%
Fecal Coliforms	2,142,000	2,800	99.9%
$NO_{2,3}$	-	3.38	-
TKN	60.3	8.5	85.9%
TN ($NO_{2,3}$ + TKN)	60.4	11.9	80.3%

n = 59; n = 118 for fecals
All parameters in mg/L except Fecal Coliforms in cfu/100mL
All values arithmetic averages except Fecal Coliforms in geometric average

Weekly influent total nitrogen concentrations ranged from 21.2 mg/L to 85.6 mg/L with a six-month average concentration of 60.4 mg/L.

Weekly effluent $NO_{2,3}$ concentrations ranged from < 0.04 mg/L to 15.2 mg/L with a six-month average of 3.38 mg/L. Weekly effluent TKN concentrations ranged from 1.2 mg/L to 21.2 mg/L with a weekly average of 8.5 mg/L. Weekly effluent total nitrogen concentrations ranged from 3.7 mg/L to 22.2 mg/L with a six-month average of 11.9 mg/L. The total nitrogen reduction over the six-month period was 80.3%.

Conclusion

In summary, the WaterNOx-LS system can successfully remove very high levels of total nitrogen passively, while buffering pH to neutral and keeping cBOD_5 and TSS levels below 10 mg/L.

APPENDIX D

Hydrologic Parameter Sheets & SWM Design

Project: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Checked By:
Date: 2024.06.19

Water Budget Summary
Project Name: 11 Main Street
Water Balance/Water Budget Assessment

Characteristic	Site				
	Pre-Development	Post-Development	Post-Development *with Mitigation*	Change (Pre to Post)	Change (Pre to Post) *with Mitigation*
Inputs (Volumes)					
Precipitation (m^3/yr)	50872	50872	50872	0%	0%
Run-On (m^3/yr)	0	0	0	0%	0%
Other inputs (m^3/yr)	0	0	0	0%	0%
Total Inputs (m^3/yr)	**50872**	**50872**	**50872**	**0**	**0**
Outputs (Volumes)					
Runoff (m^3/yr)*	9603	24891	19599	15288	9996
Evapotranspiration (m^3/yr)	34867	22726	22726	-12140	-12140
Infiltration (m^3/yr)	6402	3254	3254	-3148	-3148
Soakaway Infiltration (m^3/yr)	0	0	**5292**	**0**	**5292**
Total Infiltration (m^3/yr)	**6402**	**3254**	**8547**	-3148	2145
Runoff Pervious Areas (m^3/yr)	9603	4882	4882	-4722	-4722
Runoff Impervious Areas (m^3/yr)	0	20010	14717	20010	14717
Total Runoff (m^3/yr)	9603	24891	19599	15288	9996
Total Outputs (m^3/yr)	**50872**	**50872**	**50872**	0%	0%

Project Name: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Checked By:
Date: 2024.06.19

Climatic Water Budget - Thornthwaite Method
Project Name: 11 Main Street
*WATERLOO WELLINGTON A - Climate Normals 1971-2000 Station Data

	Degrees	Minutes	Seconds	
Insert Latitude:	43	27	0	*Only Applicable Between Latitudes 40° - 50°

Month	Mean Temperature (◦C)	Heat index	" a "	PET - Potential Evapotranspiration (mm)	Daily Correction Value	Adjusted PET - Potential Evapotranspiration (mm)	Total Precipitation (mm)	Surplus (mm)	Deficit (mm)
January	-6.3	0.0	0.49	0.0	0.77	0.0	66.3	66.3	0.0
February	-5.9	0.0	0.49	0.0	0.87	0.0	46.1	46.1	0.0
March	-0.8	0.0	0.49	0.0	0.99	0.0	57.0	57.0	0.0
April	5.9	1.3	0.52	27.0	1.11	30.1	81.2	51.1	0.0
May	12.6	4.1	0.56	60.9	1.23	74.8	80.2	5.4	0.0
June	17.8	6.8	0.61	88.3	1.29	113.7	80.5	0.0	33.2
July	20.2	8.3	0.64	101.1	1.26	127.8	96.2	0.0	31.6
August	19.1	7.6	0.62	95.2	1.17	111.4	67.2	0.0	44.2
September	15.2	5.4	0.59	74.5	1.05	78.0	75.2	0.0	2.8
October	8.8	2.4	0.53	41.5	0.92	38.2	71.0	32.8	0.0
November	2.6	0.4	0.50	11.2	0.81	9.1	74.9	65.8	0.0
December	-2.8	0.0	0.49	0.0	0.75	0.0	54.9	54.9	0.0
Totals		**36.2**	**1.07**			**583.1**	**850.7**	**379.5**	**111.8**

TOTAL WATER DEFICIT = **111.8 mm**
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = **267.6 mm**
Precipitation Adjustment Factor : **none**

NOTES:
1. Water budget adjusted for latitude and daylight.
2. (◦C) - Represents calculated mean of daily temperatures for the month.
3. Precipitation and Temperature data from the *WATERLOO WELLINGTON A (Station No.6149387) Environment Canada Station Data
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted potential evapostranspiration.

Project: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Date: 2024.06.19

Design Storm Determination
Project Name: 11 Main Street
Water Balance/Water Budget Assessment

Days with Precipitation (From Climate Data)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
>= 0.2 mm	13.0	12.3	12.0	11.8	11.0	11.5	14.1	86
>= 5 mm	5.0	4.8	5.1	4.5	4.0	4.8	4.5	33
>= 10 mm	2.4	2.8	2.6	3.0	2.4	2.7	2.6	19
>= 25 mm	0.3	0.4	0.3	1.0	0.5	0.6	0.3	3.45

Available Precipitation

Storm Event (mm)	Total Days Per Year	Incremental Precipitation (mm/yr)	Cumulative Precipitation (mm/yr)
0.2	86	17.1	17.1
5	33	163.2	180.4
10	19	186.1	366.5
25	3.45	86.3	452.8
Total	**140**	**452.8**	

Infiltration Target:	5292	m^3/year	
Contributing Area:	29402	m^2	Impervious Area
Infiltration Target:	107	mm/year	
Runoff Coefficient:	0.90		Impervious runoff coefficient
Design Precipitation:	119	mm/year	(Design Infiltration / Contributing RC)
Therefore Min. Design Storm:	3.2	mm	
Chosen Design Storm:	5	mm	
Required Storage:	147	m^3	Volume per Storm Event

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Project Name: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Checked By:
Date: 2024.06.19

Water Budget - Post-Development *with Mitigation*
Project Name: 11 Main Street
Water Balance/Water Budget Assessment

Post-development pervious area.
Post-development impervious area.

Catchment Designation	Site - Post-Development		
	Pervious Area	Impervious Area	Totals
Area (m^2)	30398	29402	59800
Pervious Area (m^2)	30398	0	30398
Impervious Area (m^2)	0	29402	29402
Infiltration Factors			
Topography Infiltration Factor	0.10	0	
Soil Infiltration Factor	0.20	0	
Land Cover Infiltration Factor	0.10	0	
MOE Infiltration Factor	0.40	0.00	
Actual Infiltration Factor	0.40	0.00	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0.00	1.00	
Inputs (per Unit Area)			
Precipitation (mm/yr)	851	851	851
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**851**	**851**	**851**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	268	851	554
Net Surplus (mm/yr)	268	851	554
Evapotranspiration (mm/yr) *	583	170	380
Infiltration (mm/yr)	107	0	54
Soakaway Infiltration (mm/yr)	0	180	88
Total Infiltration (mm/yr)	107	180	143
Runoff Pervious Areas (mm/yr)	161	0	82
Runoff Impervious Areas (mm/yr)	0	501	246
Total Runoff (mm/yr)	161	501	328
Total Outputs (mm/yr)	**851**	**851**	**851**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	25860	25012	50872
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**25860**	**25012**	**50872**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	8136	25012	33148
Net Surplus (m^3/yr)	8136	25012	33148
Evapotranspiration (m^3/yr) *	17724	5002	22726
Infiltration (m^3/yr)	3254	0	3254
Underground Storage Infiltration (m^3/yr)	0	5292	5292
Total Infiltration (m^3/yr)	3254	5292	8547
Runoff Pervious Areas (m^3/yr)	4882	0	4882
Runoff Impervious Areas (m^3/yr)	0	14717	14717
Total Runoff (m^3/yr)	4882	14717	19599
Total Outputs (m^3/yr)	**25860**	**25012**	**50872**
Difference (Inputs- Outputs)	**0**	**0**	**0**

5292 Proposed Infiltration via Mitigation

Pre-Development Total Infiltration:
107 mm/yr

Note:
0 mm
Precipitation available between Apr-Oct (non-winter months). Therefore available for infiltration into non-frozen soil

Pre-Development Total Infiltration:
6402 m3/yr

NOTES:
* Evaporation from impervious areas was assumed to be 20% of precipitation.

Project Name: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Checked By:
Date: 2024.07.02

Water Budget - Post-Development *without Mitigation*
Project Name: 11 Main Street
Water Balance/Water Budget Assessment

Post-development pervious area.
Post-development impervious area.

Note: Site land use areas consistent with Post-Development SWM hydrologic modeling & calculations

Catchment Designation	Site - Post-Development		
	Pervious Area	Impervious Area	Totals
Area (m^2)	30398	29402	59800
Pervious Area (m^2)	30398	0	30398
Impervious Area (m^2)	0	29402	29402
Infiltration Factors			
Topography Infiltration Factor	0.10	0	
Soil Infiltration Factor	0.20	0	
Land Cover Infiltration Factor	0.10	0	
MOE Infiltration Factor	0.40	0.00	
Actual Infiltration Factor	0.40	0.00	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0.00	1.00	
Inputs (per Unit Area)			
Precipitation (mm/yr)	851	851	851
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**851**	**851**	**851**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	268	851	554
Net Surplus (mm/yr)	268	851	554
Evapotranspiration (mm/yr) *	583	170	380
Infiltration (mm/yr)	107	0	54
Soakaway Infiltration (mm/yr)	0	0	0
Total Infiltration (mm/yr)	107	0	54
Runoff Pervious Areas (mm/yr)	161	0	82
Runoff Impervious Areas (mm/yr)	0	681	335
Total Runoff (mm/yr)	161	681	416
Total Outputs (mm/yr)	**851**	**851**	**851**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	25860	25012	50872
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**25860**	**25012**	**50872**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	8136	25012	33148
Net Surplus (m^3/yr)	8136	25012	33148
Evapotranspiration (m^3/yr) *	17724	5002	22726
Infiltration (m^3/yr)	3254	0	3254
Soakaway Infiltration (m^3/yr)	0	0	0
Total Infiltration (m^3/yr)	3254	0	3254
Runoff Pervious Areas (m^3/yr)	4882	0	4882
Runoff Impervious Areas (m^3/yr)	0	20010	20010
Total Runoff (m^3/yr)	4882	20010	24891
Total Outputs (m^3/yr)	**25860**	**25012**	**50872**
Difference (Inputs- Outputs)	**0**	**0**	**0**

Pre-Development Total Infiltration:
6402 m3/yr

NOTES:
* Evaporation from impervious areas was assumed to be 0% to be conservative, as there will be some evaporation.

Project Name: 11 Main Street
Project No: 2366-6357
Modelled By: DK
Checked By:
Date: 2024.07.02

Water Budget - Pre-Development
Project Name: 11 Main Street
Water Balance/Water Budget Assessment

Pre-development pervious area.
Pre-development impervious area.

Note: Site land use areas consistent with Pre-Development SWM hydrologic modeling & calculations

Catchment Designation	Site - Pre-Development		
	Pervious Area	Impervious	Totals
Area (m^2)	59800	0	59800
Pervious Area (m^2)	59800	0	59800
Impervious Area (m^2)	0	0	0
Infiltration Factors			
Topography Infiltration Factor	0.10	0	
Soil Infiltration Factor	0.20	0	
Land Cover Infiltration Factor	0.10	0	
MOE Infiltration Factor	0.40		
Actual Infiltration Factor	0.40	0	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0	0.90	
Inputs (per Unit Area)			
Precipitation (mm/yr)	851	851	851
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**851**	**851**	**851**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	268	766	268
Net Surplus (mm/yr)	268	766	268
Evapotranspiration (mm/yr) *	583	170	583
Infiltration (mm/yr)	107	0	107
Soakaway Infiltration (mm/yr)	0	0	0
Total Infiltration (mm/yr)	107	0	107
Runoff Pervious Areas (mm/yr)	161	0	161
Runoff Impervious Areas (mm/yr)	0	681	0
Total Runoff (mm/yr)	161	681	161
Total Outputs (mm/yr)	**851**	**851**	**851**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	50872	0	50872
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**50872**	**0**	**50872**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	16005	0	16005
Net Surplus (m^3/yr)	16005	0	16005
Evapotranspiration (m^3/yr) *	34867	0	34867
Infiltration (m^3/yr)	6402	0	6402
Soakaway Infiltration (m^3/yr)	0	0	0
Total Infiltration (m^3/yr)	6402	0	6402
Runoff Pervious Areas (m^3/yr)	9603	0	9603
Runoff Impervious Areas (m^3/yr)	0	0	0
Total Runoff (m^3/yr)	9603	0	9603
Total Outputs (m^3/yr)	**50872**	**0**	**50872**
Difference (Inputs- Outputs)	**0**	**0**	**0**

Project: 11 Main Street
Project No.: 2366-6537
Created By: CM
Checked By: TF
Date: 2024.11.08

Erosion Control Volume Calculations (MECP)

Area Name	**Drainage Area**			
Area to Pond =	4.02	ha	Percent Impervious	55.2%
Extended detention (MECP) =	603	m^3	Percent Pervious	44.8%

Extended Detention Volume:

Greater of :	Dry Pond Detention:	V =	150 m^3 / ha	(MECP requirement)
		V =	603 m^3	
	Detention of 25mm Runoff:	Depth =	11.56	(from VO model)
	(Runoff volume based on 25mm VO Model)	V =	465 m^3	

Required Extended Detention Volume = 603 m^3

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Project No:	2366-6537
Project:	11 Main Street
File:	Extended Detention
Design by:	CM
Checked by:	TF
Date:	2024.11.08

Extended Detention Specifications

(Per MECP)

Extended Detention Volume (Area x runoff from 25mm event)		603
t (drawdown time - seconds, *hours in italics*)	*24.0*	86400
Ao (cross section area of orifice - sqm)		0.0044
h (maximum water elevation above orifice for extended detention- m)		1.17
C (discharge coefficient)		0.64
Ap (average surface area for extended detention - sqm)		857

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

Ao = 0.008 sqm d = 98 mm

Extended Detention Orifice Diameter (as designed) d = **75** mm

ACTUAL DRAWDOWN TIME

* Neglecting tailwater conditions*

Extended Detention Volume Used	603
d (orifice diameter, mm)	75
h (maximum head acting on orifice for extended detention, m)	1.17
Ao (cross section area of orifice, m^2)	0.0044
C (discharge coefficient)	0.64
Ap (average surface area for extended detention, m^2)	850

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

t (hours) 41

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME 101A
D.A. AREA (ha) 2.02

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101A

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic Group	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	2.02
				0
				0
				0
Total Area				2.02

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*On-site soils silty sand with poor hydraulic conductivity per Terraprobe Hydrogeological Assessment (February 2023)

Impervious Landuses Present:

	Gravel		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0		0		0		0		0		0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.16	36	0.00	30	0		0		1.86	70	2.02	136.01
Subtotal	0.16		0.00		0		0		1.86			

Composite Area Calculations		
	Total Pervious Area	2.02
	Total Impervious Area	0.00
	% Impervious	0.00%
	Composite Curve Number	67.3
	Total Area Check	2.02

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Dumfries Sandy Loam*								
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.16	1.59	0.30	0.16		0		0		0	0.05
Meadow	8	0	0		0.00		0		0		0	0
Wetland	16	0	0		0.00		0		0		0	0
Lawn	5	0	0		0.00		0		0		0	0
Cultivated	7	1.86	13.03	0.45	1.86		0		0		0	0.84
Impervious	2	0	0		0.00		0		0		0	0
Composite		2.02	7.24	Composite Runoff Coefficient								0.44

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	111	6.70	6.04%	2.7	0.66	0.05	0.03	0.03	0.07	0.05	0.21	0.14

Appropriate calculated time to peak:	0.14	Appropriate Method:	Airport

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2024.04.30
By: DK/TF

D.A. NAME **101B**
D.A. AREA (ha) **0.76**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101B

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic Group	% Area	Area
Dumfries Sandy Loam*	DUF	AB	100	0.76
				0
				0
				0
Total Area				0.76

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*On-site soils silty sand with poor hydraulic conductivity per Terraprobe Hydrogeological Assessment (February 2023)

Impervious Landuses Present:												
	Gravel		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0		0		0		0		0		0	0
Subtotal	0		0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.07	36	0		0		0		0.69	70	0.76	50.82
Subtotal	0.07		0		0		0		0.69			

Composite Area Calculations		
	Total Pervious Area	0.76
	Total Impervious Area	0.00
	% Impervious	0.00%
	Composite Curve Number	66.9
	Total Area Check	0.76

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Dumfries Sandy Loam*								
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.07	0.70	0.30	0.07		0		0		0	0.02
Meadow	8	0	0		0.00		0		0		0	0
Wetland	16	0	0		0.00		0		0		0	0
Lawn	5	0	0		0.00		0		0		0	0
Cultivated	7	0.69	4.83	0.45	0.69		0		0		0	0.31
Impervious	2	0	0		0.00		0		0		0	0
Composite		0.76	7.28	Composite Runoff Coefficient								0.44

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	103	4.40	4.27%	2.7	0.56	0.05	0.03	0.03	0.08	0.05	0.23	0.15

Appropriate calculated time to peak:	0.05	Appropriate Method:	Bransby Williams

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **102**
D.A. AREA (ha) **3.96**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 102

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic Group	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	3.96
				0
				0
				0
Total Area				3.96

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*On-site soils silty sand with poor hydraulic conductivity per Terraprobe Hydrogeological Assessment (February 2023)

Impervious Landuses Present:												
	Gravel		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0		0		0		0		0		0	0
Subtotal	0.00		0		0		0.00		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.25	36	0		0		0		3.71	70	3.96	268.79
Subtotal	0.25		0		0		0		3.71			

Composite Area Calculations		
	Total Pervious Area	3.96
	Total Impervious Area	0.00
	% Impervious	0.00%
	Composite Curve Number	67.9
	Total Area Check	3.96

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				Dumfries Sandy Loam*								
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.25	2.48	0.30	0.25		0		0		0	0.07
Meadow	8	0	0		0.00		0		0		0	0.00
Wetland	16	0	0		0		0		0		0	0.00
Lawn	5	0	0		0		0		0		0	0.00
Cultivated	7	3.71	25.99	0.45	3.71		0		0		0	1.67
Impervious	1.5	0	0		0		0		0		0	0.00
Composite		3.96	7.19	Composite Runoff Coefficient								0.44

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	165	13.00	7.88%	2.7	0.76	0.06	0.04	0.04	0.09	0.06	0.23	0.16

Appropriate calculated time to peak:	0.06	Appropriate Method:	Bransby Williams

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **EX1**
D.A. AREA (ha) **5.22**

Hydrologic Parameters: CALIB STANDHYD Command
External Drainage Area: Catchment EX1

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	5.22
				0
				0
				0
Total Area Check				5.22

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*External soils assumed to be silty sand with poor hydraulic conductivity.

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.21	98	0.35	91	0.52	98	0.49	98	0.00	98	1.57	150.9
Subtotal Area	0.21		0.35		0.52		0.49		0.00		1.57	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		3.66	50	0.00		3.66	182.8
Subtotal Area	0.00		0.00		0.00		3.66		0.00			

Pervious Area Calculations	Total Pervious Area	3.66
	Composite Pervious Curve Number	50
Impervious Area Calculations	Total Directly Connected Area	1.08
	Total Indirectly Connected Area	0.49
	Total Impervious Area	1.57
	% X imp	20.7
	% T imp	30.0
	Total Area Check	5.22

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	3.66	18.28
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	10.00%	30	0.25
Impervious	1.5	10.00%	187	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **EX2 (Pre-Dev)**
D.A. AREA (ha) **1.41**

Hydrologic Parameters: CALIB STANDHYD Command
External Drainage Area: Catchment EX2 (Pre-Dev)

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	1.41
				0
				0
				0
Total Area Check				1.41

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*External soils assumed to be silty sand with poor hydraulic conductivity.
**Roadway includes driveways.

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.41	98	0.00	91	0.00	98	0.11	98	0.00	98	0.52	51.0
Subtotal Area	0.41		0.00		0.00		0.11		0.00		0.52	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		0.89	50	0.00		0.89	44.5
Subtotal Area	0.00		0.00		0.00		0.89		0.00			

	Pervious Area Calculations	Total Pervious Area	0.89
		Composite Pervious Curve Number	50
	Impervious Area Calculations	Total Directly Connected Area	0.41
		Total Indirectly Connected Area	0.11
		Total Impervious Area	0.52
		% X imp	29.1
		% T imp	36.9
		Total Area Check	1.41

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.89	4.45
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	6.00%	20	0.25
Impervious	1.5	6.00%	42	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2023-11-28
By: DK

D.A. NAME **201**
D.A. AREA (ha) **3.50**

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	3.50
				0
				0
				0
Total Area Check				3.50

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*On-site soils silty sand with poor hydraulic conductivity per Terraprobe Hydrogeological Assessment (February 2023)

Impervious Landuses Present:												
	Roadway		Driveway		Sidewalk		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.48	98	0.25	98	0.07	98	0.83	98	0.15	50	1.78	167.2
Subtotal Area	0.48		0.25		0.07		0.83		0.15			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		1.72	50	0.00		1.72	86.1
Subtotal Area	0.00		0.00		0.00		1.72		0.00			

Pervious Area Calculations	Total Pervious Area	1.72
	Composite Pervious Curve Number	50
Impervious Area Calculations	Total Directly Connected Area	0.70
	Total Indirectly Connected Area	1.08
	Total Impervious Area	1.78
	% X imp	19.9
	% T imp	50.8
	Total Area Check	3.50

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.72	8.61
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	4.00%	20	0.25
Impervious	1.5	4.00%	153	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2024.05.07
By: DK

D.A. NAME **202**
D.A. AREA (ha) **2.48**

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 202

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic Group	% Area	Area
Dumfries Sandy Loam*	DUF	A	86%	2.12
Parkhill Loam	PLL	C	14%	0.36
				0
				0
Total Area Check				2.48

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*On-site soils silty sand with poor hydraulic conductivity per Terraprobe Hydrogeological Assessment (February 2023)

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00	98	0.00	98	0.00	98	0.83	98		39	0.83	81.2
PLL							0.08	98			0.08	7.9
Subtotal Area	0.00		0.00		0.00		0.91		0.00		0.91	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		1.29	50	0.00		1.29	64.6
PLL	0.00		0.00		0.00		0.28	74	0.00		0.28	20.5
Subtotal Area	0.00		0.00		0.00		1.57		0.00			

Pervious Area Calculations	Total Pervious Area	1.57
	Composite Pervious Curve Number	54.2
Impervious Area Calculations	Total Directly Connected Area	0.00
	Total Indirectly Connected Area	0.91
	Total Impervious Area	0.91
	% X imp	0.0
	% T imp	36.7
	Total Area Check	2.48

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.57	7.85
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	4.00%	30	0.25
Impervious	1.0	2.00%	129	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **EX2**
D.A. AREA (ha) **0.26**

Hydrologic Parameters: CALIB STANDHYD Command
External Drainage Area: Catchment EX2

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	0.26
				0
				0
				0
Total Area Check				0.26

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*External soils assumed to be silty sand with poor hydraulic conductivity.
**Roadway includes driveways.

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.08	98	0.00	91	0.00	98	0.03	98	0.00	98	0.11	10.7
Subtotal Area	0.08		0.00		0.00		0.03		0.00		0.11	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		0.15	50	0.00		0.15	7.5
Subtotal Area	0.00		0.00		0.00		0.15		0.00			

	Pervious Area Calculations	Total Pervious Area	0.15
		Composite Pervious Curve Number	50
	Impervious Area Calculations	Total Directly Connected Area	0.08
		Total Indirectly Connected Area	0.03
		Total Impervious Area	0.11
		% X imp	30.5
		% T imp	42.0
		Total Area Check	0.26

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.15	0.75
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	6.00%	20	0.25
Impervious	1.5	6.00%	42	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **EX3**
D.A. AREA (ha) **0.26**

Hydrologic Parameters: CALIB STANDHYD Command
External Drainage Area: Catchment EX3

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	0.26
				0
				0
				0
Total Area Check				0.26

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*External soils assumed to be silty sand with poor hydraulic conductivity.
**Roadway includes driveways.

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.04	98	0.00	91	0.00	98	0.04	98	0.00	98	0.08	7.8
Subtotal Area	0.04		0.00		0.00		0.04		0.00		0.08	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		0.18	50	0.00		0.18	9.0
Subtotal Area	0.00		0.00		0.00		0.18		0.00			

Pervious Area Calculations	Total Pervious Area	0.18
	Composite Pervious Curve Number	50
Impervious Area Calculations	Total Directly Connected Area	0.04
	Total Indirectly Connected Area	0.04
	Total Impervious Area	0.08
	% X imp	15.4
	% T imp	30.8
	Total Area Check	0.26

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.18	0.90
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	10.00%	30	0.25
Impervious	1.5	4.00%	42	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project Name: 11 Main Street
Project Number: 2366-6537
Date: 2022-10-12
By: BP/PR

D.A. NAME **EX4**
D.A. AREA (ha) **0.46**

Hydrologic Parameters: CALIB STANDHYD Command
External Drainage Area: Catchment EX4

Curve Number Calculation

Soil Types Present per Wellington County Soils Map (1962):				
Type	ID	Hydrologic	% Area	Area
Dumfries Sandy Loam*	DUF	A	100	0.46
				0
				0
				0
Total Area Check				0.46

Note: RC and CN values obtained from the MTO Drainage Management Manual Part 4 (1995)
*External soils assumed to be silty sand with poor hydraulic conductivity.
**Roadway includes driveways.

Impervious Landuses Present:												
	Roadway		Gravel		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.10	98	0.00	91	0.00	98	0.04	98	0.00	98	0.14	13.7
Subtotal Area	0.10		0.00		0.00		0.04		0.00		0.14	

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
DUF	0.00		0.00		0.00		0.32	50	0.00		0.32	16.0
Subtotal Area	0.00		0.00		0.00		0.32		0.00			

Pervious Area Calculations	Total Pervious Area	0.32
	Composite Pervious Curve Number	50
Impervious Area Calculations	Total Directly Connected Area	0.10
	Total Indirectly Connected Area	0.04
	Total Impervious Area	0.14
	% X imp	21.7
	% T imp	30.4
	Total Area Check	0.46

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.32	1.60
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	4.00%	20	0.25
Impervious	1.5	2.00%	55	0.013

$$A = 1.5LGI^2$$

Note: LGI formula retrieved from Visual OTTHYMO Reference Manual (pg. 7)

where LGI represents impervious length (m)

Project No:	11 Main Street
Project:	2366-6537
File:	Stage-Storage-Discharge
Design by:	CM
Checked by:	TF
Date:	2024.11.08

Storage - Outflow Calculations

Outlet Structure			**Main Cell Spillway**		
E.D. Orifice Diameter:	0.075	m	Emergency Spill Elev.	313.90	m
E.D. Orifice Invert Elevation:	312.35	m	Emerg Spill Bot. Width	5	m
V-notch angle	N/A	degrees	Trap. Side Slopes	10	:1
V-notch constant	N/A	const			
V-notch invert	N/A	m			
Rect weir length	0.900	m			
Rect weir invert	313.50	m			
Extended Detention Depth:	1.17	m			

Pond Dimensions				Total	Outlet Structure			Cell Spillway			
Elev.	Depth Above PP	Area	Storage Volume	Storage Volume	ED Orifice Discharge	V-notch Discharge	Rect. Weir Discharge	Emerg. Weir Ave. Width	Emerg. Weir Discharge	Total Discharge	Storage
(m)	(m)	(sqm)	(cu.m)	(cu.m)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(m)	(cu.m/s)	(cu.m/s)	(ha-m)
312.35	0.00	243	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
312.45	0.10	256	16	16	0.003	0.000	0.000	0.000	0.000	0.003	0.002
312.55	0.20	306	44	44	0.005	0.000	0.000	0.000	0.000	0.005	0.004
312.65	0.30	357	77	77	0.006	0.000	0.000	0.000	0.000	0.006	0.008
312.75	0.40	410	116	116	0.008	0.000	0.000	0.000	0.000	0.008	0.012
312.85	0.50	463	159	159	0.009	0.000	0.000	0.000	0.000	0.009	0.016
312.95	0.60	518	208	208	0.009	0.000	0.000	0.000	0.000	0.009	0.021
313.05	0.70	575	263	263	0.010	0.000	0.000	0.000	0.000	0.010	0.026
313.15	0.80	633	323	323	0.011	0.000	0.000	0.000	0.000	0.011	0.032
313.25	0.90	692	390	390	0.012	0.000	0.000	0.000	0.000	0.012	0.039
313.35	1.00	752	462	462	0.012	0.000	0.000	0.000	0.000	0.012	0.046
313.45	1.10	814	540	540	0.013	0.000	0.000	0.000	0.000	0.013	0.054
313.52	1.17	857	603	603	0.013	0.000	0.006	1.000	0.000	0.020	0.060
313.55	1.20	876	625	625	0.014	0.000	0.019	0.000	0.000	0.032	0.062
313.65	1.30	939	715	715	0.014	0.000	0.096	0.000	0.000	0.110	0.072
313.75	1.40	1002	812	812	0.015	0.000	0.207	0.000	0.000	0.222	0.081
313.85	1.50	1067	916	916	0.015	0.000	0.343	0.000	0.000	0.358	0.092
313.90	1.55	1100	973	973	0.015	0.000	0.419	5.000	0.000	0.434	0.097
313.95	1.60	1134	1026	1026	0.016	0.000	0.500	5.500	0.190	0.706	0.103
314.05	1.70	1202	1143	1143	0.016	0.000	0.675	6.500	1.300	1.992	0.114
314.15	1.80	1271	1266	1266	0.017	0.000	0.868	9.000	2.070	2.954	0.127
314.25	1.90	1341	1397	1397	0.017	0.000	1.076	12.500	4.762	5.855	0.140
314.35	2.00	1478	1536	1536	0.018	0.000	1.298	17.000	9.442	10.758	0.154

11 Main Street

2366-6537

STORM SEWER DESIGN SHEET

CROZIER CONSULTING ENGINEERS

FREQUENCY - 5 YEAR - CITY OF GUELPH DEVELOPMENT ENGINEERING MANUAL (OCTOBER 2023)			
Coef. A=	632.75	Coef. B=	-0.741
FREQUENCY - 100 YEAR - CITY OF GUELPH DEVELOPMENT ENGINEERING MANUAL (OCTOBER 2023)			
Coef. A=	953.29	Coef. B=	-0.711

MATERIAL	MANNINGS "n"
PVC	0.009
CONCRETE	0.013

DESIGNED BY:	H.W
CHECKED BY:	T.F
DATE:	2024.11.15
REVISION NO.:	1
REVISED BY:	T.F
DATE:	2024.11.15

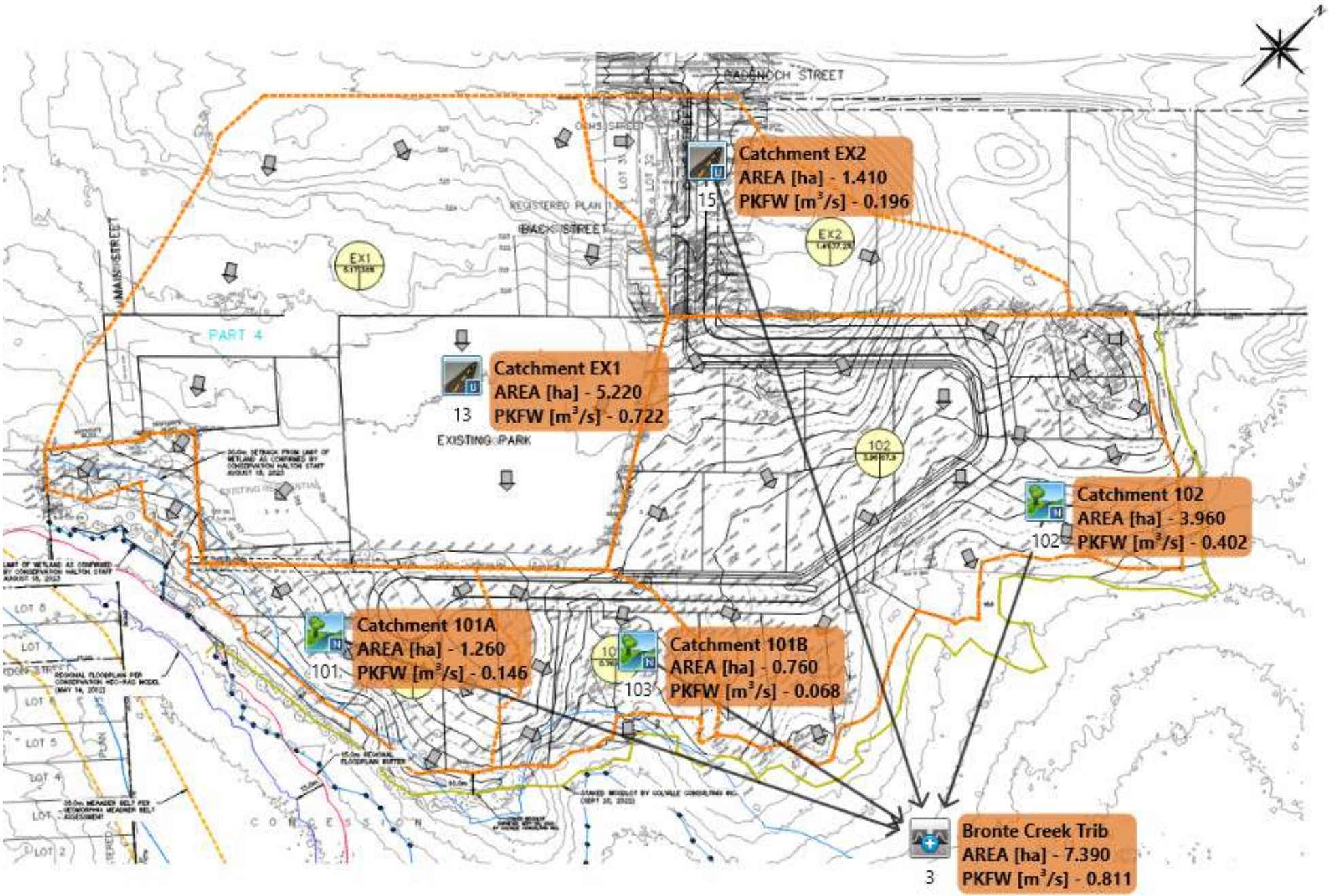
INITIAL TIME OF CONCENTRATION (minutes) = 10.00

CATCHMENT I.D.	STREET	TO MH	FROM MH	AREA (A) (Ha)	5 YEAR RUN-OFF COEFF (C_5)	100 YEAR RUN-OFF COEFF (C_{100})	DESIGN STORM	A x C	5 YEAR CUMUL. A x C	100 YEAR CUMUL. A x C	TIME OF CONC. (min.)	5 YEAR I (mm/hr)	100 YEAR I (mm/hr)	Q (RUNOFF) (l/sec)	DESIGN FLOW (l/sec)	SLOPE (%)	PIPE DIA. (mm)	MANNING'S "n"	VEL. (m/sec)	LENGTH	TIME OF FLOW (min)	PIPE CAPACITY (l/sec)	CAPACITY (%)
1	STREET A	STM DCB 15	STM MH 14	0.28	0.72	0.90	5 year	0.20	0.20	0.00	10.00	114.88	185.45	**63.26**	**63.26**	1.00%	300	0.009	2.0	37.3	0.31	**139.68**	**45%**
2	STREET A	STM MH 14	STM CBMH 13	0.04	0.67	0.83	5 year	0.03	0.22	0.00	10.31	112.27	181.41	**69.67**	**69.67**	1.00%	300	0.009	2.0	73.9	0.62	**139.68**	**50%**
3		STM CB 20	STM CBMH 19	0.07	0.74	0.93	5 year	0.05	0.05	0.00	10.00	114.88	185.45	**16.13**	**16.13**	1.00%	300	0.009	2.0	4.2	0.04	**139.68**	**12%**
4		STM CBMH 19	STM CBMH 13	0.04	0.90	1.00	5 year	0.04	0.09	0.00	10.04	114.58	184.98	**28.44**	**28.44**	2.00%	300	0.009	2.8	7.4	0.04	**197.54**	**14%**
5	STREET A	STM CBMH 13	STM CBMH 12	0.18	0.68	0.84	5 year	0.12	0.43	0.00	10.94	107.49	174.00	**128.76**	**128.76**	1.80%	450	0.009	3.5	90.7	0.44	**552.51**	**23%**
6		STM CB 18	STM CBMH 12	0.77	0.59	0.74	5 year	0.46	0.46	0.00	10.00	114.88	185.45	**145.34**	**145.34**	3.00%	300	0.009	3.4	9.2	0.04	**241.93**	**60%**
7	STREET A	STM CBMH 12	STM CBMH 11	0.25	0.68	0.85	5 year	0.17	1.05	0.00	11.37	104.43	169.24	**305.52**	**305.52**	1.70%	525	0.013	2.6	42.0	0.27	**560.73**	**54%**
8	STREET A	STM CBMH 11	STM DCBMH 2	0.43	0.62	0.78	5 year	0.27	1.32	0.00	11.64	102.63	166.44	**376.47**	**376.47**	0.40%	675	0.013	1.5	39.6	0.44	**531.63**	**71%**
9		STM DCB 17	STM DCBMH 2	0.22	0.61	0.77	5 year	0.13	0.13	0.00	10.00	114.88	185.45	**42.90**	**42.90**	0.50%	300	0.009	1.4	7.3	0.09	**98.77**	**43%**
10		STM CB 26	STM DCBMH 10	0.03	0.55	0.69	5 year	0.02	0.02	0.00	10.00	114.88	185.45	**5.88**	**5.88**	3.40%	300	0.009	3.6	3.7	0.02	**257.56**	**2%**
11		STM DCB 25	STM DCBMH 10	0.10	0.63	0.79	5 year	0.06	0.06	0.00	10.00	114.88	185.45	**20.16**	**20.16**	2.00%	300	0.009	2.8	7.4	0.04	**197.54**	**10%**
12		STM DCBMH 10	STM MH 9	0.05	0.67	0.84	5 year	0.03	0.11	0.00	10.04	114.50	184.87	**36.04**	**36.04**	2.10%	300	0.009	2.9	17.4	0.10	**202.41**	**18%**
13		STM MH 9	STM CBMH 8	0.02	0.83	1.00	5 year	0.01	0.13	0.00	10.15	113.65	183.56	**40.40**	**40.40**	2.80%	300	0.009	3.3	11.1	0.06	**233.73**	**17%**
14		STM CB 24	STM CBMH 8	0.01	0.90	1.00	5 year	0.01	0.01	0.00	10.00	114.88	185.45	**3.33**	**3.33**	2.00%	300	0.009	2.8	7.4	0.04	**197.54**	**2%**
15		STM CBMH 8	STM CBMH 7	0.02	0.79	0.99	5 year	0.01	0.15	0.00	10.04	114.50	184.87	**48.47**	**48.47**	3.00%	300	0.009	3.4	56.0	0.27	**241.93**	**20%**
16		STM CB 23	STM CBMH 7	0.05	0.84	1.00	5 year	0.05	0.05	0.00	10.00	114.88	185.45	**14.65**	**14.65**	2.00%	300	0.009	2.8	7.4	0.04	**197.54**	**7%**
17		STM CBMH 7	STM CBMH 6	0.09	0.78	0.97	5 year	0.07	0.26	0.00	10.32	112.25	181.38	**82.47**	**82.47**	2.00%	300	0.009	2.8	55.9	0.33	**197.54**	**42%**
18		STM CBMH 27	STM CBMH 22	0.06	0.71	0.89	5 year	0.05	0.05	0.00	10.00	114.88	185.45	**14.69**	**14.69**	0.50%	300	0.009	1.4	14.6	0.17	**98.77**	**15%**
19		STM CBMH 22	STM CBMH 6	0.03	0.90	1.00	5 year	0.02	0.07	0.00	10.17	113.42	183.19	**21.89**	**21.89**	2.00%	375	0.009	3.2	7.4	0.04	**358.16**	**6%**
20		STM CBMH 6	STM MH 5	0.10	0.75	0.94	5 year	0.08	0.41	0.00	10.65	109.64	177.33	**124.83**	**124.83**	3.00%	450	0.009	4.5	9.9	0.04	**713.29**	**18%**
21		STM MH 5	STM MH 4	0.04	0.70	0.88	5 year	0.03	0.44	0.00	10.69	109.36	176.89	**134.13**	**134.13**	3.00%	450	0.009	4.5	39.3	0.15	**713.29**	**19%**
22		STM CB 21	STM MH 4	0.16	0.61	0.76	5 year	0.10	0.10	0.00	10.00	114.88	185.45	**31.85**	**31.85**	2.00%	300	0.009	2.8	7.5	0.04	**197.54**	**16%**
23		STM CB 4	STM MH 3	0.05	0.90	1.00	5 year	0.05	0.59	0.00	10.83	108.26	175.19	**177.06**	**177.06**	3.00%	525	0.013	3.4	14.2	0.07	**744.89**	**24%**
24		STM MH 3	STM DCBMH 2	0.09	0.61	0.77	5 year	0.05	0.05	0.00	10.90	107.76	174.41	**15.75**	**15.75**	0.60%	600	0.013	1.7	34.6	0.34	**475.61**	**3%**
25		STM DCBMH 2	STM OGS	0.09	0.84	1.00	5 year	0.08	1.58	0.00	12.09	99.82	162.06	**439.70**	**439.70**	0.50%	750	0.013	1.8	5.6	0.05	**787.21**	**56%**
26		STM OGS	STM HW 1	0.00	0.00	0.00	5 year	0.00	1.58	0.00	12.14	99.50	161.57	**438.29**	**438.29**	0.60%	750	0.013	2.0	4.7	0.04	**862.34**	**51%**

APPENDIX E

VO Modelling

Pre-Development Visual-Otthymo Schematic



```
V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I      SS   U   U  AAAAA  L
 V  V    I       SS  U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\4b7dcaeb-9c
Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\4b7dcaeb-9c

DATE: 11-08-2024 TIME: 08:45:48

USER:

COMMENTS: _____

** SIMULATION : 2yr 4hr 10min Chicago **

| CHICAGO STORM | Ptotal= 33.31 mm |

IDF curve parameters: A= 475.610
B= 0.000
C= 0.738
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.45	1.00	12.69	2.00	5.04	3.00	2.85
0.17	2.76	1.17	86.95	2.17	4.42	3.17	2.67
0.33	3.17	1.33	15.73	2.33	3.95	3.33	2.52
0.50	3.77	1.50	9.66	2.50	3.59	3.50	2.39
0.67	4.72	1.67	7.25	2.67	3.30	3.67	2.27
0.83	6.58	1.83	5.91	2.83	3.05	3.83	2.17

| CALIB | NASHYD (0101) | ID= 1 DT= 5.0 min | Area (ha)= 1.26 | Ia (mm)= 7.21 | U.H. Tp(hrs)= 0.14 | Curve Number (CN)= 67.6 | # of Linear Res.(N)= 3.00 |

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Unit Hyd Qpeak (cms)= 0.344

PEAK FLOW (cms)= 0.019 (i)
TIME TO PEAK (hrs)= 1.417
RUNOFF VOLUME (mm)= 4.573
TOTAL RAINFALL (mm)= 33.310
RUNOFF COEFFICIENT = 0.137

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

| CALIB | NASHYD (0102) | ID= 1 DT= 5.0 min | Area (ha)= 3.96 | Ia (mm)= 7.19 | U.H. Tp(hrs)= 0.06 | Curve Number (CN)= 67.9 | # of Linear Res.(N)= 3.00 |

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Unit Hyd Qpeak (cms)= 2.521

PEAK FLOW (cms)= 0.098 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 4.004
TOTAL RAINFALL (mm)= 33.310
RUNOFF COEFFICIENT = 0.120

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

| CALIB | NASHYD (0103) | ID= 1 DT= 5.0 min | Area (ha)= 0.76 | Ia (mm)= 7.28 | U.H. Tp(hrs)= 0.05 | Curve Number (CN)= 66.9 | # of Linear Res.(N)= 3.00 |

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Unit Hyd Qpeak (cms)= 0.581

PEAK FLOW (cms)= 0.017 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 3.408
TOTAL RAINFALL (mm)= 33.310
RUNOFF COEFFICIENT = 0.102

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

| CALIB | STANDHYD (0015) | ID= 1 DT= 5.0 min | Area (ha)= 1.41 | Total Imp(%)= 36.90 | Dir. Conn.(%)= 29.10 |

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.52	0.89
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	6.00	6.00
Length (m)=	42.00	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Max.Eff.Inten.(mm/hr)=	86.95	23.68	
over (min)	5.00	10.00	
Storage Coeff. (min)=	0.94 (ii)	5.76 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.34	0.15	
			TOTALS
PEAK FLOW (cms)=	0.10	0.05	0.134 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	31.81	9.76	16.17
TOTAL RAINFALL (mm)=	33.31	33.31	33.31
RUNOFF COEFFICIENT =	0.95	0.29	0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 1 (0101):	1.26	0.019	1.42	4.57
		+ ID2= 2 (0102):	3.96	0.098	1.33	4.00
		ID = 3 (0003):	5.22	0.112	1.33	4.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)	3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 3 (0003):	5.22	0.112	1.33	4.14
		+ ID2= 2 (0103):	0.76	0.017	1.33	3.41
		ID = 1 (0003):	5.98	0.130	1.33	4.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 1 (0003):	5.98	0.130	1.33	4.05
		+ ID2= 2 (0015):	1.41	0.134	1.33	16.17
		ID = 3 (0003):	7.39	0.264	1.33	6.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB | STANDHYD (0013) | ID= 1 DT= 5.0 min | Area (ha)= 5.22 | Total Imp(%)= 30.00 | Dir. Conn.(%)= 20.70 |

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.57	3.65
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	10.00	10.00
Length (m)=	186.55	30.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Max.Eff.Inten.(mm/hr)=	86.95	24.11	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.97 (ii)	8.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.12	
			TOTALS
PEAK FLOW (cms)=	0.26	0.17	0.380 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	31.81	9.83	14.38
TOTAL RAINFALL (mm)=	33.31	33.31	33.31
RUNOFF COEFFICIENT =	0.95	0.30	0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

      V   V   I   SSSSS  U   U   A    L              (v 6.2.2015)
      V   V   I   SS     U   U  A A   L
       V V    I    SS    U   U  AAAAA L
       V V    I     SS   U   U  A   A L
        VV    I   SSSSS  UUUUU  A   A LLLLL

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

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DATE: 11-08-2024                                TIME: 08:45:48

USER:


COMMENTS: _______________________________________________________

-----------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5yr 4hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM     |     IDF curve parameters: A= 632.750
| Ptotal= 43.59 mm  |                           B=   0.000
--------------------                            C=   0.741
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  4.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33

               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.00     3.17 |  1.00   16.54 |  2.00     6.54 |  3.00     3.69
               0.17     3.57 |  1.17  114.88 |  2.17     5.73 |  3.17     3.46
               0.33     4.11 |  1.33   20.52 |  2.33     5.13 |  3.33     3.26
               0.50     4.88 |  1.50   12.57 |  2.50     4.65 |  3.50     3.09
               0.67     6.13 |  1.67    9.43 |  2.67     4.27 |  3.67     2.94
               0.83     8.55 |  1.83    7.68 |  2.83     3.95 |  3.83     2.80

---------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0101)|   Area     (ha)=   1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=   7.21   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.083     3.17 | 1.083   16.54 | 2.083     6.54 |  3.08     3.69
              0.167     3.17 | 1.167   16.54 | 2.167     6.54 |  3.17     3.69
              0.250     3.57 | 1.250  114.88 | 2.250     5.73 |  3.25     3.46
              0.333     3.57 | 1.333  114.88 | 2.333     5.73 |  3.33     3.46
              0.417     4.11 | 1.417   20.52 | 2.417     5.13 |  3.42     3.26
              0.500     4.11 | 1.500   20.52 | 2.500     5.13 |  3.50     3.26
              0.583     4.88 | 1.583   12.57 | 2.583     4.65 |  3.58     3.09
              0.667     4.88 | 1.667   12.57 | 2.667     4.65 |  3.67     3.09
              0.750     6.13 | 1.750    9.43 | 2.750     4.27 |  3.75     2.94
              0.833     6.13 | 1.833    9.43 | 2.833     4.27 |  3.83     2.94
              0.917     8.55 | 1.917    7.68 | 2.917     3.95 |  3.92     2.80
              1.000     8.55 | 2.000    7.68 | 3.000     3.95 |  4.00     2.80
```

```
     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=   8.308
     TOTAL RAINFALL   (mm)=  43.592
     RUNOFF COEFFICIENT   =   0.191

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

---------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0102)|   Area     (ha)=   3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia       (mm)=   7.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.06

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.083     3.17 | 1.083   16.54 | 2.083     6.54 |  3.08     3.69
              0.167     3.17 | 1.167   16.54 | 2.167     6.54 |  3.17     3.69
              0.250     3.57 | 1.250  114.88 | 2.250     5.73 |  3.25     3.46
              0.333     3.57 | 1.333  114.88 | 2.333     5.73 |  3.33     3.46
              0.417     4.11 | 1.417   20.52 | 2.417     5.13 |  3.42     3.26
              0.500     4.11 | 1.500   20.52 | 2.500     5.13 |  3.50     3.26
              0.583     4.88 | 1.583   12.57 | 2.583     4.65 |  3.58     3.09
              0.667     4.88 | 1.667   12.57 | 2.667     4.65 |  3.67     3.09
              0.750     6.13 | 1.750    9.43 | 2.750     4.27 |  3.75     2.94
              0.833     6.13 | 1.833    9.43 | 2.833     4.27 |  3.83     2.94
              0.917     8.55 | 1.917    7.68 | 2.917     3.95 |  3.92     2.80
              1.000     8.55 | 2.000    7.68 | 3.000     3.95 |  4.00     2.80

     Unit Hyd Qpeak  (cms)=   2.521

     PEAK FLOW       (cms)=   0.193 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   7.266
     TOTAL RAINFALL   (mm)=  43.592
     RUNOFF COEFFICIENT   =   0.167

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

---------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0103)|   Area     (ha)=   0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia       (mm)=   7.28   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.083     3.17 | 1.083   16.54 | 2.083     6.54 |  3.08     3.69
              0.167     3.17 | 1.167   16.54 | 2.167     6.54 |  3.17     3.69
              0.250     3.57 | 1.250  114.88 | 2.250     5.73 |  3.25     3.46
              0.333     3.57 | 1.333  114.88 | 2.333     5.73 |  3.33     3.46
              0.417     4.11 | 1.417   20.52 | 2.417     5.13 |  3.42     3.26
              0.500     4.11 | 1.500   20.52 | 2.500     5.13 |  3.50     3.26
              0.583     4.88 | 1.583   12.57 | 2.583     4.65 |  3.58     3.09
              0.667     4.88 | 1.667   12.57 | 2.667     4.65 |  3.67     3.09
              0.750     6.13 | 1.750    9.43 | 2.750     4.27 |  3.75     2.94
              0.833     6.13 | 1.833    9.43 | 2.833     4.27 |  3.83     2.94
              0.917     8.55 | 1.917    7.68 | 2.917     3.95 |  3.92     2.80
              1.000     8.55 | 2.000    7.68 | 3.000     3.95 |  4.00     2.80

     Unit Hyd Qpeak  (cms)=   0.581

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   6.211
     TOTAL RAINFALL   (mm)=  43.592
     RUNOFF COEFFICIENT   =   0.142

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

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--------------------
| CALIB              |
| STANDHYD (  0015)|   Area     (ha)=   1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.52          0.89
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      6.00          6.00
     Length            (m)=     42.00         20.00
     Mannings n           =     0.013         0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.083     3.17 | 1.083   16.54 | 2.083     6.54 |  3.08     3.69
              0.167     3.17 | 1.167   16.54 | 2.167     6.54 |  3.17     3.69
              0.250     3.57 | 1.250  114.88 | 2.250     5.73 |  3.25     3.46
              0.333     3.57 | 1.333  114.88 | 2.333     5.73 |  3.33     3.46
              0.417     4.11 | 1.417   20.52 | 2.417     5.13 |  3.42     3.26
              0.500     4.11 | 1.500   20.52 | 2.500     5.13 |  3.50     3.26
              0.583     4.88 | 1.583   12.57 | 2.583     4.65 |  3.58     3.09
              0.667     4.88 | 1.667   12.57 | 2.667     4.65 |  3.67     3.09
              0.750     6.13 | 1.750    9.43 | 2.750     4.27 |  3.75     2.94
              0.833     6.13 | 1.833    9.43 | 2.833     4.27 |  3.83     2.94
              0.917     8.55 | 1.917    7.68 | 2.917     3.95 |  3.92     2.80
              1.000     8.55 | 2.000    7.68 | 3.000     3.95 |  4.00     2.80

     Max.Eff.Inten.(mm/hr)=     114.88         41.98
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      0.84 (ii)     5.16 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.34          0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.13          0.08          0.199 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     42.09         16.02          23.60
     TOTAL RAINFALL   (mm)=     43.59         43.59          43.59
     RUNOFF COEFFICIENT   =      0.97          0.37           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3     |       AREA     QPEAK    TPEAK      R.V.
--------------------        (ha)     (cms)    (hrs)      (mm)
       ID1= 1 (  0101):     1.26    0.038     1.42      8.31
     + ID2= 2 (  0102):     3.96    0.193     1.33      7.27
       ===============================================
       ID = 3 (  0003):     5.22    0.225     1.33      7.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1     |       AREA     QPEAK    TPEAK      R.V.
--------------------        (ha)     (cms)    (hrs)      (mm)
       ID1= 3 (  0003):     5.22    0.225     1.33      7.52
     + ID2= 2 (  0103):     0.76    0.034     1.33      6.21
       ===============================================
       ID = 1 (  0003):     5.98    0.259     1.33      7.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3     |       AREA     QPEAK    TPEAK      R.V.
--------------------        (ha)     (cms)    (hrs)      (mm)
       ID1= 1 (  0003):     5.98    0.259     1.33      7.35
     + ID2= 2 (  0015):     1.41    0.199     1.33     23.60
       ===============================================
```

```
       ID = 3 (  0003):     7.39    0.457     1.33     10.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0013)|   Area     (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57          3.65
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=     10.00         10.00
     Length            (m)=    186.55         30.00
     Mannings n           =     0.013         0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.083     3.17 | 1.083   16.54 | 2.083     6.54 |  3.08     3.69
              0.167     3.17 | 1.167   16.54 | 2.167     6.54 |  3.17     3.69
              0.250     3.57 | 1.250  114.88 | 2.250     5.73 |  3.25     3.46
              0.333     3.57 | 1.333  114.88 | 2.333     5.73 |  3.33     3.46
              0.417     4.11 | 1.417   20.52 | 2.417     5.13 |  3.42     3.26
              0.500     4.11 | 1.500   20.52 | 2.500     5.13 |  3.50     3.26
              0.583     4.88 | 1.583   12.57 | 2.583     4.65 |  3.58     3.09
              0.667     4.88 | 1.667   12.57 | 2.667     4.65 |  3.67     3.09
              0.750     6.13 | 1.750    9.43 | 2.750     4.27 |  3.75     2.94
              0.833     6.13 | 1.833    9.43 | 2.833     4.27 |  3.83     2.94
              0.917     8.55 | 1.917    7.68 | 2.917     3.95 |  3.92     2.80
              1.000     8.55 | 2.000    7.68 | 3.000     3.95 |  4.00     2.80

     Max.Eff.Inten.(mm/hr)=     114.88         42.67
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      1.76 (ii)     6.91 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.32          0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.34          0.32          0.589 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     42.09         16.12          21.49
     TOTAL RAINFALL   (mm)=     43.59         43.59          43.59
     RUNOFF COEFFICIENT   =      0.97          0.37           0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

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DATE: 11-08-2024                            TIME: 08:45:48

USER:


COMMENTS: ____________________________________________________________

-----------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 10yr 4hr 10min Chicago        **
  ************************************************

 --------------------
 | CHICAGO STORM    |    IDF curve parameters: A= 721.920
 | Ptotal= 51.12 mm |                          B=   0.000
 --------------------                          C=   0.736
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    3.79 |  1.00   19.52 |  2.00    7.77 |  3.00    4.40
               0.17    4.26 |  1.17  132.58 |  2.17    6.82 |  3.17    4.13
               0.33    4.90 |  1.33   24.19 |  2.33    6.10 |  3.33    3.90
               0.50    5.82 |  1.50   14.88 |  2.50    5.54 |  3.50    3.69
               0.67    7.29 |  1.67   11.18 |  2.67    5.09 |  3.67    3.51
               0.83   10.14 |  1.83    9.12 |  2.83    4.72 |  3.83    3.35

-----------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | NASHYD   ( 0101) |   Area    (ha)=   1.26   Curve Number   (CN)= 67.6
 |ID= 1 DT= 5.0 min |   Ia      (mm)=   7.21   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.14

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

                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
              0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
              0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
              0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
              0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
              0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35
```

```
     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.054 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  11.551
     TOTAL RAINFALL   (mm)=  51.117
     RUNOFF COEFFICIENT   =   0.226

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

-----------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | NASHYD   ( 0102) |   Area    (ha)=   3.96   Curve Number   (CN)= 67.9
 |ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.06

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

                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
              0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
              0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
              0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
              0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
              0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Unit Hyd Qpeak  (cms)=   2.521

     PEAK FLOW       (cms)=   0.270 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  10.095
     TOTAL RAINFALL   (mm)=  51.117
     RUNOFF COEFFICIENT   =   0.197

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

-----------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | NASHYD   ( 0103) |   Area    (ha)=   0.76   Curve Number   (CN)= 66.9
 |ID= 1 DT= 5.0 min |   Ia      (mm)=   7.28   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.05

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

                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
              0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
              0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
              0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
              0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
              0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Unit Hyd Qpeak  (cms)=   0.581

     PEAK FLOW       (cms)=   0.047 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   8.650
     TOTAL RAINFALL   (mm)=  51.117
     RUNOFF COEFFICIENT   =   0.169

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

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 --------------------
 | CALIB            |
 | STANDHYD ( 0015) |   Area    (ha)=   1.41
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
 --------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.52          0.89
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=     6.00          6.00
     Length            (m)=    42.00         20.00
     Mannings n           =    0.013         0.250

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

                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
              0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
              0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
              0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
              0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
              0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=    132.58         56.04
                over (min)       5.00          5.00
     Storage Coeff.  (min)=      0.79 (ii)     4.87 (ii)
     Unit Hyd. Tpeak (min)=      5.00          5.00
     Unit Hyd. peak  (cms)=      0.34          0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.15          0.14        0.287 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.33         1.33
     RUNOFF VOLUME    (mm)=     49.62         21.11        29.40
     TOTAL RAINFALL   (mm)=     51.12         51.12        51.12
     RUNOFF COEFFICIENT   =      0.97          0.41         0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
 --------------------
 | ADD HYD  ( 0003)|
 |   1 + 2 = 3     |        AREA    QPEAK    TPEAK     R.V.
 --------------------       (ha)    (cms)    (hrs)     (mm)
        ID1= 1 ( 0101):     1.26   0.054     1.42    11.55
      + ID2= 2 ( 0102):     3.96   0.270     1.33    10.10
        ==================================================
        ID = 3 ( 0003):     5.22   0.316     1.33    10.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
 --------------------
 | ADD HYD  ( 0003)|
 |   3 + 2 = 1     |        AREA    QPEAK    TPEAK     R.V.
 --------------------       (ha)    (cms)    (hrs)     (mm)
        ID1= 3 ( 0003):     5.22   0.316     1.33    10.45
      + ID2= 2 ( 0103):     0.76   0.047     1.33     8.65
        ==================================================
        ID = 1 ( 0003):     5.98   0.364     1.33    10.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
 --------------------
 | ADD HYD  ( 0003)|
 |   1 + 2 = 3     |        AREA    QPEAK    TPEAK     R.V.
 --------------------       (ha)    (cms)    (hrs)     (mm)
        ID1= 1 ( 0003):     5.98   0.364     1.33    10.22
      + ID2= 2 ( 0015):     1.41   0.287     1.33    29.40
        ==================================================
```

```
        ID = 3 ( 0003):     7.39   0.651     1.33    13.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD ( 0013) |   Area    (ha)=   5.22
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
 --------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.57          3.65
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=    10.00         10.00
     Length            (m)=   186.55         30.00
     Mannings n           =    0.013         0.250

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

                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
              0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
              0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
              0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
              0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
              0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=    132.58         56.90
                over (min)       5.00         10.00
     Storage Coeff.  (min)=      1.66 (ii)     6.25 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.32          0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.40          0.43        0.747 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42         1.33
     RUNOFF VOLUME    (mm)=     49.62         21.23        27.10
     TOTAL RAINFALL   (mm)=     51.12         51.12        51.12
     RUNOFF COEFFICIENT   =      0.97          0.42         0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
 V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
 V    V   I    SS     U   U   A A   L
  V  V    I      SS   U   U  AAAAA  L
  V  V    I       SS  U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\90815c46-48
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\90815c46-48


DATE: 11-08-2024                          TIME: 08:45:48

USER:


COMMENTS: _____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : 25yr 4hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 822.740
| Ptotal= 61.88 mm |                          B=   0.000
--------------------                          C=   0.725
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    4.77 |  1.00   23.97 |'  2.00    9.68 |  3.00    5.53
               0.17    5.36 |  1.17  154.98 |'  2.17    8.51 |  3.17    5.19
               0.33    6.14 |  1.33   29.61 |'  2.33    7.63 |  3.33    4.90
               0.50    7.28 |  1.50   18.34 |'  2.50    6.94 |  3.50    4.65
               0.67    9.09 |  1.67   13.85 |'  2.67    6.38 |  3.67    4.43
               0.83   12.58 |  1.83   11.32 |'  2.83    5.92 |  3.83    4.23


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.21   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
               0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
               0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
               0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
               0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
               0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
               0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
               0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
               0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
               0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
               0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  3.92    4.23
               1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.52         0.89
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       6.00         6.00
     Length            (m)=      42.00        20.00
     Mannings n             =     0.013        0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
               0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
               0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
               0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
               0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
               0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
               0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
               0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
               0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
               0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
               0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  3.92    4.23
               1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98        76.33
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.74 (ii)    4.57 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.23
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.18         0.19          0.363 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=      60.38        28.94         38.09
     TOTAL RAINFALL   (mm)=      61.88        61.88         61.88
     RUNOFF COEFFICIENT   =       0.98         0.47          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     1.26   0.079     1.42     16.81
      + ID2= 2 (  0102):     3.96   0.387     1.33     14.68
        ==========================================================
        ID = 3 (  0003):     5.22   0.455     1.33     15.20

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

--------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0003):     5.22   0.455     1.33     15.20
      + ID2= 2 (  0103):     0.76   0.067     1.33     12.62
        ==========================================================
        ID = 1 (  0003):     5.98   0.523     1.33     14.87

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

--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     5.98   0.523     1.33     14.87
      + ID2= 2 (  0015):     1.41   0.363     1.33     38.09
        ==========================================================
```

```
     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.079 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  16.813
     TOTAL RAINFALL   (mm)=  61.875
     RUNOFF COEFFICIENT   =   0.272

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.06

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
               0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
               0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
               0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
               0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
               0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
               0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
               0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
               0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
               0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
               0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  3.92    4.23
               1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Unit Hyd Qpeak  (cms)=   2.521

     PEAK FLOW       (cms)=   0.387 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  14.683
     TOTAL RAINFALL   (mm)=  61.875
     RUNOFF COEFFICIENT   =   0.237

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0103)|   Area    (ha)=   0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.28   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
               0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
               0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
               0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
               0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
               0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
               0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
               0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
               0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
               0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
               0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  3.92    4.23
               1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Unit Hyd Qpeak  (cms)=   0.581

     PEAK FLOW       (cms)=   0.067 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  12.615
     TOTAL RAINFALL   (mm)=  61.875
     RUNOFF COEFFICIENT   =   0.204

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

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--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57         3.65
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=      10.00        10.00
     Length            (m)=     186.55        30.00
     Mannings n             =     0.013        0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
               0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
               0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
               0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
               0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
               0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
               0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
               0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
               0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
               0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
               0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  3.92    4.23
               1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98        77.44
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.56 (ii)    5.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.46         0.60          0.976 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      60.38        29.09         35.56
     TOTAL RAINFALL   (mm)=      61.88        61.88         61.88
     RUNOFF COEFFICIENT   =       0.98         0.47          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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        ID = 3 (  0003):     7.39   0.886     1.33     19.30

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

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\1720d434-be
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\1720d434-be


DATE: 11-08-2024                          TIME: 08:45:48

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 50yr 4hr 10min Chicago        **
  ************************************************


-------------------
| CHICAGO STORM   |    IDF curve parameters: A= 893.800
| Ptotal= 69.47 mm |                          B=   0.000
-------------------                          C=   0.719
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    5.47 |  1.00   27.09 |  2.00   11.03 |  3.00    6.33
                0.17    6.13 |  1.17  170.70 |  2.17    9.71 |  3.17    5.95
                0.33    7.02 |  1.33   33.42 |  2.33    8.71 |  3.33    5.62
                0.50    8.31 |  1.50   20.79 |  2.50    7.93 |  3.50    5.33
                0.67   10.36 |  1.67   15.73 |  2.67    7.29 |  3.67    5.08
                0.83   14.30 |  1.83   12.89 |  2.83    6.77 |  3.83    4.85


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-------------------
| CALIB           |
| NASHYD  (  0101)|   Area    (ha)=   1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.21   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

-------------------
| CALIB           |
| STANDHYD (  0015)|   Area    (ha)=   1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
-------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.52         0.89
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        6.00         6.00
     Length            (m)=       42.00        20.00
     Mannings n             =      0.013        0.250

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70        91.42
               over (min)          5.00         5.00
     Storage Coeff.  (min)=       0.72 (ii)    4.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.23
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.22          0.419 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      67.97        34.78          44.44
     TOTAL RAINFALL   (mm)=      69.47        69.47          69.47
     RUNOFF COEFFICIENT   =       0.98         0.50           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     1.26   0.098     1.42    20.91
      + ID2= 2 (  0102):     3.96   0.476     1.33    18.25
        ==========================================================
        ID = 3 (  0003):     5.22   0.563     1.33    18.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0003):     5.22   0.563     1.33    18.89
      + ID2= 2 (  0103):     0.76   0.083     1.33    15.71
        ==========================================================
        ID = 1 (  0003):     5.98   0.645     1.33    18.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     5.98   0.645     1.33    18.49
      + ID2= 2 (  0015):     1.41   0.419     1.33    44.44
        ==========================================================
```

```
     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.098 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  20.907
     TOTAL RAINFALL   (mm)=  69.467
     RUNOFF COEFFICIENT   =   0.301

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

--------------------------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD  (  0102)|   Area    (ha)=   3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.06

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Unit Hyd Qpeak  (cms)=   2.521

     PEAK FLOW       (cms)=   0.476 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  18.249
     TOTAL RAINFALL   (mm)=  69.467
     RUNOFF COEFFICIENT   =   0.263

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

--------------------------------------------------------------------------------------------------
-------------------
| CALIB           |
| NASHYD  (  0103)|   Area    (ha)=   0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.28   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.05

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Unit Hyd Qpeak  (cms)=   0.581

     PEAK FLOW       (cms)=   0.083 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  15.706
     TOTAL RAINFALL   (mm)=  69.467
     RUNOFF COEFFICIENT   =   0.226

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

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-------------------
| CALIB           |
| STANDHYD (  0013)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
-------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.57         3.65
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=       10.00        10.00
     Length            (m)=      186.55        30.00
     Mannings n             =      0.013        0.250

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70        92.71
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       1.50 (ii)    6.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.51         0.69          1.097 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      67.97        34.94          41.78
     TOTAL RAINFALL   (mm)=      69.47        69.47          69.47
     RUNOFF COEFFICIENT   =       0.98         0.50           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
        ID = 3 (  0003):     7.39   1.064     1.33    23.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0013)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
-------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.57         3.65
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=       10.00        10.00
     Length            (m)=      186.55        30.00
     Mannings n             =      0.013        0.250

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                0.167   5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                0.250   6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                0.333   6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                0.417   7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                0.500   7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                0.583   8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                0.667   8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                0.750  10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                0.833  10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                0.917  14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                1.000  14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70        92.71
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       1.50 (ii)    6.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.51         0.69          1.097 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      67.97        34.94          41.78
     TOTAL RAINFALL   (mm)=      69.47        69.47          69.47
     RUNOFF COEFFICIENT   =       0.98         0.50           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```

```
 V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
 V    V   I    SS     U   U   A A   L
  V  V    I      SS   U   U  AAAAA  L
  V  V    I       SS  U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\9453acac-6d
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\9453acac-6d

DATE: 11-08-2024                          TIME: 08:45:48

USER:


COMMENTS: _____________________________________________________
```

```
  ************************************************
  ** SIMULATION : 100yr 4hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 953.290
| Ptotal= 77.41 mm |                          B=   0.000
--------------------                          C=   0.711
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
      0.00    6.26 |   1.00   30.45 |'  2.00   12.53 |   3.00    7.23
      0.17    7.01 |   1.17  185.45 |'  2.17   11.04 |   3.17    6.80
      0.33    8.02 |   1.33   37.49 |'  2.33    9.92 |   3.33    6.43
      0.50    9.47 |   1.50   23.45 |'  2.50    9.04 |   3.50    6.10
      0.67   11.77 |   1.67   17.80 |'  2.67    8.32 |   3.67    5.82
      0.83   16.19 |   1.83   14.61 |'  2.83    7.73 |   3.83    5.56

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.21   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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

                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
     0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
     0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
     0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
     0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
     0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
     0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
     0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
     0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
     0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
     0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
     1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56
```

```
     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.118 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  25.483
     TOTAL RAINFALL   (mm)=  77.410
     RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.06

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

                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
     0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
     0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
     0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
     0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
     0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
     0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
     0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
     0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
     0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
     0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
     1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Unit Hyd Qpeak  (cms)=   2.521

     PEAK FLOW       (cms)=   0.569 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  22.234
     TOTAL RAINFALL   (mm)=  77.410
     RUNOFF COEFFICIENT   =   0.287

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0103)|   Area    (ha)=   0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.28   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

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

                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
     0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
     0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
     0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
     0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
     0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
     0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
     0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
     0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
     0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
     0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
     1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Unit Hyd Qpeak  (cms)=   0.581

     PEAK FLOW       (cms)=   0.099 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  19.165
     TOTAL RAINFALL   (mm)=  77.410
     RUNOFF COEFFICIENT   =   0.248

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

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--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.52         0.89
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     42.00        20.00
     Mannings n             =    0.013        0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
     0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
     0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
     0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
     0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
     0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
     0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
     0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
     0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
     0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
     0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
     1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       106.73
               over (min)          5.00         5.00
     Storage Coeff.  (min)=       0.69 (ii)    4.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.23
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.26          0.474 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      75.91        41.11          51.24
     TOTAL RAINFALL   (mm)=      77.41        77.41          77.41
     RUNOFF COEFFICIENT   =       0.98         0.53           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     1.26   0.118     1.42    25.48
      + ID2= 2 (  0102):     3.96   0.569     1.33    22.23
        ==========================================================
        ID = 3 (  0003):     5.22   0.675     1.33    23.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0003):     5.22   0.675     1.33    23.02
      + ID2= 2 (  0103):     0.76   0.099     1.33    19.16
        ==========================================================
        ID = 1 (  0003):     5.98   0.774     1.33    22.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     5.98   0.774     1.33    22.53
      + ID2= 2 (  0015):     1.41   0.474     1.33    51.24
        ==========================================================
```

```
        ID = 3 (  0003):     7.39   1.248     1.33    28.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57         3.65
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=     10.00        10.00
     Length            (m)=    186.55        30.00
     Mannings n             =    0.013        0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
     0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
     0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
     0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
     0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
     0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
     0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
     0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
     0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
     0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
     0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
     1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       108.19
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       1.45 (ii)    6.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.81          1.258 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      75.91        41.29          48.46
     TOTAL RAINFALL   (mm)=      77.41        77.41          77.41
     RUNOFF COEFFICIENT   =       0.98         0.53           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\42274741-47


DATE: 11-08-2024                          TIME: 08:45:48

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Hurricane Hazel (Regional)    **
  ************************************************


-------------------
|    READ STORM    |    Filename: C:\Users\cmartin\AppD
|                  |              ata\Local\Temp\
|                  |              475b8c60-e583-467e-9c13-707b8b3dd18d\eeae85f6
| Ptotal=212.00 mm |    Comments: Hazel
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    6.00 |  3.00   13.00 |   6.00   23.00 |  9.00   53.00
               1.00    4.00 |  4.00   17.00 |   7.00   13.00 | 10.00   38.00
               2.00    6.00 |  5.00   13.00 |   8.00   13.00 | 11.00   13.00

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

-------------------
| CALIB             |
| NASHYD   (  0101)|   Area    (ha)=   1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.21   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 |  3.083   13.00 |  6.083   23.00 |  9.08   53.00
               0.167    6.00 |  3.167   13.00 |  6.167   23.00 |  9.17   53.00
               0.250    6.00 |  3.250   13.00 |  6.250   23.00 |  9.25   53.00
               0.333    6.00 |  3.333   13.00 |  6.333   23.00 |  9.33   53.00
               0.417    6.00 |  3.417   13.00 |  6.417   23.00 |  9.42   53.00
               0.500    6.00 |  3.500   13.00 |  6.500   23.00 |  9.50   53.00
               0.583    6.00 |  3.583   13.00 |  6.583   23.00 |  9.58   53.00
               0.667    6.00 |  3.667   13.00 |  6.667   23.00 |  9.67   53.00
               0.750    6.00 |  3.750   13.00 |  6.750   23.00 |  9.75   53.00
               0.833    6.00 |  3.833   13.00 |  6.833   23.00 |  9.83   53.00
               0.917    6.00 |  3.917   13.00 |  6.917   23.00 |  9.92   53.00
               1.000    6.00 |  4.000   13.00 |  7.000   23.00 | 10.00   53.00
               1.083    4.00 |  4.083   17.00 |  7.083   13.00 | 10.08   38.00
               1.167    4.00 |  4.167   17.00 |  7.167   13.00 | 10.17   38.00
               1.250    4.00 |  4.250   17.00 |  7.250   13.00 | 10.25   38.00
               1.333    4.00 |  4.333   17.00 |  7.333   13.00 | 10.33   38.00
               1.417    4.00 |  4.417   17.00 |  7.417   13.00 | 10.42   38.00
               1.500    4.00 |  4.500   17.00 |  7.500   13.00 | 10.50   38.00
               1.583    4.00 |  4.583   17.00 |  7.583   13.00 | 10.58   38.00
               1.667    4.00 |  4.667   17.00 |  7.667   13.00 | 10.67   38.00
               1.750    4.00 |  4.750   17.00 |  7.750   13.00 | 10.75   38.00
               1.833    4.00 |  4.833   17.00 |  7.833   13.00 | 10.83   38.00
               1.917    4.00 |  4.917   17.00 |  7.917   13.00 | 10.92   38.00
               2.000    4.00 |  5.000   17.00 |  8.000   13.00 | 11.00   38.00
               2.083    6.00 |  5.083   13.00 |  8.083   13.00 | 11.08   13.00
               2.167    6.00 |  5.167   13.00 |  8.167   13.00 | 11.17   13.00
               2.250    6.00 |  5.250   13.00 |  8.250   13.00 | 11.25   13.00
               2.333    6.00 |  5.333   13.00 |  8.333   13.00 | 11.33   13.00
               2.417    6.00 |  5.417   13.00 |  8.417   13.00 | 11.42   13.00
               2.500    6.00 |  5.500   13.00 |  8.500   13.00 | 11.50   13.00
               2.583    6.00 |  5.583   13.00 |  8.583   13.00 | 11.58   13.00
               2.667    6.00 |  5.667   13.00 |  8.667   13.00 | 11.67   13.00
               2.750    6.00 |  5.750   13.00 |  8.750   13.00 | 11.75   13.00
               2.833    6.00 |  5.833   13.00 |  8.833   13.00 | 11.83   13.00
               2.917    6.00 |  5.917   13.00 |  8.917   13.00 | 11.92   13.00
               3.000    6.00 |  6.000   13.00 |  9.000   13.00 | 12.00   13.00

    Unit Hyd Qpeak  (cms)=   0.344

    PEAK FLOW       (cms)=   0.146 (i)
    TIME TO PEAK    (hrs)=  10.000
    RUNOFF VOLUME    (mm)= 127.476
    TOTAL RAINFALL   (mm)= 212.000
    RUNOFF COEFFICIENT   =   0.601

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

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| CALIB             |
| NASHYD   (  0102)|   Area    (ha)=   3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.06

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 |  3.083   13.00 |  6.083   23.00 |  9.08   53.00
               0.167    6.00 |  3.167   13.00 |  6.167   23.00 |  9.17   53.00
               0.250    6.00 |  3.250   13.00 |  6.250   23.00 |  9.25   53.00
               0.333    6.00 |  3.333   13.00 |  6.333   23.00 |  9.33   53.00
               0.417    6.00 |  3.417   13.00 |  6.417   23.00 |  9.42   53.00
               0.500    6.00 |  3.500   13.00 |  6.500   23.00 |  9.50   53.00
               0.583    6.00 |  3.583   13.00 |  6.583   23.00 |  9.58   53.00
               0.667    6.00 |  3.667   13.00 |  6.667   23.00 |  9.67   53.00
               0.750    6.00 |  3.750   13.00 |  6.750   23.00 |  9.75   53.00
               0.833    6.00 |  3.833   13.00 |  6.833   23.00 |  9.83   53.00
               0.917    6.00 |  3.917   13.00 |  6.917   23.00 |  9.92   53.00
               1.000    6.00 |  4.000   13.00 |  7.000   23.00 | 10.00   53.00
               1.083    4.00 |  4.083   17.00 |  7.083   13.00 | 10.08   38.00
               1.167    4.00 |  4.167   17.00 |  7.167   13.00 | 10.17   38.00
               1.250    4.00 |  4.250   17.00 |  7.250   13.00 | 10.25   38.00
               1.333    4.00 |  4.333   17.00 |  7.333   13.00 | 10.33   38.00
               1.417    4.00 |  4.417   17.00 |  7.417   13.00 | 10.42   38.00
               1.500    4.00 |  4.500   17.00 |  7.500   13.00 | 10.50   38.00
               1.583    4.00 |  4.583   17.00 |  7.583   13.00 | 10.58   38.00
               1.667    4.00 |  4.667   17.00 |  7.667   13.00 | 10.67   38.00
               1.750    4.00 |  4.750   17.00 |  7.750   13.00 | 10.75   38.00
               1.833    4.00 |  4.833   17.00 |  7.833   13.00 | 10.83   38.00
               1.917    4.00 |  4.917   17.00 |  7.917   13.00 | 10.92   38.00
               2.000    4.00 |  5.000   17.00 |  8.000   13.00 | 11.00   38.00
               2.083    6.00 |  5.083   13.00 |  8.083   13.00 | 11.08   13.00
               2.167    6.00 |  5.167   13.00 |  8.167   13.00 | 11.17   13.00
               2.250    6.00 |  5.250   13.00 |  8.250   13.00 | 11.25   13.00
               2.333    6.00 |  5.333   13.00 |  8.333   13.00 | 11.33   13.00
               2.417    6.00 |  5.417   13.00 |  8.417   13.00 | 11.42   13.00
               2.500    6.00 |  5.500   13.00 |  8.500   13.00 | 11.50   13.00
               2.583    6.00 |  5.583   13.00 |  8.583   13.00 | 11.58   13.00
               2.667    6.00 |  5.667   13.00 |  8.667   13.00 | 11.67   13.00
               2.750    6.00 |  5.750   13.00 |  8.750   13.00 | 11.75   13.00
               2.833    6.00 |  5.833   13.00 |  8.833   13.00 | 11.83   13.00
               2.917    6.00 |  5.917   13.00 |  8.917   13.00 | 11.92   13.00
               3.000    6.00 |  6.000   13.00 |  9.000   13.00 | 12.00   13.00

    Unit Hyd Qpeak  (cms)=   2.521

    PEAK FLOW       (cms)=   0.402 (i)
    TIME TO PEAK    (hrs)=  10.000
    RUNOFF VOLUME    (mm)= 110.787

    TOTAL RAINFALL   (mm)= 212.000
    RUNOFF COEFFICIENT   =   0.523

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

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| CALIB             |
| NASHYD   (  0103)|   Area    (ha)=   0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.28   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.05

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 |  3.083   13.00 |  6.083   23.00 |  9.08   53.00
               0.167    6.00 |  3.167   13.00 |  6.167   23.00 |  9.17   53.00
               0.250    6.00 |  3.250   13.00 |  6.250   23.00 |  9.25   53.00
               0.333    6.00 |  3.333   13.00 |  6.333   23.00 |  9.33   53.00
               0.417    6.00 |  3.417   13.00 |  6.417   23.00 |  9.42   53.00
               0.500    6.00 |  3.500   13.00 |  6.500   23.00 |  9.50   53.00
               0.583    6.00 |  3.583   13.00 |  6.583   23.00 |  9.58   53.00
               0.667    6.00 |  3.667   13.00 |  6.667   23.00 |  9.67   53.00
               0.750    6.00 |  3.750   13.00 |  6.750   23.00 |  9.75   53.00
               0.833    6.00 |  3.833   13.00 |  6.833   23.00 |  9.83   53.00
               0.917    6.00 |  3.917   13.00 |  6.917   23.00 |  9.92   53.00
               1.000    6.00 |  4.000   13.00 |  7.000   23.00 | 10.00   53.00
               1.083    4.00 |  4.083   17.00 |  7.083   13.00 | 10.08   38.00
               1.167    4.00 |  4.167   17.00 |  7.167   13.00 | 10.17   38.00
               1.250    4.00 |  4.250   17.00 |  7.250   13.00 | 10.25   38.00
               1.333    4.00 |  4.333   17.00 |  7.333   13.00 | 10.33   38.00
               1.417    4.00 |  4.417   17.00 |  7.417   13.00 | 10.42   38.00
               1.500    4.00 |  4.500   17.00 |  7.500   13.00 | 10.50   38.00
               1.583    4.00 |  4.583   17.00 |  7.583   13.00 | 10.58   38.00
               1.667    4.00 |  4.667   17.00 |  7.667   13.00 | 10.67   38.00
               1.750    4.00 |  4.750   17.00 |  7.750   13.00 | 10.75   38.00
               1.833    4.00 |  4.833   17.00 |  7.833   13.00 | 10.83   38.00
               1.917    4.00 |  4.917   17.00 |  7.917   13.00 | 10.92   38.00
               2.000    4.00 |  5.000   17.00 |  8.000   13.00 | 11.00   38.00
               2.083    6.00 |  5.083   13.00 |  8.083   13.00 | 11.08   13.00
               2.167    6.00 |  5.167   13.00 |  8.167   13.00 | 11.17   13.00
               2.250    6.00 |  5.250   13.00 |  8.250   13.00 | 11.25   13.00
               2.333    6.00 |  5.333   13.00 |  8.333   13.00 | 11.33   13.00
               2.417    6.00 |  5.417   13.00 |  8.417   13.00 | 11.42   13.00
               2.500    6.00 |  5.500   13.00 |  8.500   13.00 | 11.50   13.00
               2.583    6.00 |  5.583   13.00 |  8.583   13.00 | 11.58   13.00
               2.667    6.00 |  5.667   13.00 |  8.667   13.00 | 11.67   13.00
               2.750    6.00 |  5.750   13.00 |  8.750   13.00 | 11.75   13.00
               2.833    6.00 |  5.833   13.00 |  8.833   13.00 | 11.83   13.00
               2.917    6.00 |  5.917   13.00 |  8.917   13.00 | 11.92   13.00
               3.000    6.00 |  6.000   13.00 |  9.000   13.00 | 12.00   13.00

    Unit Hyd Qpeak  (cms)=   0.581

    PEAK FLOW       (cms)=   0.068 (i)
    TIME TO PEAK    (hrs)=  10.000
    RUNOFF VOLUME    (mm)=  96.784
    TOTAL RAINFALL   (mm)= 212.000
    RUNOFF COEFFICIENT   =   0.457

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

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-------------------
| CALIB             |
| STANDHYD (  0015)|   Area    (ha)=   1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
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                     IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.52          0.89
    Dep. Storage     (mm)=       1.50          5.00
    Average Slope     (%)=       6.00          6.00
    Length            (m)=      42.00         20.00
    Mannings n           =      0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 |  3.083   13.00 |  6.083   23.00 |  9.08   53.00
               0.167    6.00 |  3.167   13.00 |  6.167   23.00 |  9.17   53.00
               0.250    6.00 |  3.250   13.00 |  6.250   23.00 |  9.25   53.00
               0.333    6.00 |  3.333   13.00 |  6.333   23.00 |  9.33   53.00
               0.417    6.00 |  3.417   13.00 |  6.417   23.00 |  9.42   53.00
               0.500    6.00 |  3.500   13.00 |  6.500   23.00 |  9.50   53.00
               0.583    6.00 |  3.583   13.00 |  6.583   23.00 |  9.58   53.00
               0.667    6.00 |  3.667   13.00 |  6.667   23.00 |  9.67   53.00
               0.750    6.00 |  3.750   13.00 |  6.750   23.00 |  9.75   53.00
               0.833    6.00 |  3.833   13.00 |  6.833   23.00 |  9.83   53.00
               0.917    6.00 |  3.917   13.00 |  6.917   23.00 |  9.92   53.00
               1.000    6.00 |  4.000   13.00 |  7.000   23.00 | 10.00   53.00
               1.083    4.00 |  4.083   17.00 |  7.083   13.00 | 10.08   38.00
               1.167    4.00 |  4.167   17.00 |  7.167   13.00 | 10.17   38.00
               1.250    4.00 |  4.250   17.00 |  7.250   13.00 | 10.25   38.00
               1.333    4.00 |  4.333   17.00 |  7.333   13.00 | 10.33   38.00
               1.417    4.00 |  4.417   17.00 |  7.417   13.00 | 10.42   38.00
               1.500    4.00 |  4.500   17.00 |  7.500   13.00 | 10.50   38.00
               1.583    4.00 |  4.583   17.00 |  7.583   13.00 | 10.58   38.00
               1.667    4.00 |  4.667   17.00 |  7.667   13.00 | 10.67   38.00
               1.750    4.00 |  4.750   17.00 |  7.750   13.00 | 10.75   38.00
               1.833    4.00 |  4.833   17.00 |  7.833   13.00 | 10.83   38.00
               1.917    4.00 |  4.917   17.00 |  7.917   13.00 | 10.92   38.00
               2.000    4.00 |  5.000   17.00 |  8.000   13.00 | 11.00   38.00
               2.083    6.00 |  5.083   13.00 |  8.083   13.00 | 11.08   13.00
               2.167    6.00 |  5.167   13.00 |  8.167   13.00 | 11.17   13.00
               2.250    6.00 |  5.250   13.00 |  8.250   13.00 | 11.25   13.00
               2.333    6.00 |  5.333   13.00 |  8.333   13.00 | 11.33   13.00
               2.417    6.00 |  5.417   13.00 |  8.417   13.00 | 11.42   13.00
               2.500    6.00 |  5.500   13.00 |  8.500   13.00 | 11.50   13.00
               2.583    6.00 |  5.583   13.00 |  8.583   13.00 | 11.58   13.00
               2.667    6.00 |  5.667   13.00 |  8.667   13.00 | 11.67   13.00
               2.750    6.00 |  5.750   13.00 |  8.750   13.00 | 11.75   13.00
               2.833    6.00 |  5.833   13.00 |  8.833   13.00 | 11.83   13.00
               2.917    6.00 |  5.917   13.00 |  8.917   13.00 | 11.92   13.00
               3.000    6.00 |  6.000   13.00 |  9.000   13.00 | 12.00   13.00

    Max.Eff.Inten.(mm/hr)=      53.00         55.18
              over (min)        5.00         10.00
    Storage Coeff.  (min)=      1.14 (ii)     5.39 (ii)
    Unit Hyd. Tpeak (min)=      5.00         10.00
    Unit Hyd. peak  (cms)=      0.34          0.16
                                                    *TOTALS*
    PEAK FLOW       (cms)=      0.06          0.14      0.196 (iii)
    TIME TO PEAK    (hrs)=      9.33         10.00       10.00
    RUNOFF VOLUME    (mm)=    210.50        163.13      176.91
    TOTAL RAINFALL   (mm)=    212.00        212.00      212.00
    RUNOFF COEFFICIENT   =      0.99          0.77        0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     1.26   0.146   10.00   127.48
     + ID2= 2 (  0102):     3.96   0.402   10.00   110.79
       ================================================
       ID = 3 (  0003):     5.22   0.547   10.00   114.82

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0003):     5.22   0.547   10.00   114.82
     + ID2= 2 (  0103):     0.76   0.068   10.00    96.78
       ================================================
       ID = 1 (  0003):     5.98   0.615   10.00   112.52

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0003):      5.98   0.615    10.00   112.52
     + ID2= 2 (  0015):      1.41   0.196    10.00   176.91
       ================================================
       ID = 3 (  0003):      7.39   0.811    10.00   124.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB
| STANDHYD (  0013)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57         3.65
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=     10.00        10.00
     Length            (m)=    186.55        30.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        55.69
           over (min)             5.00        10.00
     Storage Coeff.  (min)=       2.40 (ii)    7.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.56         0.722 (iii)
     TIME TO PEAK    (hrs)=       9.67        10.00        10.00
     RUNOFF VOLUME    (mm)=     210.50       163.45       173.19
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.00
     RUNOFF COEFFICIENT   =       0.99         0.77         0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

FINISH

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

     V    V   I    SSSSS  U    U    A     L              (v 6.2.2015)
     V    V   I    SS     U    U   A A    L
      V  V    I     SS    U    U  AAAAA   L
      V  V    I      SS   U    U  A   A   L
       VV     I    SSSSS  UUUUU  A     A  LLLLL

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\4dd2c1fa-f8
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DATE: 11-08-2024                              TIME: 08:57:04

USER:


COMMENTS: ____________________________________________________________

--------------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 25mm 4hr 10min Chicago       **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 475.610
| Ptotal= 33.31 mm |                          B=   0.000
--------------------                          C=   0.738
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
             0.00     2.45 |  1.00    12.69 |  2.00     5.04 |  3.00     2.85
             0.17     2.76 |  1.17    86.95 |  2.17     4.42 |  3.17     2.67
             0.33     3.17 |  1.33    15.73 |  2.33     3.95 |  3.33     2.52
             0.50     3.77 |  1.50     9.66 |  2.50     3.59 |  3.50     2.39
             0.67     4.72 |  1.67     7.25 |  2.67     3.30 |  3.67     2.27
             0.83     6.58 |  1.83     5.91 |  2.83     3.05 |  3.83     2.17

-----------------------------------------------------------------------------
--------------------
| MODIFY STORM     |    MODIFYING PARAMETERS
--------------------    Time shift  (min)    =  0.00

             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   ( 0101)|    Area    (ha)=    1.26   Curve Number   (CN)= 67.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=    7.21   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.14

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

                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     1.84 | 1.083     9.52 | 2.083     3.78 |  3.08     2.14
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.250     2.07 | 1.250    65.25 | 2.250     3.32 |  3.25     2.01
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.417     2.38 | 1.417    11.81 | 2.417     2.97 |  3.42     1.89
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.583     2.83 | 1.583     7.25 | 2.583     2.69 |  3.58     1.79
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.750     3.55 | 1.750     5.44 | 2.750     2.47 |  3.75     1.70
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            0.917     4.94 | 1.917     4.44 | 2.917     2.29 |  3.92     1.63
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

     Unit Hyd Qpeak  (cms)=    0.344

     PEAK FLOW       (cms)=    0.008 (i)
     TIME TO PEAK    (hrs)=    1.417
     RUNOFF VOLUME    (mm)=    2.251
     TOTAL RAINFALL   (mm)=   24.999
     RUNOFF COEFFICIENT   =    0.090

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

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   ( 0102)|    Area    (ha)=    3.96   Curve Number   (CN)= 67.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=    7.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.06

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

                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     1.84 | 1.083     9.52 | 2.083     3.78 |  3.08     2.14
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.250     2.07 | 1.250    65.25 | 2.250     3.32 |  3.25     2.01
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.417     2.38 | 1.417    11.81 | 2.417     2.97 |  3.42     1.89
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.583     2.83 | 1.583     7.25 | 2.583     2.69 |  3.58     1.79
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.750     3.55 | 1.750     5.44 | 2.750     2.47 |  3.75     1.70
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            0.917     4.94 | 1.917     4.44 | 2.917     2.29 |  3.92     1.63
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

     Unit Hyd Qpeak  (cms)=    2.521

     PEAK FLOW       (cms)=    0.042 (i)
     TIME TO PEAK    (hrs)=    1.333
     RUNOFF VOLUME    (mm)=    1.974
     TOTAL RAINFALL   (mm)=   24.999
     RUNOFF COEFFICIENT   =    0.079

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

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   ( 0103)|    Area    (ha)=    0.76   Curve Number   (CN)= 66.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=    7.28   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.05

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

                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     1.84 | 1.083     9.52 | 2.083     3.78 |  3.08     2.14
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.250     2.07 | 1.250    65.25 | 2.250     3.32 |  3.25     2.01
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.417     2.38 | 1.417    11.81 | 2.417     2.97 |  3.42     1.89
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.583     2.83 | 1.583     7.25 | 2.583     2.69 |  3.58     1.79
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.750     3.55 | 1.750     5.44 | 2.750     2.47 |  3.75     1.70
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            0.917     4.94 | 1.917     4.44 | 2.917     2.29 |  3.92     1.63
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

     Unit Hyd Qpeak  (cms)=    0.581

     PEAK FLOW       (cms)=    0.007 (i)
     TIME TO PEAK    (hrs)=    1.333
     RUNOFF VOLUME    (mm)=    1.670
     TOTAL RAINFALL   (mm)=   24.999
     RUNOFF COEFFICIENT   =    0.067

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

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0015)|    Area    (ha)=    1.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.90   Dir. Conn.(%)=  29.10
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.52          0.89
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      6.00          6.00
     Length            (m)=     42.00         20.00
     Mannings n          =      0.013         0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     1.84 | 1.083     9.52 | 2.083     3.78 |  3.08     2.14
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.250     2.07 | 1.250    65.25 | 2.250     3.32 |  3.25     2.01
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.417     2.38 | 1.417    11.81 | 2.417     2.97 |  3.42     1.89
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.583     2.83 | 1.583     7.25 | 2.583     2.69 |  3.58     1.79
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.750     3.55 | 1.750     5.44 | 2.750     2.47 |  3.75     1.70
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            0.917     4.94 | 1.917     4.44 | 2.917     2.29 |  3.92     1.63
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

     Max.Eff.Inten.(mm/hr)=      65.25         11.97
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       1.05 (ii)     8.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.34          0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07          0.02          0.088 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.42          1.33
     RUNOFF VOLUME    (mm)=      23.50          5.48         10.72
     TOTAL RAINFALL   (mm)=      25.00         25.00         25.00
     RUNOFF COEFFICIENT   =       0.94          0.22          0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| ADD HYD  ( 0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 ( 0101):      1.26    0.008     1.42     2.25
       + ID2= 2 ( 0102):      3.96    0.042     1.33     1.97
         =================================================
         ID = 3 ( 0003):      5.22    0.048     1.33     2.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
--------------------
| ADD HYD  ( 0003)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 3 ( 0003):      5.22    0.048     1.33     2.04
       + ID2= 2 ( 0103):      0.76    0.007     1.33     1.67
         =================================================
         ID = 1 ( 0003):      5.98    0.055     1.33     1.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| ADD HYD  ( 0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 ( 0003):      5.98    0.055     1.33     1.99
       + ID2= 2 ( 0015):      1.41    0.088     1.33    10.72
         =================================================
         ID = 3 ( 0003):      7.39    0.143     1.33     3.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0013)|    Area    (ha)=    5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57          3.65
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=     10.00         10.00
     Length            (m)=    186.55         30.00
     Mannings n          =      0.013         0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     1.84 | 1.083     9.52 | 2.083     3.78 |  3.08     2.14
            0.167     1.84 | 1.167     9.52 | 2.167     3.78 |  3.17     2.14
            0.250     2.07 | 1.250    65.25 | 2.250     3.32 |  3.25     2.01
            0.333     2.07 | 1.333    65.25 | 2.333     3.32 |  3.33     2.01
            0.417     2.38 | 1.417    11.81 | 2.417     2.97 |  3.42     1.89
            0.500     2.38 | 1.500    11.81 | 2.500     2.97 |  3.50     1.89
            0.583     2.83 | 1.583     7.25 | 2.583     2.69 |  3.58     1.79
            0.667     2.83 | 1.667     7.25 | 2.667     2.69 |  3.67     1.79
            0.750     3.55 | 1.750     5.44 | 2.750     2.47 |  3.75     1.70
            0.833     3.55 | 1.833     5.44 | 2.833     2.47 |  3.83     1.70
            0.917     4.94 | 1.917     4.44 | 2.917     2.29 |  3.92     1.63
            1.000     4.94 | 2.000     4.44 | 3.000     2.29 |  4.00     1.63

     Max.Eff.Inten.(mm/hr)=      65.25         12.23
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       2.21 (ii)    10.70 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.30          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.19          0.07          0.223 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50          1.33
     RUNOFF VOLUME    (mm)=      23.50          5.53          9.25
     TOTAL RAINFALL   (mm)=      25.00         25.00         25.00
     RUNOFF COEFFICIENT   =       0.94          0.22          0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

 FINISH
==================================================================================================
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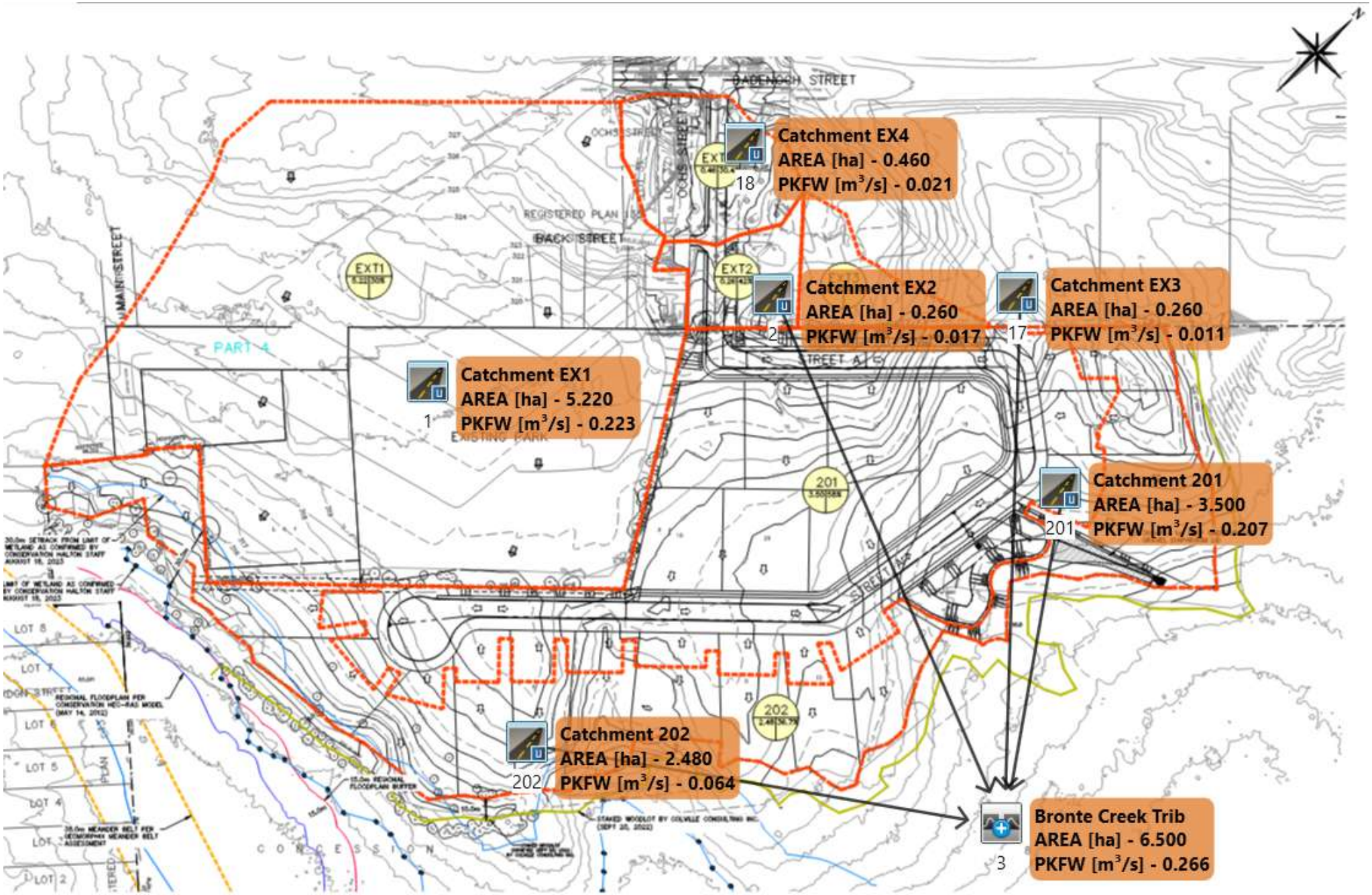
Post-Development Uncontrolled Visual-Otthymo Schematic



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

      V    V   I    SSSSS  U    U    A     L                (v 6.2.2015)
       V    V   I    SS     U    U   A A    L
        V  V    I     SS    U    U  AAAAA   L
         V V    I      SS   U    U  A   A   L
          VV    I    SSSSS  UUUUU  A    A  LLLLL

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

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  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\fbc119fe-34
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DATE: 11-08-2024                           TIME: 09:01:02

USER:

COMMENTS: ____________________________________________________________

-------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 2yr 4hr 10min Chicago        **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 475.610
| Ptotal= 33.31 mm |                          B=   0.000
--------------------                          C=   0.738
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    2.45 |  1.00   12.69 |  2.00    5.04 |  3.00    2.85
                 0.17    2.76 |  1.17   86.95 |  2.17    4.42 |  3.17    2.67
                 0.33    3.17 |  1.33   15.73 |  2.33    3.95 |  3.33    2.52
                 0.50    3.77 |  1.50    9.66 |  2.50    3.59 |  3.50    2.39
                 0.67    4.72 |  1.67    7.25 |  2.67    3.30 |  3.67    2.27
                 0.83    6.58 |  1.83    5.91 |  2.83    3.05 |  3.83    2.17

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
     Mannings n          =      0.013        0.250

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

                      ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
                0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
                0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
                0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
                0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
                0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
```

```
                0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
                0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
                0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
                0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
                0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
                1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        67.96
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        2.30 (ii)    6.71 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.30         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.17         0.20        0.330 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=       31.81        14.72        18.12
     TOTAL RAINFALL   (mm)=       33.31        33.31        33.31
     RUNOFF COEFFICIENT   =        0.95         0.44         0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0002)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  31.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11         0.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     41.63        20.00
     Mannings n          =      0.013        0.250

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

                      ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
                0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
                0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
                0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
                0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
                0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
                0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
                0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
                0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
                0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
                0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
                1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        26.82
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        0.93 (ii)    5.48 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.34         0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.02         0.01        0.026 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=       31.81        10.27        16.93
     TOTAL RAINFALL   (mm)=       33.31        33.31        33.31
     RUNOFF COEFFICIENT   =        0.95         0.31         0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| STANDHYD ( 0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91         1.57
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         4.00
     Length            (m)=    128.58        30.00
     Mannings n          =      0.013        0.250

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

                      ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
                0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
                0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
                0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
                0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
                0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
                0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
                0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
                0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
                0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
                0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
                1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        47.32
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        2.55 (ii)    9.06 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.29         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.00         0.13        0.134 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42         1.42
     RUNOFF VOLUME    (mm)=       32.31        12.87        12.97
     TOTAL RAINFALL   (mm)=       33.31        33.31        33.31
     RUNOFF COEFFICIENT   =        0.97         0.39         0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n          =      0.013        0.250

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

                      ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
                0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
                0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
                0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
                0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
                0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
                0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
                0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
                0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
                0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
                0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
                1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        28.43
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                over (min)         5.00        10.00
     Storage Coeff.  (min)=        1.05 (ii)    7.11 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.34         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.01         0.01        0.017 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=       31.81        10.52        13.78
     TOTAL RAINFALL   (mm)=       33.31        33.31        33.31
     RUNOFF COEFFICIENT   =        0.95         0.32         0.41

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3       |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 ( 0017):     0.26   0.017     1.33    13.78
        + ID2= 2 ( 0002):     0.26   0.026     1.33    16.93
          ===============================================
          ID = 3 ( 0003):     0.52   0.044     1.33    15.36

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

--------------------
| ADD HYD  ( 0003)|
|  3 + 2 = 1       |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 3 ( 0003):     0.52   0.044     1.33    15.36
        + ID2= 2 ( 0201):     3.50   0.330     1.33    18.12
          ===============================================
          ID = 1 ( 0003):     4.02   0.374     1.33    17.76

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3       |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 ( 0003):     4.02   0.374     1.33    17.76
        + ID2= 2 ( 0202):     2.48   0.134     1.42    12.97
          ===============================================
          ID = 3 ( 0003):     6.50   0.478     1.33    15.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0001)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57         3.65
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=     10.00        10.00
     Length            (m)=    186.55        30.00
     Mannings n          =      0.013        0.250

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

                      ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
                0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
                0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
                0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
                0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
                0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
                0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
                0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
```

0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Max.Eff.Inten.(mm/hr)=	86.95	24.11	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.97 (ii)	8.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.12	
			TOTALS
PEAK FLOW (cms)=	0.26	0.17	0.380 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	31.81	9.83	14.38
TOTAL RAINFALL (mm)=	33.31	33.31	33.31
RUNOFF COEFFICIENT =	0.95	0.30	0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0018)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.40	Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	12.69	2.083	5.04	3.08	2.85
0.167	2.45	1.167	12.69	2.167	5.04	3.17	2.85
0.250	2.76	1.250	86.95	2.250	4.42	3.25	2.67
0.333	2.76	1.333	86.95	2.333	4.42	3.33	2.67
0.417	3.17	1.417	15.73	2.417	3.95	3.42	2.52
0.500	3.17	1.500	15.73	2.500	3.95	3.50	2.52
0.583	3.77	1.583	9.66	2.583	3.59	3.58	2.39
0.667	3.77	1.667	9.66	2.667	3.59	3.67	2.39
0.750	4.72	1.750	7.25	2.750	3.30	3.75	2.27
0.833	4.72	1.833	7.25	2.833	3.30	3.83	2.27
0.917	6.58	1.917	5.91	2.917	3.05	3.92	2.17
1.000	6.58	2.000	5.91	3.000	3.05	4.00	2.17

Max.Eff.Inten.(mm/hr)=	86.95	23.75	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.54 (ii)	8.26 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.13	
			TOTALS
PEAK FLOW (cms)=	0.02	0.01	0.035 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	31.81	9.77	14.54
TOTAL RAINFALL (mm)=	33.31	33.31	33.31
RUNOFF COEFFICIENT =	0.95	0.29	0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
 V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
 V    V   I    SS     U   U   A A   L
  V  V    I      SS   U   U  AAAAA  L
  V  V    I       SS  U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\17438399-58
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\17438399-58

DATE: 11-08-2024                          TIME: 09:01:02

USER:


COMMENTS: _____
```

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  ************************************************
  ** SIMULATION : 5yr 4hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 632.750
| Ptotal= 43.59 mm |                           B=   0.000
--------------------                           C=   0.741
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.00    3.17 |  1.00   16.54 |  2.00    6.54 |  3.00    3.69
          0.17    3.57 |  1.17  114.88 |  2.17    5.73 |  3.17    3.46
          0.33    4.11 |  1.33   20.52 |  2.33    5.13 |  3.33    3.26
          0.50    4.88 |  1.50   12.57 |  2.50    4.65 |  3.50    3.09
          0.67    6.13 |  1.67    9.43 |  2.67    4.27 |  3.67    2.94
          0.83    8.55 |  1.83    7.68 |  2.83    3.95 |  3.83    2.80


--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0201)| Area    (ha)=   3.50
|ID= 1 DT= 5.0 min | Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.03          1.47
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=     4.00          4.00
     Length            (m)=   152.75         20.00
     Mannings n            =    0.013         0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
         0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
         0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
         0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
         0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
         0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
```

```
         0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
         0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
         0.750    6.13 | 1.750    9.43 | 2.750    4.27 |  3.75    2.94
         0.833    6.13 | 1.833    9.43 | 2.833    4.27 |  3.83    2.94
         0.917    8.55 | 1.917    7.68 | 2.917    3.95 |  3.92    2.80
         1.000    8.55 | 2.000    7.68 | 3.000    3.95 |  4.00    2.80

     Max.Eff.Inten.(mm/hr)=    114.88        109.65
           over (min)          5.00         10.00
     Storage Coeff.  (min)=    2.06 (ii)     6.88 (ii)
     Unit Hyd. Tpeak (min)=    5.00         10.00
     Unit Hyd. peak  (cms)=    0.31          0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=    0.22          0.32       0.486 (iii)
     TIME TO PEAK    (hrs)=    1.33          1.42       1.33
     RUNOFF VOLUME    (mm)=   42.09         22.60      26.48
     TOTAL RAINFALL   (mm)=   43.59         43.59      43.59
     RUNOFF COEFFICIENT   =    0.97          0.52       0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)| Area    (ha)=   2.48
|ID= 1 DT= 5.0 min | Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.91          1.57
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     2.00          4.00
     Length            (m)=   128.58         30.00
     Mannings n            =    0.013         0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
         0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
         0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
         0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
         0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
         0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
         0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
         0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
         0.750    6.13 | 1.750    9.43 | 2.750    4.27 |  3.75    2.94
         0.833    6.13 | 1.833    9.43 | 2.833    4.27 |  3.83    2.94
         0.917    8.55 | 1.917    7.68 | 2.917    3.95 |  3.92    2.80
         1.000    8.55 | 2.000    7.68 | 3.000    3.95 |  4.00    2.80

     Max.Eff.Inten.(mm/hr)=    114.88         78.65
           over (min)          5.00         10.00
     Storage Coeff.  (min)=    2.28 (ii)     7.59 (ii)
     Unit Hyd. Tpeak (min)=    5.00         10.00
     Unit Hyd. peak  (cms)=    0.30          0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=    0.00          0.24       0.238 (iii)
     TIME TO PEAK    (hrs)=    1.33          1.42       1.42
     RUNOFF VOLUME    (mm)=   42.59         20.21      20.32
     TOTAL RAINFALL   (mm)=   43.59         43.59      43.59
     RUNOFF COEFFICIENT   =    0.98          0.46       0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0017)| Area    (ha)=   0.26
|ID= 1 DT= 5.0 min | Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.08          0.18
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=     4.00         10.00
     Length            (m)=    41.63         30.00
     Mannings n            =    0.013         0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
         0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
         0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
         0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
         0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
         0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
         0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
         0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
         0.750    6.13 | 1.750    9.43 | 2.750    4.27 |  3.75    2.94
         0.833    6.13 | 1.833    9.43 | 2.833    4.27 |  3.83    2.94
         0.917    8.55 | 1.917    7.68 | 2.917    3.95 |  3.92    2.80
         1.000    8.55 | 2.000    7.68 | 3.000    3.95 |  4.00    2.80

     Max.Eff.Inten.(mm/hr)=    114.88         49.49
```

```
           over (min)          5.00         10.00
     Storage Coeff.  (min)=    0.94 (ii)     5.80 (ii)
     Unit Hyd. Tpeak (min)=    5.00         10.00
     Unit Hyd. peak  (cms)=    0.34          0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=    0.01          0.02       0.028 (iii)
     TIME TO PEAK    (hrs)=    1.33          1.42       1.33
     RUNOFF VOLUME    (mm)=   42.09         17.06      20.91
     TOTAL RAINFALL   (mm)=   43.59         43.59      43.59
     RUNOFF COEFFICIENT   =    0.97          0.39       0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.028     1.33    20.91
     + ID2= 2 (  0002):     0.26   0.045     1.33    24.58
       ====================================================
       ID = 3 (  0003):     0.52   0.073     1.33    22.74

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0003):     0.52   0.073     1.33    22.74
     + ID2= 2 (  0201):     3.50   0.486     1.33    26.48
       ====================================================
       ID = 1 (  0003):     4.02   0.560     1.33    26.00

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):     4.02   0.560     1.33    26.00
     + ID2= 2 (  0202):     2.48   0.238     1.42    20.32
       ====================================================
       ID = 3 (  0003):     6.50   0.754     1.33    23.83

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0001)| Area    (ha)=   5.22
|ID= 1 DT= 5.0 min | Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.57          3.65
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=    10.00         10.00
     Length            (m)=   186.55         30.00
     Mannings n            =    0.013         0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
         0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
         0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
         0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
         0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
         0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
         0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
         0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
```

0.750	6.13	1.750	9.43	2.750	4.27	3.75	2.94
0.833	6.13	1.833	9.43	2.833	4.27	3.83	2.94
0.917	8.55	1.917	7.68	2.917	3.95	3.92	2.80
1.000	8.55	2.000	7.68	3.000	3.95	4.00	2.80

Max.Eff.Inten.(mm/hr)=	114.88	42.67	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.76 (ii)	6.91 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.14	
			TOTALS
PEAK FLOW (cms)=	0.34	0.32	0.589 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	42.09	16.12	21.49
TOTAL RAINFALL (mm)=	43.59	43.59	43.59
RUNOFF COEFFICIENT =	0.97	0.37	0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0018)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.40	Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.17	1.083	16.54	2.083	6.54	3.08	3.69
0.167	3.17	1.167	16.54	2.167	6.54	3.17	3.69
0.250	3.57	1.250	114.88	2.250	5.73	3.25	3.46
0.333	3.57	1.333	114.88	2.333	5.73	3.33	3.46
0.417	4.11	1.417	20.52	2.417	5.13	3.42	3.26
0.500	4.11	1.500	20.52	2.500	5.13	3.50	3.26
0.583	4.88	1.583	12.57	2.583	4.65	3.58	3.09
0.667	4.88	1.667	12.57	2.667	4.65	3.67	3.09
0.750	6.13	1.750	9.43	2.750	4.27	3.75	2.94
0.833	6.13	1.833	9.43	2.833	4.27	3.83	2.94
0.917	8.55	1.917	7.68	2.917	3.95	3.92	2.80
1.000	8.55	2.000	7.68	3.000	3.95	4.00	2.80

Max.Eff.Inten.(mm/hr)=	114.88	42.09	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.38 (ii)	6.72 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.14	
			TOTALS
PEAK FLOW (cms)=	0.03	0.03	0.053 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	42.09	16.03	21.68
TOTAL RAINFALL (mm)=	43.59	43.59	43.59
RUNOFF COEFFICIENT =	0.97	0.37	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
====================================================================================================

      V    V   I   SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I   SS     U   U   A A   L
       V  V    I    SS    U   U  AAAAA  L
       V  V    I     SS   U   U  A   A  L
        VV     I   SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
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```
                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\b9d5599c-13
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\b9d5599c-13


DATE: 11-08-2024                          TIME: 09:01:02

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 10yr 4hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 721.920
| Ptotal= 51.12 mm |                           B=   0.000
--------------------                           C=   0.736
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                    0.00     3.79 |  1.00    19.52 |  2.00     7.77 |  3.00     4.40
                    0.17     4.26 |  1.17   132.58 |  2.17     6.82 |  3.17     4.13
                    0.33     4.90 |  1.33    24.19 |  2.33     6.10 |  3.33     3.90
                    0.50     5.82 |  1.50    14.88 |  2.50     5.54 |  3.50     3.69
                    0.67     7.29 |  1.67    11.18 |  2.67     5.09 |  3.67     3.51
                    0.83    10.14 |  1.83     9.12 |  2.83     4.72 |  3.83     3.35


---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.03          1.47
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     152.75         20.00
     Mannings n          =       0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                   0.083     3.79 | 1.083    19.52 | 2.083     7.77 |  3.08     4.40
                   0.167     3.79 | 1.167    19.52 | 2.167     7.77 |  3.17     4.40
                   0.250     4.26 | 1.250   132.58 | 2.250     6.82 |  3.25     4.13
                   0.333     4.26 | 1.333   132.58 | 2.333     6.82 |  3.33     4.13
                   0.417     4.90 | 1.417    24.19 | 2.417     6.10 |  3.42     3.90
                   0.500     4.90 | 1.500    24.19 | 2.500     6.10 |  3.50     3.90
                   0.583     5.82 | 1.583    14.88 | 2.583     5.54 |  3.58     3.69
                   0.667     5.82 | 1.667    14.88 | 2.667     5.54 |  3.67     3.69
                   0.750     7.29 | 1.750    11.18 | 2.750     5.09 |  3.75     3.51
                   0.833     7.29 | 1.833    11.18 | 2.833     5.09 |  3.83     3.51
                   0.917    10.14 | 1.917     9.12 | 2.917     4.72 |  3.92     3.35
                   1.000    10.14 | 2.000     9.12 | 3.000     4.72 |  4.00     3.35

     Max.Eff.Inten.(mm/hr)=     132.58       139.82
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.94 (ii)    6.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.41           0.608 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42            1.33
     RUNOFF VOLUME    (mm)=      49.62        28.75           32.90
     TOTAL RAINFALL   (mm)=      51.12        51.12           51.12
     RUNOFF COEFFICIENT   =       0.97         0.56            0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
               YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  31.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.11          0.15
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       6.00          6.00
     Length            (m)=      41.63         20.00
     Mannings n          =       0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                   0.083     3.79 | 1.083    19.52 | 2.083     7.77 |  3.08     4.40
                   0.167     3.79 | 1.167    19.52 | 2.167     7.77 |  3.17     4.40
                   0.250     4.26 | 1.250   132.58 | 2.250     6.82 |  3.25     4.13
                   0.333     4.26 | 1.333   132.58 | 2.333     6.82 |  3.33     4.13
                   0.417     4.90 | 1.417    24.19 | 2.417     6.10 |  3.42     3.90
                   0.500     4.90 | 1.500    24.19 | 2.500     6.10 |  3.50     3.90
                   0.583     5.82 | 1.583    14.88 | 2.583     5.54 |  3.58     3.69
                   0.667     5.82 | 1.667    14.88 | 2.667     5.54 |  3.67     3.69
                   0.750     7.29 | 1.750    11.18 | 2.750     5.09 |  3.75     3.51
                   0.833     7.29 | 1.833    11.18 | 2.833     5.09 |  3.83     3.51
                   0.917    10.14 | 1.917     9.12 | 2.917     4.72 |  3.92     3.35
                   1.000    10.14 | 2.000     9.12 | 3.000     4.72 |  4.00     3.35

     Max.Eff.Inten.(mm/hr)=     132.58        62.31
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.79 (ii)    4.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.22
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.03           0.056 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33            1.33
     RUNOFF VOLUME    (mm)=      49.62        21.95           30.52
     TOTAL RAINFALL   (mm)=      51.12        51.12           51.12
     RUNOFF COEFFICIENT   =       0.97         0.43            0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.91          1.57
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=     128.58         30.00
     Mannings n          =       0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                   0.083     3.79 | 1.083    19.52 | 2.083     7.77 |  3.08     4.40
                   0.167     3.79 | 1.167    19.52 | 2.167     7.77 |  3.17     4.40
                   0.250     4.26 | 1.250   132.58 | 2.250     6.82 |  3.25     4.13
                   0.333     4.26 | 1.333   132.58 | 2.333     6.82 |  3.33     4.13
                   0.417     4.90 | 1.417    24.19 | 2.417     6.10 |  3.42     3.90
                   0.500     4.90 | 1.500    24.19 | 2.500     6.10 |  3.50     3.90
                   0.583     5.82 | 1.583    14.88 | 2.583     5.54 |  3.58     3.69
                   0.667     5.82 | 1.667    14.88 | 2.667     5.54 |  3.67     3.69
                   0.750     7.29 | 1.750    11.18 | 2.750     5.09 |  3.75     3.51
                   0.833     7.29 | 1.833    11.18 | 2.833     5.09 |  3.83     3.51
                   0.917    10.14 | 1.917     9.12 | 2.917     4.72 |  3.92     3.35
                   1.000    10.14 | 2.000     9.12 | 3.000     4.72 |  4.00     3.35

     Max.Eff.Inten.(mm/hr)=     132.58       101.79
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.16 (ii)    6.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.31           0.316 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42            1.42
     RUNOFF VOLUME    (mm)=      50.12        26.01           26.13
     TOTAL RAINFALL   (mm)=      51.12        51.12           51.12
     RUNOFF COEFFICIENT   =       0.98         0.51            0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
               YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08          0.18
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       4.00         10.00
     Length            (m)=      41.63         30.00
     Mannings n          =       0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                   0.083     3.79 | 1.083    19.52 | 2.083     7.77 |  3.08     4.40
                   0.167     3.79 | 1.167    19.52 | 2.167     7.77 |  3.17     4.40
                   0.250     4.26 | 1.250   132.58 | 2.250     6.82 |  3.25     4.13
                   0.333     4.26 | 1.333   132.58 | 2.333     6.82 |  3.33     4.13
                   0.417     4.90 | 1.417    24.19 | 2.417     6.10 |  3.42     3.90
                   0.500     4.90 | 1.500    24.19 | 2.500     6.10 |  3.50     3.90
                   0.583     5.82 | 1.583    14.88 | 2.583     5.54 |  3.58     3.69
                   0.667     5.82 | 1.667    14.88 | 2.667     5.54 |  3.67     3.69
                   0.750     7.29 | 1.750    11.18 | 2.750     5.09 |  3.75     3.51
                   0.833     7.29 | 1.833    11.18 | 2.833     5.09 |  3.83     3.51
                   0.917    10.14 | 1.917     9.12 | 2.917     4.72 |  3.92     3.35
                   1.000    10.14 | 2.000     9.12 | 3.000     4.72 |  4.00     3.35

     Max.Eff.Inten.(mm/hr)=     132.58        65.50
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       0.89 (ii)    5.23 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.34         0.16
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.03           0.036 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42            1.33
     RUNOFF VOLUME    (mm)=      49.62        22.35           26.53
     TOTAL RAINFALL   (mm)=      51.12        51.12           51.12
     RUNOFF COEFFICIENT   =       0.97         0.44            0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
               YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0017):       0.26   0.036     1.33    26.53
      + ID2= 2 (  0002):       0.26   0.056     1.33    30.52
        ==================================================
        ID = 3 (  0003):       0.52   0.092     1.33    28.52

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

--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0003):       0.52   0.092     1.33    28.52
      + ID2= 2 (  0201):       3.50   0.608     1.33    32.90
        ==================================================
        ID = 1 (  0003):       4.02   0.701     1.33    32.34

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):       4.02   0.701     1.33    32.34
      + ID2= 2 (  0202):       2.48   0.316     1.42    26.13
        ==================================================
        ID = 3 (  0003):       6.50   0.967     1.33    29.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n          =       0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                     hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                   0.083     3.79 | 1.083    19.52 | 2.083     7.77 |  3.08     4.40
                   0.167     3.79 | 1.167    19.52 | 2.167     7.77 |  3.17     4.40
                   0.250     4.26 | 1.250   132.58 | 2.250     6.82 |  3.25     4.13
                   0.333     4.26 | 1.333   132.58 | 2.333     6.82 |  3.33     4.13
                   0.417     4.90 | 1.417    24.19 | 2.417     6.10 |  3.42     3.90
                   0.500     4.90 | 1.500    24.19 | 2.500     6.10 |  3.50     3.90
                   0.583     5.82 | 1.583    14.88 | 2.583     5.54 |  3.58     3.69
                   0.667     5.82 | 1.667    14.88 | 2.667     5.54 |  3.67     3.69
```

0.750	7.29	1.750	11.18	2.750	5.09	3.75	3.51
0.833	7.29	1.833	11.18	2.833	5.09	3.83	3.51
0.917	10.14	1.917	9.12	2.917	4.72	3.92	3.35
1.000	10.14	2.000	9.12	3.000	4.72	4.00	3.35

Max.Eff.Inten.(mm/hr)=	132.58	56.90	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.66 (ii)	6.25 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.40	0.43	0.747 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	49.62	21.23	27.10
TOTAL RAINFALL (mm)=	51.12	51.12	51.12
RUNOFF COEFFICIENT =	0.97	0.42	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0018)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.40	Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.79	1.083	19.52	2.083	7.77	3.08	4.40
0.167	3.79	1.167	19.52	2.167	7.77	3.17	4.40
0.250	4.26	1.250	132.58	2.250	6.82	3.25	4.13
0.333	4.26	1.333	132.58	2.333	6.82	3.33	4.13
0.417	4.90	1.417	24.19	2.417	6.10	3.42	3.90
0.500	4.90	1.500	24.19	2.500	6.10	3.50	3.90
0.583	5.82	1.583	14.88	2.583	5.54	3.58	3.69
0.667	5.82	1.667	14.88	2.667	5.54	3.67	3.69
0.750	7.29	1.750	11.18	2.750	5.09	3.75	3.51
0.833	7.29	1.833	11.18	2.833	5.09	3.83	3.51
0.917	10.14	1.917	9.12	2.917	4.72	3.92	3.35
1.000	10.14	2.000	9.12	3.000	4.72	4.00	3.35

Max.Eff.Inten.(mm/hr)=	132.58	56.17	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.30 (ii)	6.06 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.15	
			TOTALS
PEAK FLOW (cms)=	0.04	0.04	0.067 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	49.62	21.12	27.30
TOTAL RAINFALL (mm)=	51.12	51.12	51.12
RUNOFF COEFFICIENT =	0.97	0.41	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

      V    V   I    SSSSS  U    U    A    L                (v 6.2.2015)
      V    V   I    SS     U    U   A A   L
       V  V    I     SS    U    U  AAAAA  L
       V  V    I      SS   U    U  A   A  L
        VV     I    SSSSS  UUUUU  A    A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\5664af61-8b
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\5664af61-8b


DATE: 11-08-2024                              TIME: 09:01:02

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------------------------
  **************************************************
  ** SIMULATION : 25yr 4hr 10min Chicago          **
  **************************************************

--------------------
| CHICAGO STORM    |      IDF curve parameters: A= 822.740
| Ptotal= 61.88 mm |                            B=   0.000
--------------------                            C=   0.725
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                  0.00     4.77 |  1.00    23.97 |  2.00     9.68 |  3.00     5.53
                  0.17     5.36 |  1.17   154.98 |  2.17     8.51 |  3.17     5.19
                  0.33     6.14 |  1.33    29.61 |  2.33     7.63 |  3.33     4.90
                  0.50     7.28 |  1.50    18.34 |  2.50     6.94 |  3.50     4.65
                  0.67     9.09 |  1.67    13.85 |  2.67     6.38 |  3.67     4.43
                  0.83    12.58 |  1.83    11.32 |  2.83     5.92 |  3.83     4.23

--------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0201)|    Area    (ha)=    3.50
|ID= 1 DT= 5.0 min |    Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.03          1.47
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      152.75         20.00
     Mannings n          =        0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                 0.083     4.77 | 1.083    23.97 | 2.083     9.68 |  3.08     5.53
                 0.167     4.77 | 1.167    23.97 | 2.167     9.68 |  3.17     5.53
                 0.250     5.36 | 1.250   154.98 | 2.250     8.51 |  3.25     5.19
                 0.333     5.36 | 1.333   154.98 | 2.333     8.51 |  3.33     5.19
                 0.417     6.14 | 1.417    29.61 | 2.417     7.63 |  3.42     4.90
                 0.500     6.14 | 1.500    29.61 | 2.500     7.63 |  3.50     4.90
```

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                 0.583     7.28 | 1.583    18.34 | 2.583     6.94 |  3.58     4.65
                 0.667     7.28 | 1.667    18.34 | 2.667     6.94 |  3.67     4.65
                 0.750     9.09 | 1.750    13.85 | 2.750     6.38 |  3.75     4.43
                 0.833     9.09 | 1.833    13.85 | 2.833     6.38 |  3.83     4.43
                 0.917    12.58 | 1.917    11.32 | 2.917     5.92 |  3.92     4.23
                 1.000    12.58 | 2.000    11.32 | 3.000     5.92 |  4.00     4.23

     Max.Eff.Inten.(mm/hr)=      154.98       181.44
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        1.82 (ii)    6.10 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.32         0.15
                                                         *TOTALS*
     PEAK FLOW       (cms)=        0.30         0.54       0.779 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42        1.33
     RUNOFF VOLUME    (mm)=       60.38        37.94       42.40
     TOTAL RAINFALL   (mm)=       61.88        61.88       61.88
     RUNOFF COEFFICIENT   =        0.98         0.61        0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0002)|    Area    (ha)=    0.26
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  31.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.11          0.15
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        6.00          6.00
     Length            (m)=       41.63         20.00
     Mannings n          =        0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                 0.083     4.77 | 1.083    23.97 | 2.083     9.68 |  3.08     5.53
                 0.167     4.77 | 1.167    23.97 | 2.167     9.68 |  3.17     5.53
                 0.250     5.36 | 1.250   154.98 | 2.250     8.51 |  3.25     5.19
                 0.333     5.36 | 1.333   154.98 | 2.333     8.51 |  3.33     5.19
                 0.417     6.14 | 1.417    29.61 | 2.417     7.63 |  3.42     4.90
                 0.500     6.14 | 1.500    29.61 | 2.500     7.63 |  3.50     4.90
                 0.583     7.28 | 1.583    18.34 | 2.583     6.94 |  3.58     4.65
                 0.667     7.28 | 1.667    18.34 | 2.667     6.94 |  3.67     4.65
                 0.750     9.09 | 1.750    13.85 | 2.750     6.38 |  3.75     4.43
                 0.833     9.09 | 1.833    13.85 | 2.833     6.38 |  3.83     4.43
                 0.917    12.58 | 1.917    11.32 | 2.917     5.92 |  3.92     4.23
                 1.000    12.58 | 2.000    11.32 | 3.000     5.92 |  4.00     4.23

     Max.Eff.Inten.(mm/hr)=      154.98        84.37
                over (min)         5.00         5.00
     Storage Coeff.  (min)=        0.74 (ii)    4.35 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.23
                                                         *TOTALS*
     PEAK FLOW       (cms)=        0.03         0.04       0.070 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.33        1.33
     RUNOFF VOLUME    (mm)=       60.38        29.95       39.37
     TOTAL RAINFALL   (mm)=       61.88        61.88       61.88
     RUNOFF COEFFICIENT   =        0.98         0.48        0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| STANDHYD ( 0202)|    Area    (ha)=    2.48
|ID= 1 DT= 5.0 min |    Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.91          1.57
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=        2.00          4.00
     Length            (m)=      128.58         30.00
     Mannings n          =        0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                 0.083     4.77 | 1.083    23.97 | 2.083     9.68 |  3.08     5.53
                 0.167     4.77 | 1.167    23.97 | 2.167     9.68 |  3.17     5.53
                 0.250     5.36 | 1.250   154.98 | 2.250     8.51 |  3.25     5.19
                 0.333     5.36 | 1.333   154.98 | 2.333     8.51 |  3.33     5.19
                 0.417     6.14 | 1.417    29.61 | 2.417     7.63 |  3.42     4.90
                 0.500     6.14 | 1.500    29.61 | 2.500     7.63 |  3.50     4.90
                 0.583     7.28 | 1.583    18.34 | 2.583     6.94 |  3.58     4.65
                 0.667     7.28 | 1.667    18.34 | 2.667     6.94 |  3.67     4.65
                 0.750     9.09 | 1.750    13.85 | 2.750     6.38 |  3.75     4.43
                 0.833     9.09 | 1.833    13.85 | 2.833     6.38 |  3.83     4.43
                 0.917    12.58 | 1.917    11.32 | 2.917     5.92 |  3.92     4.23
                 1.000    12.58 | 2.000    11.32 | 3.000     5.92 |  4.00     4.23

     Max.Eff.Inten.(mm/hr)=      154.98       134.24
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        2.03 (ii)    6.31 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.31         0.15
                                                         *TOTALS*
     PEAK FLOW       (cms)=        0.01         0.43       0.427 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.42        1.42
     RUNOFF VOLUME    (mm)=       60.88        34.77       34.90
     TOTAL RAINFALL   (mm)=       61.88        61.88       61.88
     RUNOFF COEFFICIENT   =        0.98         0.56        0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0017)|    Area    (ha)=    0.26
|ID= 1 DT= 5.0 min |    Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.08          0.18
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        4.00         10.00
     Length            (m)=       41.63         30.00
     Mannings n          =        0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                 0.083     4.77 | 1.083    23.97 | 2.083     9.68 |  3.08     5.53
                 0.167     4.77 | 1.167    23.97 | 2.167     9.68 |  3.17     5.53
                 0.250     5.36 | 1.250   154.98 | 2.250     8.51 |  3.25     5.19
                 0.333     5.36 | 1.333   154.98 | 2.333     8.51 |  3.33     5.19
                 0.417     6.14 | 1.417    29.61 | 2.417     7.63 |  3.42     4.90
                 0.500     6.14 | 1.500    29.61 | 2.500     7.63 |  3.50     4.90
                 0.583     7.28 | 1.583    18.34 | 2.583     6.94 |  3.58     4.65
                 0.667     7.28 | 1.667    18.34 | 2.667     6.94 |  3.67     4.65
                 0.750     9.09 | 1.750    13.85 | 2.750     6.38 |  3.75     4.43
                 0.833     9.09 | 1.833    13.85 | 2.833     6.38 |  3.83     4.43
                 0.917    12.58 | 1.917    11.32 | 2.917     5.92 |  3.92     4.23
                 1.000    12.58 | 2.000    11.32 | 3.000     5.92 |  4.00     4.23

     Max.Eff.Inten.(mm/hr)=      154.98        88.44
```

```
                over (min)         5.00         5.00
     Storage Coeff.  (min)=        0.84 (ii)    4.69 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.22
                                                         *TOTALS*
     PEAK FLOW       (cms)=        0.02         0.04       0.060 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.33        1.33
     RUNOFF VOLUME    (mm)=       60.38        30.43       35.03
     TOTAL RAINFALL   (mm)=       61.88        61.88       61.88
     RUNOFF COEFFICIENT   =        0.98         0.49        0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3      |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 ( 0017):       0.26   0.060     1.33    35.03
      + ID2= 2 ( 0002):       0.26   0.070     1.33    39.37
        ===============================================
        ID = 3 ( 0003):       0.52   0.131     1.33    37.20

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

--------------------
| ADD HYD  ( 0003)|
|  3 + 2 = 1      |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 ( 0003):       0.52   0.131     1.33    37.20
      + ID2= 2 ( 0201):       3.50   0.779     1.33    42.40
        ===============================================
        ID = 1 ( 0003):       4.02   0.909     1.33    41.73

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3      |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 ( 0003):       4.02   0.909     1.33    41.73
      + ID2= 2 ( 0202):       2.48   0.427     1.42    34.90
        ===============================================
        ID = 3 ( 0003):       6.50   1.283     1.33    39.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0001)|    Area    (ha)=    5.22
|ID= 1 DT= 5.0 min |    Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.57          3.65
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=       10.00         10.00
     Length            (m)=      186.55         30.00
     Mannings n          =        0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                 0.083     4.77 | 1.083    23.97 | 2.083     9.68 |  3.08     5.53
                 0.167     4.77 | 1.167    23.97 | 2.167     9.68 |  3.17     5.53
                 0.250     5.36 | 1.250   154.98 | 2.250     8.51 |  3.25     5.19
                 0.333     5.36 | 1.333   154.98 | 2.333     8.51 |  3.33     5.19
                 0.417     6.14 | 1.417    29.61 | 2.417     7.63 |  3.42     4.90
                 0.500     6.14 | 1.500    29.61 | 2.500     7.63 |  3.50     4.90
                 0.583     7.28 | 1.583    18.34 | 2.583     6.94 |  3.58     4.65
                 0.667     7.28 | 1.667    18.34 | 2.667     6.94 |  3.67     4.65
```

0.750	9.09	1.750	13.85	2.750	6.38	3.75	4.43
0.833	9.09	1.833	13.85	2.833	6.38	3.83	4.43
0.917	12.58	1.917	11.32	2.917	5.92	3.92	4.23
1.000	12.58	2.000	11.32	3.000	5.92	4.00	4.23

Max.Eff.Inten.(mm/hr)=	154.98	77.44	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.56 (ii)	5.62 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.15	
			TOTALS
PEAK FLOW (cms)=	0.46	0.60	0.976 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	60.38	29.09	35.56
TOTAL RAINFALL (mm)=	61.88	61.88	61.88
RUNOFF COEFFICIENT =	0.98	0.47	0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0018)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.40	Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.77	1.083	23.97	2.083	9.68	3.08	5.53
0.167	4.77	1.167	23.97	2.167	9.68	3.17	5.53
0.250	5.36	1.250	154.98	2.250	8.51	3.25	5.19
0.333	5.36	1.333	154.98	2.333	8.51	3.33	5.19
0.417	6.14	1.417	29.61	2.417	7.63	3.42	4.90
0.500	6.14	1.500	29.61	2.500	7.63	3.50	4.90
0.583	7.28	1.583	18.34	2.583	6.94	3.58	4.65
0.667	7.28	1.667	18.34	2.667	6.94	3.67	4.65
0.750	9.09	1.750	13.85	2.750	6.38	3.75	4.43
0.833	9.09	1.833	13.85	2.833	6.38	3.83	4.43
0.917	12.58	1.917	11.32	2.917	5.92	3.92	4.23
1.000	12.58	2.000	11.32	3.000	5.92	4.00	4.23

Max.Eff.Inten.(mm/hr)=	154.98	76.50	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.22 (ii)	5.43 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.16	
			TOTALS
PEAK FLOW (cms)=	0.04	0.05	0.088 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	60.38	28.96	35.77
TOTAL RAINFALL (mm)=	61.88	61.88	61.88
RUNOFF COEFFICIENT =	0.98	0.47	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I      SS   U   U  AAAAA  L
  V V    I       SS  U   U  A   A  L
   VV    I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\cd322883-d1
Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\cd322883-d1

DATE: 11-08-2024 TIME: 09:01:02

USER:

COMMENTS: _____

** SIMULATION : 50yr 4hr 10min Chicago **

CHICAGO STORM | Ptotal= 69.47 mm |

IDF curve parameters: A= 893.800
B= 0.000
C= 0.719
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.47	1.00	27.09	2.00	11.03	3.00	6.33
0.17	6.13	1.17	170.70	2.17	9.71	3.17	5.95
0.33	7.02	1.33	33.42	2.33	8.71	3.33	5.62
0.50	8.31	1.50	20.79	2.50	7.93	3.50	5.33
0.67	10.36	1.67	15.73	2.67	7.29	3.67	5.08
0.83	14.30	1.83	12.89	2.83	6.77	3.83	4.85

CALIB
STANDHYD (0201) | Area (ha)= 3.50
ID= 1 DT= 5.0 min | Total Imp(%)= 58.00 Dir. Conn.(%)= 19.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.03	1.47
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	4.00	4.00
Length (m)=	152.75	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.47	1.083	27.09	2.083	11.03	3.08	6.33
0.167	5.47	1.167	27.09	2.167	11.03	3.17	6.33
0.250	6.13	1.250	170.70	2.250	9.71	3.25	5.95
0.333	6.13	1.333	170.70	2.333	9.71	3.33	5.95
0.417	7.02	1.417	33.42	2.417	8.71	3.42	5.62
0.500	7.02	1.500	33.42	2.500	8.71	3.50	5.62
0.583	8.31	1.583	20.79	2.583	7.93	3.58	5.33
0.667	8.31	1.667	20.79	2.667	7.93	3.67	5.33
0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	157.89	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.95 (ii)	5.97 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.15	
			TOTALS
PEAK FLOW (cms)=	0.01	0.51	0.509 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.42
RUNOFF VOLUME (mm)=	68.47	41.19	41.32
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.99	0.59	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0017) | Area (ha)= 0.26
ID= 1 DT= 5.0 min | Total Imp(%)= 30.80 Dir. Conn.(%)= 15.40

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.08	0.18
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	4.00	10.00
Length (m)=	41.63	30.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.47	1.083	27.09	2.083	11.03	3.08	6.33
0.167	5.47	1.167	27.09	2.167	11.03	3.17	6.33
0.250	6.13	1.250	170.70	2.250	9.71	3.25	5.95
0.333	6.13	1.333	170.70	2.333	9.71	3.33	5.95
0.417	7.02	1.417	33.42	2.417	8.71	3.42	5.62
0.500	7.02	1.500	33.42	2.500	8.71	3.50	5.62
0.583	8.31	1.583	20.79	2.583	7.93	3.58	5.33
0.667	8.31	1.667	20.79	2.667	7.93	3.67	5.33
0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	105.41	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.80 (ii)	4.39 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.23	
			TOTALS
PEAK FLOW (cms)=	0.02	0.05	0.071 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	67.97	36.43	41.27
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.98	0.52	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0017):	0.26	0.071	1.33	41.27
+ ID2= 2 (0002):	0.26	0.081	1.33	45.83
ID = 3 (0003):	0.52	0.152	1.33	43.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0003):	0.52	0.152	1.33	43.55
+ ID2= 2 (0201):	3.50	0.904	1.33	49.26
ID = 1 (0003):	4.02	1.055	1.33	48.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	4.02	1.055	1.33	48.53
+ ID2= 2 (0202):	2.48	0.509	1.42	41.32
ID = 3 (0003):	6.50	1.511	1.33	45.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0001) | Area (ha)= 5.22
ID= 1 DT= 5.0 min | Total Imp(%)= 30.00 Dir. Conn.(%)= 20.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.57	3.65
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	10.00	10.00
Length (m)=	186.55	30.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.47	1.083	27.09	2.083	11.03	3.08	6.33
0.167	5.47	1.167	27.09	2.167	11.03	3.17	6.33
0.250	6.13	1.250	170.70	2.250	9.71	3.25	5.95
0.333	6.13	1.333	170.70	2.333	9.71	3.33	5.95
0.417	7.02	1.417	33.42	2.417	8.71	3.42	5.62
0.500	7.02	1.500	33.42	2.500	8.71	3.50	5.62
0.583	8.31	1.583	20.79	2.583	7.93	3.58	5.33
0.667	8.31	1.667	20.79	2.667	7.93	3.67	5.33
0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	211.45	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.75 (ii)	5.87 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.33	0.63	0.904 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	67.97	44.62	49.26
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.98	0.64	0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0002) | Area (ha)= 0.26
ID= 1 DT= 5.0 min | Total Imp(%)= 42.00 Dir. Conn.(%)= 31.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.11	0.15
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	6.00	6.00
Length (m)=	41.63	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.47	1.083	27.09	2.083	11.03	3.08	6.33
0.167	5.47	1.167	27.09	2.167	11.03	3.17	6.33
0.250	6.13	1.250	170.70	2.250	9.71	3.25	5.95
0.333	6.13	1.333	170.70	2.333	9.71	3.33	5.95
0.417	7.02	1.417	33.42	2.417	8.71	3.42	5.62
0.500	7.02	1.500	33.42	2.500	8.71	3.50	5.62
0.583	8.31	1.583	20.79	2.583	7.93	3.58	5.33
0.667	8.31	1.667	20.79	2.667	7.93	3.67	5.33
0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	100.71	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.71 (ii)	4.19 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.24	
			TOTALS
PEAK FLOW (cms)=	0.04	0.04	0.081 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	67.97	35.90	45.83
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.98	0.52	0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	92.71	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.50 (ii)	6.32 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.15	
			TOTALS
PEAK FLOW (cms)=	0.51	0.69	1.097 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	67.97	34.94	41.78
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.98	0.50	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0018) | Area (ha)= 0.46
ID= 1 DT= 5.0 min | Total Imp(%)= 30.40 Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.47	1.083	27.09	2.083	11.03	3.08	6.33
0.167	5.47	1.167	27.09	2.167	11.03	3.17	6.33
0.250	6.13	1.250	170.70	2.250	9.71	3.25	5.95
0.333	6.13	1.333	170.70	2.333	9.71	3.33	5.95
0.417	7.02	1.417	33.42	2.417	8.71	3.42	5.62
0.500	7.02	1.500	33.42	2.500	8.71	3.50	5.62
0.583	8.31	1.583	20.79	2.583	7.93	3.58	5.33
0.667	8.31	1.667	20.79	2.667	7.93	3.67	5.33
0.750	10.36	1.750	15.73	2.750	7.29	3.75	5.08
0.833	10.36	1.833	15.73	2.833	7.29	3.83	5.08
0.917	14.30	1.917	12.89	2.917	6.77	3.92	4.85
1.000	14.30	2.000	12.89	3.000	6.77	4.00	4.85

Max.Eff.Inten.(mm/hr)=	170.70	91.61	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.18 (ii)	6.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.15	
			TOTALS
PEAK FLOW (cms)=	0.05	0.06	0.099 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	67.97	34.81	42.00
TOTAL RAINFALL (mm)=	69.47	69.47	69.47
RUNOFF COEFFICIENT =	0.98	0.50	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

      V    V   I    SSSSS  U    U    A    L              (v 6.2.2015)
       V    V  I    SS     U    U   A A   L
        V  V   I     SS    U    U  AAAAA  L
        V  V   I      SS   U    U  A   A  L
         VV    I    SSSSS  UUUUU  A     A LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\fd81c924-5d
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\fd81c924-5d


DATE: 11-08-2024                               TIME: 09:01:03

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------------
  **************************************************
  ** SIMULATION : 100yr 4hr 10min Chicago         **
  **************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 953.290
| Ptotal= 77.41 mm |                          B=   0.000
--------------------                          C=   0.711
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    6.26 |  1.00   30.45 |  2.00   12.53 |  3.00    7.23
                  0.17    7.01 |  1.17  185.45 |  2.17   11.04 |  3.17    6.80
                  0.33    8.02 |  1.33   37.49 |  2.33    9.92 |  3.33    6.43
                  0.50    9.47 |  1.50   23.45 |  2.50    9.04 |  3.50    6.10
                  0.67   11.77 |  1.67   17.80 |  2.67    8.32 |  3.67    5.82
                  0.83   16.19 |  1.83   14.61 |  2.83    7.73 |  3.83    5.56

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--------------------
| CALIB            |
| STANDHYD ( 0201)|    Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |    Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
       Surface Area      (ha)=        2.03          1.47
       Dep. Storage      (mm)=        1.50          5.00
       Average Slope      (%)=        4.00          4.00
       Length             (m)=      152.75         20.00
       Mannings n           =        0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
                 0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
                 0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
                 0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
                 0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
                 0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
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                 0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                 0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
                 0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
                 0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
                 0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
                 1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

       Max.Eff.Inten.(mm/hr)=      185.45       241.04
                  over (min)         5.00        10.00
       Storage Coeff.  (min)=        1.70 (ii)    5.68 (ii)
       Unit Hyd. Tpeak (min)=        5.00        10.00
       Unit Hyd. peak  (cms)=        0.32         0.15
                                                             *TOTALS*
       PEAK FLOW       (cms)=        0.36         0.73          1.028 (iii)
       TIME TO PEAK    (hrs)=        1.33         1.42          1.33
       RUNOFF VOLUME    (mm)=       75.91        51.75         56.56
       TOTAL RAINFALL   (mm)=       77.41        77.41         77.41
       RUNOFF COEFFICIENT   =        0.98         0.67          0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0002)|    Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  31.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
       Surface Area      (ha)=        0.11          0.15
       Dep. Storage      (mm)=        1.50          5.00
       Average Slope      (%)=        6.00          6.00
       Length             (m)=       41.63         20.00
       Mannings n           =        0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
                 0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
                 0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
                 0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
                 0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
                 0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
                 0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                 0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
                 0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
                 0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
                 0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
                 1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

       Max.Eff.Inten.(mm/hr)=      185.45       117.23
                  over (min)         5.00         5.00
       Storage Coeff.  (min)=        0.69 (ii)    4.05 (ii)
       Unit Hyd. Tpeak (min)=        5.00         5.00
       Unit Hyd. peak  (cms)=        0.34         0.24
                                                             *TOTALS*
       PEAK FLOW       (cms)=        0.04         0.05          0.091 (iii)
       TIME TO PEAK    (hrs)=        1.33         1.33          1.33
       RUNOFF VOLUME    (mm)=       75.91        42.34         52.74
       TOTAL RAINFALL   (mm)=       77.41        77.41         77.41
       RUNOFF COEFFICIENT   =        0.98         0.55          0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| STANDHYD ( 0202)|    Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |    Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
       Surface Area      (ha)=        0.91          1.57
       Dep. Storage      (mm)=        1.00          5.00
       Average Slope      (%)=        2.00          4.00
       Length             (m)=      128.58         30.00
       Mannings n           =        0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
                 0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
                 0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
                 0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
                 0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
                 0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
                 0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                 0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
                 0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
                 0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
                 0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
                 1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

       Max.Eff.Inten.(mm/hr)=      185.45       181.43
                  over (min)         5.00        10.00
       Storage Coeff.  (min)=        1.88 (ii)    5.69 (ii)
       Unit Hyd. Tpeak (min)=        5.00        10.00
       Unit Hyd. peak  (cms)=        0.32         0.15
                                                             *TOTALS*
       PEAK FLOW       (cms)=        0.01         0.59          0.591 (iii)
       TIME TO PEAK    (hrs)=        1.33         1.42          1.42
       RUNOFF VOLUME    (mm)=       76.41        48.07         48.21
       TOTAL RAINFALL   (mm)=       77.41        77.41         77.41
       RUNOFF COEFFICIENT   =        0.99         0.62          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0017)|    Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |    Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
       Surface Area      (ha)=        0.08          0.18
       Dep. Storage      (mm)=        1.50          5.00
       Average Slope      (%)=        4.00         10.00
       Length             (m)=       41.63         30.00
       Mannings n           =        0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
                 0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
                 0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
                 0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
                 0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
                 0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
                 0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                 0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
                 0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
                 0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
                 0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
                 1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

       Max.Eff.Inten.(mm/hr)=      185.45       122.54
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                  over (min)         5.00         5.00
       Storage Coeff.  (min)=        0.78 (ii)    4.16 (ii)
       Unit Hyd. Tpeak (min)=        5.00         5.00
       Unit Hyd. peak  (cms)=        0.34         0.24
                                                             *TOTALS*
       PEAK FLOW       (cms)=        0.02         0.06          0.082 (iii)
       TIME TO PEAK    (hrs)=        1.33         1.33          1.33
       RUNOFF VOLUME    (mm)=       75.91        42.92         47.99
       TOTAL RAINFALL   (mm)=       77.41        77.41         77.41
       RUNOFF COEFFICIENT   =        0.98         0.55          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (  0017):     0.26    0.082      1.33     47.99
        + ID2= 2 (  0002):     0.26    0.091      1.33     52.74
          ===================================================
          ID = 3 (  0003):     0.52    0.173      1.33     50.36

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

--------------------
| ADD HYD  ( 0003)|
|  3 + 2 = 1       |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 3 (  0003):     0.52    0.173      1.33     50.36
        + ID2= 2 (  0201):     3.50    1.028      1.33     56.56
          ===================================================
          ID = 1 (  0003):     4.02    1.201      1.33     55.76

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

--------------------
| ADD HYD  ( 0003)|
|  1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (  0003):     4.02    1.201      1.33     55.76
        + ID2= 2 (  0202):     2.48    0.591      1.42     48.21
          ===================================================
          ID = 3 (  0003):     6.50    1.740      1.33     52.88

       NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0001)|    Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |    Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
       Surface Area      (ha)=        1.57          3.65
       Dep. Storage      (mm)=        1.50          5.00
       Average Slope      (%)=       10.00         10.00
       Length             (m)=      186.55         30.00
       Mannings n           =        0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
                 0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
                 0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
                 0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
                 0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
                 0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
                 0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                 0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
```

	0.750	11.77	1.750	17.80	2.750	8.32	3.75	5.82
	0.833	11.77	1.833	17.80	2.833	8.32	3.83	5.82
	0.917	16.19	1.917	14.61	2.917	7.73	3.92	5.56
	1.000	16.19	2.000	14.61	3.000	7.73	4.00	5.56

Max.Eff.Inten.(mm/hr)=	185.45	108.19	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.45 (ii)	6.11 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.15	
			TOTALS
PEAK FLOW (cms)=	0.56	0.81	1.258 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	75.91	41.29	48.46
TOTAL RAINFALL (mm)=	77.41	77.41	77.41
RUNOFF COEFFICIENT =	0.98	0.53	0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0018)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.40	Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.26	1.083	30.45	2.083	12.53	3.08	7.23
0.167	6.26	1.167	30.45	2.167	12.53	3.17	7.23
0.250	7.01	1.250	185.45	2.250	11.04	3.25	6.80
0.333	7.01	1.333	185.45	2.333	11.04	3.33	6.80
0.417	8.02	1.417	37.49	2.417	9.92	3.42	6.43
0.500	8.02	1.500	37.49	2.500	9.92	3.50	6.43
0.583	9.47	1.583	23.45	2.583	9.04	3.58	6.10
0.667	9.47	1.667	23.45	2.667	9.04	3.67	6.10
0.750	11.77	1.750	17.80	2.750	8.32	3.75	5.82
0.833	11.77	1.833	17.80	2.833	8.32	3.83	5.82
0.917	16.19	1.917	14.61	2.917	7.73	3.92	5.56
1.000	16.19	2.000	14.61	3.000	7.73	4.00	5.56

Max.Eff.Inten.(mm/hr)=	185.45	106.95	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.14 (ii)	5.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.34	0.15	
			TOTALS
PEAK FLOW (cms)=	0.05	0.07	0.113 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	75.91	41.14	48.68
TOTAL RAINFALL (mm)=	77.41	77.41	77.41
RUNOFF COEFFICIENT =	0.98	0.53	0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

      V    V   I    SSSSS  U    U    A     L              (v 6.2.2015)
      V    V   I    SS     U    U   A A    L
       V  V    I     SS    U    U  AAAAA   L
       V  V    I      SS   U    U  A    A  L
        VV     I    SSSSS  UUUUU   A    A  LLLLL

      OOO   TTTTT  TTTTT  H   H   Y   Y   M   M   OOO     TM
     O   O    T      T    H   H    Y Y    MM MM  O   O
     O   O    T      T    H   H     Y     M   M  O   O
      OOO     T      T    H   H     Y     M   M   OOO
Developed and Distributed by Smart City Water Inc
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```
                    *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\62e33252-a2
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\62e33252-a2

DATE: 11-08-2024                        TIME: 09:01:03

USER:

COMMENTS: ____________________________________________________________

--------------------------------------------------------------------------------------------------
  **************************************************
  ** SIMULATION : Hurricane Hazel (Regional)      **
  **************************************************

--------------------
|    READ STORM    |     Filename: C:\Users\cmartin\AppD
|                  |               ata\Local\Temp\
|                  |               07e8a009-fbe7-4e9c-84bb-a205d8c3d4b9\eeae85f6
| Ptotal=212.00 mm |     Comments: Hazel
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.00	3.00	13.00	6.00	23.00	9.00	53.00
1.00	4.00	4.00	17.00	7.00	13.00	10.00	38.00
2.00	6.00	5.00	13.00	8.00	13.00	11.00	13.00

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| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03          1.47
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      4.00          4.00
     Length            (m)=    152.75         20.00
     Mannings n           =     0.013         0.250

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

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

```
     Max.Eff.Inten.(mm/hr)=      53.00         97.88
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.80 (ii)     6.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.28          0.14
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.10          0.40          0.501 (iii)
     TIME TO PEAK    (hrs)=       9.75         10.00         10.00
     RUNOFF VOLUME    (mm)=     210.50        180.65        186.59
     TOTAL RAINFALL   (mm)=     212.00        212.00        212.00
     RUNOFF COEFFICIENT   =       0.99          0.85          0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  31.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11          0.15
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      6.00          6.00
     Length            (m)=     41.63         20.00
     Mannings n           =     0.013         0.250

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

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

```
     Max.Eff.Inten.(mm/hr)=      53.00         58.81
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       1.14 (ii)     5.28 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.34          0.16
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.01          0.02          0.036 (iii)
     TIME TO PEAK    (hrs)=       9.33         10.00         10.00
     RUNOFF VOLUME    (mm)=     210.50        165.33        179.32
     TOTAL RAINFALL   (mm)=     212.00        212.00        212.00
     RUNOFF COEFFICIENT   =       0.99          0.78          0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91          1.57
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      2.00          4.00
     Length            (m)=    128.58         30.00
     Mannings n           =     0.013         0.250

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

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

```
     Max.Eff.Inten.(mm/hr)=      53.00         79.69
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.11 (ii)     8.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.12
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.00          0.35          0.348 (iii)
     TIME TO PEAK    (hrs)=       9.58         10.00         10.00
     RUNOFF VOLUME    (mm)=     211.00        174.97        175.15
     TOTAL RAINFALL   (mm)=     212.00        212.00        212.00
     RUNOFF COEFFICIENT   =       1.00          0.83          0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08          0.18
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      4.00         10.00
     Length            (m)=     41.63         30.00
     Mannings n           =     0.013         0.250

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

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00

```
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        60.61
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      1.28 (ii)    5.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.33         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.03          0.036 (iii)
     TIME TO PEAK    (hrs)=      9.33        10.00         10.00
     RUNOFF VOLUME    (mm)=    210.50       166.35        173.14
     TOTAL RAINFALL   (mm)=    212.00       212.00        212.00
     RUNOFF COEFFICIENT   =      0.99         0.78          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.036    10.00   173.14
     + ID2= 2 (  0002):     0.26   0.036    10.00   179.32
       ==========================================
       ID = 3 (  0003):     0.52   0.073    10.00   176.23

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

--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0003):     0.52   0.073    10.00   176.23
     + ID2= 2 (  0201):     3.50   0.501    10.00   186.59
       ==========================================
       ID = 1 (  0003):     4.02   0.574    10.00   185.25

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):     4.02   0.574    10.00   185.25
     + ID2= 2 (  0202):     2.48   0.348    10.00   175.15
       ==========================================
       ID = 3 (  0003):     6.50   0.922    10.00   181.40

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

--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57         3.65
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=      10.00        10.00
     Length            (m)=     186.55        30.00
     Mannings n            =      0.013        0.250

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

                        ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
     0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
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              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        55.69
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      2.40 (ii)    7.03 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.30         0.14
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.16         0.56          0.722 (iii)
     TIME TO PEAK    (hrs)=      9.67        10.00         10.00
     RUNOFF VOLUME    (mm)=    210.50       163.45        173.19
     TOTAL RAINFALL   (mm)=    212.00       212.00        212.00
     RUNOFF COEFFICIENT   =      0.99         0.77          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.32
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         4.00
     Length            (m)=      55.38        20.00
     Mannings n            =      0.013        0.250

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

                        ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
     0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
     0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
     0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
     0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
     0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
     0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
     0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
     0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
     0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
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              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        55.26
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      1.88 (ii)    6.67 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.32         0.14
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.05          0.064 (iii)
     TIME TO PEAK    (hrs)=      9.50        10.00         10.00
     RUNOFF VOLUME    (mm)=    210.50       163.18        173.44
     TOTAL RAINFALL   (mm)=    212.00       212.00        212.00
     RUNOFF COEFFICIENT   =      0.99         0.77          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\90e02d60-89
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\90e02d60-89


DATE: 11-08-2024                          TIME: 09:01:03

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 25mm 4hr 10min Chicago        **
  ************************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 475.610
| Ptotal= 33.31 mm |                          B=   0.000
--------------------                          C=   0.738
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    2.45 |  1.00   12.69 |  2.00    5.04 |  3.00    2.85
               0.17    2.76 |  1.17   86.95 |  2.17    4.42 |  3.17    2.67
               0.33    3.17 |  1.33   15.73 |  2.33    3.95 |  3.33    2.52
               0.50    3.77 |  1.50    9.66 |  2.50    3.59 |  3.50    2.39
               0.67    4.72 |  1.67    7.25 |  2.67    3.30 |  3.67    2.27
               0.83    6.58 |  1.83    5.91 |  2.83    3.05 |  3.83    2.17


--------------------------------------------------------------------------------------------------------------------
--------------------
| MODIFY STORM     |    MODIFYING PARAMETERS
--------------------    Time shift  (min)    =  0.00

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
               0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
               0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
               0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
               0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
               1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03          1.47
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      4.00          4.00
     Length            (m)=    152.75         20.00
     Mannings n            =     0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
               0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
               0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
               0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
               0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
               0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
               0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
               0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
               0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
               0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
               0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
               1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25         26.34
               over (min)        5.00         15.00
     Storage Coeff.  (min)=       2.86 (ii)   11.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.28          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.00          0.06          0.064 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50          1.50
     RUNOFF VOLUME    (mm)=      24.00          7.65          7.73
     TOTAL RAINFALL   (mm)=      25.00         25.00         25.00
     RUNOFF COEFFICIENT   =       0.96          0.31          0.31

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08          0.18
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      4.00         10.00
     Length            (m)=     41.63         30.00
     Mannings n            =     0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
     Mannings n            =     0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
               0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
               0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
               0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
               0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
               0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
               0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
               0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
               0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
               0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
               0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
               1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25         13.84
               over (min)        5.00         10.00
     Storage Coeff.  (min)=       1.05 (ii)    8.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.34          0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.01          0.00          0.017 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.42          1.33
     RUNOFF VOLUME    (mm)=      23.50          5.83         11.28

     TOTAL RAINFALL   (mm)=      25.00         25.00         25.00
     RUNOFF COEFFICIENT   =       0.94          0.23          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91          1.57
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      2.00          4.00
     Length            (m)=    128.58         30.00
     Mannings n            =     0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
               0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
               0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
               0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
               0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
               0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
               0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
               0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
               0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
               0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
               0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
               1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25         14.80
               over (min)        5.00         10.00
     Storage Coeff.  (min)=       1.18 (ii)    9.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.33          0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.01          0.00          0.011 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.42          1.33
     RUNOFF VOLUME    (mm)=      23.50          6.00          8.67
     TOTAL RAINFALL   (mm)=      25.00         25.00         25.00
     RUNOFF COEFFICIENT   =       0.94          0.24          0.35

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.011     1.33     8.67
     + ID2= 2 (  0002):     0.26   0.017     1.33    11.28
       ==========================================================
       ID = 3 (  0003):     0.52   0.028     1.33     9.98

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

--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0003):     0.52   0.028     1.33     9.98
     + ID2= 2 (  0201):     3.50   0.207     1.33    11.88
       ==========================================================
       ID = 1 (  0003):     4.02   0.235     1.33    11.63

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):     4.02   0.235     1.33    11.63
     + ID2= 2 (  0202):     2.48   0.064     1.50     7.73
       ==========================================================
       ID = 3 (  0003):     6.50   0.266     1.33    10.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.57          3.65
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=     10.00         10.00
     Length            (m)=    186.55         30.00
     Mannings n            =     0.013         0.250
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.84	1.083	9.52	2.083	3.78	3.08	2.14
0.167	1.84	1.167	9.52	2.167	3.78	3.17	2.14
0.250	2.07	1.250	65.25	2.250	3.32	3.25	2.01
0.333	2.07	1.333	65.25	2.333	3.32	3.33	2.01
0.417	2.38	1.417	11.81	2.417	2.97	3.42	1.89
0.500	2.38	1.500	11.81	2.500	2.97	3.50	1.89
0.583	2.83	1.583	7.25	2.583	2.69	3.58	1.79
0.667	2.83	1.667	7.25	2.667	2.69	3.67	1.79
0.750	3.55	1.750	5.44	2.750	2.47	3.75	1.70
0.833	3.55	1.833	5.44	2.833	2.47	3.83	1.70
0.917	4.94	1.917	4.44	2.917	2.29	3.92	1.63
1.000	4.94	2.000	4.44	3.000	2.29	4.00	1.63

Max.Eff.Inten.(mm/hr)=	65.25	12.23	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.21 (ii)	10.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.30	0.09	
			TOTALS
PEAK FLOW (cms)=	0.19	0.07	0.223 (iii)
TIME TO PEAK (hrs)=	1.33	1.50	1.33
RUNOFF VOLUME (mm)=	23.50	5.53	9.25
TOTAL RAINFALL (mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT =	0.94	0.22	0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0018) | Area (ha)= 0.46
ID= 1 DT= 5.0 min | Total Imp(%)= 30.40 Dir. Conn.(%)= 21.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.14	0.32
Dep. Storage (mm)=	1.50	5.00
Average Slope (%)=	2.00	4.00
Length (m)=	55.38	20.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.84	1.083	9.52	2.083	3.78	3.08	2.14
0.167	1.84	1.167	9.52	2.167	3.78	3.17	2.14
0.250	2.07	1.250	65.25	2.250	3.32	3.25	2.01
0.333	2.07	1.333	65.25	2.333	3.32	3.33	2.01
0.417	2.38	1.417	11.81	2.417	2.97	3.42	1.89
0.500	2.38	1.500	11.81	2.500	2.97	3.50	1.89
0.583	2.83	1.583	7.25	2.583	2.69	3.58	1.79
0.667	2.83	1.667	7.25	2.667	2.69	3.67	1.79
0.750	3.55	1.750	5.44	2.750	2.47	3.75	1.70
0.833	3.55	1.833	5.44	2.833	2.47	3.83	1.70
0.917	4.94	1.917	4.44	2.917	2.29	3.92	1.63
1.000	4.94	2.000	4.44	3.000	2.29	4.00	1.63

Max.Eff.Inten.(mm/hr)=	65.25	12.01	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.73 (ii)	10.56 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.02	0.01	0.021 (iii)
TIME TO PEAK (hrs)=	1.33	1.50	1.33
RUNOFF VOLUME (mm)=	23.50	5.49	9.38
TOTAL RAINFALL (mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT =	0.94	0.22	0.38

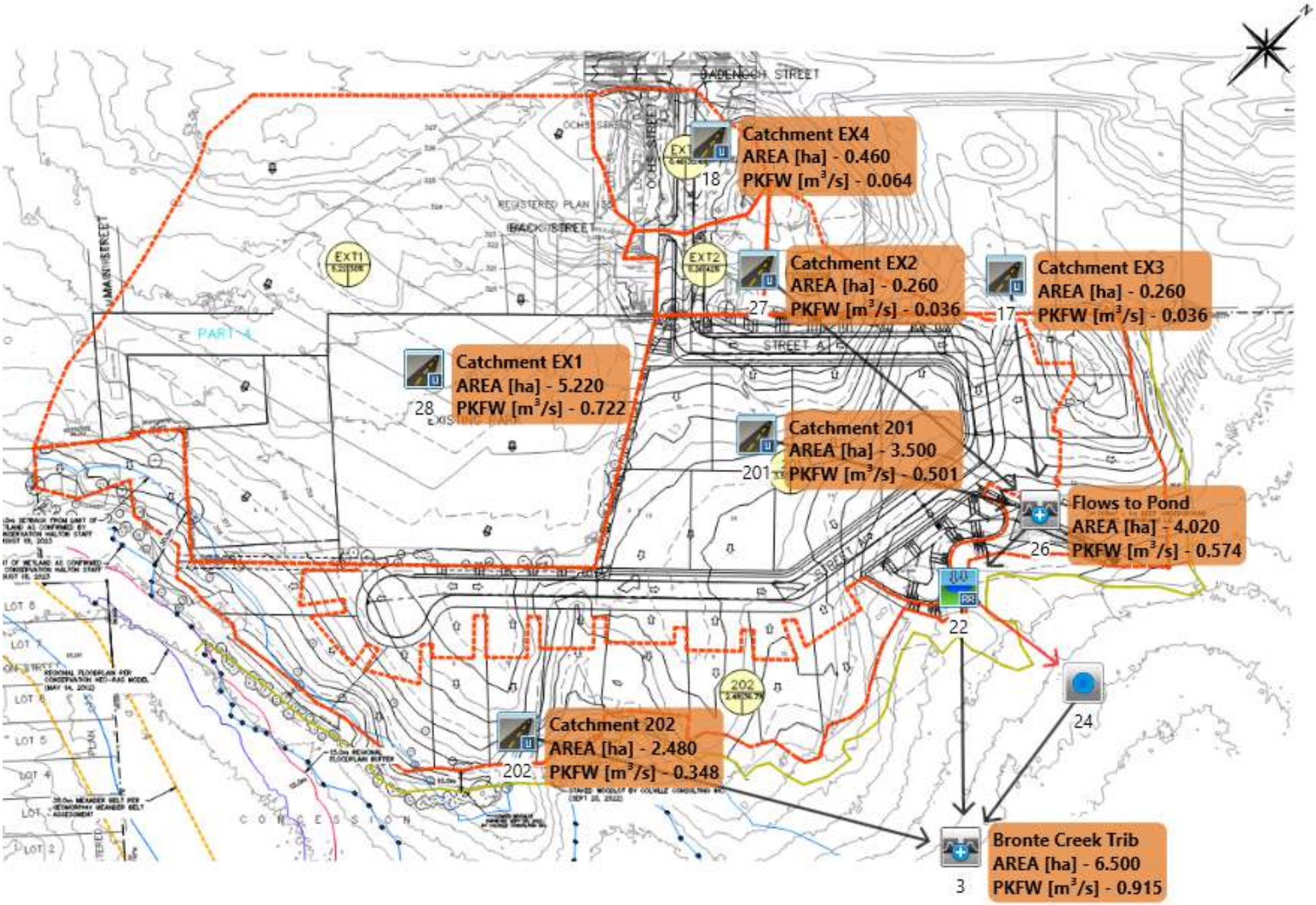
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

FINISH

==========

Post-Development Controlled Visual-Otthymo Schematic



```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\45c39cc8-23
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DATE: 11-08-2024                          TIME: 09:08:43

USER:


COMMENTS: _____________________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 2yr 4hr 10min Chicago         **
  ************************************************


--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 475.610
| Ptotal= 33.31 mm |                           B=   0.000
--------------------                           C=   0.738
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.00    2.45 |  1.00   12.69 |  2.00    5.04 |  3.00    2.85
             0.17    2.76 |  1.17   86.95 |  2.17    4.42 |  3.17    2.67
             0.33    3.17 |  1.33   15.73 |  2.33    3.95 |  3.33    2.52
             0.50    3.77 |  1.50    9.66 |  2.50    3.59 |  3.50    2.39
             0.67    4.72 |  1.67    7.25 |  2.67    3.30 |  3.67    2.27
             0.83    6.58 |  1.83    5.91 |  2.83    3.05 |  3.83    2.17


----------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.03         1.47
     Dep. Storage     (mm)=       1.70         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     152.75        20.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
              0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
              0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
              0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
              0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
              0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
              0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
              0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
              0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
              0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
              0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
              1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        67.96
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     2.30 (ii)    6.71 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.30         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=     0.17         0.20         0.330 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=    31.61        14.72        18.08
     TOTAL RAINFALL   (mm)=    33.31        33.31        33.31
     RUNOFF COEFFICIENT   =     0.95         0.44         0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08         0.18
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       4.00        10.00
     Length            (m)=      41.63        30.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
              0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
              0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
              0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
              0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
              0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
              0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
              0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
              0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
              0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
              0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
              1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        28.43
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     1.05 (ii)    7.11 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.34         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=     0.01         0.01         0.017 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=    31.81        10.52        13.78
     TOTAL RAINFALL   (mm)=    33.31        33.31        33.31
     RUNOFF COEFFICIENT   =     0.95         0.32         0.41

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.017     1.33    13.78
     + ID2= 2 (  0201):     3.50   0.330     1.33    18.08
     ==========================================================
       ID = 3 (  0026):     3.76   0.347     1.33    17.78

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.347     1.33    17.78
     + ID2= 2 (  0027):     0.26   0.026     1.33    16.87
     ==========================================================
       ID = 1 (  0026):     4.02   0.374     1.33    17.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0130     0.0540
                         0.0030     0.0020    |   0.1100     0.0720
                         0.0090     0.0160    |   0.4340     0.0980
                         0.0090     0.0210    |   0.5160     0.1030
                         0.0100     0.0260    |   0.6920     0.1140
                         0.0120     0.0390    |   1.8600     0.1540

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0026)     4.020     0.374      1.33       17.72
     OUTFLOW: ID= 1 (  0022)     4.020     0.021      3.67       17.68
     OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00        0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.49
                    TIME SHIFT OF PEAK FLOW         (min)=140.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0554

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  --------------------------
  | Junction Command(0024) |
  --------------------------

                             AREA     QPEAK   TPEAK     R.V.
                             (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0022)    0.00      0.00    0.00      0.00
  OUTFLOW: ID= 2(  0024)    0.00      0.00    0.00      0.00

----------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.91         1.57
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         4.00
     Length            (m)=     128.58        30.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
              0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
              0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
              0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
              0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
              0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
              0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
              0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
              0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
              0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
              0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
              1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95        47.32
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     2.55 (ii)    9.06 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.29         0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=     0.00         0.13         0.134 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42         1.42
     RUNOFF VOLUME    (mm)=    32.31        12.87        12.97
     TOTAL RAINFALL   (mm)=    33.31        33.31        33.31
     RUNOFF COEFFICIENT   =     0.97         0.39         0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +   2 =   3  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0202):     2.48   0.134     1.42    12.97
    + ID2= 2 (  0022):     4.02   0.021     3.67    17.68
      ==========================================
      ID = 3 (  0003):     6.50   0.144     1.42    15.88

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

--------------------
| ADD HYD  (  0003)|
|   3 +   2 =   1  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
      ID1= 3 (  0003):     6.50   0.144     1.42    15.88
    + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
      ==========================================
      ID = 1 (  0003):     6.50   0.144     1.42    15.88

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

--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n             =    0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
              0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
              0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
              0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
              0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
              0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
              0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
              0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
              0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
              0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
              0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
              1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95         23.75
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      1.54 (ii)     8.26 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.33          0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.02          0.01          0.035 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     31.81          9.77          14.54
     TOTAL RAINFALL   (mm)=     33.31         33.31          33.31
     RUNOFF COEFFICIENT   =      0.95          0.29           0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n             =    0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.45 | 1.083   12.69 | 2.083    5.04 |  3.08    2.85
              0.167    2.45 | 1.167   12.69 | 2.167    5.04 |  3.17    2.85
              0.250    2.76 | 1.250   86.95 | 2.250    4.42 |  3.25    2.67
              0.333    2.76 | 1.333   86.95 | 2.333    4.42 |  3.33    2.67
              0.417    3.17 | 1.417   15.73 | 2.417    3.95 |  3.42    2.52
              0.500    3.17 | 1.500   15.73 | 2.500    3.95 |  3.50    2.52
              0.583    3.77 | 1.583    9.66 | 2.583    3.59 |  3.58    2.39
              0.667    3.77 | 1.667    9.66 | 2.667    3.59 |  3.67    2.39
              0.750    4.72 | 1.750    7.25 | 2.750    3.30 |  3.75    2.27
              0.833    4.72 | 1.833    7.25 | 2.833    3.30 |  3.83    2.27
              0.917    6.58 | 1.917    5.91 | 2.917    3.05 |  3.92    2.17
              1.000    6.58 | 2.000    5.91 | 3.000    3.05 |  4.00    2.17

     Max.Eff.Inten.(mm/hr)=      86.95         24.11
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      1.97 (ii)     8.44 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.31          0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.26          0.17          0.380 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     31.81          9.83          14.38
     TOTAL RAINFALL   (mm)=     33.31         33.31          33.31
     RUNOFF COEFFICIENT   =      0.95          0.30           0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\fb0d1eaa-b1
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\fb0d1eaa-b1

DATE: 11-08-2024                          TIME: 09:08:43

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : 5yr 4hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 632.750
| Ptotal= 43.59 mm |                           B=   0.000
--------------------                           C=   0.741
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.00    3.17 |  1.00   16.54 |  2.00    6.54 |  3.00    3.69
             0.17    3.57 |  1.17  114.88 |  2.17    5.73 |  3.17    3.46
             0.33    4.11 |  1.33   20.52 |  2.33    5.13 |  3.33    3.26
             0.50    4.88 |  1.50   12.57 |  2.50    4.65 |  3.50    3.09
             0.67    6.13 |  1.67    9.43 |  2.67    4.27 |  3.67    2.94
             0.83    8.55 |  1.83    7.68 |  2.83    3.95 |  3.83    2.80


----------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.03         1.47
     Dep. Storage     (mm)=       1.70         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     152.75        20.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.17 |  1.083   16.54 |  2.083    6.54 |  3.08    3.69
              0.167    3.17 |  1.167   16.54 |  2.167    6.54 |  3.17    3.69
              0.250    3.57 |  1.250  114.88 |  2.250    5.73 |  3.25    3.46
              0.333    3.57 |  1.333  114.88 |  2.333    5.73 |  3.33    3.46
              0.417    4.11 |  1.417   20.52 |  2.417    5.13 |  3.42    3.26
              0.500    4.11 |  1.500   20.52 |  2.500    5.13 |  3.50    3.26
              0.583    4.88 |  1.583   12.57 |  2.583    4.65 |  3.58    3.09
              0.667    4.88 |  1.667   12.57 |  2.667    4.65 |  3.67    3.09
              0.750    6.13 |  1.750    9.43 |  2.750    4.27 |  3.75    2.94
              0.833    6.13 |  1.833    9.43 |  2.833    4.27 |  3.83    2.94
              0.917    8.55 |  1.917    7.68 |  2.917    3.95 |  3.92    2.80
              1.000    8.55 |  2.000    7.68 |  3.000    3.95 |  4.00    2.80

     Max.Eff.Inten.(mm/hr)=     114.88        49.49
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     0.94 (ii)    5.80 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.34         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.01         0.02       0.028 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42       1.33
     RUNOFF VOLUME    (mm)=    42.09        17.06      20.91
     TOTAL RAINFALL   (mm)=    43.59        43.59      43.59
     RUNOFF COEFFICIENT   =     0.97         0.39       0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.028     1.33    20.91
     + ID2= 2 (  0201):     3.50   0.486     1.33    26.44
       ========================================================
       ID = 3 (  0026):     3.76   0.515     1.33    26.06

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.515     1.33    26.06
     + ID2= 2 (  0027):     0.26   0.045     1.33    24.52
       ========================================================
       ID = 1 (  0026):     4.02   0.560     1.33    25.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0130     0.0540
                         0.0030     0.0020    |   0.1100     0.0720
                         0.0090     0.0160    |   0.4340     0.0980
                         0.0090     0.0210    |   0.5160     0.1030
                         0.0100     0.0260    |   0.6920     0.1140
                         0.0120     0.0390    |   1.8600     0.1540

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0026)      4.020     0.560      1.33       25.96
     OUTFLOW: ID= 1 (  0022)      4.020     0.068      2.08       25.92
     OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00        0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.16
                    TIME SHIFT OF PEAK FLOW         (min)= 45.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0642

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  --------------------------
  | Junction Command(0024) |
  --------------------------

                              AREA     QPEAK    TPEAK     R.V.
                              (ha)     (cms)    (hrs)     (mm)
     INFLOW : ID= 3(  0022)    0.00     0.00     0.00     0.00
     OUTFLOW: ID= 2(  0024)    0.00     0.00     0.00     0.00

----------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.91         1.57
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         4.00
     Length            (m)=     128.58        30.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.17 |  1.083   16.54 |  2.083    6.54 |  3.08    3.69
              0.167    3.17 |  1.167   16.54 |  2.167    6.54 |  3.17    3.69
              0.250    3.57 |  1.250  114.88 |  2.250    5.73 |  3.25    3.46
              0.333    3.57 |  1.333  114.88 |  2.333    5.73 |  3.33    3.46
              0.417    4.11 |  1.417   20.52 |  2.417    5.13 |  3.42    3.26
              0.500    4.11 |  1.500   20.52 |  2.500    5.13 |  3.50    3.26
              0.583    4.88 |  1.583   12.57 |  2.583    4.65 |  3.58    3.09
              0.667    4.88 |  1.667   12.57 |  2.667    4.65 |  3.67    3.09
              0.750    6.13 |  1.750    9.43 |  2.750    4.27 |  3.75    2.94
              0.833    6.13 |  1.833    9.43 |  2.833    4.27 |  3.83    2.94
              0.917    8.55 |  1.917    7.68 |  2.917    3.95 |  3.92    2.80
              1.000    8.55 |  2.000    7.68 |  3.000    3.95 |  4.00    2.80

     Max.Eff.Inten.(mm/hr)=     114.88        78.65
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     2.28 (ii)    7.59 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.30         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.00         0.24       0.238 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42       1.42
     RUNOFF VOLUME    (mm)=    42.59        20.21      20.32
     TOTAL RAINFALL   (mm)=    43.59        43.59      43.59
     RUNOFF COEFFICIENT   =     0.98         0.46       0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +   2 =   3  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0202):     2.48   0.238     1.42    20.32
     + ID2= 2 (  0022):     4.02   0.068     2.08    25.92
       ================================================
       ID = 3 (  0003):     6.50   0.249     1.42    23.78

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


--------------------
| ADD HYD  (  0003)|
|   3 +   2 =   1  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0003):     6.50   0.249     1.42    23.78
     + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
       ================================================
       ID = 1 (  0003):     6.50   0.249     1.42    23.78

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.14          0.32
    Dep. Storage     (mm)=       1.50          5.00
    Average Slope     (%)=       2.00          4.00
    Length            (m)=      55.38         20.00
    Mannings n           =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
   0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
   0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
   0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
   0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
   0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
   0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
   0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
   0.750    6.13 | 1.750    9.43 | 2.750    4.27 |  3.75    2.94
   0.833    6.13 | 1.833    9.43 | 2.833    4.27 |  3.83    2.94
   0.917    8.55 | 1.917    7.68 | 2.917    3.95 |  3.92    2.80
   1.000    8.55 | 2.000    7.68 | 3.000    3.95 |  4.00    2.80

    Max.Eff.Inten.(mm/hr)=     114.88        42.09
              over (min)          5.00        10.00
    Storage Coeff.  (min)=       1.38 (ii)    6.72 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.33         0.14
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.03         0.03        0.053 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.42         1.33
    RUNOFF VOLUME    (mm)=      42.09        16.03        21.68
    TOTAL RAINFALL   (mm)=      43.59        43.59        43.59
    RUNOFF COEFFICIENT   =       0.97         0.37         0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.57          3.65
    Dep. Storage     (mm)=       1.50          5.00
    Average Slope     (%)=      10.00         10.00
    Length            (m)=     186.55         30.00
    Mannings n           =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    3.17 | 1.083   16.54 | 2.083    6.54 |  3.08    3.69
   0.167    3.17 | 1.167   16.54 | 2.167    6.54 |  3.17    3.69
   0.250    3.57 | 1.250  114.88 | 2.250    5.73 |  3.25    3.46
   0.333    3.57 | 1.333  114.88 | 2.333    5.73 |  3.33    3.46
   0.417    4.11 | 1.417   20.52 | 2.417    5.13 |  3.42    3.26
   0.500    4.11 | 1.500   20.52 | 2.500    5.13 |  3.50    3.26
   0.583    4.88 | 1.583   12.57 | 2.583    4.65 |  3.58    3.09
   0.667    4.88 | 1.667   12.57 | 2.667    4.65 |  3.67    3.09
   0.750    6.13 | 1.750    9.43 | 2.750    4.27 |  3.75    2.94
   0.833    6.13 | 1.833    9.43 | 2.833    4.27 |  3.83    2.94
   0.917    8.55 | 1.917    7.68 | 2.917    3.95 |  3.92    2.80
   1.000    8.55 | 2.000    7.68 | 3.000    3.95 |  4.00    2.80

    Max.Eff.Inten.(mm/hr)=     114.88        42.67
              over (min)          5.00        10.00
    Storage Coeff.  (min)=       1.76 (ii)    6.91 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.32         0.14
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.34         0.32        0.589 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.42         1.33
    RUNOFF VOLUME    (mm)=      42.09        16.12        21.49
    TOTAL RAINFALL   (mm)=      43.59        43.59        43.59
    RUNOFF COEFFICIENT   =       0.97         0.37         0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  80.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\e9272cd5-a2
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\e9272cd5-a2

DATE: 11-08-2024                          TIME: 09:08:43

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : 10yr 4hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 721.920
| Ptotal= 51.12 mm |                           B=   0.000
--------------------                           C=   0.736
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.00    3.79 |  1.00   19.52 |  2.00    7.77 |  3.00    4.40
             0.17    4.26 |  1.17  132.58 |  2.17    6.82 |  3.17    4.13
             0.33    4.90 |  1.33   24.19 |  2.33    6.10 |  3.33    3.90
             0.50    5.82 |  1.50   14.88 |  2.50    5.54 |  3.50    3.69
             0.67    7.29 |  1.67   11.18 |  2.67    5.09 |  3.67    3.51
             0.83   10.14 |  1.83    9.12 |  2.83    4.72 |  3.83    3.35


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--------------------
| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.70         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
```

```
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
             0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
             0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
             0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
             0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
             0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
             1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58        65.50
               over (min)          5.00        10.00
     Storage Coeff.  (min)=      0.89 (ii)    5.23 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.34         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.03       0.036 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.42       1.33
     RUNOFF VOLUME    (mm)=     49.62        22.35      26.53
     TOTAL RAINFALL   (mm)=     51.12        51.12      51.12
     RUNOFF COEFFICIENT   =      0.97         0.44       0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.036     1.33    26.53
     + ID2= 2 (  0201):     3.50   0.608     1.33    32.86
       ========================================================
       ID = 3 (  0026):     3.76   0.645     1.33    32.43

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.645     1.33    32.43
     + ID2= 2 (  0027):     0.26   0.055     1.33    30.45
       ========================================================
       ID = 1 (  0026):     4.02   0.700     1.33    32.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0130     0.0540
                         0.0030     0.0020    |   0.1100     0.0720
                         0.0090     0.0160    |   0.4340     0.0980
```

```
              0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
              0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
              0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
              0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
              0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
              1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58       139.82
               over (min)          5.00        10.00
     Storage Coeff.  (min)=      1.94 (ii)    6.50 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.31         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.26         0.41       0.608 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.42       1.33
     RUNOFF VOLUME    (mm)=     49.42        28.75      32.86
     TOTAL RAINFALL   (mm)=     51.12        51.12      51.12
     RUNOFF COEFFICIENT   =      0.97         0.56       0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11         0.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     41.63        20.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
             0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
             0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
             0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
             0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
             0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
             1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58        63.14
               over (min)          5.00         5.00
     Storage Coeff.  (min)=      0.79 (ii)    4.66 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.22
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.03         0.03       0.055 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33       1.33
     RUNOFF VOLUME    (mm)=     49.62        22.05      30.45
     TOTAL RAINFALL   (mm)=     51.12        51.12      51.12
     RUNOFF COEFFICIENT   =      0.97         0.43       0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
```

```
                        0.0090     0.0210   |   0.5160     0.1030
                        0.0100     0.0260   |   0.6920     0.1140
                        0.0120     0.0390   |   1.8600     0.1540

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0026)     4.020     0.700      1.33       32.30
     OUTFLOW: ID= 1 (  0022)     4.020     0.117      1.83       32.26
     OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00        0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.74
                    TIME SHIFT OF PEAK FLOW          (min)= 30.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0726

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  --------------------------
  | Junction Command(0024) |
  --------------------------

                             AREA     QPEAK   TPEAK     R.V.
                             (ha)     (cms)   (hrs)     (mm)
    INFLOW : ID= 3(  0022)    0.00     0.00    0.00     0.00
    OUTFLOW: ID= 2(  0024)    0.00     0.00    0.00     0.00

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91         1.57
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         4.00
     Length            (m)=    128.58        30.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
             0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
             0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
             0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
             0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
             0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  3.92    3.35
             1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58       101.79
               over (min)          5.00        10.00
     Storage Coeff.  (min)=      2.16 (ii)    6.95 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.31         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.00         0.31       0.316 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.42       1.42
     RUNOFF VOLUME    (mm)=     50.12        26.01      26.13
     TOTAL RAINFALL   (mm)=     51.12        51.12      51.12
     RUNOFF COEFFICIENT   =      0.98         0.51       0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +   2 =   3  |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0202):     2.48   0.316     1.42    26.13
    + ID2= 2 (  0022):     4.02   0.117     1.83    32.26
      ================================================
      ID = 3 (  0003):     6.50   0.329     1.42    29.92

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


--------------------
| ADD HYD  (  0003)|
|   3 +   2 =   1  |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
      ID1= 3 (  0003):     6.50   0.329     1.42    29.92
    + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
      ================================================
      ID = 1 (  0003):     6.50   0.329     1.42    29.92

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n             =    0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
             0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
             0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
             0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
             0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
             0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  4.00    3.35
             1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58         56.17
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      1.30 (ii)     6.06 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.33          0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.04          0.04          0.067 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     49.62         21.12          27.30
     TOTAL RAINFALL   (mm)=     51.12         51.12          51.12
     RUNOFF COEFFICIENT   =      0.97          0.41           0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n             =    0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.79 | 1.083   19.52 | 2.083    7.77 |  3.08    4.40
             0.167    3.79 | 1.167   19.52 | 2.167    7.77 |  3.17    4.40
             0.250    4.26 | 1.250  132.58 | 2.250    6.82 |  3.25    4.13
             0.333    4.26 | 1.333  132.58 | 2.333    6.82 |  3.33    4.13
             0.417    4.90 | 1.417   24.19 | 2.417    6.10 |  3.42    3.90
             0.500    4.90 | 1.500   24.19 | 2.500    6.10 |  3.50    3.90
             0.583    5.82 | 1.583   14.88 | 2.583    5.54 |  3.58    3.69
             0.667    5.82 | 1.667   14.88 | 2.667    5.54 |  3.67    3.69
             0.750    7.29 | 1.750   11.18 | 2.750    5.09 |  3.75    3.51
             0.833    7.29 | 1.833   11.18 | 2.833    5.09 |  3.83    3.51
             0.917   10.14 | 1.917    9.12 | 2.917    4.72 |  4.00    3.35
             1.000   10.14 | 2.000    9.12 | 3.000    4.72 |  4.00    3.35

     Max.Eff.Inten.(mm/hr)=     132.58         56.90
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      1.66 (ii)     6.25 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.32          0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.40          0.43          0.747 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=     49.62         21.23          27.10
     TOTAL RAINFALL   (mm)=     51.12         51.12          51.12
     RUNOFF COEFFICIENT   =      0.97          0.42           0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\0e26e68f-37
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\0e26e68f-37


DATE: 11-08-2024                          TIME: 09:08:42

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 25yr 4hr 10min Chicago        **
  ************************************************


--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 822.740
| Ptotal= 61.88 mm |                           B=   0.000
--------------------                           C=   0.725
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.00    4.77 |  1.00   23.97 |'  2.00    9.68 |  3.00    5.53
             0.17    5.36 |  1.17  154.98 |'  2.17    8.51 |  3.17    5.19
             0.33    6.14 |  1.33   29.61 |'  2.33    7.63 |  3.33    4.90
             0.50    7.28 |  1.50   18.34 |'  2.50    6.94 |  3.50    4.65
             0.67    9.09 |  1.67   13.85 |'  2.67    6.38 |  3.67    4.43
             0.83   12.58 |  1.83   11.32 |'  2.83    5.92 |  3.83    4.23


--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.03          1.47
     Dep. Storage     (mm)=     1.70          5.00
     Average Slope     (%)=     4.00          4.00
     Length            (m)=   152.75         20.00
     Mannings n           =    0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.77 |  1.083   23.97 |'  2.083    9.68 |  3.08    5.53
              0.167    4.77 |  1.167   23.97 |'  2.167    9.68 |  3.17    5.53
              0.250    5.36 |  1.250  154.98 |'  2.250    8.51 |  3.25    5.19
              0.333    5.36 |  1.333  154.98 |'  2.333    8.51 |  3.33    5.19
              0.417    6.14 |  1.417   29.61 |'  2.417    7.63 |  3.42    4.90
              0.500    6.14 |  1.500   29.61 |'  2.500    7.63 |  3.50    4.90
```

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--------------------
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.08          0.18
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=     4.00         10.00
     Length            (m)=    41.63         30.00
     Mannings n           =    0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.77 |  1.083   23.97 |'  2.083    9.68 |  3.08    5.53
              0.167    4.77 |  1.167   23.97 |'  2.167    9.68 |  3.17    5.53
              0.250    5.36 |  1.250  154.98 |'  2.250    8.51 |  3.25    5.19
              0.333    5.36 |  1.333  154.98 |'  2.333    8.51 |  3.33    5.19
              0.417    6.14 |  1.417   29.61 |'  2.417    7.63 |  3.42    4.90
              0.500    6.14 |  1.500   29.61 |'  2.500    7.63 |  3.50    4.90
              0.583    7.28 |  1.583   18.34 |'  2.583    6.94 |  3.58    4.65
              0.667    7.28 |  1.667   18.34 |'  2.667    6.94 |  3.67    4.65
              0.750    9.09 |  1.750   13.85 |'  2.750    6.38 |  3.75    4.43
              0.833    9.09 |  1.833   13.85 |'  2.833    6.38 |  3.83    4.43
              0.917   12.58 |  1.917   11.32 |'  2.917    5.92 |  3.92    4.23
              1.000   12.58 |  2.000   11.32 |'  3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98        88.44
               over (min)          5.00          5.00
     Storage Coeff.  (min)=     0.84 (ii)     4.69 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=        0.34          0.22
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.02          0.04         0.060 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.33          1.33
     RUNOFF VOLUME    (mm)=       60.38         30.43         35.03
     TOTAL RAINFALL   (mm)=       61.88         61.88         61.88
     RUNOFF COEFFICIENT   =        0.98          0.49          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
---------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.060     1.33    35.03
     + ID2= 2 (  0201):     3.50   0.779     1.33    42.36
       ========================================================
       ID = 3 (  0026):     3.76   0.839     1.33    41.85

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
---------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.839     1.33    41.85
     + ID2= 2 (  0027):     0.26   0.070     1.33    39.31
       ========================================================
       ID = 1 (  0026):     4.02   0.909     1.33    41.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
---------------------      (cms)     (ha.m.)  |    (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0130     0.0540
                          0.0030     0.0020   |   0.1100     0.0720
                          0.0090     0.0160   |   0.4340     0.0980
```

```
              0.583    7.28 |  1.583   18.34 |  2.583    6.94 |  3.58    4.65
              0.667    7.28 |  1.667   18.34 |  2.667    6.94 |  3.67    4.65
              0.750    9.09 |  1.750   13.85 |  2.750    6.38 |  3.75    4.43
              0.833    9.09 |  1.833   13.85 |  2.833    6.38 |  3.83    4.43
              0.917   12.58 |  1.917   11.32 |  2.917    5.92 |  3.92    4.23
              1.000   12.58 |  2.000   11.32 |  3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98        181.44
               over (min)          5.00         10.00
     Storage Coeff.  (min)=     1.82 (ii)     6.10 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.32          0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.30          0.54         0.779 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.42          1.33
     RUNOFF VOLUME    (mm)=       60.18         37.94         42.36
     TOTAL RAINFALL   (mm)=       61.88         61.88         61.88
     RUNOFF COEFFICIENT   =        0.97          0.61          0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.11          0.15
     Dep. Storage     (mm)=     1.50          5.00
     Average Slope     (%)=     6.00          6.00
     Length            (m)=    41.63         20.00
     Mannings n           =    0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.77 |  1.083   23.97 |'  2.083    9.68 |  3.08    5.53
              0.167    4.77 |  1.167   23.97 |'  2.167    9.68 |  3.17    5.53
              0.250    5.36 |  1.250  154.98 |'  2.250    8.51 |  3.25    5.19
              0.333    5.36 |  1.333  154.98 |'  2.333    8.51 |  3.33    5.19
              0.417    6.14 |  1.417   29.61 |'  2.417    7.63 |  3.42    4.90
              0.500    6.14 |  1.500   29.61 |'  2.500    7.63 |  3.50    4.90
              0.583    7.28 |  1.583   18.34 |'  2.583    6.94 |  3.58    4.65
              0.667    7.28 |  1.667   18.34 |'  2.667    6.94 |  3.67    4.65
              0.750    9.09 |  1.750   13.85 |'  2.750    6.38 |  3.75    4.43
              0.833    9.09 |  1.833   13.85 |'  2.833    6.38 |  3.83    4.43
              0.917   12.58 |  1.917   11.32 |'  2.917    5.92 |  3.92    4.23
              1.000   12.58 |  2.000   11.32 |'  3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98         85.43
               over (min)          5.00          5.00
     Storage Coeff.  (min)=     0.74 (ii)     4.37 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=        0.34          0.23
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.03          0.04         0.070 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.33          1.33
     RUNOFF VOLUME    (mm)=       60.38         30.08         39.31
     TOTAL RAINFALL   (mm)=       61.88         61.88         61.88
     RUNOFF COEFFICIENT   =        0.98          0.49          0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
```

```
                        0.0090     0.0210   |   0.5160      0.1030
                        0.0100     0.0260   |   0.6920      0.1140
                        0.0120     0.0390   |   1.8600      0.1540

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0026)     4.020     0.909      1.33       41.69
     OUTFLOW: ID= 1 (  0022)     4.020     0.236      1.67       41.65
     OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00        0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.94
                    TIME SHIFT OF PEAK FLOW          (min)= 20.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0823

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  -------------------------
  | Junction Command(0024) |
  -------------------------

                             AREA     QPEAK   TPEAK     R.V.
                             (ha)     (cms)   (hrs)     (mm)
    INFLOW : ID= 3(  0022)    0.00     0.00    0.00      0.00
    OUTFLOW: ID= 2(  0024)    0.00     0.00    0.00      0.00

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.91          1.57
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     2.00          4.00
     Length            (m)=   128.58         30.00
     Mannings n           =    0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.77 |  1.083   23.97 |'  2.083    9.68 |  3.08    5.53
              0.167    4.77 |  1.167   23.97 |'  2.167    9.68 |  3.17    5.53
              0.250    5.36 |  1.250  154.98 |'  2.250    8.51 |  3.25    5.19
              0.333    5.36 |  1.333  154.98 |'  2.333    8.51 |  3.33    5.19
              0.417    6.14 |  1.417   29.61 |'  2.417    7.63 |  3.42    4.90
              0.500    6.14 |  1.500   29.61 |'  2.500    7.63 |  3.50    4.90
              0.583    7.28 |  1.583   18.34 |'  2.583    6.94 |  3.58    4.65
              0.667    7.28 |  1.667   18.34 |'  2.667    6.94 |  3.67    4.65
              0.750    9.09 |  1.750   13.85 |'  2.750    6.38 |  3.75    4.43
              0.833    9.09 |  1.833   13.85 |'  2.833    6.38 |  3.83    4.43
              0.917   12.58 |  1.917   11.32 |'  2.917    5.92 |  3.92    4.23
              1.000   12.58 |  2.000   11.32 |'  3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98        134.24
               over (min)          5.00         10.00
     Storage Coeff.  (min)=     2.03 (ii)     6.31 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.31          0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.01          0.43         0.427 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.42          1.42
     RUNOFF VOLUME    (mm)=       60.88         34.77         34.90
     TOTAL RAINFALL   (mm)=       61.88         61.88         61.88
     RUNOFF COEFFICIENT   =        0.98          0.56          0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +   2 =   3  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0202):     2.48   0.427     1.42    34.90
    + ID2= 2 (  0022):     4.02   0.236     1.67    41.65
      ==========================================
      ID = 3 (  0003):     6.50   0.488     1.42    39.07

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


--------------------
| ADD HYD  (  0003)|
|   3 +   2 =   1  |        AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
      ID1= 3 (  0003):     6.50   0.488     1.42    39.07
    + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
      ==========================================
      ID = 1 (  0003):     6.50   0.488     1.42    39.07

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n             =     0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
             0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
             0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
             0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
             0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
             0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
             0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
             0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
             0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
             0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
             0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  4.00    4.23
             1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98         76.50
               over (min)          5.00         10.00
     Storage Coeff.  (min)=       1.22 (ii)     5.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.33          0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04          0.05          0.088 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=      60.38         28.96          35.77
     TOTAL RAINFALL   (mm)=      61.88         61.88          61.88
     RUNOFF COEFFICIENT   =       0.98          0.47           0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n             =     0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.77 | 1.083   23.97 | 2.083    9.68 |  3.08    5.53
             0.167    4.77 | 1.167   23.97 | 2.167    9.68 |  3.17    5.53
             0.250    5.36 | 1.250  154.98 | 2.250    8.51 |  3.25    5.19
             0.333    5.36 | 1.333  154.98 | 2.333    8.51 |  3.33    5.19
             0.417    6.14 | 1.417   29.61 | 2.417    7.63 |  3.42    4.90
             0.500    6.14 | 1.500   29.61 | 2.500    7.63 |  3.50    4.90
             0.583    7.28 | 1.583   18.34 | 2.583    6.94 |  3.58    4.65
             0.667    7.28 | 1.667   18.34 | 2.667    6.94 |  3.67    4.65
             0.750    9.09 | 1.750   13.85 | 2.750    6.38 |  3.75    4.43
             0.833    9.09 | 1.833   13.85 | 2.833    6.38 |  3.83    4.43
             0.917   12.58 | 1.917   11.32 | 2.917    5.92 |  4.00    4.23
             1.000   12.58 | 2.000   11.32 | 3.000    5.92 |  4.00    4.23

     Max.Eff.Inten.(mm/hr)=     154.98         77.44
               over (min)          5.00         10.00
     Storage Coeff.  (min)=       1.56 (ii)     5.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.33          0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.46          0.60          0.976 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.42           1.33
     RUNOFF VOLUME    (mm)=      60.38         29.09          35.56
     TOTAL RAINFALL   (mm)=      61.88         61.88          61.88
     RUNOFF COEFFICIENT   =       0.98          0.47           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\7b63774b-63
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\7b63774b-63

DATE: 11-08-2024                          TIME: 09:08:43

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 50yr 4hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 893.800
| Ptotal= 69.47 mm |                           B=   0.000
--------------------                           C=   0.719
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    5.47 |  1.00   27.09 |'  2.00   11.03 |  3.00    6.33
              0.17    6.13 |  1.17  170.70 |'  2.17    9.71 |  3.17    5.95
              0.33    7.02 |  1.33   33.42 |'  2.33    8.71 |  3.33    5.62
              0.50    8.31 |  1.50   20.79 |'  2.50    7.93 |  3.50    5.33
              0.67   10.36 |  1.67   15.73 |'  2.67    7.29 |  3.67    5.08
              0.83   14.30 |  1.83   12.89 |'  2.83    6.77 |  3.83    4.85


--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.70         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
     Mannings n             =    0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
               0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
               0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
               0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
               0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
               0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
               0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
               0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
               0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
               0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
               0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
               1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70       105.41
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      0.80 (ii)    4.39 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.02         0.05          0.071 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=     67.97        36.43         41.27
     TOTAL RAINFALL   (mm)=     69.47        69.47         69.47
     RUNOFF COEFFICIENT   =      0.98         0.52          0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.071     1.33    41.27
     + ID2= 2 (  0201):     3.50   0.904     1.33    49.22
       ==========================================================
       ID = 3 (  0026):     3.76   0.975     1.33    48.68

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.975     1.33    48.68
     + ID2= 2 (  0027):     0.26   0.080     1.33    45.77
       ==========================================================
       ID = 1 (  0026):     4.02   1.055     1.33    48.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0130     0.0540
                         0.0030     0.0020    |   0.1100     0.0720
                         0.0090     0.0160    |   0.4340     0.0980
```

```
                         0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                         0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                         0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                         0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                         0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                         1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

              Max.Eff.Inten.(mm/hr)=     170.70       211.45
                        over (min)        5.00        10.00
              Storage Coeff.  (min)=      1.75 (ii)    5.87 (ii)
              Unit Hyd. Tpeak (min)=      5.00        10.00
              Unit Hyd. peak  (cms)=      0.32         0.15
                                                        *TOTALS*
              PEAK FLOW       (cms)=      0.33         0.63          0.904 (iii)
              TIME TO PEAK    (hrs)=      1.33         1.42          1.33
              RUNOFF VOLUME    (mm)=     67.77        44.62         49.22
              TOTAL RAINFALL   (mm)=     69.47        69.47         69.47
              RUNOFF COEFFICIENT   =      0.98         0.64          0.71

         ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
         ***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
                     YOU SHOULD CONSIDER SPLITTING THE AREA.

                (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                      CN*  =  80.0    Ia = Dep. Storage  (Above)
               (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                      THAN THE STORAGE COEFFICIENT.
              (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

         --------------------------------------------------------------------------------------------------------
         --------------------
         | CALIB            |
         | STANDHYD (  0027)|   Area    (ha)=   0.26
         |ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
         --------------------
                                 IMPERVIOUS    PERVIOUS (i)
              Surface Area     (ha)=      0.11         0.15
              Dep. Storage     (mm)=      1.50         5.00
              Average Slope     (%)=      6.00         6.00
              Length            (m)=     41.63        20.00
              Mannings n             =    0.013        0.250

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


                                   ---- TRANSFORMED HYETOGRAPH ----
                        TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                         hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                        0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                        0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                        0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                        0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                        0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                        0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                        0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                        0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                        0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                        0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                        0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                        1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

              Max.Eff.Inten.(mm/hr)=     170.70       101.93
                        over (min)        5.00         5.00
              Storage Coeff.  (min)=      0.71 (ii)    4.21 (ii)
              Unit Hyd. Tpeak (min)=      5.00         5.00
              Unit Hyd. peak  (cms)=      0.34         0.24
                                                        *TOTALS*
              PEAK FLOW       (cms)=      0.04         0.04          0.080 (iii)
              TIME TO PEAK    (hrs)=      1.33         1.33          1.33
              RUNOFF VOLUME    (mm)=     67.97        36.04         45.77
              TOTAL RAINFALL   (mm)=     69.47        69.47         69.47
              RUNOFF COEFFICIENT   =      0.98         0.52          0.66

         ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

                (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                      CN*  =  80.0    Ia = Dep. Storage  (Above)
               (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                      THAN THE STORAGE COEFFICIENT.
              (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

         --------------------------------------------------------------------------------------------------------
         --------------------
         | CALIB            |
```

```
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n             =    0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
               0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
               0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
               0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
               0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
               0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
               0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
               0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
               0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
               0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
               0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
               1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70       105.41
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      0.80 (ii)    4.39 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.02         0.05          0.071 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=     67.97        36.43         41.27
     TOTAL RAINFALL   (mm)=     69.47        69.47         69.47
     RUNOFF COEFFICIENT   =      0.98         0.52          0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.071     1.33    41.27
     + ID2= 2 (  0201):     3.50   0.904     1.33    49.22
       ==========================================================
       ID = 3 (  0026):     3.76   0.975     1.33    48.68

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   0.975     1.33    48.68
     + ID2= 2 (  0027):     0.26   0.080     1.33    45.77
       ==========================================================
       ID = 1 (  0026):     4.02   1.055     1.33    48.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0130     0.0540
                         0.0030     0.0020    |   0.1100     0.0720
                         0.0090     0.0160    |   0.4340     0.0980
```

```
                         0.0090     0.0210    |   0.5160     0.1030
                         0.0100     0.0260    |   0.6920     0.1140
                         0.0120     0.0390    |   1.8600     0.1540

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
              INFLOW : ID= 2 (  0026)     4.020     1.055      1.33       48.49
              OUTFLOW: ID= 1 (  0022)     4.020     0.327      1.58       48.45
              OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00        0.00

                         TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                         CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                         PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                         PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.97
                         TIME SHIFT OF PEAK FLOW         (min)= 15.00
                         MAXIMUM  STORAGE   USED       (ha.m.)=  0.0896

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

           -------------------------
           | Junction Command(0024) |
           -------------------------
                                   AREA     QPEAK    TPEAK     R.V.
                                   (ha)     (cms)    (hrs)     (mm)
           INFLOW : ID= 3(  0022)    0.00     0.00     0.00     0.00
           OUTFLOW: ID= 2(  0024)    0.00     0.00     0.00     0.00

         --------------------------------------------------------------------------------------------------------
         --------------------
         | CALIB            |
         | STANDHYD (  0202)|   Area    (ha)=   2.48
         |ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
         --------------------
                                 IMPERVIOUS    PERVIOUS (i)
              Surface Area     (ha)=      0.91         1.57
              Dep. Storage     (mm)=      1.00         5.00
              Average Slope     (%)=      2.00         4.00
              Length            (m)=    128.58        30.00
              Mannings n             =    0.013        0.250

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


                                   ---- TRANSFORMED HYETOGRAPH ----
                        TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                         hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                        0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
                        0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
                        0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
                        0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
                        0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
                        0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
                        0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
                        0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
                        0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
                        0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
                        0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
                        1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

              Max.Eff.Inten.(mm/hr)=     170.70       157.89
                        over (min)        5.00        10.00
              Storage Coeff.  (min)=      1.95 (ii)    5.97 (ii)
              Unit Hyd. Tpeak (min)=      5.00        10.00
              Unit Hyd. peak  (cms)=      0.31         0.15
                                                        *TOTALS*
              PEAK FLOW       (cms)=      0.01         0.51          0.509 (iii)
              TIME TO PEAK    (hrs)=      1.33         1.42          1.42
              RUNOFF VOLUME    (mm)=     68.47        41.19         41.32
              TOTAL RAINFALL   (mm)=     69.47        69.47         69.47
              RUNOFF COEFFICIENT   =      0.99         0.59          0.59

         ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
         ***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
                     YOU SHOULD CONSIDER SPLITTING THE AREA.

                (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                      CN*  =  80.0    Ia = Dep. Storage  (Above)
               (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                      THAN THE STORAGE COEFFICIENT.
              (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +   2 =  3   |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0202):     2.48   0.509     1.42    41.32
     + ID2= 2 (  0022):     4.02   0.327     1.58    48.45
       ================================================
       ID = 3 (  0003):     6.50   0.632     1.42    45.73

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

--------------------
| ADD HYD  (  0003)|
|   3 +   2 =  1   |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0003):     6.50   0.632     1.42    45.73
     + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
       ================================================
       ID = 1 (  0003):     6.50   0.632     1.42    45.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.32
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         4.00
     Length            (m)=      55.38        20.00
     Mannings n             =    0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
             0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
             0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
             0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
             0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
             0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
             0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
             0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
             0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
             0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
             0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
             1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70        91.61
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       1.18 (ii)    6.04 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.06          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      67.97        34.81          42.00
     TOTAL RAINFALL   (mm)=      69.47        69.47          69.47
     RUNOFF COEFFICIENT   =       0.98         0.50           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57         3.65
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=      10.00        10.00
     Length            (m)=     186.55        30.00
     Mannings n             =    0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    5.47 | 1.083   27.09 | 2.083   11.03 |  3.08    6.33
             0.167    5.47 | 1.167   27.09 | 2.167   11.03 |  3.17    6.33
             0.250    6.13 | 1.250  170.70 | 2.250    9.71 |  3.25    5.95
             0.333    6.13 | 1.333  170.70 | 2.333    9.71 |  3.33    5.95
             0.417    7.02 | 1.417   33.42 | 2.417    8.71 |  3.42    5.62
             0.500    7.02 | 1.500   33.42 | 2.500    8.71 |  3.50    5.62
             0.583    8.31 | 1.583   20.79 | 2.583    7.93 |  3.58    5.33
             0.667    8.31 | 1.667   20.79 | 2.667    7.93 |  3.67    5.33
             0.750   10.36 | 1.750   15.73 | 2.750    7.29 |  3.75    5.08
             0.833   10.36 | 1.833   15.73 | 2.833    7.29 |  3.83    5.08
             0.917   14.30 | 1.917   12.89 | 2.917    6.77 |  3.92    4.85
             1.000   14.30 | 2.000   12.89 | 3.000    6.77 |  4.00    4.85

     Max.Eff.Inten.(mm/hr)=     170.70        92.71
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       1.50 (ii)    6.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.51         0.69          1.097 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      67.97        34.94          41.78
     TOTAL RAINFALL   (mm)=      69.47        69.47          69.47
     RUNOFF COEFFICIENT   =       0.98         0.50           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\19d0a497-3c
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\19d0a497-3c

DATE: 11-08-2024                          TIME: 09:08:42

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 100yr 4hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 953.290
| Ptotal= 77.41 mm |                           B=   0.000
--------------------                           C=   0.711
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.00    6.26 |  1.00   30.45 |'  2.00   12.53 |  3.00    7.23
          0.17    7.01 |  1.17  185.45 |'  2.17   11.04 |  3.17    6.80
          0.33    8.02 |  1.33   37.49 |'  2.33    9.92 |  3.33    6.43
          0.50    9.47 |  1.50   23.45 |'  2.50    9.04 |  3.50    6.10
          0.67   11.77 |  1.67   17.80 |'  2.67    8.32 |  3.67    5.82
          0.83   16.19 |  1.83   14.61 |'  2.83    7.73 |  3.83    5.56


--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.70         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
     Mannings n              =   0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
         0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
         0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
         0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
         0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
         0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
```

```
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n              =   0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
         0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
         0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
         0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
         0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
         0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
         0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
         0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
         0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
         0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
         0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
         1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       122.54
               over (min)        5.00         5.00
     Storage Coeff.  (min)=     0.78 (ii)    4.16 (ii)
     Unit Hyd. Tpeak (min)=     5.00         5.00
     Unit Hyd. peak  (cms)=     0.34         0.24
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.02         0.06        0.082 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.33         1.33
     RUNOFF VOLUME    (mm)=    75.91        42.92        47.99
     TOTAL RAINFALL   (mm)=    77.41        77.41        77.41
     RUNOFF COEFFICIENT   =     0.98         0.55         0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
---------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.26   0.082     1.33    47.99
     + ID2= 2 (  0201):     3.50   1.028     1.33    56.52
       ========================================================
       ID = 3 (  0026):     3.76   1.110     1.33    55.93

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

--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
---------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):     3.76   1.110     1.33    55.93
     + ID2= 2 (  0027):     0.26   0.091     1.33    52.67
       ========================================================
       ID = 1 (  0026):     4.02   1.201     1.33    55.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
---------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  0.0130     0.0540
                          0.0030     0.0020    |  0.1100     0.0720
                          0.0090     0.0160    |  0.4340     0.0980
```

```
                0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
                0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
                0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
                0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
                0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
                1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       241.04
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     1.70 (ii)    5.68 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.32         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.36         0.73        1.028 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=    75.71        51.75        56.52
     TOTAL RAINFALL   (mm)=    77.41        77.41        77.41
     RUNOFF COEFFICIENT   =     0.98         0.67         0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11         0.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     41.63        20.00
     Mannings n              =   0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
         0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
         0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
         0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
         0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
         0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
         0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
         0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
         0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
         0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
         0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
         1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       118.62
               over (min)        5.00         5.00
     Storage Coeff.  (min)=     0.69 (ii)    4.07 (ii)
     Unit Hyd. Tpeak (min)=     5.00         5.00
     Unit Hyd. peak  (cms)=     0.34         0.24
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.04         0.05        0.091 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.33         1.33
     RUNOFF VOLUME    (mm)=    75.91        42.49        52.67
     TOTAL RAINFALL   (mm)=    77.41        77.41        77.41
     RUNOFF COEFFICIENT   =     0.98         0.55         0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
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                0.0090    0.0210  |   0.5160    0.1030
                0.0100    0.0260  |   0.6920    0.1140
                0.0120    0.0390  |   1.8600    0.1540

                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0026)     4.020     1.201      1.33      55.72
   OUTFLOW: ID= 1 (  0022)     4.020     0.419      1.58      55.68
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.90
                TIME SHIFT OF PEAK FLOW         (min)= 15.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0973

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

  -------------------------
  | Junction Command(0024) |
  -------------------------

                          AREA     QPEAK    TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0022)    0.00     0.00     0.00     0.00
  OUTFLOW: ID= 2(  0024)    0.00     0.00     0.00     0.00

--------------------------------------------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91         1.57
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         4.00
     Length            (m)=    128.58        30.00
     Mannings n              =   0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
         0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
         0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
         0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
         0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
         0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
         0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
         0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
         0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
         0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
         0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
         1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       181.43
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     1.88 (ii)    5.69 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.32         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.01         0.59        0.591 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42         1.42
     RUNOFF VOLUME    (mm)=    76.41        48.07        48.21
     TOTAL RAINFALL   (mm)=    77.41        77.41        77.41
     RUNOFF COEFFICIENT   =     0.99         0.62         0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0202):     2.48   0.591     1.42    48.21
    + ID2= 2 (  0022):     4.02   0.419     1.58    55.68
      ==========================================
      ID = 3 (  0003):     6.50   0.833     1.42    52.83

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

--------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
      ID1= 3 (  0003):     6.50   0.833     1.42    52.83
    + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
      ==========================================
      ID = 1 (  0003):     6.50   0.833     1.42    52.83

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n           =      0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
             0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
             0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
             0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
             0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
             0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
             0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
             0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
             0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
             0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
             0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
             1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       106.95
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.14 (ii)    5.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.34         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.07          0.113 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      75.91        41.14          48.68
     TOTAL RAINFALL   (mm)=      77.41        77.41          77.41
     RUNOFF COEFFICIENT   =       0.98         0.53           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n           =      0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.26 | 1.083   30.45 | 2.083   12.53 |  3.08    7.23
             0.167    6.26 | 1.167   30.45 | 2.167   12.53 |  3.17    7.23
             0.250    7.01 | 1.250  185.45 | 2.250   11.04 |  3.25    6.80
             0.333    7.01 | 1.333  185.45 | 2.333   11.04 |  3.33    6.80
             0.417    8.02 | 1.417   37.49 | 2.417    9.92 |  3.42    6.43
             0.500    8.02 | 1.500   37.49 | 2.500    9.92 |  3.50    6.43
             0.583    9.47 | 1.583   23.45 | 2.583    9.04 |  3.58    6.10
             0.667    9.47 | 1.667   23.45 | 2.667    9.04 |  3.67    6.10
             0.750   11.77 | 1.750   17.80 | 2.750    8.32 |  3.75    5.82
             0.833   11.77 | 1.833   17.80 | 2.833    8.32 |  3.83    5.82
             0.917   16.19 | 1.917   14.61 | 2.917    7.73 |  3.92    5.56
             1.000   16.19 | 2.000   14.61 | 3.000    7.73 |  4.00    5.56

     Max.Eff.Inten.(mm/hr)=     185.45       108.19
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.45 (ii)    6.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.81          1.258 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      75.91        41.29          48.46
     TOTAL RAINFALL   (mm)=      77.41        77.41          77.41
     RUNOFF COEFFICIENT   =       0.98         0.53           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\10e3ea0a-16
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\10e3ea0a-16


DATE: 11-08-2024                          TIME: 09:08:43

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Hurricane Hazel (Regional)    **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\cmartin\AppD
|                  |              ata\Local\Temp\
|                  |              8c6e7f0c-3162-4f43-9add-4f8818604794\eeae85f6
| Ptotal=212.00 mm |    Comments: Hazel
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    6.00 |  3.00   13.00 |'  6.00   23.00 |  9.00   53.00
               1.00    4.00 |  4.00   17.00 |'  7.00   13.00 | 10.00   38.00
               2.00    6.00 |  5.00   13.00 |'  8.00   13.00 | 11.00   13.00

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--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.70         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        97.88
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      2.80 (ii)    6.62 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.28         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.10         0.40      0.501 (iii)
     TIME TO PEAK    (hrs)=      9.75        10.00        10.00
     RUNOFF VOLUME    (mm)=    210.30       180.65       186.55
     TOTAL RAINFALL   (mm)=    212.00       212.00       212.00
     RUNOFF COEFFICIENT   =      0.99         0.85         0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11         0.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     41.63        20.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        59.28
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      1.14 (ii)    5.27 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.34         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.02      0.036 (iii)
     TIME TO PEAK    (hrs)=      9.33        10.00        10.00
     RUNOFF VOLUME    (mm)=    210.50       165.60       179.29
     TOTAL RAINFALL   (mm)=    212.00       212.00       212.00
     RUNOFF COEFFICIENT   =      0.99         0.78         0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n            =     0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        60.61
           over (min)            5.00        10.00
     Storage Coeff.  (min)=      1.28 (ii)    5.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.03      0.036 (iii)
     TIME TO PEAK    (hrs)=      9.33        10.00        10.00
     RUNOFF VOLUME    (mm)=    210.50       166.35       173.14
     TOTAL RAINFALL   (mm)=    212.00       212.00       212.00
     RUNOFF COEFFICIENT   =      0.99         0.78         0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0026)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):      0.26    0.036    10.00   173.14
     + ID2= 2 (  0201):      3.50    0.501    10.00   186.55
       ================================================
       ID = 3 (  0026):      3.76    0.538    10.00   185.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0026)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0026):      3.76    0.538    10.00   185.62
     + ID2= 2 (  0027):      0.26    0.036    10.00   179.29
       ================================================
       ID = 1 (  0026):      4.02    0.574    10.00   185.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
|  IN= 2---> OUT= 1 |
|  DT=  5.0 min    |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0130     0.0540
                         0.0030     0.0020    |  0.1100     0.0720
                         0.0090     0.0160    |  0.4340     0.0980
                         0.0090     0.0210    |  0.5160     0.1030
                         0.0100     0.0260    |  0.6920     0.1140
                         0.0120     0.0390    |  1.8600     0.1540

                              AREA     QPEAK     TPEAK      R.V.
                              (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0026)    4.020     0.574     10.00    185.21
   OUTFLOW: ID= 1 (  0022)    4.020     0.567     10.00    185.17
   OVERFLOW:ID= 3 (  0003)    0.000     0.000      0.00      0.00

                TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 98.77
                TIME SHIFT OF PEAK FLOW          (min)=  0.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1149
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  | Junction Command(0024) |
  -------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0022)    0.00      0.00    0.00     0.00
  OUTFLOW: ID= 2(  0024)    0.00      0.00    0.00     0.00

  ------------------------------------------------------------------------------------------
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| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.91          1.57
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=     128.58         30.00
     Mannings n             =     0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00         79.69
           over (min)            5.00         10.00
     Storage Coeff.  (min)=       3.11 (ii)    8.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.00          0.35          0.348 (iii)
     TIME TO PEAK    (hrs)=       9.58         10.00          10.00
     RUNOFF VOLUME    (mm)=     211.00        174.97         175.15
     TOTAL RAINFALL   (mm)=     212.00        212.00         212.00
     RUNOFF COEFFICIENT   =       1.00          0.83           0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n             =     0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00         55.26
           over (min)            5.00         10.00
     Storage Coeff.  (min)=       1.88 (ii)    6.67 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.32          0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.01          0.05          0.064 (iii)
     TIME TO PEAK    (hrs)=       9.50         10.00          10.00
     RUNOFF VOLUME    (mm)=     210.50        163.18         173.44
     TOTAL RAINFALL   (mm)=     212.00        212.00         212.00
     RUNOFF COEFFICIENT   =       0.99          0.77           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n             =     0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00         55.69
           over (min)            5.00         10.00
     Storage Coeff.  (min)=       2.40 (ii)    7.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.30          0.14
```

```
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0202):     2.48    0.348    10.00   175.15
      + ID2= 2 (  0022):     4.02    0.567    10.00   185.17
        ==========================================
        ID = 3 (  0003):     6.50    0.915    10.00   181.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0003)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0003):     6.50    0.915    10.00   181.35
      + ID2= 2 (  0024):     0.00    0.000     0.00     0.00
        ==========================================
        ID = 1 (  0003):     6.50    0.915    10.00   181.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n             =     0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
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                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.16          0.56          0.722 (iii)
     TIME TO PEAK    (hrs)=       9.67         10.00          10.00
     RUNOFF VOLUME    (mm)=     210.50        163.45         173.19
     TOTAL RAINFALL   (mm)=     212.00        212.00         212.00
     RUNOFF COEFFICIENT   =       0.99          0.77           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  80.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH
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      V    V   I   SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I   SS     U   U   A A   L
       V  V    I    SS    U   U  AAAAA  L
       V  V    I     SS   U   U  A   A  L
        VV     I   SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\99c626c3-7e
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\db2b9d01-d7f6-4e0b-8e9d-a57b449df036\99c626c3-7e


DATE: 11-08-2024                          TIME: 09:08:43

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 25mm 4hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 475.610
| Ptotal= 33.31 mm |                           B=   0.000
--------------------                           C=   0.738
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    2.45 |  1.00   12.69 |  2.00    5.04 |  3.00    2.85
                  0.17    2.76 |  1.17   86.95 |  2.17    4.42 |  3.17    2.67
                  0.33    3.17 |  1.33   15.73 |  2.33    3.95 |  3.33    2.52
                  0.50    3.77 |  1.50    9.66 |  2.50    3.59 |  3.50    2.39
                  0.67    4.72 |  1.67    7.25 |  2.67    3.30 |  3.67    2.27
                  0.83    6.58 |  1.83    5.91 |  2.83    3.05 |  3.83    2.17


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--------------------
| MODIFY STORM     |     MODIFYING PARAMETERS
--------------------     Time shift  (min)    =  0.00

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
                 0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
                 0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
                 0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
                 0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
                 1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

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| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   3.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  19.90
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.03         1.47
     Dep. Storage     (mm)=      1.70         5.00
     Average Slope     (%)=      4.00         4.00
     Length            (m)=    152.75        20.00
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     Mannings n           =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
                 0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
                 0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
                 0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
                 0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
                 0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
                 0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
                 0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
                 0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
                 0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
                 0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
                 1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25        39.36
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.58 (ii)    8.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.11         0.207 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      23.30         8.99         11.84
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =       0.93         0.36          0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  30.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.11         0.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      6.00         6.00
     Length            (m)=     41.63        20.00
     Mannings n           =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
                 0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
                 0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
                 0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
                 0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
                 0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
                 0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
                 0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
                 0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
                 0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
                 0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
                 1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25        14.09
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.05 (ii)    8.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.34         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00         0.017 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      23.50         5.88         11.23
```

```
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =       0.94         0.24          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0017)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.80   Dir. Conn.(%)=  15.40
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.18
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      4.00        10.00
     Length            (m)=     41.63        30.00
     Mannings n           =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
                 0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
                 0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
                 0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
                 0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
                 0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
                 0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
                 0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
                 0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
                 0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
                 0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
                 1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25        14.80
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.18 (ii)    9.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00         0.011 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      23.50         6.00          8.67
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =       0.94         0.24          0.35

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0026)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0017):      0.26   0.011     1.33      8.67
      + ID2= 2 (  0201):      3.50   0.207     1.33     11.84
        ==================================================
        ID = 3 (  0026):      3.76   0.218     1.33     11.62

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

--------------------
| ADD HYD  (  0026)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0026):      3.76   0.218     1.33     11.62
```

```
      + ID2= 2 (  0027):      0.26   0.017     1.33     11.23
        ==================================================
        ID = 1 (  0026):      4.02   0.235     1.33     11.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------
--------------------
| RESERVOIR(  0022)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0130     0.0540
                         0.0030     0.0020    |  0.1100     0.0720
                         0.0090     0.0160    |  0.4340     0.0980
                         0.0090     0.0210    |  0.5160     0.1030
                         0.0100     0.0260    |  0.6920     0.1140
                         0.0120     0.0390    |  1.8600     0.1540

                               AREA      QPEAK     TPEAK       R.V.
                               (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0026)     4.020      0.235      1.33       11.59
   OUTFLOW: ID= 1 (  0022)     4.020      0.011      4.00       11.56
   OVERFLOW:ID= 3 (  0003)     0.000      0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.86
                   TIME SHIFT OF PEAK FLOW         (min)=160.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0352

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

   -------------------------
   | Junction Command(0024) |
   -------------------------

                            AREA     QPEAK   TPEAK     R.V.
                            (ha)     (cms)    (hrs)    (mm)
   INFLOW : ID= 3(  0022)    0.00     0.00    0.00     0.00
   OUTFLOW: ID= 2(  0024)    0.00     0.00    0.00     0.00

   ------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   2.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.70   Dir. Conn.(%)=   0.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.91         1.57
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         4.00
     Length            (m)=    128.58        30.00
     Mannings n           =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
                 0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
                 0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
                 0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
                 0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
                 0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
                 0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
                 0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
                 0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
                 0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
                 0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
                 1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25        26.34
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.86 (ii)   11.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.06         0.064 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.50
     RUNOFF VOLUME    (mm)=      24.00         7.65          7.73
```

```
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.31           0.31

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0202):     2.48   0.064     1.50     7.73
     + ID2= 2 (  0022):     4.02   0.011     4.00    11.56
       ==========================================================
       ID = 3 (  0003):     6.50   0.073     1.50    10.10

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

--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0024 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0003):     6.50   0.073     1.50    10.10
     + ID2= 2 (  0024):     0.00   0.000     0.00     0.00
       ==========================================================
       ID = 1 (  0003):     6.50   0.073     1.50    10.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0018)|   Area    (ha)=   0.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.40   Dir. Conn.(%)=  21.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.32
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          4.00
     Length            (m)=      55.38         20.00
     Mannings n            =      0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
             0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
             0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
             0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
             0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
             0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
             0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
             0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
             0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
             0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
             0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
             1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25         12.01
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      1.73 (ii)    10.56 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.32          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.02          0.01          0.021 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.50          1.33
     RUNOFF VOLUME    (mm)=     23.50          5.49          9.38
     TOTAL RAINFALL   (mm)=     25.00         25.00         25.00
     RUNOFF COEFFICIENT   =      0.94          0.22          0.38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   5.22
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.70
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.57          3.65
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=      10.00         10.00
     Length            (m)=     186.55         30.00
     Mannings n            =      0.013         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    1.84 | 1.083    9.52 | 2.083    3.78 |  3.08    2.14
             0.167    1.84 | 1.167    9.52 | 2.167    3.78 |  3.17    2.14
             0.250    2.07 | 1.250   65.25 | 2.250    3.32 |  3.25    2.01
             0.333    2.07 | 1.333   65.25 | 2.333    3.32 |  3.33    2.01
             0.417    2.38 | 1.417   11.81 | 2.417    2.97 |  3.42    1.89
             0.500    2.38 | 1.500   11.81 | 2.500    2.97 |  3.50    1.89
             0.583    2.83 | 1.583    7.25 | 2.583    2.69 |  3.58    1.79
             0.667    2.83 | 1.667    7.25 | 2.667    2.69 |  3.67    1.79
             0.750    3.55 | 1.750    5.44 | 2.750    2.47 |  3.75    1.70
             0.833    3.55 | 1.833    5.44 | 2.833    2.47 |  3.83    1.70
             0.917    4.94 | 1.917    4.44 | 2.917    2.29 |  3.92    1.63
             1.000    4.94 | 2.000    4.44 | 3.000    2.29 |  4.00    1.63

     Max.Eff.Inten.(mm/hr)=      65.25         12.23
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      2.21 (ii)    10.70 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.30          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.19          0.07          0.223 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.50          1.33
     RUNOFF VOLUME    (mm)=     23.50          5.53          9.25
     TOTAL RAINFALL   (mm)=     25.00         25.00         25.00
     RUNOFF COEFFICIENT   =      0.94          0.22          0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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APPENDIX F

Water Treatment Train Calculations

Project: 11 Main Street
Project No.: 2366-6537
Prepared By: BP
Date: 20234.03.08

WATER QUALITY CALCULATIONS (TREATMENT TRAIN)			
Catchment ID	LID	TSS removal	Combined TSS Removal
1	EF08 SYSTEM	50.0	80.0
	Dry Pond	60.0	

Note: The TSS removal values were calculated using the New Jersey Treatment train equation. Although the EF08 system is designed to provide higher treatment rates than those shown above the rates shown above are representative of the long term treatment provided by these systems.

Treatment Train Approach:

$$R = A + B - [(A \times B) / 100] \qquad \text{(Equation 4-1)}$$

Where:

R = Total TSS Removal Rate

A = TSS Removal Rate of the First or Upstream BMP

B = TSS Removal Rate of the Second or Downstream BMP

*Per 'New Jersey Stormwater Best Management Practices Manual' Equation 4-1 (February 2004)

TSS Removal:

EF08 (Rate 1) = 50 %

Dry Pond (Rate 2) = 60 %

Removal at end of treatment train:

R_3 = Rate 1 + Rate 2 - [(Rate 1 x Rate 2)/100]

R_{total} = 80.0 %

*It should be noted that following treatment from the OGS and Dry Pond the runoff will outlet through a level spreader and then travel 30 meters overland which will provide additional TSS removal.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

11/15/2024

Province:	Ontario
City:	Puslinch
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Site Name:	11 Main Street

Drainage Area (ha):	4.02
% Imperviousness:	55.20

Runoff Coefficient 'c': 0.63

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	50.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	96.14
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	439.70
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	1262

Project Name:	11 Main Street
Project Number:	66114
Designer Name:	Cole Martin
Designer Company:	C.F. Crozier & Associates Inc.
Designer Email:	cmartin@cfcrozier.ca
Designer Phone:	289-204-8239
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	33
EFO6	43
EFO8	50
EFO10	55
EFO12	58

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 50

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

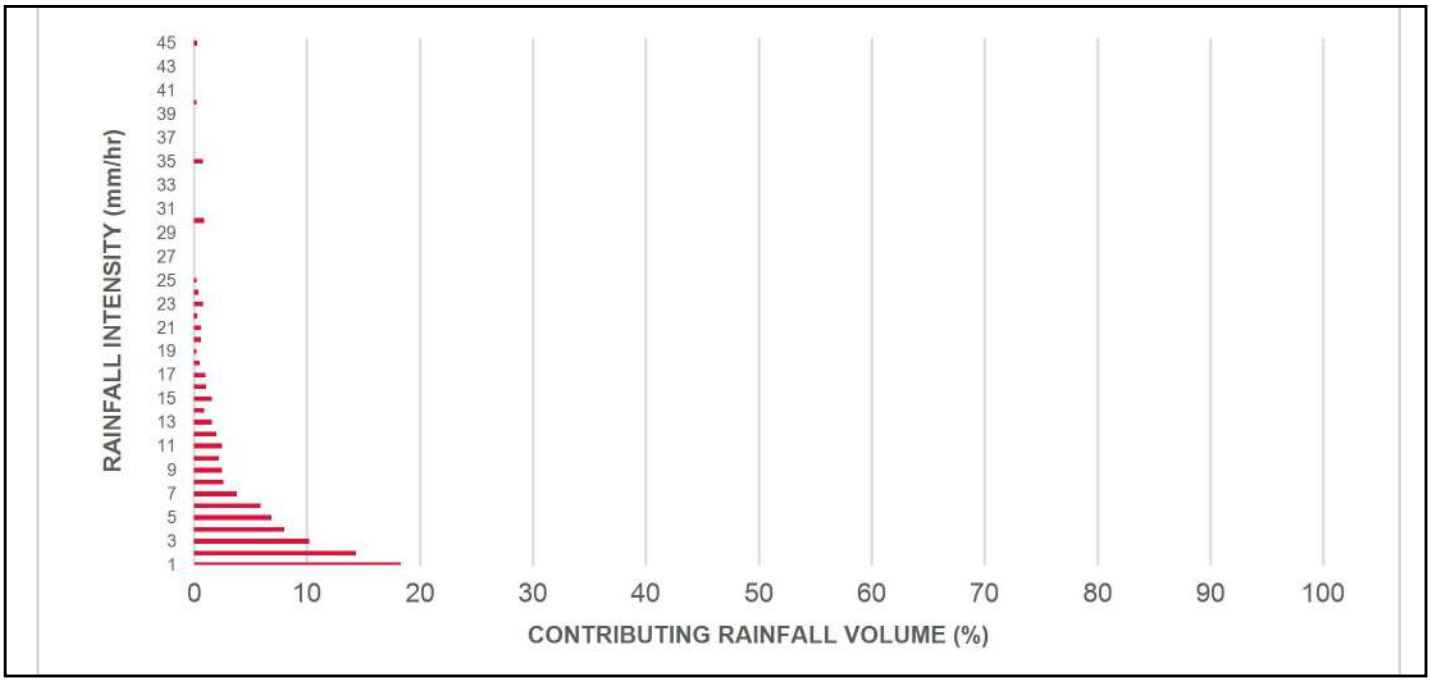
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

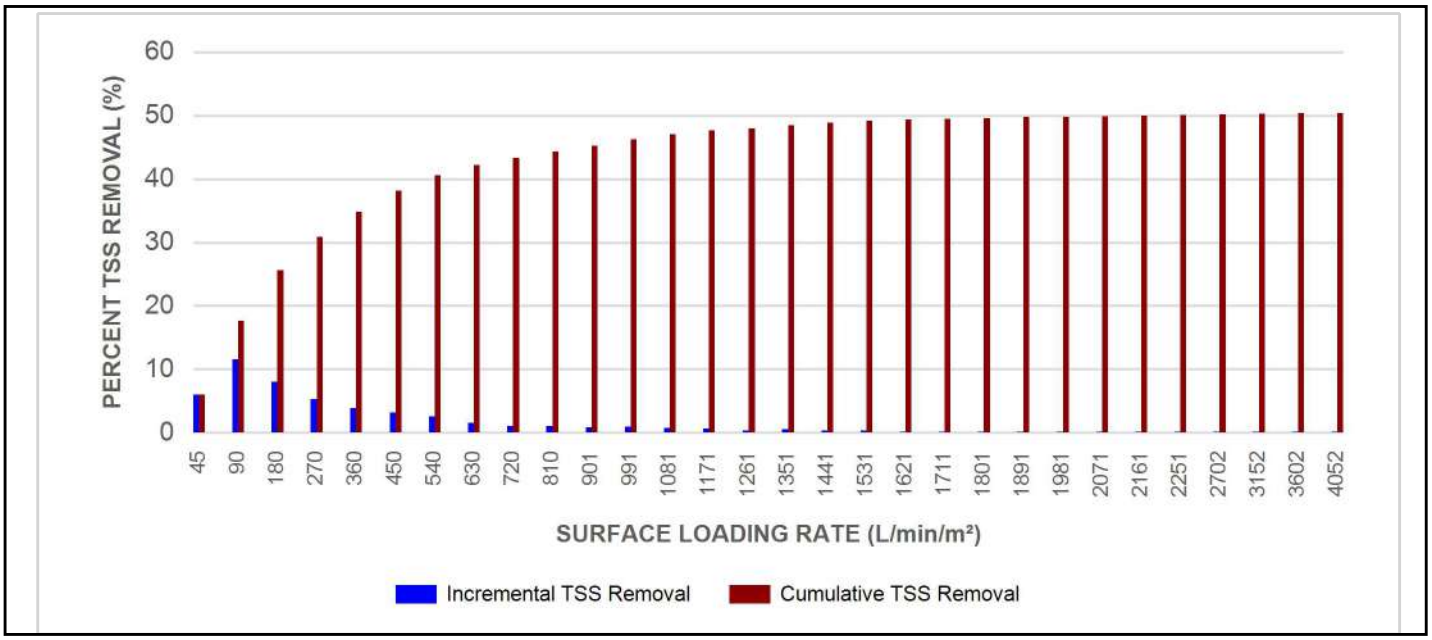
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.53	212.0	45.0	70	6.0	6.0
1.00	18.3	26.8	7.05	423.0	90.0	63	11.6	17.6
2.00	14.4	41.3	14.11	846.0	180.0	56	8.0	25.6
3.00	10.2	51.5	21.16	1270.0	270.0	52	5.3	30.9
4.00	8.0	59.5	28.22	1693.0	360.0	49	3.9	34.8
5.00	6.9	66.4	35.27	2116.0	450.0	47	3.2	38.1
6.00	5.9	72.3	42.32	2539.0	540.0	44	2.6	40.6
7.00	3.8	76.1	49.38	2963.0	630.0	42	1.6	42.2
8.00	2.6	78.7	56.43	3386.0	720.0	41	1.1	43.3
9.00	2.5	81.1	63.49	3809.0	810.0	41	1.0	44.3
10.00	2.2	83.3	70.54	4232.0	901.0	41	0.9	45.2
11.00	2.5	85.8	77.59	4656.0	991.0	40	1.0	46.2
12.00	2.0	87.8	84.65	5079.0	1081.0	39	0.8	47.0
13.00	1.6	89.4	91.70	5502.0	1171.0	37	0.6	47.6
14.00	0.9	90.4	98.76	5925.0	1261.0	36	0.3	47.9
15.00	1.6	91.9	105.81	6349.0	1351.0	35	0.5	48.4
16.00	1.1	93.0	112.86	6772.0	1441.0	33	0.4	48.8
17.00	1.0	94.0	119.92	7195.0	1531.0	31	0.3	49.1
18.00	0.5	94.6	126.97	7618.0	1621.0	29	0.2	49.3
19.00	0.2	94.8	134.03	8042.0	1711.0	28	0.1	49.4
20.00	0.6	95.4	141.08	8465.0	1801.0	26	0.2	49.5
21.00	0.6	96.1	148.13	8888.0	1891.0	25	0.2	49.7
22.00	0.3	96.4	155.19	9311.0	1981.0	24	0.1	49.7
23.00	0.8	97.2	162.24	9735.0	2071.0	23	0.2	49.9
24.00	0.4	97.6	169.30	10158.0	2161.0	22	0.1	50.0
25.00	0.2	97.8	176.35	10581.0	2251.0	21	0.0	50.1
30.00	0.9	98.7	211.62	12697.0	2702.0	18	0.2	50.2
35.00	0.8	99.5	246.89	14813.0	3152.0	15	0.1	50.3
40.00	0.2	99.7	282.16	16930.0	3602.0	13	0.0	50.4
45.00	0.3	100.0	317.43	19046.0	4052.0	12	0.0	50.4
Estimated Net Annual Sediment (TSS) Load Reduction =								**50 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

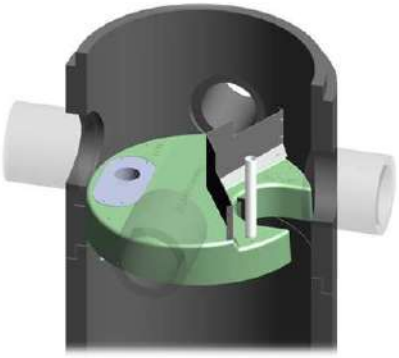
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

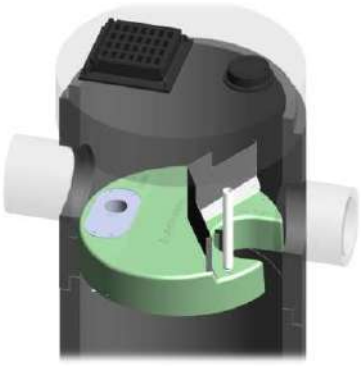
DESIGN FLEXIBILITY

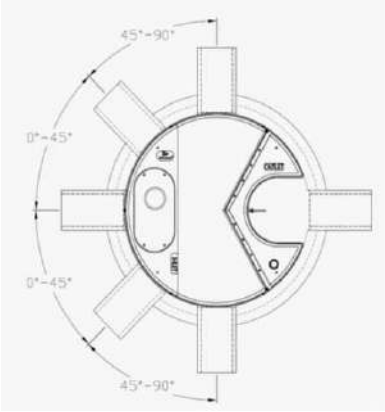
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX G

Conservation Halton Email Excerpts

Daniel Caberlin

From: Ola Panczyk <opanczyk@hrca.on.ca>
Sent: August 1, 2023 2:57 PM
To: Brendan Walton; Janet Engel
Cc: Kayly Robbins; Brett Pond
Subject: RE: [EXTERNAL]11 Main Street, Morriston | Floodplain Study Follow-up (CFCA 2366-6537)

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Filed to Sharepoint

Hi Brendan,

Thank you for your patience while we reviewed the overlay in relation to CH's hydraulic model.

For this specific site, based on the quality of the existing model and the location of the proposed development, CH has no objection to the use of CH's HEC-RAS model for the purposes of delineating the flood hazard limit. Please ensure a topographic survey is included in the future submission, which delineates the flood hazard based on the elevations from the HEC-RAS model.

Please note that any changes to the location of the proposed development may require updated flood hazard modelling.

If you have any questions, please let me know.

Thank you,
Ola

Ola Panczyk
Environmental Planner

2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext.2279 | opanczyk@hrca.on.ca
conservationhalton.ca

From: Brendan Walton <bwalton@cfcrozier.ca>
Sent: Tuesday, July 18, 2023 1:31 PM
To: Ola Panczyk <opanczyk@hrca.on.ca>; Janet Engel <jengel@hrca.on.ca>
Cc: Kayly Robbins <krobbins@westonconsulting.com>; Brett Pond <bpond@cfcrozier.ca>
Subject: RE: [EXTERNAL]11 Main Street, Morriston | Floodplain Study Follow-up (CFCA 2366-6537)

Hi Ola,

Thank you for confirming. We look forward to CH's feedback next week.

Kind regards,

Brendan

Brendan Walton, P.Eng.
Project Manager, Land Development
Office: 548.708.0022
Collingwood | Milton | Toronto | Bradford | Guelph

From: Ola Panczyk <opanczyk@hrca.on.ca>
Sent: Monday, July 17, 2023 10:37 AM
To: Brendan Walton <bwalton@cfcrozier.ca>; Janet Engel <jengel@hrca.on.ca>
Cc: Kayly Robbins <krobbins@westonconsulting.com>; Brett Pond <bpond@cfcrozier.ca>
Subject: RE: [EXTERNAL]11 Main Street, Morriston | Floodplain Study Follow-up (CFCA 2366-6537)

Hi Brendan,

Confirming receipt of your email. Thanks for providing the overlay. We will take a look and discuss internally. We will aim to get back to you next week.

Kind regards,
Ola

Ola Panczyk
Environmental Planner

2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext.2279 | opanczyk@hrca.on.ca
conservationhalton.ca

RECOGNIZED AS ONE OF HAMILTON-NIAGARA'S TOP EMPLOYERS 2023
Find out more about our recent award **here**!

From: Brendan Walton <bwalton@cfcrozier.ca>
Sent: Wednesday, July 12, 2023 1:13 PM
To: Ola Panczyk <opanczyk@hrca.on.ca>; Janet Engel <jengel@hrca.on.ca>
Cc: Kayly Robbins <krobbins@westonconsulting.com>; Brett Pond <bpond@cfcrozier.ca>
Subject: [EXTERNAL]11 Main Street, Morriston | Floodplain Study Follow-up (CFCA 2366-6537)

Good afternoon Ola, Janet,

Thank you again for meeting with us last week regarding this project. It was nice catching up with each of you!

As requested, please see attached overlay figure that outlines the Regional floodplain and 15.0 m set-back near Highway 6 on a satellite image. As discussed on the call, we believe a detailed hydrologic/hydraulic floodplain assessment for the proposed development is not required considering the floodplain (dark blue solid line) and associated set-back (red solid line) are sufficiently far enough away from the proposed dwellings and building envelopes (black dashed lines). There are also environmental features (i.e., wetland, woodlot) located outside of the floodplain that further increase the separation distance from the Regional floodplain.

Upon your review, please let us know if you have any questions or would like to discuss. We are happy to have a follow up discussion too if helpful.

Kind regards,

Brendan
Brendan Walton, P.Eng.
Project Manager, Land Development
Office: 548.708.0022
Collingwood | Milton | Toronto | Bradford | Guelph

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CROZIER CONSULTING ENGINEERS

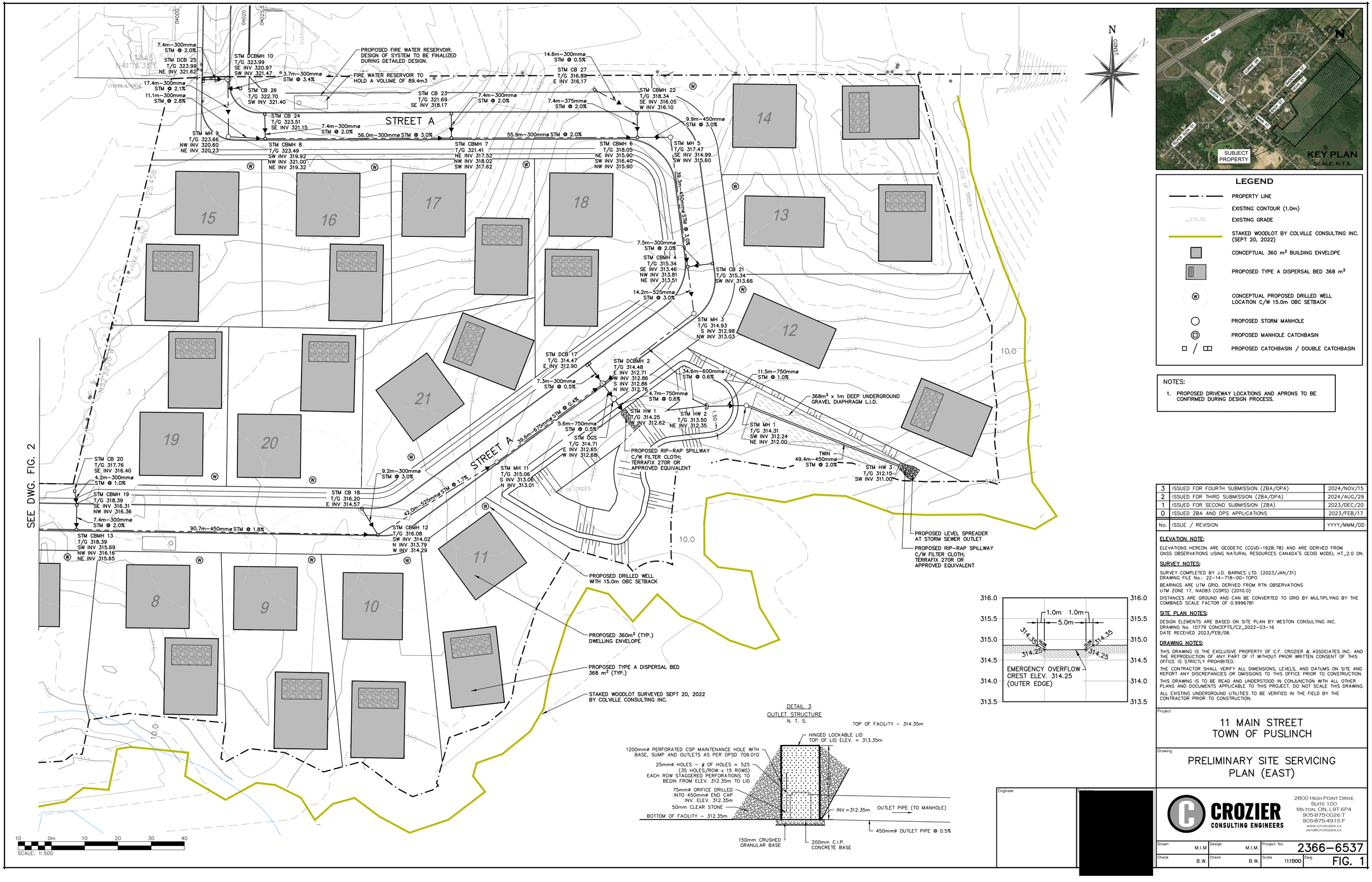
APPENDIX H

Site Photos


2024/11/01 - Site Photo of Earth Berm located at southern limits of Old Morriston Baseball Diamond (EX1)


2024/11/01 - Site Photo of general slope of Old Morriston Baseball Diamond (EX1) - Photo taken looking west

FIGURES



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (1.0m)
- x215.00 EXISTING GRADE
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- CONCEPTUAL 360 m² BUILDING ENVELOPE
- PROPOSED TYPE A DISPERSAL BED 368 m²
- (W) CONCEPTUAL PROPOSED DRILLED WELL LOCATION C/W 15.0m OBC SETBACK
- PROPOSED STORM MANHOLE
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

NOTES:

1. PROPOSED DRIVEWAY LOCATIONS AND APRONS TO BE CONFIRMED DURING DESIGN PROCESS.

DETAIL 3
OUTLET STRUCTURE
N. T. S.

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR FOURTH SUBMISSION (ZBA/OPA)	2024/NOV/15
2	ISSUED FOR THIRD SUBMISSION (ZBA/OPA)	2024/AUG/29
1	ISSUED FOR SECOND SUBMISSION (ZBA)	2023/DEC/20
0	ISSUED ZBA AND DPS APPLICATIONS	2023/FEB/17

ELEVATION NOTE:

ELEVATIONS HEREON ARE GEODETIC (CGVD–1928:78) AND ARE DERIVED FROM GNSS OBSERVATIONS USING NATURAL RESOURCES CANADA'S GEOID MODEL HT_2.0 ON.

SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LTD. (2023/JAN/31)
DRAWING FILE No.: 22-14-718-00-TOPO

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (CSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY WESTON CONSULTING INC.
DRAWING No. 10779 CONCEPTS/C2_2022-03-16
DATE RECEIVED 2023/FEB/06

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

PRELIMINARY SITE SERVICING PLAN (EAST)

Engineer

[redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905.875.0026 T
905.875.4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M	M.I.M.		2366–6537
Check	Check	Scale	Dwg.
B.W.	B.W.	1:500	FIG. 1

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 1.dwg, FIG 1, 2024-11-15 4:46:34 PM, hwilkinson

SEWAGE SYSTEM NOTES

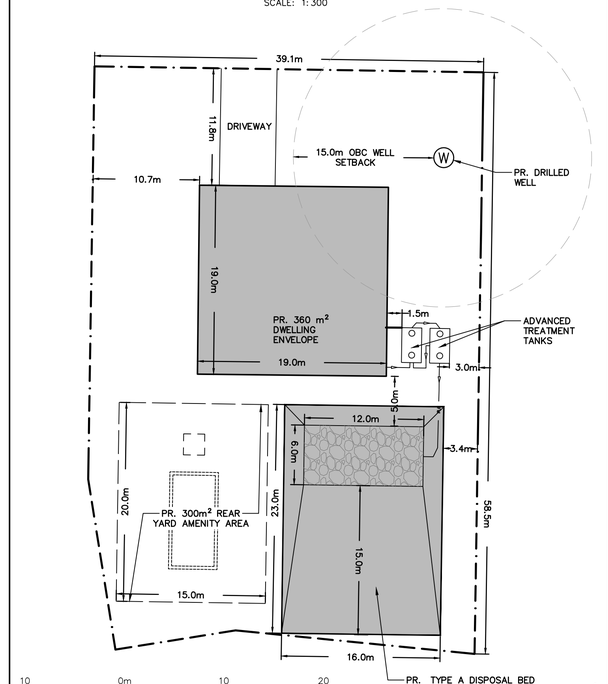
1. PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ONSITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
3. THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
4. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWAGE WORKS PRIOR TO CONSTRUCTION.
5. ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
6. ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
7. ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
8. IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
9. GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.0M COVER IS PROVIDED. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
10. UNLESS OTHERWISE NOTED PE FORCEMAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCEMAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
11. ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
12. ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GLAVANIZED OR STAINLESS STEEL
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS FOR WATERTIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
14. ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND GASKETED AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYLOK RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
15. EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
16. WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
17. ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL
18. ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
19. ALL DISTURBED AREAS TO BE TOPSOILED (100MM MINIMUM) AND SEEDED COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS
20. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
21. MAXIMUM BURIAL DEPTH OF TANKS NOT TO EXCEED TO MANUFACTURERS RECOMMENDATIONS
22. CLEARANCE DISTANCES FROM PROPERTY LINES, STRUCTURES, WELLS, AND SURFACE WATER WILL ADHERE TO THE REQUIREMENTS OF OBC 8.2.1.6.A
23. A LEACHING BED SHALL NOT BE LOCATED ON AN AREA WITH A SLOPE OF GREATER THAN 4 UNITS HORIZONTALLY TO 1 UNIT VERTICALLY.
24. THE HEADER LINE, DISTRIBUTION PIPES AND LEACHING BED SHALL BE EQUIPPED WITH MEANS OF DETECTION AS REQUIRED BY OBC 8.7.2.2. (2). LIGHT COLOURED PLASTIC COATED 14 GAUGE TRACER WIRE OR EPOXY COATED, 10m REBAR LAID HORIZONTALLY AT EACH CORNER OF THE BED IS ACCEPTABLE.
25. STONE TRENCH OR LAYER TO BE COVERED WITH PERMEABLE GEOTEXTILE PRIOR TO BACKFILL.
26. STONE TO CONFORM WITH OBC 8.7.3.3.
27. ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
28. ANAEROBIC DIGESTER AND BIOFILTER BASKET PUMPS AS DESIGNED AND SUPPLIED BY WATERLOO BIOFILTER.
29. PUMP CHAMBER TO BE VENTED AND EQUIPPED WITH AUDIBLE AND VISUAL HIGH LEVEL ALARM
30. ALL VALVES TO PROVIDE NO OBSTRUCTION TO FLOW WHEN FULLY OPENED. ALL VALVES AND COUPLINGS TO BE ACCESSIBLE AT GRADE.
31. ALL PUMP FLOATS TO BE SECURED TO A REMOVABLE PVC FLOAT TREE
32. ALL PUMP CONTROL PANELS TO BE EQUIPPED WITH SEPARATE CIRCUIT BREAKERS FOR PUMP CIRCUIT
33. NO JUNCTION BOXES IN RISERS
34. ALL BURIED ELECTRICAL WIRING TO BE IN PVC CONDUIT
35. PRIOR TO ACCEPTANCE CONTRACTOR TO PROVIDE DOCUMENTATION THAT ALL ELECTRICAL WORK HAS BEEN INPSECTED AND APPROVED BY THE ELECTRICAL AUTHORITY HAVING JURISDICTION

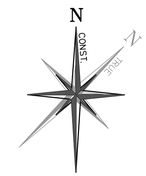
ONSITE SEWAGE SYSTEM DESIGN TYPICAL LOT NOTES

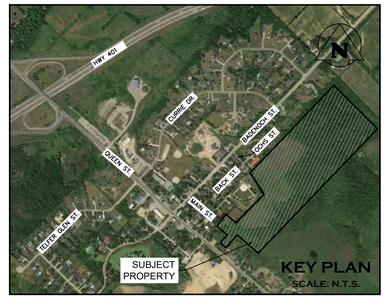
PROPOSED 4 BEDROOM, 360 m² HOME WITH FORTY-FIVE (45) FIXTURE UNITS	BASE FLOW (4 BEDROOMS)= 2,000 L/DAY ADDITIONAL FLOOR AREA (160 m2)= 1,600 L/DAY ADDITIONAL FIXTURE UNITS (25)= 1,250 L/DAY Q TOTAL (2,000+1,600)= 3,600 L/DAY
SOIL PERCOLATION RATE	T = 30 min/cm (ESTIMATED BY C.F. CROZIER)
PROPOSED TREATMENT UNIT	WATERLOO BIOFILTER AD-BA40
TYPE A DISPERSAL BED STONE AREA	MINIMUM SIZE=Q/50=3,600/50 = 72 m² PROVIDED = 72 m²
TYPE A DISPERSAL BED SAND AREA	MINIMUM SIZE=QT/400= 3,600*30/400= 270 m² PROVIDED = 270m – 368m²
SHALLOW BURIED TRENCH (LOT 1)	MINIMUM LENGTH=QT/50= 3,600/50= 72 m² PROVIDED 3 RUNS x 25m = 75 m²

TYPICAL LOT SCHEMATIC (LOT 8)

SCALE: 1:300







LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (1.0m)
- x215.00 EXISTING GRADE
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
- REGIONAL FLOODPLAIN 15.0m BUFFER
- CONSERVATION HALTON REGULATION LIMIT
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF (AUGUST 18, 2023)
- 30.0m SETBACK FROM LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF AUGUST 18, 2023
- MEANDER BELT 38m BUFFER (19m EACH SIDE)
- CONCEPTUAL 360 m² BUILDING ENVELOPE
- PROPOSED TYPE A DISPERSAL BED 368 m²
- Ⓦ CONCEPTUAL PROPOSED DRILLED WELL LOCATION C/W 15.0m OBC SETBACK
- PROPOSED STORM MANHOLE
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

NOTES:

1. PROPOSED DRIVEWAY LOCATIONS AND APRONS TO BE CONFIRMED DURING DESIGN PROCESS.

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3	ISSUED FOR FOURTH SUBMISSION (ZBA/OPA)	2024/NOV/15
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SURVEY NOTES:

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DRAWING FILE No.: 22-14-718-00-TOPO

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UTM ZONE 17, NAD83 (GSRS) (2010.0)

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DRAWING No. 10779 CONCEPTS/C2_2022-03-16
DATE RECEIVED 2023/FEB/06

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Project

11 MAIN STREET TOWN OF PUSLINCH

Drawing

PRELIMINARY SITE SERVICING PLAN (WEST)

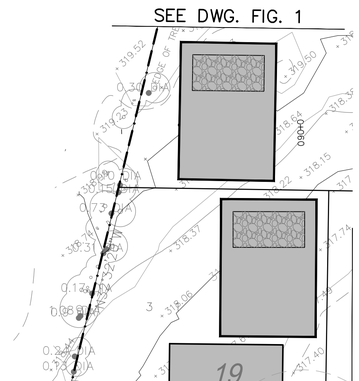
Engineer

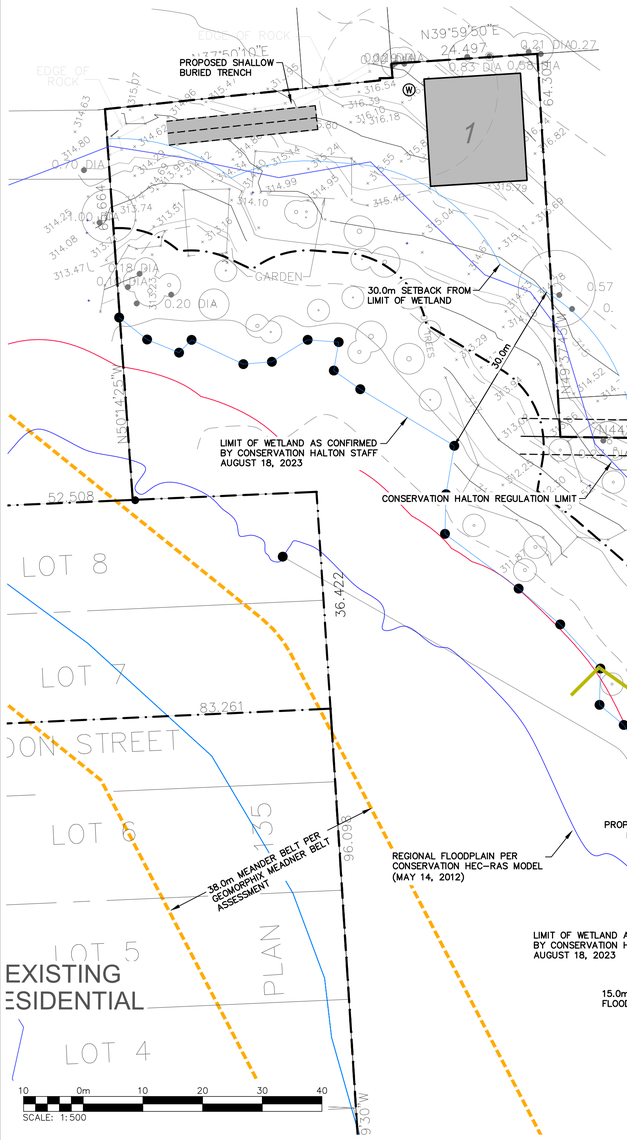
[redacted]

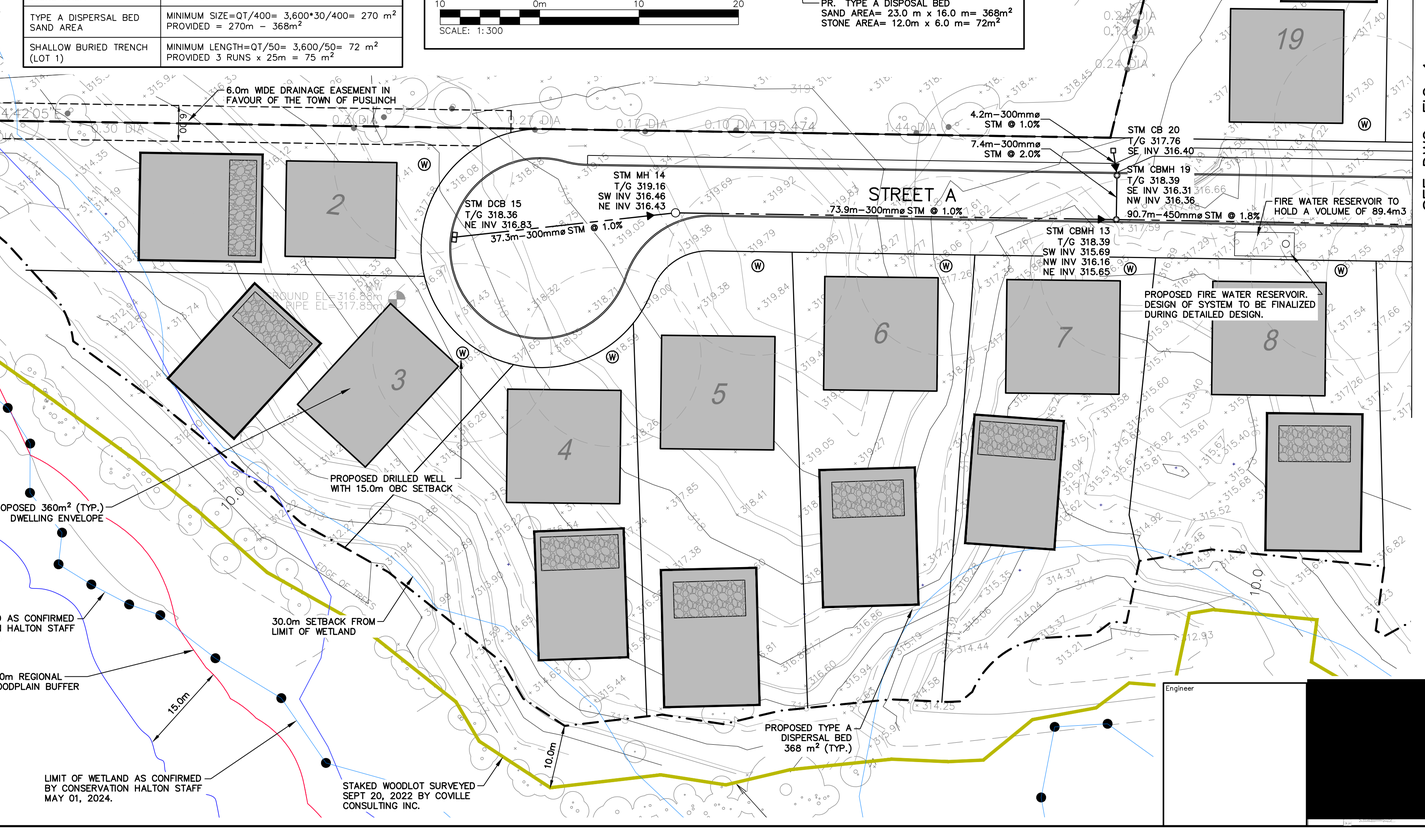
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

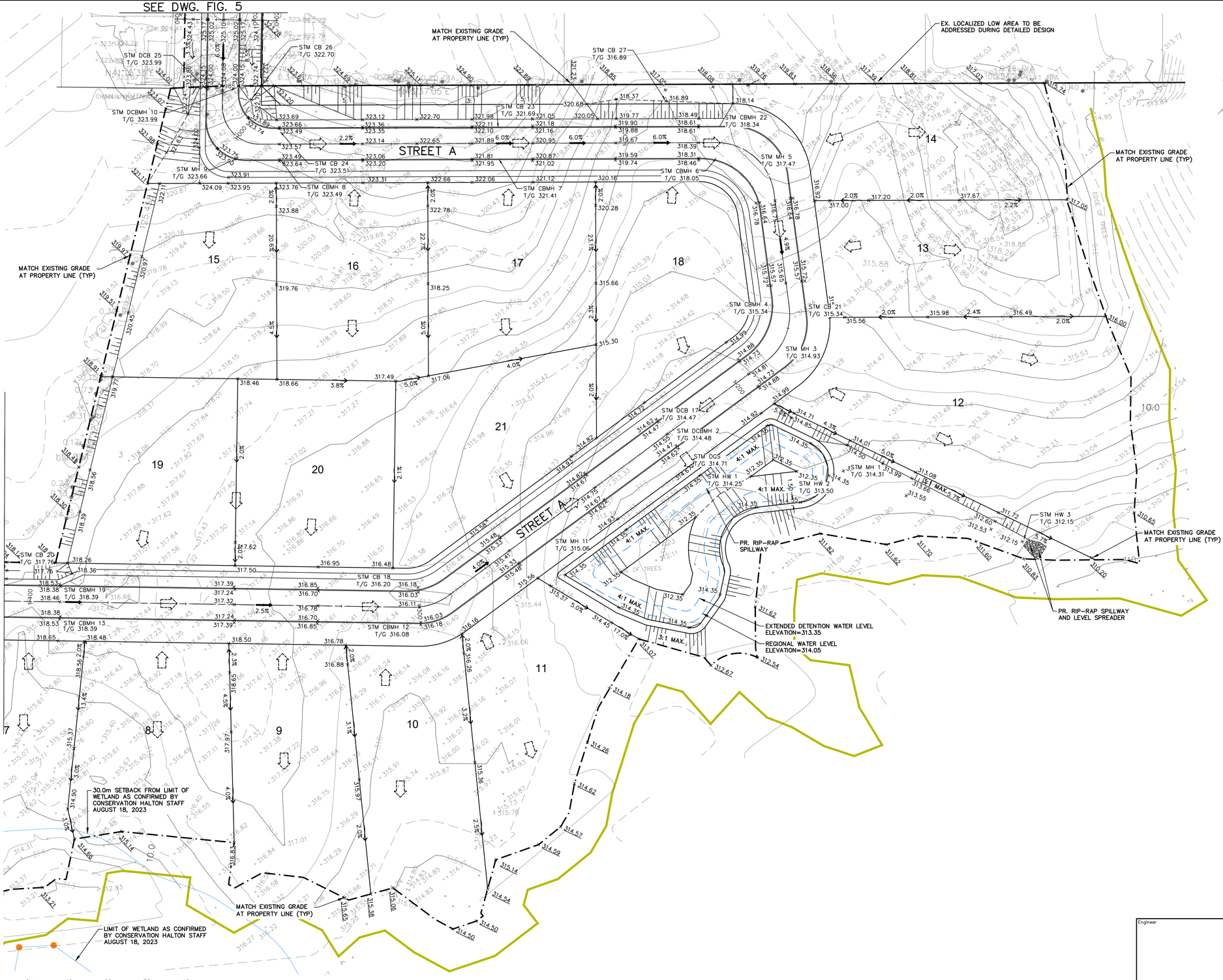
Drawn	Design	Project No.	
M.I.M	M.I.M.	2366-6537	
Check	Check	Scale	Dwg.
B.W.	B.W.	1:500	FIG. 2

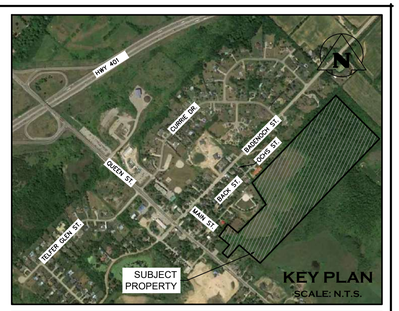
SEE DWG. FIG. 1











LEGEND

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- ×215.00 EXISTING GRADE
- ×215.00 PROPOSED GRADE
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- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- STAKED WOODLOT BY COLVILLE CONSULTING INC.
- PROPOSED STORM MANHOLE
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

SITE GRADING PLAN (EAST)

Engineer

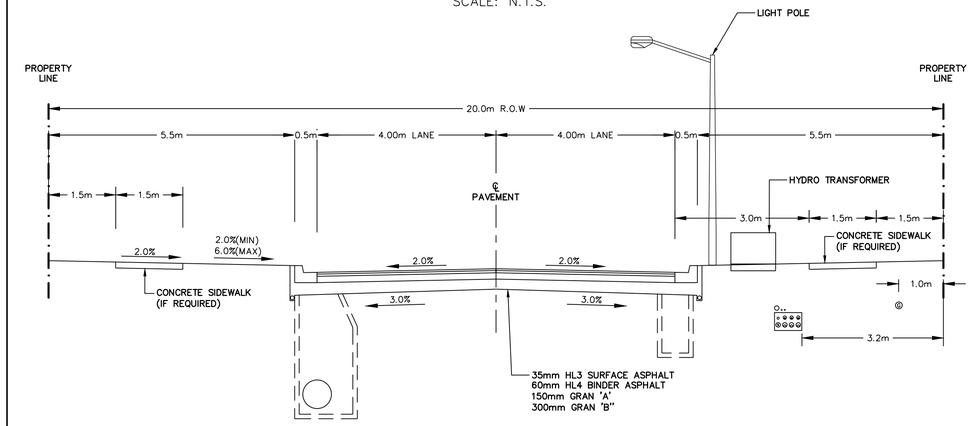
[redacted]

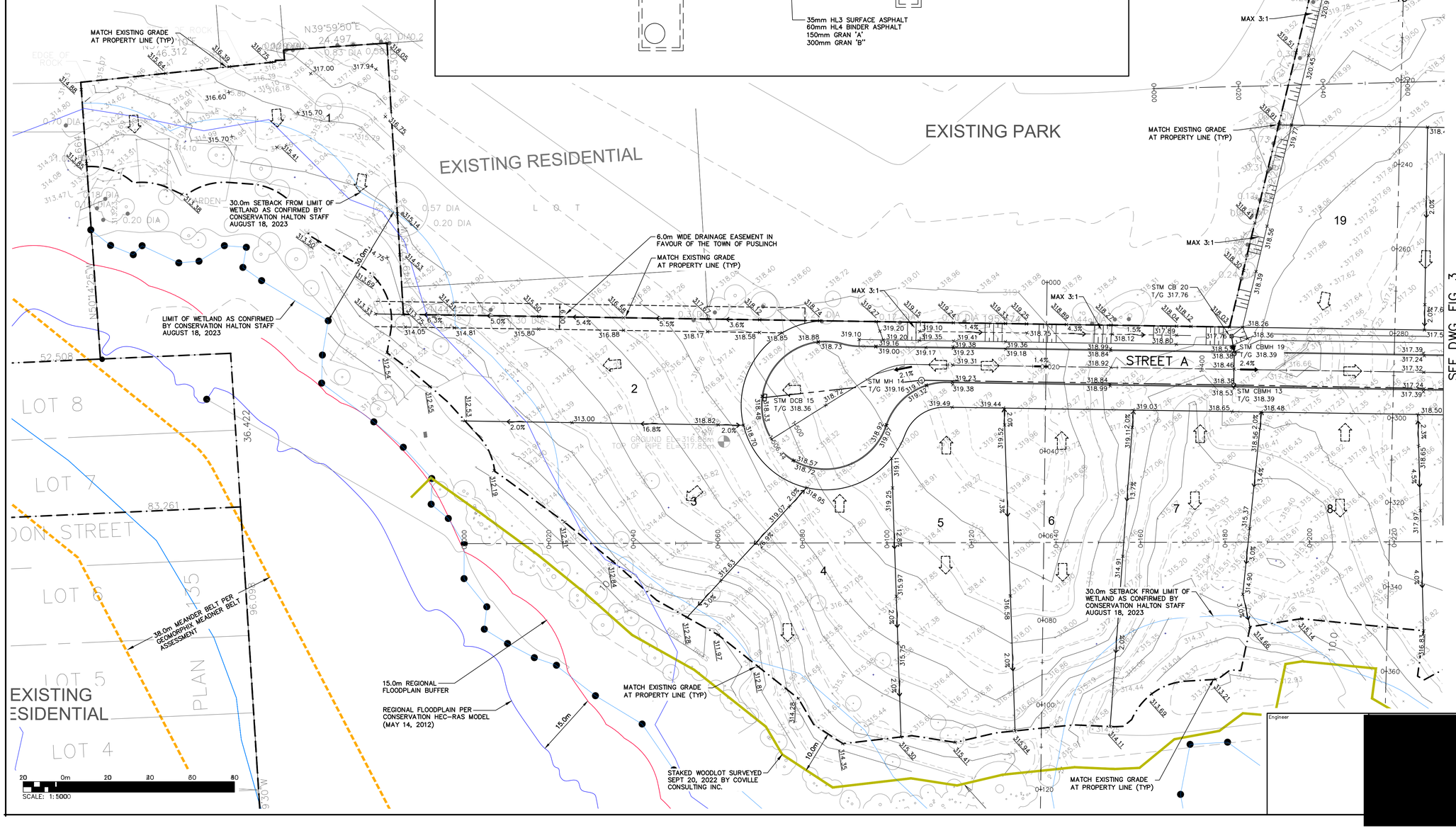
CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca
info@cfcrozier.ca

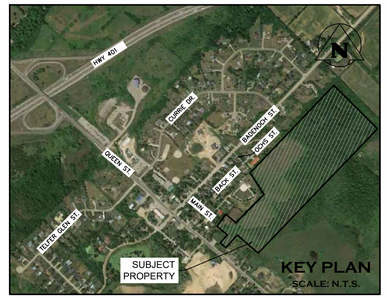
Drawn	Design	Project No.	
M.I.M	M.I.M.		2366-6537
Check	Check	Scale	Dwg.
B.W.	B.W.	1:500	FIG. 3

TYPICAL ROAD SECTION

SCALE: N.T.S.







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- CONSERVATION HALTON REGULATION LIMIT
- PROPOSED STORM MANHOLE / MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

SITE GRADING PLAN (WEST)

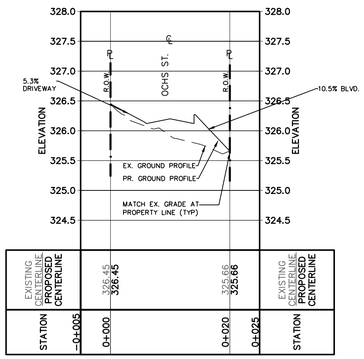
Engineer

[redacted]

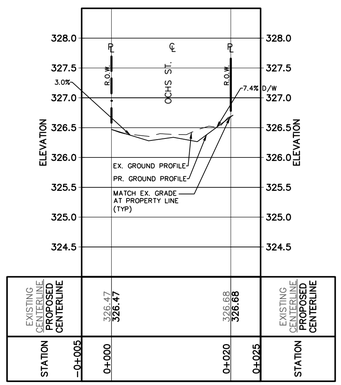
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905875-0026 T
905875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:500
				Dwg.	FIG. 4

SECTION A



SECTION B



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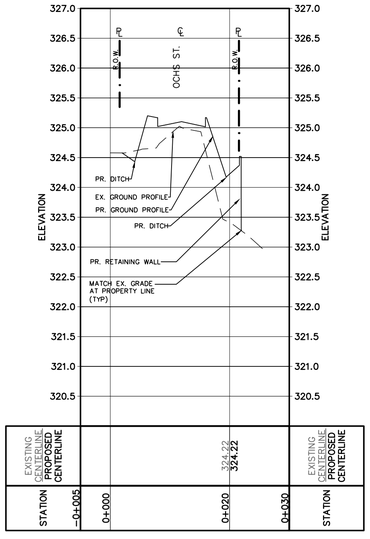

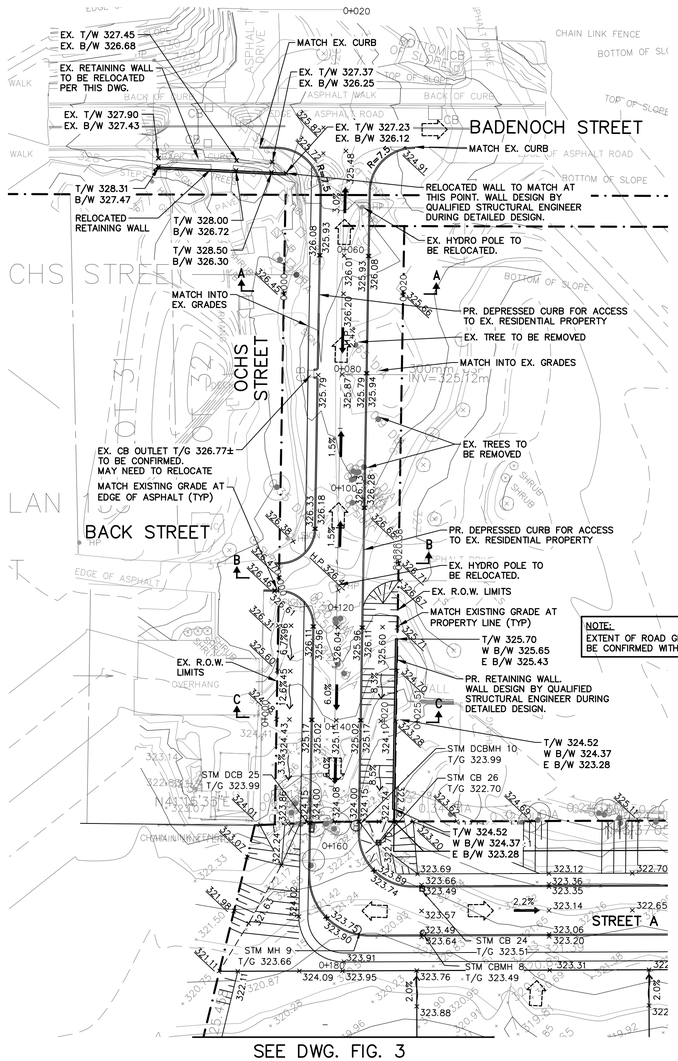

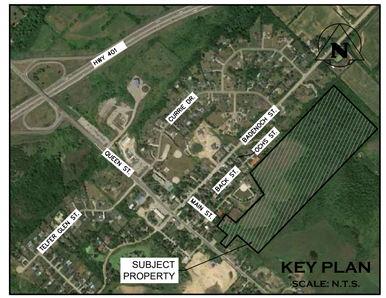

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- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION

NOTE:

EXTERNAL OF OCHS STREET IS FOR SCHEMATIC PURPOSES ONLY. DETAILED DESIGN OF OCHS STREET TO BE COMPLETED THROUGH CONSULTATION WITH THE TOWNSHIP DURING SUBSEQUENT PLANNING APPLICATION.

EXTERNAL DRAINAGE FROM PRIVATE LOTS TO BE CONVEYED AS PART OF THESE ROAD IMPROVEMENTS.

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

EXTERNAL GRADING PLAN (OCHS STREET)

Engineer

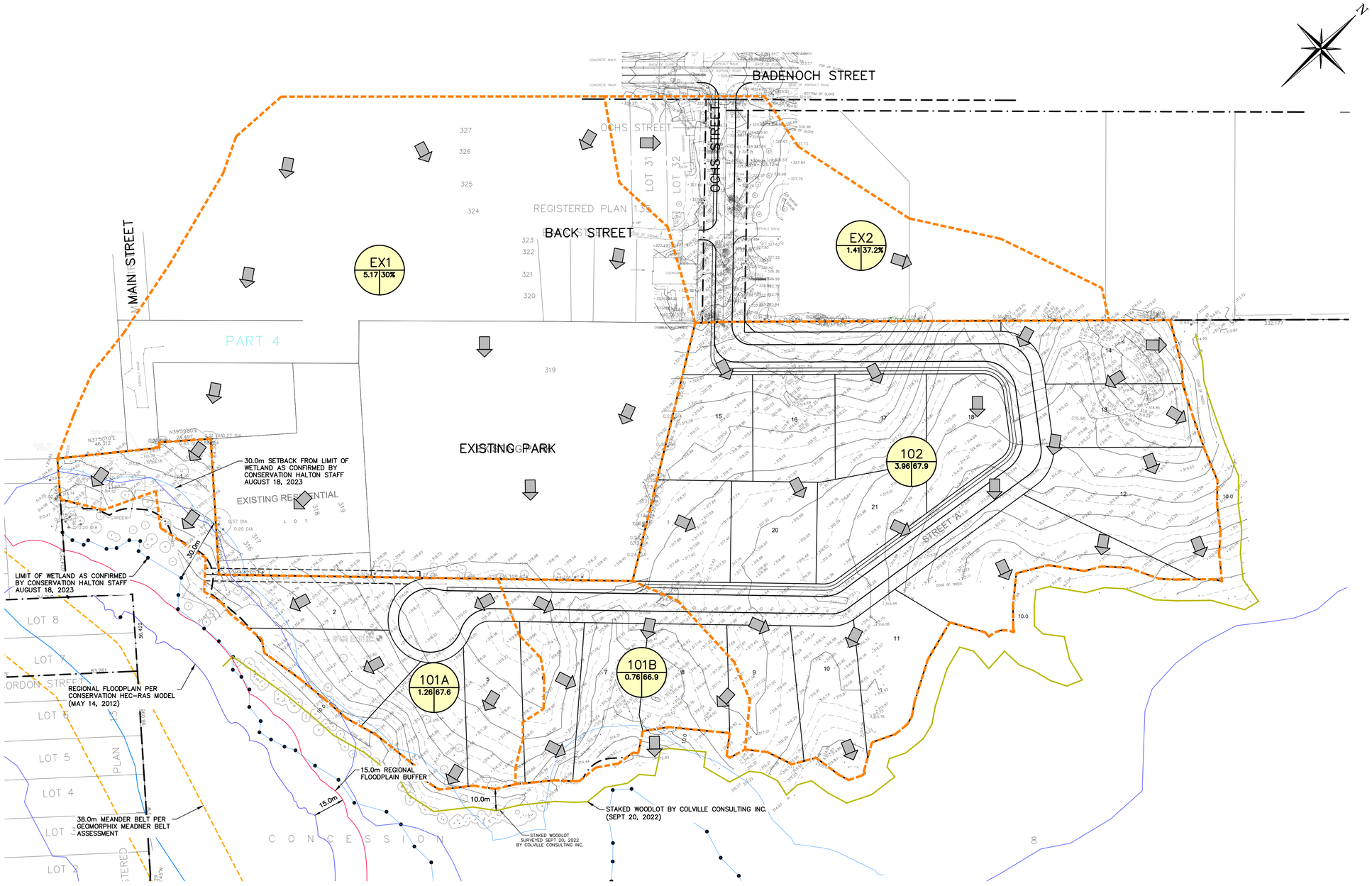
[redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875-0026 T
905 875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:500
				Dwg.	FIG. 5

10 0m 10 20 30 40
SCALE: 1:500

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 5.dwg, FIG. 5, 2024-11-15 4:51:47 PM, hwilkinson



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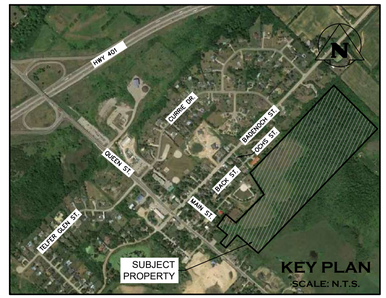

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
- REGIONAL FLOODPLAIN 15.0m BUFFER
- CONSERVATION HALTON REGULATION LIMIT
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF (AUGUST 18, 2023)
- 30.0m SETBACK FROM LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF AUGUST 18, 2023
- MEANDER BELT 38m BUFFER (19m EACH SIDE)
- ID / A | %IMP — CATCHMENT I.D.; AREA (ha) | PERCENT IMPERVIOUS
- ID / A | RC — CATCHMENT I.D.; AREA (ha) | RUNOFF CO-EFFICIENT

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0	ISSUED ZBA AND DPS APPLICATIONS	2023/FEB/17

ELEVATION NOTE:

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SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LTD. (2023/JAN/31)
DRAWING FILE No.: 22-14-718-00-TOPO

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (CSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY WESTON CONSULTING INC.
DRAWING No. 10779 CONCEPTS/C2_2022-03-16
DATE RECEIVED 2023/FEB/06

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

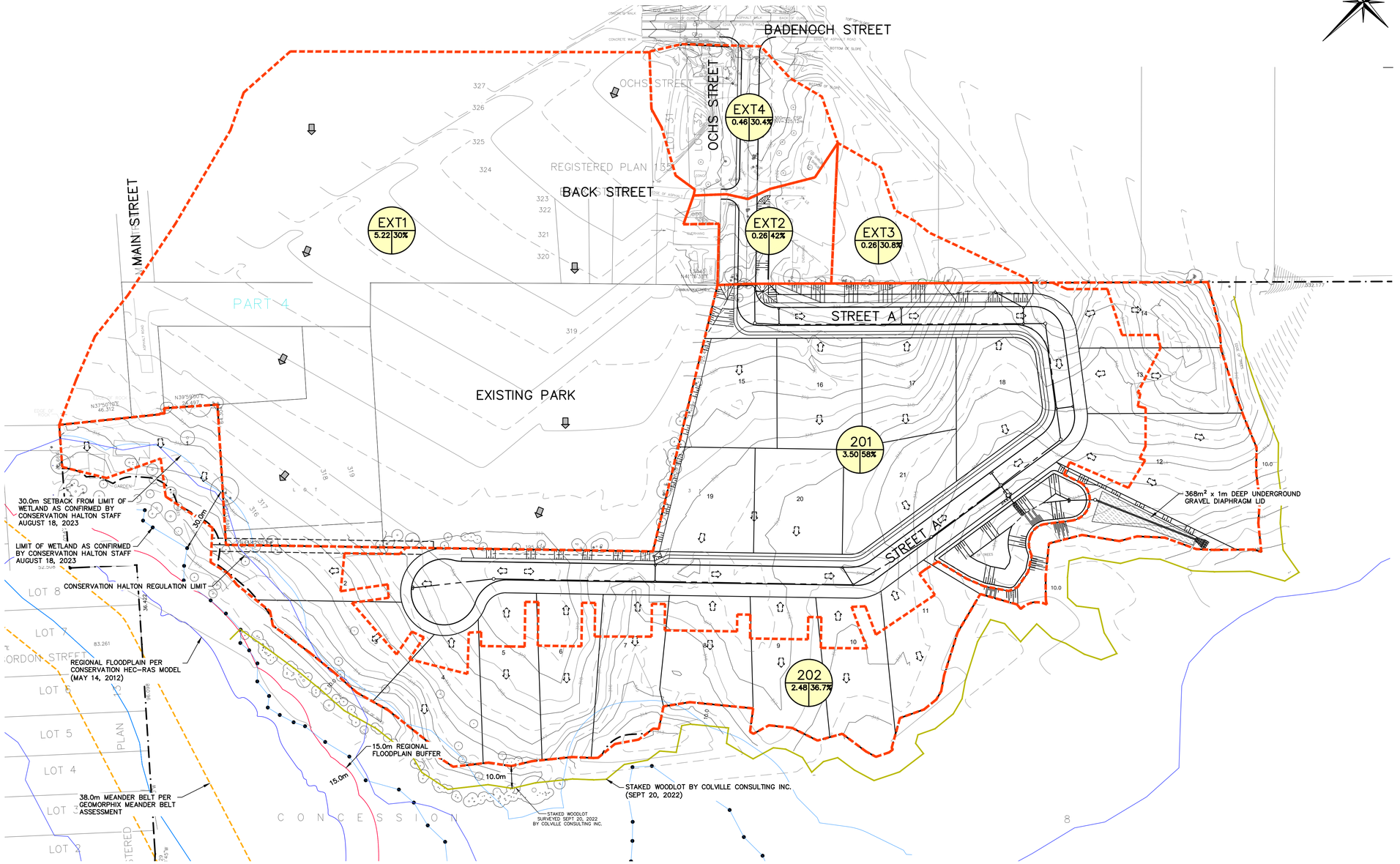
Engineer

[redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M	M.I.M.		2366-6537
Check	Check	Scale	Dwg.
B.W.	B.W.	1:1000	FIG. 6

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 6.dwg, FIG 6, 2024-11-15 4:52:54 PM, hwilkinson



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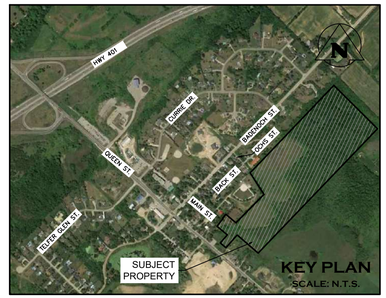

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
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- PROPOSED SINGLE CATCHBASIN MANHOLE
- ID — CATCHMENT I.D.
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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

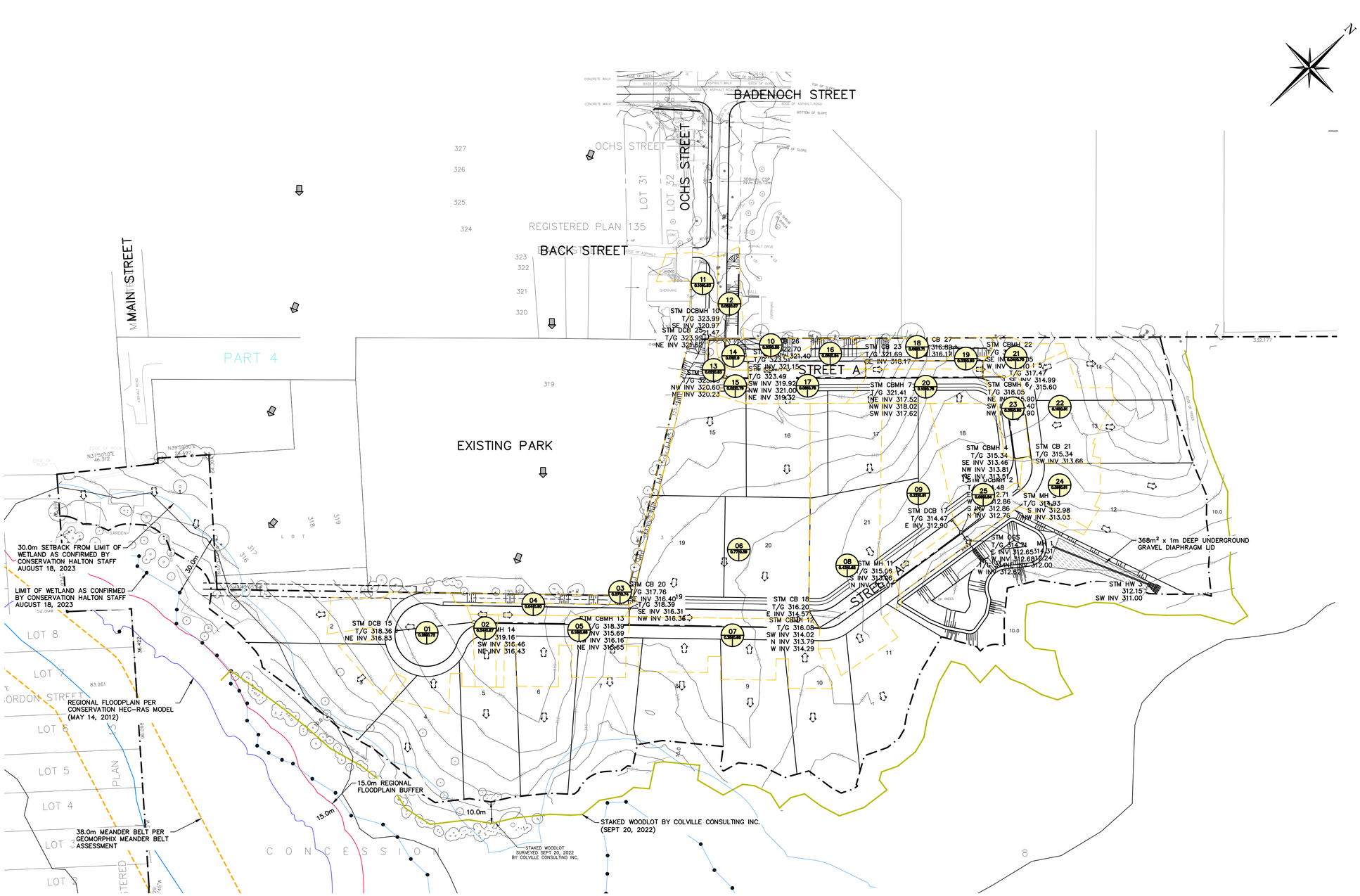
Engineer

Engineer

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:1000
				Dwg.	FIG. 7

J:\2300\2366 - WDO Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 7.dwg, FIG7, 2024-11-15 4:54:55 PM, hwilkinson



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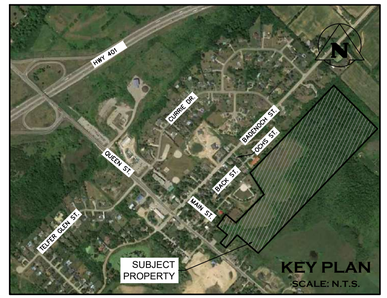

KEY PLAN
SCALE: N.T.S.

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

STORM DESIGN SHEET
DRAINAGE PLAN

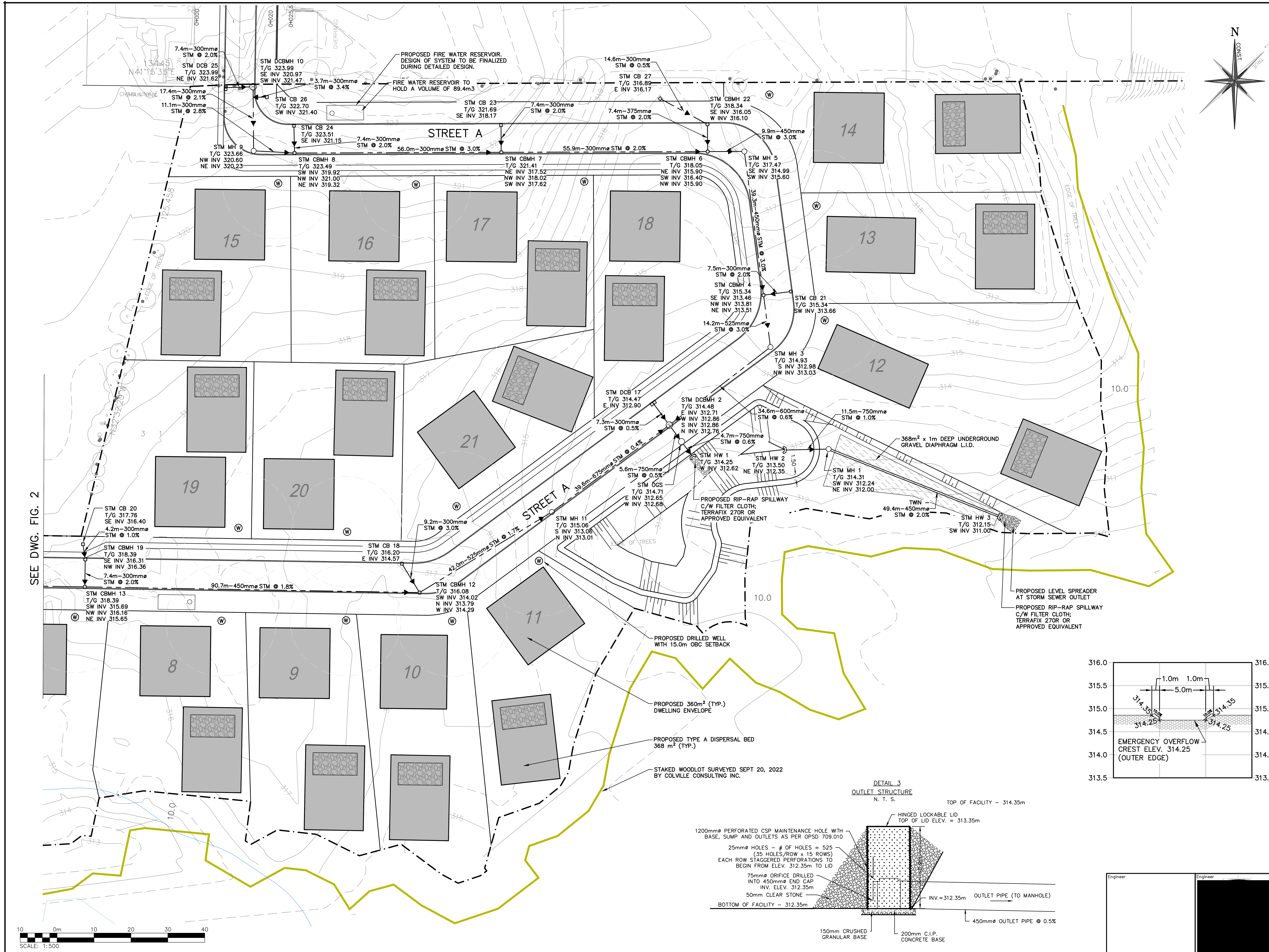
Engineer

Engineer [redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale 1:1000	Dwg. FIG. 8

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 8.dwg, FIG8, 2024-11-15 4:48:18 PM, hwilkinson



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- CONCEPTUAL 360 m² BUILDING ENVELOPE
- PROPOSED TYPE A DISPERSAL BED 368 m²
- CONCEPTUAL PROPOSED DRILLED WELL LOCATION C/W 15.0m OBC SETBACK
- PROPOSED STORM MANHOLE
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

NOTES:

1. PROPOSED DRIVEWAY LOCATIONS AND APRONS TO BE CONFIRMED DURING DESIGN PROCESS.

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

PRELIMINARY SITE SERVICING PLAN (EAST)

Engineer

Engineer [redacted]

CROZIER CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905.875.0026 T
905.875.4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.
M.I.M	M.I.M	2366–6537
Check B.W.	Check B.W.	Scale 1:1500 / Dwg. FIG. 1

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 1.dwg, FIG.1, 2024-11-15 4:46:34 PM, fwilkinson

SEWAGE SYSTEM NOTES

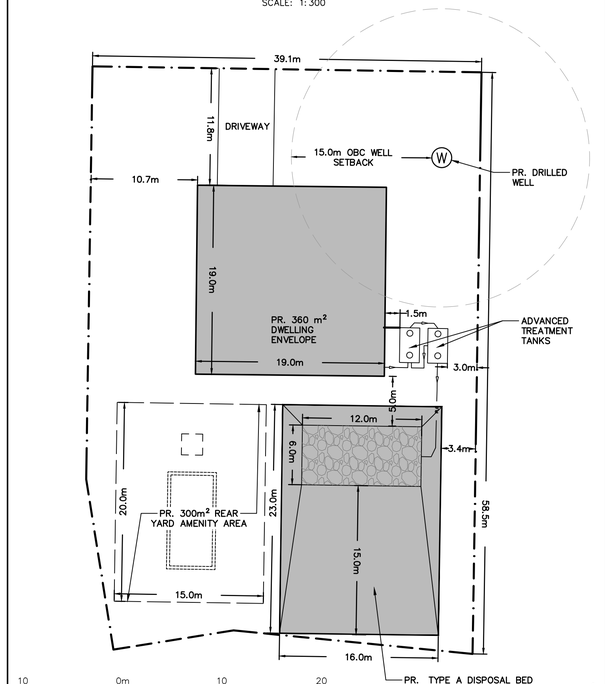
1. PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ONSITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
3. THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
4. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWAGE WORKS PRIOR TO CONSTRUCTION.
5. ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
6. ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
7. ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
8. IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
9. GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.0M COVER IS PROVIDED. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
10. UNLESS OTHERWISE NOTED PE FORCEMAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCEMAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
11. ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
12. ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GLAVANIZED OR STAINLESS STEEL
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS FOR WATERTIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
14. ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND GASKETED AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYLOK RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
15. EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
16. WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
17. ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL
18. ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
19. ALL DISTURBED AREAS TO BE TOPSOILED (100MM MINIMUM) AND SEEDED COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS
20. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
21. MAXIMUM BURIAL DEPTH OF TANKS NOT TO EXCEED TO MANUFACTURERS RECOMMENDATIONS
22. CLEARANCE DISTANCES FROM PROPERTY LINES, STRUCTURES, WELLS, AND SURFACE WATER WILL ADHERE TO THE REQUIREMENTS OF OBC 8.2.1.6.A
23. A LEACHING BED SHALL NOT BE LOCATED ON AN AREA WITH A SLOPE OF GREATER THAN 4 UNITS HORIZONTALLY TO 1 UNIT VERTICALLY.
24. THE HEADER LINE, DISTRIBUTION PIPES AND LEACHING BED SHALL BE EQUIPPED WITH MEANS OF DETECTION AS REQUIRED BY OBC 8.7.2.2. (2). LIGHT COLOURED PLASTIC COATED 14 GAUGE TRACER WIRE OR EPOXY COATED, 10m REBAR LAID HORIZONTALLY AT EACH CORNER OF THE BED IS ACCEPTABLE.
25. STONE TRENCH OR LAYER TO BE COVERED WITH PERMEABLE GEOTEXTILE PRIOR TO BACKFILL.
26. STONE TO CONFORM WITH OBC 8.7.3.3.
27. ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
28. ANAEROBIC DIGESTER AND BIOFILTER BASKET PUMPS AS DESIGNED AND SUPPLIED BY WATERLOO BIOFILTER.
29. PUMP CHAMBER TO BE VENTED AND EQUIPPED WITH AUDIBLE AND VISUAL HIGH LEVEL ALARM
30. ALL VALVES TO PROVIDE NO OBSTRUCTION TO FLOW WHEN FULLY OPENED. ALL VALVES AND COUPLINGS TO BE ACCESSIBLE AT GRADE.
31. ALL PUMP FLOATS TO BE SECURED TO A REMOVABLE PVC FLOAT TREE
32. ALL PUMP CONTROL PANELS TO BE EQUIPPED WITH SEPARATE CIRCUIT BREAKERS FOR PUMP CIRCUIT
33. NO JUNCTION BOXES IN RISERS
34. ALL BURIED ELECTRICAL WIRING TO BE IN PVC CONDUIT
35. PRIOR TO ACCEPTANCE CONTRACTOR TO PROVIDE DOCUMENTATION THAT ALL ELECTRICAL WORK HAS BEEN INPSECTED AND APPROVED BY THE ELECTRICAL AUTHORITY HAVING JURISDICTION

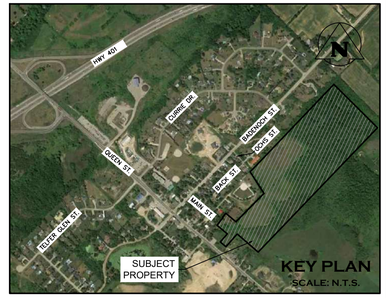
ONSITE SEWAGE SYSTEM DESIGN TYPICAL LOT NOTES

PROPOSED 4 BEDROOM, 360 m² HOME WITH FORTY-FIVE (45) FIXTURE UNITS	BASE FLOW (4 BEDROOMS)= 2,000 L/DAY ADDITIONAL FLOOR AREA (160 m2)= 1,600 L/DAY ADDITIONAL FIXTURE UNITS (25)= 1,250 L/DAY Q TOTAL (2,000+1,600)= 3,600 L/DAY
SOIL PERCOLATION RATE	T = 30 min/cm (ESTIMATED BY C.F. CROZIER)
PROPOSED TREATMENT UNIT	WATERLOO BIOFILTER AD-BA40
TYPE A DISPERSAL BED STONE AREA	MINIMUM SIZE=Q/50=3,600/50 = 72 m² PROVIDED = 72 m²
TYPE A DISPERSAL BED SAND AREA	MINIMUM SIZE=QT/400= 3,600*30/400= 270 m² PROVIDED = 270m – 368m²
SHALLOW BURIED TRENCH (LOT 1)	MINIMUM LENGTH=QT/50= 3,600/50= 72 m² PROVIDED 3 RUNS x 25m = 75 m²

TYPICAL LOT SCHEMATIC (LOT 8)

SCALE: 1:300





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (1.0m)
- ×215.00 EXISTING GRADE
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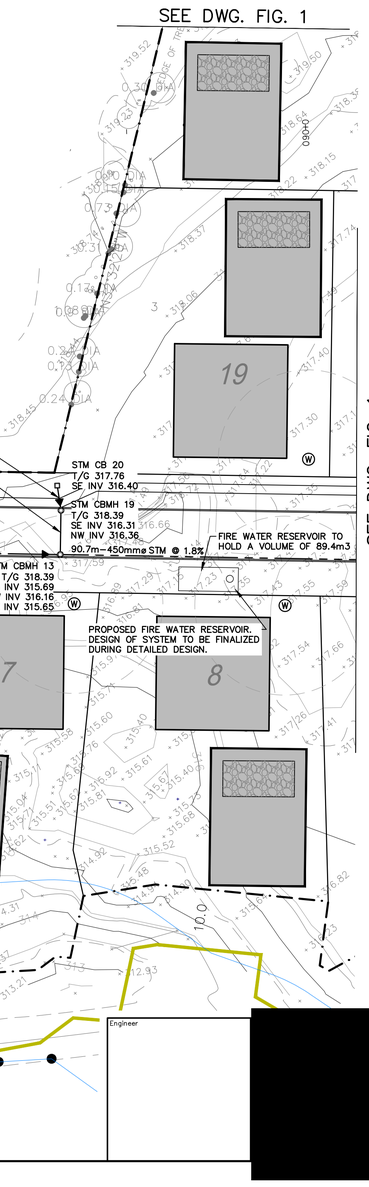
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

SEE DWG. FIG. 1



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ELEVATION NOTE:

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SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LTD. (2023/JAN/31)
DRAWING FILE No.: 22-14-718-00-TOPO

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UTM ZONE 17, NAD83 (GSRS) (2010.0)

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SITE PLAN NOTES:

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DRAWING No. 10779 CONCEPTS/C2_2022-03-16
DATE RECEIVED 2023/FEB/06

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Project

11 MAIN STREET
TOWN OF PUSLINCH

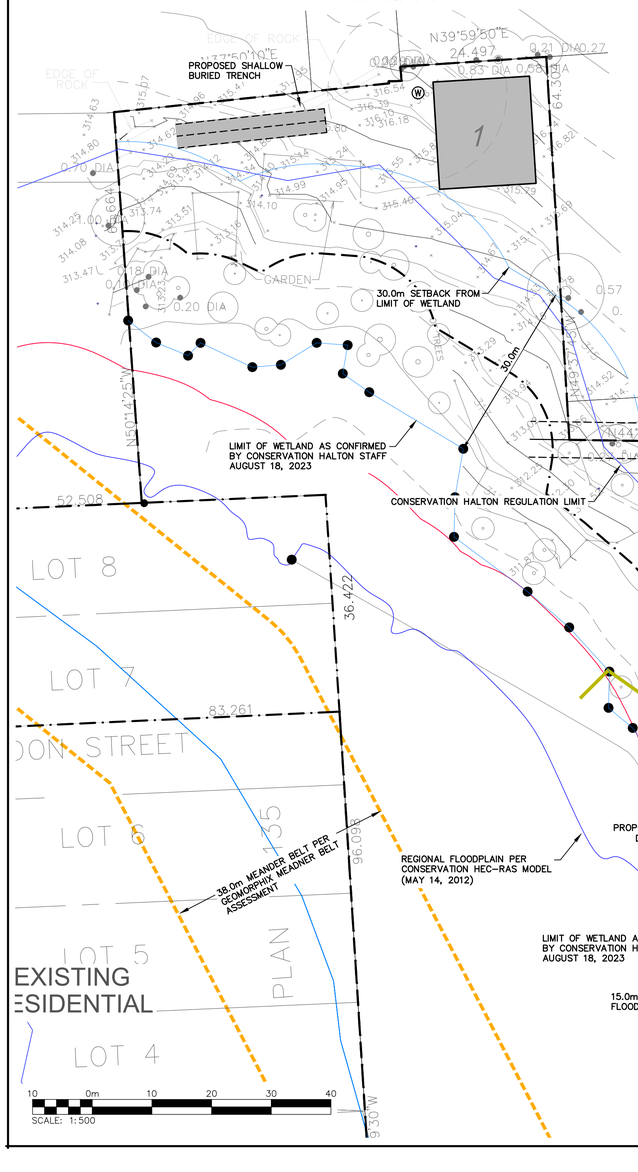
Drawing

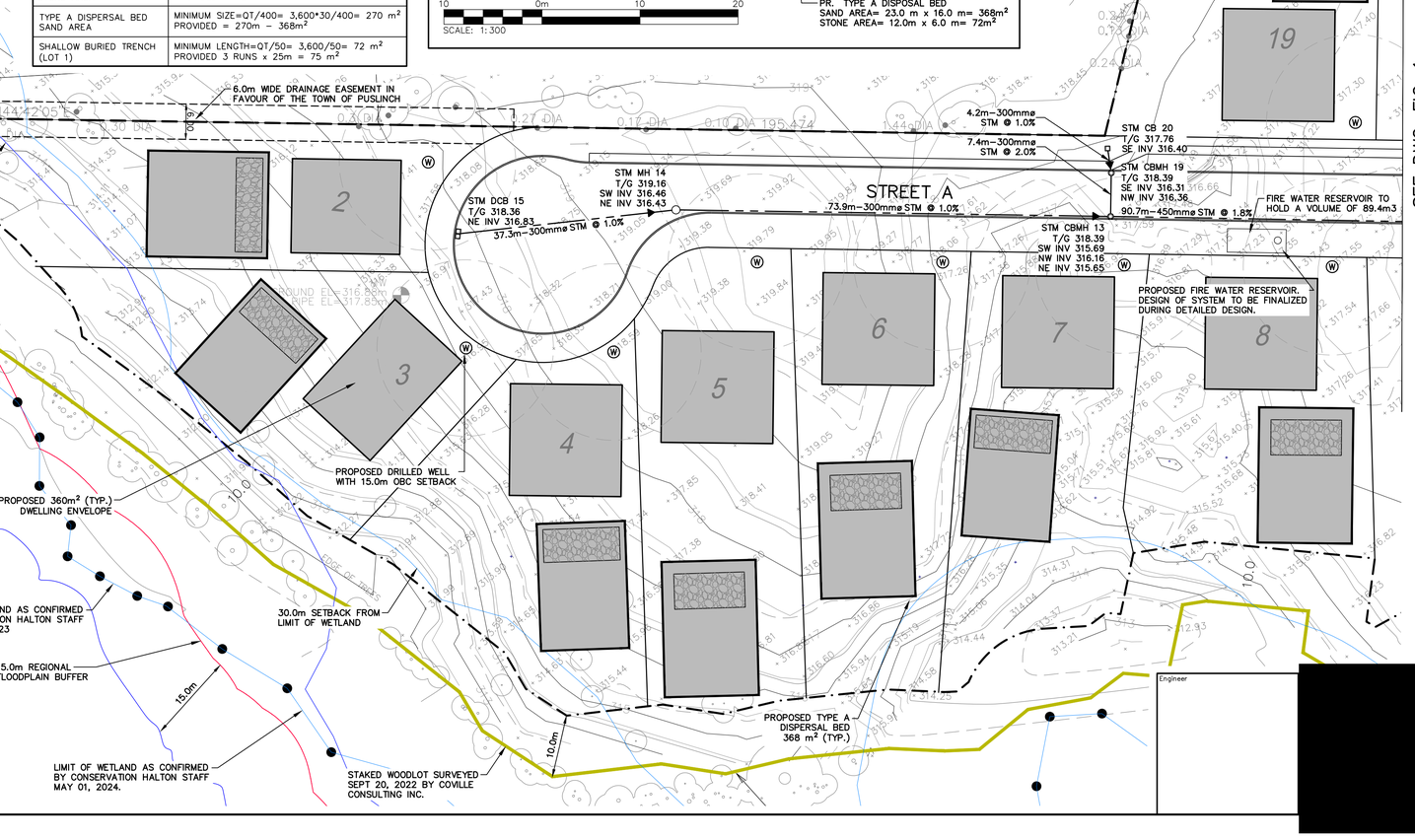
PRELIMINARY SITE SERVICING PLAN (WEST)

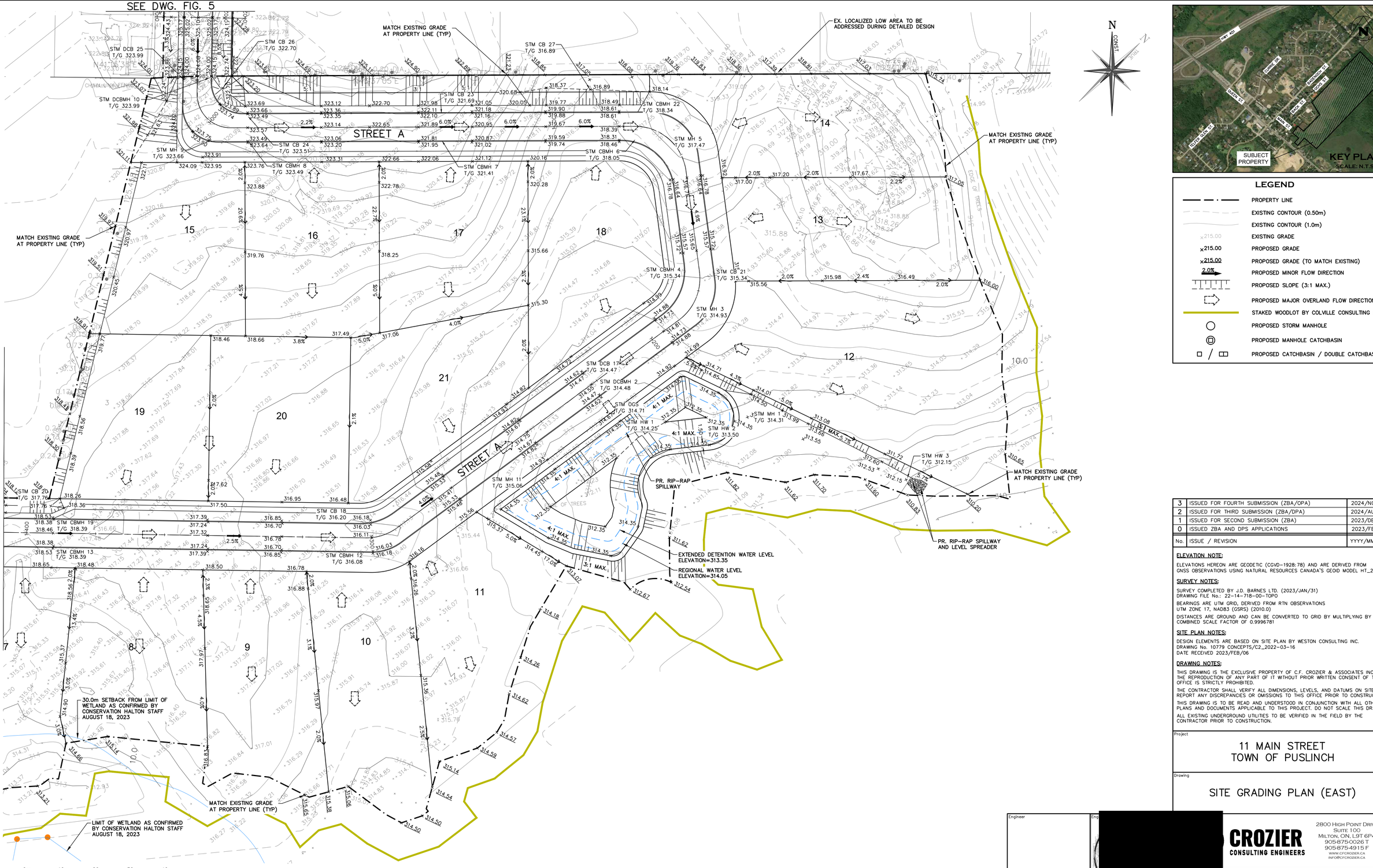
Engineer

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale 1:500	Dwg. FIG. 2







LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.50m)
- EXISTING CONTOUR (1.0m)
- ×215.00 EXISTING GRADE
- ×215.00 PROPOSED GRADE
- ×215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- STAKED WOODLOT BY COLVILLE CONSULTING INC.
- PROPOSED STORM MANHOLE
- PROPOSED MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN / DOUBLE CATCHBASIN

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR FOURTH SUBMISSION (ZBA/OPA)	2024/NOV/15
2	ISSUED FOR THIRD SUBMISSION (ZBA/DPA)	2024/AUG/29
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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

SITE GRADING PLAN (EAST)

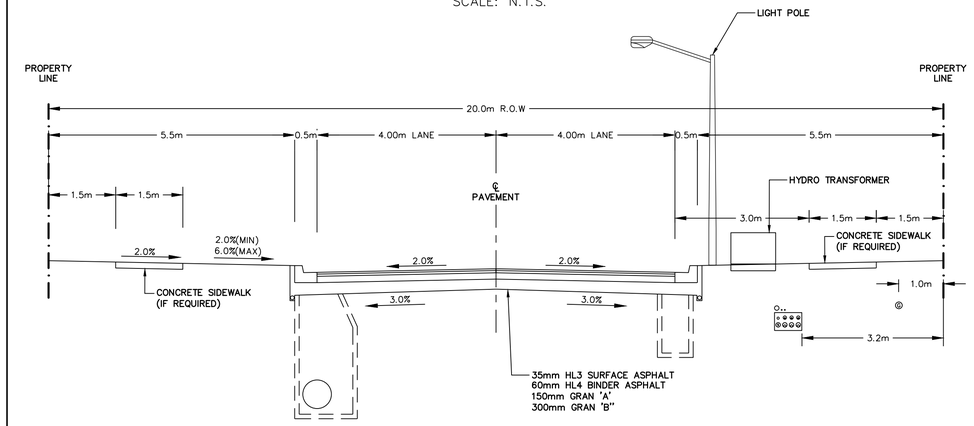
Engineer

CROZIER
CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

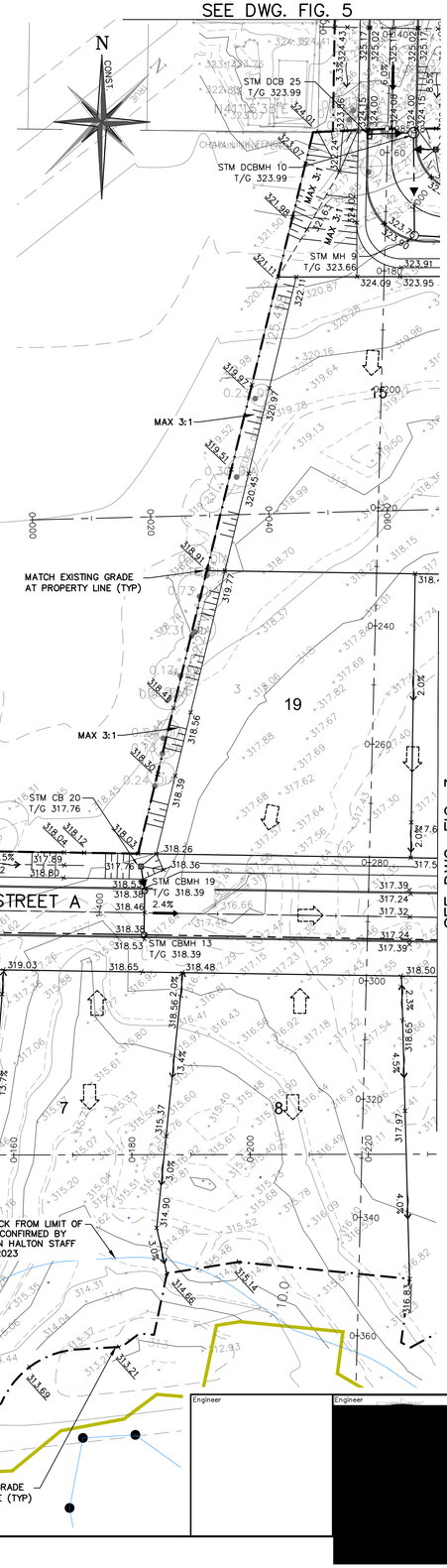
Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Scale	1:500
		Dwg.	FIG. 3

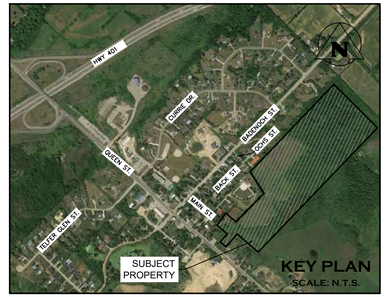
TYPICAL ROAD SECTION

SCALE: N.T.S.



SEE DWG. FIG. 5





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.50m)
- EXISTING CONTOUR (1.0m)
- ×215.00 EXISTING GRADE
- ×215.00 PROPOSED GRADE
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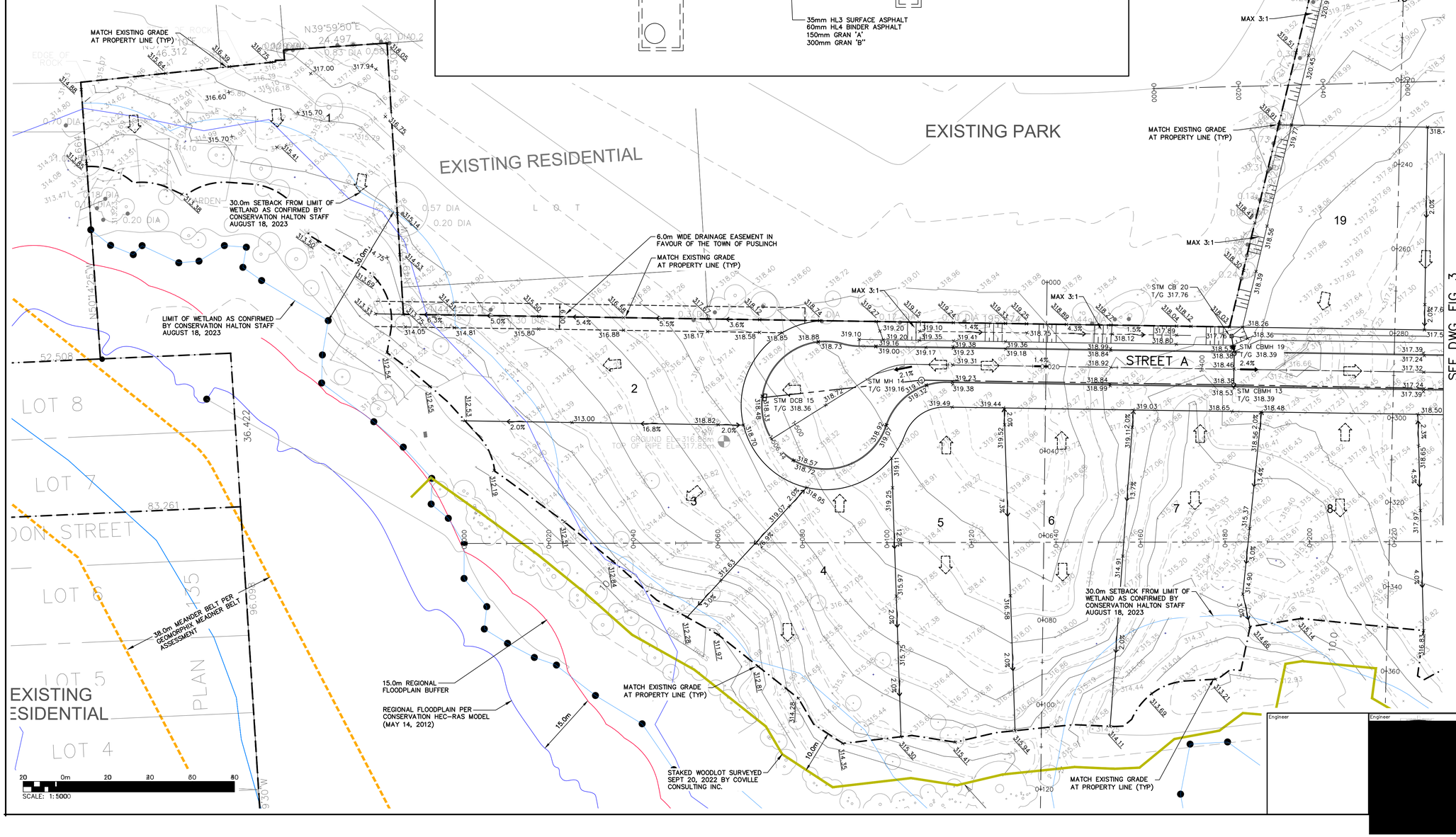
- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF (AUGUST 18, 2023)
- 30.0m SETBACK FROM LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF AUGUST 18, 2023
- MEANDER BELT 38m BUFFER (19m EACH SIDE)
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
- REGIONAL FLOODPLAIN 15.0m BUFFER
- CONSERVATION HALTON REGULATION LIMIT
- PROPOSED STORM MANHOLE / MANHOLE CATCHBASIN
- PROPOSED CATCHBASIN

SEE DWG. FIG. 3



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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

SITE GRADING PLAN (WEST)

Engineer

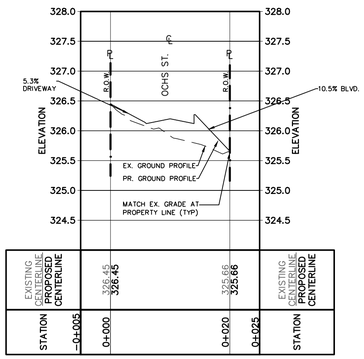
Engineer

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905875-0026 T
905875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

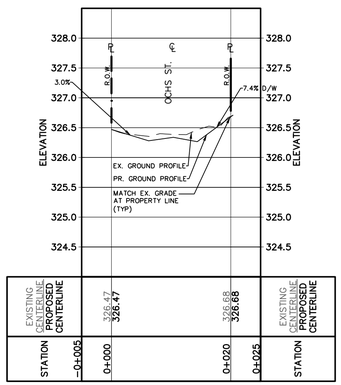
Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:500
				Dwg.	FIG. 4

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 4.dwg, FIG. 4, 2024-11-15 4:50:40 PM, hwilkinson

SECTION A



SECTION B



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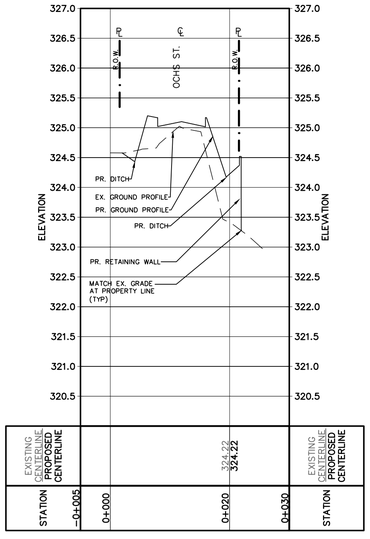
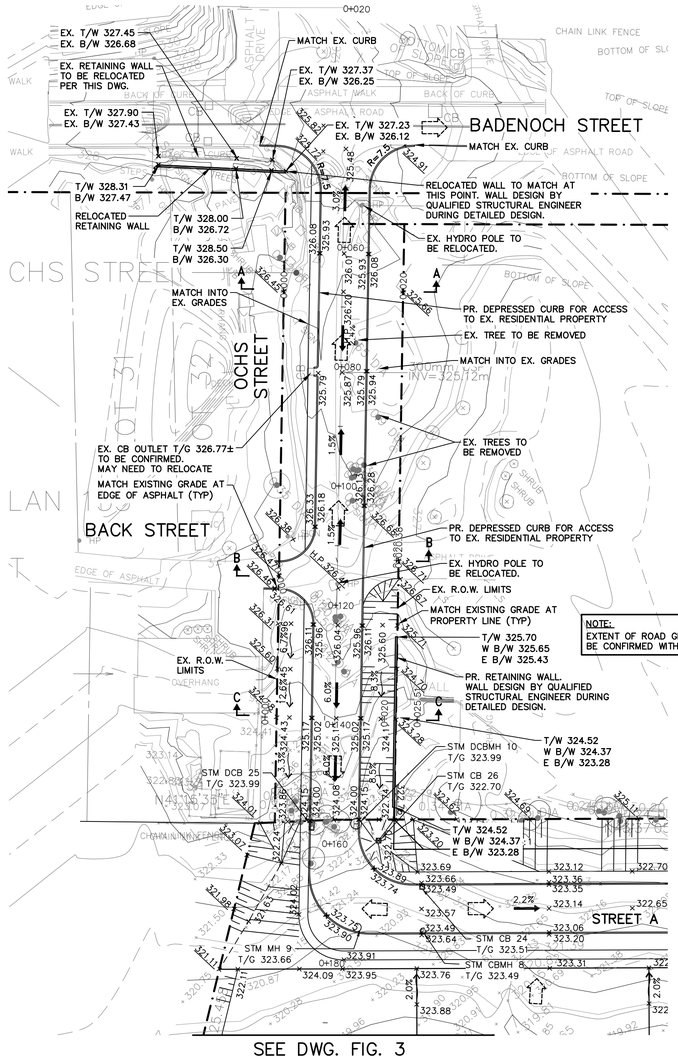
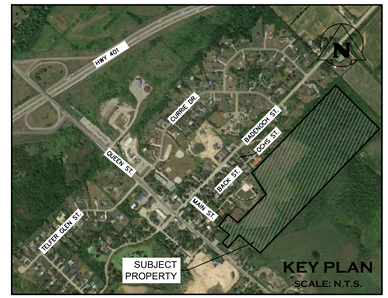




SEE DWG. FIG. 3



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.50m)
- EXISTING CONTOUR (1.0m)
- ×215.00 EXISTING GRADE
- ×215.00 PROPOSED GRADE
- ×215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION

NOTE:

EXTERNAL OF OCHS STREET IS FOR SCHEMATIC PURPOSES ONLY. DETAILED DESIGN OF OCHS STREET TO BE COMPLETED THROUGH CONSULTATION WITH THE TOWNSHIP DURING SUBSEQUENT PLANNING APPLICATION.

EXTERNAL DRAINAGE FROM PRIVATE LOTS TO BE CONVEYED AS PART OF THESE ROAD IMPROVEMENTS.

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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

EXTERNAL GRADING PLAN (OCHS STREET)

Engineer

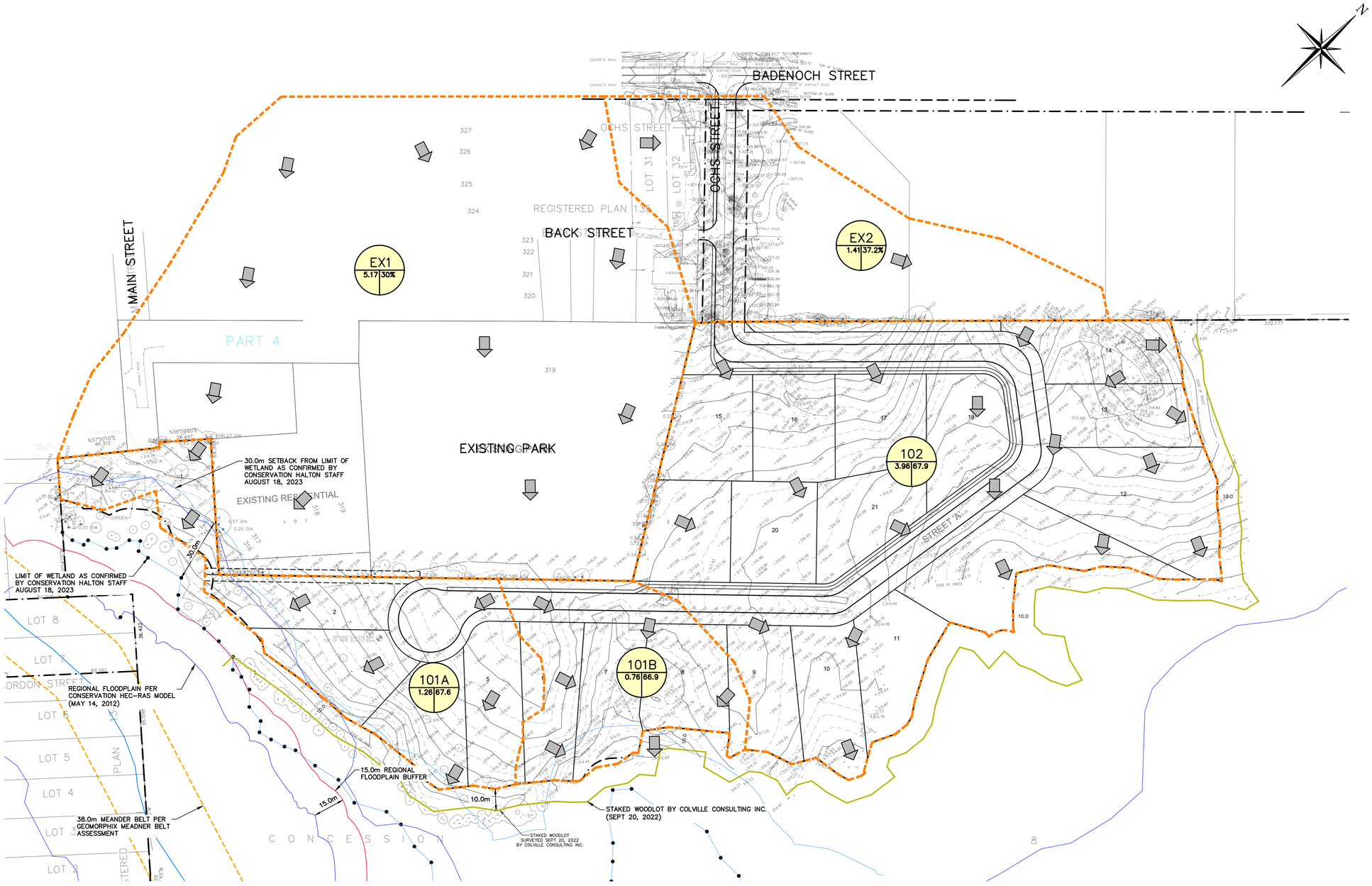
[redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875-0026 T
905 875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:500
				Dwg.	FIG. 5

10 0m 10 20 30 40
SCALE: 1:500

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\CAD\Civil_Sheets\6537_FIG 5.dwg, FIG. 5, 2024-11-15 4:51:47 PM, hwilkinson



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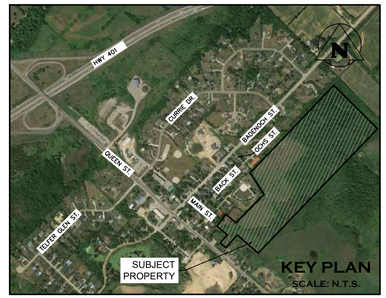
SCALE: 1:1000



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
- REGIONAL FLOODPLAIN 15.0m BUFFER
- CONSERVATION HALTON REGULATION LIMIT
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF (AUGUST 18, 2023)
- 30.0m SETBACK FROM LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF AUGUST 18, 2023
- MEANDER BELT 38m BUFFER (19m EACH SIDE)
- ID / A | %IMP — CATCHMENT I.D.; AREA (ha) | PERCENT IMPERVIOUS
- ID / A | RC — CATCHMENT I.D.; AREA (ha) | RUNOFF CO-EFFICIENT

No.	ISSUE / REVISION	YYYY/MMM/DD
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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

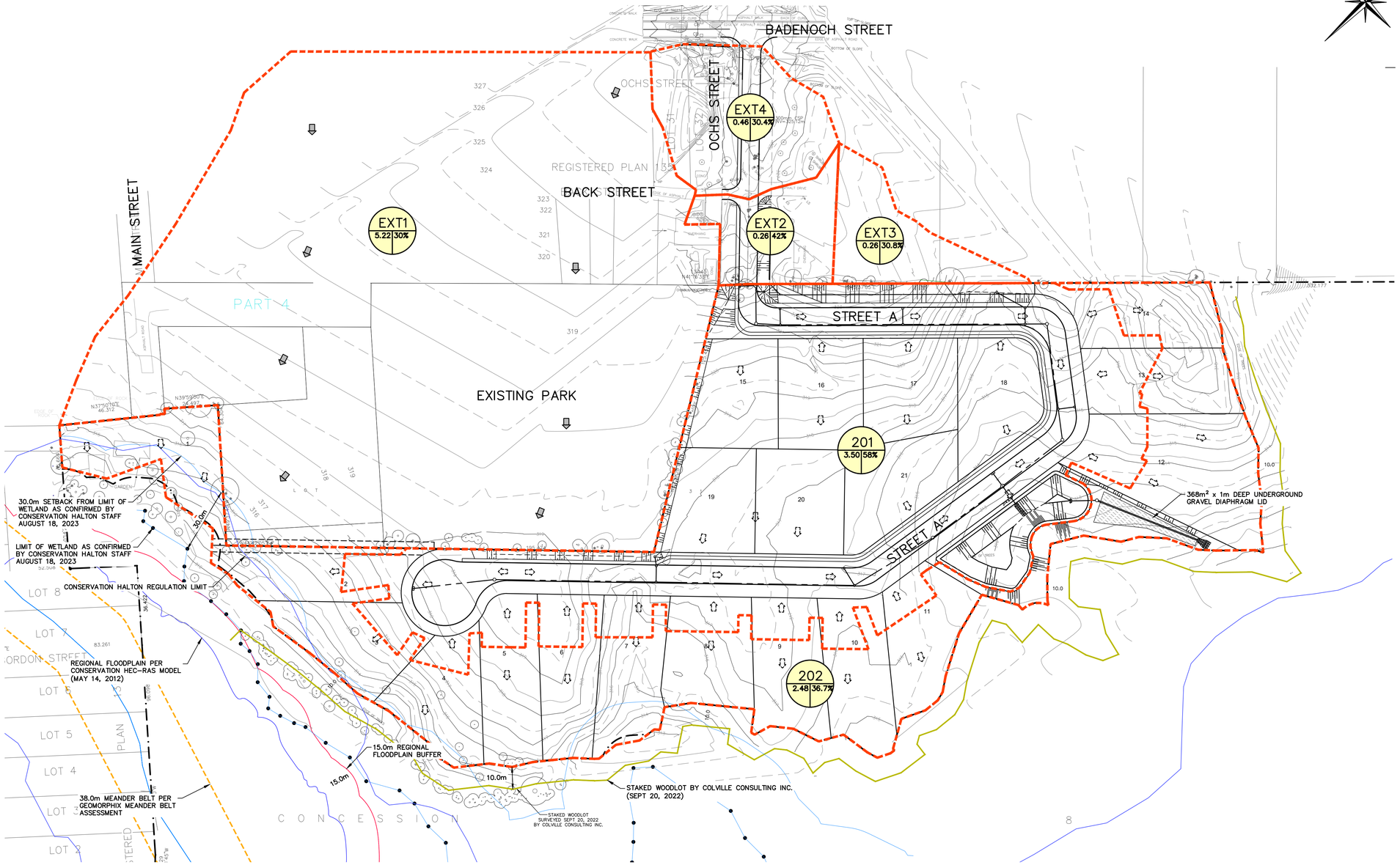
PRE-DEVELOPMENT DRAINAGE PLAN

Engineer

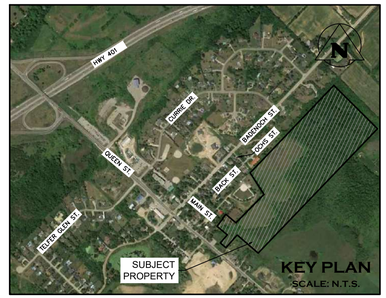
[redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M	M.I.M.		2366-6537
Check	Check	Scale	Dwg.
B.W.	B.W.	1:1000	FIG. 6



20 0m 20 40 60 80
SCALE: 1:1000



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE (x 215.00)
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- POST-DEVELOPMENT STORM DRAINAGE CATCHMENT
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
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Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

Engineer

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2800 HIGH POINT DRIVE
SUITE 100
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905.875.0026 T
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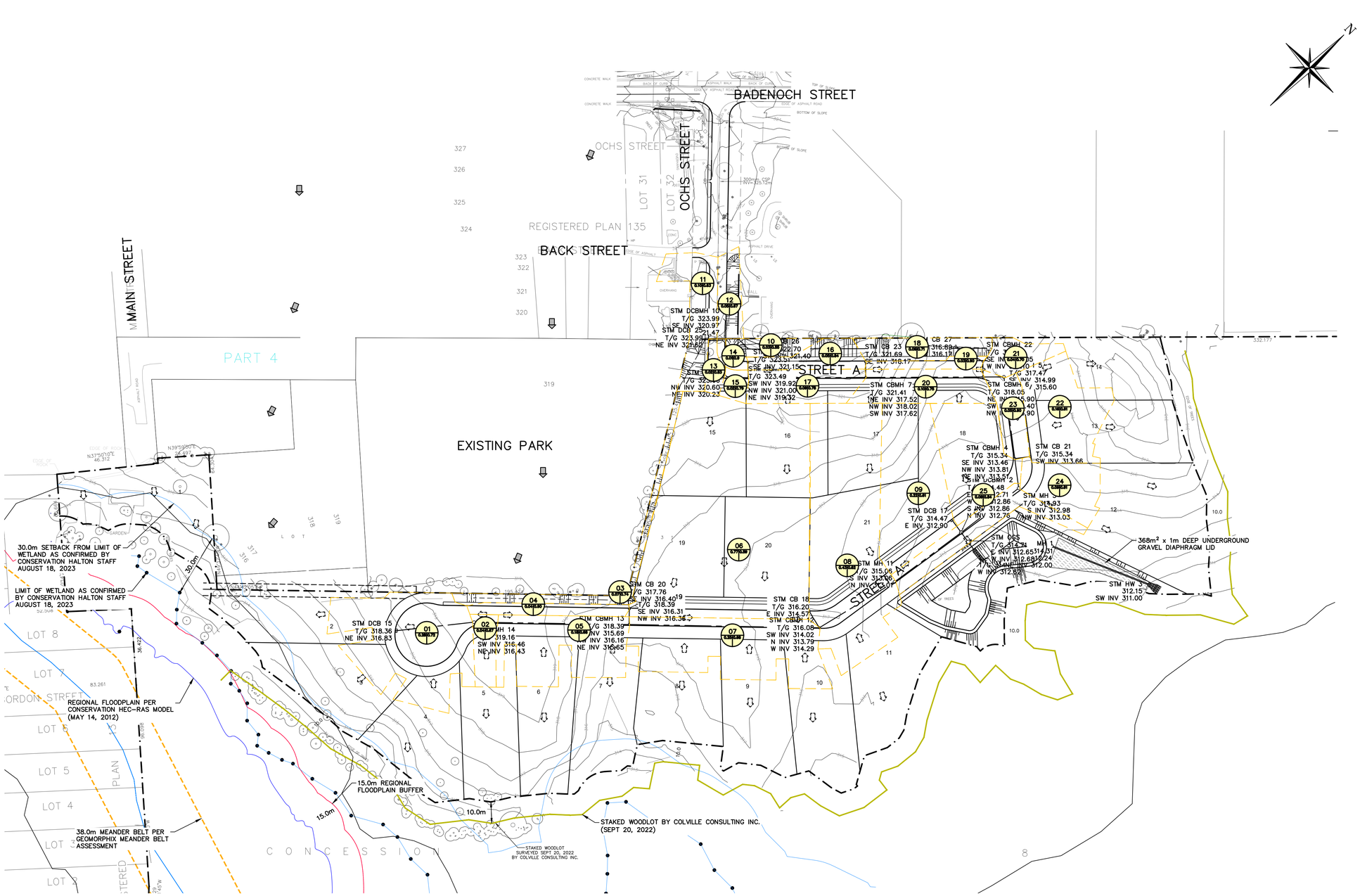
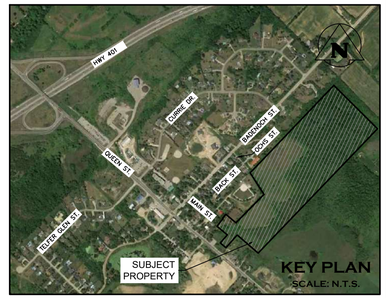
Drawn	Design	Project No.	
M.I.M	M.I.M.		2366-6537
Check	Check	Scale	Dwg.
B.W.	B.W.	1:1000	FIG. 7





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE (x 215.00)
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- POST-DEVELOPMENT STORM DRAINAGE CATCHMENT
- REGIONAL FLOODPLAIN (CONSERVATION HALTON)
- REGIONAL FLOODPLAIN 15.0m BUFFER
- STAKED WOODLOT BY COLVILLE CONSULTING INC. (SEPT 20, 2022)
- LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF (AUGUST 18, 2023)
- 30.0m SETBACK FROM LIMIT OF WETLAND AS CONFIRMED BY CONSERVATION HALTON STAFF AUGUST 18, 2023
- MEANDER BELT 38m BUFFER (19m EACH SIDE)
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SINGLE CATCHBASIN MANHOLE
- ID / A|RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR FOURTH SUBMISSION (ZBA/OPA)	2024/NOV/15
2	ISSUED FOR THIRD SUBMISSION (ZBA/DPA)	2024/AUG/29
1	ISSUED FOR SECOND SUBMISSION (ZBA)	2023/DEC/20
0	ISSUED ZBA AND DPS APPLICATIONS	2023/FEB/17

ELEVATION NOTE:

ELEVATIONS HEREON ARE GEODETIC (CGVD-1928:78) AND ARE DERIVED FROM ONSS OBSERVATIONS USING NATURAL RESOURCES CANADA'S GEOID MODEL HT_2.0 ON.

SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LTD. (2023/JAN/31)
DRAWING FILE No.: 22-14-718-00-TOPO

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (GSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY WESTON CONSULTING INC.
DRAWING No. 10779 CONCEPTS/C2_2022-03-16
DATE RECEIVED 2023/FEB/06

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

11 MAIN STREET
TOWN OF PUSLINCH

Drawing

STORM DESIGN SHEET
DRAINAGE PLAN

Engineer

Engineer [redacted]

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	M.I.M	Design	M.I.M.	Project No.	2366-6537
Check	B.W.	Check	B.W.	Scale	1:1000
				Dwg.	FIG. 8

NOVEMBER 15, 2024

PROJECT NO: 2366-6537

SENT VIA: EMAIL

WDD Main Street
499 Brant Street
Burlington ON L7R 2G5

Attention: Mr. Faisal Hamadi

RE: 11 MAIN STREET, TOWNSHIP OF PUSLINCH – ADU AND HOME BASED BUSINESSES

Dear Faisal,

As part of the fourth submission for Zoning Bylaw Amendment (ZBA) and Draft Plan Approval for the proposed residential at 11 Main Street, Twp of Puslinch, Crozier has been asked to provide input to support the permitting of Additional Dwelling Units (ADU) and Home Based Businesses (HBB). This letter is to be read in conjunction with the latest engineering submission materials dated November 15, 2024.

We do not anticipate any significant changes to the proposed servicing strategy as a result of the proposed ADUs and HBBs. However, we note the following:

- The footprints of the proposed private sewage systems will need to be reviewed to confirm appropriate sizing as part of the building permit stage if ADUs or HBBs are proposed on specific lots. ADUs and HBBs can potentially increase the assumed fixture counts for the lots, necessitating a revised sewage system design.

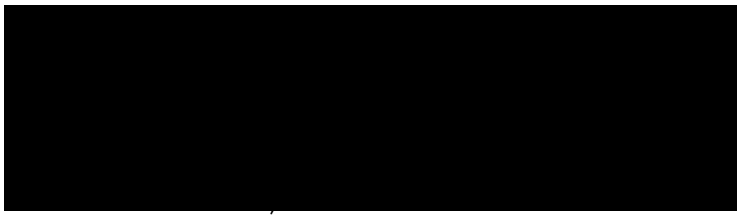
- The current lot fabric provides sufficient space for some increase in footprint of sewage systems.

- The current sewage system footprints are designed for 3,600 L/d. The expected increase in fixture count due to an ADU or HBB would not cause a significant increase to the expected flow. Therefore, if there are any ADUs and HBBs proposed, it is not anticipated that the properties will be subject to Section 53 of the Ontario Water Resources Act and require an Environmental Compliance Approval (ECA) from the Ministry of the Environment, Conservation, and Parks (MECP). All approvals can remain within the Building Permit process with the Township of Puslinch.

As such, sewage system footprints should be reviewed at the Building Permit stage to confirm they are appropriately sized for ADUs and/or HBBs if they are proposed. However, the lot fabric is sufficient to allow for some increase in footprint and is not anticipated to be an issue. Similarly, there is not expected to be a need for an ECA from the MECP as a result of the ADUs or HBBs.

Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,



TAF/tc

J:\2300\2366 - WDD Main Street\6537 - 11 Main Street\Letters\2024.11.15_ (2366-6537)_Letter_ADU.docx

100 Milverton Drive, Suite 404
Mississauga, ON L5R 4H1
Canada
ghd.com

13 November 2024

WDD Main Street
499 Brant Street
Burlington, ON
L7R 2G5

Re: Review of Additional Dwelling Unit and Home-Based Business Uses
11 Main Street
Township of Puslinch

In support of the fourth submission for the Zoning Bylaw Amendment (ZBA) and Draft Plan Approval for the proposed residential development at 11 Main Street in the Township of Puslinch, GHD has been engaged to provide an assessment supporting the inclusion of Additional Dwelling Units (ADUs) and Home-Based Businesses (HBBs) as permitted uses. This letter is submitted alongside the latest engineering materials, dated November 15, 2024, and provides the rationale for allowing these uses under the existing zoning framework.

Our analysis demonstrates that the inclusion of ADUs and HBBs is feasible and can be compatible with the current Zoning Bylaw requirements, with no significant impact on traffic flow, intersection capacity or parking. The following key points provide further support for permitting these uses:

- **Parking Compliance:** The current Zoning Bylaw requires each single detached dwelling unit to provide two parking spaces, with one additional space required for an ADU or HBB is the employee is not a resident. Based on the proposed lot layout which includes two car garages and additional driveway parking, each lot can provide adequate space to satisfy these parking requirements fully.

  Therefore, allowing ADUs or HBBs will not impact on-street parking availability, as each lot is designed to meet parking demands on-site, maintaining sufficient visitor parking and minimizing overflow onto public streets.

- **Traffic Impact:** The addition of ADUs and HBBs typically results in minor traffic increases, well within acceptable thresholds for residential neighborhoods. Given the layout and access points of the development, any additional trips generated are unlikely to affect roadway capacity or operational flow significantly.

- **Lot Fabric and Flexibility:** The proposed lot sizes and configurations allow ample room for any required parking adjustments and HBB activities while remaining in full compliance with the zoning bylaw. The flexibility inherent in the lot design ensures that any additional demand for parking or minor modifications can be accommodated without impacting adjacent properties or requiring variances.

In summary, permitting ADUs and HBBs within this development will support housing flexibility and small-scale business opportunities without creating adverse effects on traffic, parking, or infrastructure. We recommend allowing these uses under the current zoning framework, with specific details reviewed at the Site Plan stage to confirm compliance with zoning requirements.

Should you have any questions or need further information, please do not hesitate to contact the undersigned.

Please feel free to reach out if further clarification or information is needed.

Regards,

William Maria, P. Eng.
Transportation Planning Lead

November 19, 2024

Project T1220482.003

Weston Consulting
201 Millway Avenue, Unit 19
Concord, ON L4K 5K8
Attention: Kayly Robbins, MPL, MCIP, RPP, Senior Planner

Subject: **Additional Dwelling Units and Home Based Businesses**
Proposed Residential Subdivision – 11 Main Street
Puslinch, Ontario

Dear Ms. Kayly Robbins:

This letter provides a discussion regarding private servicing viability for the above noted residential development considering potential land use for proposed residential lots for additional dwelling units and home-based businesses.

Private groundwater supply was investigated through the installation and pumping of three test wells. Test wells were pumped at a constant rate of 37.8 L/min over the duration of six hours, with a total volume pumped of 13,608 L. The observed reduction in available drawdown (based on the well depth less the static groundwater depth, and the pump submergence, assumed at 1.5 m from the bottom of the well) was between 1% to 12% of total available drawdown. Residential demand is assessed at 450 L/person per day, when considering twice the daily demand it is expected that wells will be capable of meeting daily water requirements of 15 people without significant impacts. It is expected that private residential supply wells will be capable of supporting additional dwelling units, if implemented by lot owners.

Home based businesses are not expected to require significant additional water demand above considered per person daily demand.

I trust the above provides the requested clarification regarding the feasibility of additional dwelling units and home-based businesses. If you require additional information, please do not hesitate to contact the undersigned.

Yours very truly,

Englobe Corp.

[redacted]

Paul Raepple, P.Geo.
Senior Hydrogeologist

T 877.300.4800 – info@englobecorp.com
20 Carlson Court – Etobicoke, ON – Canada M9W 7K6
englobecorp.com

Comment-Response Matrix

11 Main Street– 3rd ZBA Submission Comments

Township of Puslinch

WDD Main Street Inc.

Weston File: 10779

Date: November 2024

Contents

County of Wellington – Planning Department Commenter – Commenter Contact Details September 5, 2024		
Comment	**Consultant**	**Response**
County Planning has no concerns with deeming the subject Zoning By-law amendment application complete and we concur with the comments provided by the Township Planning Consultant (NPG Planning Solutions) dated September 19th, 2024. Our office will provide more detailed comments on matters of interest to the County once the Zoning By-law amendment application is deemed complete and circulated, if comments are required, and through the Draft Plan of Subdivision application once it is deemed complete and circulated by the County.	-	Acknowledged
This development and the associated Draft Plan will need to demonstrate consistency with Provincial policies and Official Plan policies. Comments from Conservation Halton will also need to be considered and addressed.	Weston Consulting	Discussions with Conservation Halton have taken place, the civil engineering drawings have been revised to ensure all structures (septic, dwellings, etc.) are located outside of the 30m buffer. Furthermore, minimal grading is to occur with a small portion of the buffer, per discussions with Conservation Halton. Based on the discussion with Conservation Halton and general acceptance by the Township's ecologist of the proposed lot lines, preliminary conceptual location of structures and buildings, there are no further concerns.

Township of Puslinch – Fire Department Brent Smith – Commenter Contact Details		
Comment	**Consultant**	**Response**
More details are required for fire protection water supply/ location/size of tanks, connection types, etc.	Crozier	More details have been provided for the fire water tank. Crozier has also provided a second water tank in front of lot 8 to provide adequate coverage for the entire development (150 m per Puslinch Fire Chief)

Conservation Halton Commenter – Commenter Contact Details		
Comment	**Consultant**	**Response**
CH has reviewed the ZBA and has the following comment: • CH staff still recommends that all of CH's regulated area (wetland hazard plus the 30m regulatory setback) be zoned appropriately and be conveyed to public ownership. The current zoning schedule provided appears to zone the wetland hazard and a minimum 15m limit to the wetland as NE. This is a recommendation and is deferred to the Township and/or the County if they are in acceptance of the approach shown in the ZBA schedule.	Weston Consulting	Areas outside of the lot lines are zoned NE, this includes the feature and a consistent 15m buffer, with a greater buffer in most instances. The Township's ecologist is satisfied with this approach, which includes an enhancement plan as part of the conditions of approval.
With respect to the Subdivision Application, CH has the following key comment that will need to be addressed prior to Draft Plan approval: • As stated previously, CH regulates 30m from the limits of the staked wetland and no development is permitted within the 30m regulatory setback to the wetland. The Engineering Drawings currently show the septic system and building envelop within the 30m regulatory setback on Lot's 1, 2 and 3.	Crozier	The engineering drawings have been revised based on discussions with Conservation Halton to remove all structures from this limit. Minimal grading is shown, as discussed to be acceptable by Conservation Halton. Please note the location of structures shown on the engineering plans is conceptual and

		does not infer any confirmation/approval of locations of dwellings, septic, etc.
• CH currently does not have policy that will allow development within the 30m setback to the staked limit of the wetland. Development includes septic system, building envelope, grading, deck, swimming pool etc.	Colville / Weston	The engineering drawings have been revised based on discussions with Conservation Halton to remove all structures from this limit. Minimal grading is shown, as discussed to be acceptable by Conservation Halton.
• Please ensure that all drawings show the staked limits of the wetland plus the 30m regulatory setback.	Crozier	Acknowledged. Staked limits of wetland and 30m setback are shown on all drawings.
• CH may have additional comments on the Functional Servicing & Preliminary Stormwater Management Report and other reports during the Subdivision Application (detail design).	Crozier	Acknowledged.

County of Wellington – Transportation Department Commenter – Commenter Contact Details		
Comment	**Consultant**	**Response**
No Objection with the zoning application and further comments will be provided during the draft plan of subdivision application is submitted.	-	Acknowledged

NPG – Township Planning Consultant Jesse Auspitz – jauspitz@npgsolutions.ca September 19, 2024		
Comment	**Consultant**	**Response**
NPG Planning Solutions Inc. (NPG) has been retained to provide comments regarding a Zoning By-law Amendment Application and a Draft Plan of Subdivision Application proposing a residential subdivision consisting of 21 detached dwelling lots, environmental protection lands, a stormwater management pond and a municipal road. The Subject Lands are approximately 23.10 hectares in size and have frontage along Highway 6, Main St and Ochs St. The Subject Lands are currently vacant and are in proximity to residential uses to the north and west, and agricultural and natural lands to the east and south. This is the third submission for this application.	-	Information only.
1. The Township should clarify as to whether they are accepting ownership of the natural environment block as per Section 3.3 of the PJR, and any additional requirements that are to be met prior to taking ownership of said block.	Weston Consulting	A note has been sent to the Township to request this confirmation.
2. The cover letter submitted with the Applications suggests that the residential subdivision consists of 20 detached dwelling lots. This description is not consistent with the Draft Plan that has been submitted or supporting studies. Please confirm if the Draft Plan and supporting studies are correct and up to date. The supporting studies should include the most updated version of the draft plan of subdivision dated September 3, 2024.	Weston Consulting	The cover letter included a small error, this has been revised with the new cover letter. The Draft Plan and supporting studies are all up to date. The cover letter provides for a general overview of the application and to list the technical plans and reports submitted and is not to be considered a technical document.
3. Previous planning comments sought clarity as to whether there were any technical assessments submitted assessing all the dwelling types permitted in the Urban Residential (UR) Zone or the permissions for additional residential units. While it is noted that the Draft Zoning By-law has been revised, the submitted technical studies only assess single-detached dwellings. There has been no information provided by the studies that supports the permission of additional	Weston Consulting	A Planning Justification Report Addendum has been submitted and concludes that the provision of additional residential units and home businesses in accordance with the

residential units and/or home businesses on the Subject Lands. The technical studies should have regard to whether the additional residential units and/or home businesses are supportable from a technical perspective.		applicable planning policies constitutes good planning. Technical letters have been submitted with regard to the additional residential units and home businesses and state that these uses are supportable from a servicing, transportation, and environmental perspective.
4. Previous planning comments noted that the Zoning By-law should address the exclusion of uses on the proposed stormwater management pond block. The revised Zoning By-law does not include any language addressing this matter.	Weston Consulting	This has been captured in updated Zoning By-law.
5. Previous planning comments noted that conformity with the County Official Plan had not been met yet in regard to the Greenland System based on the comments of the Township/County consulting Ecologist. The Township/County consulting Ecologist will need to confirm that all their comments have been addressed and that the proposed development will not result in any negative impacts to the regulated natural heritage features on and the adjacent subject property.	Weston Consulting / Colville	The Township ecologist provided peer review comments in which they have no outstanding comments and are satisfied with the draft plan and the Environmental Impact Study. The County has not yet provided detailed comments on the September submission.
6. The PJR provides that “the proposed detached dwelling lots will be serviced with individual private services as municipal services are not available in Morriston. The lots have been sized to accommodate private drilled wells and septic systems. The depth, size and locations of the wells will be determined during the detailed design of each individual lot.” The Townships Engineering and Hydrogeological Consultant will need to confirm that site conditions are suitable for the long-term provision of individual onsite sewage services and individual on-site water services without negative impacts. Of note, the Provincial Planning Statement defines negative impacts as follows: *potential risks to human health and safety and degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and*	Weston Consulting	Acknowledged. The preliminary layout and details of the individuals services have been provided by the engineer, and reviewed by the Township’s engineer.

their related hydrologic functions, due to single, multiple or successive development. Negative impacts should be assessed through environmental studies including hydrogeological or water quality impact assessments, in accordance with provincial standards.		
7. The Townships Traffic Consultant and the Ministry of Transportation will need to be satisfied that access to the Subject Lands is acceptable.	GHD	There are no further concerns or comments from the Townships traffic consultant or MTO.
8. As a result of the PPS (2024) coming into effect on October 20,2024, the PJR and EIS should be revised to address the policies of the Provisional Planning Statement.	Weston Consulting / Colville	Please find enclosed the Planning Addendum and EIS Addendum which review the PPS 2024.

GEI - Engineers
Parth Lad, E.I.T. – Commenter Contact Details
September 27, 2024

Comment	Consultant	Response
We defer detailed review of the remaining documents to Township staff and other consultants. Based on our previous submission comments and review of third submission documents identified above, we provide the following comment for Zoning By-Law Amendment and Draft Plan of Subdivision:	-	Acknowledged
Quality Control - Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** Please revise the stormwater quality control section using **local design criteria** (Ontario MECP criteria rather than New Jersey). MOE SWMPD Manual Table 3.2 provides the storage volumes required for dry ponds to provide 60% TSS removal, and while this calculation is used in the Extended Detention calculation in Appendix D, Appendix F should also be updated accordingly. Please provide calculations based on an MECP approved methodology to support that 80% TSS removal is provided by a combination of the dry pond and OGS.	Crozier	We have provided the Stormceptor sizing report to provide more details on the TSS removal efficiency of the OGS. We have assumed a 50% removal rate with the OGS. Additionally, the dry pond has been designed with an extended detention to provide 60% TSS removal per MOE design criteria. Following treatment from the dry pond, stormwater will outlet through a level spreader and will travel overland through existing woodlot, which will provide additional TSS

The Erosion Control Volume Calculations in Appendix D should be based on a drainage area of 3.50 ha plus the areas of EX2 and EX3, which also contribute. During the detailed design stage, information should be provided to support the TSS removal capabilities of the Stormceptor EFO8 system based on specific site conditions.		removal. Through the combination of these quality control measures, 80% removal has been provided. The MECP does not provide methodology for treatment train quality efficiency, please advise if GEI is aware of methodology to apply, if the provided method is not acceptable.
Infiltration Water Quality - Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** Infiltration facilities require 1.2 m frost cover depth and 1 m separation with groundwater per MOE SWMPD Manual criteria. The proposed facility is 1 m in depth while the maximum depth is 0.6 m per MOE SWMPD Manual criteria. Please show relevant **elevations** on the Servicing Plan including top of infiltration facility, bottom of infiltration facility, frost cover depth, groundwater separation, inlet elevation and outlet elevation. Clearly show how flow is to be transferred from the pond outlet to the infiltration facility.	Crozier	Relevant elevations have been provided on updated servicing plan. Given the available space and required infiltration volume, 0.6m depth is not achievable. Given the MOE SWMPD Manual is outdated, it is our opinion that the 1.0 m storage depth is acceptable and has been approved for other projects in Ontario. Please provide rationale for the 0.6 m request.
Quantity Control of Stormwater – Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** Please indicate the size, location and elevation of the proposed orifice on the Servicing Plan. Based on Appendix D calculations, the proposed orifice size is to be 50 mm. Per Table 4.8 in the MOE SWMPD Manual, the minimum orifice size for a dry pond is 75 mm with a preferred diameter of 100 mm, as small orifices can be clogged easily. Please revise calculations to adhere to **MECP criteria** or describe how a 50 mm diameter orifice would be protected. At detailed design, please provide a detail for the outlet control structure.	Crozier	Noted. Orifice size has been increased to a diameter of 75 mm. Additionally, a CSP guard has been proposed to minimize clogging of the orifice. Please see revised drawings for details.
External Area Topography – Engineering Plans **GEI Comment (September 2024)**	Crozier	Refer to FIG 4 a proposed a swale within the drainage easement to control flows from EX1

The LiDAR mapping does not appear to show the berms. Please provide **topographic data** for the existing ball diamond area (EX1) to show the low-lying depression area where ponding reportedly currently occurs per the report, and the existing berms. Please demonstrate the conditions under which it can be expected that the existing storage limits will be exceeded, and stormwater will flow onto the subject lands. Please clearly show how these flows will be routed around the development, specifically lots 1 and 2, to the Bronte Creek outlet. Please demonstrate that flows from EX1 will not enter the proposed stormwater facility. As previously discussed, site visit photos may be helpful to show the extents of existing surface ponding in the park area under typical conditions.		and route between lots 1 and 2 has been added. We suggest that a topographic survey to be completed on the Morriston Ball Park during the detailed design phase and not as part of Draft Plan Approval. We also note that access approval will be required by the Township prior to completion of any survey on adjacent lands. We have provided site photos of the park in Appendix H to demonstrate existing topography and drainage conditions.
Drainage Easement – Engineering Plans **GEI Comment (September 2024)** Please indicate any required drainage easements on the engineering plans.	Crozier	Drainage easement has been identified on the drawings.
Ponding at Catchbasin – Engineering Plans **GEI Comment (September 2024)** Per Puslinch development standards, storm sewers are to be designed using the rational method and a storm sewer design sheet is to be provided to demonstrate that the 100-year storm can be conveyed. The first reach of the storm sewer in the cul-de-sac bulb should have a slope of at least 1%, currently it is shown as 0.5%. All other storm sewer should have a slope of at least 0.5%. As discussed with Crozier staff, additional topographic data may be required to show the 100-year storm event ponding limits at detailed design.	Crozier	Sewers have been designed to convey the minor system (5-year event). Major storms are proposed to be conveyed via overland flow within the right-of-way and will spill into the pond at low point in development. The first reach of the storm sewer in the cul-de-sac bulb has been adjusted to 1%.
Conservation Regulation Limit – Engineering Plans **GEI Comment (September 2024)** Engineering Plans should show all relevant property and regulatory limits. Please show the latest Conservation Halton regulation limit on the plans.	Crozier	Property and regulatory limits are shown on the revised engineering materials.

Proposed Streets – Draft Plan **GEI Comment (September 2024)** The Draft Plan in previous submissions showed two proposed streets while the latest submission shows only one proposed street. Why has Street B been removed? How will emergency access be provided to the subdivision if Street A is blocked? The Township Public Works department should be consulted regarding the feasibility of a cul-de-sac of this length. The Catchment 201 and 202 paragraphs of Section 6.2 of the FSSWM report still refer to Street B and may need to be updated.	Weston Consulting	The cul-de-sac and public road has been designed according to Town standards. Town Fire reviewed the draft plan and did not advise of any concerns.
Inconsistency – Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** The following inconsistencies should be corrected in future submissions: 1. Third paragraph of page 1 refers to first and second submissions but should refer to second and third submissions respectively in this case.	Crozier	Acknowledged.
2. The volume in Table 1 should be 2160 m3 per the appendix and not 5400 m3.	Crozier	Acknowledged.
3. Per the appendix, the additional flow area – floor area in Table 2 should be 1800 L/day, for a total flow per unit of 3800 L/day. The flow per day should also be updated in the following paragraph.	Crozier	Noted. Report and Appendix have been updated to be accurate.
4. Table 3 should be updated per the appendix. Using a flow per day of 3800 L/day, a minimum stone area of 76 m2 is calculated in the appendix, rather than 72 m2. As 72 m2 is the reported provided amount, this will need to be increased slightly. Likewise, the minimum sand area calculated in the appendix is 190 m2. The provided sand area is shown as 368 m2 on drawings but reported as 352 m2 in the appendix.	Crozier	Noted. Report and Appendix have been updated to be accurate.
5. There are inconsistencies between the catchment names used in Tables 6 and 7, the model and drainage plans, i.e. catchments 101A and 101B modelled as catchments 101 and 103, EX3 and EX4 not included on the pre-development plan,	Crozier	Noted. Report and Appendix have been updated for consistency.

labelling for EX catchments are different in the model. Can these names be made more consistent?		
6. Notes 1 and 2 below Table 8 should state that runoff from EX3 is also included.	Crozier	Noted.
7. In Table 9 the total contributing area to the dry pond should also include the areas of EX2 and EX3. The labelling of this table needs to be clearer – the required volume of 384 m3 calculated is based on a quality requirement of 110 m3/ha and not an extended detention requirement of 40 m3/ha. Likewise, it should be clearer what the provided volume of 462 m3 represents.	Crozier	Extended detention calculation has been updated to include EX2 and EX3 and report updated accordingly.
8. In Table 11 it states that the required storage is 93 m3, whereas the appendix seems to differ.	Crozier	Noted. Table 11 has been updated.
9. Please confirm that the infiltration target in bullet 5 of the Stormwater Management section on page 15 matches the appendix.	Crozier	Infiltration target has been confirmed.
10. The top of grade elevations for HW1 and HW2 on the Servicing Plan do not match the grading plan.	Crozier	Grade elevations have been corrected.
11. Some of the labels for the areas of the Type A dispersion beds on the drawings do not match the calculations and information provided in the report appendix.	Crozier	Calculations and labels have been updated for consistency.
Flow Directions – Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** The Catchment EX4 paragraph of Section 6.2 describes post-development flows from this catchment being conveyed via proposed storm sewer infrastructure and internal roadway within the Ochs Street extension to existing storm sewer on Badenoch Street. There does not appear to be proposed storm sewer on Ochs Street within EX4, and flows are directed towards Badenoch Street via the roadway.	Crozier	Section 6.2 has been updated accordingly.

The second last paragraph of page 7 states that 100-year flows from catchment 201 are conveyed to the SWM facility. Catchments EX2 and EX3 are also conveyed to the SWM facility.	Crozier	Noted.
The EX4 row of Table 5 states the outlet for these flows is the Bronte Creek Tributary. Is this true for flows conveyed to Badenoch Street?	Crozier	Flows from EX4 will be conveyed to Badenoch Street. Table 5 has been updated accordingly.
Bullet 2 of the Stormwater Management section on page 15 should reference that EX3 is also conveyed to the SWM facility.	Crozier	Noted.
Model Outputs – Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** For future submissions can model outputs for all storms including the 25 mm storm be provided? The pre-development peak flows for the 50- and 100-year storms and uncontrolled post-development peak flows for the 10-to-100-year storms appear to be less than for the regional events. It would be useful to review the model outputs to see why this is the case. The regional storm controlled post-development peak flow is greater than the pre-development peak flow. Can this be addressed briefly in terms of impacts to the downstream receiver, and how stormwater control measures being taken will help mitigate the impacts.	Crozier	Model output files have been provided for all storm events. An emergency overflow spillway has been proposed to convey the regional event to the Bronte Creek Tributary.
Percolation Time – Functional Servicing & Preliminary SWM Report **GEI Comment (September 2024)** A percolation time of 20min./cm., is used in the septic system sizing calculations in Appendix B, whereas the report states that a value of 30min./cm. was to be used. At detailed design, please use a value justified in the report.	Crozier	Noted. Material has been updated to be consistent.
Construction North – Drawing Set **GEI Comment (September 2024)**	Crozier	Noted.

At detailed design, it may be helpful to label construction north on the drawing set as the report refers to directions on the subject lands that aren't necessarily accurate.		
Additional Commentary **<u>GEI Comment (September 2024)</u>** As there is no quality control for Catchment 202, the Township and future homeowners should be made aware that it will not be acceptable for driveways, parking areas etc. to be extended into the rear parts of the proposed lots in the future.	Owner / Crozier	Acknowledged

<u>Natural Resource Solutions Inc. – Township Ecologist</u> Jack Richard September 19, 2024		
Comment	**Consultant**	**Response**
In addition to the EIS and TPP, NRSI staff also conducted a high-level review of the additional reports and plans provided as part of the third submission in order to further understand potential impacts to existing natural heritage features on and adjacent to the subject property. The review comments provided below are primarily focused on the EIS and TPP. The review comments are based on a desktop review of the above-described materials, aerial imagery, and available natural heritage information for the subject property and surrounding lands, in addition to the site visit completed by Jack Richard and Colville staff in May 2023.	-	Acknowledged
Comments on Reviewed Materials **<u>Environmental Impact Study</u>** NRSI staff previously commented that all background information considered as part of the background review be detailed within the EIS and that additional natural heritage information resources such as the Ontario Reptile and Amphibian Atlas	Colville Consulting Inc.	Acknowledged. No further action.

(Ontario Nature 2019), Ontario Butterfly Atlas (MacNaughton et al. 2024), Ontario Mammal Atlas (Dobbyn 1994), and Ontario Odonate Atlas (OOAD 2023) be consulted as part of the background review. The revised EIS has addressed this recommendation and included the requested information.		
It is understood that the development will include the extension/improvement of Ochs Street, north of the subject property. The 2024 EIS, as well as the TPP, appears to have considered impacts that may occur as a result of the Ochs Street extension works, in addition to impacts associated with the proposed development within the subject property. It is noted that ecological impacts appear to be limited to the removal of trees, which has been characterized appropriately within the TPP.	Colville Consulting Inc.	Acknowledged. No further action.
Field Surveys Previous peer review comments provided by NRSI staff requested rationalization as to why all wetland communities within the subject property were not assessed for suitable amphibian breeding habitat during the field survey program. Within the 2024 EIS, the author identifies that a preliminary evaluation of all wetlands on the subject property was completed in advance of the first monitoring period for calling amphibians, and only the MAM2-2 and SWT2-5 communities were determined to contain potential amphibian breeding habitat. The 2024 EIS also provides a comparison of the results of Beacon Environmental's amphibian call surveys to those completed by Colville staff in 2023. It is noted that, while additional amphibian calling was recorded by Beacon staff during their field program, the results are generally comparable to those of Colville's 2023 field program. NRSI staff are supportive of the conclusions provided in the 2024 EIS on this matter.	Colville Consulting Inc.	Acknowledged. No further action.
Habitat for Endangered or Threatened Species The revised EIS has provided additional discussion with respect to SAR bats and their habitat within and adjacent to the subject property, in response to the previous peer review comments on this matter. Specifically, the number of acoustic recordings collected that were unable to be categorized as "Low" vs "High" frequencies have been identified and manual vetting of the recordings has occurred. Additional consideration with respect to the timing of Little Brown Myotis (Myotis lucifugus) detections has also been provided in addition to an assessment	Colville Consulting Inc.	Acknowledged. No further action.

of the potential for bat habitat to occur within isolated trees throughout the property.		
Advisory Comment It should be noted that Eastern Red Bat (Lasiurus borealis), Hoary Bat (Lasiurus cinereus), and Silver-haired Bat (Lasionycteris noctivagans) (all reported as present within the EIS) have been newly assessed as Endangered by the Committee on the Status of Species at Risk in Ontario (COSSARO) and will be protected by the ESA as of January 31, 2025. As a result, it is recommended that ongoing and future considerations regarding SAR bats and their habitat should extend to these species.	Colville Consulting Inc.	Acknowledged.
<u>Significant Wildlife Habitat</u> Within previous comments provided by NRSI staff it was recommended that an approach to compensation for the removal of portions of the Fresh-Moist Deciduous Woodland (WODM5) community be provided in order to offset the partial removal of this feature, portions of which have been identified as Significant Wildlife Habitat (SWH). The revised EIS has prescribed that the buffers identified between the proposed lot boundaries and adjacent woodlands, and wetlands, should be restored to enhance the ecological function of those buffers. This is proposed to be achieved through the planting of native trees and shrubs, and additional habitat enhancement works. It is noted that the EIS recommends that a detailed enhancement plan will be prepared as a condition of future approvals. NRSI staff are supportive of this approach and recommend that a detailed habitat enhancement plan be prepared as a future condition of approval, and include relevant restoration details such as the species, location, size, and quantity of plantings. It is recommended that this plan also include details of a monitoring program and survivorship thresholds to be achieved through the restoration works.	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.
Recommendations Consistent with the recommendation provided in the EIS, a detailed restoration/habitat enhancement plan should be prepared as a condition of approval. This plan should include specific details of the proposed restoration/habitat enhancement works to be completed within the woodland and	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.

wetland buffer areas, as well as a monitoring program to evaluate the success of the proposed restoration effort.		
<u>Significant Woodlands</u> As discussed within previous peer review comments, the EIS identifies that the proposed stormwater management pond will discharge into the adjacent woodland area, which includes both Significant Woodland and SWH. The EIS author identifies that the function of the woodland will not be negatively impacted and that individual tree mortality may be offset by the planting of salt-tolerant tree species native to the subject property. Previous peer review comments provided by NRSI staff expressed the need for greater detail regarding the quantity and quality of water being directed into the woodland areas. The revised EIS contains an additional assessment of impacts, including mitigation and offsetting measures (i.e., replacement planting) in response to potential future impacts within the woodland. In addition, the EIS recommends that a future monitoring program be prepared and completed to evaluate downstream impacts from the stormwater outfall, including potential impacts on tree health and the stability of soils within the outfall area. Where impacts are noted, it is recommended that replacement tree species known to be tolerant to salt, while still being consistent with the existing ecological community, are installed. NRSI staff are generally supportive of this proposed approach and agree that the proponent's ecologist and stormwater engineers should collaborate throughout the detailed design process and throughout the 2-year proposed monitoring period to determine mitigative options and identify necessary adaptive management activities.	Colville Consulting Inc.	Acknowledged. Noted for condition of approval and detailed design process.
As prescribed within the EIS, a specific monitoring plan should be prepared that outlines the frequency of monitoring, provides a description of the assessments that will be completed, and mortality thresholds that will trigger the requirement to plant replacement trees within this area. It is anticipated that this plan could be provided as a future condition of approval and that a more detailed analysis of potential stormwater management outfall impacts on the woodland can be provided at the detailed design stage.	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.
The EIS has also provided additional recommendations towards the mitigation of impacts to the Significant Woodland area, in response to the peer review comments provided in February 2024. This includes recommendations regarding the installation of rear-yard fencing and other mitigation measures known to be	Colville Consulting Inc.	Acknowledged. No further action.

appropriate to reduce impacts where woodlands occur in proximity to residential development. It is our opinion that the proposed mitigation measures are suitable.		
Recommendations • As prescribed in the EIS, a detailed monitoring plan should be prepared to evaluate potential downstream impacts of the stormwater management outfall within the woodland for a minimum of a 2-year period. Details should include the frequency of monitoring, assessments that will be completed, and mortality thresholds that will trigger the requirement to plant replacement trees within this area.	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.
<u>Wetlands (Core Greenlands)</u> As previously stated in the 2023 peer review comments, a considerable portion of the proposed development limit overlaps with the regulated wetland areas in the southwestern portion of the property. Specifically, Lots 1-4 and 6-8 appear to be partially overlapped by the 30m regulation limit associated with the wetland areas identified in Figure 4. It is noted that the wetland limits were refined through a site visit with Conservation Halton staff and the 30m regulation limit has been identified, in response to the February 2024 peer review comments.	Colville Consulting Inc.	Acknowledged.
The EIS references Ontario Regulation 41/24 and the HRCA Policy Document (HRCA 2024). The HRCA Policy Document states that "except as provided for in Policies 2.32.1 and 2.32.2, no new development is permitted within 30 metres of a Provincially Significant Wetland or a wetland greater than or equal to 2 ha in size". The size of the wetland overlapping a portion of the subject property has not been identified within the EIS. The extent of the wetland has also not been identified outside of the subject property. However, based on the extent of the wetland identified in Figure 4 and the extent of the vegetation community the EIS identifies as corresponding with the wetland limits, it is anticipated that this wetland area is greater than 2 ha in size. The author does not address whether or not the proposed development conforms to this policy requirement. It is anticipated that consultation with Conservation Halton will be required in order to confirm whether or not the proposed development conforms with the Conservation Authority's policy requirements. Specifically, confirmation should be sought from the conservation authority as to whether a reduced setback will be accepted. Confirmation of the	Colville Consulting Inc.	Discussions with Conservation Halton have occurred and as a result all buildings and structures have been removed from the buffer area. Conservation Halton advised that minor grading is able to occur in this setback area. Furthermore, an enhancement plan is to be provided through conditions of approval.

suitability of the reduced setback from the conservation authority is also a requirement of the Township of Puslinch Zoning By-law (2021).		
The EIS states that changes in the wetland hydrology as a result of the proposed development are not anticipated to impact this feature. In response to previous peer review comments, a preliminary water balance assessment has been completed to support the conclusion that the water quality and quantity directed to the adjacent wetland will not amount to a negative impact in the post-development scenario. While it is understood that the assessment provided as part of this EIS is considered preliminary, it is anticipated that a further assessment of water balance may be completed in conjunction with a stormwater management report at the detailed design stage. NRSI staff generally agree with the preliminary conclusions provided in the EIS and can provide further review upon receipt of the detailed water balance assessment.	Colville Consulting Inc.	Acknowledged. Noted for detailed design.
As recommended in the February 2024 peer review comments, additional mitigation measures have been prescribed within the revised EIS to support the reduction of potential impacts to the adjacent wetland features. It is understood that the prescribed buffers will undergo planting and additional enhancement management activities and that the details of these works will be provided in a detailed restoration/habitat enhancement plan to be prepared as a condition of approval. As stated above, this plan should include specific details of the proposed restoration/habitat enhancement works, as well as a monitoring program to evaluate the success of the proposed restoration effort.	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.
Recommendations • Consult with Conservation Halton to confirm the suitability of proposed development in relation to Conservation Halton regulated areas. Confirmation should be provided as to whether the proposed development limits in relation to the identified regulated wetland areas conform to the Conservation Authority's policy requirements; and,	Colville Consulting Inc.	Discussions with Conservation Halton have occurred and as a result all buildings and structures have been removed from the buffer area. Conservation Halton advised that minor grading is able to occur in this setback area.
• Consistent with the recommendations provided above, a detailed restoration/habitat enhancement plan should be prepared as a condition of approval. This plan should include specific details of the proposed restoration/habitat enhancement works to be completed within the	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.

woodland and wetland buffer areas, as well as a monitoring program to evaluate the success of the proposed restoration effort.		
Tree Preservation Plan The following comments and recommendations have been provided based on our review of the revised TPP prepared by Colville: • The TPP states that the Butternut (Juglans cinerea) directly adjacent to the subject property and development area is presumed to be a hybrid. Based on the site visit completed during May 2023 and the physical attributes observed, we agree with this conclusion. The revised TPP has identified the prescribed tree protection zone for this tree in relation to the development area. Based on the TPP mapping, it appears that the tree is well-setback from the proposed development works and the TPP shall be maintained in order to effectively preserve this tree. Consistent with the recommendation provided in the TPP, we agree that additional hybridity testing may be required, should changes to the development design require impacts with the tree protection zone for this tree;	Colville Consulting Inc.	Acknowledged. No further action.
• It is recommended that a revised TPP be prepared as a future condition of approval and that this revised TPP be informed by a detailed grading plan. The updated TPP should identify the tree protection zone of trees to be retained, which should be established using a suitable method consistent with arboricultural best practices (i.e., Dripline + 1m, ISA diameter-based calculation method, etc.). The tree protection zone for all trees to be retained should be visually identified in relation to the required grading works in order to effectively demonstrate how trees will be protected from development impacts;	Colville Consulting Inc.	Acknowledged. Noted for condition of approval.
• Many of the boundary trees currently prescribed for retention appear to have canopies and associated root zones that overlap the development area. This includes the canopy/root zone of tree #544, an off-property tree, which appears to be directly overlapped by “Street A”. Similar to the above comment, the tree protection zone for each of these trees and a combined “tree protection area” should be mapped and delineated with a proposed tree protection fencing alignment;	Colville Consulting Inc.	Acknowledged. Noted for detailed design stage.

• Consistent with the comments made within the TPP, any injury or removal of a boundary tree will require the written permission of each respective landowner prior to its removal. This is a requirement of the provincial Forestry Act (1990), and it is recommended that this be obtained prior to any tree removal activity being initiated;	Colville Consulting Inc.	Acknowledged.
• Consistent with Colville's comments under "Summary and Recommendations", tree retention and removal prescriptions should be informed by final grading and development details; and,	Colville Consulting Inc.	Acknowledged.
• We are in agreement with Colville's comment that compensation for trees removed from the subject property should be considered. In lieu of specific tree replacement requirements within the County or Township, it is recommended that tree compensation of 2:1 replacement, or greater, be considered.	Colville Consulting Inc.	Acknowledged.
Conclusion Based on our review of the EIS, TPP, and additional application materials, it is our opinion that recommendations made within the February 2024 peer review letter prepared by NRSI have been generally addressed through the revised reports prepared by Colville. Additional comments and recommendations have been made within this letter; however, it is anticipated that these may be addressed through future conditions of approval. Please do not hesitate to contact us if you require further clarification on these matters.	Colville Consulting Inc.	Acknowledged. Noted for conditions of approval.

Wellington Hydrogeology – Township Hydrogeologist
Angela Mason – amason@wellingtonhydrogeology.com / 519-831-9696
September 20, 2024

Comment	Consultant	Response
No Objection with the zoning application and further comments will be provided Wellington Hydrogeology Ltd. is pleased to provide hydrogeological comments on	Englobe	Noted

the above-noted submission for 11 Main Street (Lot 31, Concession 8) in the hamlet of Morriston, Township of Puslinch, Ontario (the site). Previous hydrogeological review comments were provided by Harden Environmental Services Ltd. dated April 13, 2023 (1st Submission) and February 2, 2024 (2nd Submission). Revised hydrogeological review comments are provided herein based on the 3rd submission responses and documents.		
Hydrogeological Comments – Priority **Water supply**: Englobe completed a desktop review of MECP water well records, identifying 228 wells within 500 m of the site (including 194 domestic/livestock supply wells and 6 commercial/public supply wells). While most wells were installed as drilled wells within the shallow or deep bedrock, 43 wells were installed within overburden and may be shallow dug wells, though this was not specifically discussed by Englobe.	Englobe	The comment is noted, there is potential for shallow dug wells. Of the noted overburden wells it is expected that the noted 14 monitoring wells were completed within overburden deposits. Shallow dug wells would be present within areas characterized by sand. Potential exists for additional unreported shallow dug wells predating well record regulations. Based on received responses to the completed well survey locations of shallow dug wells were not confirmed. Potential impacts to the shallow overburden from water taking were assessed during aquifer testing through monitoring on-site shallow monitoring wells completed within overburden deposits. A significant drawdown within monitoring wells was not observed.
The previous report by Terraprobe (2023a) indicated that test wells are to be installed as part of further investigations, which will also include a private well survey. Englobe (2024) report section 5.1 outlined the proposed water supply investigation, which includes drilling 3 test wells, conducting pumping tests, collecting groundwater quality samples for O.Reg.169/03 Schedule 1 and partial Schedule 2 (metals and inorganics), completing a private well survey within 250 m of	Englobe	Summary, response not required

the site and monitoring of groundwater levels and water quality in nearby private wells as part of the onsite pumping tests.		
The pumping test must be conducted in accordance with MECP Guideline D-5-5. We are also requesting analysis of all parameters in Schedules 1 and 2 of Ontario Regulation 169/03 in at least one of the supply wells.	Englobe	Comment noted, testing was completed over the duration of six hours at a rate of 37.8 L/min for each of the three completed test wells, for a total volume of 13,608 L. Daily water taking is expected at 450 L/day per person with a daily demand of 2,250 L and peak demand of 18.75 L/min based on five-person occupancy. Test wells are capable of meeting expected residential demand. Analysis of all parameters within Schedules 1 and 2 of O. Reg. 169/03 was completed for TW2. Exceedances were noted for low levels of total coliform (1 CFU/100 mL), hardness, total dissolved solids, colour, total iron, and total manganese. Groundwater is considered suitable for residential use.
It is our recommendation to the Township that the water supply evaluation be completed prior to ZBA approval as the results will determine the feasibility of sustainable water supply (both quality and quantity) for the proposed number of lots, while also evaluating impacts to existing groundwater users in the vicinity of the site. The remaining hydrogeological comments are to be addressed at the detailed design stage.	Englobe	Noted
Hydrogeological Comments – Detailed Design Stage **Topography and drainage**: Section 3.1 of the report indicates that "topography of the site is sloping downwards in a northwest direction. As such, it is anticipated that generated runoff (if not managed) will flow in a northwesterly direction." This interpretation is incorrect based on the Topography Map (Figure 5).	Englobe	Noted, comment will be address at the detailed design stage

Please revise/clarify (at the detailed design submission stage).		
High groundwater table: Groundwater monitoring was completed within the four onsite monitoring wells between August 24 and September 19, 2022. Additional groundwater monitoring was completed on July 18 and August 6, 2024. The highest groundwater elevation measured to date was 312.86 masl at BH3 on July 18, 2024. In the absence of spring freshet monitoring data, the project hydrogeologist interprets the July 2024 measurements as representative of the seasonal high groundwater table due to significant precipitation events preceding the July measurements.	Englobe	Summary, response not required
The proponent should complete monthly groundwater level monitoring for at least 12 consecutive months, including the spring freshet, prior to detailed design submission. The design elevations of building foundations, septic leaching beds, SWM facilities and LIDs (e.g., infiltration facilities) must be evaluated in relation to the high water table (required at the detailed design submission stage).	Englobe	Noted, comment will be address at the detailed design stage
Groundwater contribution to Bronte Creek: Terraprobe (2023a) indicated that further field investigations would be completed to assess the presence of groundwater seepage during seasonal high groundwater conditions. Englobe (2024) did not include details of groundwater seepage or vertical gradients within the updated report.	Englobe	Noted, comment will be address at the detailed design stage
We recommend the installation of shallow piezometers to monitor baseline conditions and vertical gradients within Bronte Creek on the site, with monitoring completed at the same frequency to groundwater level monitoring on the site (i.e., monthly for at least one year, including the spring groundwater high) (required at the detailed design submission stage).	Englobe	Noted
Groundwater flow direction: Englobe interpreted that a shallow groundwater flow divide was present with the highest groundwater elevation at BH3, with groundwater flow to both the west (toward Bronte Creek) and to the east (toward the tributary of Bronte Creek and associated wetlands). Englobe also noted that residential properties to the north were considered upgradient, suggesting local flow to the south (toward the site) toward surface water features.	Englobe	Noted, comment will be address at the detailed design stage

We generally concur with this assessment of shallow groundwater flow. On a regional scale, deeper groundwater flow is typically to the south-southeast within Puslinch in the general vicinity of the site – it is recommended that the project hydrogeologist confirm and interpret deeper/regional groundwater flow as well (at the detailed design submission stage).		
Shallow groundwater quality: Groundwater quality samples were collected in 2022 from three shallow monitoring wells on the site as part of the nitrate impact assessment report, which were analyzed for nitrate, nitrite, phosphorus, ammonia/ammonium, and pH. Additional analysis was requested to characterize the shallow groundwater quality, including general chemistry, metals and nutrients, with comparison to the Ontario Drinking Water Quality Standards (ODWS).	Englobe	Noted
Englobe collected additional groundwater quality samples from all four monitoring wells on August 6, 2024 for general groundwater chemistry characterization analysis including nutrients, dissolved metals and inorganic parameters, with the results compared to the ODWS. The results showed elevated hardness in all monitoring wells. The sample from BH3 also had elevated total dissolved solids (TDS), sodium, chloride and nitrate relative to the samples from other wells. Can the project hydrogeologist provide an explanation for the elevated TDS, sodium, chloride and nitrate at BH3? (at the detailed design submission stage)	Englobe	Noted, comment will be address at the detailed design stage
Surface water quality: Englobe collected a surface water quality sample from Bronte Creek on August 6, 2024, with the results compared to the ODWS. The surface water sample contained elevated concentrations of chloride, sodium, manganese, iron, hardness, TDS, turbidity and colour. The results are indicative of impacts from road deicing salt. We recommend that the surface water quality results also be compared to the Provincial Water Quality Objectives (at the detailed design submission stage) as they are more applicable for evaluating surface water quality.	Englobe	Noted, comment will be address at the detailed design stage
Bronte Creek impact assessment: Englobe (2024) evaluated the impact of phosphorus and nitrate loading to Bronte Creek. Nitrate concentrations were quantified using a mass balance calculation and are expected to be below the	Englobe	Acknowledged. No further action.

CWQG limit of 2.93 mg/L. Impacts from total phosphorus were not quantified but were not expected to have significant impacts to surface water.		
We recommend that the project hydrogeologist quantify the predicted phosphorus concentration at the surface water feature (e.g., using the Robertson attenuation method, dilution or equivalent) (at the detailed design submission stage).	Englobe	Noted, comment will be address at the detailed design stage
Groundwater recharge facilities: The soakaway pits were designed by Crozier (December 2023) based on the hydraulic conductivity estimates determined by Terraprobe (2023). The infiltration estimates should be confirmed with soil infiltration testing at representative locations and appropriate depths based on the proposed septic beds and soakaway pits. Infiltration testing will confirm soil conditions and field saturated hydraulic conductivity/infiltration rates. The proposed depths/elevations of subsurface infiltration structures must also be evaluated alongside the annual high groundwater table elevation across the site (required at the detailed design submission stage).	Englobe	Noted, comment will be address at the detailed design stage
Construction dewatering: The project hydrogeologist must consider the high groundwater table in the assessment of construction dewatering requirements. If groundwater dewatering is required, management of discharge water quantity and quality must be discussed (required at the detailed design submission stage).	Englobe	Noted, comment will be address at the detailed design stage
Phase One ESA: The Phase One Environmental Site Assessment (ESA) completed by Niagara Soils Solutions Ltd. (March 2022) was updated (August 2024) and the previous recommendation for a Phase Two ESA was changed. The previously identified Areas of Potential Environmental Concern (APEC) related to off-site Potentially Contaminating Activities (PCA) related to metal fabrication and commercial autobody shops was changed to remove the on-site APEC as the off-site welding activities were more than 30 m from the property boundary therefore not interpreted as an APEC. A Phase Two ESA is no longer recommended.		Acknowledged. No further action.
Excess soil management: Any import/export of fill/soil from the site must be conducted in accordance with O. Reg. 406/19: On-Site and Excess Soil	Niagara Soil Solutions Ltd	Acknowledged

Management, the Rules for Soil Management and Excess Soil Quality Standards (Soil Rules) and O. Reg. 153/04, as amended.		

Province of Ontario – Ministry of Transportation
Allan Hodgins – Allan.Hodgins@ontario.ca / (226) 973-8580
September 23, 2024

Comment	Consultant	Response
The Ministry of Transportation (MTO) has completed our review of the 3rd submission of the draft plan of subdivision prepared by Weston Consulting dated September 03, 2024, and associated package for 11 Highway 6, Morriston ON. The following outlines our comments: The MTO does not oppose the proposed zoning amendments, however the following comments will need to be addressed as conditions of draft plan approval or MTO permit.	-	Acknowledged.
Blocks and Land Use: MTO has no objections with the proposed block configuration and access as proposed from Ochs Street.		Acknowledged. No further action.
Stormwater Management: • To ensure that stormwater runoff from this property does not adversely affect our highway drainage system or highway corridor, MTO requires the owner to submit a Storm Water Management Report (SWMR) along with the above-noted grading/drainage plans for the proposed development for our review and approval. MTO Stormwater Management Requirements for Land Development Proposals can be obtained from the following website: https://www.ontario.ca/page/resources-transportation-planners#section-5 ○ The owner's drainage consultant should refer to the ministry website for applicable IDF curves and the ministry's Stormwater Management Requirements for Land Development Proposals.	Crozier	Acknowledged. To be completed through detailed design. Stormwater Management Report also provided through this resubmission.

http://www.mto.gov.on.ca/IDF_Curves/terms.shtml ○ The owner's drainage consultant shall ensure that all return periods are assessed (2yr, 5yr, 10yr, 25yr, 50yr, 100yr and Regional).		
• Stormwater Management Blocks are to be assumed and owned by the Township of Puslinch.	Owner	Acknowledged.
Traffic Impact Review MTO has reviewed the revised Traffic Impact Study prepared by GHD, dated June 28, 2024, and confirm the report addresses the items MTO previously identified and have no further comments.	GHD	Acknowledged. No further action.
Proposed Conditions of Draft Plan Approval The following are MTO's proposed Conditions of Draft Approval: 1. That prior to final approval, the owner(s) to submit to the Ministry of Transportation for review and approval, a copy of a Traffic Impact Study indicating the anticipated traffic volumes and their impact on Highway 6 and Badenoch St intersection. The Traffic Impact Study will be prepared in accordance with MTO's Traffic Impact Study Guidelines. The owner's transportation consultant shall be RAQS certified.	Owner / GHD	Acknowledged. Condition of Approval.
2. That prior to final approval, the owner shall submit a stormwater management report along with grading/drainage plans for the proposed development for review and approval.	Owner / Crozier	Acknowledged. Condition of Approval.
3. That Prior to final approval, the owner shall submit to the Ministry of Transportation for review and approval a draft copy of the M-Plan for this subdivision.	Owner / Weston Consulting	Acknowledged. Condition of Approval.
4. That prior to final approval, the owners shall provide the Ministry of Transportation for review and approval, the Conditions of Draft Plan Approval and Draft Subdivision Agreement to ensure our requirements have been incorporated.	Owner	Acknowledged. Condition of Approval.
Notes to Draft Plan Approval - Conditions of MTO Permits:	Owner	Acknowledged.

The owner should be made aware that under the Public Transportation and Highway Improvement Act (PTHIA), MTO permits are required prior to development of the subject property. The owner shall submit site plans, site-servicing plans, grading plans, and drainage plans for the proposed development to MTO for review and approval.		
1. MTO Building and Land Use permit(s) will be required prior to any bulk grading, and subdivision servicing.	Owner	Acknowledged.
2. MTO Building and Land Use permit(s) for all of the individual residential lots proposed, as all fall within the MTO Permit Control Area.	Owner	Acknowledged.

Salvini Consulting – Township Traffic Consultant Julia Salvini September 19, 2024		
Comment	**Consultant**	**Response**
I've reviewed the June 2024 TIS prepared by GHD for the proposed residential subdivision in Morriston. The study has addressed my previous comments as outlined below. • Base traffic data, the background growth assumptions, the traffic generation and distribution, and the future total traffic volumes are all acceptable. I agree with the capacity analyses at the Badenoch/Ochs and Ochs/Back intersections. • The updated sightline assessment exiting Ochs Street to Badenoch Street illustrates that appropriate sight distance is available for vehicles turning at the intersection under a variety of conditions, conditional on the realignment and reconstruction of the retaining wall on the southwest corner of the intersection. I agree with the sightline assessment. • Crozier, the Civil Engineer for the project, has prepared a drawing illustrating how the retaining wall at the southwest corner of the Badenoch/Ochs intersection could be reconfigured to meet the sightline requirements at the intersection. This will be reviewed in more detail with GEI Consultants. • Ochs Street is narrow and requires reconstruction to meet Township standards. It is also my understanding that it will be realigned slightly to the east. • The proposed cross-section included in the study for new Street A has been updated to reflect the Township's 20 metre urban cross-section as requested. Please let me know if there is anything further to discuss on this application or if you have any further questions.	GHD	Acknowledged. All previous comments addressed.

WESTON CONSULTING

Township of Puslinch
Planning and Development
7404 Wellington Road 34,
Puslinch, ON
N0B 2J0

November 20, 2024
File: 10779

County of Wellington
Planning and Development
74 Woolwich Street
Guelph, ON
N1H 3T9

Attn: Lynne Banks, Development and Legislative Coordinator, Township of Puslinch
Meagan Ferris, Manager of Planning and Environment, County of Wellington

Re: Fourth Submission Zoning By-law Amendment and Draft Plan of Subdivision
11 Main Street, Morriston
Township of Puslinch

Weston Consulting is the planning consultant for WDD Main Street Inc., the registered owner of the lands located at 11 Main Street (Lot 31, Concession 8) in the Township of Puslinch (the "Subject Lands"). We are pleased to submit the following materials in support of a Zoning By-law Amendment and Draft Plan of Subdivision application for a proposed residential subdivision consisting of 21 detached dwelling lots, environmental protection lands, a stormwater management pond and municipal roads.

Description of Subject Property

The Subject Lands are currently vacant and located southeast of the Main Street and Badenoch Street intersection in Morriston. The Subject Lands are surrounded by open spaces to the east and south, and single-detached dwellings to the north and west. The Subject Lands have an approximate area of 23.48 hectares (58.03 acres) and an approximate frontage of 12 metres at the terminus of Main Street and 20 metres at the current terminus of Ochs Street.

The County of Wellington Official Plan designates the northwesterly portion of the Subject Lands as *Residential,* and the easterly and southerly portion of the subject lands as *Greenlands*, and a small portion is designated *Core Greenlands*. The Township of Puslinch Comprehensive Zoning By-law 023-18 zones the majority of the Subject Lands as *Future Development (FD2)* and a minor portion of the north-easterly corner as *Urban Residential (UR),* and a minor southeasterly and southerly portion of the subject lands as *Natural Environment (NE)*. The southwestern, southern and eastern part of the subject lands are overlayed by the Environmental Protection zone. A portion of the subject lands to the west and south are within the Halton Region Conservation Authority (HRCA) regulated area.

Background

A preliminary Concept Plan was submitted to the Township as part of a Pre-Consultation process to receive feedback and a list of required materials for a Complete Application. The Township provided Pre-Consultation comments to the applicant dated February 1st, 2022 which identified comments to be considered as well as materials required for a Complete Application for Zoning By-law Amendment and Draft Plan of Subdivision.

On March 1, 2023, a formal Zoning By-law Amendment and Draft Plan of Subdivision application were submitted to the Township and County. The submission was deemed incomplete on May 3, 2023 due to comments that needed to be addressed. Detailed comments were provided from the Town on April 13, 2023. An updated submission of Zoning By-law Amendment and Draft Plan of Subdivision applications was provided to the Township and County on January 10, 2024 addressing the comments from the previous submission. Detailed comments were provided by the Township on February 20, 2024. Furthermore, a subsequent submission addressing comments provided on February 20, 2024 was made on September 5, 2024. New comments were provided by the Township on October 31, 2024.

The purpose of this submission is to provide the Township and County with the updated technical materials to address the specific comments provided on October 31, 2024. As part of this submission, there were no changes to the Draft Plan of Subdivision. It is our intent to move through the statutory planning process to address any outstanding comments. We ask that a Public Meeting be scheduled at the earliest available date to engage with the Public, and provide them an opportunity to provide comments through the appropriate statutory process.

Submission Materials

The following materials are being provided electronically, and address the comments from the Township of Puslinch regarding the By-law Amendment Application.

No.	Document	Consultant	Date
1.	Draft Plan of Subdivision	Weston	September 3, 2024
2.	Draft Zoning By-law Amendment Text		November, 2024
3.	Planning Justification Report Addendum Letter		November, 2024
4.	Hydrogeological Letter – Results of Test Well Drilling and Aquifer Testing (includes Test Well Results)	Englobe	November 19, 2024
5.	Environmental Impact Study Addendum Letter	Colville	
6.	Functional Servicing and Preliminary Stormwater Management Report (Incl. Hydrologic and Hydraulic)*	Crozier	November, 2024
7.	Civil Engineering Drawing Package		November 15, 2024
8.	Servicing Review Letter for Additional Residential Units and Home-Based Businesses		November 15, 2024
9.	Traffic Review Letter for Additional Residential Units and Home-Based Businesses	GHD	November 13, 2024
10.	Hydrogeological Letter for Additional Residential Units and Home-Based Businesses	Englobe	November 19, 2024
11.	Comment-Response Matrix	All	November, 2024

We trust that the above documents are sufficient for your review and circulation of the Zoning By-law Amendment and Draft Plan of Subdivision applications. Should you have any questions please contact the undersigned at ext. 315 or Michael Pizzimenti at ext. 365.

Yours truly,
Weston Consulting
Per:

Kayly Robbins, MPL, MCIP, RPP
Senior Planner

c. WDD Main Street Inc.

December 2, 2024

Project T1220482.003

Weston Consulting
Millway Avenue, Unit 19
Concord, ON L4K 5K8

Attention: Kayly Robbins, Senior Planner, MPL, MCIP, RPP

Subject: **Addendum to Hydrogeological Investigation**
Results of O. Reg. 169/03 Schedule 2 Sampling
Proposed Residential Development - 11 Main Street
Puslinch, Ontario

Dear Ms. Robbins:

The purpose of this letter is to provide the results of analysis for completed O.Reg. 169/03 Schedule 2 sampling completed for TW3, one of the three completed test wells for the above noted proposed residential development. Groundwater sampling was completed on October 31, 2024, through a test pump installed by Aardvark Drilling for aquifer testing completed October 8, 2024, reported under separate cover.

Additional sampling was carried out for the full list of parameters within O.Reg. 169/03 for TW3, the remaining test wells were analyzed for a partial list of parameters, including metals and inorganics. Groundwater samples were collected from the pump discharge after a pumping duration of approximately one hour at a rate of 37.8 L/min. Samples were collected in laboratory supplied bottles appropriate for the completed analysis. All collected samples were stored in laboratory supplied coolers on ice for transport to Agat Laboratories of Mississauga, a CALA accredited third party laboratory, for analysis. Temperatures were confirmed within a suitable range upon receipt by the laboratory.

The following table provides a summary of the results of analysis for the expanded parameters sampled at TW3:

Summary of Results of Analysis - O.Reg. 169/03 - Schedule 2

Parameter (mg/L)	O.Reg. 169/03 Limit	Result
Alachlor	0.005	<0.0005
Arsenic	0.01	<0.003
Azinphos-methyl	0.02	<0.002
Benzene	0.001	<0.00020
Boron	5.0	0.017
Bromoxynil	0.005	<0.0003
Carbaryl	0.09	<0.005
Carbon Tetrachloride	0.002	<0.00020
Chlorate	1.0	N/A
Chlorpyrifos	0.09	<0.001
Cyanide	0.2	<0.002
Dicamba	0.12	<0.0005
1,4-Dichlorobenzene	0.005	<0.00010

Parameter (mg/L)	O.Reg. 169/03 Limit	Result
Antimony	0.06	<0.003
Atrazine	0.005	<0.0005
Barium	1.0	0.408
Benzo(a)pyrene	0.00001	<0.000001
Bromate	0.01	N/A
Cadmium	0.005	<0.0001
Carbofuran	0.09	<0.005
Chloramines	3.0	<0.0001
Chlorite	1.0	N/A
Chromium	0.05	<0.003
Diazinon	0.02	<0.001
1,2-Dichlorobenzene	0.2	<0.00010
1,2-Dichloroethylene	0.014	<0.00020

Parameter (mg/L)	O.Reg. 169/03 Limit	Result
1,1-Dichloroethylene	0.014	<0.0002
2,4-Dichlorophenol	0.9	<0.0002
Diclofop-methyl	0.009	<0.0005
Dioxin and Furan	1.5 x 10^{-8} TCCD	Not Detected
Diuron	0.15	<0.01
Fluoride	1.5	<0.05
Haloacetic Acids	0.8	<0.002
Malathion	0.19	<0.005
2-Methyl-4-chlorophenoxyacetic Acid	0.1	<0.005
Metribuzin	0.08	<0.00025
Monochlorobenzene	0.08	<0.00010
Nitrite	1.0	<0.05
NDMA	0.000009	<0.0005
Pentachlorophenol	0.06	<0.0005
Picloram	0.19	<0.0005
Prometryne	0.001	<0.00025
Simazine	0.01	<0.001
Tetrachloroethylene	0.01	<0.00020
Toluene	0.06	<0.00020
Trichloroethylene	0.005	<0.00020
Trifluralin	0.045	<0.001
Uranium	0.02	0.0007
Xylenes	0.09	<0.00020

Parameter (mg/L)	O.Reg. 169/03 Limit	Result
Dichloromethane	0.05	<0.00020
2,4-D	0.1	<0.0005
Dimethoate	0.02	<0.0025
Diquat	0.07	<0.005
Ethylbenzene	0.14	<0.00010
Glyphosate	0.28	<0.02
Lead	0.010	0.0010
Mercury	0.001	<0.0001
Metolachlor	0.05	<0.00011
Microcystin LR	0.0015	N/A
Nitrate	10.0	0.91
NTA	0.4	0.0012
Paraquat	0.01	<0.001
Phorate	0.002	<0.0005
PCB	0.003	<0.0001
Selenium	0.05	<0.002
Terbufos	0.001	<0.0005
2,3,4,6-Tetrachlorophenol	0.1	<0.0005
Triallate	0.23	<0.001
2,4,6-Trichlorophenol	0.005	<0.0005
Trihalomethanes	0.100	N/A
Vinyl Chloride	0.001	<0.00017

The laboratory certificates of analysis are provided in the attached enclosures.

Microcystins were not evaluated, since the source is groundwater of which cyanobacteria do not pose an issue (i.e., surface water). Trihalomethanes were not analyzed, as these are a byproduct of chlorination, in addition to the anions of bromate, chlorate, and chlorite. These parameters are considered as byproducts of using chlorine dioxide in the treatment of water for potable use. Since analysis was completed on untreated groundwater these analyses were not completed and are not considered applicable.

Of the remaining Schedule 2 parameters, exceedances above O. Reg. 169/03 standards were not noted. Based on the completed sampling groundwater was tested to be of suitable quality for potable use. Health related exceedances of O. Reg. 169/03 were not observed within completed groundwater sampling.

If you require additional information, please do not hesitate to contact the undersigned.

Yours very truly,

Englobe Corp.

[redacted]

Paul L. Raepple, P.Geo.
Senior Hydrogeologist

Enclosures

Laboratory Certificates of Analysis

Enclosures

ENGLOBE

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: ENGLOBE CORP.
903, BARTON CREEK
STONEY CREEK, ON L8E5P5
(905) 643-7560
ATTENTION TO: Nicole Burke
PROJECT: T-1-22-0482.003
AGAT WORK ORDER: 24T215439
TRACE ORGANICS REVIEWED BY: Radhika Chakraberty, Trace Organics Lab Manager
ULTRA TRACE REVIEWED BY: Roza Mokhtari, Chimiste, AGAT Montréal
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead
DATE REPORTED: Nov 29, 2024
PAGES (INCLUDING COVER): 37
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Base Neutrals and Acids [Water]

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Naphthalene	µg/L		0.30	1.22
Acenaphthylene	µg/L		0.31	<0.31
Acenaphthene	µg/L		0.30	<0.30
Fluorene	µg/L		0.31	<0.31
Phenanthrene	µg/L		0.32	<0.32
Anthracene	µg/L		0.30	<0.30
Fluoranthene	µg/L		0.27	<0.27
Pyrene	µg/L		0.20	<0.20
Benzo(a)anthracene	µg/L		0.20	<0.20
Chrysene	µg/L		0.27	<0.27
Benzo(b)fluoranthene	µg/L		0.20	<0.20
Benzo(k)fluoranthene	µg/L		0.20	<0.20
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.20	<0.20
Dibenzo(a,h)anthracene	µg/L		0.20	<0.20
Benzo(g,h,i)perylene	µg/L		0.20	<0.20
Phenol	µg/L		1.0	60.0
Bis(2-chloroethyl)ether	µg/L		0.5	<0.5
2-Chlorophenol	µg/L		0.5	<0.5
o-Cresol	µg/L		0.5	6.4
Bis(2-chloroisopropyl)ether	µg/L		0.5	<0.5
m&p-Cresol	µg/L		0.5	10.6
Hexachloroethane	µg/L		0.5	<0.5
2,4-Dimethylphenol	µg/L		0.5	<0.5
2,4-Dichlorophenol	µg/L		0.3	<0.3
1,2,4-Trichlorobenzene	µg/L		0.5	<0.5
p-Chloroaniline	µg/L		1.0	<1.0
Hexachlorobutadiene	µg/L		0.4	<0.4
2-and 1-methyl Napthalene	µg/L		0.5	<0.5

Certified By: [redacted]

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Base Neutrals and Acids [Water]

DATE RECEIVED: 2024-10-31 **DATE REPORTED: 2024-11-29**

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
2,4,6-Trichlorophenol	µg/L		0.2	<0.2
2,4,5-Trichlorophenol	µg/L		0.2	<0.2
1,1-Biphenyl	µg/L		0.5	<0.5
Dimethyl phthalate	µg/L		0.5	<0.5
2,6-Dinitrotoluene	µg/L		0.5	<0.5
2,4-Dinitrotoluene	µg/L		0.5	<0.5
2,3,4,6-Tetrachlorophenol	µg/L		0.5	<0.5
Diethyl phthalate	µg/L		0.5	<0.5
Hexachlorobenzene	µg/L		0.5	<0.5
Pentachlorophenol	µg/L		0.5	<0.5
3,3'-dichlorobenzidine	µg/L		0.5	<0.5
Bis(2-Ethylhexyl)phthalate	µg/L		0.5	<0.5
2,4-Dinitrophenol	µg/L		10	<10
Sediment				1
Surrogate	**Unit**	**Acceptable Limits**		
2-Fluorophenol	%	50-140		75
phenol-d6 surrogate	%	50-140		70
2,4,6-Tribromophenol	%	50-140		67
Chrysene-d12	%	50-140		77

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amounts

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Carbamate Pesticides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243
Aldicarb	µg/L		2.0	<2.0
Bendiocarb	µg/L		2	<2
Carbofuran	µg/L		5	<5
Carbaryl	µg/L		5	<5
Diuron	µg/L		10	<10
Triallate	µg/L		1	<1
Temephos	µg/L		10	<10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Glyphosate in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243Zh**	
Glyphosate	µg/L		20	<20	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Haloacetic Acids in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Monobromoacetic Acid	ug/L		0.5	<0.5
Monochloroacetic Acid	ug/L		0.5	<0.5
Dichloroacetic Acid	ug/L		0.5	<0.5
Dibromoacetic Acid	ug/L		0.5	<0.5
Trichloroacetic Acid	ug/L		0.5	1.2
Haloacetic Acids (HAA5)	ug/L		2.0	<2.0
Bromochloroacetic Acid	ug/L		0.5	<0.5
Surrogate	**Unit**	**Acceptable Limits**		
2-Bromopropionic Acid	%	70-130		95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Haloacetic Acids (HAA5) is a calculated parameter. The calculated value is the sum of Monobromoacetic Acid, Monochloroacetic Acid, Dichloroacetic Acid, Dibromoacetic Acid and Trichloroacetic Acid.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

OP Pesticides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Phorate	µg/L		0.5	<0.5
Dimethoate	µg/L		2.5	<2.5
Terbufos	µg/L		0.5	<0.5
Diazinon	µg/L		1	<1
Malathion	µg/L		5	<5
Chlorpyrifos	µg/L		1	<1
Parathion	µg/L		1	<1
Azinphos-methyl	µg/L		2	<2
Surrogate	**Unit**	**Acceptable Limits**		
Triphenyl phosphate (surr)	%	50-140		92

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ODWS - Table D
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Paraquat/Diquat (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**	
Paraquat	µg/L		1	<1	
Diquat	µg/L		5	<5	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Phenoxy Acid Herbicides (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		**BH4**
		SAMPLE TYPE:		**Water**
		DATE SAMPLED:		**2024-10-31 09:45**
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
2,4-D	µg/L		0.5	<0.5
2,4,5-T	µg/L		0.5	<0.5
2,4,5-TP	µg/L		0.5	<0.5
Dicamba	µg/L		0.5	<0.5
Dichlorprop	µg/L		0.5	<0.5
Dinoseb	µg/L		0.5	<0.5
Picloram	µg/L		0.5	<0.5
Diclofop-methyl	µg/L		0.5	<0.5
2,3,4,6-Tetrachlorophenol	µg/L		0.5	<0.5
2,4-Dichlorophenol	µg/L		0.2	<0.2
2,4,5-Trichlorophenol	µg/L		0.5	<0.5
2,4,6-Trichlorophenol	µg/L		0.5	<0.5
Bromoxynil	µg/L		0.3	<0.3
MCPA	µg/L		5.0	<5.0
MCPP	µg/L		5.0	<5.0
Pentachlorophenol	µg/L		0.1	<0.1
Surrogate	**Unit**	**Acceptable Limits**		
DCAA	%	50-140		80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Total PCBs (Water)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		**BH4**
		SAMPLE TYPE:		**Water**
		DATE SAMPLED:		**2024-10-31 09:45**
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
PCBs	µg/L		0.1	<0.1
Surrogate	**Unit**	**Acceptable Limits**		
Decachlorobiphenyl	%	60-130		112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Triazine Pesticides [Water]

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Trifluralin	µg/L		1.0	<1.0
Simazine	µg/L		1.0	<1.0
Atrazine	µg/L		0.5	<0.5
Metribuzin	µg/L		0.25	<0.25
Prometryne	µg/L		0.25	<0.25
Metolachlor	µg/L		0.11	<0.11
Alachlor	µg/L		0.5	<0.5
Cyanazine	µg/L		1.0	<1.0
Surrogate	**Unit**	**Acceptable Limits**		
Triphenyl phosphate (surr)	%	30-130		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ODWS - Table D
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6278243 Results relate only to the items tested.

Analysis performed at AGAT Toronto (unless marked by *)

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243
Dichlorodifluoromethane	µg/L		0.40	<0.40
Chloromethane	µg/L		0.20	<0.20
Vinyl Chloride	µg/L		0.17	<0.17
Bromomethane	µg/L		0.20	<0.20
Chloroethane	µg/L		0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40
Acetone	µg/L		1.0	<1.0
1,1-Dichloroethylene	µg/L		0.2	<0.2
Methylene Chloride	µg/L		0.30	<0.30
trans- 1,2-dichloroethylene	µg/L		0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20
Chloroform	µg/L		0.20	<0.20
1,2-Dichloroethane	µg/L		0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20
Benzene	µg/L		0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20
cis-1,3-Dichloropropene	µg/L		0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0
trans-1,3-Dichloropropene	µg/L		0.30	<0.30
1,1,2-Trichloroethane	µg/L		0.20	<0.20
Toluene	µg/L		0.20	<0.20
2-Hexanone	µg/L		1.0	<1.0
Dibromochloromethane	µg/L		0.10	<0.10

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Ethylene Dibromide	µg/L		0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20
Bromoform	µg/L		0.10	<0.10
Styrene	µg/L		0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10
o-Xylene	µg/L		0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10
1,2,4-Trichlorobenzene	µg/L		0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		0.30	<0.30
Xylenes (Total)	µg/L		0.20	<0.20
n-Hexane	µg/L		0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	50-140		106
4-Bromofluorobenzene	% Recovery	50-140		90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: [redacted]

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Dioxins and Furans (Water) WHO 2005

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		**BH4**
		SAMPLE TYPE:		**Water**
		DATE SAMPLED:		**2024-10-31 09:45**
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
2,3,7,8-Tetra CDD	pg/L		0.1	<0.1
1,2,3,7,8-Penta CDD	pg/L		0.2	<0.2
1,2,3,4,7,8-Hexa CDD	pg/L		0.1	<0.1
1,2,3,6,7,8-Hexa CDD	pg/L		0.1	<0.1
1,2,3,7,8,9-Hexa CDD	pg/L		0.1	<0.1
1,2,3,4,6,7,8-Hepta CDD	pg/L		0.1	<0.1
Octa CDD	pg/L		0.1	<0.1
2,3,7,8-Tetra CDF	pg/L		0.1	<0.1
1,2,3,7,8-Penta CDF	pg/L		0.1	<0.1
2,3,4,7,8-Penta CDF	pg/L		0.1	<0.1
1,2,3,4,7,8-Hexa CDF	pg/L		0.1	<0.1
1,2,3,6,7,8-Hexa CDF	pg/L		0.1	<0.1
2,3,4,6,7,8-Hexa CDF	pg/L		0.1	<0.1
1,2,3,7,8,9-Hexa CDF	pg/L		0.1	<0.1
1,2,3,4,6,7,8-Hepta CDF	pg/L		0.1	<0.1
1,2,3,4,7,8,9-Hepta CDF	pg/L		0.1	<0.1
Octa CDF	pg/L		0.1	0.3
Total Tetra CDD	pg/L		0.1	<0.1
Total Penta CDD	pg/L		0.2	<0.2
Total Hexa CDD	pg/L		0.1	<0.1
Total Hepta CDD	pg/L		0.1	<0.1
Total PCDDs	pg/L		0.2	<0.2
Total Tetra CDF	pg/L		0.1	<0.1
Total Penta CDF	pg/L		0.1	0.2
Total Hexa CDF	pg/L		0.1	<0.1
Total Hepta CDF	pg/L		0.1	<0.1
Total PCDFs	pg/L		0.1	0.5
2,3,7,8-Tetra CDD (TEQ)	pg TEQ/L			0
1,2,3,7,8-Penta CDD (TEQ	pg TEQ/L			0

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Dioxins and Furans (Water) WHO 2005

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	Unit	G / S	RDL	6278243	
1,2,3,4,7,8-Hexa CDD (TEQ)	pg TEQ/L			0	
1,2,3,6,7,8-Hexa CDD (TEQ)	pg TEQ/L			0	
1,2,3,7,8,9-Hexa CDD (TEQ)	pg TEQ/L			0	
1,2,3,4,6,7,8-Hepta CDD (TEQ)	pg TEQ/L			0	
Octa CDD (TEQ)	pg TEQ/L			0	
2,3,7,8-Tetra CDF (TEQ)	pg TEQ/L			0	
1,2,3,7,8-Penta CDF (TEQ)	pg TEQ/L			0	
2,3,4,7,8-Penta CDF (TEQ)	pg TEQ/L			0	
1,2,3,4,7,8-Hexa CDF (TEQ)	pg TEQ/L			0	
1,2,3,6,7,8-Hexa CDF (TEQ)	pg TEQ/L			0	
2,3,4,6,7,8-Hexa CDF (TEQ)	pg TEQ/L			0	
1,2,3,7,8,9-Hexa CDF (TEQ)	pg TEQ/L			0	
1,2,3,4,6,7,8-Hepta CDF (TEQ)	pg TEQ/L			0	
1,2,3,4,7,8,9-Hepta CDF (TEQ)	pg TEQ/L			0	
Octa CDF (TEQ)	pg TEQ/L			0.000102	
Total PCDDs and PCDFs (TEQ)	pg TEQ/L			0.000102	

Certified By:

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Dioxins and Furans (Water) WHO 2005

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:	BH4
		SAMPLE TYPE:	Water
		DATE SAMPLED:	2024-10-31 09:45
Surrogate	**Unit**	**Acceptable Limits**	**6278243**
13C-2,3,7,8-TCDF	%	30-140	63
13C-1,2,3,7,8-PeCDF	%	30-140	66
13C-2,3,4,7,8-PeCDF	%	30-140	37
13C-1,2,3,4,7,8-HxCDF	%	30-140	69
13C-1,2,3,6,7,8-HxCDF	%	30-140	70
13C-2,3,4,6,7,8-HxCDF	%	30-140	73
13C-1,2,3,7,8,9-HxCDF	%	30-140	65
13C-1,2,3,4,6,7,8-HpCDF	%	30-140	61
13C-1,2,3,4,7,8,9-HpCDF	%	30-140	53
13C-2,3,7,8-TCDD	%	30-140	62
13C-1,2,3,7,8-PeCDD	%	30-140	**13**
13C-1,2,3,4,7,8-HxCDD	%	30-140	76
13C-1,2,3,6,7,8-HxCDD	%	30-140	73
13C-1,2,3,4,6,7,8-HpCDD	%	30-140	59
13C-OCDD	%	30-140	59

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 LDR = LDE = Estimated Detection Limit
TEQ = Toxicity Equivalent
Toxicity Equivalency Factors (TEF) based on WHO 2005.
The results were corrected based on the surrogate percent recoveries.
Surrogate 13C-1,2,3,7,8-PeCDD is not within acceptance limits.

Analysis performed at AGAT Montréal (unless marked by *)

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

(Water) Inorganic Chemistry

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

		SAMPLE DESCRIPTION:		BH4
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Fluoride	mg/L		0.05	<0.05
Nitrate as N	mg/L		0.05	0.91
Nitrite as N	mg/L		0.05	<0.05
Cyanide, WAD	mg/L		0.002	<0.002
Total Antimony	mg/L		0.003	<0.003
Total Arsenic	mg/L		0.003	<0.003
Total Barium	mg/L		0.002	0.408
Total Boron	mg/L		0.010	0.017
Total Cadmium	mg/L		0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003
Total Lead	mg/L		0.0005	0.0010
Total Mercury	mg/L		0.0001	<0.0001
Total Selenium	mg/L		0.002	<0.002
Total Uranium	mg/L		0.0005	0.0007

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

[redacted]

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Chloramines

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

			SAMPLE DESCRIPTION:	BH4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243**
Chloramines - Total	mg/L		0.1	<0.1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6278243 Chloramines is a calculated parameter. The calculated parameter is non-accredited. The component parameters of the calculation are accredited.
TRC and Chloramines have been analyzed past the recommended holding time of 15 minutes from sampling. Field measurement recommended for most accurate result

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Water Analysis - Anion Scan in Water

DATE RECEIVED: 2024-10-31

DATE REPORTED: 2024-11-29

				SAMPLE DESCRIPTION:	BH4
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2024-10-31 09:45
Parameter	**Unit**	**G / S**	**RDL**	**6278243Zi**	
Chloride	mg/L		1.0	88.9	
Nitrate	mg/L		0.5	2.3	
Nitrite	mg/L		0.05	<0.05	
Sulfate	mg/L		1.0	34.3	
Fluoride	mg/L		0.01	<0.01	
Bromide	mg/L		0.1	<0.1	
Reporting- W					

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By:

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in Water (ug/L)															
Dichlorodifluoromethane	6279538		<0.40	<0.40	NA	< 0.40	106%	50%	140%	118%	50%	140%	110%	50%	140%
Chloromethane	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	73%	50%	140%	68%	50%	140%
Vinyl Chloride	6279538		<0.17	<0.17	NA	< 0.17	120%	50%	140%	107%	50%	140%	118%	50%	140%
Bromomethane	6279538		<0.20	<0.20	NA	< 0.20	95%	50%	140%	110%	50%	140%	92%	50%	140%
Chloroethane	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	107%	50%	140%	115%	50%	140%
Trichlorofluoromethane	6279538		<0.40	<0.40	NA	< 0.40	102%	50%	140%	115%	50%	140%	111%	50%	140%
Acetone	6279538		<1.0	<1.0	NA	< 1.0	107%	50%	140%	88%	50%	140%	79%	50%	140%
1,1-Dichloroethylene	6279538		<0.2	<0.2	NA	< 0.2	103%	50%	140%	91%	60%	130%	86%	50%	140%
Methylene Chloride	6279538		<0.30	<0.30	NA	< 0.30	105%	50%	140%	94%	60%	130%	104%	50%	140%
trans- 1,2-dichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	81%	50%	140%	84%	60%	130%	85%	50%	140%
Methyl tert-butyl ether	6279538		<0.20	<0.20	NA	< 0.20	72%	50%	140%	73%	60%	130%	60%	50%	140%
1,1-Dichloroethane	6279538		<0.30	<0.30	NA	< 0.30	74%	50%	140%	79%	60%	130%	85%	50%	140%
Methyl Ethyl Ketone	6279538		<1.0	<1.0	NA	< 1.0	97%	50%	140%	96%	50%	140%	92%	50%	140%
cis- 1,2-Dichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	76%	50%	140%	87%	60%	130%	72%	50%	140%
Chloroform	6279538		<0.20	<0.20	NA	< 0.20	67%	50%	140%	60%	60%	130%	71%	50%	140%
1,2-Dichloroethane	6279538		<0.20	<0.20	NA	< 0.20	94%	50%	140%	103%	60%	130%	85%	50%	140%
1,1,1-Trichloroethane	6279538		<0.30	<0.30	NA	< 0.30	87%	50%	140%	93%	60%	130%	71%	50%	140%
Carbon Tetrachloride	6279538		<0.20	<0.20	NA	< 0.20	84%	50%	140%	85%	60%	130%	89%	50%	140%
Benzene	6279538		<0.20	<0.20	NA	< 0.20	108%	50%	140%	112%	60%	130%	104%	50%	140%
1,2-Dichloropropane	6279538		<0.20	<0.20	NA	< 0.20	99%	50%	140%	102%	60%	130%	98%	50%	140%
Trichloroethylene	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	113%	60%	130%	109%	50%	140%
Bromodichloromethane	6279538		<0.20	<0.20	NA	< 0.20	80%	50%	140%	82%	60%	130%	86%	50%	140%
cis-1,3-Dichloropropene	6279538		<0.20	<0.20	NA	< 0.20	62%	50%	140%	63%	60%	130%	60%	50%	140%
Methyl Isobutyl Ketone	6279538		<1.0	<1.0	NA	< 1.0	100%	50%	140%	100%	50%	140%	103%	50%	140%
trans-1,3-Dichloropropene	6279538		<0.30	<0.30	NA	< 0.30	66%	50%	140%	63%	60%	130%	62%	50%	140%
1,1,2-Trichloroethane	6279538		<0.20	<0.20	NA	< 0.20	100%	50%	140%	106%	60%	130%	105%	50%	140%
Toluene	6279538		<0.20	<0.20	NA	< 0.20	109%	50%	140%	119%	60%	130%	113%	50%	140%
2-Hexanone	6279538		<1.0	<1.0	NA	< 1.0	106%	50%	140%	75%	50%	140%	77%	50%	140%
Dibromochloromethane	6279538		<0.10	<0.10	NA	< 0.10	63%	50%	140%	66%	60%	130%	72%	50%	140%
Ethylene Dibromide	6279538		<0.10	<0.10	NA	< 0.10	90%	50%	140%	95%	60%	130%	96%	50%	140%
Tetrachloroethylene	6279538		<0.20	<0.20	NA	< 0.20	114%	50%	140%	109%	60%	130%	118%	50%	140%
1,1,1,2-Tetrachloroethane	6279538		<0.10	<0.10	NA	< 0.10	69%	50%	140%	80%	60%	130%	80%	50%	140%
Chlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	103%	50%	140%	103%	60%	130%	99%	50%	140%
Ethylbenzene	6279538		<0.10	<0.10	NA	< 0.10	97%	50%	140%	106%	60%	130%	98%	50%	140%
m & p-Xylene	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	114%	60%	130%	110%	50%	140%
Bromoform	6279538		<0.10	<0.10	NA	< 0.10	64%	50%	140%	67%	60%	130%	51%	50%	140%
Styrene	6279538		<0.10	<0.10	NA	< 0.10	94%	50%	140%	96%	60%	130%	93%	50%	140%
1,1,2,2-Tetrachloroethane	6279538		<0.10	<0.10	NA	< 0.10	83%	50%	140%	93%	60%	130%	98%	50%	140%
o-Xylene	6279538		<0.10	<0.10	NA	< 0.10	108%	50%	140%	114%	60%	130%	110%	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	111%	50%	140%	113%	60%	130%	110%	50%	140%
1,4-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	109%	50%	140%	107%	60%	130%	106%	50%	140%
1,2-Dichlorobenzene	6279538		<0.10	<0.10	NA	< 0.10	109%	50%	140%	107%	60%	130%	105%	50%	140%
1,2,4-Trichlorobenzene	6279538		<0.30	<0.30	NA	< 0.30	110%	50%	140%	91%	60%	130%	99%	50%	140%
n-Hexane	6279538		<0.20	<0.20	NA	< 0.20	107%	50%	140%	96%	60%	130%	112%	50%	140%
Total PCBs (Water)															
PCBs	6275762		< 0.1	< 0.1	NA	< 0.1	96%	50%	140%	99%	50%	140%	98%	50%	140%
OP Pesticides (Water)															
Phorate	6246873		< 0.5	< 0.5	NA	< 0.5	87%	50%	140%	86%	50%	140%	87%	50%	140%
Dimethoate	6246873		< 2.5	< 2.5	NA	< 2.5	108%	50%	140%	101%	50%	140%	101%	50%	140%
Terbufos	6246873		< 0.5	< 0.5	NA	< 0.5	100%	50%	140%	73%	50%	140%	72%	50%	140%
Diazinon	6246873		< 1	< 1	NA	< 1	101%	50%	140%	94%	50%	140%	113%	50%	140%
Malathion	6246873		< 5	< 5	NA	< 5	106%	50%	140%	83%	50%	140%	71%	50%	140%
Chlorpyrifos	6246873		< 1	< 1	NA	< 1	103%	50%	140%	78%	50%	140%	90%	50%	140%
Parathion	6246873		< 1	< 1	NA	< 1	94%	50%	140%	90%	50%	140%	96%	50%	140%
Azinphos-methyl	6246873		< 2	< 2	NA	< 2	93%	50%	140%	79%	50%	140%	99%	50%	140%
Carbamate Pesticides (Water)															
Aldicarb	1		< 2.0	< 2.0	NA	< 2.0	99%	50%	140%	108%	50%	140%	NA	50%	140%
Bendiocarb	1		< 2	< 2	NA	< 2	64%	50%	140%	62%	50%	140%	NA	50%	140%
Carbofuran	1		< 5	< 5	NA	< 5	64%	50%	140%	62%	50%	140%	NA	50%	140%
Carbaryl	1		< 5	< 5	NA	< 5	81%	50%	140%	122%	50%	140%	NA	50%	140%
Diuron	1		< 10	< 10	NA	< 10	93%	50%	140%	86%	50%	140%	NA	50%	140%
Triallate	1		< 1	< 1	NA	< 1	99%	50%	140%	97%	50%	140%	NA	50%	140%
Temephos	1		< 10	< 10	NA	< 10	74%	60%	130%	81%	60%	130%	NA	60%	130%
Phenoxy Acid Herbicides (Water)															
2,4-D	1		< 0.5	< 0.5	NA	< 0.5	90%	50%	140%	85%	50%	140%	NA	50%	140%
2,4,5-T	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	82%	50%	140%	NA	50%	140%
2,4,5-TP	1		< 0.5	< 0.5	NA	< 0.5	80%	50%	140%	86%	50%	140%	NA	50%	140%
Dicamba	1		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	84%	50%	140%	NA	50%	140%
Dichlorprop	1		< 0.5	< 0.5	NA	< 0.5	102%	50%	140%	75%	50%	140%	NA	50%	140%
Dinoseb	1		< 0.5	< 0.5	NA	< 0.5	80%	50%	140%	76%	50%	140%	NA	50%	140%
Picloram	1		< 0.5	< 0.5	NA	< 0.5	84%	50%	140%	82%	50%	140%	NA	50%	140%
Diclofop-methyl	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	86%	50%	140%	NA	50%	140%
2,3,4,6-Tetrachlorophenol	1		< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	88%	50%	140%	NA	50%	140%
2,4-Dichlorophenol	1		< 0.2	< 0.2	NA	< 0.2	90%	50%	140%	90%	50%	140%	NA	50%	140%
2,4,5-Trichlorophenol	1		< 0.5	< 0.5	NA	< 0.5	89%	50%	140%	85%	50%	140%	NA	50%	140%
2,4,6-Trichlorophenol	1		< 0.5	< 0.5	NA	< 0.5	86%	50%	140%	87%	50%	140%	NA	50%	140%
Bromoxynil	1		< 0.3	< 0.3	NA	< 0.3	90%	50%	140%	85%	50%	140%	NA	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
MCPA	1		< 5.0	< 5.0	NA	< 5.0	98%	50%	140%	95%	50%	140%	NA	50%	140%
MCPP	1		< 5.0	< 5.0	NA	< 5.0	96%	50%	140%	81%	50%	140%	NA	50%	140%
Pentachlorophenol	1		< 0.1	< 0.1	NA	< 0.1	94%	50%	140%	98%	50%	140%	NA	50%	140%
Triazine Pesticides [Water]															
Trifluralin	6246873		< 1.0	< 1.0	NA	< 1.0	110%	50%	140%	67%	50%	140%	85%	50%	140%
Simazine	6246873		< 1.0	< 1.0	NA	< 1.0	97%	50%	140%	83%	50%	140%	100%	50%	140%
Atrazine	6246873		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	100%	50%	140%	114%	50%	140%
Metribuzin	6246873		< 0.25	< 0.25	NA	< 0.25	124%	50%	140%	107%	50%	140%	104%	50%	140%
Prometryne	6246873		< 0.25	< 0.25	NA	< 0.25	91%	50%	140%	81%	50%	140%	79%	50%	140%
Metolachlor	6246873		< 0.11	< 0.11	NA	< 0.11	98%	50%	140%	79%	50%	140%	101%	50%	140%
Alachlor	6246873		< 0.5	< 0.5	NA	< 0.5	94%	50%	140%	78%	50%	140%	107%	50%	140%
Cyanazine	6246873		< 1.0	< 1.0	NA	< 1.0	112%	50%	140%	87%	50%	140%	108%	50%	140%
Base Neutrals and Acids [Water]															
Naphthalene	6275685		< 0.30	< 0.30	NA	< 0.30	91%	50%	140%	71%	50%	140%	73%	50%	140%
Acenaphthylene	6275685		< 0.31	< 0.31	NA	< 0.31	82%	50%	140%	72%	50%	140%	76%	50%	140%
Acenaphthene	6275685		< 0.30	< 0.30	NA	< 0.30	88%	50%	140%	69%	50%	140%	69%	50%	140%
Fluorene	6275685		< 0.31	< 0.31	NA	< 0.31	110%	50%	140%	88%	50%	140%	78%	50%	140%
Phenanthrene	6275685		< 0.32	< 0.32	NA	< 0.32	111%	50%	140%	84%	50%	140%	72%	50%	140%
Anthracene	6275685		< 0.30	< 0.30	NA	< 0.30	108%	50%	140%	87%	50%	140%	78%	50%	140%
Fluoranthene	6275685		< 0.27	< 0.27	NA	< 0.27	100%	50%	140%	98%	50%	140%	94%	50%	140%
Pyrene	6275685		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	99%	50%	140%	95%	50%	140%
Benzo(a)anthracene	6275685		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	100%	50%	140%	98%	50%	140%
Chrysene	6275685		< 0.27	< 0.27	NA	< 0.27	112%	50%	140%	108%	50%	140%	102%	50%	140%
Benzo(b)fluoranthene	6275685		< 0.20	< 0.20	NA	< 0.20	113%	50%	140%	78%	50%	140%	84%	50%	140%
Benzo(k)fluoranthene	6275685		< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	90%	50%	140%	93%	50%	140%
Benzo(a)pyrene	6275685		< 0.01	< 0.01	NA	< 0.01	112%	50%	140%	82%	50%	140%	80%	50%	140%
Indeno(1,2,3-cd)pyrene	6275685		< 0.20	< 0.20	NA	< 0.20	77%	50%	140%	103%	50%	140%	63%	50%	140%
Dibenzo(a,h)anthracene	6275685		< 0.20	< 0.20	NA	< 0.20	78%	50%	140%	67%	50%	140%	71%	50%	140%
Benzo(g,h,i)perylene	6275685		< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	97%	50%	140%	76%	50%	140%
Phenol	6275685		< 1.0	< 1.0	NA	< 1.0	80%	50%	140%	62%	50%	140%	75%	50%	140%
Bis(2-chloroethyl)ether	6275685		< 0.5	< 0.5	NA	< 0.5	82%	50%	140%	68%	50%	140%	74%	50%	140%
2-Chlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	93%	50%	140%	112%	50%	140%	115%	50%	140%
o-Cresol	6275685		< 0.5	< 0.5	NA	< 0.5	78%	50%	140%	65%	50%	140%	73%	50%	140%
Bis(2-chloroisopropyl)ether	6275685		< 0.5	< 0.5	NA	< 0.5	74%	50%	140%	66%	50%	140%	68%	50%	140%
m&p-Cresol	6275685		< 0.5	< 0.5	NA	< 0.5	108%	50%	140%	120%	50%	140%	75%	50%	140%
Hexachloroethane	6275685		< 0.5	< 0.5	NA	< 0.5	81%	50%	140%	67%	50%	140%	70%	50%	140%
2,4-Dimethylphenol	6275685		< 0.5	< 0.5	NA	< 0.5	77%	30%	130%	102%	30%	130%	110%	30%	130%
2,4-Dichlorophenol	6275685		< 0.3	< 0.3	NA	< 0.3	98%	50%	140%	97%	50%	140%	93%	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Trace Organics Analysis (Continued)

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2,4-Trichlorobenzene	6275685		< 0.5	< 0.5	NA	< 0.5	98%	50%	140%	77%	50%	140%	75%	50%	140%
p-Chloroaniline	6275685		< 1.0	< 1.0	NA	< 1.0	94%	50%	140%	71%	50%	140%	69%	50%	140%
Hexachlorobutadiene	6275685		< 0.4	< 0.4	NA	< 0.4	114%	50%	140%	90%	50%	140%	84%	50%	140%
2,4,6-Trichlorophenol	6275685		< 0.2	< 0.2	NA	< 0.2	106%	50%	140%	97%	50%	140%	108%	50%	140%
2,4,5-Trichlorophenol	6275685		< 0.2	< 0.2	NA	< 0.2	101%	50%	140%	66%	50%	140%	69%	50%	140%
1,1-Biphenyl	6275685		< 0.5	< 0.5	NA	< 0.5	95%	50%	140%	75%	50%	140%	76%	50%	140%
Dimethyl phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	98%	50%	140%	71%	50%	140%	75%	50%	140%
2,6-Dinitrotoluene	6275685		< 0.5	< 0.5	NA	< 0.5	108%	50%	140%	74%	50%	140%	79%	50%	140%
2,4-Dinitrotoluene	6275685		< 0.5	< 0.5	NA	< 0.5	87%	50%	140%	65%	50%	140%	73%	50%	140%
2,3,4,6-Tetrachlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	64%	50%	140%	70%	50%	140%	69%	50%	140%
Diethyl phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	109%	50%	140%	89%	50%	140%	78%	50%	140%
Hexachlorobenzene	6275685		< 0.5	< 0.5	NA	< 0.5	111%	50%	140%	104%	50%	140%	88%	50%	140%
Pentachlorophenol	6275685		< 0.5	< 0.5	NA	< 0.5	91%	50%	140%	108%	50%	140%	107%	50%	140%
3,3'-dichlorobenzidine	6275685		< 0.5	< 0.5	NA	< 0.5	107%	30%	130%	92%	30%	130%	80%	30%	130%
Bis(2-Ethylhexyl)phthalate	6275685		< 0.5	< 0.5	NA	< 0.5	107%	50%	140%	93%	50%	140%	98%	50%	140%
2,4-Dinitrophenol	6275685		< 10	< 10	NA	< 10	106%	30%	130%	70%	30%	130%	100%	30%	130%
Paraquat/Diquat (Water)															
Paraquat	1		< 1	< 1	NA	< 1	101%	50%	140%	104%	50%	140%	NA	50%	140%
Diquat	1		< 5	< 5	NA	< 5	110%	50%	140%	110%	50%	140%	NA	50%	140%
Haloacetic Acids in Water															
Monobromoacetic Acid	6277992	6277992	0.7	0.6	NA	< 0.5	97%	70%	130%	60%	60%	130%	70%	70%	130%
Monochloroacetic Acid	6277992	6277992	< 0.5	< 0.5	NA	< 0.5	104%	70%	130%	60%	60%	130%	70%	70%	130%
Dichloroacetic Acid	6277992	6277992	< 0.5	< 0.5	NA	< 0.5	99%	70%	130%	84%	60%	130%	102%	70%	130%
Dibromoacetic Acid	6277992	6277992	1.3	1.2	NA	< 0.5	87%	70%	130%	76%	60%	130%	96%	70%	130%
Trichloroacetic Acid	6277992	6277992	1.3	1.3	NA	< 0.5	89%	70%	130%	71%	60%	130%	90%	70%	130%
Bromochloroacetic Acid	6277992	6277992	< 0.5	< 0.5	0.0%	< 0.5	116%	70%	130%	103%	60%	130%	115%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Glyphosate in Water															
Glyphosate	992	6278243	< 20	< 20	NA	< 20	115%	50%	140%	108%	50%	140%	108%	50%	140%

Comments: Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.
The sample spikes and dups are not from the same sample ID.

Certified By:

[redacted]

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Ultra Trace Analysis

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dioxins and Furans (Water) WHO 2005															
2,3,7,8-Tetra CDD	1	MR	106	105	0.9%	< 0.1	NA	70%	130%	106%	70%	130%	NA	70%	130%
1,2,3,7,8-Penta CDD	1	MR	492	481	2.3%	< 0.1	NA	70%	130%	98%	70%	130%	NA	70%	130%
1,2,3,4,7,8-Hexa CDD	1	MR	473	467	1.3%	< 0.1	NA	70%	130%	95%	70%	130%	NA	70%	130%
1,2,3,6,7,8-Hexa CDD	1	MR	502	508	1.2%	< 0.1	NA	70%	130%	100%	70%	130%	NA	70%	130%
1,2,3,7,8,9-Hexa CDD	1	MR	464	490	5.5%	< 0.1	NA	70%	130%	93%	70%	130%	NA	70%	130%
1,2,3,4,6,7,8-Hepta CDD	1	MR	456	455	0.2%	< 0.1	NA	70%	130%	91%	70%	130%	NA	70%	130%
Octa CDD	1	MR	934	938	0.4%	0.7	NA	70%	130%	93%	70%	130%	NA	70%	130%
2,3,7,8-Tetra CDF	1	MR	110	107	2.8%	< 0.1	NA	70%	130%	110%	70%	130%	NA	70%	130%
1,2,3,7,8-Penta CDF	1	MR	470	468	0.4%	< 0.1	NA	70%	130%	94%	40%	130%	NA	70%	130%
2,3,4,7,8-Penta CDF	1	MR	501	498	0.6%	< 0.1	NA	70%	130%	100%	70%	130%	NA	70%	130%
1,2,3,4,7,8-Hexa CDF	1	MR	487	489	0.4%	< 0.1	NA	70%	130%	97%	70%	130%	NA	70%	130%
1,2,3,6,7,8-Hexa CDF	1	MR	491	491	0.0%	< 0.1	NA	70%	130%	98%	70%	130%	NA	70%	130%
2,3,4,6,7,8-Hexa CDF	1	MR	489	486	0.6%	< 0.1	NA	70%	130%	98%	70%	130%	NA	70%	130%
1,2,3,7,8,9-Hexa CDF	1	MR	492	490	0.4%	< 0.1	NA	70%	130%	98%	70%	130%	NA	70%	130%
1,2,3,4,6,7,8-Hepta CDF	1	MR	480	478	0.4%	< 0.1	NA	70%	130%	96%	70%	130%	NA	70%	130%
1,2,3,4,7,8,9-Hepta CDF	1	MR	538	535	0.6%	< 0.1	NA	70%	130%	108%	70%	130%	NA	70%	130%
Octa CDF	1	MR	957	939	1.9%	< 0.1	NA	70%	130%	96%	70%	130%	NA	70%	130%
13C-2,3,7,8-TCDF	1	MR	66%	73%	10.1%	64	NA	30%	140%	66%	30%	140%	NA	30%	140%
13C-1,2,3,7,8-PeCDF	1	MR	75%	83%	10.1%	70	NA	30%	140%	75%	30%	140%	NA	30%	140%
13C-2,3,4,7,8-PeCDF	1	MR	72%	73%	1.4%	68	NA	30%	140%	72%	30%	140%	NA	30%	140%
13C-1,2,3,4,7,8-HxCDF	1	MR	80%	79%	1.3%	70	NA	30%	140%	80%	30%	140%	NA	30%	140%
13C-1,2,3,6,7,8-HxCDF	1	MR	80%	82%	2.5%	70	NA	30%	140%	80%	30%	140%	NA	30%	140%
13C-2,3,4,6,7,8-HxCDF	1	MR	83%	88%	5.8%	75	NA	30%	140%	83%	30%	140%	NA	30%	140%
13C-1,2,3,7,8,9-HxCDF	1	MR	71%	82%	14.4%	69	NA	30%	140%	71%	30%	140%	NA	30%	140%
13C-1,2,3,4,6,7,8-HpCDF	1	MR	70%	74%	5.6%	67	NA	30%	140%	70%	30%	140%	NA	30%	140%
13C-1,2,3,4,7,8,9-HpCDF	1	MR	60%	71%	16.8%	56	NA	30%	140%	60%	30%	140%	NA	30%	140%
13C-2,3,7,8-TCDD	1	MR	67%	73%	8.6%	66	NA	30%	140%	67%	30%	140%	NA	30%	140%
13C-1,2,3,7,8-PeCDD	1	MR	76%	76%	0.0%	68	NA	30%	140%	76%	30%	140%	NA	30%	140%
13C-1,2,3,4,7,8-HxCDD	1	MR	86%	91%	5.6%	77	NA	30%	140%	86%	30%	140%	NA	30%	140%
13C-1,2,3,6,7,8-HxCDD	1	MR	82%	85%	3.6%	73	NA	30%	140%	82%	30%	140%	NA	30%	140%
13C-1,2,3,4,6,7,8-HpCDD	1	MR	68%	80%	16.2%	64	NA	30%	140%	68%	30%	140%	NA	30%	140%
13C-OCDD	1	MR	73%	71%	2.8%	61	NA	30%	140%	73%	30%	140%	NA	30%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Ultra Trace Analysis (Continued)

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: NA : Non applicable.

If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

NA as the percentage of recovery for the matrix spike indicates that the result is not provided due to the heterogeneity of the sample or the spiked analyte concentration was lower than the matrix contribution.

NA in the spike blank or CRM indicates that it is not required by the procedure.
Presence of a small contamination in the method blank. The method blank has been subtracted from the samples.

Certified By:

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

Water Analysis

RPT Date: Nov 29, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
(Water) Inorganic Chemistry															
Fluoride	6280571		<0.05	<0.05	NA	< 0.05	100%	70%	130%	102%	80%	120%	99%	70%	130%
Nitrate as N	6280571		<0.07	<0.07	NA	< 0.05	93%	70%	130%	95%	80%	120%	95%	70%	130%
Nitrite as N	6280571		<0.05	<0.05	NA	< 0.05	95%	70%	130%	96%	80%	120%	95%	70%	130%
Cyanide, WAD	6269091		<0.002	<0.002	NA	< 0.002	99%	70%	130%	96%	80%	120%	100%	70%	130%
Total Antimony	6278243	6278243	<0.003	<0.003	NA	< 0.003	102%	70%	130%	104%	80%	120%	107%	70%	130%
Total Arsenic	6278243	6278243	<0.003	<0.003	NA	< 0.003	106%	70%	130%	106%	80%	120%	109%	70%	130%
Total Barium	6278243	6278243	0.408	0.436	6.6%	< 0.002	104%	70%	130%	101%	80%	120%	81%	70%	130%
Total Boron	6278243	6278243	0.017	0.037	NA	< 0.010	105%	70%	130%	126%	80%	120%	115%	70%	130%
Total Cadmium	6278243	6278243	<0.0001	0.0002	NA	< 0.0001	100%	70%	130%	98%	80%	120%	105%	70%	130%
Total Chromium	6278243	6278243	<0.003	<0.003	NA	< 0.003	100%	70%	130%	98%	80%	120%	100%	70%	130%
Total Lead	6278243	6278243	0.0010	0.0017	NA	< 0.0005	101%	70%	130%	102%	80%	120%	102%	70%	130%
Total Mercury	6278243	6278243	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	101%	80%	120%	96%	70%	130%
Total Selenium	6278243	6278243	<0.002	<0.002	NA	< 0.002	102%	70%	130%	101%	80%	120%	100%	70%	130%
Total Uranium	6278243	6278243	0.0007	0.0013	NA	< 0.0005	99%	70%	130%	90%	80%	120%	103%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.
QA Qualifier for metals – Total Boron: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.

Water Analysis - Anion Scan in Water															
Chloride	1	6278243	88.9	92.3	3.7%	< 1.0	90%	70%	130%	86%	80%	120%	NA	70%	130%
Nitrate	1	6278243	2.8	2.5	10.2%	< 0.5	88%	70%	130%	88%	80%	120%	82%	70%	130%
Nitrite	1	6278243	<0.20	<0.20	NA	< 0.05	84%	70%	130%	81%	80%	120%	79%	70%	130%
Sulfate	1	6278243	31.1	34.0	8.9%	< 1.0	88%	70%	130%	87%	80%	120%	83%	70%	130%
Fluoride	1	6278243	<0.06	<0.06	NA	< 0.01	90%	70%	130%	93%	80%	120%	85%	70%	130%
Bromide	1	6278243	<0.2	<0.2	NA	< 0.1	88%	70%	130%	89%	80%	120%	89%	70%	130%

Comments: Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.
Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.

Nitrate and Nitrite: The regulatory hold time for the analysis of nitrate and/or nitrite in water is 72 hours.

Certified By:

[redacted]

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QC Exceedance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

RPT Date: Nov 29, 2024		REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
(Water) Inorganic Chemistry										
Total Boron	6278243	105%	70%	130%	126%	80%	120%	115%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.
QA Qualifier for metals – Total Boron: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Acenaphthylene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Acenaphthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Fluorene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Phenanthrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Anthracene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(a)anthracene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(b)fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(k)fluoranthene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Benzo(a)pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Phenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-chloroethyl)ether	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-Chlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
o-Cresol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-chloroisopropyl)ether	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
m&p-Cresol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Hexachloroethane	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dimethylphenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
1,2,4-Trichlorobenzene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
p-Chloroaniline	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Hexachlorobutadiene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-and 1-methyl Napthalene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,6-Trichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,5-Trichlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
1,1-Biphenyl	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Dimethyl phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,6-Dinitrotoluene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dinitrotoluene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,3,4,6-Tetrachlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Diethyl phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Hexachlorobenzene	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Pentachlorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
3,3'-dichlorobenzidine	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4-Dinitrophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
phenol-d6 surrogate	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Sediment			N/A
Aldicarb	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Bendiocarb	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Carbofuran	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Carbaryl	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Diuron	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Triallate	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Temephos	ORG-91-5101	EPA 632 531.1 & MOE E3158	HPLC
Glyphosate	TO-1320	"In house" method based on OSHA Method # PV2067	HPLC
Monobromoacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Monochloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Dichloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Dibromoacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Trichloroacetic Acid	ORG-91-5121	EPA 552.3	GC ECD
Haloacetic Acids (HAA5)	ORG-91-5121	EPA 552.3	GC ECD

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromochloroacetic Acid	ORG-91-5121	EPA 552.3	GC/ECD
2-Bromopropionic Acid	ORG-91-5121	EPA 552.3	GC/ECD
Phorate	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Dimethoate	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Terbufos	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Diazinon	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Malathion	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Chlorpyrifos	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Parathion	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Azinphos-methyl	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Triphenyl phosphate (surr)	ORG-91-5103	modified from EPA SW-846 3510C, 8141B & 8270E	GC/MS
Paraquat	ORG-91-5102	EPA 549.1	HPLC
Diquat	ORG-91-5102	EPA 549.1	HPLC
2,4-D	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-T	ORG-91-5510	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-TP	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dicamba	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dichlorprop	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Dinoseb	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Picloram	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Diclofop-methyl	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,3,4,6-Tetrachlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4-Dichlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,5-Trichlorophenol	ORG-91-5100	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
2,4,6-Trichlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Bromoxynil	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
MCPA	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
MCPP	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
Pentachlorophenol	ORG-91-5110	modified from EPA 515.2, EPA SW-846 8151A	GC/ECD
DCAA	ORG-91-5110	EPA SW-846 8151	GC/ECD
PCBs	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Trifluralin	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Simazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Atrazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Metribuzin	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Prometryne	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Metolachlor	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Alachlor	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Cyanazine	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Triphenyl phosphate (surr)	ORG-91-5104	EPA SW-846 3510C, 8270D & MOE E3121	GC/MS
Dichlorodifluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
2-Hexanone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ultra Trace Analysis			
2,3,7,8-Tetra CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,7,8-Tetra CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,7,8-Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,6,7,8-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8,9-Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Tetra CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Penta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hexa CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hepta CDD	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDDs	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Tetra CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Penta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hexa CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total Hepta CDF	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDFs	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2,3,7,8-Tetra CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDD (TEQ	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDD (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,7,8-Tetra CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8-Penta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,7,8-Penta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,6,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
2,3,4,6,7,8-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,7,8,9-Hexa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,6,7,8-Hepta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
1,2,3,4,7,8,9-Hepta CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Octa CDF (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
Total PCDDs and PCDFs (TEQ)	HR-151-5400F	CEAEQ MA.400-DF 1.1; USEPA 1613,1311; EPSI/RM/19	APGC
13C-2,3,7,8-TCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,7,8-PeCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,4,7,8-PeCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,6,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,4,6,7,8-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,7,8,9-HxCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,6,7,8-HpCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8,9-HpCDF	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-2,3,7,8-TCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T215439

PROJECT: T-1-22-0482.003

ATTENTION TO: Nicole Burke

SAMPLING SITE:11 Main St.

SAMPLED BY:N. Burke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
13C-1,2,3,7,8-PeCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,7,8-HxCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,6,7,8-HxCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-1,2,3,4,6,7,8-HpCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
13C-OCDD	HR-151-5400F	CEAEQ MA.400 - DF 1.0; USEPA 1613	APGC
Water Analysis			
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Cyanide, WAD	INOR-93-6052	modified from ON MOECC E3015,SM 4500-CN- I, G-387	SEGMENTED FLOW ANALYSIS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Chloramines - Total			CALCULATION
Chloride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrite	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Sulfate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Bromide	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Reporting- W			N/A

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Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 24T215439

Cooler Quantity: 2 large

Arrival Temperatures: 9.2 | 9.5 | 9.8

~~Depot~~ Temperatures: 9.6 | 9.2 | 9.9

Custody Seal Intact: ☐Yes ☐No ☒N/A

Notes: no ice

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Englobe

Contact: Nicole Burke

Address: 903 Barton St E, #22 Stoney Creek, ONT

Phone: 905-379-8059 Fax:

Reports to be sent to:

1. Email: nicole.burke@englobecorp.com
2. Email: paul.raepple@englobecorp.com

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04 — Table (Indicate One): ☐Ind/Com ☐Res/Park ☐Agriculture; Soil Texture (Check One): ☐Coarse ☐Fine

☐ Regulation 406 — Table (Indicate One): ☐Ind/Com ☐Res/Park ☐Agriculture

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐Sanitary ☐Storm — Region

☐ Prov. Water Quality Objectives (PWQO)

☒ Other: O Reg 169/03 Sched. 2 (Indicate One)

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply) ☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CSR

Project Information:

Project: T-1-22-0482.003

Site Location: 11 Main St. Puslinch

Sampled By: N. Burke

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition (RSC)? ☐ Yes ☐ No

Report Guideline on Certificate of Analysis ☒ Yes ☐ No

Legal Sample ☐

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: Englobe

Contact:

Address:

Email:

Sample Matrix Legend

GW	Ground Water	SD	Sediment
O	Oil	SW	Surface Water
P	Paint	R	Rock/Shale
S	Soil		

	Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	Metals - ☐ CrVI, ☒ Hg, ☐ HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package	pH, Metals, BTEX, F1-F4	EC, SAR	Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	OC/PCB/Organophosphorus	Dioxins/Furans	Paraquat/Diquat	ABN	Glyphosate	HAA		Potentially Hazardous or High Concentration (Y/N)
1.	BH4	10.31.24	9:45 AM	35	GW	As per tests request			X	X	X									X	X	X	X	X	X		
2.			AM PM																								
3.			AM PM																								
4.			AM PM																								
5.			AM PM																								
6.			AM PM																								
7.			AM PM																								
8.			AM PM																								
9.			AM PM																								
10.			AM PM																								
11.			AM PM																								

Samples Relinquished By (Print Name and Sign): [redacted]	Date: 10.31.24	Time: 11:35am	Samples Received By (Print Name and Sign): [redacted]	Date	Time: '24 OCT 31 11:36AM
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

Nº: T - 163837

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT