Functional Servicing and Preliminary Stormwater Management Report

TLM Holdings Inc.
50 Welham Road

City of Barrie
County of Simcoe

PEARSON
ENGINEERING

PEARSONENG.COM

March 2023

21037

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Functional Servicing Report & Preliminary SWM report

TLM Holdings – 50 Welham Road

1. INTRODUCTION

PEARSON Engineering Ltd. (PEARSON) has been retained by TLM Holdings (Client) to prepare a Functional Servicing Report & Preliminary Stormwater Management (SWM) Report (FSR) in support of the proposed Industrial Subdivision located at 50 Welham Road (Welham) the City of Barrie (City), in the County of Simcoe (County). This FSR is provided to the City in support of the Draft Plan Approval.

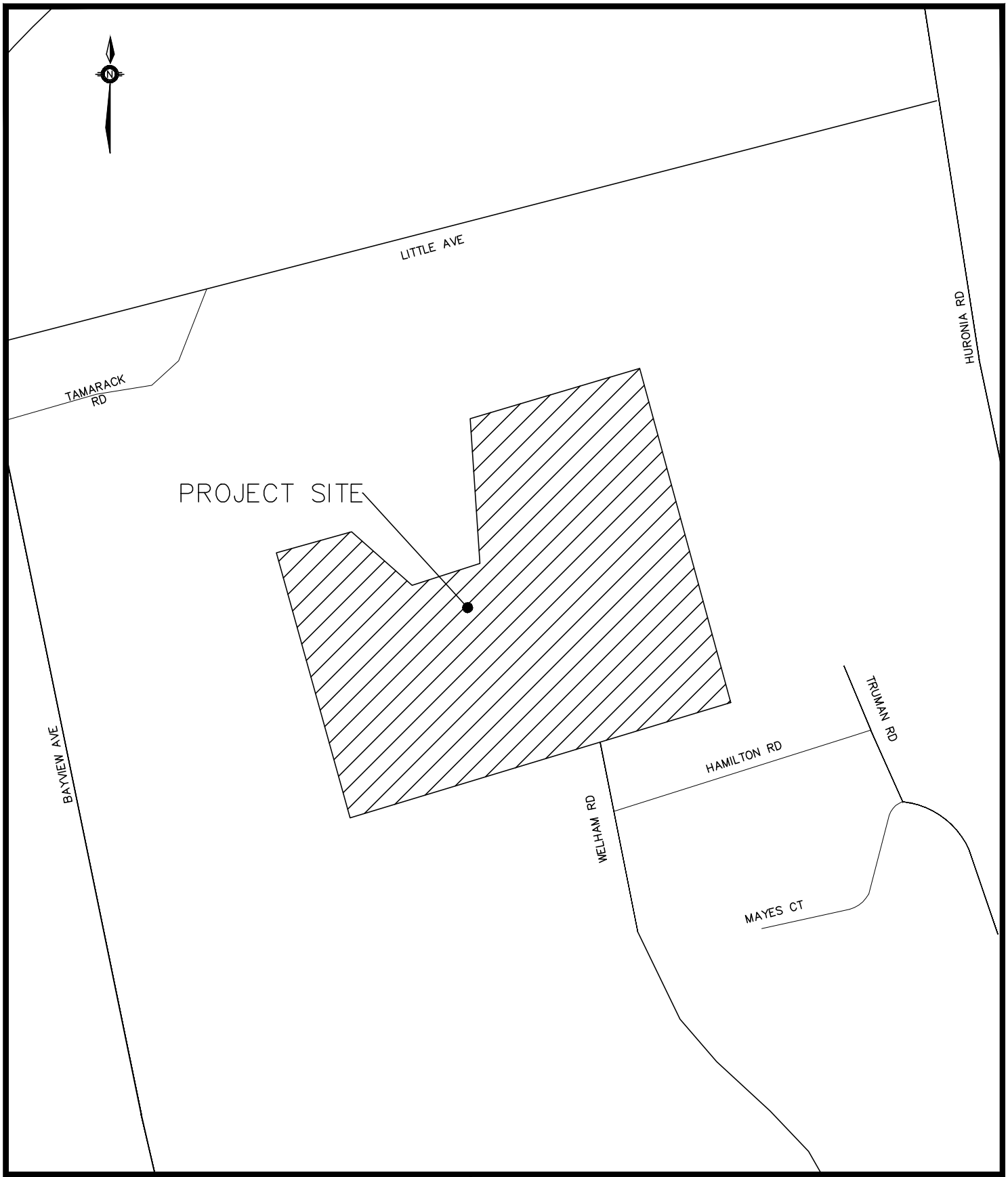
The Project Lands comprise of a total area of approximately 25.6 ha, to be developed into 20 general industrial lots, environmental protection lands and a SWM Pond block. The Project Lands are currently partially treed pasture lands and is bound by the existing termination of Welham Road and existing industrial developments to the south, Bayview Drive (Bayview) and Whiskey Creek to the west and north and an existing industrial development and Huronia Road to the east. Whiskey Creek traverses the west and northern boundaries of the site. The majority of the property generally slopes from south to north. Refer to Figure 1 – Site Location Plan for the location of the site.

This FSR assesses the required municipal services to support development of the Project Lands, complete with preliminary grading, servicing and SWM design and associated calculations. The Project will connect to existing municipal services located on Welham Road and Huronia Road and a proposed SWM Pond at the northeast corner of the site.

2. SUPPORTING DOCUMENTS

The following documents have been referenced in the preparation of this report:

- Ministry of the Environment, Design Guidelines for Sewage Works – 2008
- Ministry of the Environment, Design Guidelines for Drinking-Water Systems - 2008
- The Ministry of the Environment Stormwater Management Planning and Design Manual, March 2003.
- City of Barrie, Sanitary Sewage Collection System Policies and Design Guidelines
- City of Barrie, Storm Drainage and Stormwater Management Policies and Design Guidelines, February 2022.
- City of Barrie, Water Transmission and Distribution Design Standard, August 2021
- City of Barrie, Lot Grading and Drainage Standards and Design Manual, 2019
- Lake Simcoe Region Conservation Authority Technical Guidelines for Stormwater Management Submissions, April 2022
- Lae Simcoe Phosphorus Offsetting Policy, July 2021



TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

SITE LOCATION PLAN

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DESIGNED BY	AMC	HORIZ SCALE	NTS	PROJECT #	21037
DRAWN BY	TC/AMC	VERT SCALE	NTS	DRAWING #	FIG–1
CHECKED BY	MWD	DATE	JUNE 2021	REVISION #	0

3. WATER SUPPLY AND DISTRIBUTION

The site is to have a general industrial land use block area of approximately 15.24 ha. Utilizing the City of Barrie Engineering Design Criteria for industrial water demand of 35,000 L/ha/day, an Average Day Demand (ADD) of 6.17 L/s was calculated. A Peak Rate factor of 4.00 was used in calculating a Peak Hour Demand of 24.69 L/s for the proposed development. Calculations for the domestic water requirements for the site can be found in Appendix A.

The Project Lands are proposed to be serviced by connecting to the existing 500 mm watermain located on the east side of Huronia Drive and the 200 mm watermain on the east side of Welham. The proposed 300 mm watermain will connect to the Huronia Drive watermain and extend through the City owned open land to the Project site.

Each proposed industrial lot will receive a domestic and fire water service. Internal fire hydrants will be proposed to provide adequate firefighting coverage as per City Standards. The proposed water system can be seen on Figure 2 – Water Servicing Plan.

As per City of Barrie Standards the City minimum required fire flow demands shall be used unless the Fire Underwriters Survey (FUS) calculations require a higher fire flow. Using City of Barrie Standards and industrial requirements a minimum required fire flow of 333 L/s is required. The required fire flow was calculated as per the FUS assessment and was calculated to be approximately 233 L/s. The City's minimum required fire flow governs and was utilized to calculate available fire flow and residual pressure.

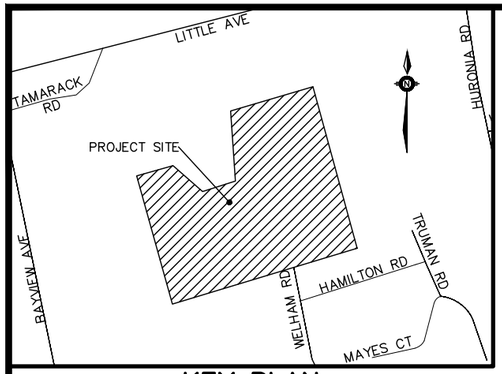
A water model was created utilizing a static pressure of 40 PSI at the Welham Road hydrant and 86 PSI at the Huronia Road hydrant, as per City of Barrie OpenData GIS information. The model determined the lowest flow available was 512 L/s for the Lot 20. The water model will be updated to utilize hydrant test results during the detaiedl design phase or once spring conditions allow for pressure testing. Therefore, the available flow meets the required fire flow as per the City of Barrie requirements. Fire flow calculations and water model results are included in Appendix A.

4. SANITARY SERVICING

4.1. SANITARY DESIGN CRITERIA

Utilizing the MECP and City of Barrie Guidelines for industrial sewage flow use of 35,000 L/ha/d, an Average Daily Flow (ADF) of 6.17 L/s. is calculated. Using a Peaking Factor of 4.00 for this project, a Peak Flow of 24.69 L/s is calculated for the entire development. The peak flow including an infiltration allowance of 0.10 L/s/ha was calculated to be 26.22 L/s.

The proposed 300 mm sanitary sewer will convey flow to the existing sewer on Huronia Road through through City of Barrie owned open space. The sanitary sewer has a capacity of 68.38 L/s at 0.5% slope at a minimum velocity of 0.76 m/s therefore meets the City of Barrie's minimum requirement of 0.60 m/s. The existing 600 mm diameter main on Huronia has a slope of 0.5% and a design capacity of 434.23 L/s. The proposed peak flow is approximately 6.3% of the pipe capacity therefore the existing 600 mm diameter sanitary sewer is expected to be sufficient to convey the sanitary design flows. Sanitary design flow calculations can be found in Appendix B.



KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- WATERMAIN
- H&V — FIRE HYDRANT
- WATER VALVE

SWM BLOCK

OPEN SPACE

McCONKEY PLACE

BOARD FENCE

CONNECT TO EX. 500mmø CONC. PRESSURE PIPE WATERMAIN

300mmø W/M

EX. 500mmø CONC. PRESSURE PIPE W/M

EX. 52mmø W/S

LEVEL 1 FEATURE – 15m SETBACK

STREET A

STREET B

27.00m

20.00m

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

49 TRUMAN ROAD

WHISKEY CREEK

200mm TO 300mm INCREASER

CONNECT TO EX. 200mmø DI WATERMAIN

EX. EOSE 0.60

WELHAM ROAD

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50 WELHAM ROAD
CITY OF BARRIE

WATER SERVICING PLAN

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DESIGNED BY AMC	HORIZ SCALE 1:2500	PROJECT #	21037
DRAWN BY TWC/AMC	VERT SCALE	DRAWING #	FIG–2
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It is proposed that the subdivision's sanitary sewers be constructed in accordance with the City of Barrie and the MECP guidelines to service the Project. The proposed sewers will consist of a minimum diameter of 300 mm and will be designed to meet minimum design grades and the required minimum and maximum velocities under flow conditions. The proposed sanitary sewer system for the site can be seen on Figure 3. Peak flow calculations and a sanitary sewer design shee can be found in Appendix B.

5. STORMWATER MANAGEMENT

5.1. OVERVIEW

A key component of developing the Project Lands is the need to address Stormwater Management (SWM) issues as well as related environmental concerns. SWM parameters are developed from an understanding of the site's natural systems. This FSR focuses on the necessary measures to satisfy the MECP's SWM requirements.

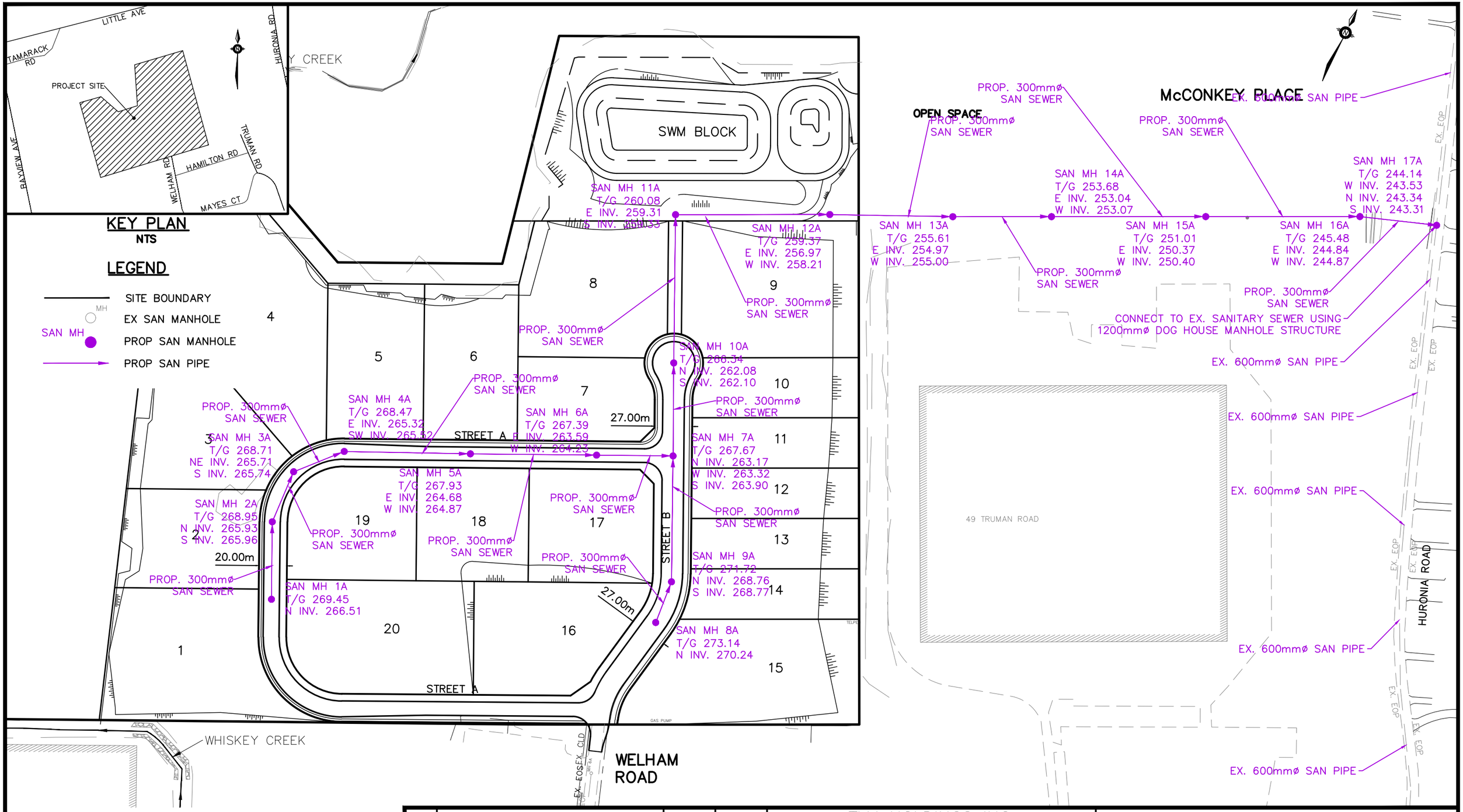
- It is understood the objectives of the SWM plan are to:
- Protect life and property from flooding and erosion;
- Maintain water quality for ecological integrity, recreational opportunities, etc.;
- Protect and maintain groundwater flow regime(s);
- Protect aquatic and fishery communities and habitats; and
- Maintain and protect significant natural features.

5.2. ANALYSIS METHODOLOGY

The design of the SWM Facilities for this site has been conducted in accordance with:

- The Ministry of the Environment Stormwater Management Planning and Design Manual, March 2003.
- City of Barrie, Storm Drainage and Stormwater Management Policies and Design Guidelines, February 2022
- Lake Simcoe Region Conservation Authority Technical Guidelines for Stormwater Management Submissions, September 2016

In order to design the facilities to meet these requirements, it is essential to select the appropriate modeling methodology for the storm system design. Given the size of the site and the number of catchment areas, the computer model Visual OTTHYMO is appropriate for the design for the SWM system.



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TLM HOLDINGS INC.
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CITY OF BARRIE

SANITARY SERVICING PLAN

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DESIGNED BY AMC	HORIZ SCALE 1:2500	PROJECT #	21037
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5.3. EXISTING DRAINAGE CONDITIONS

The Project Lands are mostly pasture lands and are located in the Whiskey Creek watershed. The site currently drains in two directions 21.47 ha flows directly to Whiskey Creek to the northwest. An area of 4.10 ha flows to the northeast and ultimately gets conveyed to Whiskey Creek north of the project site. Whiskey Creek is located west and north of the site and flows in a northeasterly direction..

As per the preliminary Geotechnical Investigation Report completed by Cambium Inc. dated July 21, 2021 the site comprises of topsoil/ organic soil between 305mm to 760mm in thickness sand to silty sand with varying amounts of gravel and clay.

The pre-development Storm Drainage Plan (Figure 4) shows the existing storm drainage patterns for the development. The pre-development peak flows from the site were calculated using Visual OTTHYMO and are provided in Table 1 below. The peak flow calculations and the Visual OTTHYMO Parameter calculations can be found in Appendix D.

Table 1: Pre-Development Peak Flows

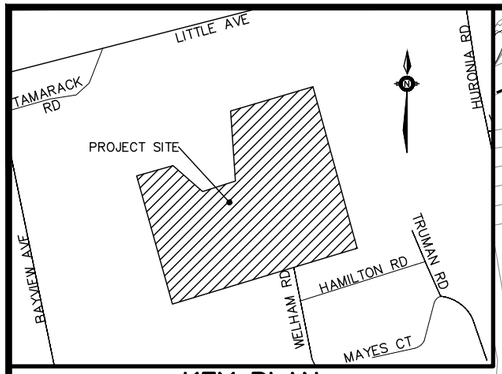
	25 mm Storm	2 Year Storm	5 Year Storm	10 Year Storm	25 Year Storm	100 Year Storm	Hazel
4-Hour Chicago Storm (m^3/s)	0.04	0.15	0.34	0.50	0.73	1.13	-
24-Hour SCS Storm (m^3/s)	-	0.35	0.71	1.00	1.42	2.11	2.31

5.4. PROPOSED DRAINAGE CONDITIONS

The post development drainage for the site will generally follow pre-development drainage patterns. A storm sewer sized for the 5-year storm will convey the minor system peak flows from the site to a SWM Pond located in the northeast corner of the site. In the event of a storm greater than the 5-year storm, an overland flow route will convey water through the project's roadways to the proposed pond. Refer to Figure 6 – Post Development Storm Drainage Plan for post-development drainage patterns.

The proposed SWM Pond is located in the northeast corner of the Project Lands and will provide quantity and quality control for the development lots. Lot level LID SWM features including rooftop infiltration, volume control and phosphorus reducing features will be required at site plan design. Additional lot level quantity/quality controls will be required if the post development runoff coefficient of 0.85 is exceeded. The site grading allows the major system to drain to the SWM pond via overland flow.

The Project's storm sewer will be sized for the minor storm, defined as all storms up to and including the 5-year storm event. The storm sewer has been designed to convey the runoff from the majority of the Industrial blocks and road right of way to the proposed SWM pond in the northeast corner of the site and will outlet directly in the forebay of the SWM pond. In the event of a storm event greater than the 5-year storm, the storm sewer will overflow, and the water will be conveyed overland towards the SWM Pond, bypassing the forebay and directly to the main cell. The SWM Pond which will provide both quality and quantity controls up to the allowable runoff coefficient for the Project lands.



KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- OVERLAND FLOW DIRECTION
- CATCHMENT AREA (1 | 0.75 | 1.00 ha) RUNOFF COEFFICIENT — AREA IN HECTARES
- CATCHMENT BOUNDARY
- EXISTING 100 YR FLOODLINE
- EXISTING REGIONAL FLOODLINE

WHISKEY CREEK

BOARD FENCE

100 | 0.25 | 21.47 ha

101 | 0.25 | 4.10 ha

49 TRUMAN ROAD

BAYVIEW DRIVE

DITCH

EX 500mmø CULVERT
INV. 262.75

ASPHALT

279 BAYVIEW DRIVE

WHISKEY CREEK

EX. EOSF

WELHAM ROAD

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PRE DEVELOPMENT STORM DRAINAGE PLAN

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DRAWN BY TWC/AMC	VERT SCALE	DRAWING #	FIG–4
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5.5. Quantity Control

The proposed development will increase the imperviousness of the site and as such the post-development peak flows will increase.. A post development runoff coefficient of 0.85 has been provided for the Industrial blocks and 0.70 for the right-of-way.

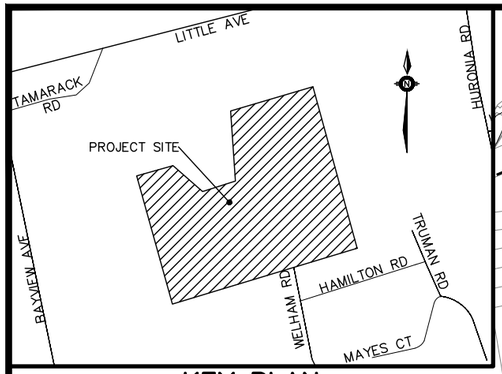
The proposed drainage from the Project Lands will be conveyed to a wet pond at the northeast corner of the development, which has been designed to provide quantity control by retaining flows and releasing them below pre-development values. The proposed SWM Pond will outlet to the existing Whiskey Creek channel.

The stormwater management pond is designed with 4:1 internal side slopes and 3.0 m wide 7:1 safety shelf on either side of the permanent pool elevation as per MECP guidelines. Rip rap will be placed on the inlet location to prevent erosion. The SWM pond has also been designed to meet all requirements in section 4.7 of the City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines to ensure the SWM Pond geometry will fit within the proposed SWM Block such as sediment drying area, overland flow route past the forebay and directly to the main cell component, and 5 m wide access road with a ramp to the forebay bottom. Refer to Appendix C for the full list of requirements and proposed design outline.

A reverse slope outlet pipe complete with orifice tube connected to the control structure and emergency overflow weir will reduce the flows leaving the pond. A minimum of 0.30 m of freeboard will be maintained as per MECP and LSRCA guidelines. Preliminary pond outflow and corresponding storage requirement can be seen in Table 2 below and the OTTHYMO results pond drawing Figure 7 have been included in Appendix C and Appendix G respectively.

Table 2 - SWM Pond Outflow and Storage

	25mm Storm (m^3/s)	2 year (m^3/s)	5 year (m^3/s)	10 year (m^3/s)	25 year (m^3/s)	50 year (m^3/s)	100 year (m^3/s)	Hazel (m^3/s)
4 Hour Chicago Storm Events								
Peak Flow (m^3/s)	0.06	0.08	0.10	0.35	0.66	0.74	0.82	-
Storage Volume (m^3)	2,678	4,317	6,358	6,712	7,259	7,950	8,784	-
24 Hour SCS Storm Events								
Peak Flow (m^3/s)	-	0.09	0.46	0.72	0.86	0.96	1.92	2.59
Storage Volume (m^3)	-	5,380	6,880	7,731	9,309	10,535	11,259	11,601



KEY PLAN
NTS

LEGEND

OVERLAND FLOW DIRECTION

CATCHMENT AREA | 1 | 0.75 | 1.00 ha | RUNOFF COEFFICIENT

AREA IN HECTARES

CATCHMENT BOUNDARY

PROP. 100 YEAR FLOODLINE

PROP. REGIONAL FLOODLINE

WHISKEY CREEK

BOARD FENCE

OPEN SPACE

PROP. 300mmø STM.

PROP. 450mmø STM.

SWM BLOCK NT

PROP. 1350mmø STM.

MH 17

MH 16

MH 15

MH 14

PROP. 1350mmø STM.

PROP. 1350mmø STM.

BH103-21
267.20

LEVEL 1 FEATURE – 15m SETBACK

BH104-21
267.58

PROP. 1050mmø STM.

PROP. 1050mmø STM.

PROP. 1050mmø STM.

PROP. 1050mmø STM.

PROP. 1050mmø STM.

PROP. 1050mmø STM.

CBMH 1

MH 10

MH 9

MH 8

MH 7

MH 6

MH 5

MH 4

MH 3

MH 2

MH 1

MH 11

MH 12

MH 13

STREET A

STREET A

STREET B

201 | 0.25 | 5.10 ha

200 | 0.83 | 19.67 ha

202 | 0.25 | 0.80 ha

PROP. 900mmø STM.

PROP. 600mmø STM.

PROP. 525mmø STM.

PROP. 750mmø STM.

PROP. 450mmø STM.

PROP. 300mmø STM.

PROP. 300mmø STM.

PROP. 300mmø STM.

BH101-21
265.30

BH106-21
268.80

BH105-21
266.86

LEVEL 1 FEATURE – 15m SETBACK

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 19 20

49 TRUMAN ROAD

BAYVIEW DRIVE

BAYVIEW DRIVE

DITCH

ASPHALT

EX 500mmø CULVERT
INV. 262.75

WHISKEY CREEK

WELHAM

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CITY OF BARRIE

POST DEVELOPMENT STORM DRAINAGE PLAN

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Table 3 below summarizes the post-development peak flows for the site and when compared to table 1 demonstrates that the total post development peak flow is at or below pre-development values. Preliminary layout for stormwater servicing can be found on Figure 6 – Post Development Storm Drainage Plan.

Table 3: Post Development Peak Flows

	25 mm Storm	2 Year Storm	5 Year Storm	10 Year Storm	25 Year Storm	100 Year Storm	Hazel
Whiskey Creek Watershed							
4-Hour Chicago Storm (m^3/s)	0.06	0.08	0.10	0.35	0.68	0.84	-
24-Hour SCS Storm (m^3/s)	-	0.10	0.47	0.74	0.91	2.00	2.68

5.6. Quality Control

The MECP in March 2003 issued a "Stormwater Management Planning and Design Manual". This manual has been adopted by a variety of agencies including the City of Barrie. The objective of the Stormwater Quality Control will be to ensure Enhanced Protection quality control as stated in the MECP manual is achieved. To achieve Enhanced Protection, permanent and temporary control of erosion and sediment transport are proposed.

The development's roadways pose a risk to stormwater quality through the collection of grit, salt, sand, and oils on the paved surface. The MECP standard stipulates a Total Suspended Solids (TSS) removal of at least 80%.

The majority of the project will be conveyed to a SWM Pond complete with a quality control forebay and wet cell which have been sized to provide 6,233 m^3 of quality storage, exceeding the calculated required 4,143 m^3 as per MECP Table 3.2. Detailed calculations can be seen in Appendix C.

During construction, earth grading and excavation will create the potential for soil erosion and sedimentation. It is imperative that effective environmental and sedimentation controls are in place and maintained throughout the duration of construction activities to ensure stormwater runoff's quality.

Therefore, the following recommendations shall be implemented and maintained during construction to achieve acceptable stormwater runoff quality:

- Installation of silt fence along the entire perimeter of the site to reduce sediment migration onto surrounding properties.
- Installation of a construction entrance mat at the entrance to minimize transportation of sediment onto roadways.
- Restoration of exposed surfaces with vegetative and non-vegetative material as soon as construction schedules permit;
- Installation of filter strips where applicable.
- Reduce stormwater drainage velocities where possible;
- Ensure that disturbed areas are vegetated and stabilized as quickly as possible;

5.7. Low Impact Development

Modern Stormwater Management (SWM) practices have evolved over recent years, with Low Impact Development (LID) techniques being widely used as the preferred method of Stormwater Management. When properly implemented, LID techniques enhance runoff infiltration into the shallow soil regime. It is proposed that LID techniques such as rooftop infiltration and permeable pavers be implemented in portions of the Project Lands with appropriate soil conditions and groundwater levels. LID design will be reviwed at detailed design. Additional details regarding preliminary LID sizing can be seen in the following sections.

5.8. Volume Control

Since the project site meets the definition of Major Development as per LSRCA Guidelines, considerations were taken to meet the volume control criteria detailed in section 2.2.2. The LSRCA guidelines state that for a new development that creates 500 m^2 or more of impervious surfaces, 25 mm of runoff over the total impervious area of the site is to be retained and treated on site, with flexible alternatives if this criterion cannot be met.

Storage for the 25 mm storm for each Industrial lot can be provided in a combination of underground storage chambers and permeable pavers. The proposed drainage from the rooftop area of all buildings should be conveyed through a roof leader to separate underground storage chambers for each building, sized for the 25 mm storm event for infiltration. Grading parking lot areas to direct stormwater towards permeable pavers will provide additional storage. The pavers will provide treatment via filtration and are wrapped in an impermeable liner and include a perforated underdrain which is connected to the storm sewer system.

The project creates 156,036 m^3 of impervious surface, which results in a required volume control of 3901 m^3 for the 25 mm storm. Preliminary calculations utilizing 25mm rooftop infiltration and 12.5% parking lot coverage results in a preliminary retention volume of 3,808 m^3. A chart has been provided in Appendix C specifying the minimum volume control for each block.

Each Industrial block should be designed to meet the LSRCA volume control guidelines. Preliminary calculations show that approximately 12.5% of the parking lot area will consist of permeable pavers assuming a paver structure depth consisting of 0.50 m of clear stone to meet volume control criteria. Permeable pavers should generally be located in parking spaces or where passenger vehicles travel and not where transport trucks will be driving/turning. Due to the industrial nature of the project, site constraints may result in the need to design to Alternative #1 from LSRCA guidelines section 2.2.2.2 which is to retain runoff from a 12.5 mm event from all impervious surfaces. Volume control calculations will be reviewed further at the detailed design of each lot.

5.9. Water Balance

Since the post-development state will increase the imperviousness of the site, considerations will be taken in regard to groundwater recharge to satisfy the City's and LSRCA's water balance criteria. The post-development conditions will reduce the amount of infiltration across the site and therefore infiltration facilities are proposed in order to offset the deficit. Under pre-development conditions, the majority of the project site consists of pasture, which infiltrates approximately 60,186 m^3 annually. With the assumed level of increased imperviousness of the site, this recharge will be reduced to 23,470 m^3, resulting in a deficit volume of 36,716 m^3. Detailed calculations can be found in Appendix C.

According to the Preliminary Geotechnical Investigation Report completed by Cambium Inc. dated July 21, 2021, the project site is comprised of sand to silty sand and therefore it is assumed that the existing soils have adequate infiltration rates. Groundwater monitoring wells explored to a depth of 6.1m below grade were dry indicating a deep water table across the site. Infiltration options and in-situ infiltration rates will be reviewed further at detailed design of each Industrial block, however preliminary calculations have been completed based on assumed 50% building area for each Industrial block.

In order to infiltrate the deficit volume of 34,536 m^3 annually, it is required to infiltrate the first 10 mm from the rooftop drainage area in underground infiltration galleries, resulting in a storage volume of 533 m^3. It is required to provide retention for the first 5 mm of rainfall over the site area as per City of Barrie Guidelines. The City of Barrie's criteria results in a total volume of 1024 m^3 which governs for the project, which can be achieved by infiltrating the 25 mm storm event over the rooftop area, resulting in an infiltration volume of 1333 m^3. Based on these requirements, a chart has been provided in Appendix C specifying the minimum infiltration volume requirement for each block.

5.10. Phosphorus Calculations

Local conservation authorities have determined the importance of reducing phosphorus levels in water courses in this area. The reduction was based on conservative values derived from the LSRCA. As such, best efforts are to be employed in order to reduce phosphorus levels to pre-development levels or better.

The existing site is in the Barrie Creeks Subwatershed and generates approximately 1.82 kg of phosphorus annually and the proposed Project will generate approximately 24.02 kg of phosphorus annually if uncontrolled. Best efforts will be used in order to reduce the phosphorus loading as much as is reasonably possible.

Each Industrial Block will require detailed design and it is recommended they utilize a treatment train approach to minimize the amount of phosphorus discharged from the site. The following are the recommended removal approaches with reduction based on LSRCA Phosphorus Loading Development Tool:

- Rooftop infiltration (87% typical phosphorus reduction),
- Permeable pavers with impermeable liner and perforated underdrain providing filtration (45% typical phosphorus reduction)
- OGS unit (20% typical phosphorus reduction)
- Wet detention pond (63% typical phosphorus reduction).

Table 4 details the anticipated phosphorus loadings for pre and post-development conditions for the total site based on the above noted treatment train approach. Detailed phosphorous loading calculations for the project can be found in Appendix C, as well as a summary table demonstrating the portion of the total phosphorous load for each lot.

Table 4: Phosphorus Loadings

	Total P (kg)
Pre-Development	1.43
Uncontrolled Post-Development	32.00
Controlled Post-Development	8.56

5.10.1. Lake Simcoe Phosphorous Offsetting Policy

The LSRCA has implemented a Phosphorus Offsetting Policy in July 2021 which has a goal that all new developments must reduce the 100% of the phophorus leaving the property. A fee of $35,770/kg/year and an administration fee of 15% is required for anything pre-development phosphorus loading values. Therefore, the required fee for the proposed development is as follows:

LSPOP Fee: $35,770 x 2.5 x 7.13 + 15% Administration Fee = $623,517

As per section 5.1 of the WBRP, only the greater of the two compensation fees is required. As water balance requirements are met for this site, the phosphorus offsetting fee governs for the site. Compensation fee calcultions can be seen in Appendix D.

6. Whiskey Creek Floodline Delineation

The LSRCA provided the HEC-RAS Hydraulic model used to calculated the floodlines for Whiskey Creek which is based on their digital elevation model (DEM). The HEC-RAS model contained cross sections for Whiskey Creek located along the channel through the proposed development property. The floodline location on the property is shown on Figure 4 and 5 and the 100-year and Regional floodline elevations can be found in Table 4 below. The pond outlet is to be located above the regional floodline and is not expected to impacted by Whiskey Creek.

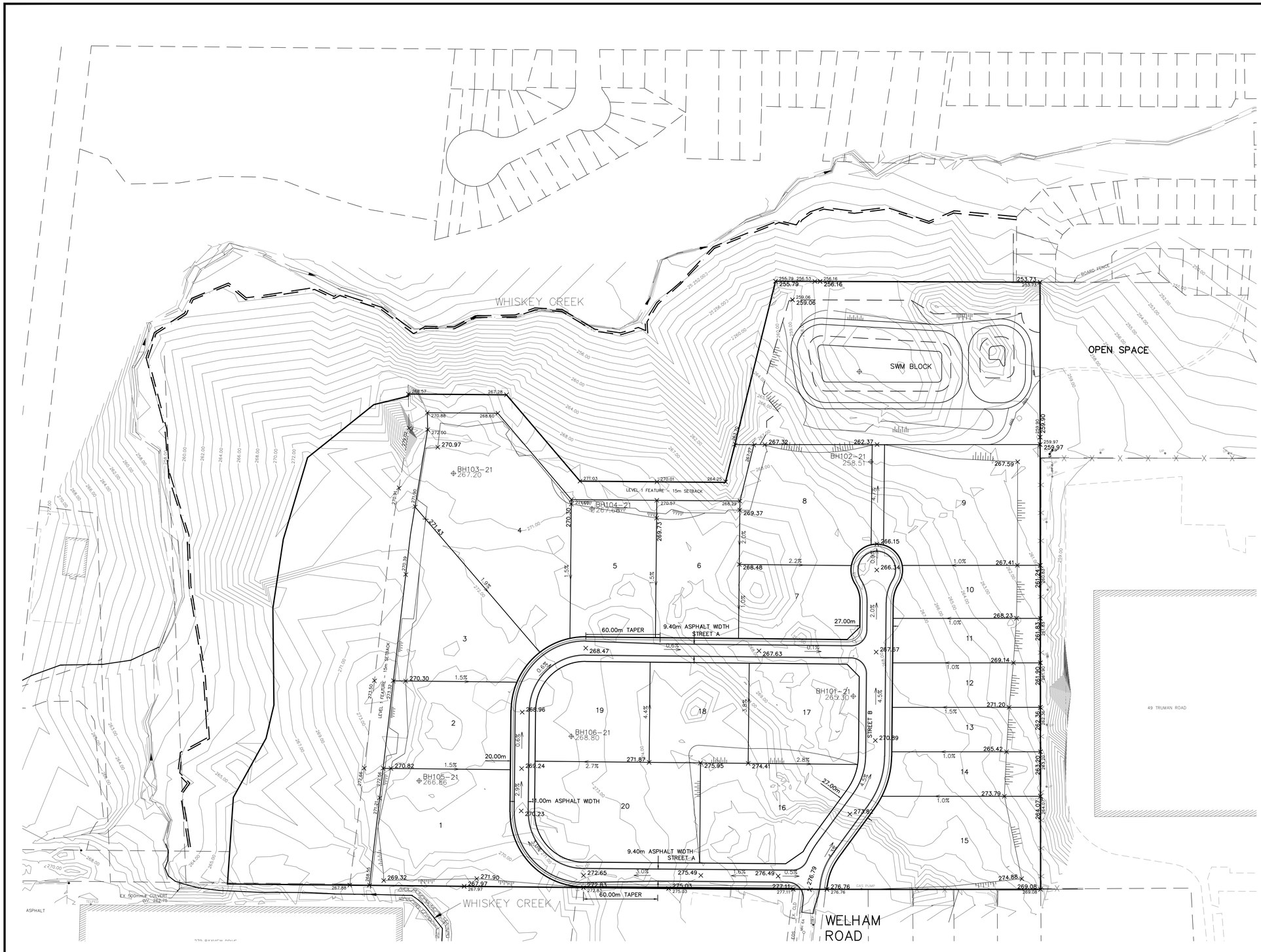
Table 5 – Whiskey Creek Floodlines

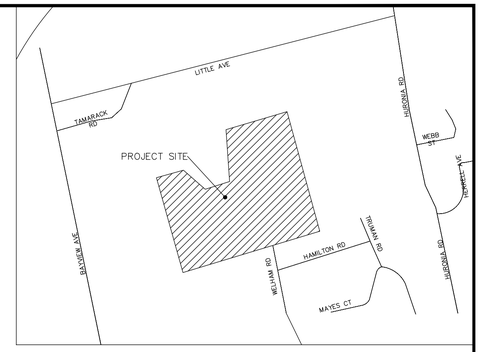
Section	Elevations (m)	
	100-Year	Regional
2420	250.96	251.13
2683	253.59	253.72
2839	255.70	255.86
3173	258.39	258.46
3363	263.24	263.37

*Elevations based on existing site elevations

7. Grading

A preliminary grading design has been completed for the project and has been designed to generally drain storm runoff to the northeast corner of the property at an average grade of 0.5%, allowing the majority of the site to be conveyed to the proposed SWM pond. A small portion of the proposed road will drain uncontrolled to Bayview Drive. Lots have generally been designed at 1% slopes draining rear to front and are self contained where possible. Refer to Figure 8 – Site Grading for details of the preliminary grading design.





KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- 254.63 / 254.09 — PROPOSED ELEVATION / EXISTING ELEVATION
- 1.5% — PROPOSED GRADE
- EXISTING 100 YR FLOODLINE
- EXISTING REGIONAL FLOODLINE
- MAX 3:1 SLOPE UNLESS OTHERWISE NOTED

BENCHMARK

NO.	REVISION NOTE	DATE	BY

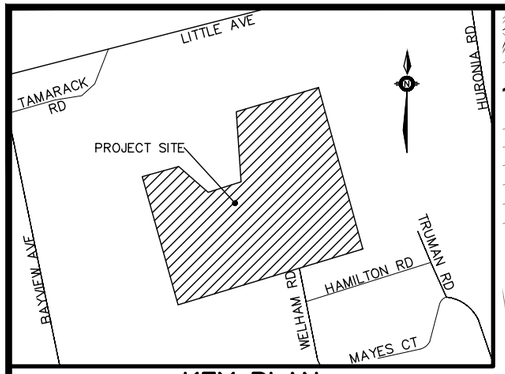
TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

GRADING PLAN

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	AMC	HORIZ SCALE	1:500
DRAWN BY	TWC/AMC	VERT SCALE	N/A
CHECKED BY	MWD	DATE	JUNE 2021

PROJECT #	21037
DRAWING #	FIG-8
REVISION #	0



KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- EXISTING 100 YR FLOODLINE
- EXISTING REGIONAL FLOODLINE
- ROCK CHECK DAM
- SWALE
- SILT FENCE
- EXISTING DRAINAGE FLOW
- PROPOSED DRAINAGE FLOW

WHISKEY CREEK
HICKENBOTTOM DRAIN
BOARD FENCE
SWM BLOCK
OPEN SPACE
TEMPORARY SEDIMENT CONTROL POND
LEVEL 1 FEATURE – 15m SETBACK
TOPSOIL STOCKPILE
STREET A
STREET B
TEMP. STOCKPILE
MUDMAT TO BE INSTALLED AS PER LSRCA ESC-3
49 TRUMAN ROAD
BAYVIEW DRIVE
DITCH
ASPHALT
EX 500mmØ CULVERT INV. 262.75
279 BAYVIEW DRIVE
WELHAM ROAD
EX. EOSFX CLD
GAS PUMP

NO.	REVISION NOTE	DATE	BY

TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

ENVIRONMENTAL PROTECTION PLAN

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY AMC	HORIZ SCALE 1:2500	PROJECT # 21037
DRAWN BY TWC/AMC	VERT SCALE	DRAWING # FIG-8
CHECKED BY MWD	DATE JUNE 2021	REVISION # 0

8. Secondary Utilities

Consultation with existing Utility companies is currently underway to confirm the serviceability for secondary utilities. Based on the location of the site within the urban area it is expected utilities will be available.

9. Conclusions

The Project Lands can be serviced by extending services from Welham Road and Huronia Road as follows:

- Extension of the Internal Road network off Welham Road.
- Municipal water extended from the existing municipal watermains on Welham Road looped to the existing watermain on Huronia Road.
- Gravity sanitary sewer system from the existing municipal system on Huronia Road.
- Construction of a new SWM Pond at the northeast corner of the property to provide quantity and quality control that will outlet to the existing Whiskey Creek.
- LID techniques where soil infiltration and groundwater conditions allow.

The analysis and conceptual designs outlined in this report demonstrates that the servicing is feasible.

All of which is respectfully submitted,

Pearson Engineering Ltd.

Gary Pearson, P. Eng.
Principal

Mike Dejean, P. Eng.
Partner, Manager of Engineering Services

Appendix A

Water and Fire Flow Calculations and Supporting Documents

PEARSON ENGINEERING

50 Welham Road, Barrie
Water Flow Calculations

Design Criteria

Demand per capita (Q):	35000	L/ha/day
Peak Rate Factor (Max. Hour)	4.00	(Table 3-3: Peaking Factors, MOE Design Guidelines for Drinking-Water Systems)
Max. Day Factor	2.00	(Table 3-3: Peaking Factors, MOE Design Guidelines for Drinking-Water Systems)

Site Data

Description	Density		Units	Flow Rate		Peaking Factors	
Industrial (General)	15.24	ha	1 units	35,000	L/ha/d	MAX DAY FACTOR*	2.00
						PEAK RATE FACTOR*	4.00
						*From MOE Manual based on Industrial Land Use	

Calculate Average Day Demand (ADD)

ADD	=	35,000	x	15
ADD	=	533,400	L/day	
ADD	=	6.17	L/s	

Calculate Max Day Flow

MDF	=	6.17	x	2.00
MDF	=	12.35	L/s	

Calculate Peak Hour Demand

PHD	=	6.17	x	4.00
PHD	=	24.69	L/s	

PEARSON ENGINEERING

50 Welham Road, Barrie
Fire Flow Calculations - Industrial Building

Required fire flow calculations as per the Fire Underwritors Survey's Water Supply for Public Fire Protection (DRAFT) - 2019:

Location:	50 Welham Road, Barrie	
OBC Occupancy:	Industrial Occupancies - Group F	
Building Foot Print:	4,731 m^{2}***	
# of Stories:	1	**Industrial Building**

**Building Footprint Assumed to be 30% of Largest Lot

Date: 2023-03-29
Project: HAB, Brantford
Project Number: 22119

Type	Construction Class	Charge
5	Wood Frame	1.5
4	Heavy Timber	0.9
3	Ordinary	1.0
2	Non-Combustible	0.8
1	Fire Resistive	0.6

Construction Class: Type 3 — Ordinary

Automated Sprinkler Protection:

		Credit	Total
NFPA 13 sprinkler standard	Yes	30%	
Standard Water Supply	Yes	10%	50%
Fully Supervised System	Yes	10%	

Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Contents Factor: Rapid Burning — **Charge:** 25%

Exposure Side & Building	Length - Height Ratio	Distance to Exposure Building (m)	Charge
North Prop. Industrial	21-40	3.1 - 10.0 m	11%
East Prop. Road	21-40	> 30.1 m	0%
South Prop. Industrial	21-40	3.1 - 10.0 m	11%
West Ex. Forest	21-40	> 30.1 m	0%
		Total:	**22%**

Note: the max Exposure Adjustment Charge is 75%

Separation Distance	Charge
0.0 - 3.0 m	15%
3.1 - 10.0 m	11%
10.1 - 20.0 m	8%
20.1 - 30.0 m	4%
> 30.1 m	0%

Are Buildings Contigious? No

Fire Resistant Building: Are vertical openings and exterior vertical communications protected with a minimum one (1) hr rating?

Calculations: *C* = 1.0 — Ordinary

Required Fire Flow: ***RFF = 220 x C x √A***

Where: *RFF* = required fire flow in liters per minute
C = Coefficient related to the type of construction
A = the total floor area in square meters (excluding basements in building considered

Total Effective Area: *A* = 4,731 m²

RFF = 15,132 L/min

Round to Nearest 1000 L/min: RFF = 15,000 L/min * Must be > 2000 L/min or < 45,000 L/min

Correction Factors:

Contents Charge		3,750	L/min
RFF Adjusted for Contents	**E =**	18,750	L/min
Reduction For Sprinkler	**F =**	9,375	L/min
RFF w/ Sprinkler Reduction		9,375	L/min
Exposure Charge	**G =**	4,125	L/min
RFF w/ Exposure Charge		13,500	L/min

As per "Water Supply for Public Fire Protection" pg.20 note H:
RFF **= E - F + G**

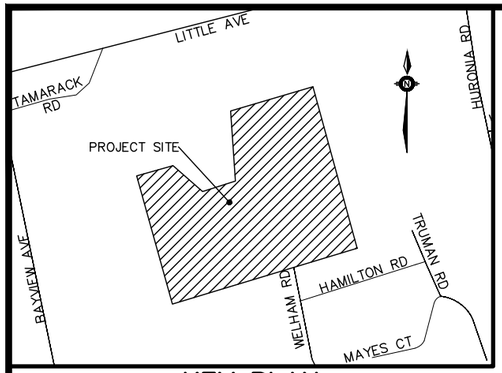
RFF = 18750 L/min - 9375 L/min + 4125 L/min
RFF = 13500 L/min

Required Fire Flow: **RFF =** 13,500 L/min

Round to Nearest 1000 L/min: **RFF = 14,000 L/min**

RFF= 3,696 GPM

RFF = 233 L/s



KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- WATERMAIN
- H&V
- FIRE HYDRANT
- WATER VALVE

SWM BLOCK

OPEN SPACE

McCONKEY PLACE

CONNECT TO EX. 500mmø CONC. PRESSURE PIPE WATERMAIN

300mmø W/M

300mmø W/M

J15

J16

BH102-21
258.51

BH103-21
267.20

BH104-21
267.68

LEVEL 1 FEATURE – 15m SETBACK

EX. 500mmø CONC. PRESSURE PIPE W/M

EX. 52mmø W/S

8

9

4

5

6

7

10

300mmø W/M

J14

J13

300mmø W/M

STREET A

J9

J10

J11

J12

11

3

J8

12

J7

19

18

17

BH101-21
265.30

J17

STREET B

13

BH106-21
268.80

300mmø W/M

J18

14

BH105-21
266.86

J19

20

16

J6

300mmø W/M

15

J5

STREET A

J3

J2

J4

J1

49 TRUMAN ROAD

WHISKEY CREEK

200mm TO 300mm INCREASER

CONNECT TO EX. 200mmø DI WATERMAIN

EX. EOSFX CAD

WELHAM ROAD

NO.	REVISION NOTE	DATE	BY

TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

WATER SERVICING PLAN – WATERCAD MODEL LAYOUT

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY AMC	HORIZ SCALE 1:2500	PROJECT # 21037
DRAWN BY TWC/AMC	VERT SCALE	DRAWING # WC-1
CHECKED BY MWD	DATE JUNE 2021	REVISION # 0

PEARSON ENGINEERING

50 Welham Road, Barrie
WaterCAD FlexTable: Junction Table - Domestic Report

Label	Elevation (m)	Head (m)	Demand (L/s)	Fire Flow Req'd (L/s)	Pressure (psi)
J-1	277.12	-	-	-	-
J-2	274.00	29.10	1.29	333.0	41.4
J-3	274.00	29.10	1.29	333.0	41.3
J-4	274.72	28.38	0.00	333.0	40.3
J-5	270.15	32.85	1.29	333.0	46.7
J-6	268.63	34.37	1.29	333.0	48.8
J-7	267.36	35.64	1.29	333.0	50.6
J-8	267.16	35.84	1.29	333.0	50.9
J-9	266.99	36.01	1.29	333.0	51.1
J-10	266.58	36.42	2.58	333.0	51.7
J-11	266.25	36.75	2.58	333.0	52.1
J-12	266.07	36.93	1.29	333.0	52.4
J-13	265.13	37.77	2.58	333.0	53.7
J-14	264.74	38.16	2.58	333.0	54.2
J-15	260.60	42.30	0.00	333.0	60.0
J-16	244.10	-	-	-	-
J-17	267.25	35.75	2.58	333.0	50.7
J-18	268.84	34.16	1.29	333.0	48.5
J-19	271.68	31.32	1.29	333.0	44.5

Appendix B

Sanitary Calculations and Supporting Documents

50 Welham Road, Barrie
Sanitary Flow Calculations

Design Criteria

Flow per Capita (Q):	225	L/cap/day	
Peak Flow:	Qp = P * Q * M / 86400 + I * A		
Peaking Factor (Harmon Formula):	M = 1 + (14 / (4 + (P / 1000) ^ 0.5))	Where:	2.0 <= "M" <= 4.0
Peak Extraneous Flow (I):	0.10	L/s/ha	

Site Data

Description		Density		Units	Flow Rate	
Industrial (General)	15.24	ha		1 units	35,000	L/ha/d

Calculate Average Daily Flows

ADF	=	35,000	x	15.24
ADF	=	533,400	L/day	
ADF	=	6.17	L/s	

Calculate Peaking Factor

$$M = 1 + \frac{14}{4 + \left(\frac{P}{1{,}000}\right)^{0.5}} + 0.1 * 0.12$$

M	=	1	+	14			+	0.1	*	0.12
				4	+	$\left(\frac{15}{1{,}000}\right)^{0.5}$				
M	=	4.41								

Use Max Peaking Factor 4

Calculate Peak Flow

Qp	=	6.17	x	4.00
	=	24.69	L/s	
Infiltration Allowance	=	0.10	x	15.24
	=	1.52	L/s	
Qp (Inc. Infiltration Allowance)	=	26.22	L/s	

SANITARY SEWER DESIGN

Development Details Basis

DESIGN SHEET Sanitary Sewer Design Sheet
FILE NO 21037
CONTRACT / PROJECT 50 Welham Road

n ≥ 0.013 — Numbers in blue or text in red are equations

M = 4.0 — Peaking factor of 4.0 as per Section 3.3.1.1 of the Barrie Sanitary Design Guidelines.

$Q_p = A*q*M/86400$ (Peak population flow where; q = 35000 L/day/ha; A = area (ha))
$Q_i = I*A$ (Peak extraneous flow: I= 0.1L/s/ha over development area)
$Q_{tot} = Q_p + Q_i$ (Total peak flow as the sum of peak population flow and peak extraneous flow)

STREET / AREA	MAINTENANCE HOLE FROM	MAINTENANCE HOLE TO	Area (ha)	Area (ACC) (ha)	PEAKING FACTOR	Q_p (l/s)	Q_i (l/s)	Q_{tot} (l/s)	L (m)	D (mm)	S (%)	Qf FULL (l/s)	d/D[2]	d/D[3] >0.5 or >0.70	Velocity FULL (m/s)	Velocity Partial[1] (m/s)	Velocity[4] > 0.6 (m/s)
	SAN MH1A	SAN MH2A	3.00	3.00	4.000	4.861	0.300	5.161	55	300	1.00%	96.701	0.156	Ok	1.368	0.713	Ok
	SAN MH2A	SAN MH3A	0.98	3.98	4.000	6.449	0.398	6.847	39	300	0.50%	68.378	0.213	Ok	0.967	0.607	Ok
	SAN MH3A	SAN MH4A	1.61	5.59	4.000	9.058	0.559	9.617	39	300	0.50%	68.378	0.253	Ok	0.967	0.670	Ok
	SAN MH4A	SAN MH 5A	1.70	7.29	4.000	11.813	0.729	12.542	90	300	0.50%	68.378	0.290	Ok	0.967	0.724	Ok
	SAN MH 5A	SANMH6A	1.56	8.85	4.000	14.340	0.885	15.225	90	300	0.50%	68.378	0.320	Ok	0.967	0.764	Ok
	SANMH6A	SANMH7A	0.00	8.85	4.000	14.340	0.885	15.225	55	300	0.50%	68.378	0.320	Ok	0.967	0.764	Ok
	SAN MH8A	SAN MH9A	2.05	2.05	4.000	3.322	0.205	3.527	31	300	4.70%	209.642	0.090	Ok	2.966	1.089	Ok
	SAN MH9A	SAN MH7A	2.28	4.33	4.000	7.016	0.433	7.449	90	300	5.40%	224.712	0.124	Ok	3.179	1.438	Ok
	SAN MH7A	SAN MH10A	1.71	14.89	4.000	24.127	1.489	25.616	67	300	1.60%	122.318	0.310	Ok	1.730	1.346	Ok
	SAN MH10A	SAN MH11A	2.35	17.24	4.000	27.935	1.724	29.659	106	300	2.60%	155.925	0.295	Ok	2.206	1.667	Ok
	SAN MH11A	SAN MH12A	0.00	17.24	4.000	27.935	1.724	29.659	110	300	1.00%	96.701	0.380	Ok	1.368	1.184	Ok
	SAN MH12A	SAN MH13A	0.00	17.24	4.000	27.935	1.724	29.659	88	300	2.25%	145.051	0.306	Ok	2.052	1.584	Ok
	SAN MH13A	SAN MH14A	0.00	17.24	4.000	27.935	1.724	29.659	70	300	2.70%	158.896	0.292	Ok	2.248	1.689	Ok
	SAN MH14A	SAN MH15A	0.00	17.24	4.000	27.935	1.724	29.659	110	300	2.40%	149.808	0.301	Ok	2.119	1.621	Ok
	SAN MH15A	SAN MH16A	0.00	17.24	4.000	27.935	1.724	29.659	110	300	5.00%	216.229	0.250	Ok	3.059	2.104	Ok
	SAN MH16A	EX. SAN MH	0.00	17.24	4.000	27.935	1.724	29.659	55	300	2.37%	148.869	0.302	Ok	2.106	1.613	Ok

DATE: 2023-03-29 CHECKED BY: AR

Notes:
(1) without extraneous flow
(2) with extraneous flow
(3) d/D>0.5 for pipes 375 and less, d/D>0.70 for pipes greater than 375
(4) Velocity check based on the lesser of full flow or partial velocity

Appendix C

Stormwater Management Calculations and Supporting Documents

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Calculation of Runoff Coefficients

Runoff Coefficient	=	0.25	0.25	0.70	0.50	0.85		Weighted
Imperviousness	=	0.00	0.00	0.60	0.40	0.88		
Surface Cover	=	Grass	Forest	ROW	SWM Pond	Block		Runoff Coefficient
Pre-Development	Total Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)		
100	214706	0	214706	0	0	0		0.25
101	41030	0	41030	0	0	0		0.25
Pre Total	255736	0	255736	0	0	0		0.25
Post-Development	Total Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)	Area (m^2)		
200	196677	0	0	21146	23165	152366		0.79
201	51023	51023	0	0	0	0		0.25
202	8036	8036	0	0	0	0		0.25
Post Total	255736	59059	0	21146	23165	152366		0.67

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Pre-Development OTTHYMO Parameters

Drainage ID	**=**	**100**	
Forest Area	=	21.47	ha
Impervious Area	=	0.00	ha
Total Area	=	21.47	ha

Based on Hydrogeological Assessment completed by Cambium, the assumed Soil Group is:

Hydrologic Soils Group:	=	AB	

CN Value is as follows:

CN	=	46.0	(Forest as per MOE Guidelines)

IA Value is as follows:

IA	=	10.00	(Forest as per MOE Guidelines)

Runoff Coefficient Value is as follows:

C	=	0.40	(Forest as per MOE Guidelines)

Find Time to Peak using Airport Equation and Uplands Method

Airport Equation		$T_c = 3.26(1.1 - c)L^{0.5}S_w^{-0.33}$	
Length (L)	=	254	m
Elevation 1 (El_1)	=	273.36	m
Elevation 2 (El_2)	=	256.34	m
Slope (S)	=	0.067	m/m
Time of Concentration (T_c)	=	19.30	mins
Total Time of Concentration (T_c)	=	19.30	mins
	=	0.32	hrs
Uplands Method			
Section	=	1	
Land Cover	=	Pasture	
Length	=	254	m
Slope	=	0.067	m/m
Velocity	=	0.60	m/s
Time of Concentration (T_c)	=	0.12	hrs
Total Time of Concentration (T_c)	=	0.12	hrs

Governing Time to Peak

Airport Equation

T_c	=	0.32	hrs
T_p (Tp = 2/3 Tc)	=	0.21	hrs
D_T (1/5 T_p)	=	2.6	mins

Drainage ID	**=**	**101**	
Forest Area	=	4.10	ha
Total Area	=	4.10	ha

Based on Hydrogeological Assessment completed by Cambium, the assumed Soil Group is:

Hydrologic Soils Group:	=	AB	

CN Value is as follows:

CN	=	46	(Forest as per MOE Guidelines)

IA Value is as follows:

IA	=	10	(Forest as per MOE Guidelines)

Runoff Coefficient Value is as follows:

C	=	0.10	(Forest as per MOE Guidelines)

Find Time to Peak using Airport Equation and Uplands Method

Airport Equation		$T_c = 3.26(1.1 - c)L^{0.5}S_w^{-0.33}$	
Length (L)	=	220	m
Elevation 1 (El_1)	=	304.49	m
Elevation 2 (El_2)	=	297.81	m
Slope (S)	=	0.030	m/m
Time of Concentration (T_c)	=	33.40	mins
Total Time of Concentration (T_c)	=	33.40	mins
	=	0.56	hrs

Uplands Method			
Section	=	1	
Land Cover	=	Pasture	
Length	=	220	m
Slope	=	0.030	m/m
Velocity	=	0.40	m/s
Time of Concentration (T_c)	=	0.15	hrs
Total Time of Concentration (T_c)	=	0.15	hrs

Governing Time to Peak

Airport Equation			
T_c	=	0.56	hrs
T_p (Tp = 2/3 Tc)	=	0.37	hrs
D_T (1/5 T_p)	=	4.5	mins

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Conceptual Stage-Storage-Discharge Table

Elevation (m)	Area (m^2)	Volume (m^3)	Quality Control Vol. (m^3)	Quatity Control Vol. (m^3)	Orifice 1 Head (m)	Orifice 1 Flow (m^3/s)	Orifice 2 Head (m)	Orifice 2 Flow (m^3/s)	Weir Head (m)	Weir Flow (m^3/s)	Total Flow (m^3/s)
255.00	3053	0	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.10	3181	312	312		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.20	3312	325	636		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.30	3444	338	974		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.40	3578	351	1325		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.50	3714	365	1690		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.60	3851	378	2068		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.70	3991	392	2460		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.80	4132	406	2866		0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.90	4275	420	3287		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.00	4419	435	3721		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.10	4589	450	4172		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.20	4857	472	4644		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.30	5131	499	5144		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.40	5411	527	5671		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.50	5837	562	6233		0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.50	5837	0		0	0.00	0.00					0.00
256.60	6125	598		598	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.70	6418	627		1225	0.10	0.04	0.00	0.00	0.00	0.00	0.04
256.80	6715	657		1882	0.20	0.05	0.00	0.00	0.00	0.00	0.05
256.90	7019	687		2569	0.30	0.06	0.00	0.00	0.00	0.00	0.06
257.00	7281	715		3284	0.40	0.07	0.00	0.00	0.00	0.00	0.07
257.10	7474	738		4021	0.50	0.08	0.00	0.00	0.00	0.00	0.08
257.20	7666	757		4778	0.60	0.09	0.00	0.00	0.00	0.00	0.09
257.30	7856	776		5554	0.70	0.09	0.00	0.00	0.00	0.00	0.09
257.40	8045	795		6349	0.80	0.10	0.00	0.00	0.00	0.00	0.10
257.50	8229	814		7163	0.90	0.11	0.00	0.00	0.00	0.00	0.11
257.60	8411	832		7995	1.00	0.11	0.00	0.00	0.00	0.00	0.11
257.70	8590	850		8845	1.10	0.12	0.94	0.74	0.00	0.00	0.86
257.80	8765	868		9713	1.20	0.12	1.04	0.78	0.00	0.00	0.90
257.90	8938	885		10598	1.30	0.13	1.14	0.82	0.00	0.00	0.95
258.00	9106	902		11500	1.40	0.13	1.24	0.85	0.00	0.00	0.99
258.10	9266	919		12419	1.50	0.14	1.34	0.89	0.00	0.00	1.02
258.20	9428	935		13354	1.60	0.14	1.44	0.92	0.10	1.34	2.40
258.30	9664	955		14308	1.70	0.15	1.54	0.95	0.20	3.80	4.90
258.40	9898	978		15286	1.80	0.15	1.64	0.98	0.30	6.98	8.11
258.50	10187	1004		16291	1.90	0.15	1.74	1.01	0.40	10.75	11.92

Orifice 1	
Diameter	200 mm
nvert Elevatio	256.50
rifice Constai	0.80
rifice Centroi	256.60
ice Flow Forn	$0.80\pi(D/2000)^2x(2x9.81xH)^{0.5}$

Orifice 2	
Diameter	525 mm
nvert Elevatio	256.50
rifice Constai	0.80
rifice Centroi	256.76
ice Flow Forn	$0.80\pi(D/2000)^2x(2x9.81xH)^{0.5}$

Major Storm Control Weir	
Width	25.00 m
Invert of Weir	258.10 m
eir Flow Form	$1.7WH^{1.5}$

TLM Holdings Inc., 50 Welham Dr
Quality Control Calculations

Find Wet Cell Volumes Required for Proposed Subdivision

Area	=	19.6677	ha.
% Total Impervious	=	76%	

Note: The Total Impervious was increased to 82% in order to provide quality control for the Residential Block assuming an imperviousness of 90% for the area.

From MOE SWMPPD Manual Table 3.2

Level 1 Quality Volumes for a wet pond:

70%	=	225	m^3/ha.
85%	=	250	m^3/ha.

Therefore,

76%	=	235	m^3/ha.

40 m^3/ha. Is for extended detention, therefore, permanent pool volume is 235 m^3/ha. - 40 m^3/ha. = 195 m^3/ha.

Volume	=	Area		x	Volume Req'd
	=	19.6677		x	195
	=	3835	m^3		
Volume Provided	=	6233	m^4		

Forebay 1 Calculations for proposed Subdivision

Settling Calculations as per MOE Equation 4.5

Length to Width Ratio of Forebay (r)	=	2.00	
Peak Flow (2 year) from pond (Q)	=	0.11	m^3/s
Settling Velocity (V)	=	0.0003	m/s
Forebay Length (D)	=	$\frac{\sqrt{(rQ)}}{V}$	
	=	27	m
Provided	=	44	m

Dispersion Length as per MOE Equation 4.6

5 Year Inlet Flow Rate (Q)	=	0.79	m^3/s
Depth of Permanent Pool (d)	=	1.00	m
Desired Velocity (V)	=	0.5	m/s
Dispersion Length	=	$\frac{8Q}{dV}$	
	=	13	m
Provided	=	44	m

Minimum Forebay Deep Zone Bottom Width as per MOE Equation 4.7

Dispersion Length	=	13	m
Width	=	Dispersion Length/8	
	=	2	m
Provided	=	4	m

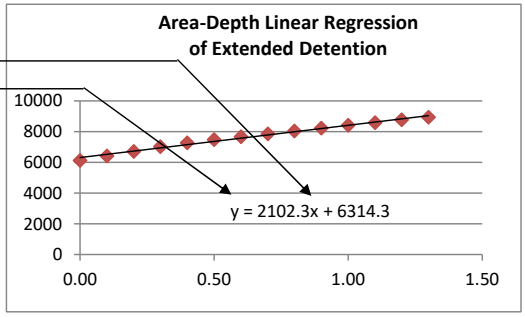
PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Extended Detention Drawdown Time

Orifice Invert Elevation	=	256.50	m
Size of Orifice	=	200	mm
Orifice Centroid	=	256.60	m
Orifice Constant	=	0.80	

Elevation (m)	Area (m^2)	Volume (m^3)	Cum. Volume (m^3)	Depth over Orifice (m)	Head (m)	Flow (m^3/s)
256.50	5837			0.00	0.00	0.0000
256.60	6125	598	598	0.10	0.00	0.0000
256.70	6418	627	1225	0.20	0.10	0.0352
256.80	6715	657	1882	0.30	0.20	0.0498
256.90	7019	687	2569	0.40	0.30	0.0610
257.00	7281	715	3284	0.50	0.40	0.0704
257.10	7474	738	4021	0.60	0.50	0.0787
257.20	7666	757	4778	0.70	0.60	0.0862
257.30	7856	776	5554	0.80	0.70	0.0931
257.40	8045	795	6349	0.90	0.80	0.0996
257.50	8229	814	7163	1.00	0.90	0.1056
257.60	8411	832	7995	1.10	1.00	0.1113
257.70	8590	850	8845	1.20	1.10	0.1168
257.80	8765	868	9713	1.30	1.20	0.1219
257.90	8938	885	10598	1.40	1.30	0.1269

Elevation of Perm. Pool	256.50	m
Intercept of Regression	6314.3	C_3
Slope of Regression	2102.30	C_2
Elevation of 25mm Storm	256.96	m
Depth over Orifice Centroid	0.36	m
Orifice Area	0.031	sq.m
Drawdown Time	25.33	hrs.



PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Pre Development Water Balance

Catchment Designation	Site			
	Grassed	Impervious	Total	
Area	255776	0	255776	
Pervious Area	255776	0	255776	
Impervious Area	0	0	0	
Infiltration Factors				
Topography Infiltration Factor	0.3	0.0		(From MOE Table 3.1 for Rolling Land)
Soil Infiltration Factor	0.3	0.0		(From MOE Table 3.1 for an average value between Medium combinations of clay and loam and Open sandy loam)
Land Cover Infiltration Factor	0.1	0.0		
MOE Infiltration Factor	0.7	0.0		
Actual Infiltration Factor	0.7	0.0		
Run-Off Coeffiecient	0.3	1.0		
Runoff from Impervious Surfaces*	0.0	0.8		
Inputs (per Unit Area)				
Precipitation	932.9	932.9	932.9	(Precipitation values from Environment Canada)
Run-On	0.0	0.0	0.0	
Other Inputs	0.0	0.0	0.0	
Total Inputs	932.9	932.9	932.9	
Outputs (per Unit Area)				
Precipitation Surplus	336.2	746.3	336	
Net Surplus	336.2	746.3	336	
Evapotranspiration	596.7	186.6	597	(Evapotranspiration values from Table 5-2 in the City of Barrie Tier Three Recharge Estimation, dated June 2012)
Infiltration	235.3	0.0	235	
Rooftop Infiltration	0.0	0.0	0	
Total Infiltration	235.3	0.0	235	
Runoff Pervious Areas	100.8	0.0	101	
Runoff Impervious Areas	0.0	746.3	746	
Total Runoff	100.8	746.3	847	
Total Outputs	932.9	932.9	1866	
Difference (Inputs - Outputs)	0.0	0.0	0	
Inputs (Volumes)				
Precipitation	238613	0	238613	
Run-On	0	0	0	
Other Inputs	0	0	0	
Total Inputs	238613	0	238613	
Outputs (Volumes)				
Precipitation Surplus	85980	0	85980	
Net Surplus	85980	0	85980	
Evapotranspiration	152634	0	152634	
Infiltration	60186	0	60186	
Rooftop Infiltration	0	0	0	
Total Infiltration	60186	0	60186	
Runoff Pervious Areas	25794	0	25794	
Runoff Impervious Areas	0	0	0	
Total Runoff	25794	0	25794	
Total Outputs	238613	0	238613	
Difference (Inputs - Outputs)	0	0	0	

Note: Highlighted cells are input cells.

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Post Development Water Balance (No Infiltration)

Catchment Designation	Site				
	Grassed	Impervious	Building (With Infiltration)	Total	
Area	99740	156036	0	255776	
Pervious Area	117217	0	0	117217	
Impervious Area	0	156036	0	156036	
Infiltration Factors					
Topography Infiltration Factor	0.3	0.0	0.0		(From MOE Table 3.1 for Rolling Land)
Soil Infiltration Factor	0.3	0.0	0.0		(From MOE Table 3.1 for an average value between Medium combinations of clay and loam and Open sandy loam)
Land Cover Infiltration Factor	0.1	0.0	0.0		
MOE Infiltration Factor	0.7	0.0	0.0		
Actual Infiltration Factor	0.7	0.0	0.0		
Run-Off Coeffiecient	0.3	1.0	1.0		
Runoff from Impervious Surfaces*	0.0	0.95	0.95		
Inputs (per Unit Area)					
Precipitation	932.9	932.9	932.9	932.9	(Precipitation values from Environment Canada)
Run-On	0	0	0	0	
Other Inputs	0	0	0	0	
Total Inputs	932.9	932.9	932.9	932.9	
Outputs (per Unit Area)					
Precipitation Surplus	336.2	886.3	886.3	671.7	
Net Surplus	336.2	886.3	886.3	671.7	
Evapotranspiration	596.7	46.6	46.6	261.2	(Evapotranspiration values from Table 5-2 in the City of Barrie Tier Three Recharge Estimation, dated June 2012)
Infiltration	235.3	0.0	0.0	91.8	
Rooftop Infiltration	0.0	0.0	0.0	0.0	
Total Infiltration	235.3	0.0	0.0	91.8	
Runoff Pervious Areas	100.8	0.0	0.0	39.3	
Runoff Impervious Areas	0.0	886.3	886.3	540.7	
Total Runoff	100.8	886.3	886.3	580.0	
Total Outputs	932.9	932.9	932.9	932.9	
Difference (Inputs - Outputs)	0.0	0.0	0.0		
Inputs (Volumes)					
Precipitation	93048	145566	0	238613	
Run-On	0	0	0	0	
Other Inputs	0	0	0	0	
Total Inputs	93048	145566	0	238613	
Outputs (Volumes)					
Precipitation Surplus	33528	138287	0	171815	
Net Surplus	33528	138287	0	171815	
Evapotranspiration	59520	7278	0	66798	
Infiltration	23470	0	0	23470	
Rooftop Infiltration	0	0	0	0	
Total Infiltration	23470	0	0	23470	
Runoff Pervious Areas	10058	0	0	10058	
Runoff Impervious Areas	0	138287	0	138287	
Total Runoff	10058	138287	0	148346	
Total Outputs	93048	145566	0	238613	
Difference (Inputs - Outputs)	0	0	0	0	

Note: Highlighted cells are input cells.

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Post Development Water Balance (With Infiltration)

Catchment Designation	Site				
	Grassed	Impervious	Building (With Infiltration)	Total	
Area	99740	102708	53328	255776	
Pervious Area	99740	0	0	99740	
Impervious Area	0	102708	53328	156036	
Infiltration Factors					
Topography Infiltration Factor	0.3	0	0		(From MOE Table 3.1 for Rolling Land)
Soil Infiltration Factor	0.3	0	0		(From MOE Table 3.1 for an average value between Medium combinations of clay and loam and Open sandy loam)
Land Cover Infiltration Factor	0.1	0	0		
MOE Infiltration Factor	0.7	0	0		
Actual Infiltration Factor	0.7	0	0		
Run-Off Coeffiecient	0.3	1	1		
Runoff from Impervious Surfaces*	0	0.95	0.95		
Inputs (per Unit Area)					(Precipitation values from Environment Canada)
Precipitation	932.9	932.9	932.9	932.9	
Run-On	0	0	0	0	
Other Inputs	0	0	0	0	
Total Inputs	932.9	932.9	932.9	932.9	
Outputs (per Unit Area)					
Precipitation Surplus	336.2	886.3	886.3	671.7	
Net Surplus	336.2	886.3	886.3	671.7	
Evapotranspiration	596.7	46.6	46.6	261.2	(Evapotranspiration values from Table 5-2 in the City of Barrie Tier Three Recharge Estimation, dated June 2012)
Infiltration	235.3	0.0	0.0	91.8	
Rooftop Infiltration	0.0	0.0	**686.9**	143.2	Depth of rainfall over the rooftop required to be infiltrated to achieve water balance.
Total Infiltration	235.3	0.0	686.9	235.0	
Runoff Pervious Areas	100.8	0.0	0.0	39.3	
Runoff Impervious Areas	0.0	886.3	199.4	397.4	
Total Runoff	100.8	886.3	199.4	436.8	
Total Outputs	932.9	932.9	932.9	932.9	
Difference (Inputs - Outputs)	0.0	0.0	0.0	0.0	
Inputs (Volumes)					
Precipitation	93048	95816	49750	238613	
Run-On	0	0	0	0	
Other Inputs	0	0	0	0	
Total Inputs	93048	95816	49750	238613	
Outputs (Volumes)					
Precipitation Surplus	33528	91025	47262	171815	
Net Surplus	33528	91025	47262	171815	
Evapotranspiration	59520	4791	2487	66798	
Infiltration	23470	0	0	23470	
Rooftop Infiltration	0	0	36631	36631	
Total Infiltration	23470	0	36631	60101	
Runoff Pervious Areas	10058	0	0	10058	
Runoff Impervious Areas	0	91025	10631	101656	
Total Runoff	10058	91025	10631	111715	
Total Outputs	93048	95816	49750	238613	
Difference (Inputs - Outputs)	0	0	0	0	

Note: Highlighted cells are input cells.

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Water Balance Calculations

Annual Rainfall Depth Required

Depth of Rainfall Required	=	686.9	m^3	(From Post-Development Water Balance (With Infiltration))

Find Percent of Annual Rainfall that Required Rainfall Depth represents:

Annual Rainfall for Study Area	=	932.9	mm
% Annual Rainfall	=	686.9 / 932.9	mm / mm
	=	74%	

From MOE Figure C-2, 74% of annual rainfall occurs for storm events of 10mm or less.

Find storage volume required for rainfall events of 10 mm to Rooftop Infiltration Gallery:

Roof Top Area	=	53,328	m^2		
Rainfall Depth	=	10	mm		
Storage Volume Required	=	A	x	D	
	=	53,328	x	10	
	=	533	m^3		

Minimum Infiltration Volume as per City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines Section 4.1.3 is as follows:

Storage Volume Required	=	Site Area	x	5	mm
	=	204,713	x	0.005	
	=	1024	m^3		

Infiltration Volume Provided

Volume Provided	=	Rooftop Area	x	25	mm
	=	53,328	x	0.025	
	=	1333	m^3		

It is proposed to infiltrate the 25 mm storm event over the rooftop area, resulting in a storage volume of 1333m³ exceeding the City of Barrie Criteria. Therefore, water balance for the site is achieved.

TLM Holdings Inc., 50 Welham Dr
Phosphorus Budget

Barrie Creeks	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Phosphorus Export (kg/ha/year)	0.07	1.82	0.05	0.26

Pre-Development Condition

	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha)	20.48	0.00	0.00	0.00
Total P (kg)	1.43	0.00	0.00	0.00
Total Pre-Development P (kg)		**1.43**		

Post-Development Condition (Uncontrolled):

	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	2.11	17.36	0.00	1.01
Total P (kg) :	0.15	31.59	0.00	0.26
Total Uncontrolled Post-Development (kg):		**32.00**		

Post-Development Condition (Controlled):

Untreated Area	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	0.80	0.00	0.00	0.00
Total P (kg) :	0.06	0.00	0.00	0.00

Area from Rooftop Draining to Infiltration	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	0.00	5.33	0.00	0.00
Total P (kg) :	0.00	9.71	0.00	0.00

Soakaway Infiltration	
Total P (kg):	9.71
Soakaway Infiltration Proficiency (%):	60
P Removed (kg):	5.82
P Remaining (kg):	3.88

Area Draining to Permeable Pavers	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	0.00	7.43	0.00	0.00
Total P (kg) :	0.00	13.52	0.00	0.00

Sand or Media Filters	
Total P (kg):	13.52
Sand or Media Filters Proficiency (%):	45
P Removed (kg):	6.08
P Remaining (kg):	7.44

Area Draining to OGS	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	0.00	4.60	0.00	0.00
Total P (kg) :	0.00	8.37	0.00	0.00

OGS	
P from Pavers	7.44
Total P (kg):	15.80
OGS Proficiency (%):	20
P Removed (kg):	3.16
P Remaining (kg):	12.64

Area Draining to Wet Detention Pond not Previously Treated	Hay / Pasture	High Intensity Industrial	Forest	Open Water
Area (ha):	1.32	0.00	0.00	1.01
Total P (kg) :	0.09	0.00	0.00	0.26

Wet Detention Ponds	
P Remaing from Pavers (kg):	12.64
Total P (kg):	12.64
Wet Detention Ponds Proficiency (%):	63
P Removed (kg):	7.96
P Remaining (kg):	4.68

Total Post-Development P (kg):	**8.56**

PEARSON ENGINEERING

TLM Holdings Inc., 50 Welham Dr
Block Allocation Calculations

Lot	Area	% of Total Req'd	Infiltration Storage (m^3)	Volume Control (m^3)	Phosphorus Loading
1	6840.58	4%	57.28	167.61	1.37
2	7284.02	5%	61.00	178.48	1.46
3	9477.75	6%	79.37	232.23	1.91
4	15768.57	10%	132.05	386.37	3.17
5	7507.07	5%	62.87	183.94	1.51
6	7288.99	5%	61.04	178.60	1.47
7	6090.86	4%	51.01	149.24	1.22
8	9272.60	6%	77.65	227.20	1.86
9	8209.84	5%	68.75	201.16	1.65
10	8921.04	6%	74.71	218.59	1.79
11	4284.06	3%	35.88	104.97	0.86
12	4297.44	3%	35.99	105.30	0.86
13	4312.10	3%	36.11	105.66	0.87
14	4404.58	3%	36.88	107.92	0.89
15	11539.03	7%	96.63	282.74	2.32
16	9033.58	6%	75.65	221.35	1.82
17	8959.71	6%	75.03	219.54	1.80
18	8200.00	5%	68.67	200.92	1.65
19	8313.62	5%	69.62	203.70	1.67
20	9198.42	6%	77.03	225.38	1.85
Total	159203.86	100%	1333	3901	32

Notes

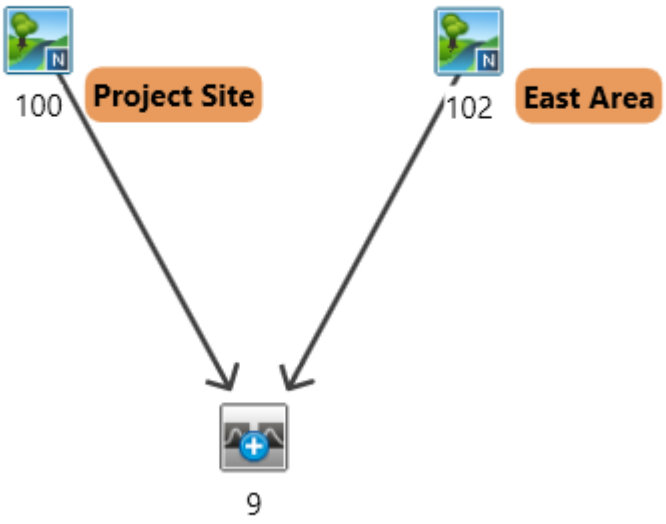
Block Area ÷ Total Site Area = % of total required

Total Volume required x % required = Volume for each block

Post Development Phosphorus x % required = Phosphorus Portion for each block

Appendix D

Pre-Development Visual OTTHYMO Modeling



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        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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DATE: 03-29-2023                              TIME: 09:53:16

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COMMENTS: _____________________________________________________________________

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--------------------
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                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.17   18.78 |  2.33    4.89 |  3.50    2.55
                0.17    2.47 |  1.33   83.11 |  2.50    4.28 |  3.67    2.39
                0.33    2.82 |  1.50   24.57 |  2.67    3.82 |  3.83    2.26
                0.50    3.31 |  1.67   13.01 |  2.83    3.46 |  4.00    2.15
                0.67    4.05 |  1.83    9.01 |  3.00    3.17 |
                0.83    5.30 |  2.00    6.97 |  3.17    2.93 |
                1.00    7.98 |  2.17    5.73 |  3.33    2.72 |

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

--------------------
| CALIB            |
```

| NASHYD (0100)| Area (ha)= 21.47 Curve Number (CN)= 59.2
|ID= 1 DT= 3.0 min | Ia (mm)= 9.95 # of Linear Res.(N)= 3.00
---------- U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 3.0 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
0.050	0.00	1.100	7.98	2.150	6.97	3.20	3.01
0.100	0.00	1.150	7.98	2.200	6.14	3.25	2.93
0.150	0.00	1.200	15.18	2.250	5.73	3.30	2.93
0.200	1.65	1.250	18.78	2.300	5.73	3.35	2.86
0.250	2.47	1.300	18.78	2.350	5.45	3.40	2.72
0.300	2.47	1.350	40.22	2.400	4.89	3.45	2.72
0.350	2.59	1.400	83.11	2.450	4.89	3.50	2.72
0.400	2.82	1.450	83.11	2.500	4.89	3.55	2.55
0.450	2.82	1.500	83.11	2.550	4.28	3.60	2.55
0.500	2.82	1.550	24.57	2.600	4.28	3.65	2.55
0.550	3.31	1.600	24.57	2.650	4.28	3.70	2.44
0.600	3.31	1.650	24.57	2.700	3.97	3.75	2.39
0.650	3.31	1.700	16.86	2.750	3.82	3.80	2.39
0.700	3.80	1.750	13.01	2.800	3.82	3.85	2.35
0.750	4.05	1.800	13.01	2.850	3.70	3.90	2.26
0.800	4.05	1.850	11.68	2.900	3.46	3.95	2.26
0.850	4.47	1.900	9.01	2.950	3.46	4.00	2.26
0.900	5.30	1.950	9.01	3.000	3.46	4.05	2.15
0.950	5.30	2.000	9.01	3.050	3.17	4.10	2.15
1.000	5.30	2.050	6.97	3.100	3.17	4.15	2.15
1.050	7.98	2.100	6.97	3.150	3.17		

Unit Hyd Qpeak (cms)= 2.563

PEAK FLOW (cms)= 0.143 (i)
TIME TO PEAK (hrs)= 1.950
RUNOFF VOLUME (mm)= 3.600
TOTAL RAINFALL (mm)= 36.919
RUNOFF COEFFICIENT = 0.098

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

| CALIB |
| NASHYD (0102)| Area (ha)= 4.10 Curve Number (CN)= 46.0
|ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
---------- U.H. Tp(hrs)= 0.56

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	7.98	2.250	5.73	3.33	2.93
0.167	0.00	1.250	18.78	2.333	5.73	3.42	2.72
0.250	2.47	1.333	18.78	2.417	4.89	3.50	2.72
0.333	2.47	1.417	83.11	2.500	4.89	3.58	2.55
0.417	2.82	1.500	83.11	2.583	4.28	3.67	2.55
0.500	2.82	1.583	24.57	2.667	4.28	3.75	2.39
0.583	3.31	1.667	24.57	2.750	3.82	3.83	2.39
0.667	3.31	1.750	13.01	2.833	3.82	3.92	2.26
0.750	4.05	1.833	13.01	2.917	3.46	4.00	2.26

0.833	4.05	1.917	9.01	3.000	3.46	4.08	2.15
0.917	5.30	2.000	9.01	3.083	3.17	4.17	2.15
1.000	5.30	2.083	6.97	3.167	3.17		
1.083	7.98	2.167	6.97	3.250	2.93		

Unit Hyd Qpeak (cms)= 0.280

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 2.234
TOTAL RAINFALL (mm)= 36.955
RUNOFF COEFFICIENT = 0.060

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

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0100):	21.47	0.143	1.95	3.60
	+ ID2= 2 (0102):	4.10	0.012	2.33	2.23
	ID = 3 (0009):	25.57	0.152	2.00	3.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\20abf0cf-4992-4bbe-a55d-240a0adcba47\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\20abf0cf-4992-4bbe-a55d-240a0adcba47\scena


DATE: 03-29-2023                              TIME: 09:53:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 02                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 50.52 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\441c6d51-a635-49b5-ba39-85d6
    remark: 5yr_4hr_chi
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.31  1.90   7.61 0.15   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  10.0
    [ Ptot= 50.52 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\441c6d51-a635-49b5-ba39-85d6
    remark: 5yr_4hr_chi
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.03  2.25   4.85 0.10   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    0.34  1.95   7.17  n/a   0.000
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\e0d2aea3-612c-4a45-a39e-755b159178e0\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\e0d2aea3-612c-4a45-a39e-755b159178e0\scena


DATE: 03-29-2023                              TIME: 09:53:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 03                        **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 59.69 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\7d369f10-af03-4407-a938-8de5
    remark: 10yr_4hr_chi
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.46  1.90  10.98 0.18   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  10.0
    [ Ptot= 59.69 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\7d369f10-af03-4407-a938-8de5
    remark: 10yr_4hr_chi
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.04  2.25   7.10 0.12   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    0.50  1.90  10.36  n/a   0.000
*
 FINISH

================================================================================
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```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\21a324b8-324f-40f2-b2d1-54f06a8183cb\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\21a324b8-324f-40f2-b2d1-54f06a8183cb\scena


DATE: 03-29-2023                          TIME: 09:53:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 04                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
    READ STORM                 10.0
    [ Ptot= 71.24 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\7dbb36ed-96c0-4e50-9ea4-63fa
    remark: 25yr_4hr_chi
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.68  1.90  15.86 0.22   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 10.0
    [ Ptot= 71.24 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\7dbb36ed-96c0-4e50-9ea4-63fa
    remark: 25yr_4hr_chi
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.06  2.25  10.43 0.15   0.000
    [CN=46.0         ]
```

[N = 3.0:Tp 0.56]

*

ADD [0100+ 0102] 0009 3 3.0 25.57 0.73 1.90 14.99 n/a 0.000

*

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\db072d86-2199-448e-bc1e-1137b6c24f22\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\db072d86-2199-448e-bc1e-1137b6c24f22\scena


DATE: 03-29-2023                              TIME: 09:53:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 05                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 79.45 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\922c1a80-8568-4248-be93-bf8b
    remark: 50yr_4hr_chi
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.86  1.90  19.71 0.25   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 10.0
    [ Ptot= 79.45 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\922c1a80-8568-4248-be93-bf8b
    remark: 50yr_4hr_chi
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.08  2.25  13.12 0.17   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    0.92  1.90  18.65  n/a   0.000
*
```

```
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\dc8f4b41-8623-4bd5-9e49-ea165808e7d9\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\dc8f4b41-8623-4bd5-9e49-ea165808e7d9\scena


DATE: 03-29-2023                              TIME: 09:53:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 06                        **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 87.58 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\75ea23c6-a0bf-4e9b-9c59-77bf
    remark: 100yr_4hr_chi
*
 ** CALIB NASHYD         0100  1  3.0   21.47    1.06  1.90  23.80 0.27   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  10.0
    [ Ptot= 87.58 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\75ea23c6-a0bf-4e9b-9c59-77bf
    remark: 100yr_4hr_chi
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.09  2.25  16.02 0.18   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    1.13  1.90  22.55  n/a   0.000
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                 filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\da5f3c28-5fb5-491e-bc02-6193d3b579fa\scena
  Summary             filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\da5f3c28-5fb5-491e-bc02-6193d3b579fa\scena


DATE: 03-29-2023                              TIME: 09:53:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 07                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 55.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\35adffe5-ed3c-4d8f-9261-88a2
    remark: 2yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.33 12.20   9.22 0.17   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  15.0
    [ Ptot= 55.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\35adffe5-ed3c-4d8f-9261-88a2
    remark: 2yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.03 12.50   5.90 0.11   0.000
    [CN=46.0         ]
```

[N = 3.0:Tp 0.56]

*

ADD [0100+ 0102] 0009 3 3.0 25.57 0.35 12.25 8.69 n/a 0.000

*

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\b8d99189-a611-4bdc-9b61-6e0bde8af906\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\b8d99189-a611-4bdc-9b61-6e0bde8af906\scena


DATE: 03-29-2023                          TIME: 09:53:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 08                        **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 76.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\afda407d-1c95-4acc-9000-4c50
    remark: 5yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.67 12.20  18.09 0.24   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  15.0
    [ Ptot= 76.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\afda407d-1c95-4acc-9000-4c50
    remark: 5yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.06 12.50  11.96 0.16   0.000
    [CN=46.0         ]
```

[N = 3.0:Tp 0.56]

*

ADD [0100+ 0102] 0009 3 3.0   25.57   0.71 12.20 17.11 n/a   0.000

*

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\0cfdb567-d3a2-449c-8da7-2933a0e12264\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\0cfdb567-d3a2-449c-8da7-2933a0e12264\scena


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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 09                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 89.90 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\d9e18f4c-021b-478a-ac87-3ecf
    remark: 10yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.94 12.20  25.07 0.28   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  15.0
    [ Ptot= 89.90 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\d9e18f4c-021b-478a-ac87-3ecf
    remark: 10yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.08 12.50  16.88 0.19   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    1.00 12.20  23.75  n/a   0.000
*
```

```
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\634db696-cf15-41fb-b566-bc9c827854c2\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\634db696-cf15-41fb-b566-bc9c827854c2\scena


DATE: 03-29-2023                              TIME: 09:53:17

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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 10                         **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
    READ STORM                 15.0
    [ Ptot=107.50 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\6705da12-f884-4770-a938-7679
    remark: 25yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    1.33 12.20  34.91 0.32   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 15.0
    [ Ptot=107.50 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\6705da12-f884-4770-a938-7679
    remark: 25yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.11 12.50  24.02 0.22   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    1.42 12.20  33.16  n/a   0.000
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\6e5e4da1-759c-4b24-87ba-80f5c57e5707\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\6e5e4da1-759c-4b24-87ba-80f5c57e5707\scena


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USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 11                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=120.60 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\ad33bbdd-f2a1-46c0-ba64-d4d4
    remark: 50yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    1.64 12.20  42.85 0.36   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 15.0
    [ Ptot=120.60 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\ad33bbdd-f2a1-46c0-ba64-d4d4
    remark: 50yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.14 12.50  29.92 0.25   0.000
    [CN=46.0         ]
```

[N = 3.0:Tp 0.56]

*

ADD [0100+ 0102] 0009 3 3.0 25.57 1.76 12.20 40.78 n/a 0.000

*

```
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                 filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\ac1e7a28-874b-4c1d-b468-c4f8042e8bd8\scena
  Summary             filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\ac1e7a28-874b-4c1d-b468-c4f8042e8bd8\scena


DATE: 03-29-2023                              TIME: 09:53:17

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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 12                         **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot=133.60 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\e8ae8d37-38d9-4edc-b490-d8ee
    remark: 100yr_24hr_scs
*
 ** CALIB NASHYD         0100  1  3.0   21.47    1.97 12.20  51.18 0.38   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  15.0
    [ Ptot=133.60 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\e8ae8d37-38d9-4edc-b490-d8ee
    remark: 100yr_24hr_scs
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.17 12.50  36.22 0.27   0.000
    [CN=46.0         ]
```

[N = 3.0:Tp 0.56]

*

ADD [0100+ 0102] 0009 3 3.0 25.57 2.11 12.20 48.78 n/a 0.000

*

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\64e09a02-6eef-44f1-bdaa-e9ea1fea5040\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\64e09a02-6eef-44f1-bdaa-e9ea1fea5040\scena


DATE: 03-29-2023                          TIME: 09:53:17

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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 13                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\488f9f1e-ddcd-40a5-a62d-34a1
    remark: 25mm4hr
*
 ** CALIB NASHYD         0100  1  3.0   21.47    0.03  2.20   1.19 0.05   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\488f9f1e-ddcd-40a5-a62d-34a1
    remark: 25mm4hr
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.00  2.75   0.72 0.03   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    0.04  2.20   1.11  n/a   0.000
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output                filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\21170916-1c4d-48d3-8787-6b6dc9864ee7\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\21170916-1c4d-48d3-8787-6b6dc9864ee7\scena


DATE: 03-29-2023                              TIME: 09:53:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 14                         **
  ************************************************

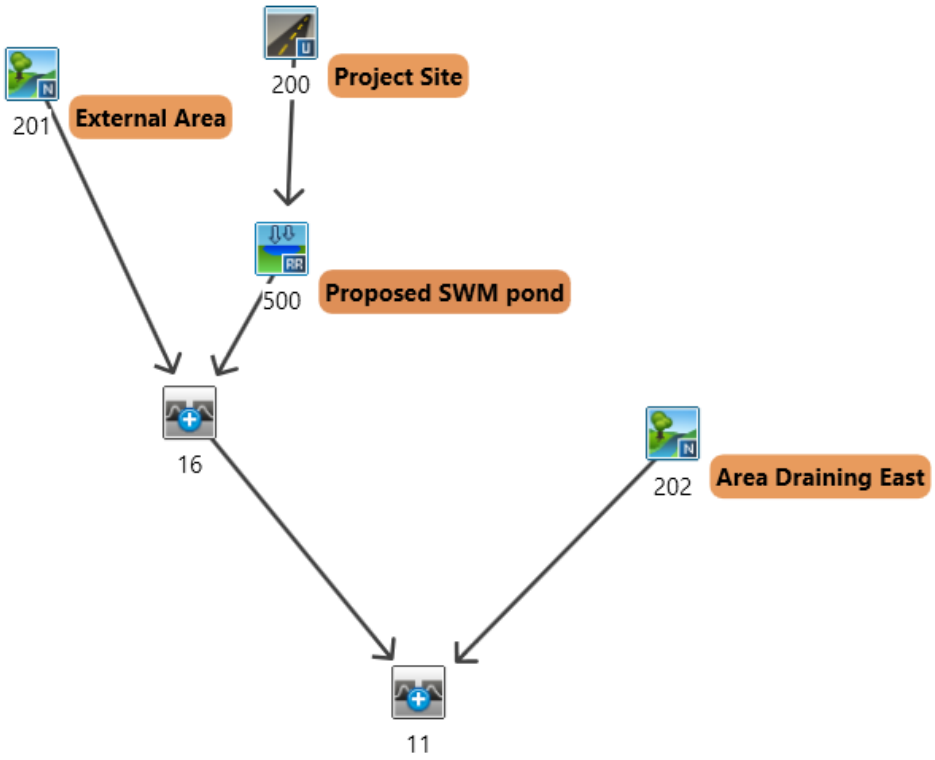
  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\bd1941b2-3f42-4603-a37c-281d
    remark: hazel-hr
*
 ** CALIB NASHYD         0100  1  3.0   21.47    2.06 10.10 108.25 0.51   0.000
    [CN=59.2         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname      :      C:\Users\aregmi\AppData\Local\Temp\137742c3-fa66-440b-8c05-
fdc0edf58656\bd1941b2-3f42-4603-a37c-281d
    remark: hazel-hr
*
 ** CALIB NASHYD         0102  1  5.0    4.10    0.27 10.50  81.58 0.38   0.000
    [CN=46.0         ]
```

```
    [ N = 3.0:Tp 0.56]
*
    ADD [  0100+  0102]  0009  3  3.0   25.57    2.31 10.10 103.98  n/a   0.000
*
```

Appendix E

Post-Development Visual OTTHYMO Modeling



```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\3ad085f0-fe9e-4f12-8298-673af188da3c\scena
  Summary             filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\3ad085f0-fe9e-4f12-8298-673af188da3c\scena


DATE: 03-14-2023                              TIME: 09:34:16

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
-------------------------
  ************************************************
  ** SIMULATION : Run 01                        **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\aregmi\AppD
|                  |              ata\Local\Temp\
|                  |              b3f654ef-ff45-4eef-b86c-3b07bc461ed4\09e908db
| Ptotal= 36.95 mm |    Comments: 2yr_4hr_chi
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.17   18.78 |  2.33    4.89 |  3.50    2.55
                0.17    2.47 |  1.33   83.11 |  2.50    4.28 |  3.67    2.39
                0.33    2.82 |  1.50   24.57 |  2.67    3.82 |  3.83    2.26
                0.50    3.31 |  1.67   13.01 |  2.83    3.46 |  4.00    2.15
                0.67    4.05 |  1.83    9.01 |  3.00    3.17 |
                0.83    5.30 |  2.00    6.97 |  3.17    2.93 |
                1.00    7.98 |  2.17    5.73 |  3.33    2.72 |

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


--------------------
| CALIB            |
```

| NASHYD (0202)| Area (ha)= 0.85 Curve Number (CN)= 59.0
|ID= 1 DT= 1.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.067	7.98	2.117	6.97	3.17	3.17
0.033	0.00	1.083	7.98	2.133	6.97	3.18	2.93
0.050	0.00	1.100	7.98	2.150	6.97	3.20	2.93
0.067	0.00	1.117	7.98	2.167	6.97	3.22	2.93
0.083	0.00	1.133	7.98	2.183	5.73	3.23	2.93
0.100	0.00	1.150	7.98	2.200	5.73	3.25	2.93
0.117	0.00	1.167	7.98	2.217	5.73	3.27	2.93
0.133	0.00	1.183	18.78	2.233	5.73	3.28	2.93
0.150	0.00	1.200	18.78	2.250	5.73	3.30	2.93
0.167	0.00	1.217	18.78	2.267	5.73	3.32	2.93
0.183	2.47	1.233	18.78	2.283	5.73	3.33	2.93
0.200	2.47	1.250	18.78	2.300	5.73	3.35	2.72
0.217	2.47	1.267	18.78	2.317	5.73	3.37	2.72
0.233	2.47	1.283	18.78	2.333	5.73	3.38	2.72
0.250	2.47	1.300	18.78	2.350	4.89	3.40	2.72
0.267	2.47	1.317	18.78	2.367	4.89	3.42	2.72
0.283	2.47	1.333	18.78	2.383	4.89	3.43	2.72
0.300	2.47	1.350	83.11	2.400	4.89	3.45	2.72
0.317	2.47	1.367	83.11	2.417	4.89	3.47	2.72
0.333	2.47	1.383	83.11	2.433	4.89	3.48	2.72
0.350	2.82	1.400	83.11	2.450	4.89	3.50	2.72
0.367	2.82	1.417	83.11	2.467	4.89	3.52	2.55
0.383	2.82	1.433	83.11	2.483	4.89	3.53	2.55
0.400	2.82	1.450	83.11	2.500	4.89	3.55	2.55
0.417	2.82	1.467	83.11	2.517	4.28	3.57	2.55
0.433	2.82	1.483	83.11	2.533	4.28	3.58	2.55
0.450	2.82	1.500	83.11	2.550	4.28	3.60	2.55
0.467	2.82	1.517	24.57	2.567	4.28	3.62	2.55
0.483	2.82	1.533	24.57	2.583	4.28	3.63	2.55
0.500	2.82	1.550	24.57	2.600	4.28	3.65	2.55
0.517	3.31	1.567	24.57	2.617	4.28	3.67	2.55
0.533	3.31	1.583	24.57	2.633	4.28	3.68	2.39
0.550	3.31	1.600	24.57	2.650	4.28	3.70	2.39
0.567	3.31	1.617	24.57	2.667	4.28	3.72	2.39
0.583	3.31	1.633	24.57	2.683	3.82	3.73	2.39
0.600	3.31	1.650	24.57	2.700	3.82	3.75	2.39
0.617	3.31	1.667	24.57	2.717	3.82	3.77	2.39
0.633	3.31	1.683	13.01	2.733	3.82	3.78	2.39
0.650	3.31	1.700	13.01	2.750	3.82	3.80	2.39
0.667	3.31	1.717	13.01	2.767	3.82	3.82	2.39
0.683	4.05	1.733	13.01	2.783	3.82	3.83	2.39
0.700	4.05	1.750	13.01	2.800	3.82	3.85	2.26
0.717	4.05	1.767	13.01	2.817	3.82	3.87	2.26
0.733	4.05	1.783	13.01	2.833	3.82	3.88	2.26
0.750	4.05	1.800	13.01	2.850	3.46	3.90	2.26
0.767	4.05	1.817	13.01	2.867	3.46	3.92	2.26
0.783	4.05	1.833	13.01	2.883	3.46	3.93	2.26
0.800	4.05	1.850	9.01	2.900	3.46	3.95	2.26
0.817	4.05	1.867	9.01	2.917	3.46	3.97	2.26
0.833	4.05	1.883	9.01	2.933	3.46	3.98	2.26
0.850	5.30	1.900	9.01	2.950	3.46	4.00	2.26
0.867	5.30	1.917	9.01	2.967	3.46	4.02	2.15
0.883	5.30	1.933	9.01	2.983	3.46	4.03	2.15
0.900	5.30	1.950	9.01	3.000	3.46	4.05	2.15

0.917	5.30	1.967	9.01	3.017	3.17	4.07	2.15
0.933	5.30	1.983	9.01	3.033	3.17	4.08	2.15
0.950	5.30	2.000	9.01	3.050	3.17	4.10	2.15
0.967	5.30	2.017	6.97	3.067	3.17	4.12	2.15
0.983	5.30	2.033	6.97	3.083	3.17	4.13	2.15
1.000	5.30	2.050	6.97	3.100	3.17	4.15	2.15
1.017	7.98	2.067	6.97	3.117	3.17	4.17	2.15
1.033	7.98	2.083	6.97	3.133	3.17		
1.050	7.98	2.100	6.97	3.150	3.17		

Unit Hyd Qpeak (cms)= 0.162

PEAK FLOW (cms)= 0.011 (i)
TIME TO PEAK (hrs)= 1.733
RUNOFF VOLUME (mm)= 4.898
TOTAL RAINFALL (mm)= 36.955
RUNOFF COEFFICIENT = 0.133

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

CALIB	
STANDHYD (0200)	Area (ha)= 19.62
ID= 1 DT= 5.0 min	Total Imp(%)= 83.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	16.28	3.34
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	361.66	40.00
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	0.00	1.167	7.98	2.250	5.73	3.33	2.93
0.167	0.00	1.250	18.78	2.333	5.73	3.42	2.72
0.250	2.47	1.333	18.78	2.417	4.89	3.50	2.72
0.333	2.47	1.417	83.11	2.500	4.89	3.58	2.55
0.417	2.82	1.500	83.11	2.583	4.28	3.67	2.55
0.500	2.82	1.583	24.57	2.667	4.28	3.75	2.39
0.583	3.31	1.667	24.57	2.750	3.82	3.83	2.39
0.667	3.31	1.750	13.01	2.833	3.82	3.92	2.26
0.750	4.05	1.833	13.01	2.917	3.46	4.00	2.26
0.833	4.05	1.917	9.01	3.000	3.46	4.08	2.15
0.917	5.30	2.000	9.01	3.083	3.17	4.17	2.15
1.000	5.30	2.083	6.97	3.167	3.17		
1.083	7.98	2.167	6.97	3.250	2.93		

Max.Eff.Inten.(mm/hr)=		83.11	50.14	
over (min)		5.00	15.00	
Storage Coeff. (min)=		5.95 (ii)	10.54 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.19	0.09	
				TOTALS
PEAK FLOW	(cms)=	2.31	0.28	2.450 (iii)
TIME TO PEAK	(hrs)=	1.50	1.67	1.50
RUNOFF VOLUME	(mm)=	35.95	11.04	25.99
TOTAL RAINFALL	(mm)=	36.95	36.95	36.95
RUNOFF COEFFICIENT	=	0.97	0.30	0.70

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0500)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0600    |   0.7450      0.8000
                          0.0350     0.1230    |   0.8250      0.8850
                          0.0500     0.1880    |   0.8980      0.9710
                          0.0610     0.2570    |   0.9650      1.0600
                          0.0700     0.3280    |   2.3720      1.1500
                          0.0790     0.4020    |   4.8880      1.2420
                          0.0860     0.4780    |   8.1260      1.3350
                          0.0930     0.5550    |  11.9480      1.4310
                          0.1000     0.6350    |  16.2730      1.5290
                          0.6540     0.7160    |  21.0480      1.6290

                                 AREA      QPEAK     TPEAK       R.V.
                                 (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     19.620      2.450      1.50       25.99
   OUTFLOW: ID= 1 (  0500)     19.620      0.082      4.17       22.91

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.33
                  TIME SHIFT OF PEAK FLOW         (min)=160.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4305

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0202):     0.85   0.011     1.73     4.90
      + ID2= 2 (  0500):    19.62   0.082     4.17    22.91
        ================================================
        ID = 3 (  0011):    20.47   0.083     4.17    22.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   5.10   Curve Number   (CN)= 46.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
              0.033    0.00 | 1.100    7.98 | 2.167    6.97 |  3.23    2.93
              0.067    0.00 | 1.133    7.98 | 2.200    5.73 |  3.27    2.93
              0.100    0.00 | 1.167    7.98 | 2.233    5.73 |  3.30    2.93
              0.133    0.00 | 1.200   18.78 | 2.267    5.73 |  3.33    2.93
              0.167    0.00 | 1.233   18.78 | 2.300    5.73 |  3.37    2.72
```

0.200	2.47	1.267	18.78	2.333	5.73	3.40	2.72
0.233	2.47	1.300	18.78	2.367	4.89	3.43	2.72
0.267	2.47	1.333	18.78	2.400	4.89	3.47	2.72
0.300	2.47	1.367	83.11	2.433	4.89	3.50	2.72
0.333	2.47	1.400	83.11	2.467	4.89	3.53	2.55
0.367	2.82	1.433	83.11	2.500	4.89	3.57	2.55
0.400	2.82	1.467	83.11	2.533	4.28	3.60	2.55
0.433	2.82	1.500	83.11	2.567	4.28	3.63	2.55
0.467	2.82	1.533	24.57	2.600	4.28	3.67	2.55
0.500	2.82	1.567	24.57	2.633	4.28	3.70	2.39
0.533	3.31	1.600	24.57	2.667	4.28	3.73	2.39
0.567	3.31	1.633	24.57	2.700	3.82	3.77	2.39
0.600	3.31	1.667	24.57	2.733	3.82	3.80	2.39
0.633	3.31	1.700	13.01	2.767	3.82	3.83	2.39
0.667	3.31	1.733	13.01	2.800	3.82	3.87	2.26
0.700	4.05	1.767	13.01	2.833	3.82	3.90	2.26
0.733	4.05	1.800	13.01	2.867	3.46	3.93	2.26
0.767	4.05	1.833	13.01	2.900	3.46	3.97	2.26
0.800	4.05	1.867	9.01	2.933	3.46	4.00	2.26
0.833	4.05	1.900	9.01	2.967	3.46	4.03	2.15
0.867	5.30	1.933	9.01	3.000	3.46	4.07	2.15
0.900	5.30	1.967	9.01	3.033	3.17	4.10	2.15
0.933	5.30	2.000	9.01	3.067	3.17	4.13	2.15
0.967	5.30	2.033	6.97	3.100	3.17	4.17	2.15
1.000	5.30	2.067	6.97	3.133	3.17		
1.033	7.98	2.100	6.97	3.167	3.17		
1.067	7.98	2.133	6.97	3.200	2.93		

Unit Hyd Qpeak (cms)= 0.974

PEAK FLOW (cms)= 0.026 (i)
TIME TO PEAK (hrs)= 1.767
RUNOFF VOLUME (mm)= 2.235
TOTAL RAINFALL (mm)= 36.955
RUNOFF COEFFICIENT = 0.060

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

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\871ed49d-12b8-4a21-a0b0-e052c2617587\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\871ed49d-12b8-4a21-a0b0-e052c2617587\scena


DATE: 03-14-2023                              TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 02                        **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 50.52 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\441c6d51-a635-49b5-ba39-85d6
    remark: 5yr_4hr_chi
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.02  1.72   9.33 0.18   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  10.0
    [ Ptot= 50.52 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\441c6d51-a635-49b5-ba39-85d6
    remark: 5yr_4hr_chi
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    3.54  1.50  37.30 0.74   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.10  4.25  34.22  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.10  1.83  32.61  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 50.52 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\441c6d51-a635-49b5-ba39-85d6
    remark: 5yr_4hr_chi
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.06  1.73   4.85 0.10   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c7a8b7c7-8897-4b66-84be-3f8c1bb6c7db\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c7a8b7c7-8897-4b66-84be-3f8c1bb6c7db\scena


DATE: 03-14-2023                          TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 03                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 59.69 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7d369f10-af03-4407-a938-8de5
    remark: 10yr_4hr_chi
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.03  1.72  12.94 0.22   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                 10.0
    [ Ptot= 59.69 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7d369f10-af03-4407-a938-8de5
    remark: 10yr_4hr_chi
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    4.26  1.50  45.21 0.76   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.34  2.75  42.13  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.35  2.75  40.31  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 59.69 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7d369f10-af03-4407-a938-8de5
    remark: 10yr_4hr_chi
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.09  1.73   7.10 0.12   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\cb64d408-04dd-4b02-a8f0-f724be5b9902\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\cb64d408-04dd-4b02-a8f0-f724be5b9902\scena


DATE: 03-14-2023                          TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 04                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 71.24 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7dbb36ed-96c0-4e50-9ea4-63fa
    remark: 25yr_4hr_chi
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.04  1.72  18.07 0.25   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  10.0
    [ Ptot= 71.24 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7dbb36ed-96c0-4e50-9ea4-63fa
    remark: 25yr_4hr_chi
*
 *  CALIB STANDHYD       0200  1  5.0   19.62    5.18  1.50  55.40 0.78   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.66  2.25  52.32  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.68  2.17  50.28  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 71.24 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\7dbb36ed-96c0-4e50-9ea4-63fa
    remark: 25yr_4hr_chi
*
 *  CALIB NASHYD         0201  1  2.0    5.10    0.13  1.73  10.43 0.15   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
 FINISH

================================================================================
==========================
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\ab29ce38-75c9-4a26-873c-befdc04e87f0\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\ab29ce38-75c9-4a26-873c-befdc04e87f0\scena


DATE: 03-14-2023                          TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 05                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 79.45 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\922c1a80-8568-4248-be93-bf8b
    remark: 50yr_4hr_chi
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.05  1.72  22.09 0.28   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                 10.0
    [ Ptot= 79.45 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\922c1a80-8568-4248-be93-bf8b
    remark: 50yr_4hr_chi
*
 *  CALIB STANDHYD       0200  1  5.0   19.62    5.88  1.50  62.77 0.79   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.74  2.25  59.69  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.76  2.17  57.50  n/a   0.000
*
    READ STORM                10.0
    [ Ptot= 79.45 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\922c1a80-8568-4248-be93-bf8b
    remark: 50yr_4hr_chi
*
 *  CALIB NASHYD         0201  1  2.0    5.10    0.17  1.73  13.12 0.17   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\90106411-de67-4558-a663-0ddfd3f66f6d\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\90106411-de67-4558-a663-0ddfd3f66f6d\scena


DATE: 03-14-2023                          TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 06                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 87.58 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\75ea23c6-a0bf-4e9b-9c59-77bf
    remark: 100yr_4hr_chi
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.06  1.72  26.32 0.30   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  10.0
    [ Ptot= 87.58 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\75ea23c6-a0bf-4e9b-9c59-77bf
    remark: 100yr_4hr_chi
*
 *  CALIB STANDHYD       0200  1  5.0   19.62    6.59  1.50  70.15 0.80   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.82  2.25  67.07  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.84  2.08  64.73  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 87.58 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\75ea23c6-a0bf-4e9b-9c59-77bf
    remark: 100yr_4hr_chi
*
 *  CALIB NASHYD         0201  1  2.0    5.10    0.21  1.73  16.02 0.18   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\08b5778a-9751-4a1f-bb97-d89bdfce11ec\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\08b5778a-9751-4a1f-bb97-d89bdfce11ec\scena


DATE: 03-14-2023                          TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 07                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 55.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\35adffe5-ed3c-4d8f-9261-88a2
    remark: 2yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.02 12.10   8.69 0.16   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot= 55.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\35adffe5-ed3c-4d8f-9261-88a2
    remark: 2yr_24hr_scs
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    2.16 12.00  41.14 0.75   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:              0500  1  5.0   19.62    0.09 14.33  38.06  n/a   0.000
*
    ADD [  0202+  0500]   0011  3  1.0   20.47    0.10 12.17  30.88  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 55.00 mm ]
    fname         :         C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\35adffe5-ed3c-4d8f-9261-88a2
    remark: 2yr_24hr_scs
*
 ** CALIB NASHYD          0201  1  2.0    5.10    0.07 12.10   5.90 0.11   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c5027644-514c-4db4-8d76-4134d0aedc17\scena
  Summary            filename:           C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c5027644-514c-4db4-8d76-4134d0aedc17\scena


DATE: 03-14-2023                              TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 08                        **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 76.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\afda407d-1c95-4acc-9000-4c50
    remark: 5yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.04 12.10  16.28 0.21   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot= 76.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\afda407d-1c95-4acc-9000-4c50
    remark: 5yr_24hr_scs
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    3.25 12.00  59.66 0.79   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:              0500  1  5.0   19.62    0.46 12.58  56.58  n/a   0.000
*
    ADD [  0202+  0500]   0011  3  1.0   20.47    0.47 12.58  44.90  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 76.00 mm ]
    fname         :         C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\afda407d-1c95-4acc-9000-4c50
    remark: 5yr_24hr_scs
*
 ** CALIB NASHYD          0201  1  2.0    5.10    0.14 12.10  11.96 0.16   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\09667341-8b86-4c52-abab-f87755f5b3a0\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\09667341-8b86-4c52-abab-f87755f5b3a0\scena


DATE: 03-14-2023                          TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 09                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 89.90 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\d9e18f4c-021b-478a-ac87-3ecf
    remark: 10yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.06 12.10  22.20 0.25   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot= 89.90 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\d9e18f4c-021b-478a-ac87-3ecf
    remark: 10yr_24hr_scs
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    4.12 12.00  72.27 0.80   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.71 12.50  69.19  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.74 12.25  56.29  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 89.90 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\d9e18f4c-021b-478a-ac87-3ecf
    remark: 10yr_24hr_scs
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.20 12.10  16.88 0.19   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\6ec9e39e-c062-485f-ae7b-76d1c26c6929\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\6ec9e39e-c062-485f-ae7b-76d1c26c6929\scena


DATE: 03-14-2023                          TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 10                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot=107.50 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\6705da12-f884-4770-a938-7679
    remark: 25yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.08 12.10  30.55 0.28   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot=107.50 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\6705da12-f884-4770-a938-7679
    remark: 25yr_24hr_scs
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    5.10 12.00  88.52 0.82   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    0.86 12.50  85.44  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    0.91 12.25  71.07  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=107.50 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\6705da12-f884-4770-a938-7679
    remark: 25yr_24hr_scs
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.29 12.10  24.02 0.22   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:        C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c1e55ce1-33a8-464c-a6de-a8c924bc8b11\scena
  Summary            filename:          C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\c1e55ce1-33a8-464c-a6de-a8c924bc8b11\scena


DATE: 03-14-2023                           TIME: 09:34:17

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 11                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot=120.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\ad33bbdd-f2a1-46c0-ba64-d4d4
    remark: 50yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.09 12.10  37.28 0.31   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot=120.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\ad33bbdd-f2a1-46c0-ba64-d4d4
    remark: 50yr_24hr_scs
*
 *  CALIB STANDHYD       0200  1  5.0   19.62    5.84 12.00 100.78 0.84   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:              0500  1  5.0   19.62    0.96 12.50  97.70  n/a   0.000
*
    ADD [  0202+  0500]   0011  3  1.0   20.47    1.02 12.25  82.63  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\ad33bbdd-f2a1-46c0-ba64-d4d4
    remark: 50yr_24hr_scs
*
 *  CALIB NASHYD          0201  1  2.0    5.10    0.36 12.10  29.92 0.25   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\8ad929d5-1b61-48db-ba8f-49f65ac84276\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\8ad929d5-1b61-48db-ba8f-49f65ac84276\scena


DATE: 03-14-2023                          TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 12                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot=133.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\e8ae8d37-38d9-4edc-b490-d8ee
    remark: 100yr_24hr_scs
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.11 12.10  44.36 0.33   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  15.0
    [ Ptot=133.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\e8ae8d37-38d9-4edc-b490-d8ee
    remark: 100yr_24hr_scs
*
 *  CALIB STANDHYD       0200  1  5.0   19.62    6.59 12.00 113.04 0.85   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    1.90 12.25 109.96  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    2.00 12.17  94.31  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\e8ae8d37-38d9-4edc-b490-d8ee
    remark: 100yr_24hr_scs
*
 *  CALIB NASHYD         0201  1  2.0    5.10    0.44 12.10  36.22 0.27   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\1a3e5ef4-5d57-454c-b6db-ae41ce518815\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\1a3e5ef4-5d57-454c-b6db-ae41ce518815\scena


DATE: 03-14-2023                          TIME: 09:34:16

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 13                        **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  10.0
    [ Ptot= 25.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\488f9f1e-ddcd-40a5-a62d-34a1
    remark: 25mm4hr
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.00  1.73   2.03 0.08   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  10.0
    [ Ptot= 25.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\488f9f1e-ddcd-40a5-a62d-34a1
    remark: 25mm4hr
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    1.32  1.50  16.53 0.66   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:              0500  1  5.0   19.62    0.06  4.08  13.45  n/a   0.000
*
    ADD [  0202+  0500]   0011  3  1.0   20.47    0.06  4.03  12.95  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\488f9f1e-ddcd-40a5-a62d-34a1
    remark: 25mm4hr
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.01  1.90   0.72 0.03   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

```
================================================================================
==========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2012)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output               filename:       C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\1dfa60c9-d42e-4001-908f-9c2fd779b673\scena
  Summary            filename:         C:\Users\aregmi\AppData\Local\Civica\VH5
\fb2faa40-6aae-43f9-8f1d-f2fc6e0bc008\1dfa60c9-d42e-4001-908f-9c2fd779b673\scena


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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Run 14                        **
  ************************************************

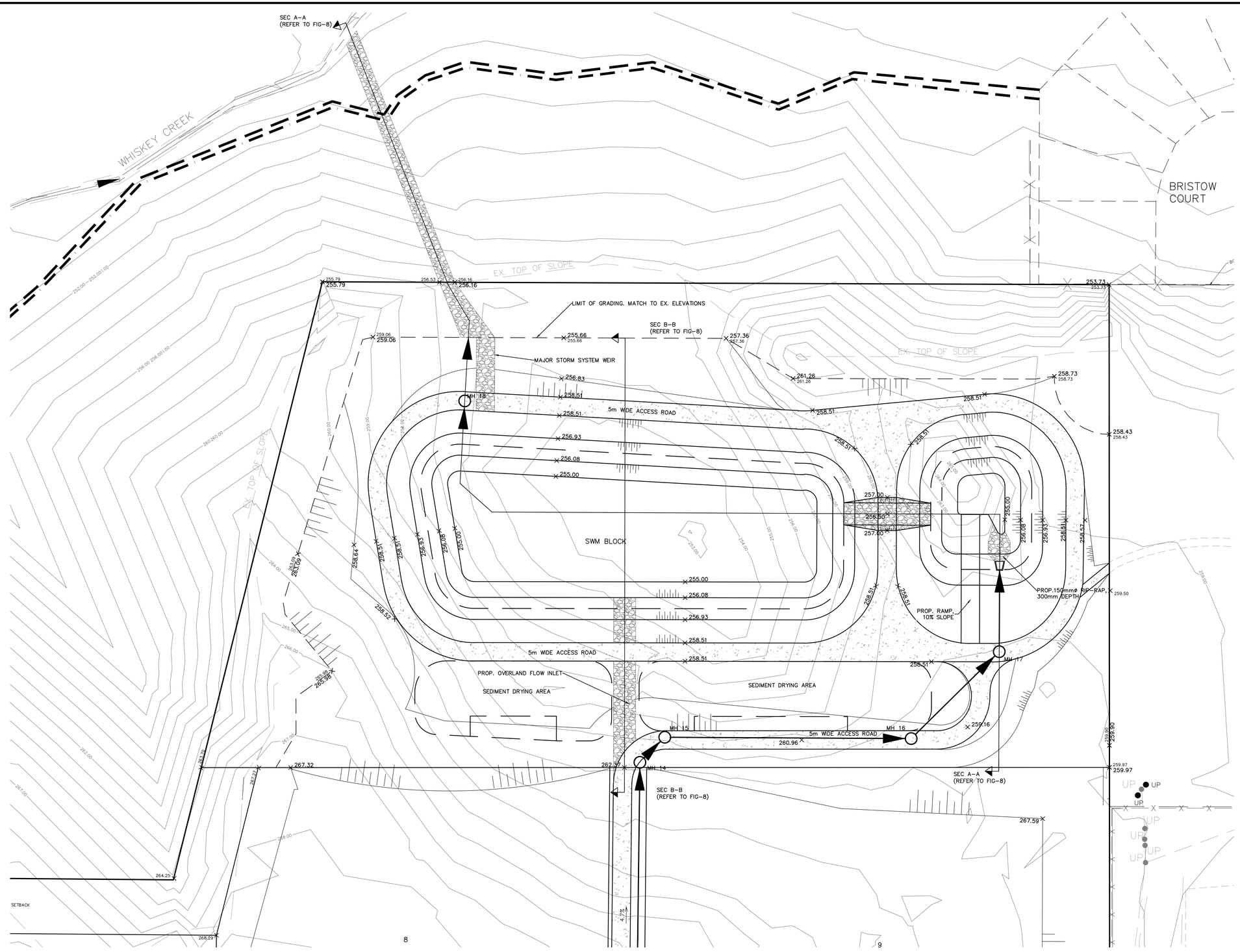
  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

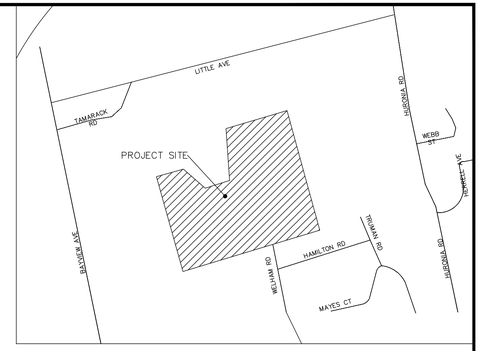
      START @  0.00 hrs
      --------------------
    READ STORM                  60.0
    [ Ptot=212.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\bd1941b2-3f42-4603-a37c-281d
    remark: hazel-hr
*
 ** CALIB NASHYD         0202  1  1.0    0.85    0.09 10.03 111.73 0.53   0.000
    [CN=59.0         ]
    [ N = 3.0:Tp 0.20]
*
    READ STORM                  60.0
    [ Ptot=212.00 mm ]
    fname         :        C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\bd1941b2-3f42-4603-a37c-281d
    remark: hazel-hr
*
 ** CALIB STANDHYD       0200  1  5.0   19.62    2.73 10.00 188.44 0.89   0.000
    [I%=60.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0500  1  5.0   19.62    2.59 10.08 185.36  n/a   0.000
*
    ADD [  0202+  0500]  0011  3  1.0   20.47    2.68 10.08 178.30  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname         :         C:\Users\aregmi\AppData\Local\Temp\b3f654ef-ff45-4eef-
b86c-3b07bc461ed4\bd1941b2-3f42-4603-a37c-281d
    remark: hazel-hr
*
 ** CALIB NASHYD         0201  1  2.0    5.10    0.40 10.03  81.57 0.38   0.000
    [CN=46.0         ]
    [ N = 3.0:Tp 0.20]
*
```

Appendix F

Pearson Engineering Drawings





KEY PLAN
NTS

LEGEND

- SITE BOUNDARY
- 254.63 / 254.09 — PROPOSED ELEVATION / EXISTING ELEVATION
- 1.5% — PROPOSED GRADE
- EXISTING 100 YR FLOODLINE
- EXISTING REGIONAL FLOODLINE
- STM MH — PROP STM MANHOLE
- STORM SEWER
- MAX 3:1 SLOPE UNLESS OTHERWISE NOTED
- NATURAL HERITAGE RESOURCE FEATURE 15m BUFFER & STABLE SLOPE SETBACK

BENCHMARK

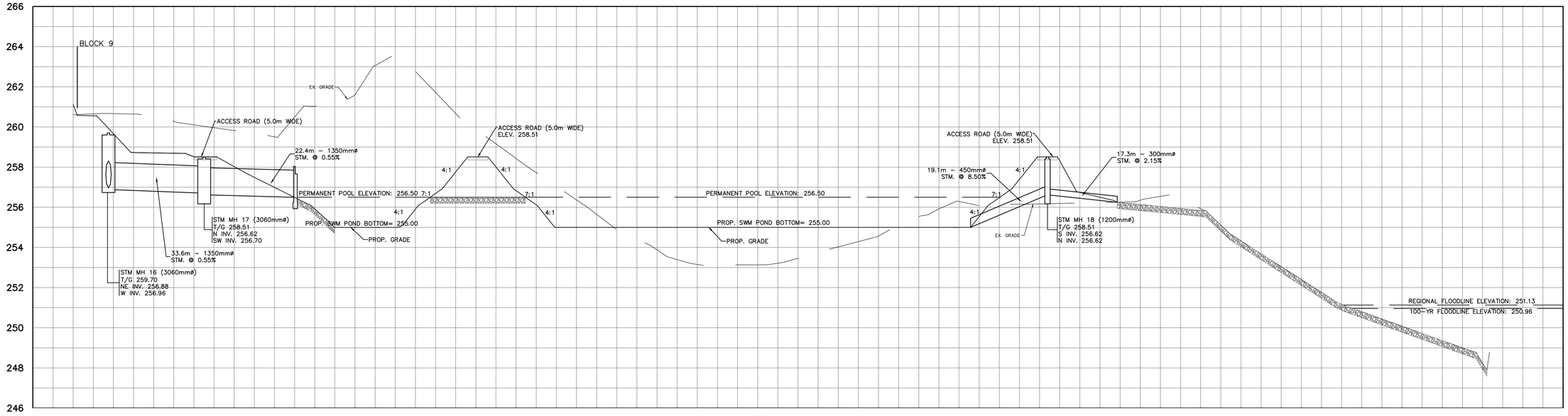
NO.	REVISION NOTE	DATE	BY

TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

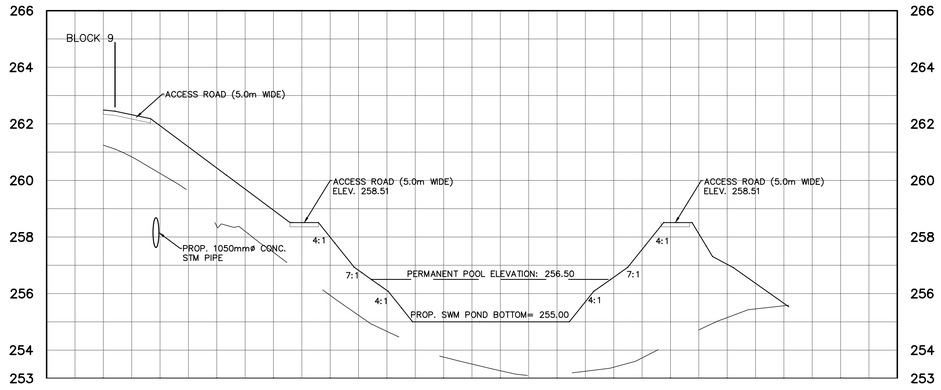
STORMWATER MANAGEMENT POND PLAN

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	AMC	HORIZ SCALE	1:500
DRAWN BY	TWC/AMC	VERT SCALE	N/A
CHECKED BY	MWD	DATE	JUNE 2021
PROJECT #	21037		
DRAWING #	FIG–6		
REVISION #	0		



STORMWATER MANAGEMENT POND
SECTION A–A



STORMWATER MANAGEMENT POND
SECTION B–B

BENCHMARK

NO.	REVISION NOTE	DATE	BY

TLM HOLDINGS INC.
50 WELHAM ROAD
CITY OF BARRIE

STORMWATER MANAGEMENT
POND SECTIONS

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	AMC	HORIZ SCALE	1:500
DRAWN BY	TWC/AMC	VERT SCALE	1:100
CHECKED BY	MWD	DATE	JUNE 2021
PROJECT #	21037		
DRAWING #	FIG-7		
REVISION #	0		