Ballymore
750 Lockhart Road, Barrie

Functional Servicing Report

March 2019

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SUBMISSION HISTORY

Submission	Date	In Support Of	Distributed To
1st	March 2019	Draft Plan Approval	City of Barrie, Lake Simcoe Region Conservation Authority, Metrolinx

1.0 INTRODUCTION

SCS Consulting Group Ltd. has been retained by Ballymore Barrie (Building) Corp. to prepare a Functional Servicing Report for a proposed development within the Hewitt's Secondary Plan, located in the City of Barrie.

1.1 Purpose

The Functional Servicing Report (FSR) has been prepared in support of the Draft Plan of Subdivision application for the proposed development. The Draft Plan of Subdivision is provided in **Appendix A**. The subject lands are located within two phases of the Hewitt's Secondary Plan, as shown in **Appendix B**. A large Natural Heritage Area is located in the centre of the site. The study area within Phase 1 of the Secondary Plan are located north of the natural heritage area and consists of low density residential with associated roads. The study area within Phase 3 of the Secondary Plan is located south of the natural heritage area and is composed of the following land uses:

- medium density residential,
- high density residential,
- SWM block, and
- proposed roads.

The purpose of this report is to demonstrate that the proposed development can be graded and serviced in accordance with the City of Barrie, Lake Simcoe Region Conservation Authority (LSRCA) and the Ministry of Environment Conservation and Parks (MECP) design criteria.

1.2 Study Area

The study area is approximately 25.66 ha in size and is bound by a natural heritage area to the east, a future residential subdivision to the north, Lockhart Road to the south and the existing Metrolinx rail corridor and future mixed use residential development to the west as shown in **Figure 1.1**. Per the Hewitts Secondary Plan, the study area is comprised of Phase 1 and Phase 3 lands. As all the lands are assessed as part of this application, the two development phases are hereafter referred to as north lands and south lands.

1.3 Background Servicing Information

In preparation of the site servicing and SWM strategies, the following design guidelines and standards were used:

- Stormwater Management Policies and Design Guidelines, City of Barrie (November 2009);
- Sanitary Sewer Collection System Policies and Design Guidelines, City of Barrie (September 2012);
- Water Transmission and Distribution Policies and Design Guidelines, City of Barrie (May 2015);
- Low Impact Development, Interim Guidance Document, City of Barrie (September 2017);

- Lot Grading and Drainage Standards and Design Manual, City of Barrie (June 2016);
- LSRCA Technical Guidelines for Stormwater Management Submissions (September 2016);
- Lake Simcoe Protection Plan (July 2009);
- LSRCA Phosphorus Offsetting Policy (September 2017);
- MECP Stormwater Management Planning and Design Manual (March 2003); and
- Ministry of Transportation (MTO) Drainage Management Manual (1997).
- Guidelines for New Development in Proximity to Railway Operations, May 2013

The site servicing and SWM strategies in this report are based on the following reports:

- A Geotechnical Investigation for Proposed Residential Development, 750 Lockhart Road, Soil Engineers Ltd., March 2019
- Hydrogeological Study in Support of Draft Plan Ballymore Building (Barrie) Corp., Barrie Ontario, RJ Burnside, dated January 2019;
- Water Distribution Analysis, Laughlen Municipal Consulting, dated March 2019,
- Environmental Noise Feasibility Study, Valcoustics Canada Ltd., February 2019
- Functional Servicing Report, Campbell Subdivision, The Jones Consulting Group, February 2017,
- Functional Servicing Report, Crisdawn Construction Inc. – Hewitt's Gate Subdivision, The Jones Consulting Group, February 2017,
- Preliminary Stormwater Management Report, Campbell Subdivision, The Jones Consulting Group, February 2017,
- Preliminary Stormwater Management Report, Crisdawn Construction Inc. – Hewitt's Gate Subdivision, The Jones Consulting Group, February 2017,
- Hewitt's Secondary Plan Transportation Improvements Municipal Class Environmental Assessment, Phases 3&4;
- Traffic Impact Study in Support of Draft Plan Ballymore Building (Barrie) Corp., Barrie Ontario, TMIG, dated March 2019; and
- Hewitt's Secondary Plan Area Subwatershed Impact Study (SIS) Lover's, Hewitt's, and Sandy Cove Creeks prepared by R.J. Burnside November 2017.

Excerpts from the above listed documents are included in **Appendix B** or as noted in the following sections.

2.0 STORMWATER MANAGEMENT

2.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the design guidelines and standards listed in **Section 1.3,** predominantly in reference to the approved SIS. The stormwater runoff criteria are summarized below in **Table 2.1**:

Table 2.1 – Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Proposed peak flow controls are to match approved unitary discharge rates as determined through the SIS. Proposed runoff volume controls require capture and treatment of runoff from a 25 mm rainfall event over all new impervious areas. For the North lands the targets are best efforts infiltration and 25 mm of filtration over all new impervious areas. For the South lands the targets are 5 mm of infiltration and 20 mm of filtration over all new impervious areas.
Quality Control	MECP Enhanced Level Protection (80% TSS Removal).
Erosion Control	Detention of the runoff volume from a 25 mm 4-hour Chicago storm for a minimum of 24 hours.
Water Balance	Maintain existing groundwater recharge rates and appropriate distribution, to the extent feasible, ensuring the protection of related hydrology ecologic functions.
Phosphorus Budget	A best effort shall be employed such that any increase in loading is kept to a minimum with the target of "zero" increase in loading. Regardless of existing loading, the removal of 80% of the proposed annual Total Phosphorus load is required. The remaining proposed phosphorus loading conveyed offsite (if any) is to be offset per the LSRCA Phosphorus Offsetting Policy.

2.2 Existing Drainage

As shown on **Figure 2.1**, the existing site generally drains primarily to the existing natural heritage feature (NHS) located in the center of the property via overland flow. Additional external flows from the west are conveyed to the existing NHS via an existing 750 mm diameter culvert crossing under the existing Metrolinx track running along the west property limit.

2.3 Hewitt's Secondary Plan SWM Catchments

As outlined in the SIS (**Appendix B**), the proposed development is within proposed SWM Catchments 5 and 6 which convey runoff to proposed SWMF #5 and SWMF #6 respectively.

The proposed SWMF #6 is located partially within each of the external Campbell and Crisdawn lands as identified in the respective SWM reports (**Appendix B**). The North lands convey runoff to SWMF #6.

The proposed SWMF #5 is located within the proposed development within the South lands and provides stormwater treatment for the South lands as well as external lands adjacent to Yonge Street as shown on Figure 10 in the SIS (**Appendix B**).

2.3.1 Allowable Release Rate – SWMF #6

The allowable release rates from SWMF #6 are per the approved unitary discharge rates as determined as part of the design of SWMF #6 to the north (by others). The North lands will convey minor system drainage uncontrolled to the north while conveying overland flow via the proposed municipal ROW's. The proposed drainage condition is discussed further in **Section 2.4** below.

2.3.2 Allowable Release Rate – SWMF #5

The allowable release rate from the proposed SWMF #5 is established based on the allowable unitary discharge rates as defined in the SIS. As shown on **Figure 2.2**, the proposed SWMF#5 receives internal drainage from the south lands as well as external flows for a total drainage area of approximately 37.26 ha.

The allowable release rate calculation based on the total drainage area is shown in **Appendix C-2**, and summarized on **Table 2.2**.

Table 2.2 – SWMF #5 Allowable Unit Release Rate Summary

Storm Event	Unit Release Rate ($m^3/s/ha$)	Allowable Release Rate (m^3/s)
2 Year	0.006	0.224
5 Year	0.011	0.410
10 Year	0.016	0.596
25 Year	0.023	0.857
50 Year	0.029	1.081
100 Year	0.036	1.341

2.4 Best Management Practices

In accordance with the Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (2003), a review of stormwater management best practices was completed for the subdivision components of the proposed development using a treatment train approach, which evaluated lot level, conveyance system and end-of-pipe alternatives. Best Management Practices for external lands and internal future development blocks will be assessed as part of future applications.

The following site characteristics were taken into consideration:

- The site has existing slopes of approximately one to four percent and slopes towards the existing NHS located in the centre of the site;
- Based on the Hydrogeological Study, site soils consisted of silty and sandy soils with percolation rates ranging from 54 to 79 mm/hr;
- Within the installed site wells, groundwater was observed at depths ranging between 0 and 4 m below existing grade;
- The proposed development is approximately 25.66 ha and consists of a proposed SWM facility (SWMF #5), townhouses, open space, future residential development and municipal roads; and
- The proposed development provides groundwater contributions to three wetland areas, Wetland #3, Wetland #4 and Wetland #5.

2.4.1 Lot Level Controls

Lot-level controls are at-source measures that reduce runoff prior to stormwater entering the conveyance system. These controls are proposed on private properties. Incorporating controls that do not require frequent maintenance can be an effective method in the treatment train approach to SWM.. The following lot level controls have been evaluated for use in the study area:

Increased Topsoil Depth – An increase in the restored topsoil depth on lots can be used to promote lot level infiltration and evapotranspiration. Increased topsoil depth will contribute to lot level quality and water balance control. A minimum depth of 0.30 m is proposed in all landscaped areas.

Passive Landscaping – Planting of gardens and other vegetation designed to minimize local runoff or use rainwater as a watering source can be used to reduce rainwater runoff by increasing evaporation, transpiration, and infiltration. By promoting infiltration through passive landscaping, water quality and quantity control is provided for the volume of water retained. Passive landscaping can provide significant SWM benefits as part of the overall treatment train approach for the proposed development. While encouraged, benefits are not quantified as part of the design.

Roof Runoff to Soak-away Pits – Directing roof runoff to subsurface soak-away pits can be used to promote infiltration. By promoting infiltration, water quality and quantity control is provided for the volume of water retained. Infiltration of roof runoff can provide a significant SWM benefit as part of the overall treatment train approach. The feasibility of this practicecan be explored for use on the future development blocks. Feasibility should be further assessed should groundwater elevations permit based on the detailed evaluation to be undertaken at the detail design stage.

Roof Runoff to Retention Cisterns – Directing roof runoff to rainwater retention cisterns (i.e. rain barrels or greywater re-use) can contribute to water quality and water balance control. The retained rainwater can be harvested for re-use such as irrigation and/or greywater use. A typical rain barrel ranges in size from 190 to 400 liters. Feasibility of retention cisterns will be determined by the home builder and while encouraged, is not quantified as part of the design.

Green Roofs – Best suited for flat roofs, green roofs provide rainwater retention in the growing medium where water is evaporated, evapotranspirated, or slowly drains away after the rainfall event. The proposed development initially consists of ground related townhouse product with sloped roofs and therefore is not suitable for implementing Green Roofs. The built form for the future development blocks may be more amenable to green roofs, and would be recommended should the opportunity become available.

Rooftop and/or Parking Lot Detention Storage – Often utilized with large rooftop or parking lot footprints, flow attenuation for quantity or extended detention control can be provided via a flow restriction with stormwater storage provided via ponding either on rooftops or parking lots. The proposed development does not have any large flat rooftops or parking lots and therefore this is not suitable.

Roof overflow to Grassed Areas – Directing roof leaders to grassed areas will contribute to water quality and water balance control by encouraging stormwater retention. Roof leaders can be directed to grassed areas where there is grass, however, if there is no or very limited grassed areas, roof leaders should be connected to the storm sewer to eliminate the hazard of ice accumulation. It is recommended to direct roof leaders to the front and/or rear yards where possible to promote infiltration and to avoid discharging to impervious areas directly connected to the storm sewer per City of Barrie guidelines.

Pervious Pavement – By encouraging infiltration and filtration, pervious pavement within the proposed driveways can contribute to water quality, balance and erosion control. Due to potential of removal by homeowners, permeable pavers are not recommended for the residential portion of the site and are not generally accepted by the City of Barrie within the municipal ROWs.

Vegetated Filter Strip – At source filtration and infiltration may be encouraged through the use of vegetated filter strips by directing sheet flow from impermeable areas to the strip prior to being collected via the storm system. Vegetated filter strips are best suited to parking lot areas with landscaped borders or islands or within buffer areas.

A summary of the suitability of potential lot level controls for the proposed developments is provided in **Table 2.3**.

2.4.2 Conveyance Controls

Conveyance controls provide treatment of stormwater during the transport of runoff from individual lots to the receiving watercourse or end-of-pipe facility and present opportunities to distribute stormwater management techniques throughout a development. The following conveyance controls have been evaluated for use in the study area:

Grassed Swales – A grassed swale will promote infiltration, filtration, and evapotranspiration, contributing to water quality and quantity control. It is noted that smaller grassed swales will potentially be used at the individual lot grading level.

Exfiltration at Rear Lot Catchbasins – Where rear lot catchbasins are required due to grading constraints, a perforated pipe system can be incorporated into the rear lot catchbasin design to promote infiltration of stormwater runoff from the rear lots and roof areas. By promoting

infiltration, water quality and quantity control is provided for the volume of water retained. As it is preferred by the City of Barrie that municipal lands be utilized to promote infiltration over rear lot catch basins, this is not recommended.

Bioretention – Whether through bioswales, rain gardens, tree pits, etc. bioretention promotes infiltration, filtration, plant uptake and evapotranspiration, contributing to water quality, quantity and erosion control. These practices are feasible and therefore proposed throughout the development.

A summary of the suitability of potential conveyance controls for the proposed developments is provided in **Table 2.3**.

2.4.3 End-of-Pipe Controls

Stormwater management facilities at the end of pipe receive stormwater flows from a conveyance system and provide treatment of stormwater prior to discharging flows to the receiving watercourse. While lot level and conveyance system controls are valuable components of the overall SWM plan, on their own they are not sufficient to meet the quantity and quality control objectives for the proposed development. The following end of pipe controls have been evaluated for use in the study area:

Wet Ponds, Wetlands, Dry Ponds – Sized in accordance with the MECP criteria, these end of pipe facilities can provide water quality, quantity, and erosion control treatment. As outlined in the SIS, an end of pipe wet pond is proposed to provide water quality, quantity, and erosion control treatment for the proposed development. The SIS also notes that the wet pond facility could be designed as a constructed wetland should the block accommodate it as discussed further in **Section 2.5**.

Manufactured Treatment Device – A properly sized Manufactured Treatment Device (MTD) can provide MECP Enhanced (Level 1) treatment and contribute to the treatment train approach for water quality control. Any MTD specified is required to have New Jersey Department of Environmental Protection (NJDEP) and/or Environmental Testing Verification program (ETV) certification. However, as SWMF #5 is proposed to provide MECP "Enhanced" level protection, MTD units are not required. MTD units may be proposed in future development blocks or external to the proposed development but within the SWM #5 catchment boundary.

2.4.4 Selection of Low Impact Development Practices

Table 2.3 summarizes the suitability of the various stormwater management controls identified for the proposed development.

Table 2.3 - Recommended Stormwater LID Practices

Stormwater Management Practice	Feasible	Recommended
Increased Topsoil Depth	Yes	Yes
Passive Landscaping	Yes	Yes
Roof Leader to Soak-away Pits	Yes (groundwater dependent)	Yes (groundwater dependent)
Roof Runoff to Retention Cisterns	Yes	Yes
Green Roofs	No	No
Rooftop and/or Parking Lot Detention Storage	No	No
Roof Overflow to Grassed Areas	Yes	Yes
Pervious Pavement	No	No
Vegetated Filter Strips	Yes	Yes
Grassed Swales	Yes	Yes
Exfiltration at Rear Lot Catchbasins	Yes	No
Bioretention	Yes	Yes
Wet Ponds, Wetlands, Dry Ponds	Yes	Yes
Manufactured Treatment Device	Yes	No

To ensure the BMP's selected were amenable to all applicable agencies, a design charrette was completed as outlined in the following section.

2.5 Design Charrette

A design charrette was completed on December 13, 2018 at the City of Barrie in conjunction with the conformity review process. Meeting minutes from the design charrette are included in **Appendix D** and the following LID measures were discussed and agreed to in principle at the meeting.

As confirmed through the design charrette, centralized LID facilities, while preferred by the City, are not practical for the proposed development aside from the SWM facility as shown on **Figure 2.4**. Necessary to achieve the volume control criteria, ROW based LIDs have been explored and their potential locations are shown on **Figure 2.4**.

2.5.1 Catchbasin Exfiltration Trenches in ROW

Catchbasin exfiltration trenches are feasible within a portion of the proposed 18 m municipal ROWs in areas with a sufficient depth of groundwater. The potential locations are limited to

the north lands and are shown on **Figure 2.4**. Runoff captured by the street catchbasins will be conveyed to the exfiltration trench located in the boulevard. Catchbasins will be provided with a deep sump and pre-treatment device (Goss Trap, CB Shield, etc.) to prevent floatables and sediment from entering the exfiltration trench. Runoff in excess of the capacity of the exfiltration trench will overflow to the mainline storm sewer. A preliminary detail of the potential catchbasin exfiltration system contemplated within an 18 m ROW is shown on **Figure C-4** in **Appendix C-3**.

2.5.2 Rain Gardens in Roundabouts

Rain gardens are feasible in the centre portion of the proposed roundabouts within municipal ROWs. The potential locations are shown on **Figure 2.4**. The standard roundabout grading would be modified to direct the majority of the runoff to the centre where a raingarden with overflow catchbasin would be located. Major system flows would still be directed downstream to SWMF #5.

When runoff enters the rain garden, it will filter through an engineered soil media sized to achieve water filtration targets. An underdrain, located at the bottom of the rain garden will collect the filtered water and convey the water to the proposed storm sewer. In areas with sufficiently deep groundwater, the rain gardens are to be unlined and equipped with a raised discharge pipe to the proposed storm sewer to promote infiltration. In areas of high groundwater, the potential rain gardens would be lined and equipped with a discharge pipe at the subdrain to allow for filtration and discharge to the proposed storm sewer. A preliminary detail of the potential rain garden layout within the roundabout is shown on **Figure C-5** in **Appendix C-3**.

2.5.3 Tree Box LID in ROW

While City of Barrie criteria does not encourage LID's on Collector Roads, the proposed development has over 500 m of Collector Road that is adjacent to an NHS area with no residential development on either side of the ROW. In addition there is over 200 m of single loaded ROW, and long segments of Collector Road without driveways in which Tree Box based LID's could be implemented. The potential locations are shown on **Figure 2.4**.

Tree Box based LIDs consist of a bioretention system below the standard street trees in the boulevard. The bioretention system has a number of benefits including quality control via infiltration and/or filtration, promotes healthy root growth for street trees and therefore also adds to the aesthetic of the ROW. Runoff enters the system via the street catchbasins which provide pre-treatment via the catchbasin sump. If placed in an area where infiltration is possible, an overflow system is included to ensure the trees to do not become oversaturated. Where groundwater levels to not permit infiltration, a bottom draw would convey filtered water to the storm sewer system. A preliminary detail of the potential tree pit LID layout within the 24 m ROW is shown on **Figure C-6** in **Appendix C-3**.

2.5.4 Hybrid Bioswales in Rear Yards/Buffer

As shown on **Figure 2.4**, bioswales are proposed adjacent to rear lots within the first 15 m of the 30 m Environmental Protection (EP) buffer along the northeast limit of the site along the

buffer from Block 16 to Block 13 adjacent to Street 2 ultimately outletting to the external future storm sewer to the north.

The proposed bioswale is required to be lined as groundwater levels in this area are near surface. It is noted that the proposed bioswale could be incorporated into a future trail network that connects the external development to the north down to SWMF #5 via Kneeshaw Drive.

A preliminary detail of the proposed bioswale is shown on **Figure C-7** in **Appendix C-3**. It is noted that this measure contributes to SWMF #6 and the requirement for this measure would be determined through the detailed design of the future SWM facility.

2.6 Proposed Storm Drainage

As shown on **Figure 2.2**, minor system (storm events up to and including the 5 year storm) and major system (storms greater than the 5 year event up to and including the 100 year storm event) runoff from Catchment 401 (north lands), will be conveyed north to the future SWMF #6 (to be designed by others). Per Drawing SWM-2 from the Preliminary SWM Report for the lands to the north (**Appendix B**), a drainage area of 3.29 ha at a runoff coefficient of 0.70 (72% impervious) was contemplated for the proposed development. Per **Figure 2.2**, the proposed drainage area to SWMF #6 is 2.53 ha at an imperviousness of 73%. Therefore the proposed development is in compliance with the functional design of external storm infrastructure.

Minor and major system runoff from Catchment 203 will be conveyed to the proposed SWM facility (Catchment 204) via the internal storm sewers and overland flow.

Minor and major system runoff from Catchment 501 will continue to be conveyed via overland flow through the Metrolinx corridor to the existing 750 mm diameter CSP culvert to the north which is to be extended in the proposed condition.

Minor system runoff from Catchment 304 will be captured at the south end of the proposed Kneeshaw Drive storm sewer adjacent to Lockhart Road and conveyed to the proposed SWMF #5. Major system runoff from Catchment 304 will continue to be conveyed to Hewitt's Creek via the existing ditch system as it is not feasible to direct overland flow to the proposed SWMF #5.

Minor and major system runoff from external lands including Catchments 301, 302 and 303 will be captured and conveyed to the proposed SWMF #5 via the proposed servicing easement and proposed 100 year storm sewer which crosses the Metrolinx corridor and enters the proposed development west of the proposed SMWF #5.

2.7 Proposed Stormwater Management Plan

2.7.1 Quantity Control

The proposed end-of-pipe SWMF #5 will control proposed flows from the majority of proposed development, west and south of the NHS as well as the external lands to the west to the allowable release rates outlined in **Section 2.1.2** above. The preliminary design requirements of the end-of-pipe SWM facility are discussed further in the following sections.

Runoff from the north lands will be conveyed to the external SWMF #6 which will control flows to the allowable unit release rates as defined in the SIS and subsequent Preliminary SWM Reports for the two properties to the north.

2.7.2 Quality Control

As outlined in the SIS and associated FSRs, SWMF #6 and SWMF #5 will provide 80% TSS removal per MECP criteria. In addition, the proposed LID's, as discussed in **Section 2.8**, will provide additional quality control via a treatment train approach. While not contemplated in the calculations provided in **Appendix C-3**, the proposed LID's will increase the TSS removal capabilities of the proposed SWM system in comparison to what was assumed in the previous reports.

2.7.3 Erosion Control

As noted in **Table 2.1** the erosion control criteria is to provide a minimum of 24 hour extended detention of the runoff from a 25 mm rainfall event and will be provided in SWMF #6 and SWMF #5 for the proposed development. As noted previously, the drainage conveyed from the proposed development to SWMF #6 has been adequately accounted for downstream.

In addition, the proposed LID's, as discussed in **Section 2.8**, will provide additional erosion control. While not contemplated in the calculations provided in **Appendix C-3**, the proposed LID's will further mitigate the impacts of erosion in addition to the proposed SWM facilities.

2.7.4 Volume Control

As detailed in the SIS, the target filtration and infiltration rates have been set based on site soils and LSRCA guidelines. More specifically, the site lies within SIS Catchments 5 and 6 directed to SWMF#5 and SWMF#6, respectively. The infiltration recommendation for the North lands is best efforts infiltration and 20 mm of filtration. The infiltration recommendation for the South land is 5 mm from the impervious areas and the filtration target is 20 mm from the impervious areas.

As shown in the calculations included in **Appendix C-3**, the 25 mm filtration target for the North lands corresponds to a volume of 460 m^3 while the 5 mm infiltration target for the South lands corresponds to a volume of 287 m^3 with a 20 mm target filtration volume of 1150 m^3.

As detailed in **Section 2.8**, LIDs have been explored to maximize filtration and to utilize infiltration as a best efforts approach.

2.7.5 Water Budget

Where feasible, measures to minimize impacts on the water budget will be incorporated into the development design. As noted in the Hydrogeological Study (R.J. Burnside, January 2019), the estimated existing infiltration volume on the site is providing groundwater to three wetland communities referred to as Catchments 3, 4 and 6. In the existing condition, a total infiltration volume of 31,400 m^3 is provided, as shown below in **Table 2.4**.

Table 2.4 – Summary of Existing Infiltration Values

Wetland Catchment	Approximate Land Area (ha)	Average Annual Infiltration (m^3/year)
3	6.3	5,400
4	18.5	22,900
6	1.6	3,100
Total	**26.4**	**31,400**

In the proposed condition, the introduction of the proposed development diminishes the existing annual infiltration when considered without any mitigation. Without mitigation the proposed development infiltration volume is approximately 12,650 m^3 or an overall reduction of 64%. The without mitigation infiltration volumes for each catchment are outlined in **Table 2.5**.

Table 2.5 – Summary of Proposed Unmitigated Infiltration Values

Wetland Catchment	Proposed Infiltration (m^3/year)	Proposed Infiltration Deficit (m^3/year)	Percentage Change (%)
3	2,000	3,500	-64
4	9,750	13,100	-57
6	900	2,200	-71
Total	**12,650**	**18,800**	**-64**

As recommended in the Hydrogeological Study, low impact development measures, such as those described previously in **Section 2.3** and as noted in **Section 2.8** will be implemented, as feasible, to maintain or increase existing infiltration rates to the three existing wetland communities.

2.7.6 Phosphorus Budget

Under the Lake Simcoe Protection Plan (LSPP), a stormwater management plan must demonstrate how phosphorus loadings are minimized between existing and proposed conditions. The LSPP states that:

> "*Best efforts shall be employed such that any increase in loading (proposed compared to pre development) is kept to a minimum. The target is "zero" increase in loading.*"

In addition to the LSPP, the LSRCA SWM Guidelines state that regardless of existing loading, the removal of 80% of the proposed annual Total Phosphorus load is required.

The remaining proposed phosphorus loading conveyed offsite (if any) is to be offset per the LSRCA Phosphorus Offsetting Policy.

The MECP database application *Lake Simcoe Phosphorus Loading Development Tool* (v2, 01-April-2012 update) was used to complete the phosphorus budget for the proposed development.

Existing Phosphorus Loadings

The existing phosphorus loading is based on the land uses per the Ecological Land Classification (ELC) community type for existing conditions shown in the Natural Heritage Evaluation, prepared by Savanta, submitted under separate cover. The existing land uses are shown on **Figure 2.5**. Based on the Phosphorus Loading Development Tool, the existing annual phosphorus loadings were calculated to be 0.49 kg/year for the North lands and 1.29 kg/year for the South lands. Refer to **Appendix C-5** for the phosphorus loading tool output.

Proposed Phosphorus Loadings

The proposed land uses for the site are shown on **Figure 2.6**. Residential lots are considered high intensity development according to the MECP Phosphorus Tool. The proposed phosphorus loading with no best management practices (BMPs) for the North and South lands were calculated to be 3.23 kg/yr and 8.64 kg/yr, respectively (refer to **Appendix C-5**).

As noted in **Table 2.1**, the minimum requirement is a reduction of 80% of proposed phosphorus loading. For the North and South lands of the proposed development, that results in 0.65 kg/yr and 1.73 kg/yr, respectively. As these loadings are larger than existing phosphorus levels, the target is to reduce proposed loadings to a minimum of the existing loading rate of 0.49 kg/yr for the North lands and 1.29 kg/yr for the South lands.

The proposed phosphorus loading with BMPs was calculated to be 0.87 kg/yr for the North lands and 1.49 kg/yr for the South lands (see **Appendix C-5**). **Table 2.6** provides a summary of the land use, BMP, and phosphorus removal efficiencies for the proposed condition.

Table 2.6: Phosphorus Budget Summary

	Phosphorus Loading (kg/yr)			
	Proposed without BMPs	**Proposed with BMPs**	**Net Reduction due to BMP's**	**Existing**
North	3.23	0.87	73%	0.49
South – Interim (excluding Blocks 22, 23 and 24)	5.38	0.86	85%	0.80
South - Ultimate	8.64	1.49	83%	1.29
Total	**11.87**	**2.36**	**80%**	**1.78**

As shown in **Table 2.6**, the North lands reduce proposed phosphorus loading by 73% while increasing existing loading by 0.38 kg/yr. As BMPs have been maximized for this catchment per City of Barrie criteria, it illustrates the requirement for additional removal downstream within the SWMF #6 catchment area. Per the Jones Preliminary SWM Reports for the lands to the north (**Appendix B**), there is a net reduction of approximately 1.0 kg/yr in the proposed when compared to existing. Therefore the additional 0.22 kg/yr required for the North lands to meet the minimum target of 80% reduction of proposed annual phosphorus loading. These

loadings will need to be confirmed through the detailed design of downstream infrastructure. It is noted that per **Table 2.6** the overall proposed development can meet the 80% reduction target.

The South lands have been modelled for the ultimate buildout condition, but it is noted that a large portion of the proposed development are future site plans that may have opportunities to provide additional on-site phosphorus removal. Based on the proposed BMP's in the municipal ROW's and SWMF #5, and assuming 80% reduction for the future development blocks, **Table 2.6** highlights that the minimum criteria is met. To minimize the proposed development phosphorus offsetting required, all efforts will be made through detailed design to achieve as close to zero phosphorous export as feasible.

2.8 Stormwater Management Facility #5

The proposed SWMF #5 is located adjacent to the south boundary of the existing NHS area. It is proposed to be a constructed wetland facility with two inlets and associated forebays located on the east and west ends of the pond.

2.8.1 Permanent Pool

The function of the permanent pool is to provide sediment removal from the storm runoff conveyed to the pond. SWMF #5 will be designed to provide permanent pool storage of 85 m^3/ha based on MECP's Enhanced Level Protection for a constructed wetland facility having a 74% impervious drainage area (see Table 3.2, 2003 MECP Guidelines). The required permanent pool volume is 3,160 m^3 based on a total area draining to the pond of 37.26 ha (**Figure 2.2**). The available permanent pool storage is 6,416 m^3 (see **Figure 2.3** and calculations in **Appendix C-2**).

2.8.2 Erosion Control

The erosion control criteria is to provide a minimum of 24 hour extended detention of the runoff from a 25 mm rainfall event and will be provided in SWMF #5 for the proposed development.

With respect to SWMF #5 servicing the proposed development and the external lands to the west, the extended detention volume of 5,350 m^3 will be attenuated for a minimum of 24 hours (**Appendix C-2**). This volume is greater than the 2003 MECP guidelines minimum extended detention volume of 40 m^3/ha or 1,490 m^3 based on the 37.26 ha drainage area. The peak release rate for the extended detention volume is approximately 0.17 m^3/s.

The calculations for the extended detention component of the proposed SWMF #5 are provided in **Appendix C-2**.

2.8.3 Quantity Control

SWMF #5 will control proposed flows from the site to allowable release rates outlined in **Section 2.1.2** above. Proposed hydrology modelling was completed using the VO5 model to determine the required pond volume. Refer to the CD containing VO5 hydrology model provided in **Appendix C-1**. At detailed design, the hydrology modelling will be completed

using the overall PCSWMM continuous model which will incorporate the impact of upstream LID's.
The 24-hour and 6-hour SCS Type II design storm distributions per the findings in the SIS were modelled for the proposed conditions hydrology model. A summary of the resulting storage requirements for SWMF #5 is provided in **Table 2.7**. The stage-storage-discharge characteristics of SWMF #5 are provided in **Appendix C-2**.

Table 2.7: SWMF #5 Storage Requirements

Return Period Storm	6 Hour SCS Type II		24 Hour SCS Type II	
	Discharge (m^3/s)	Storage (m^3)	Discharge (m^3/s)	Storage (m^3)
2 Year	0.208	7336	0.224	**8310**
5 Year	0.279	10899	0.351	**12399**
10 Year	0.385	13104	0.527	**15002**
25 Year	0.599	15641	0.854	**17905**
50 Year	0.793	17361	1.079	**20259**
100 Year	0.966	18998	1.265	**22170**

Note: Bold values indicate the more conservative (higher) proposed storage volumes

2.8.4 General Pond Design Criteria

Functional level pond grading is provided on **Figure 2.3**. The SWMF #5 design was established based on the following general criteria as outlined in the SIS and City of Barrie criteria:

- A 5 m wide maintenance access road will be provided from a proposed municipal road with a maximum longitudinal slope of 10% and a crossfall of 2% (max). It will be used to facilitate machinery to access the forebays during scheduled maintenance as well as to access the outlet structure for maintenance purposes;
- A maximum slope of 3:1 from the pond bottom to 0.5 m below the normal water level will be provided;
- A maximum slope of 6:1 from 0.5 m below and above the normal water level will be provided;
- A maximum slope of 4:1 will be provided from 0.5 m above the normal water level to the pond grading limits where not adjacent to a ROW;
- A maximum slope of 5:1 will be provided from 0.5 m above the normal water level to the pond grading limits where adjacent to a ROW;
- Maximum depth of 1.0 m above the NWL for all events less than the 10 year storm and a maximum active water level depth of 2.0 m;
- Freeboard of 0.3 m above the maximum routed water level under the Regional Storm;
- Forebay berm to have spillway invert at the NWL with a minimum top width of 1.0 m set at a height equal to or above the extended detention elevation;
- Forebay(s) to be equipped with dewatering sump(s);
- Forebay(s) shall be lined with 300 mm of 50 mm diameter crusher run rock, unless demonstrated by the geotechnical engineer that it is not necessary;

- Sediment Drying Area to be provided, where feasible, sized for a minimum of 10 years of sediment accumulation;
- Outlet structure to be designed per City of Barrie Standard BSD-78;
- Emergency spillway to be set at an elevation equal to or above the 100 year controlled water level and sized to convey the greater of the unrouted 100 year or Regional peak flow; and
- A suitable liner is required and to be installed as recommended by the geotechnical consultant (**Appendix B**).

2.9 Comparison of Allowable and Proposed Flows

The flows from SWMF #5 are controlled to the allowable release rates outlined in **Section 2.1.2** via a preliminary control structure design that utilizes two orifice controls as shown in the calculations in **Appendix C-2**. **Table 2.8** provides a comparison of allowable and proposed flows at the SWMF #5 outlet.

Table 2.8: Comparison of Allowable and Proposed Flows from SWMF #5

Return Period Storm	Allowable (m^3/s)	Proposed (m^3/s)
2 Year	0.224	0.224
5 Year	0.410	0.351
10 Year	0.596	0.527
25 Year	0.857	0.854
50 Year	1.081	1.079
100 Year	1.341	1.265

As shown in **Table 2.8**, the proposed flows are less than or equal to the allowable release rates for the 2 through 100 year storm events.

2.10 Storm Servicing

The storm sewer system (minor system) will be designed for the 5 year return period storm per City of Barrie standards.

The major system drainage will generally be conveyed overland along the proposed ROW's. Per the City of Barrie standards, flow depth on roads shall not exceed 0.20 m above the crown of any local road or 0.10 m above the crown on any collector road. The major system drainage from external lands (Catchments 301 – 303, **Figure 2.2**) west of the Metrolink will be captured and conveyed via a 100 year storm sewer to the proposed SWMF #5. To capture the major system drainage from the external lands will result in a 1800 mm diameter storm sewer at a slope of 1.0%. Refer to the storm design sheet in **Appendix C-6**.

The storm sewer system will typically be designed with grades between 0.5% and 5%. Throughout the proposed development, the storm sewer will be constructed at a minimum depth of 1.5 m to obvert to provide frost protection and 3.0 m where basement connections are required (if any) per City of Barrie standard drawing BSD-75A and/or BSD-75B. The

preliminary layout for the proposed storm sewer within the subject lands is provided on **Figure 2.2**. There are no anticipated crossing conflicts with the sanitary sewer per City of Barrie standards, refer to **Figure 3.1**. Basements are not to be connected to the storm sewer, unless directed by City staff. It is anticipated that to facilitate watermain crossings, the storm sewer will typically be at a depth of 2.5 m to obvert.

The storm sewer system will be designed in accordance with the City of Barrie and MECP guidelines, including the following:

- Pipes to be sized to accommodate runoff from a 5 year storm event,
- Minimum Pipe Slope 0.5 %
- Maximum Flow Velocity: 4.0 m/s,
- Minimum Flow Velocity: 0.75 m/s,
- Minimum Pipe Depth: 1.5 m to obvert (per City Standard BSD-76 or BSD-75A), 3.0 m where basement connections are required (per City Standard BSD-75B).

The rainfall intensity will be calculated as follows, where 'i' is the rainfall intensity (mm/hour) and A, B, and C are as per **Table 2.9**:

$$i = A / (T_c + B)^c$$

Table 2.9: Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	678.085	4.699	0.781
5 Year	853.608	4.699	0.766
10 Year	975.865	4.699	0.760
25 Year	1146.275	4.922	0.757
50 Year	1236.152	4.699	0.751
100 Year	1426.408	5.273	0.759

2.11 Overland Flow

Major system flows will be conveyed within the municipal ROWs and overland flow blocks to both SWMF #5 and SWMF #6. Overland flow routes are shown on **Figure C-8**. Associated ROW capacity calculations are provided in **Appendix C-4** for ROWs adjacent to and overland flow routes into SWMF #5 and demonstrate that the major system flows can be safely conveyed within the proposed road and overland flow routes.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Sewer System

As illustrated in the SIS, the existing municipal sanitary sewer system accounted for this portion of the Hewitt's Secondary Plan area in which the proposed development is located, in the 825 mm diameter trunk sanitary sewer flowing north, located on an existing servicing block located at the corner of Sun King Crescent and Bourbon Circle (connection E5). As part of the overall Hewitt's Secondary Plan area development, this existing trunk has previously been extended to Mapleview Drive.

There are no existing sanitary sewers in Lockhart Road to the south.

The existing sanitary infrastructure adjacent to the Hewitt's Secondary Plan was investigated as part of the SIS. Excerpts relevant to the proposed development are included in **Appendix B**.

3.2 Proposed Sanitary Sewer System

As outlined in the SIS and FSRs for lands to the north, sanitary flows from the proposed development as well as existing and future development lands external to the proposed development will be serviced via the proposed sanitary trunk sewer running along Kneeshaw Drive. The sanitary trunk sewer on Kneeshaw Drive within the proposed development is required to extend north through the Campbell property and the Crisdawn property. As outlined in the SIS and the Functional Servicing Report for the Cirsdawn property (**Appendix B**), the trunk sewer at the intersection of Kneeshaw Drive and Mapleview Drive will connect to the existing 825 mm diameter sanitary sewer via Mapleview Drive.

The external drainage through the subject site includes drainage from the future municipal recreation centre (Catchment 301, 7.28 ha, **Figure 3.2**), drainage from future medium/high density residential (Catchment 302, 3.73 ha, **Figure 3.2**), drainage from a future school block (Catchment 303, 6.19 ha**, Figure 3.2**) and drainage from future mixed used medium/high density residential (Catchment 303, 11.14 ha, **Figure 3.2**).

A future local sanitary sewer is proposed along Yonge Street to convey drainage from Catchments 301 and 302. A future trunk sewer is proposed along Yonge Street from Lockhart Road to the future servicing easement to convey drainage from Catchment 303. A future trunk sewer is proposed within Catchment 303 to convey drainage from the upstream catchments as well as drainage from Catchment 303. The future trunk sewer will connect into the proposed development via a future connection through the Metrolinx corridor to Kneeshaw Drive.

The configuration of the sanitary trunk sewer are consistent with the SIS from the north limit to the adjacent sanitary easement. From this point, the trunk sewer has been removed and replaced with a local sanitary sewer for the remainder of Kneeshaw Drive. This due to the potential future overpass of the existing Metrolinx tracks on Lockhart Road. To continue to extend the trunk sewer as identified in the SIS, the trunk sewer on Yonge Street has been extended to Lockhart Road as shown on **Figure 3.2**.

The preliminary layout for the proposed sanitary sewers within the proposed development is provided on **Figure 3.1**.

The sanitary sewer system will be designed in accordance with the City of Barrie and MECP criteria, including but not limited to:

- Residential Sanitary Generation Rate: 225 l/c/d,
- Population Density: 2.34 people/unit for townhomes and walk-up apartments, and 1.67 people/unit for apartment dwellings,
- Institutional/Commercial Demand 28 m3/day/ha,
- Design capacity: maximum 85% full flow,
- Peaking Factor: Harmon (1.5-4),
- Infiltration Rate: 0.1 L/s/ha,
- Minimum Pipe Size: 250 mm diameter,
- Minimum Pipe Cover: 2.5 m,
- Minimum Sewage Flow Velocity: 0.60 m/s, and
- Maximum Flow Velocity: 3.0 m/s.

As shown in the calculations provided in **Appendix E**, a preliminary sanitary design sheet has been completed for the proposed development and external lands based on the assumptions made in the SIS and subsequent approved FSRs as illustrated on **Figure 3.2**. The resulting flow of 58.1 L/s requires a 375 mm diameter sanitary sewer at the connection of Kneeshaw Drive and the Campbell lands to the north. As the overall drainage area and unit count is generally consistent with the SIS, the E5 connection has sufficient capacity to service the proposed development and external lands that convey flow through the proposed development.

4.0 WATER SUPPLY AND DISTRIBUTION

4.1 Existing Water Distribution

As indicated in the Watermain Analysis, completed by Municipal Engineering Solutions (MES) (**Appendix F**), and on **Figure 4.1** there are no existing watermains adjacent to the proposed development.

4.2 Internal Water Distribution

The preliminary layout for the proposed watermain system, as outlined in the watermain analysis (**Appendix F**), is provided on **Figure 4.1.**

As there are no existing watermain adjacent to the proposed development, the following watermain extensions are required from north of the proposed development:

- 300 mm watermain along Kneeshaw Drive from Mapleview Avenue; and,
- 200 mm diameter watermain along Streets 2 and 3 from future development to the north.

As described in the watermain analysis, the future watermain connections to the north listed above provide the required hydraulic requirements as prescribed by the City of Barrie watermain design criteria.

The watermain system will designed in accordance with the City of Barrie and MECP criteria including:

- Average Daily Demand: 225 l/c/d,
- Population Density: 2.34 people/unit for townhomes and walk-up apartments, and 1.67 people/unit for apartment dwellings,
- Minimum Pipe Size: 150 mm diameter,
- Minimum Pipe Depth: 1.7 m in urbanized areas, and
- Maximum Hydrant Spacing: 152 m.
- Fire Flow Requirements per MES Table 5, **Appendix F**

Ultimately the proposed 300 mm diameter watermain on Kneeshaw will connect to a future 300 mm diameter watermain on Lockhart Road. The future watermain on Lockhart Road will connect to the future 300 mm watermain on Yonge Street. The SIS identifies a mid-block connection between Yonge Street and the Campbell lands to the north of the proposed development as well. It is noted that per the watermain analysis in **Appendix F**, the proposed development can proceed in its entirety prior to these future projects being completed.

5.0 SITE GRADING

5.1 Existing Grading Conditions

As illustrated by the existing contour elevations on **Figure 5.1,** under existing conditions, the site is generally sloped down to the Natural Heritage Area at slopes of approximately one to four percent.

5.2 Proposed Grading Concept

In general, the site will be graded in a manner which will satisfy the following goals:

- Satisfy the Municipality lot and road grading criteria including:
  - Minimum Road Grade: 0.5%
  - Maximum Road Grade: 7.0%
  - Minimum Lot Grade: 2%
  - Maximum Lot Grade: 5%
- Provide continuous road grades for overland flow conveyance;
- Minimize the need for retaining walls;
- Minimize the volume of earth to be moved and minimize cut/fill differential;
- Minimize the need for rear lot catchbasins;
- Underside of the floor slab should be set 0.5 m higher than seasonal groundwater level (where feasible); and
- Achieve the SWM objectives required for the proposed development.

A preliminary grading plan is provided on **Figure 5.1**. As a portion of the proposed development proposes residential lots adjacent to the existing Metrolinx corridor a 2.5 m high safety berm with noise fence has been proposed in conformance with the Guidelines for New Development in Proximity to Railway Operations. The combination of the berm and acoustic fence provides adequate noise protection as outlined by Valcoustics' report, excerpts of which are included in **Appendix B**.

As noted in the TIS, the connection of Kneeshaw Drive and Lockhart Road is required to be located as shown on the Draft Plan (**Appendix A**) as a result of the potential future Metrolinx overpass on Lockhart Road. The proposed grading at this intersection has been completed to accommodate both the interim and ultimate condition and will be refined in the future through detailed design.

As discussed in the design charrette and through meetings with City staff, the alignment of Kneeshaw Drive through the NHA was completed to minimize disturbance to the NHA. Due to vertical separation between proposed and existing grades along the Metrolinx cooridor, the typical Kneeshaw Road cross-section is proposed to be modified to allow for the removal of the sidewalk from the west boulevard to accommodate grading. As shown on **Figure 5.1** and **Figure 5.2**, the grading impacts within the boulevard will vary but should not exceed 3.5 m of sloping in the boulevard based on preliminary grading.

At the detailed design stage, the preliminary grading shown on **Figure 5.1** will be subject to a more in-depth analysis in an attempt to balance the cut and fill volumes and minimize slopes and walls.

6.0 RIGHT-OF-WAYS AND SIDEWALKS

The majority of the proposed development is composed of 12 m, 18 m and 24 m ROWs for which cross-sections will be in accordance with the City of Barrie Standard Drawing BSD-314, BSD-301 and BSD-303 respectively (**Appendix B**).

Where ROW LIDs are utilized, the standard ROW sections will be replaced with the modified standards proposed in **Appendix C-3.**

As discussed at the Design Charrette, a modified ROW cross-section has been developed for the portion of Kneeshaw Drive adjacent to the Metrolinx corridor and the NHS area (**Appendix D**) to minimize impact to the NHS area.

The proposed sidewalk location plan (**Figure 6.1**) reflects the standard and modified right-of-way cross sections and the sidewalk recommendations provided in the Traffic Impact Study by TMIG and noted above (**Appendix B**).

7.0 COST-SHARING

The cost of infrastructure which benefits multiple properties, such as trunk storm sewers, trunk sanitary sewers, sanitary pumping stations, watermains, collector roads, and stormwater management facilities, should be shared by the benefiting landowners. The landowners within the Hewitt's Creek Secondary Plan (including Ballymore Barrie (Buildings) Corp.) have established a cost sharing agreement which sets out the principles in which these costs will be equitably shared.

8.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

During the detailed design stage, temporary erosion and sediment control measures will be designed with a focus on erosion control practices (such as stabilization, track walking, staged earthworks, etc.) as well as sediment controls (such as temporary fencing, construction access, catchbasin sediment control devices, check dams and temporary sediment traps and ponds). These measures will be designed and constructed as per the "Erosion and Sediment Control Guideline for Urban Construction" document (December 2006) and current LSRCA and City of Barrie Criteria. A detailed erosion and sediment control plan will be prepared for review and approval by the Municipality and Conservation Authority prior to any site grading being undertaken. This plan will address phasing, inspection and monitoring aspects of erosion and sediment control. All reasonable measures will be taken to ensure sediment loading to adjacent environmental features/properties are minimized both during and following construction.

9.0 UTILITY CONSIDERATIONS

Utility coordination for the overall Hewitt's Secondary Plan Area has been undertaken by the Hewitt's Land Owner Group. Specific servicing details will be provided with the detailed engineering submissions. We note that the utility providers for the proposed development are as follows:

- Hydro – InnPower
- Gas – Enbridge Gas
- Communications – Rogers & Bell

10.0 SUMMARY

This Functional Servicing Report has been prepared in support of the Draft Plan of Subdivision application for the proposed residential development in the City of Barrie. This report outlines the means by which the site can be graded and serviced in accordance with the City of Barrie, LSRCA, Metrolinx and MECP design criteria and policies.

General Information

- The existing land use cropland;
- The site is located in the Hewitt's Creek subwatershed in the Lake Simcoe Watershed; and
- The proposed development consists of;
  - medium and high density residential,
  - stormwater management facility,
  - natural heritage area,
  - proposed roads.

Stormwater Management and Storm Servicing

- Quality Control: MECP Enhanced (Level 1) water quality protection can be provided through the use of the proposed SWMF #5 (Phase 3 lands) and SWMF #6 (Phase 1 Lands);
- Erosion Control: The runoff volume from a 25 mm rainfall event will be detained over a minimum of 24 hours by the proposed SWMF #5 (Phase 3 lands) and SWMF #6 (Phase 1 lands);
- Quantity Control: Quantity control will be provided via by the proposed SWMF #5 (Phase 3 lands) and SWMF #6 (Phase 1 lands) to the allowable unit release rates as defined in the R.J. Burnside SIS for the 2 through 100 year storm events;
- Water Budget: As recommended in the Hydrogeological Study, low impact development measures will be implemented, as feasible, to maintain or increase existing infiltration rates to the three existing wetland communities.
- Phosphorus Budget: A phosphorus budget analysis was completed using the MECP phosphorus budget tool, which shows that the proposed phosphorus export will meet the minimum criteria as set by the LSRCA;
- Storm Servicing:
  - Storm runoff will be conveyed by storm sewers designed in accordance with City of Barrie and MECP criteria;
  - Storm sewers will generally be designed for the 5 year storm event; and
  - Adequate 100 year overland flow routes will be provided.
  - Servicing will be provided to convey the flows from external lands to the west.

Sanitary Sewage Disposal

- Sanitary servicing is to be provided for the proposed development via connection point E5 per the SIS.

Water Supply

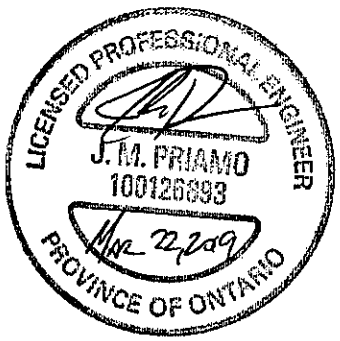
- Water servicing is proposed to be provided per the SIS.

Site Grading

- The preliminary site grading has been developed to match to the existing surrounding grades in addition to the proposed grades of adjacent sites within the Hewitt's SPA, and provide conveyance of stormwater runoff, including external drainage; and
- The preliminary lot grading will be subject to further grading design at the detailed design stage.

Respectfully Submitted:

SCS Consulting Group Ltd.



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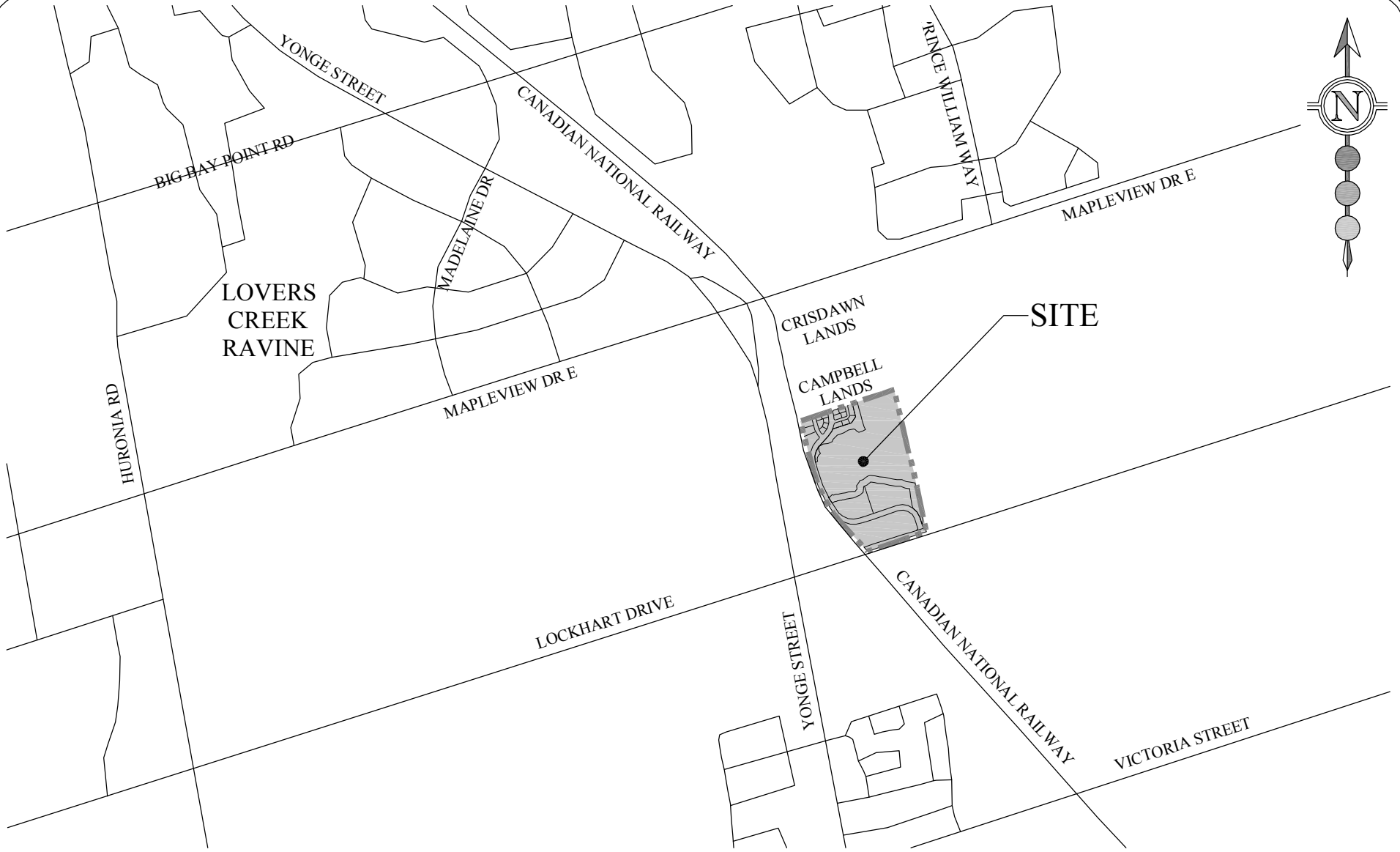

LEGEND:

PROPERTY BOUNDARY

750 LOCKHART ROAD BALLYMORE - BARRIE

SITE LOCATION PLAN

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: M.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: 1.1
SCALE: N.T.S.	DATE: MARCH 2019		

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CAMPBELL LANDS

METROLINX

YONGE STREET

EX. 750mmØ
CSP CULVERT

NATURAL
HERITAGE AREA

METROLINX

HEWITT'S CREEK
TRIBUTARY

LOCKHART ROAD

LOCKHART ROAD

LEGEND:

PROPERTY BOUNDARY

270.25 EXISTING CONTOUR

OVERLAND FLOW DIRECTION

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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750 LOCKHART ROAD
BALLYMORE - BARRIE

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.
SCALE:	1:1500	DATE:	MARCH 2019
PROJECT No:	1964	FIGURE No:	2.1

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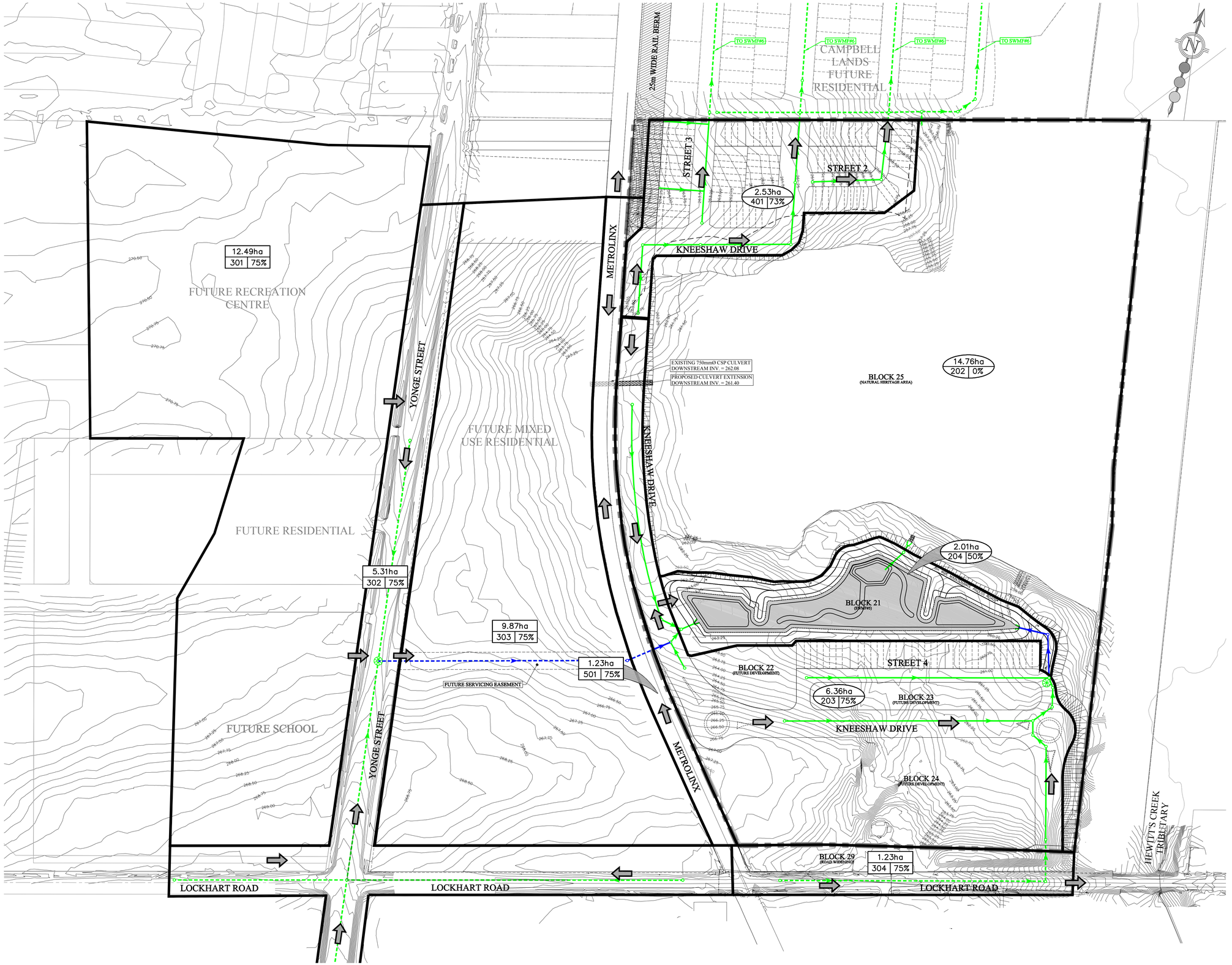

LEGEND:

- PROPERTY BOUNDARY
- STORM DRAINAGE BOUNDARY
- 30m OFFSET FROM STAKED DRIPLINE
- MAJOR SYSTEM - OVERLAND FLOW
- EXISTING CONTOUR (270.25)
- DRAINAGE AREA (HECTARES)
- PERCENT IMPERVIOUSNESS
- CATCHMENT ID
- EXTERNAL STORM DRAINAGE AREA (HECTARES)
- PERCENT IMPERVIOUSNESS
- CATCHMENT ID
- FUTURE / EXTERNAL STORM SEWER AND MANHOLE - 5 YEAR CONVEYANCE
- STORM SEWER AND MANHOLE - 5 YEAR CONVEYANCE
- STORM SEWER AND MANHOLE - 100 YEAR CONVEYANCE
- FUTURE / EXTERNAL STORM SEWER AND MANHOLE - 100 YEAR CONVEYANCE
- 100 YEAR CAPTURE LOCATION
- REAR LOT CATCHBASIN

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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750 LOCKHART ROAD BALLYMORE - BARRIE

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.
SCALE:	1:1500	DATE:	MARCH 2019
PROJECT No:	1964	FIGURE No:	2.2

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SWM POND SUMMARY:

POND BLOCK AREA = 2.01ha
PERMANENT POOL REQUIRED = 3,160m ^{3}
PERMANENT POOL PROVIDED = 6,416m ^{3}
EXTENDED DETENTION STORAGE REQUIRED = 5,350m ^{3}
EXTENDED DETENTION STORAGE WATER LEVEL = 260.00m
100yr ACTIVE STORAGE REQUIRED = 22,118m ^{3}

NATURAL HERITAGE AREA
BLOCK 25

KNEESHAW DRIVE

METROLINX

STAKED DRIPLINE

OUTLET CONTROL MANHOLE

DEWATERING SUMP

DEWATERING SUMP

6m WIDE MAINTENANCE ACCESS ROAD

SEDIMENT FOREBAY

4m WIDE BERM

BLOCK 21
(SWMF#1)

WETLAND

4m WIDE BERM

SEDIMENT FOREBAY

FUTURE SERVICING EASEMENT

BLOCK 22
(FUTURE DEVELOPMENT)

BLOCK 17

BLOCK 18

BLOCK 19

BLOCK 20

BLOCK 21

STREET 4

BLOCK 23
(FUTURE DEVELOPMENT)

KNEESHAW DRIVE

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

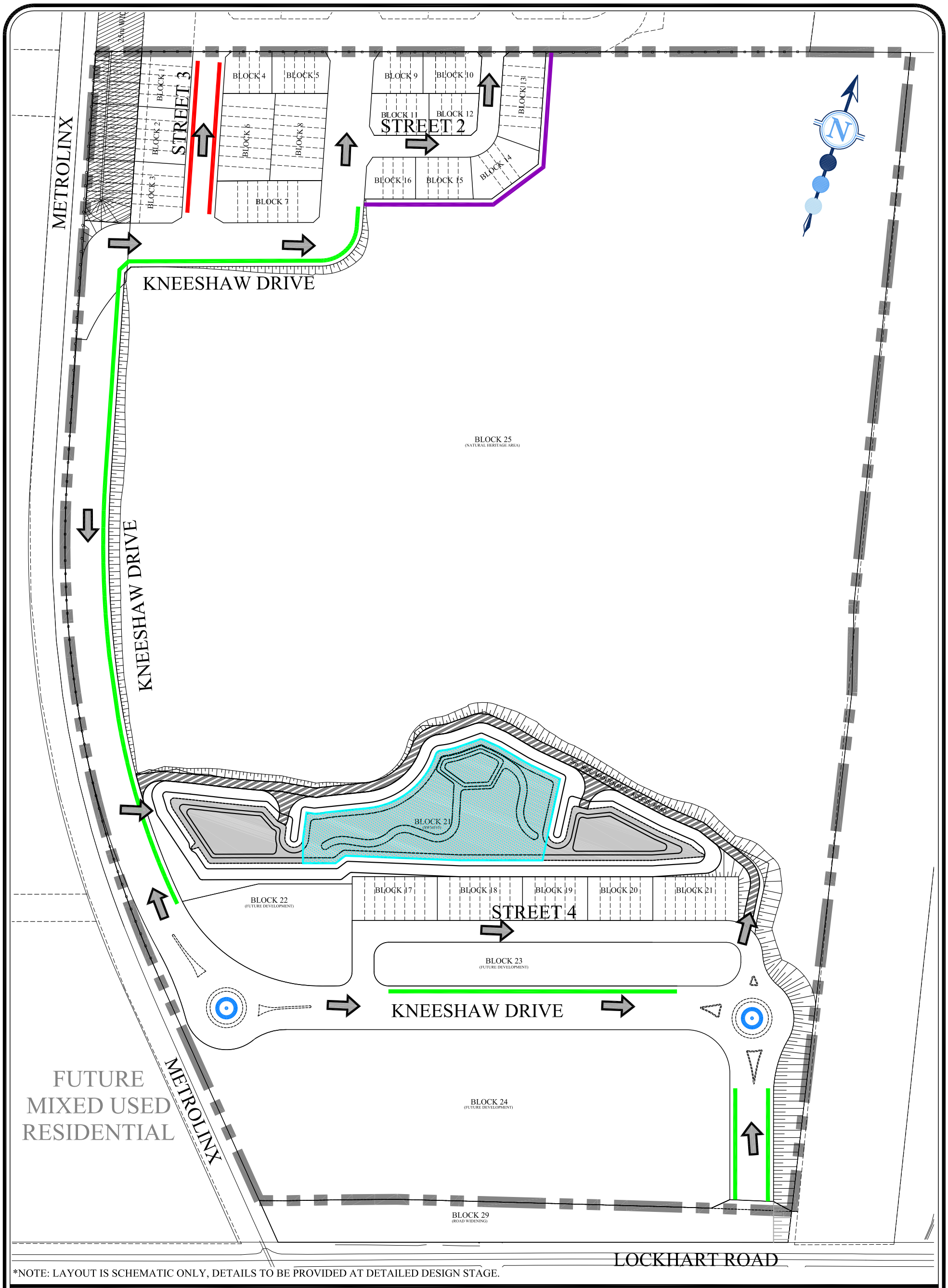
LEGEND:

- PROPERTY BOUNDARY
- PROPOSED STORM SEWER
- FUTURE STORM SEWER
- EXISTING CONTOUR
- PROPOSED CONTOUR
- × 223.91 PROPOSED ELEVATION
- × 224.35EX EXISTING ELEVATION
- PERMANENT POOL
- MAINTENANCE ACCESS ROAD
- OVERLAND FLOW ROUTE
- EMERGENCY SPILLWAY
- 30m OFFSET FROM STAKED DRIPLINE
- 3:1 MAXIMUM SLOPING
- 3.5% ROAD SLOPE AND DIRECTION
- 259.50 NWL NORMAL WATER LEVEL CONTOUR
- SWM POND BLOCK
- STAKED DRIPLINE
- MAJOR SYSTEM - OVERLAND FLOW
- PROPOSED PLUNGE POOL AND FLOW SPREADER

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

750 LOCKHART ROAD BALLYMORE - BARRIE		STORMWATER MANAGEMENT FACILITY #5	
DESIGNED BY: M.T.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: 2.3
SCALE: 1:500	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-POND-2.3.dwg – Revised by <HDUNNNCS> : Fri, Mar 22 2019 – 5:35pm



*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- PROPERTY BOUNDARY
- OVERLAND FLOW ROUTE
- ROUNDABOUT BASED LID
- TREE BOX BASED LID
- REAR LOT BASED LID
- ROW BASED LID
- PROPOSED WETLAND

750 LOCKHART ROAD BALLYMORE - BARRIE

POTENTIAL L.I.D. LOCATION PLAN

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.	PROJECT No:	FIGURE No:
SCALE:	1:2000	DATE:	MARCH 2019	1964	2.4

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-LIDS-2.4.dwg – Revised by <ILIN> : Fri, Mar 22 2019 – 12:33pm

METROLINX

NATURAL
HERITAGE AREA

PRE-DEVELOPMENT LAND USE	TOTAL AREA (ha) NORTH	SOUTH
CROP	2.53	5.81
FOREST	0.13	1.82
LOW INTENSITY DEVELOPMENT	N/A	0.70

METROLINX

FUTURE
MIXED USE
RESIDENTIAL

ROAD WIDENING

LOCKHART ROAD

LEGEND:

PROPERTY BOUNDARY

750 LOCKHART ROAD BALLYMORE - BARRIE

EXISTING PHOSPHORUS BUDGET

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.T.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: 2.5
SCALE: 1:2000	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P–PHSB–EXST–2.5.dwg – Revised by <ILIN> : Fri, Mar 22 2019 – 12:34pm

METROLINX

STREET 3

STREET 2

KNEESHAW DRIVE

NATURAL HERITAGE AREA

	BEST MANAGEMENT PRACTICE	TOTAL AREA (ha) PROPOSED LAND USE: HIGH INTENSITY RESIDENTIAL	TOTAL AREA (ha) PROPOSED LAND USE: LOW INTENSITY RESIDENTIAL
NORTH	WET POND FACILITY	1.56	0.15
NORTH	TREE PIT/EXFILTRATION IN ROW AND WET POND	0.68	N/A
NORTH	REAR LOT BIOSWALE	0.18	N/A
NORTH	NONE	N/A	0.09
SOUTH	WETLAND FACILITY	1.88	1.98
SOUTH	TREE PIT AND WETLAND	1.11	N/A
SOUTH	RAIN GARDEN AND WETLAND	0.47	N/A
SOUTH	FUTURE SITE PLAN AND WETLAND	2.89	N/A

KNEESHAW DRIVE

METROLINX

STREET 4

KNEESHAW DRIVE

FUTURE MIXED USE RESIDENTIAL

ROAD WIDENING

LOCKHART ROAD

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

PROPERTY BOUNDARY

750 LOCKHART ROAD BALLYMORE - BARRIE

PROPOSED PHOSPHORUS BUDGET

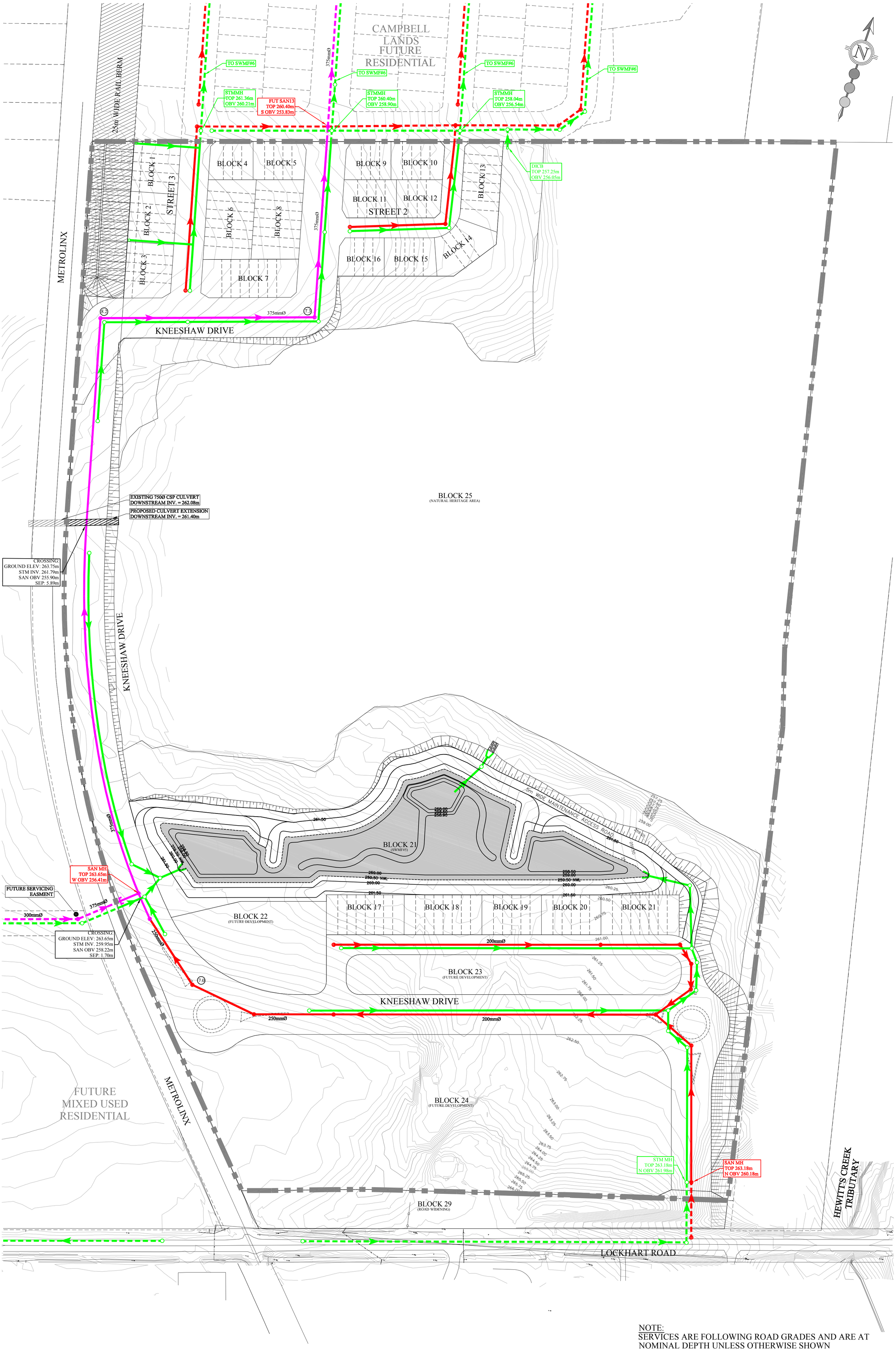
SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.T.T. | CHECKED BY: J.M.P.

SCALE: 1:2000 | DATE: MARCH 2019

PROJECT No: 1964 | FIGURE No: 2.6

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-PHSB-PROP-2.6.dwg – Revised by <ILIN> : Fri, Mar 22 2019 – 12:34pm



NOTE:
SERVICES ARE FOLLOWING ROAD GRADES AND ARE AT NOMINAL DEPTH UNLESS OTHERWISE SHOWN

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- PROPERTY BOUNDARY
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY TRUNK SEWER
- FUTURE / EXTERNAL SANITARY SEWER
- FUTURE / EXTERNAL SANITARY TRUNK SEWER
- PROPOSED STORM SEWER
- FUTURE / EXTERNAL STORM SEWER
- 263.00 EXISTING CONTOUR AND ELEVATION
- (7.3) DEPTH OF SANITARY TRUNK SEWER OBV (m)

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

750 LOCKHART ROAD BALLYMORE - BARRIE

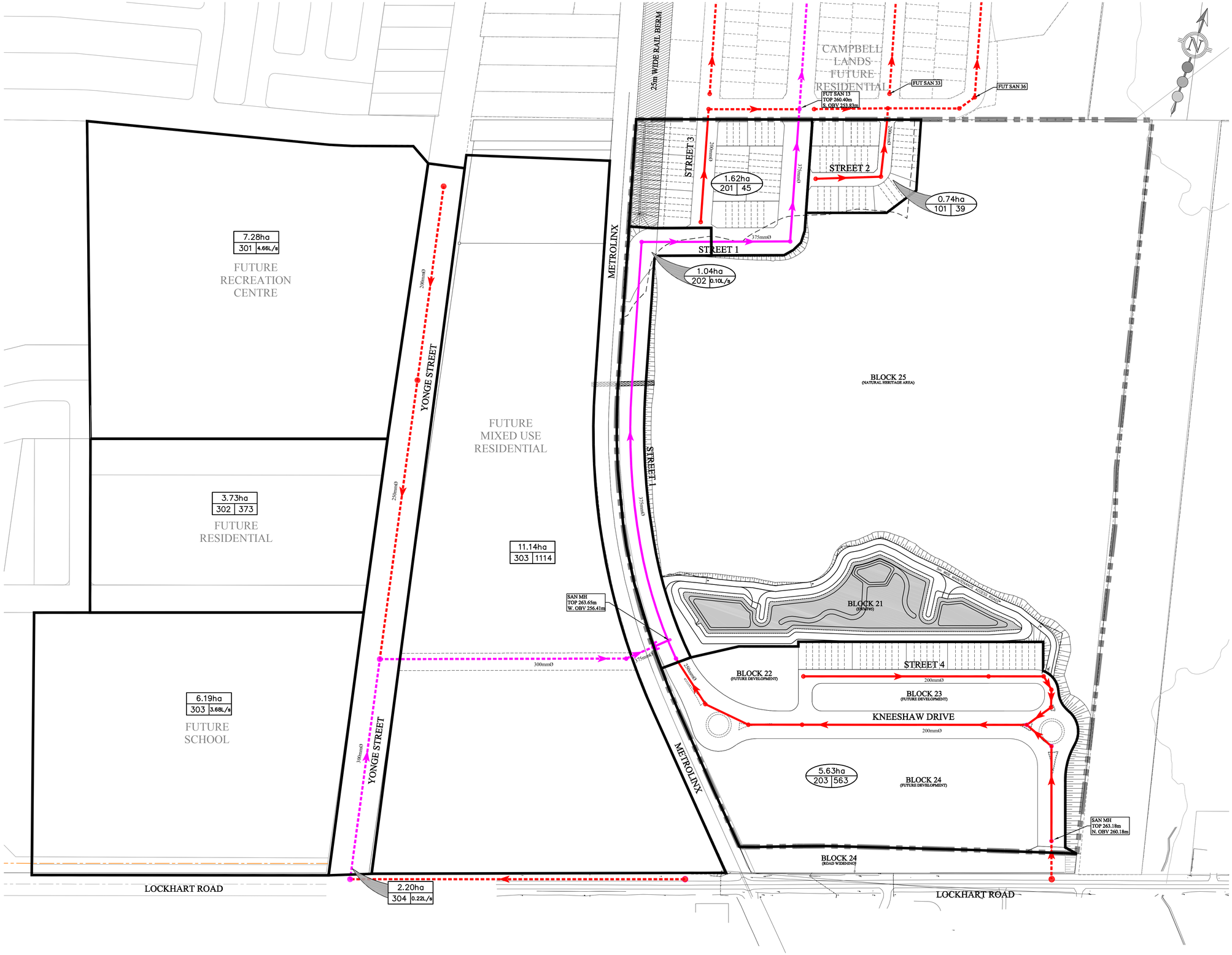
PROPOSED SERVICING PLAN

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	MARCH 2019

PROJECT No: 1964

FIGURE No: 3.1

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-SERV-3.1.dwg – Revised by <CMCCARTHY> : Tue, Mar 26 2019 – 9:51am



LEGEND:

- PROPERTY BOUNDARY
- SANITARY DRAINAGE BOUNDARY
- 30m OFFSET FROM STAKED DRIPLINE
- PROPOSED SANITARY SEWER /MANHOLE
- PROPOSED SANITARY TRUNK SEWER / MANHOLE
- FUTURE / EXTERNAL SANITARY SEWER / MANHOLE
- FUTURE / EXTERNAL SANITARY TRUNK SEWER / MANHOLE

0.74ha | 101 | 39
- DRAINAGE AREA (HECTARES)
- # OF UNITS
- CATCHMENT ID

3.37ha | 302 | 373
- EXTERNAL SANITARY DRAINAGE AREA (HECTARES)
- # OF UNITS
- CATCHMENT ID

1.04ha | 202 | 0.10L/s
- DRAINAGE AREA (HECTARES)
- FLOW (L/s)
- CATCHMENT ID

7.28ha | 301 | 4.66L/s
- EXTERNAL SANITARY DRAINAGE AREA (HECTARES)
- FLOW (L/s)
- CATCHMENT ID

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

750 LOCKHART ROAD BALLYMORE - BARRIE

PROPOSED SANITARY DRAINAGE PLAN

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.
SCALE:	1:1500	DATE:	MARCH 2019
PROJECT No:	1964	FIGURE No:	3.2

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSR\Fig\Report Figures\1964R-SANI-3.2.dwg – Revised by <DMCCARTHY> : Tue, Mar 26 2019 – 10:15am

FUTURE RESIDENTIAL

METROLINX

25m WIDE

STREET 3

200Ø

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

300Ø

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

STREET 2

200Ø

BLOCK 13

BLOCK 14

BLOCK 15

BLOCK 16

300Ø

KNEESHAW DRIVE

N

BLOCK 25
(NATURAL HERITAGE AREA)

KNEESHAW DRIVE

300Ø

BLOCK 21
(SWMF#5)

BLOCK 22
(FUTURE DEVELOPMENT)

BLOCK 17

BLOCK 18

BLOCK 19

BLOCK 20

BLOCK 21

STREET 4

200Ø

BLOCK 23
(FUTURE DEVELOPMENT)

KNEESHAW DRIVE
300Ø

METROLINX

FUTURE
MIXED USED
RESIDENTIAL

BLOCK 24
(FUTURE DEVELOPMENT)

300Ø

BLOCK 29
(ROAD WIDENING)

300Ø

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE

LOCKHART ROAD

LEGEND:

PROPERTY BOUNDARY

LOCAL TRUNK WATERMAIN

LOCAL WATERMAIN

FUTURE / EXTERNAL WATERMAIN

750 LOCKHART ROAD BALLYMORE - BARRIE

PROPOSED WATER DISTRIBUTION SYSTEM

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.T.T.	CHECKED BY: J.M.P.
SCALE: 1:2000	DATE: MARCH 2019

PROJECT No: 1964

FIGURE No: 4.1

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P–WTRM–4.1.dwg – Revised by <ILIN> : Fri, Mar 22 2019 – 12:34pm

CAMPBELL LANDS FUTURE RESIDENTIAL

× 260.99 FUT
× 259.24 FUT
× 257.24 FUT
× 255.41 FUT
× 261.36 FUT
× 260.40 FUT
× 258.04 FUT
0.7%
2.2%
2.0%
3.0%
1.2%
3.0%

25m WIDE RAIL BERM

METROLINX

265.00 EX
267.50
261.80
261.50
264.77 EX
265.20 EX
267.70
265.39 EX
262.00
265.25 EX
267.80
262.31
255.30 EX
263.15
262.68
263.03
264.48 EX
263.85 EX
263.33
263.27 EX
264.04
263.87

BLOCK 1 S
BLOCK 2 S
BLOCK 3 S
STREET 3
BLOCK 4 S
BLOCK 5 S
BLOCK 6 S
BLOCK 7 S
BLOCK 8 F
BLOCK 9 S
BLOCK 10 S
BLOCK 11 S
BLOCK 12 S
STREET 2
BLOCK 13 S
BLOCK 14 S
BLOCK 15 S
BLOCK 16 S

0.7%
0.5%
2.0%
1.0%
1.6%
1.3%
2.0%
261.82
260.72
259.25
258.44 EX
258.68 EX
261.33
261.53
261.57
262.31
262.54
261.81
262.70
263.16
263.16
264.16

KNEESHAW DRIVE

EXISTING 750Ø CSP CULVERT
DOWNSTREAM INV. = 262.08m
PROPOSED CULVERT EXTENSION
DOWNSTREAM INV. = 261.40m
262.53 EX
263.75

BLOCK 25
(NATURAL HERITAGE AREA)

STAKED DRIPLINE

263.29 EX
263.29
263.42
259.48 EX
260.32 EX
259.65 EX
262.58 EX
262.68 EX
262.98 EX
262.50 EX
261.18 EX
263.14 EX
262.91
262.54
262.53 EX
263.75

5m WIDE MAINTENANCE ACCESS ROAD
260.40 EX
259.22 EX
259.33 EX
260.25 EX
260.65 EX
259.19 EX
259.43 EX
263.09

BLOCK 21
(SWMF#5)
259.00
259.50 NWL
260.00

FUTURE SERVICING EASEMENT

BLOCK 22
(FUTURE DEVELOPMENT)
262.10
264.55
264.42
265.09 EX
3.8%
3.1%
266.56
1.5%
265.45

BLOCK 17 W/O
BLOCK 18 B/S
BLOCK 19 B/S
STREET 4
BLOCK 20 S
BLOCK 21 S
262.10
264.61
263.81
263.09
262.60
1.0%
1.0%
1.0%
1.1%

BLOCK 23
(FUTURE DEVELOPMENT)

KNEESHAW DRIVE

BLOCK 24
(FUTURE DEVELOPMENT)
0.6%

FUTURE MIXED USED RESIDENTIAL

METROLINX

266.89 EX

BLOCK 29
(ROAD WIDENING)

263.39
263.18
258.35 EX
263.39 EX
262.74

HEWITT'S CREEK TRIBUTARY

LOCKHART ROAD
267.38 EX
1.0%
267.43 EX
0.1%
267.48 EX
266.63 EX
265.40 EX
0.5%
266.28 EX
266.61 EX
266.91 EX
1.5%
265.31 EX
265.80 EX
4.8%
LOCKHART ROAD
262.57 EX
3.0%
260.22 EX

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- PROPERTY BOUNDARY
- 270.25 EXISTING CONTOUR
- ×223.91 PROPOSED ELEVATION
- ×224.35EX EXISTING ELEVATION
- ×223.71 / ×223.61 PROPOSED ROAD HIGH / LOW POINT ELEVATION
- 3.5% AVERAGE ROAD SLOPE AND DIRECTION
- 3:1 MAXIMUM SLOPING
- 30m OFFSET FROM STAKED DRIPLINE
- S SPLIT DRAINING LOT
- F FRONT DRAINING LOT
- W/O WALKOUT LOT TYPES
- B/S BACK SPLIT DRAINING LOT

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

750 LOCKHART ROAD BALLYMORE - BARRIE

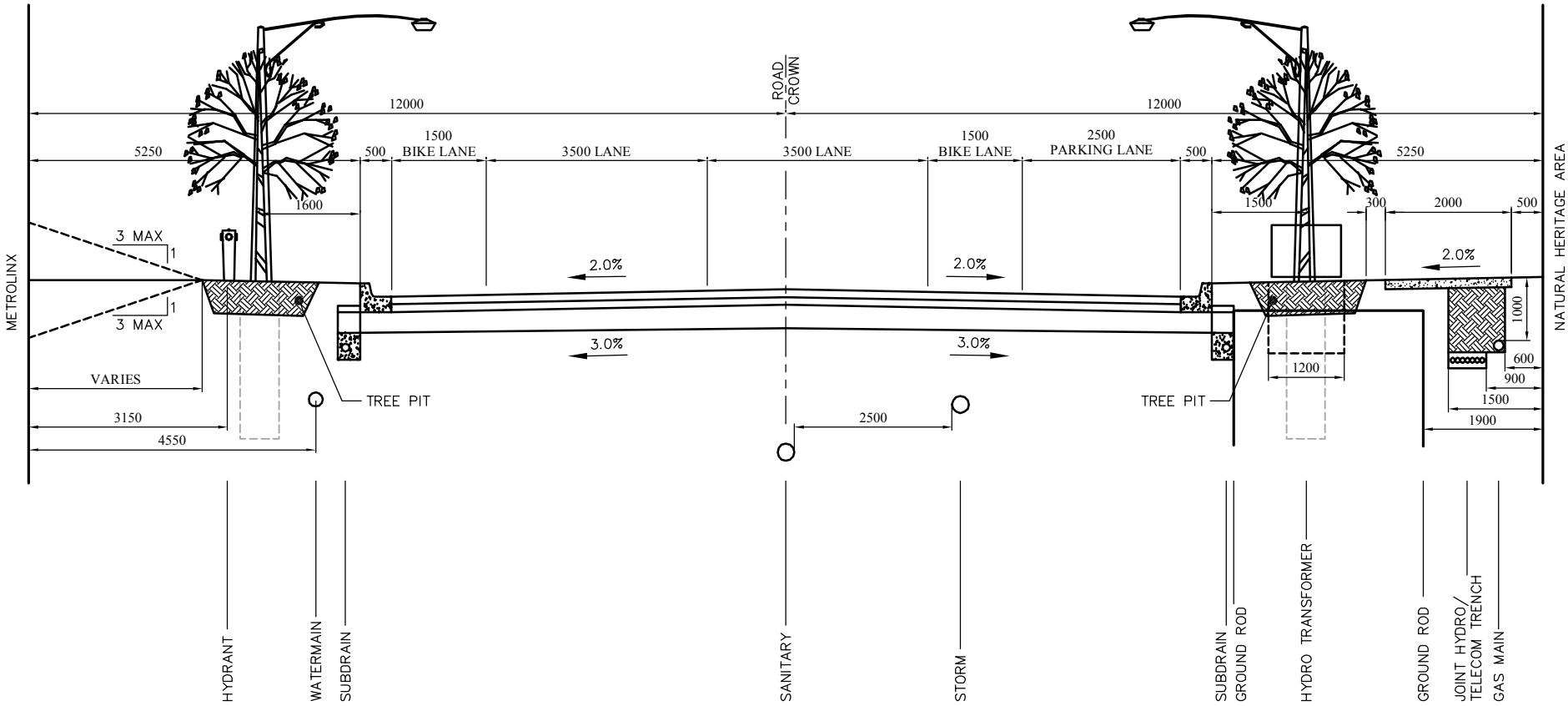
PRELIMINARY GRADING PLAN

DESIGNED BY:	M.T.T.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	MARCH 2019

PROJECT No: 1964

FIGURE No: 5.1

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-GRAD-5.1.dwg – Revised by <CMCCARTHY> : Tue, Mar 26 2019 – 8:55am



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. EXTENT OF 3:1 VARIES; MAX 3.75m

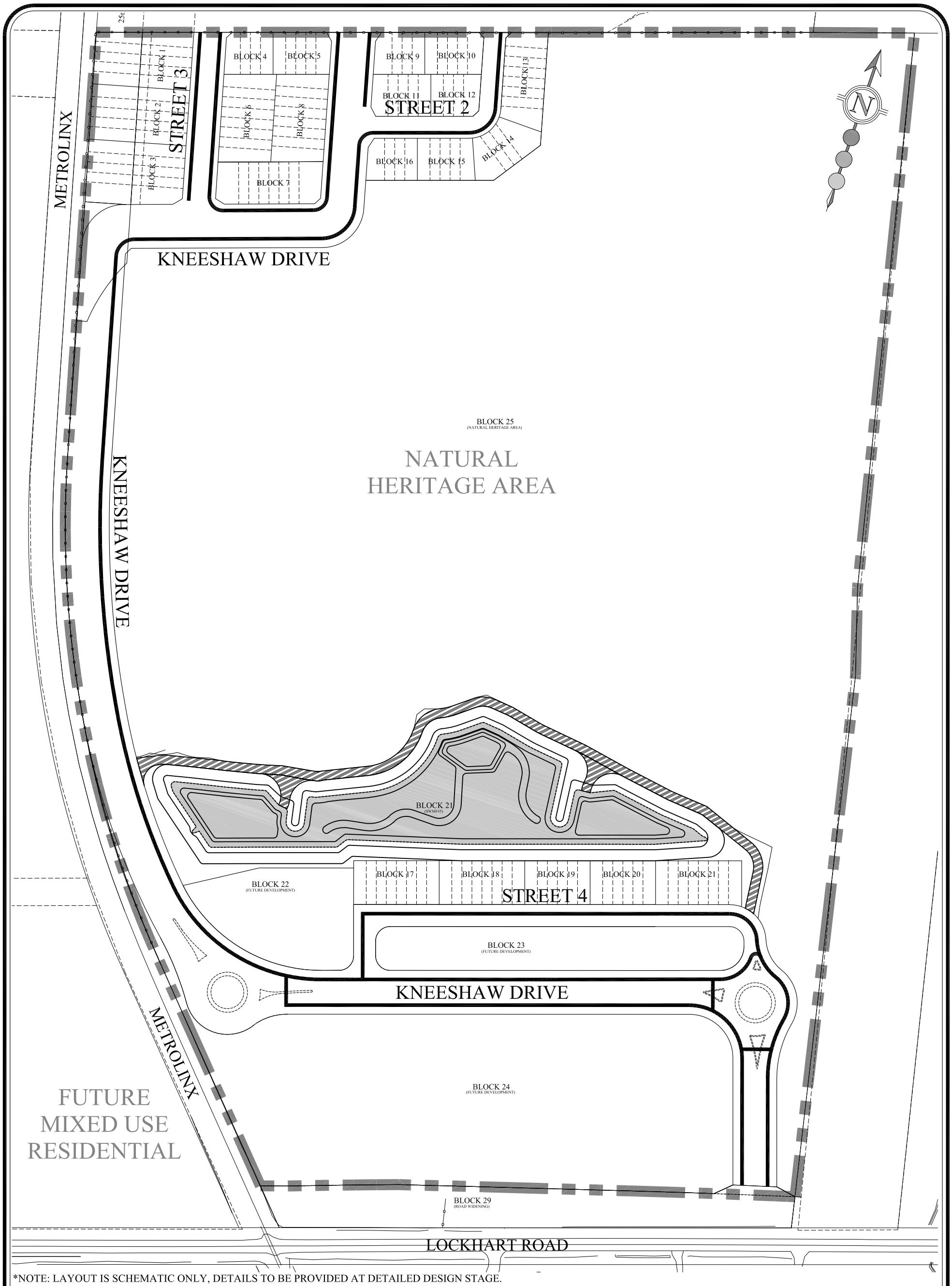
750 LOCKHART ROAD BALLYMORE - BARRIE

PROPOSED KNEESHAW DRIVE ROW SECTION ADJACENT TO NHS

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: H.D.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: 5.2
SCALE: N.T.S.	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-XSEC-5.2.dwg – Revised by <CMCCARTHY> : Tue, Mar 26 2019 – 9:52am



*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

PROPERTY BOUNDARY

PROPOSED SIDEWALK

750 LOCKHART ROAD BALLYMORE - BARRIE

PRELIMINARY SIDEWALK LAYOUT

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.T.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: 6.1
SCALE: 1:2000	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-SDWK-6.1.dwg – Revised by <LIN> : Fri, Mar 22 2019 – 2:36pm

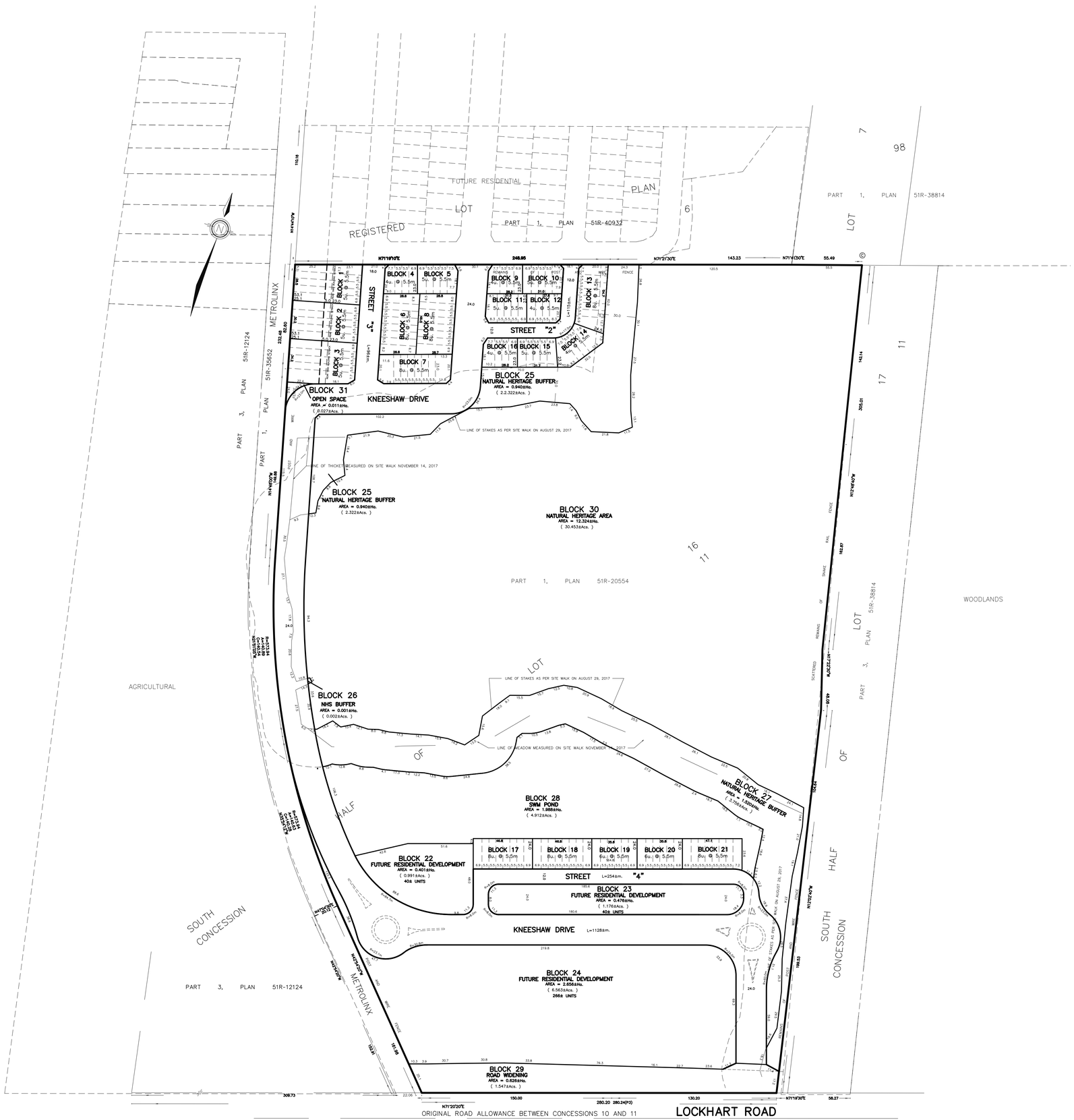
APPENDIX A

DRAFT PLAN

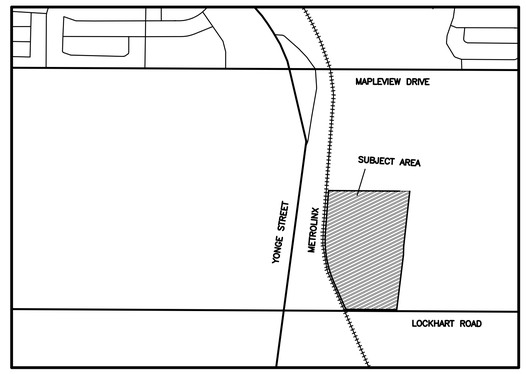
SCS consulting group ltd

DRAFT PLAN OF SUBDIVISION
PART OF THE SOUTH HALF OF LOT 16, CONCESSION 11
(GEOGRAPHIC TOWNSHIP OF INNISFIL)
CITY OF BARRIE
COUNTY OF SIMCOE

SCALE 1:1000



DRAFT PLAN T–



KEY PLAN N.T.S

SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE ----------, 2018

PIER DE ROSA OLS
J.D. BARNES LTD.

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF BARRIE FOR APPROVAL.

OWNER

BALLYMORE BUILDING (BARRIE) CORP.

12840 YONGE STREET
SUITE 200
RICHMOND HILL, ON
L4E 4H1

LOUIE MORRA A.S.O.

SCHEDULE OF LAND USE

TOTAL AREA OF LAND = 26.416±Ha. (65.275±Acs)

	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
TOWNHOUSE DWELLINGS					
STREET TOWNHOUSES					
BLOCKS 1–21	21		123	2.148	5.308
MIN. UNIT FRONTAGE = 5.5m.					
FUTURE RESIDENTIAL DEVELOPMENT					
BLOCKS 22–24	3		346*	3.534	8.733
SUBTOTAL	24		469*	5.682	14.041
BLOCKS 25–27 – NATURAL HERITAGE BUFFER 30m	3			2.461	6.081
BLOCK 28 – SWM POND	1			1.988	4.912
BLOCK 29 – ROAD WIDENING	1			0.626	1.547
BLOCK 30 – NATURAL HERITAGE AREA	1			12.324	30.453
BLOCK 31 – OPEN SPACE	1			0.011	0.027
STREETS AND LANEWAYS				3.324	8.214
24.0m WIDE TOTAL LENGTH= 1128±m. AREA=2.708±Ha.					
18.0m WIDE TOTAL LENGTH= 96±m. AREA=0.173±Ha.					
12.0m WIDE TOTAL LENGTH= 369±m. AREA=0.443±Ha.					
TOTAL LENGTH= 1593±m. AREA=3.324±Ha.					
TOTAL	31		469*	26.416	65.275

NOTE – ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM

NOTE – *SUBJECT TO FINAL CALCULATION

PROJECT No. P-3006

SCALE 1:1000 FEB. 14, 2019

(3006DES12) X-REF: (3006MAS1 & 3006TOPO)

DWG. No. - 19:5

KLM PLANNING PARTNERS INC.
64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
TEL: (905) 669-4055 FAX: (905) 669-0097 design@klmplanning.com

Planning ● Design ● Development

APPENDIX B

BACKGROUND INFORMATION & RELEVANT EXCERPTS

REFER TO FIGURE 11

REFER TO FIGURE 9

REFER TO FIGURE 9

REFER TO FIGURE 11

OUTLET H07

OUTLET H08

OUTLET H09

YONGE STREET

EXISTING ARE TO MAINTAIN DRAINAGE TO EXISTING MAPLEVIEW DRIVE INLETS

MAPLEVIEW DRIVE

SUN KING CRESCENT

SUCCESSION CRESCENT

WILLIAM WAY

ST PAUL'S CRESCENT

GO TRANSIT RAIL

5.8ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK

9.7ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO SANDY COVE CREEK

3.9ha OF EXISTING SANDY COVE CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITT'S CREEK

3.9ha OF EXISTING LOVER'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO HEWITTS CREEK

1.8ha OF EXISTING HEWITT'S CREEK WATERSHED TO BE REGRADED TO DRAIN TO SANDY COVE CREEK

SCHOOL

PARK

PHASE 1

PHASE 2

PHASE 3

LOCKHART ROAD

HEWITT'S CREEK TRUBITARY

HEWITT'S CREEK

HEADWALL OBV: 249.61m

HEADWALL OBV: 249.61m

HEADWALL OBV: 250.87m

HEADWALL OBV: 257.53m

HEADWALL OBV: 253.43m

HEADWALL OBV: 254.80m

HEADWALL OBV: 254.71m

SWMF #10 NWL: 246.15m TOP: 250.41m

SWMF #9 NWL: 246.11m TOP: 250.41m

SWMF #8 NWL: 249.57m TOP: 251.67m

SWMF #5 NWL: 256.03m TOP: 258.33m

SWMF #6 NWL: 253.10m TOP: 255.60m

SWMF #7 NWL: 249.03m TOP: 254.23m

SWMF #11 NWL: 252.21m TOP: 255.51m

FOC4-1 MAM2-2 FOC4-1 MAM2-2 CUM1-1 SWD7 MAS2-4 MAM2-2 SWM1-1 SWC1 MAM2-2 MAM2-5 SWC1 HR FOC4-1 FOD5-2 MAM2-2 OC1-2 MAS2-1 SWM1-1 SWM1-1 FOM7-2 WT2 MAM2-2 MAM3-3 SWM SAS1 FOM FOC4-1 SWD SWM1-1 SWT2-2 CUP3-2 FOC4-1 FOM8 MAM2-5

7 6 7a 10 10a 9 9a 8c 8a 8b 8e 8d 8 12 11 5 5-EXT 8-EXT 203 204

LEGEND

- NHS LIMITS
- NHS BUFFER LIMITS
- 100 YEAR CAPTURE AREA
- 2031 PHASE LIMITS
- EXISTING 100 YR FLOOD LIMITS
- EXISTING REGIONAL FLOOD LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY
- ORIGINAL WATERSHED BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

FLOW DIRECTION

STORM SEWER SYSTEM

- 100 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- 100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
- 5 YR CAPTURE SEWER, MANHOLE & FLOW DIRECTION
- EXISTING STORM SEWER, MANHOLE

0 100 200 400 600 Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (2 OF 3)

Drawn	Checked	Date
BH	CC	16/09/07

Scale: H 1:3,000*

Project No.: 300032860

Figure No.: FIG 10

REFER TO DETAIL A ON FIGURE 15

REFER TO FIGURE 15

REFER TO FIGURE 13

REFER TO FIGURE 13

REFER TO FIGURE 15

SOBEY'S

NSCNG LAND EVELOPMENT INC.

NON PARTICIPANT

CRISDAWN CONSTRUCTION INC.

2303757 ONTARIO INC.

NON PARTICIPANT

PHASE 1

PHASE 3

PHASE 2

NON PARTICIPANT

CRISDAWN CONSTRUCTION INC.

NON PARTICIPANT

CRISDAWN CONSTRUCTION INC.

BULUT LANDS 1091369 ONTARIO INC

NON PARTICIPA

CRISDAWN CONSTRUCTION INC.

NON PARTI

MAPLEVIEW DRIVE

SUN KING CRESCENT

SUCCESSION CRESCENT

YONGE STREET

GO TRANSIT RAIL

LOCKHART ROAD

HEWITT'S CREEK TRIBUTARY

HEWITT'S CREEK

30.8ha

60.8ha

85.7ha

9.8ha

24.4ha

SWMF #7

SWMF #10

SWMF #6

SWMF #11

SWMF #9

SWMF #5

SWMF #8

CONNECTION E4-A EX.:2508 OBV: 269.04 DEPTH: 3.0

CONNECTION E6 INV: 256.31

OBV: 260.64 DEPTH: 5.6

OBV: 261.09 DEPTH: 6.2

OBV: 261.71 DEPTH: 6.3

OBV: 268.79 DEPTH: 3.0

OBV: 268.85 DEPTH: 3.0

OBV: 269.50 DEPTH: 3.0

OBV: 262.14 DEPTH: 6.5

OBV: 262.60 DEPTH: 6.4

OBV: 263.72 DEPTH: 6.3

OBV: 271.02 DEPTH: 3.0

OBV: 268.01 DEPTH: 3.7

OBV: 269.69 DEPTH: 3.0

OBV: 268.15 DEPTH: 3.0

OBV: 264.18 DEPTH: 3.5

OBV: 266.69 DEPTH: 3.0

OBV: 263.00 DEPTH: 4.0

OBV: 263.50 DEPTH: 3.4

OBV: 254.54 DEPTH: 3.9

OBV: 254.99 DEPTH: 6.4

OBV: 255.40 DEPTH: 7.4

OBV: 256.03 DEPTH: 6.3

OBV: 255.68 DEPTH: 7.0

OBV: 260.50 DEPTH: 3.7

OBV: 251.37 DEPTH: 3.0

OBV: 258.56 DEPTH: 5.8

OBV: 269.83 DEPTH: 3.0

OBV: 241.75 DEPTH: 6.3

OBV: 242.03 DEPTH: 8.0

OBV: 249.18 DEPTH: 3.0

OBV: 256.72 DEPTH: 4.0

OBV: 251.57 DEPTH: 7.5

OBV: 250.95 DEPTH: 7.3

OBV: 247.36 DEPTH: 8.9

OBV: 248.95 DEPTH: 6.9

OBV: 250.25 DEPTH: 8.5

OBV: 251.35 DEPTH: 7.6

OBV: 253.83 DEPTH: 5.8

OBV: 260.13 DEPTH: 3.0

OBV: 260.39 DEPTH: 4.2

OBV: 253.30 DEPTH: 3.0

OBV: 257.06 DEPTH: 3.8

OBV: 253.87 DEPTH: 3.9

OBV: 248.59 DEPTH: 7.5

OBV: 249.99 DEPTH: 7.1

OBV: 255.87 DEPTH: 3.0

OBV: 255.71 DEPTH: 3.0

OBV: 231.23 DEPTH: 3.0

OBV: 257.00 DEPTH: 3.2

OBV: 268.76 DEPTH: 3.0

CREEK CROSSING DEPTH @ 2.5m

CREEK CROSSING DEPTH @ 2m

FILL REQUIRED TO ACHIEVE SERVICING

LEGEND

- SURVEYED NHS LIMIT (2015)
- NHS BUFFER LIMIT
- 2031 PHASE LIMITS
- DEV. LIMITS
- PHASING LIMITS

- 2031 PHASE LIMITS
- EXISTING 100 YR FLOOD LIMITS
- EXISTING REGIONAL FLOOD LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

- FLOW DIRECTION ARROW
- SANITARY DC TRUNK SEWER
- SANITARY LOCAL TRUNK SEWER
- SANITARY LOCAL COLLECTOR SEWER
- SANITARY FORCEMAIN
- SANITARY MANHOLE
- EXISTING SANITARY SEWER
- FLOW DIRECTION ARROW DEPICTS SEWER CONTINUES ON IN ARROW DIRECTION

P PUMP STATION

0 60 120 180 240 Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

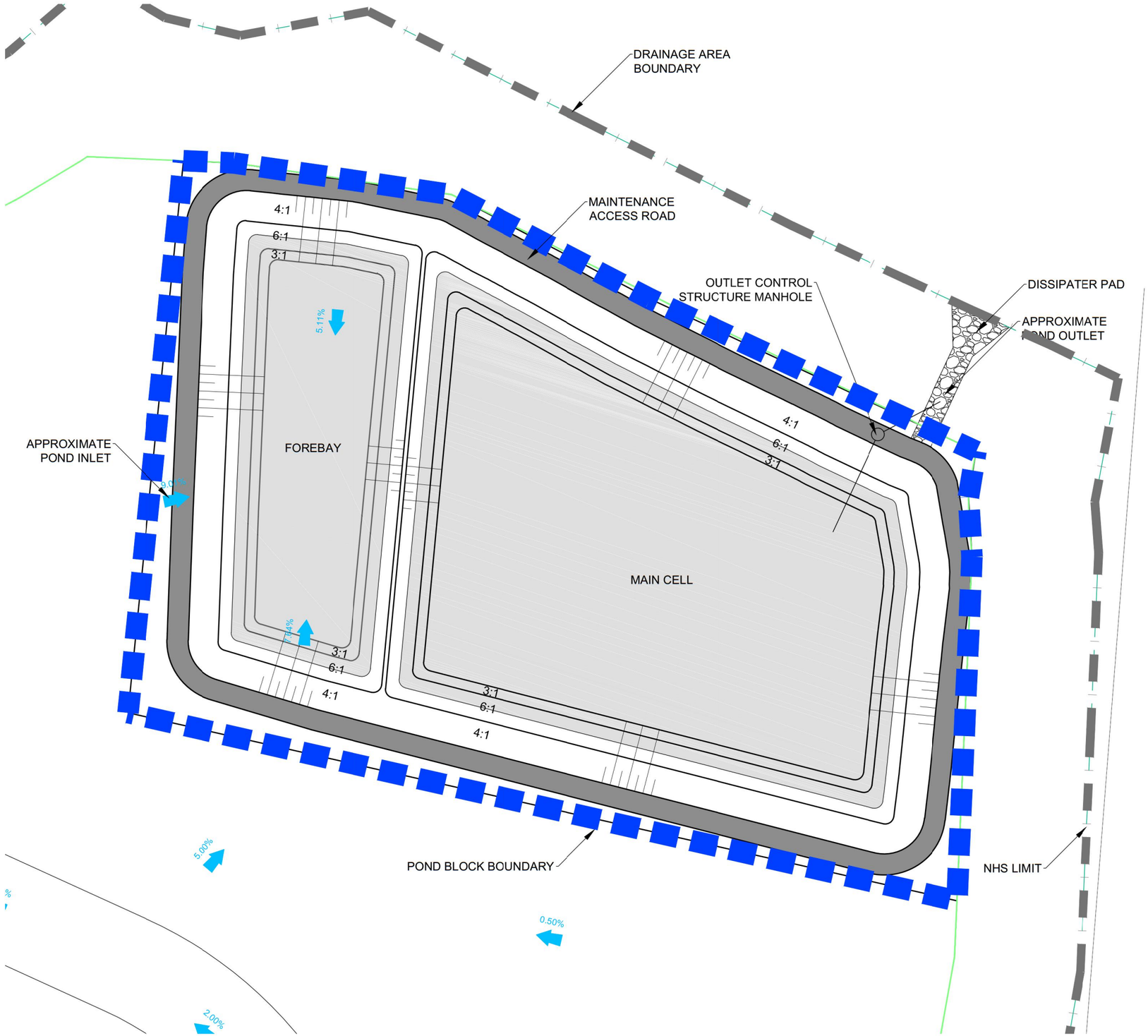
Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

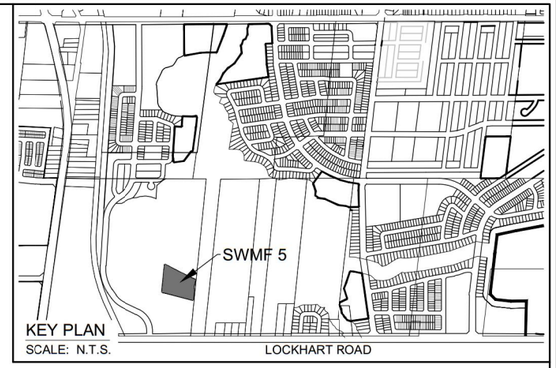
Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED SANITARY SEWER PLAN (2 OF 3)

Drawn	Checked	Date
BH	CC	16/09/07
Scale: H 1:3,000"		Project No.: 300032860

Figure No.: FIG 14

F:\...\Figure 14 Hewitt's Secondary Plan Area Subwatershed Impact Study - Sanitary Sewer Plan (2 of 3).dwg, 2007-09-17 3:29:57 PM, Plotted by: Brian Hollis, September 18, 2007 8:30:57 AM





LEGEND

- OVERLAND FLOW DIRECTION
- EXISTING 100 YEAR FLOOD LIMIT
- EXISTING REGIONAL FLOOD LIMIT
- PROPOSED REGIONAL FLOOD LIMIT
- CONCEPTUAL SWMF BLOCK

POND STATISTICS

TOP OF POND ELEV	:259.03m
NWL ELEV	:256.73m
MAX DEPTH	:2.60m
PERMANENT POOL VOL	:14,928m³
ACTIVE STORAGE VOL	:33,376m³
CONCEPTUAL SWMF BLOCK AREA	:24,754.8m²

N

0 20 40 60 80
Metres

BURNSIDE

Client
HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title
HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
Preliminary SWMF Design – Facility No. 5

Drawn	Checked	Date	Figure No.
T.S.	C.C.	16/01/28	**FIG 21**
Scale		Project No.	
1:1000		300032860	

File: \\barkley\Shared Work Areas\032860 - Annexed Lands\11 SIS\03 Production\Dwg\032860 - SIS - POND 5-10.dwg Date Plotted: September 9, 2016 - 3:32 PM

5.4.7.2 Hewitt's Creek

Table 12 Hewitt's Creek, Proposed Condition Modelling Results

Hewitt's Creek Proposed Model Summary		24 Hour SCS Type II Storm					
	Area(ha)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
RJB Allowable Unitary Discharge Rate ($m^3/s/ha$)		**0.006**	**0.011**	**0.016**	**0.023**	**0.029**	**0.036**
Catchment 5 Total Allowable Discharge (m^3/s)	***34.4***	***0.21***	***0.38***	***0.54***	***0.79***	***1.00***	***1.23***
Uncontrolled Flows to SWMF 5 (m^3/s)	34.4	3.50	5.19	6.50	8.13	9.37	10.63
Proposed Flows from SWMF 5 (m^3/s)		0.10	0.14	0.28	0.54	0.78	1.07
Catchment 5 Total Proposed Discharge (m^3/s)	***34.4***	***0.10***	***0.14***	***0.28***	***0.54***	***0.78***	***1.07***
Catchment 6 Total Allowable Discharge (m^3/s)	***14.6***	***0.09***	***0.16***	***0.23***	***0.33***	***0.42***	***0.52***
Uncontrolled Flows to SWMF 6 (m^3/s)	14.6	1.36	1.94	2.46	3.07	3.54	4.02
Proposed Flows from SWMF 6 (m^3/s)		0.04	0.05	0.11	0.24	0.36	0.51
Catchment 6 Total Proposed Discharge (m^3/s)	***14.6***	***0.04***	***0.05***	***0.11***	***0.24***	***0.36***	***0.51***
Catchment 7 Total Allowable Discharge (m^3/s)	***26.3***	***0.05***	***0.10***	***0.14***	***0.20***	***0.25***	***0.31***
Uncontrolled Flows to SWMF 7 (m^3/s)	8.7	0.86	1.30	1.60	2.01	2.31	2.63
Uncontrolled Flows to SWMF 7 (Catch 7a) (m^3/s)	17.6	2.10	3.00	3.78	4.69	5.39	6.08
Proposed Flows from SWMF 7 (m^3/s)	26.3	0.07	0.11	0.22	0.40	0.57	0.75
Catchment 7 Total Proposed Discharge (m^3/s)	***26.3***	***0.07***	***0.11***	***0.22***	***0.40***	***0.57***	***0.75***
Catchment 8 Allowable Flows (m^3/s)	***25.9***	***0.16***	***0.29***	***0.41***	***0.59***	***0.75***	***0.92***
Uncontrolled Flows to SWMF 8 (m^3/s)	18.3	1.61	2.33	2.81	3.46	3.99	4.57
Proposed Flows from SWMF 8 (m^3/s)		0.01	0.01	0.01	0.05	0.10	0.19
Uncontrolled Flows to SWMF 8a (m^3/s)	1.0	0.00	0.02	0.14	0.21	0.26	0.31
Uncontrolled Flows to SWMF 8b (m^3/s)	0.2	0.00	0.00	0.00	0.01	0.03	0.05
Uncontrolled Flows to SWMF 8c (m^3/s)	4.5	0.00	0.00	0.04	0.07	0.11	0.14
Uncontrolled Flows to SWMF 8d (m^3/s)	0.2	0.01	0.02	0.03	0.04	0.05	0.06
[A]Uncontrolled Flows to SWMF 8e (m^3/s)	1.7	0.01	0.02	0.03	0.04	0.05	0.06
Catchment 8 Total Proposed Discharge (m^3/s)	***25.9***	***0.03***	***0.07***	***0.25***	***0.42***	***0.60***	***0.81***
Catchment 9 Allowable Flows (m^3/s)	***31.9***	***0.20***	***0.35***	***0.50***	***0.73***	***0.93***	***1.14***
Uncontrolled Flows to SWMF 9 (m^3/s)	31.4	2.37	3.50	4.40	5.50	6.35	7.20
Proposed Flows from SWMF 9 (m^3/s)		0.07	0.16	0.28	0.47	0.63	0.82
Uncontrolled Flows to SWMF 9a (m^3/s)	0.4	0.00	0.01	0.05	0.08	0.10	0.12
Catchment 9 Total Proposed Discharge (m^3/s)	***31.9***	***0.07***	***0.17***	***0.33***	***0.55***	***0.73***	***0.94***
Catchment 10 Allowable Flows (m^3/s)	***40.4***	***0.25***	***0.45***	***0.63***	***0.92***	***1.18***	***1.44***
Uncontrolled Flows to SWMF 10 (m^3/s)	39.3	3.64	5.48	6.78	8.49	9.81	11.14
Proposed Flows from SWMF 10 (m^3/s)		0.10	0.15	0.28	0.53	0.75	0.98
Uncontrolled Flows to SWMF 10a (m^3/s)	1.1	0.09	0.19	0.26	0.33	0.39	0.44
Catchment 10 Total Proposed Discharge (m^3/s)	***40.4***	***0.19***	***0.34***	***0.54***	***0.86***	***1.14***	***1.42***
Catchment 15 Allowable Flows (m^3/s)	***26.7***	***0.16***	***0.30***	***0.42***	***0.61***	***0.78***	***0.95***
Uncontrolled Flows to SWMF 15 (m^3/s)	22.2	2.04	2.96	3.72	4.63	5.32	6.03
Proposed Flows from SWMF 15 (m^3/s)		0.07	0.13	0.22	0.38	0.53	0.70
Uncontrolled Flows to SWMF 15a (m^3/s)	4.5	0.00	0.01	0.06	0.11	0.15	0.20
Catchment 15 Total Proposed Discharge [B] (m^3/s)	***26.7***	***0.07***	***0.14***	***0.28***	***0.49***	***0.68***	***0.90***
Catchment 16 Allowable Flows (m^3/s)	***22.89***	***0.14***	***0.25***	***0.36***	***0.52***	***0.67***	***0.82***
Uncontrolled Flows to SWMF 16 (m^3/s)	21.34	2.11	2.99	3.57	4.31	4.86	5.41
Proposed Flows from SWMF 16 (m^3/s)		0.04	0.08	0.15	0.28	0.40	0.53
Uncontrolled Flows to SWMF 16a (m^3/s)	1.55	0.07	0.10	0.12	0.14	0.16	0.18
Catchment 16 Total Proposed Discharge [C] (m^3/s)	***22.89***	***0.11***	***0.18***	***0.27***	***0.42***	***0.56***	***0.71***
Discharge to Existing Subdivisions							
Catchment 203 to Mapleview Drive (via Yonge St.)							
Pre-Development Flows to Mapleview (m^3/s)	*31.39*	*0.78*	*1.22*	*1.53*	*1.95*	*2.29*	*2.64*
Post-Dev. Catchment 203 Flows to Mapleview (m^3/s)	**16.07**	**0.68**	**0.97**	**1.30**	**1.67**	**1.97**	**2.27**
Catchment 204 to Mapleview Drive (at Maplecort)							
Pre-Development Flows to Mapleview (m^3/s)	*6.54*	0.09	0.13	0.21	0.29	0.35	0.43
Post-Dev. Catchment 204 Flows to Mapleview (m^3/s)	**0.29**	**0.00**	**0.00**	**0.01**	**0.02**	**0.02**	**0.03**
Catchment 205 to Maplecort Dev. (Unicorn Lane) [D]							
Pre-Development (124) Flows to Unicorn (m^3/s)	*1.8*	*0.00*	*0.00*	*0.03*	*0.06*	*0.08*	*0.10*
Post-Dev. Catchment 205 Flows to Unicorn (m^3/s)	**0.3**	**0.01**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**

Notes
A - Catchment 8E requires LID controls to meet unitary discharge rates
B - Catchment 15 to discharge to Winchester Terrace in Hamptons on Big Bay Development via 675 mm dia. pipe @1.9%, 1.2 cms capacity
C - Catchment 16 to discharge to Versailles Cres. in Hamptons on Big Bay Development via 750 mm dia. pipe @0.9%, 1.1 cms capacity
D - Maplecort Development accounted for up to 0.40 cms during 100 year event at this location. Additional LID required to reduce peak flows in 2 and 5 year events to pre dev levels

Catchment 5 & 5-EXT/SWMF #5

SWMF#5 is proposed to be located on the west side of Yonge Street in Phase 3 lands owned by a non-participating group member. Conceptual development plans have not been made available to Burnside for review and as such all design for this facility has been completed based on Land Use Schedule 9C from the July 2015 OMB decision. A portion of the catchment (northwest corner of Lockhart and Yonge Street) is owned by Rainsong and is proposed as a school block.

Catchment 5 consists of medium/high density residential, the southern half of the Yonge Street mixed use corridor, the institutional (school) block at the northwest corner of Yonge Street and Lockhart Road, and the remainder of the recreational centre block that will not be treated by SWMF #4. We have assumed that the existing culvert crossing on Yonge Street at Carpe Diem Orchards and the existing culvert crossing under the GO Transit Rail line (where the NHS limits touch the edge of the GO Transit railway corridor) will be abandoned or altered in favour of directing flow to SWMF #5. In addition we have assumed that 100 year conveyance will be required south along Yonge Street, east along Lockhart and north through the proposed development lands to SWMF#5.

The current SWMF block and design meets the assumed needs of the development area, however without additional conceptual details including the internal grading of the site, road network, and lotting concept it is not possible to comment further on the appropriate size and configuration of the SWMF. The block and design provided in this report demonstrate that a drainage area of this size and land use designation could be accommodated.

Additional details will need to be developed and presented by the land owner for this facility.

Catchment 6/SWMF #6

SWMF#6 is proposed to be located on the west side of Hewitt’s Creek primarily in the Phase 1 Crisdawn Construction lands, and partially in the 2303757 Ontario Inc. lands. This facility is intended to provide quality and quantity control primarily for the southern part of the Crisdawn Construction Inc. lands on the west side of Hewitt’s Creek, the 2303757 Ontario Inc. lands and a portion of the non-participating member development lands south of 2303757 Ontario Inc.

Catchment 6 consists of roughly equal proportion of residential development and mixed use areas, with one small park. The 4 ha of land that drained east under the railway tracks (part of existing Catchment 115) via the 900 mm dia. culvert is to be redirected north along the west side of the train tracks and the 900 mm dia. culvert abandoned.

A portion of the catchment draining to this SWMF drains to the Lover's Creek watershed in the existing condition (similar to Catchment 3). A similarly sized drainage area that in the existing condition drains to Hewitt's Creek is to be routed to Lover's Creek, with the net difference in drainage area to be less than 2%.

The current SWMF block and design is sized sufficiently for the proposed drainage area. The implementation of LID within the catchment, including the park block, may allow for a small additional increase in the drainage area or an additional decrease in the SWM block size. Please refer to Section 5.5 for a discussion on the potential modifications related to LID implementation.

This facility is proposed to be orientated in a north-south direction as per the LSRCA recommendations, and the design provides the required overall forebay and pond length to width ratios and proposed permanent pool and active storage depths consistent with MOECC recommendations. The design also provides sufficient area for a maintenance access road, and a dissipater outlet located outside of the floodplain to spread the discharge flow.

The SWMF straddles an ownership parcel, requiring coordination between the two land owners to complete the design and construction of this facility as shown within this Report.

Catchment 7 & 7A/SWMF #7

SWMF#7 is proposed to be located on the west side of Hewitt's Creek in the Phase 1 Crisdawn Construction lands. This facility is also intended to provide quality and quantity control for the Sobey's site west of Yonge, portions of the north half of the Yonge Street mixed use corridor, and portions of the Rainsong Development. It is noted that mixed use developments along the Yonge Street corridor, particularly for commercial developments such as the Sobey's lands, may be able to utilize on site controls if development staging is such that utilization of SWMF#7 is not feasible.

100 year capture pipes will be required to convey runoff from the Rainsong and Sobey's Lands west of the Yonge Street corridor across Yonge to this SWMF. Please refer to Figure 11 for the proposed storm sewer configuration. It appears from aerial and ownership mapping that the recommended route to construct infrastructure is to utilize the narrow parcel of land between 99 and 105 St. Paul's Crescent, which is owned by Crisdawn Construction. This configuration will require a new crossing through the GO Transit Rail Berm. Alternative routing options for the 100 year capture storm piping may need to be considered, such as a northern route along Yonge Street and east on Mapleview Drive depending on the final conceptual draft plans and an assessment of the relative costs of the routing.

5.5.5 Hewitt's Creek LID Recommendations

Catchment 5/5-EXT

Catchment ID	5	5-EXT
Catchment Area	32.74	1.65
Impervious %	76%	50%
Dominant Soil Type	Loam	Loam
Effective Soil Type	Loam	Loam
Hydraulic Conductivity	13.2 mm/hr	13.2 mm/hr
LSRCA Hydraulic Conductivity[A]	5.28 mm/hr	5.28 mm/hr
25 mm Runoff Volume (m^3)	6068	206
Required Infiltration Storage Volume[B]		
25 mm Runoff (m^3)	26000	N/C
12.5 mm Runoff (m^3)	16000	N/C
5 mm Runoff (m^3)	5500	N/C
Recommended Infiltration Target		
	5 mm	N/C
Recommended Filtration Target		
	20 mm	N/C
LID Opportunities		
Park Block (m^2)	None	None
School/Community Centre (m^2)	32600	None
Accessible NHS Buffer (Linear m)	541	None
ROW (Linear m)	679	85
Pervious Area available for Additional Topsoil (m^2)	78576	8250
SWM Control	LID/SWMF 5	LID/ SWMF 5
Discharge Point	Hewitt's Creek	Hewitt's Creek

Notes

[A]LSRCA Factor of Safety Required = 2.5 (Divide measured Hydraulic Conductivity by 2.5)

[B]Assumes 24 hr drawdown, 1.0 m tall stone trench with bottom set at 1.2 m below grade, 0.4 void ratio

The majority of Catchment 5 includes non-participating land owners and as such this report does not provide full recommendations for this area. The soils in Catchment 5 are a loam with a low infiltration rate and although infiltration LIDs within this catchment are possible, it is not likely that the 25 mm target can be achieved. We have provided a breakdown for the required infiltration targets and options for Catchment 5 in Appendix G based on the information available.

The large school block within Rainsong owned lands at the NW corner of Lockhart Road and Yonge Street provides an opportunity to implement infiltration/filtration LID.

Catchment 6

A summary of LID considerations and recommendations for the catchment are outlined below.

Table 16 LID Considerations – Catchment 6

Catchment ID	**6**
Catchment Area	14.56
Impervious %	53%
Dominant Soil Type	Loam
Effective Soil Type	Loam
Hydraulic Conductivity	13.2 mm/hr
LSRCA Hydraulic Conductivity[A]	5.28 mm/hr
25 mm Runoff Volume (m^3)	16602
Required Infiltration Storage Volume[B]	
25 mm Runoff (m^3)	8000
12.5 mm Runoff (m^3)	5000
5 mm Runoff (m^3)	2000
Recommended Infiltration Target	
	Best Effort
Recommended Filtration Target	
	25 mm
LID Opportunities	
Park Block (m^2)	3400
School/Community Centre (m^2)	None
Accessible NHS Buffer (Linear m)	661
ROW (Linear m)	2036
Pervious Area available for Additional Topsoil (m^2)	68432
SWM Control	LID/SWMF 6
Discharge Point	Hewitt's Creek
Notes	
[A]LSRCA Factor of Safety Required = 2.5 (Divide measured Hydraulic Conductivity by 2.5)	
[B]Assumes 24 hr drawdown, 1.0 m tall stone trench with bottom set at 1.2 m below grade, 0.4 void ratio	

The entirety of Catchment 6 is in an area of high groundwater table. As such, the use of infiltration or filtration LID will be limited to areas where proposed grades will raise the site to a level that permits the use of LID with sufficient separation to the groundwater table. Extensive use of LID is not considered feasible for this area. As such, it is recommended that best efforts are used to try and achieve the 5 mm minimum infiltration and filtration LID and traditional end-of-pipe SWMF be utilized for Catchment 6.

Shallow infiltration LID above the frost line should be considered in some areas. Additional topsoil depths of 300 mm, as outlined in Section 5.5.2.1, on all of the proposed lots within this area could provide some level of infiltration and peak flow reduction, however there is currently no credit for this method.

Additional geotechnical work may refine the groundwater depths and allow for some infiltration LID, which could be located within the park block, NHS buffers and within the ROW. Approximately 80% of the runoff from the catchment could be routed through the park block for treatment, and there is 660 m of accessible NHS buffer.

through the implementation of at-source LID's, the SWMF's have been designed for quality and quantity void of upstream LID's.

In order to provide the required stormwater quality and quantity control for the site, four (4) extended detention wet ponds are proposed. The ponds, referred herein as the Southwest (Pond 6), Northeast (Pond 10), Southeast (Pond 9) and Northwest (Pond 7) Ponds, are located in each of the four quarters of the site. The two West ponds capture runoff for all developable and external areas previously identified West of Hewitt's Creek, and the two East ponds capture runoff for all developable and external areas previously identified East of Hewitt's Creek. The creek is the discharge location for all of the pond outlets and for all other stormwater runoff from the site.

5.2. Stormwater Quality Control

As per the City and LSRCA requirements, *Enhanced* (Level 1) stormwater quality control is required for the site. The four (4) proposed extended detention wet ponds will provide the required level of SWM quality control, as the calculations provided below will demonstrate. In addition to the typical quality control requirements, the incorporation of Low Impact Development (LID) measures will provide phosphorus removal benefits to ensure that best efforts are taken to reduce post-development phosphorus loadings to pre-development levels (or a minimum 80% removal of TP from post-development). Phosphorus Loading calculations are provided within **Section 5.5** below.

A plan view and section drawing has been provided for each pond. Refer to **Drawings PND-1** through **PND-4** in **Appendix D**.

5.2.1. Southwest Pond (Pond 6)

The total land draining to Pond 6 includes Catchments 6, 6a, 6b & 6c, totaling an area of 19.61 hectares. The total imperviousness used to size the pond is 60% given that catchment 6c is an external area with low overall imperviousness. Based on the MOE requirements (extrapolation of Table 3.2), 201.7 m^3/ha of storage is required for Enhanced quality control. This storage corresponds to both the extended detention volume (40 m^3/ha) and the permanent pool volume (161.7 m^3/ha).

The extended detention and permanent pool volumes, as per the MOE guidelines, are calculated as follows:

4.5. Model Results

The hydrologic modeling results are summarized herein. The pre-development condition was not modeled within PCSWMM as the allowable peak flow rates are established using Unitary Discharge Rates for the Hewitt's Creek watershed as established within the SIS. The Unitary Discharge Rates, provided in units of $m^3/s/ha$, and the resulting allowable peak flow rates are summarized in **Table 4** along with the post-development peak flow rates computed by the PCSWMM model. The PCSWMM model schematics along with the output printout for the 100-year SCS 24-hour storm are provided in **Appendix B**. The model output printouts are provided in PDF format for all storm events on a CD provided with the digital modeling files appended at the back of the report.

Table 4: Hydrologic Model Results – Overall Development Area

Storm Peak Event Flow (m^3/s) – Site Total							
	Area (ha)	**Storm Distribution**					
Return Period (years)		**2**	**5**	**10**	**25**	**50**	**100**
Allowable Flow Rates per the Hewitt's Secondary Plan Area SIS							
Unitary Discharge Rates ($m^3/s/ha$)		***0.006***	***0.011***	***0.016***	***0.023***	***0.029***	***0.036***
Target Flow Rates	120.63	0.724	1.327	1.930	2.774	3.498	4.343
Post Development Condition – Peak Flow at Outfall H08							
SCS Type II - 6 hour	120.63	0.298	0.653	1.005	1.543	1.864	2.192
SCS Type II - 24 hour	120.63	0.349	0.804	1.307	1.896	2.298	2.973
25mm Storm	120.63	0.175					
Hazel Storm	120.63	8.801					

The results demonstrate that the proposed stormwater management ponds will provide the required quantity control to reduce post-development peak flows to the allowable release rates. The function of the proposed extended detention wet ponds is discussed in further detail in **Section 5**.

Enhanced (Level 1) Water Quality Protection

Total area draining to pond for quality control = 19.61 ha

(60% Net Impervious Area), (201.7 m^3/ha)

19.61 ha * 161.7 m^3/ha = 3,170 m^3 (permanent pool)

19.61 ha * 40 m^3/ha = 784 m^3 (extended detention)

However, the extended detention volume must be designed to attenuate the erosion volume from the 4-hour 25 mm Chicago rainfall event. Based on the watershed characteristics and the PCSWMM model, the 25 mm storm event produces a runoff volume of 3,155 m^3 (16.09 mm * 19.61 ha). Therefore, the runoff volume from the 4-hour 25 mm Chicago storm event will govern.

	Required:	Provided:
Permanent Pool	3,170 m^3	3,420 m^3
Extended Detention	3,155 m^3	3,218 m^3

The 24 hour extended detention release rate is the maximum target flow rate to ensure that 24 hour settling occurs in the pond. The extended detention outlet is 150 mm in diameter. The drawdown equation has been used to verify the detention time for the extended detention volume. The equation is given as follows:

$$t = \frac{0.66C_2h\sqrt{h} + 2C_3\sqrt{h}}{2.75A_0}$$

Where:

t = drawdown time (seconds)

C_2 = slope coefficient from the area-depth linear regression (3,849)

C_3 = intercept from the area-depth linear regression (4,159)

A_0 = cross-sectional area of the extended detention orifice (0.01767 m^2)

h = maximum water elevation above the orifice, taken from the extended detention elevation to centroid of orifice (0.52 m)

5.3. Stormwater Quantity Control

In order to provide stormwater quantity control, the site will utilize Low Impact Development (LID) measures and extended detention wet ponds. The combination of LID Measures and the ponds' active storage and outlet controls will attenuate post-development stormwater peak runoff to the allowable flow rates determined via the Hewitt's Secondary Plan Subwatershed Impact Study and those outlined in **Section 4.5** above.

In accordance with the SIS, four (4) wet ponds will be utilized as end-of-pipe stormwater management facilities, which are sized to provide the required quantity control for the site for all design storms up to the 100-year event. Each of the ponds' outlet structures and overflow weir have been sized to safely convey the Regional storm event, ensuring a 0.3m freeboard between the top of pond and the Hazel storm event's ponding elevation. The pond block sizing is conservative as reduction in runoff volume that may be realized through the implementations of upstream LIDs has not been considered when sizing the SWMF's.

5.3.1. Southwest Pond (Pond 6)

The bottom elevation of Pond 6's main cell is 247.50m, the bottom of the forebay is 248.50m, and the permanent pool elevation is 249.50m. This provides a depth of 2m and 1m in the main cell and forebay, respectively. The top of pond elevation is 251.80m, providing a total depth of 4.3m. Sideslopes of 4H:1V are proposed throughout the SWMF except for a 7H:1V safety shelf surrounding the permanent pool. An allowance for a 5m wide access road is provided around the entire perimeter of the pond.

Pond 6 will discharge through a reverse-sloped 300mm diameter storm pipe to a control maintenance hole complete with a 150mm diameter orifice plate bolted to the inside with an invert set to the permanent pool elevation. The primary outlet pipe will discharge via a Hickenbottom structure at the bottom of the pond, ensuring that the water is drawn from the bottom portion of the pond. A secondary outlet pipe, 600mm in diameter, will discharge to the control maintenance hole at an invert of 250.15m. The control maintenance hole will discharge to the channel via a 750mm diameter storm pipe at a slope of 0.5%. A 12m wide emergency overflow spill weir is incorporated at an

elevation of 251.20m to ensure safe conveyance of peak flows during the Regional (Hazel) storm event. An abbreviated version of the Pond 6 stage-storage-discharge table is presented in **Table 5** below. The full table is provided in **Appendix A**. The values for storage and pond outflow result from the proposed design height and dimensions for the orifices and overflow weir.

Table 5: Pond 6 Stage-Storage-Discharge Table

Elevation (m)	Total Storage (m^3)	Active Storage (m^3)	Water Depth (m)	Discharge (m^3/s)	
247.50	0	0	0	0	Bottom of Main Cell
248.50	818	0	1.00	0	Bottom of Forebay
249.50	3,420	0	2.00	0	Permanent Pool
249.95	5,680	2,261	2.45	0.030	25mm
250.10	6,638	3,218	2.60	0.036	Extended Detention
250.15	6,973	3,553	2.65	0.037	Secondary Orifice
250.25	7,654	4,235	2.75	0.048	2-Year
250.40	8,708	5,288	2.90	0.099	5-Year
250.55	9,799	6,379	3.05	0.298	10-Year
250.70	10,927	7,508	3.20	0.447	25-Year
250.85	12,094	8,674	3.35	0.554	50-Year
250.95	12,893	9,473	3.45	0.615	100-Year
251.20	14,965	11,546	3.70	0.746	Overflow Weir
251.25	15,393	11,973	3.75	1.001	Regional (Hazel)
251.80	20,386	16,966	4.30	11.837	Top of Pond

5.3.2. Northeast Pond (Pond 10)

The bottom elevation of Pond 10's main cell and forebay is 246.80m and the permanent pool elevation is 248.30m, providing a permanent pool depth of 1.5m throughout the whole pond. The top of pond elevation is 250.30m, providing a total depth of 3.5m. Sideslopes of 4H:1V are proposed throughout the SWMF except for a 7H:1V safety shelf surrounding the permanent pool. An allowance for a 5m wide access road is provided around the entire perimeter of the pond.

LEGEND:

- 675mmø — PROPOSED STORM SEWER, PIPE DIAMETER, MAINTENANCE HOLE AND FLOW DIRECTION
- STORM CATCHMENT AREA
- OVERLAND FLOW DIRECTION
- DEVELOPMENT BOUNDARY PHASE I
- REGIONAL FLOODLINE
- 100 YEAR FLOODLINE
- NATURAL HERITAGE SYSTEM BUFFER
- NATURAL HERITAGE SYSTEM

CATCHMENT AREA ID NUMBER — 9a 70% 0.68 — IMPERVIOUS %; AREA IN HECTARES (ha)

BENCHMARK:

BENCHMARK NO: VO10065454 LOCATED ON CONCRETE BRIDGE CARRYING MAPLEVIEW DRIVE E OVER LOWER'S CREEK, 0.65m EAST OF HURONIA ROAD. TABLET IS SET HORIZONTALLY IN THE NORTH FACE, 0.46m NORTH OF CENTRELINE OF ROAD, 58cm WEST OF THE NORTHEAST END OF BRIDGE, 19cm TOP OF COPING. N4610780.889 E607284.100 ELEV 241.891

BENCHMARK NO: 53120030039 MAPLEWOOD HEIGHTS ELEMENTARY SCHOOL – 180 ESTHER DR. THE VERTICAL MONUMENT IS SET FLUSH IN CONCRETE FLAGPOLE BASE, 4.7m SOUTH FROM THE SOUTHEAST CORNER OF THE MAIN ENTRANCE TO SCHOOL AND TABLET IS ON THE SOUTHSIDE OF THE FLAGPOLE BASE. N4611910 E607799 ELEV 250.506

BENCHMARK NO: 53120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 11m EAST OF HURONIA ROAD. N4611807.122 E607501.002 ELEV 248.898

BENCHMARK NO: 53120110013 LOCATED ON LOCKHART ROAD ON THE NORTH SIDE OF THE BOULEVARD, APPROXIMATELY 1.62m WEST OF THE YONGE STREET AND HURONIA ROAD INTERSECTION N4600898.357 E606733.880 ELEV 252.807

NO.	REVISIONS	DATE	INITIAL
1.	FSR SUBMISSION	FEB 2017	MF

D.E. RICHARDSON 100112707 — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — FEB 17/17

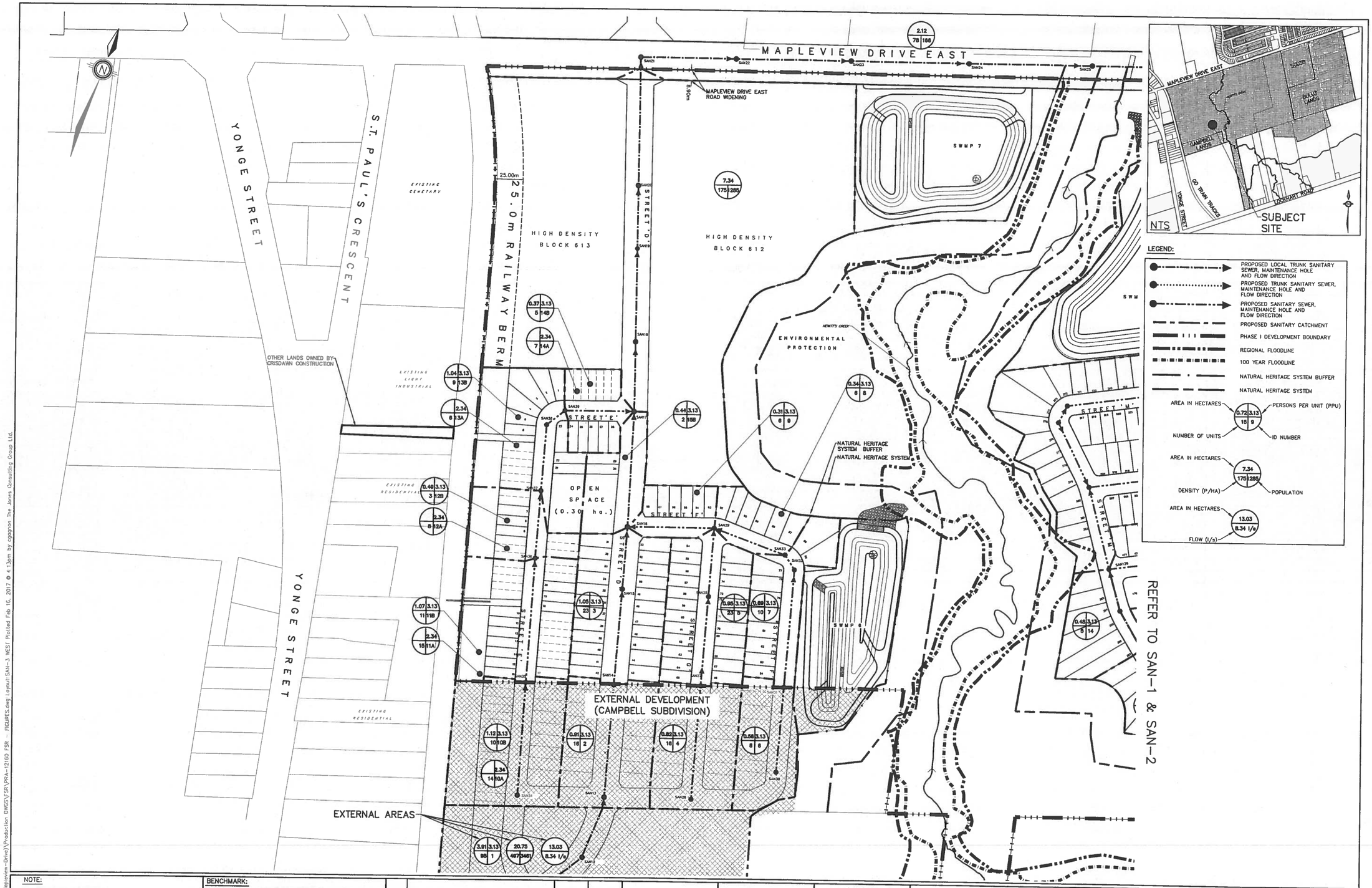
OVERALL STORMWATER MANAGEMENT PLAN WEST OF HEWITT'S CREEK

HEWITT'S GATE
CRISDAWN CONSTRUCTION INC.

JONES CONSULTING GROUP LTD. PLANNERS & ENGINEERS
220 Mapleview Dr. E, Unit 1
Barrie, ON L4N 0W5
P. 705.734.2538
F. 705.734.1066

DESIGN	MF	SCALE: 1:2000	DATE FEBRUARY 2017
DRAWN	CG	PROJECT PRA-12160	DWG. Nº SWM-2
CHECKED	MF		

G:\Eng_Jb\VPRA-12160\Mapleview-Drive\Production DWGS\FSR\PRA-12160 FSR – FIGURES.dwg Layout SWM-2 WEST Plotted Feb 16, 2017 @ 4:26pm by cgagnon The Jones Consulting Group Ltd.


MAPLEVIEW DRIVE EAST
YONGE STREET
ST. PAUL'S CRESCENT
25.0m RAILWAY BERM
25.00m
MAPLEVIEW DRIVE EAST ROAD WIDENING
5.50m
EXISTING CEMETARY
EXISTING LIGHT INDUSTRIAL
EXISTING RESIDENTIAL
EXISTING RESIDENTIAL
OTHER LANDS OWNED BY CRISDAWN CONSTRUCTION
HIGH DENSITY BLOCK 613
HIGH DENSITY BLOCK 612
STREET 'D'
STREET 'E'
STREET 'F'
STREET 'G'
STREET 'H'
STREET 'J'
STREET 'K'
STREET 'L'
STREET 'M'
OPEN SPACE (0.30 ha.)
ENVIRONMENTAL PROTECTION
HEWITT'S CREEK
NATURAL HERITAGE SYSTEM BUFFER
NATURAL HERITAGE SYSTEM
SWMP 7
SWMP 6
SWM
EXTERNAL DEVELOPMENT (CAMPBELL SUBDIVISION)
EXTERNAL AREAS
REFER TO SAN-1 & SAN-2
2.12 78 186
7.34 175 285
0.37 3.13 5 14B
2.34 7 14A
1.04 3.13 9 13B
2.34 6 13A
0.49 3.13 3 12B
2.34 8 12A
1.07 3.13 11 11B
2.34 15 11A
1.12 3.13 10 10B
2.34 14 10A
0.91 3.13 16 2
0.82 3.13 16 4
0.56 3.13 8 6
0.44 3.13 2 15B
0.31 3.13 6 9
0.34 3.13 6 8
1.05 3.13 23 3
0.95 3.13 23 5
0.89 3.13 10 7
0.48 3.13 5 14
3.91 3.13 98 1
20.75 467 3481
13.03 8.34 l/s
SAN21
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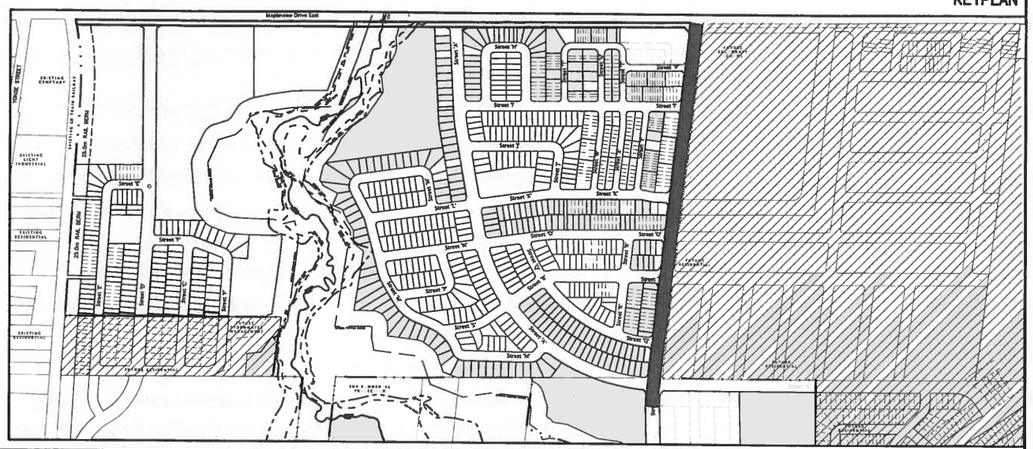
SAN60

KEYPLAN



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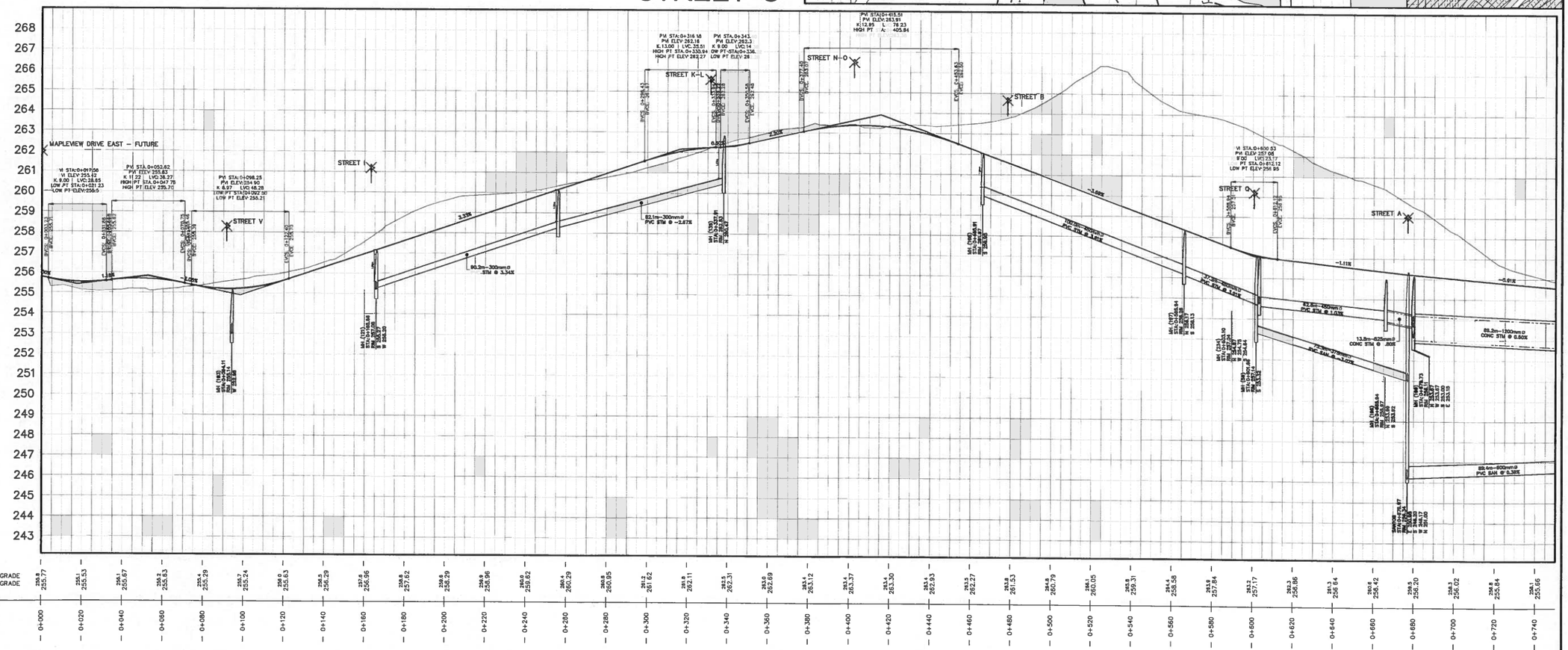
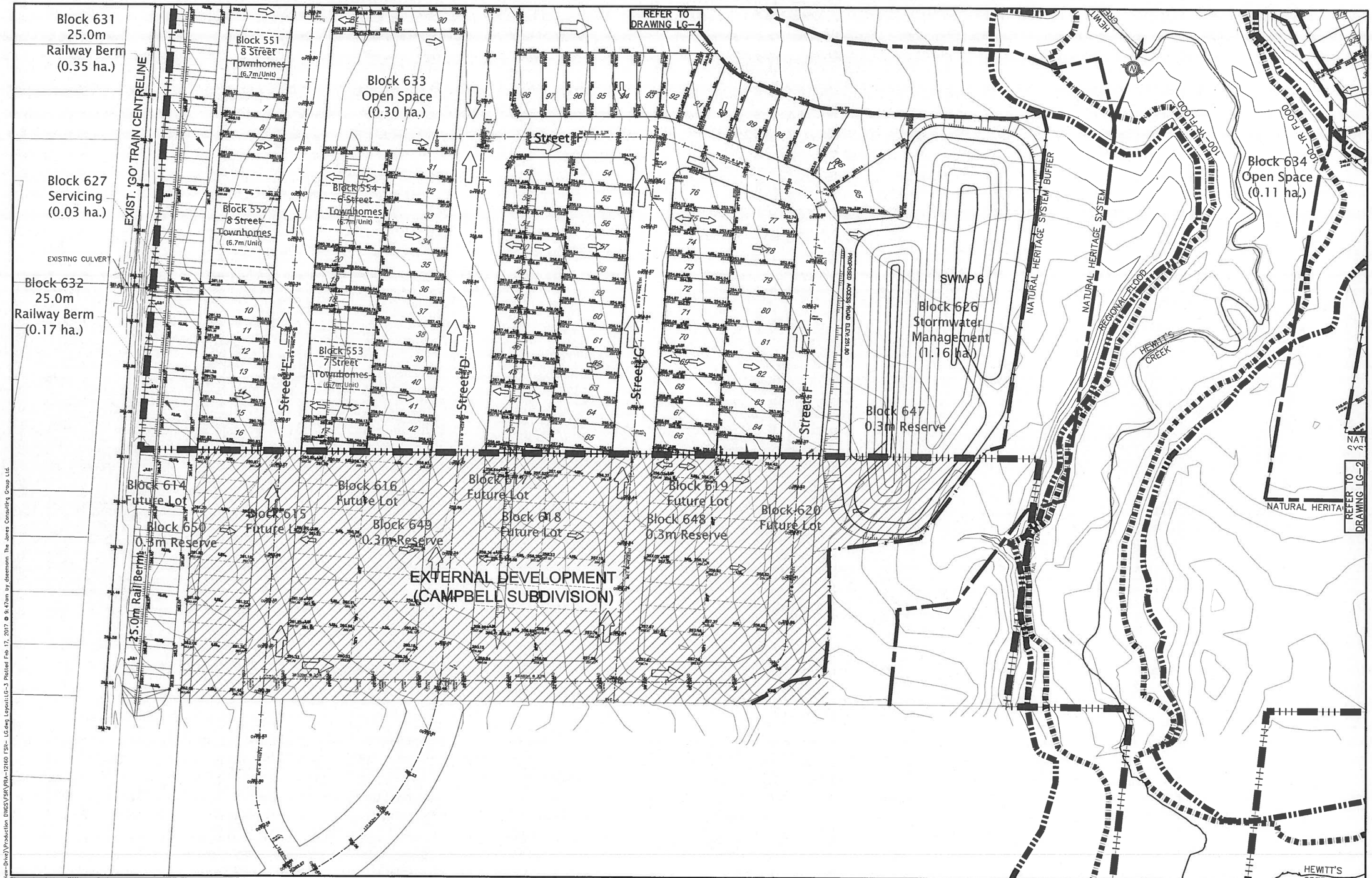

MAPLEVIEW DRIVE EAST – FUTURE
STREET V
STREET K–L
STREET N–O
STREET B
STREET Q
STREET A
PVI STA:0+316.16
PVI ELEV:282.16
K:13.00 | LVC:33.51
HIGH PT STA:0+330.94
HIGH PT ELEV:282.27
PVI STA:0+343.
PVI ELEV:282.3
K:9.00 LVC:14
CW PT-STA:0+336.
LOW PT ELEV:28
PVI STA:0+415.51
PVI ELEV:283.91
K:12.95 L: 76.23
HIGH PT A: 405.84
VI STA:0+017.58
VI ELEV:255.42
K:8.00 | LVC:28.65
LOW PT STA:0+021.23
LOW PT ELEV:256.5
PVI STA:0+052.82
PVI ELEV:255.83
K:11.22 LVC:38.27
HIGH PT STA:0+047.78
HIGH PT ELEV:255.70
PVI STA:0+098.25
PVI ELEV:254.90
K:8.97 LVC:48.28
LOW PT STA:0+102.30
LOW PT ELEV:255.21
VI STA:0+800.83
PVI ELEV:257.06
K:0.00 LVC:23.77
PT STA:0+815.12
LOW PT ELEV:256.95
1.25%
-2.00%
3.33%
-3.00%
6.50%
-1.11%
-0.91%
82.1m–300mmø PVC STM @ -2.67%
80.2m–300mmø STM @ 3.34%
100.0m–300mmø PVC STM @ 1.81%
82.6m–600mmø PVC STM @ 3.63%
13.8m–425mmø CONC STM @ 2.00%
88.2m–1200mmø CONC STM @ 0.50%
PVC SAN @ 2.00%
69.4m–600mmø PVC SAN @ 5.39%
MH (101) STA:0+316.16 RIM 284.97 N 284.57 S 284.39
MH (102) STA:0+330.94 RIM 284.97 N 284.57 S 284.39
MH (103) STA:0+343.11 RIM 284.97 N 284.57 S 284.39
MH (104) STA:0+415.51 RIM 285.76 N 285.36 S 285.16
MH (105) STA:0+415.51 RIM 285.76 N 285.36 S 285.16
MH (106) STA:0+800.83 RIM 285.76 N 285.36 S 285.16
MH (107) STA:0+815.12 RIM 285.76 N 285.36 S 285.16
MH (134) STA:0+343.10 RIM 284.97 N 284.57 S 284.44
MH (135) STA:0+343.10 RIM 284.97 N 284.57 S 284.44
MH (136) STA:0+343.10 RIM 284.97 N 284.57 S 284.44
MH (137) STA:0+343.10 RIM 284.97 N 284.57 S 284.44
MH



G:\Eng_JD\PRA-12160(Mapleview-Drive)\Production DWGS\FSR\PRA-12160 FSR- LG.dwg Layout:LG-3 Plotted Feb 17, 2017 @ 9:47am by dseemon The Jones Consulting Group Ltd.

LEGEND:

- DEVELOPMENT BOUNDARY
- PROP. 3:1 SLOPE
- GENERAL LOT DRAINAGE ROUTE
- OVERLAND DRAINAGE ROUTE

BENCHMARK:

BENCHMARK NO: V010865454 LOCATED ON CONCRETE BRIDGE CARRYING MAPLEVIEW DRIVE E OVER LOVER'S CREEK, 0.65KM EAST OF HURONIA ROAD. TABLET IS SET HORIZONTALLY IN THE NORTH FACE, 5.45M NORTH OF CENTRELINE OF ROAD, 26CM WEST OF THE NORTHEAST END OF BRIDGE, 19CM TOP OF COPING. N491078S.889 E507264.100 ELEV 241.561

BENCHMARK NO: 031200330029 MAPLEVIEW HEIGHTS ELEMENTARY SCHOOL – 180 ESTHER DR. THE VERTICAL MONUMENT IS SET FLUSH IN CONCRETE FLAGPOLE BASE 4.7m SOUTH FROM THE SOUTHEAST CORNER OF THE MAIN ENTRANCE TO SCHOOL AND TABLET IS ON THE SOUTHSIDE OF THE FLAGPOLE BASE. N491161.0 E507799 ELEV 250.508

BENCHMARK NO: 031200800054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONIA ROAD. N491087S.122 E507501.062 ELEV 248.898

BENCHMARK NO: 031201100013 LOCATED ON LOCKHART ROAD ON THE NORTH SIDE OF THE BOULEVARD, APPROXIMATELY 1.020m WEST OF THE YONGE STREET AND HURONIA ROAD INTERSECTION N490098S70.257 E508733.580 ELEV 252.807

NO.	REVISIONS	DATE	INITIAL
1.	FSR SUBMISSION	FEB 2017	MF

LICENSED PROFESSIONAL ENGINEER
D. F. RICHARDSON
100112707
PROVINCE OF ONTARIO
FEB 15 17

HEWITT'S GATE

OVERALL LOT GRADING PLAN
SOUTH-WEST

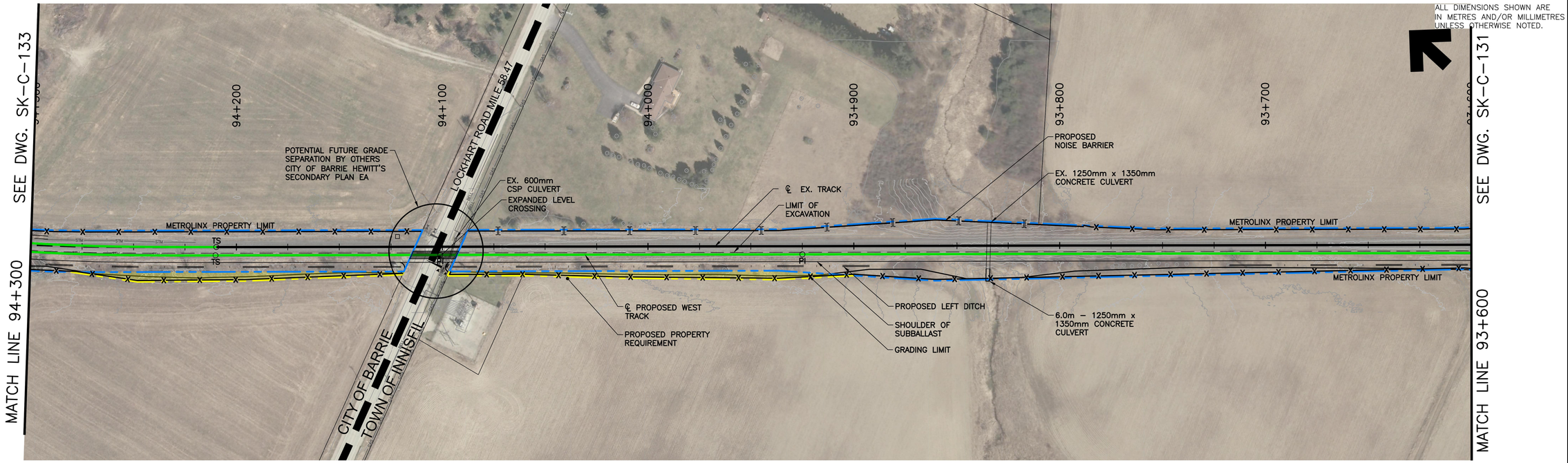
JONES CONSULTING GROUP LTD.
PLANNERS & ENGINEERS
229 Mapleview Dr. E, Unit 1
Barrie, ON L4N 0W8
P. 705.734.2538
F. 705.734.1056

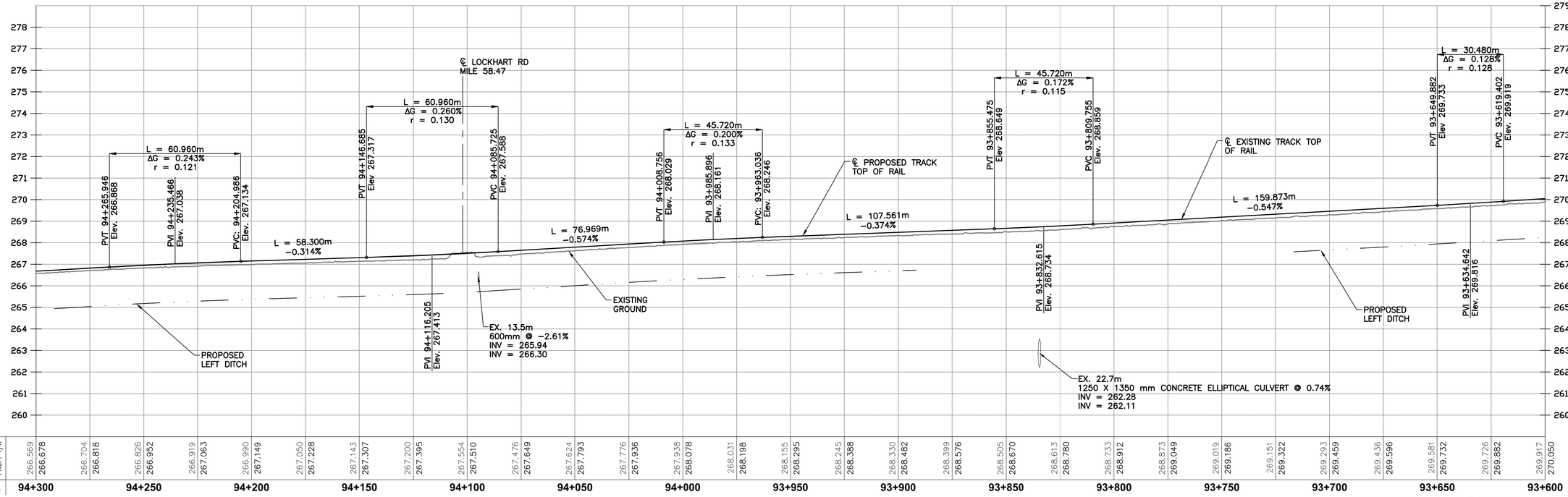
DESIGN	DS	SCALE: 1:750	DATE 27JAN2017
DRAWN	DS	PROJECT PRA-12160	DWG. NO LG3
CHECKED	MF		

D SIZE 22" x 34" (558.8mm x 863.6mm)

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.





METROLINX PROJECT NO. 149704

REFERENCE DRAWINGS		ISSUE			REVISIONS		
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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: K.D. 15/09/03	DESIGNED BY: K.D. 15/09/02
CHECKED BY: M.P. 17/07/25	APPROVED BY: S.D. 17/08/08
SCALE: 1:1000 H	FULL SIZE ONLY 1:100 V

HATCH

METROLINX
An agency of the Government of Ontario

NOT FOR CONSTRUCTION

BARRIE RAIL CORRIDOR EXPANSION
PRELIMINARY DESIGN
DOUBLE TRACK PLAN AND PROFILE
STA 93+600 TO STA 94+300

CONTRACT NO.	DWG. NO.	REV.	SHEET
	SK-C-132	0	

Jul 10, 2017, 3:44pm Login name: dan851125
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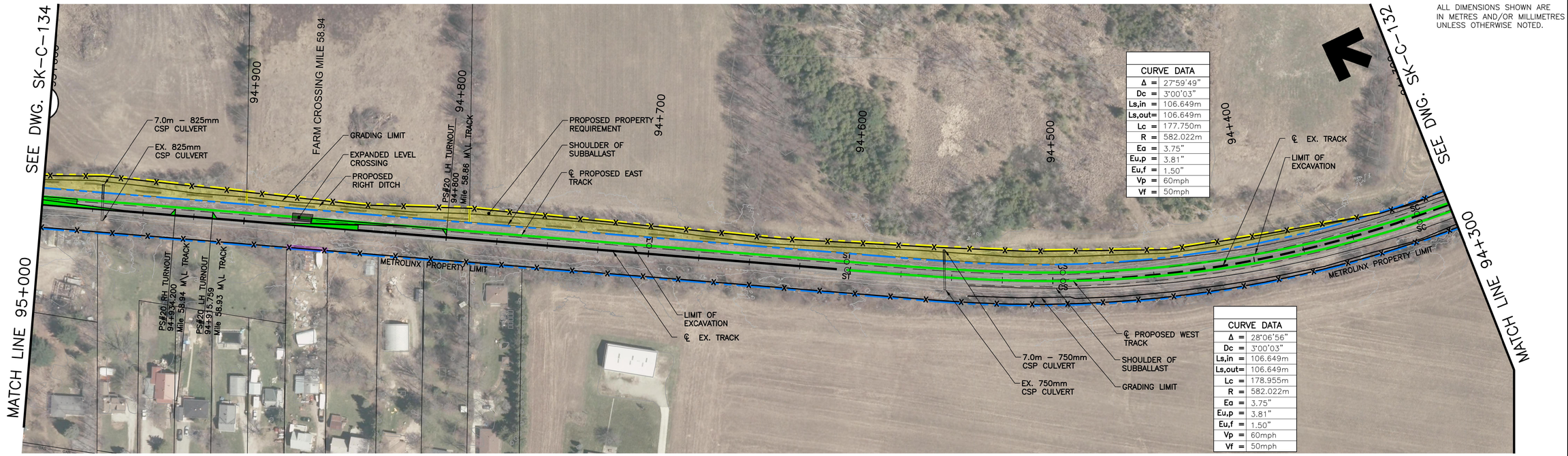
D SIZE 22" x 34" (558.8mm x 863.6mm)

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



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Dc =	3°00'03"
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Ls,out=	106.649m
Lc =	177.750m
R =	582.022m
Eq =	3.75"
Eu,p =	3.81"
Eu,f =	1.50"
Vp =	60mph
Vf =	50mph

CURVE DATA	
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Ls,out=	106.649m
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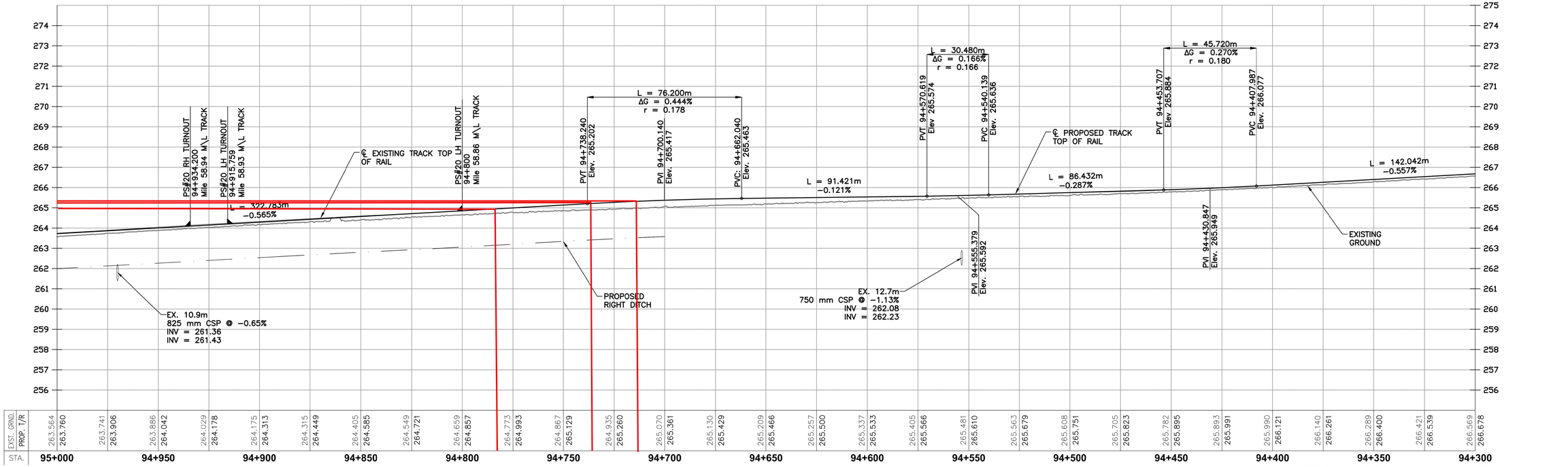
Eu,p =	3.81"
Eu,f =	1.50"
Vp =	60mph
Vf =	50mph



STA.	EXST. GRND.	PROP. T/R
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94+950	263.886	264.042
	264.029	264.178
94+900	264.175	264.313
	264.315	264.449
94+850	264.405	264.585
	264.549	264.721
94+800	264.659	264.857
	264.773	264.993
94+750	264.867	265.129
	264.935	265.260
94+700	265.070	265.361
	265.130	265.429
94+650	265.209	265.466
	265.257	265.500
94+600	265.337	265.533
	265.405	265.566
94+550	265.481	265.610
	265.563	265.679
94+500	265.608	265.751
	265.705	265.823
94+450	265.782	265.895
	265.893	265.991
94+400	265.990	266.121
	266.140	266.261
94+350	266.289	266.400
	266.421	266.539
94+300	266.569	266.678

METROLINX PROJECT NO. 149704

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		0	17/08/08	FINAL EPR			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: K.D. 15/09/03	DESIGNED BY: K.D. 15/09/02
CHECKED BY: M.P. 17/07/25	APPROVED BY: S.D. 17/08/08
SCALE: 1:1000 H	FULL SIZE ONLY 1:100 V

HATCH

METROLINX
An agency of the Government of Ontario

NOT FOR CONSTRUCTION

BARRIE RAIL CORRIDOR EXPANSION
PRELIMINARY DESIGN
DOUBLE TRACK PLAN AND PROFILE
STA 94+300 TO STA 95+000

CONTRACT NO.	DWG. NO.	REV.	SHEET
	SK-C-133	0	

Jul 10, 2017, 3:46pm Login name: dani851125
Drawing Name: C:\Users\dani851125\appdata\local\temp\AcPublish_7376\345492-C-SK112-142.dwg

Table 1: Summary of Grainsize Analyses

Sample ID	Depth of Sample (mbgs)	Soil Classification	Hydraulic Conductivity (cm/s)
BH5-SS8	6.3	Sandy Silt Till, some clay, a trace of gravel	1×10^{-6}
BH8-SS3	1.8	Sandy Silt Till, some clay, a trace of gravel	1×10^{-7}
BH2-SS5	3.3	Fine to Medium Sand, trace to some silt and gravel	1×10^{-3}
BH4-SS6	4.0	Fine to Medium Sand, trace to some silt and gravel	1×10^{-2}
BH9-SS6	4.8	Fine Sand, some silt and trace clay	1×10^{-3}
BH5-SS11	11	Silt, some fine sand, trace clay	1×10^{-4}
BH8-SS9	9.3	Sandy Silt, trace clay	1×10^{-4}

2.5.2 Single Well Response Tests

To assess the in situ hydraulic conductivity of the sediments, single well response tests (bail-down tests) were conducted at monitoring wells BM-1, BM-5d, BM-7 and BM-9. The results from the tests were plotted (Appendix C) and analyzed to calculate hydraulic conductivity of the sediments screened. A summary the calculated hydraulic conductivities is provided below in Table 2.

Table 2: Single Well Response Testing Results

Monitoring Well	Screen Interval (mbgs)*	Formation Screened	Hydraulic Conductivity (cm/sec)
BM-1	1.7 - 5.3	Sandy Silt, Sand and Silt	4.3×10^{-4}
BM-5d	7.1 - 10.6	Sandy Silt Till, Silt	2.3×10^{-4}
BM-7	0.4 - 3.6	Sandy Silt Till and Sand	1.5×10^{-3}
BM-9	2.4 - 5.9	Sandy Silt Till and Sand	1.1×10^{-3}

*metres below ground surface

2.5.3 Hydraulic Conductivity Discussion

Grainsize analyses results indicate that the sediments within the overburden range in composition from fine to medium sand with trace silt and trace gravel to sandy silt till. The greater amount of fines within a deposit impacts the ability of the material to transmit water and generally lowers the overall hydraulic conductivity. Groundwater flow is generally limited by fine grained sediments with lower hydraulic conductivity.

Grainsize analysis completed on a range of sediment types indicate that there are some sediments with lower hydraulic conductivity but the majority of the sediments found on

the subject lands are sand and silty sand. The hydraulic conductivities based on grainsize analyses for the majority of the sediments is estimated in the range of 10^{-2} to 10^{-7} cm/sec.

The single well response test analyses resulted in moderate hydraulic conductivities ranging from 10^{-3} to 10^{-4} cm/sec. The wells tested were all screened across Sandy Silt Till and sand in the surficial sand layer which forms the local surficial aquifer.

Overall, the hydraulic conductivity of the overburden sediments on the subject lands consisting of sand and silty sand till is interpreted to be 10^{-3} cm/sec to 10^{-4} cm/sec.

3.0 Hydrogeology

3.1 Local Groundwater Use

The City of Barrie obtains its water from a combination of groundwater and surface water based supplies. Municipal servicing is assumed to be available for lands within the municipal boundary which includes lands north of Mapleview Drive (Figure 2) and outside of the SPA. Areas outside of municipal servicing and within the SPA are assumed to have individual private water supply wells. A review of the MECP water well records indicated that there are approximately 23 water supply well records within 500 m of the subject lands. Based on the well records and interpreted hydrostratigraphy, most of these wells are completed in the surficial (local) aquifer with depths ranging from 6 m to 50 m. The locations of the MECP water well records are shown on Figure 5.

The City of Barrie groundwater supply wells are located in deep aquifers (A3 and A4 in the regional hydrostratigraphy). There are no municipal water supply wells located close to the subject lands; the municipal water supply wells are located on the west and northern sides of the City. The subject lands do not fall within any wellhead protection areas or intake protection zones associated with the City of Barrie water supply systems (LSRCA, 2012).

3.2 Water Level Monitoring Results

Groundwater levels were monitored at the on-site monitoring wells on a monthly basis between August 2017 and August 2018 and bimonthly to December 2018. Groundwater level data is provided in tables and hydrographs in Appendix D. Groundwater elevations are plotted with daily precipitation data obtained from a nearby climate station – Barrie-Oro (Climate Station ID# 6117700) – which is the closest station with daily precipitation values for 2017. In addition to the manual water level measurements recorded at each location, automatic water level recorders were installed in BM-5s, BM-5d and BM-9 to record continuous water levels. The datalogger data collected are included on the hydrographs provided in Appendix D.

The groundwater monitoring data show the following (refer to Figure 2 for the monitoring locations and the data tables and hydrographs in Appendix D):

- Typically, in shallow wells in southern Ontario, a seasonal groundwater level fluctuation pattern is apparent with highest levels occurring in the spring, declining throughout the summer and early fall and then rising again in the late fall/early winter. This seasonal pattern is observed at the wells on the subject lands with season variations ranging from 0.8 m to 1.2 m (Figures D-1 to D-6, Appendix D).

- Continuous water level data are plotted against precipitation to determine if there is a correlation between changes in water level and the occurrence of precipitation events (Figures D-2 and D-5). At BM-9, water levels increase 0.8 m in response to a large rain and melt event in February 2018. Responses to precipitation events are also observed at BM-5s/d with a typical response to a greater than 20 mm rain event of around 0.4 m.
- The groundwater table is interpreted to generally reflect the topography of the area. From August 2017 to December 2018, groundwater elevations in the monitoring wells ranged from 254.20 masl to 263.89 masl. Groundwater was shallowest at BM-7 and BM-8s with levels less than 0.5 m below ground surface (Figures D-3 and D-4, Appendix D) and deepest at BM-1 with levels around 3 to 4 m below ground surface (Figure D-1).

3.3 Interpreted Groundwater Flow Pattern

Groundwater flow within the shallow overburden (water table) is interpreted to be influenced by the surface topography with groundwater flow from the topographically higher areas towards topographically lower areas and surface water features. Groundwater elevation data (April 2018) obtained from the monitoring wells are shown on Figure 8, along with the interpreted groundwater elevation contours for the subject lands. Arrows perpendicular to the groundwater elevation contours shown on Figure 8 illustrate the interpreted direction of the groundwater movement. Groundwater flow is interpreted to be in an east, northeast direction towards St. Paul's Swamp and Hewitt's Creek with an interpreted convergence towards these watercourses.

3.4 Recharge and Discharge Conditions

Areas where water from precipitation infiltrates into the ground and moves downward (i.e., areas of downward hydraulic gradients) are known as recharge areas. These areas are generally in areas of relatively higher topographic elevation. Areas where groundwater moves upward (i.e., areas of upward hydraulic gradients) to be discharged at surface are known as discharge areas and these generally occur in areas of relatively lower topographic elevation, such as along watercourses.

Table 4: Summary of Pre-Development Infiltration Values

Wetland Catchment	Approximate Land Area (ha)	Average Annual Infiltration (m^3/year)
3	6.3	5,400
4	18.5	22,900
6	1.6	3,100
TOTALS	**26.4**	**31,400**

5.5 Potential Urban Development Impacts to Water Balance

Development of an area affects the natural water balance. The most significant difference between pre and post development conditions is the addition of impervious surfaces as a type of surface cover (i.e., roads, parking lots, driveways, and rooftops). Impervious surfaces prevent infiltration of water into the soils and the removal of the vegetation removes the evapotranspiration component of the natural water balance resulting in evaporation as the only remaining loss mechanism (beside runoff). The evaporation component from impervious surfaces is relatively minor (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component that occurs with vegetation in this area (about 64% of precipitation in the subject lands). So the net effect of the construction of impervious surfaces is that most of the precipitation that falls onto impervious surfaces becomes surplus water and direct runoff. The natural infiltration components (interflow and deep recharge) are reduced.

A water balance calculation of the potential water surplus for impervious areas is shown at the bottom of Table F-1 in Appendix F. The evaporation component for the impervious surfaces has been estimated at 15% of precipitation for the purposes of this study. The remaining 85% of the precipitation that falls on impervious surfaces is assumed to become runoff. Therefore, assuming an evaporation/loss from impervious surfaces of 15% of the precipitation, there is a potential water surplus from impervious areas of 793 mm/year.

It is noted that the proposed development will be serviced by municipal water supply and waste water services. Therefore, there will be no impact on the water balance and local groundwater or surface water quantity and quality conditions related to any on-site groundwater supply pumping or disposal of septic effluent.

5.6 Post-Development Water Balance with No Mitigation

To assess potential development impacts on infiltration, the post-development infiltration volumes have been calculated for each of the wetland catchment areas on the subject lands on Tables F-3, F-4 and F-5 in Appendix F. These calculations assume no low impact development (LID) measures for stormwater management are in place. The total

areas for the proposed land uses and the associated percentage impervious factors were provided by SCS Consulting Group.

The infiltration and runoff components for the post-development land uses have been calculated using the MECP SWM Planning and Design Manual (2003) methodology based on topography, soil type and land cover as shown on Tables F-1 and F-2 in Appendix F.

From these tables, the total calculated post-development infiltration volume (without LID measures) for each wetland catchment area is provided in Table 5 below.

Table 5: Summary of Post-Development Infiltration Values (without LID measures)

Wetland Catchment	Post-Development Infiltration (m^3/year)	Post-Development Infiltration Deficit (m^3/year)	Percentage Change
3	2,000	3,500	-64%
4	9,750	13,100	-57%
6	900	2,200	-71%
TOTAL	**12,650**	**18,800**	-64%

5.7 Recommended Mitigation Strategies for Infiltration

The water balance calculations suggest that, without mitigation, the subject lands will receive about 36% of the current amount of average annual groundwater infiltration after development. The overall deficit in groundwater infiltration has been estimated to be 18,800 m^3/year (see Table 5 and Tables F-3, F-4 and F-5 in Appendix F). It is recommended to minimize the potential development impacts to infiltration through the use of 'low impact development' (LID) measures for stormwater management to ensure the post-development groundwater infiltration volume is maintained as close to the pre-development infiltration volume as possible.

In order to maintain existing groundwater inputs to each of the wetland catchments, the target infiltration through the use of LIDs for each catchment is provided above in Table 5. There, as outlined in the MECP SWM Design Manual (2003), a number of mitigation techniques that can be used to increase the potential for post-development infiltration and mitigate the reductions in infiltration that may occur with land development. Techniques to maximize the water availability in pervious areas such as designing grades to direct roof runoff towards lawns, side and rear yard swales, boulevards, parks, and other open space areas throughout the development where possible and increasing the topsoil thickness (i.e., from typical thicknesses of about 15 cm up to 20 cm or 30 cm) can increase the potential for infiltration in developed areas. These types of surface LID techniques promote natural infiltration by providing additional water volumes in the pervious areas. This may be particularly effective in the summer months, when natural infiltration would not generally occur because the

additional water overcomes the natural soil moisture deficit. Other LID measures that may be considered to reduce runoff volumes include bioswales, rain gardens, perforated pipe systems, infiltration trenches and facilities, permeable pavements, tree boxes, and rainwater harvesting techniques, such as cisterns and rain barrels.

6.0 Development Considerations

6.1 Construction Below the Water Table

Based on groundwater level data collected as part of this study water table on the subject lands ranges from 0 m to 4 m below ground surface. Should excavations during construction of servicing extend below the water table the local soils may need to be dewatered. Significant groundwater flows may be encountered in areas where high permeability sand and gravel layers are encountered. The construction of buried services below the water table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavations. Groundwater may also infiltrate into joints in storm sewers and manholes. Over the long-term, these impacts can lower the groundwater table across the development area. To mitigate this effect, services to be installed below the water table should be constructed to prevent redirection of groundwater flow. This will involve the use of anti-seepage collars or clay plugs surrounding the pipes to provide barriers to flow and prevent groundwater flow along granular bedding material and erosion of the backfill materials.

Due to shallow water table conditions on some areas of the subject lands there is the potential for encountering the water table during construction. The dewatering of local aquifers may be required in order for services to be installed below the water table. The undertaking of dewatering according to industry standards and in accordance with a MECP processes will ensure that adequate attention is paid to potential adverse impacts to the environment. Currently the MECP allows for construction dewatering of less than 400,000 L/d to proceed under the Environmental Activity Sector Registry (EASR) process. If dewatering is to be above this threshold, then the standard Permit to Take Water (PTTW) process applies. In both cases, a scientific study is required in support of EASR registration or PTTW application. This scientific study must review the potential for environmental impacts and provide mitigation and monitoring measures to the satisfaction of the MECP or other review agency. The requirements for construction dewatering should be confirmed by geotechnical/hydrogeological investigations completed in support of detailed design.

6.2 Local Groundwater Supply Wells

The area surrounding the subject lands is not currently serviced and residences are supplied by private wells. A water well survey study was completed on behalf of the Hewitt's SPA Landowner's Group for residences within 300 m of the Hewitt's SPA lands

5 FUTURE BACKGROUND CONDITIONS

5.1 Study Area Transportation Network Improvements

The major roadway improvement projects assumed completed for the 2023 and 2031 horizon year traffic analyses were derived from the Updated Master Transportation Study for the HSPA, review of the Transportation Master Plans (TMP) of the City of Barrie, Town of Innisfil, and County of Simcoe as well as a review of the City of Barrie's Multi-Modal Active TMP (MMATMP), and discussions with City staff. The capital budget of the City of Barrie was also reviewed to confirm the estimated timing of the planned road improvements.

5.2 Proposed Pedestrian Routes

The planned Pedestrian Network Plan (from the Updated Master Transportation Study) aims to ensure direct connections to all destinations within the study area, which are comfortable, safe and accessible. This plan considers the location of primary destinations and nodes of activity, efficient connections to these areas, and continuity in pedestrian routes, comfort, enjoyment, safety, and creating route options for pedestrians. Effort is made to ensure routes will link various neighbourhoods and an array of destinations including parks, greenways, schools, and commercial land uses.

Sidewalks are proposed on both sides of almost all roadways in the study area. According to City policy, sidewalks shall generally be provided on both sides of all streets with the exception of local streets in industrial areas, residential streets with less than ten dwelling units or cul-de-sacs; window streets, or a street flanking the Natural Heritage System or a public park. In these cases, sidewalks shall only be required on one side of the street. Further guidelines outlining the specifications and classifications of the sidewalk network are outlined in the City's Multi-Modal Active TMP. The proposed future sidewalk network plan of the HSPA is provided in **Appendix E.**

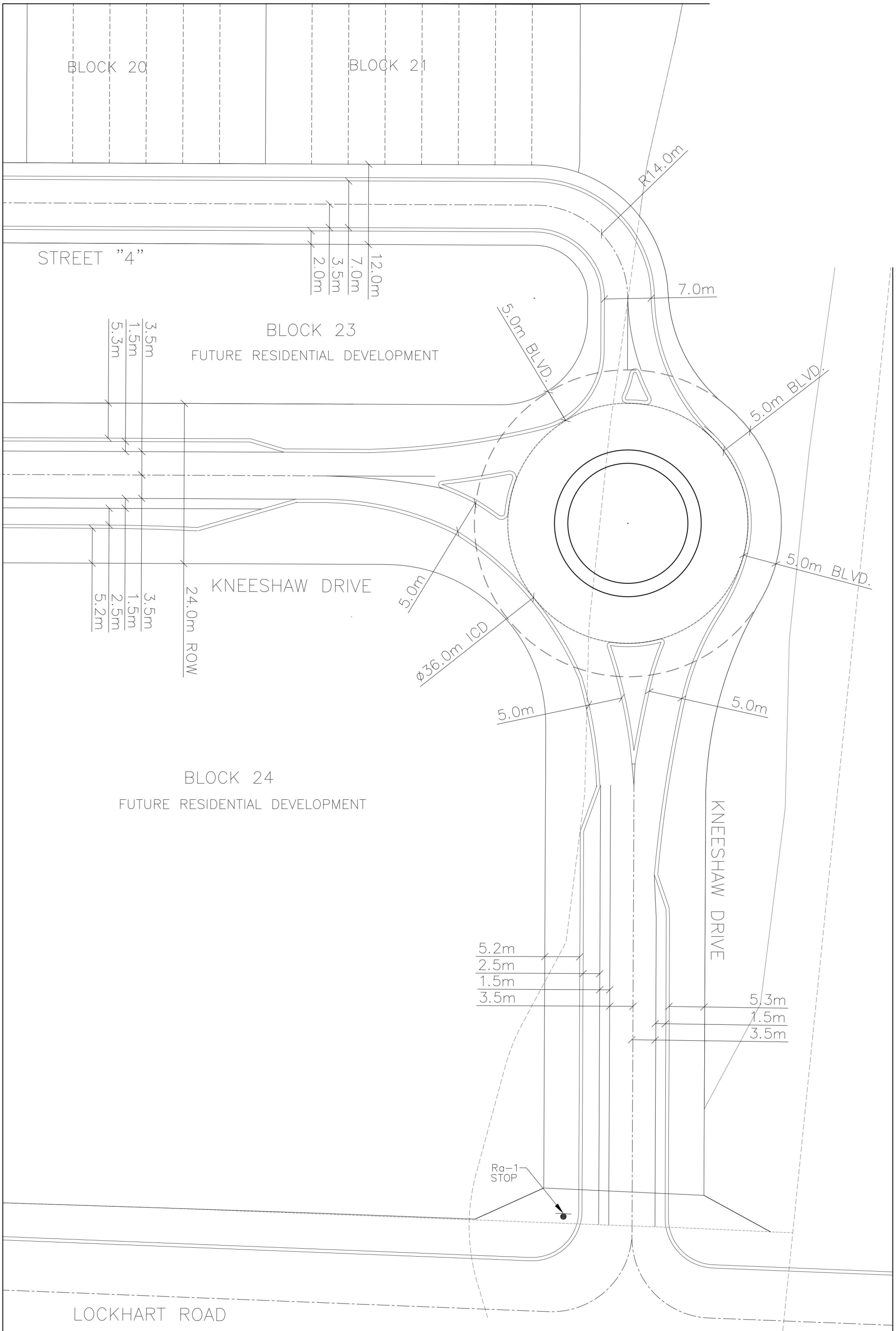
5.3 Proposed Cycling Routes

The Updated Master Transportation Study proposes planned bicycle facilities to ensure uninterrupted and continued connections via arterial and collector roads. Further attention has been given to ensuring cycling routes link major destinations, with particular attention paid to schools.

Along arterial roads, there are buffered bike lanes which will provide further separation between vehicles and cyclists. These bicycle lanes along arterial roads continue west and north of the subject lands, allowing for further connectivity to other areas in the City, including downtown Barrie, and the Salem Lands.

Bike lanes are proposed along Kneeshaw Drive through the Ballymore Draft Plan which will allow for local trips to commercial developments, schools, parks and recreational area accessible by bike. The subject lands are located in close proximity to the Barrie South GO station (located off of Yonge Street), which can be accessed by bike along the bike lanes provided on Yonge, which will promote multi-modal transportation use for trips in and out of the study area.

Guidelines detailing the specifications of the cycling network, including bicycle lanes and buffers, are outlined in the City of Barrie Multi-Modal Active Transportation Master Plan. The proposed Cycling Network Plan is attached in **Appendix F.**



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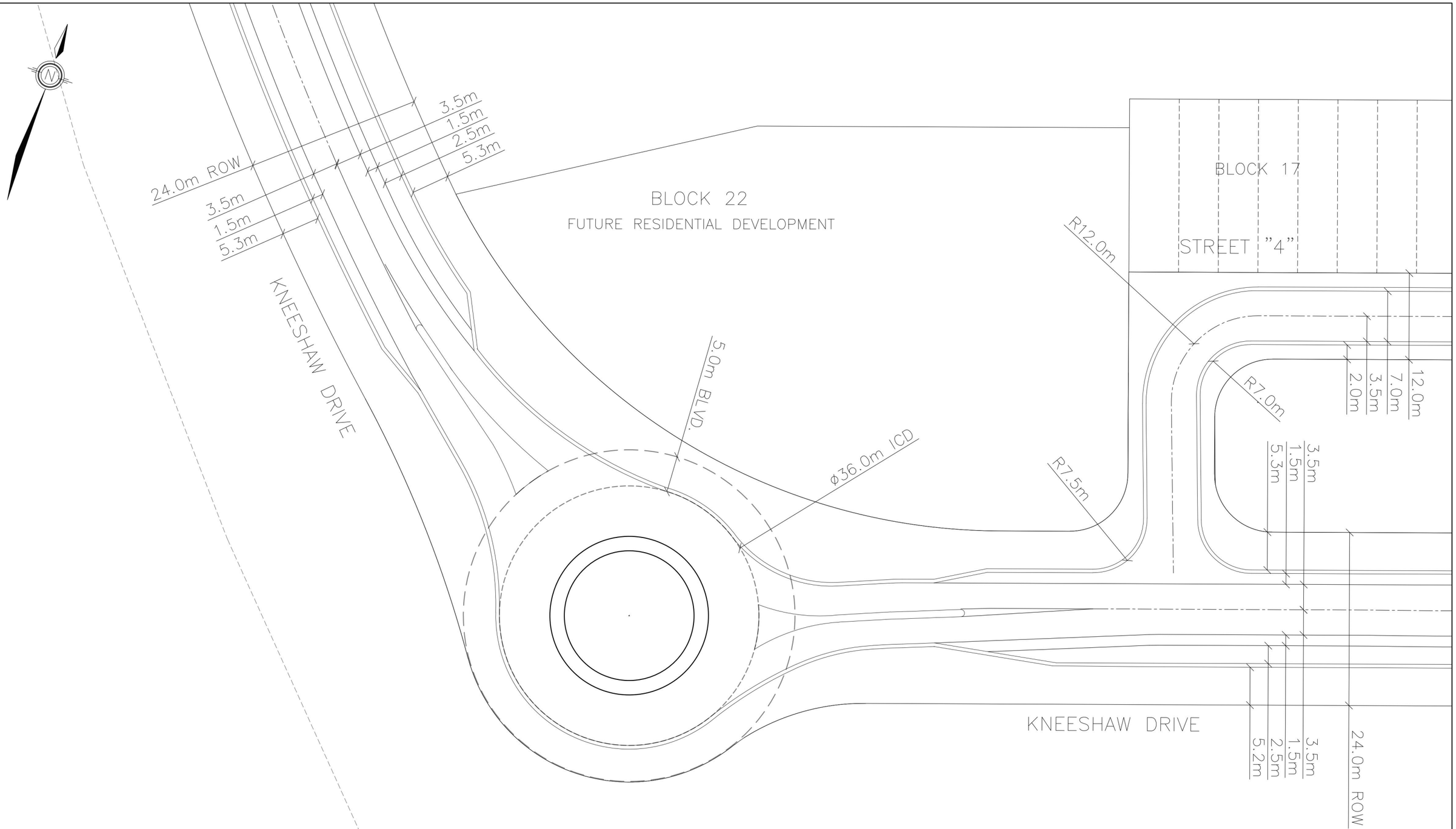
EAST ROUNDABOUT CONCEPTUAL DESIGN

SCALE: 1 : 2000		PROJECT No. 17163
DATE: FEBRUARY 2019		
DESIGNED BY: L.M.	DRAWN BY: L.M.	FIGURE No. 2
CHECKED BY: M.D.	CHECKED BY: M.D.	



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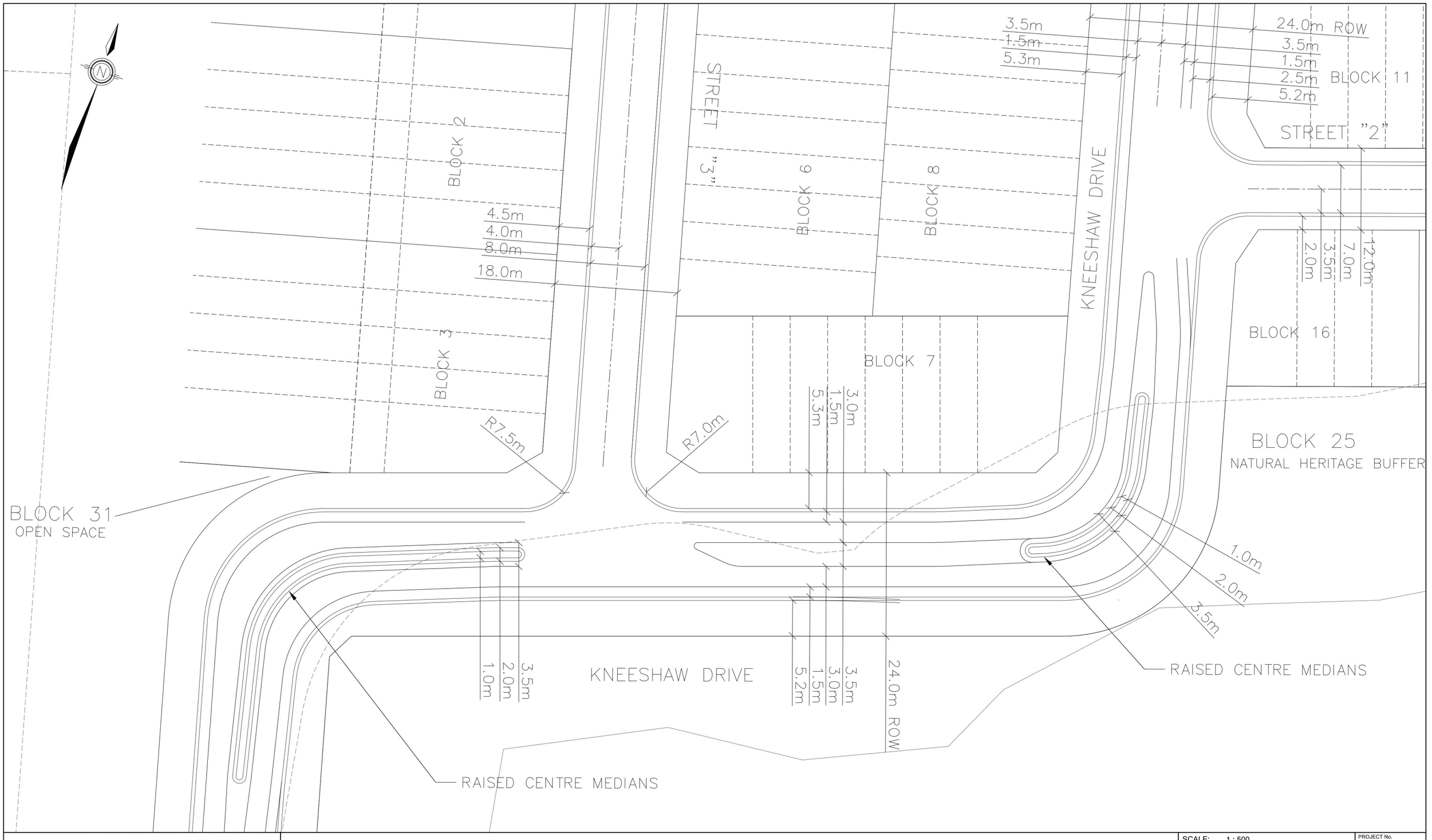
WEST ROUNDABOUT CONCEPTUAL DESIGN

SCALE: 1 : 500		PROJECT No.	17163
DATE: FEBRUARY 2019			
DESIGNED BY: L.M.	DRAWN BY: L.M.	FIGURE No.	3
CHECKED BY: M.D.	CHECKED BY: M.D.		



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RAISED CENTRE MEDIAN CONCEPTUAL DESIGN

SCALE: 1 : 500		PROJECT No.	17163
DATE: FEBRUARY 2019			
DESIGNED BY: L.M.	DRAWN BY: L.M.	FIGURE No.	4
CHECKED BY: M.D.	CHECKED BY: M.D.		

5.1 INDOOR REQUIREMENTS

5.1.1 Architectural Elements

The indoor noise level guidelines can be achieved by using appropriate construction for exterior walls, windows and doors. In determining the worst-case architectural requirements for the residential units, wall and window areas were assumed to be 80% and 30%, respectively, of the floor area, on each facade of a corner room with facades exposed directly or at an angle to the road traffic noise source.

Based on the predicted sound levels, the required architectural elements are as follows:

- Blocks 1 to 3 require brick veneer or masonry equivalent exterior walls and STC 29 windows;
- Blocks 7 and 19 require STC 37 exterior walls and STC 29 windows; and,
- Blocks 17 and 18 require STC 54 (e.g. brick veneer) exterior walls and STC 29 windows;

At all other townhouse blocks, exterior wall and window construction meeting the minimum non-acoustical requirements of the OBC are predicted to be sufficient to achieve the indoor noise criteria.

For walls, a typical exterior facade construction which meets the minimum non-acoustical requirements of the OBC would be expected to achieve the requirement of STC 37. For windows, double-glazing configurations meeting the minimum non-acoustical requirements of the OBC would be expected to achieve an STC rating of 29. Note, the window frames themselves must also be designed to ensure that the overall sound isolation performance for the entire window unit meets the sound isolation requirement. This should be confirmed by the window manufacturer through the submission of acoustical test data.

The final sound isolation requirements should be reviewed when architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance. This is typically required by the City at the time of building permit application.

5.1.2 Ventilation Requirements

Based on the predicted sound levels, residential townhouses in Blocks 1 to 5, 7, 17 and 18 require the provision for adding air conditioning at a later date. This typically takes the form of a ducted, forced air heating system, suitably sized to accommodate central air conditioning.

5.2 OUTDOOR REQUIREMENTS

The unmitigated daytime sound levels in the OLAs of Blocks 1 to 3 are predicted to exceed the 55 dBA design objective. Thus, sound barriers have been investigated.

As previously discussed, there will be a berm along the west property line of the site, between Blocks 1 to 3 and the rail line. The south end of the berm will terminate at Kneeshaw Drive, in line with the south property line of Block 3. It is understood that the berm will continue beyond the north property line of the site as part of the adjacent future development.

To mitigate the daytime OLA sound levels at Block 3 to the 55 dBA design objective, portions of the sound barrier would need to be more than 4.0 m above grade. This is not considered feasible. However, a 1.8 m high acoustic fence along the top of the berm with a 2.3 m to 3.0 m high return to the southerly unit of Block 3 will mitigate the daytime OLA sound levels at Block 3 to 58 dBA. This is within the 5 dB leeway permitted under the MECP guidelines when it is not feasible to meet 55 dBA. The portion of the return that runs down the slope of berm should be 3.0 m high (minimum top of fence elevation of 265.68 m) relative to the grade of the rear yard, and the portion of the return that runs along the south property line of Block 3 should be 2.3 m high (minimum top of fence elevation 264.98 m) relative to the rear yard of Block 3. The locations and orientation of the sound barriers are shown on Figure 2B.

The berm and acoustic fence combination described above will mitigate the daytime OLA sound levels at Blocks 1 and 2 to 55 dBA or less. Note, the assessment assumed the acoustic fence on top of the berm would continue north of the property line into the adjacent development. However, even if the acoustic fence atop the berm were to terminate at the north property line, the predicted sound levels at Blocks 1 and 2 would still be 55 dBA or less.

The unmitigated daytime OLA sound levels at all other dwellings are 55 dBA or lower. Thus, sound barriers are not required for noise control purposes at these locations.

5.2.1 Notes on Sound Barriers

The sound barrier requirements were based on the preliminary grading information provided by SCS Consulting Ltd. (see Appendix A). The locations of the rear building façades were based on the rear-yard setback line shown on the Draft Plan. The sound barrier requirements will need to be confirmed if the grading plan is revised or the rear-yard setbacks are changed.

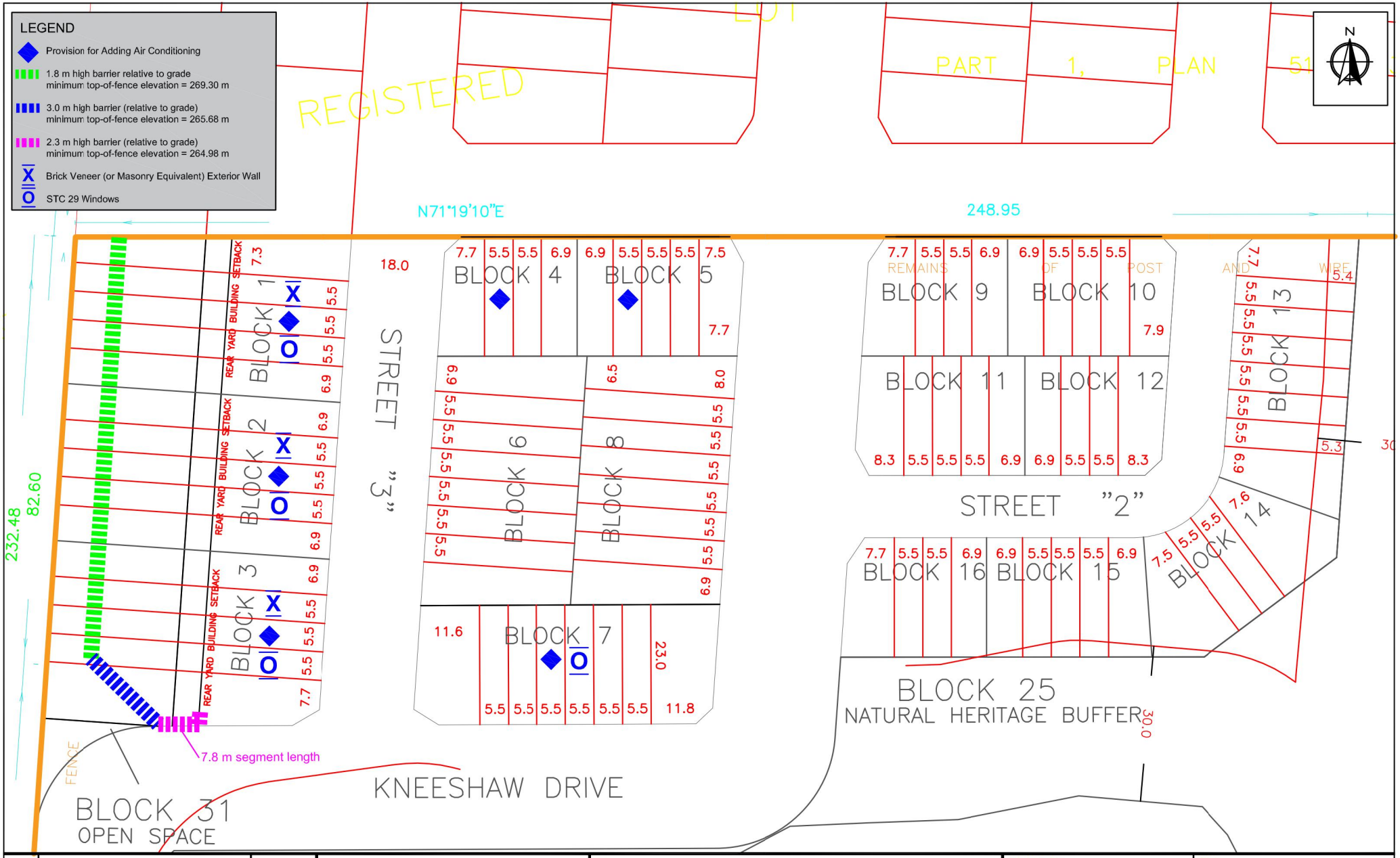
The sound barriers must be of solid construction with no gaps, cracks or holes (except for small localized openings required for water drainage) and must have a minimum surface weight of 20 kg/m². A variety of materials are available, including concrete, masonry, glass, wood, specialty composite materials, or a combination of the above.

5.3 WARNING CLAUSES

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation. Locations requiring warning clauses and the appropriate wording are given in Table 3 and in the notes to Table 3, respectively.

5.4 FUTURE RESIDENTIAL DEVELOPMENT BLOCKS

Detailed concept plans for Blocks 22 to 24 in the southern portion of the development are currently under development and specific mitigation measures have therefore not been established. Based on the road traffic volumes and compositions used in this assessment, general noise control requirements that could be expected are:



No.	Revision/Issue	Date

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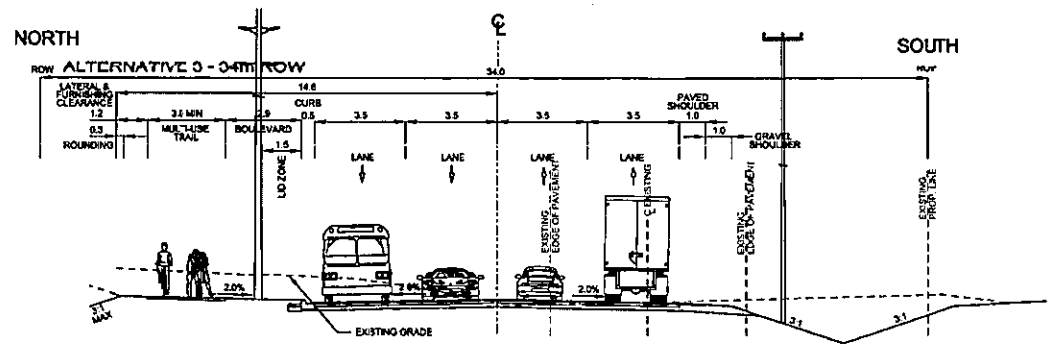
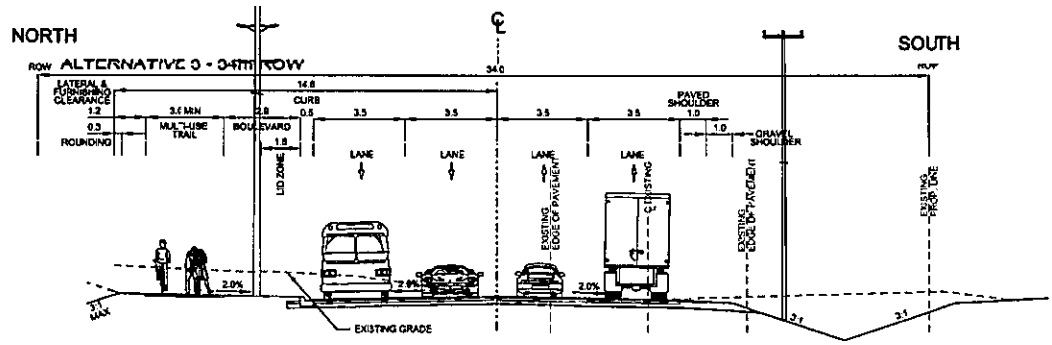
Title	Project No.	Date
Minimum Noise Control Requirements - Northern Lands	118-0671	2019-02-25
Project Name	**Scale**	**Figure**
750 Lockhart Road, Barrie	N.T.S.	2B

Lockhart Road – 600m East of Huronia Road to Yonge Street



TYPICAL CROSS SECTION
4 LANES WITH MULTI USE PATH SOUTH DITCH
DRAFT - NOT FOR CONSTRUCTION

Lockhart Road – Yonge St to East of Barrie Rail Corridor – Mitigated Preferred Alternative



TYPICAL CROSS SECTION
4 LANES WITH MULTI USE PATH SOUTH DITCH
DRAFT - NOT FOR CONSTRUCTION

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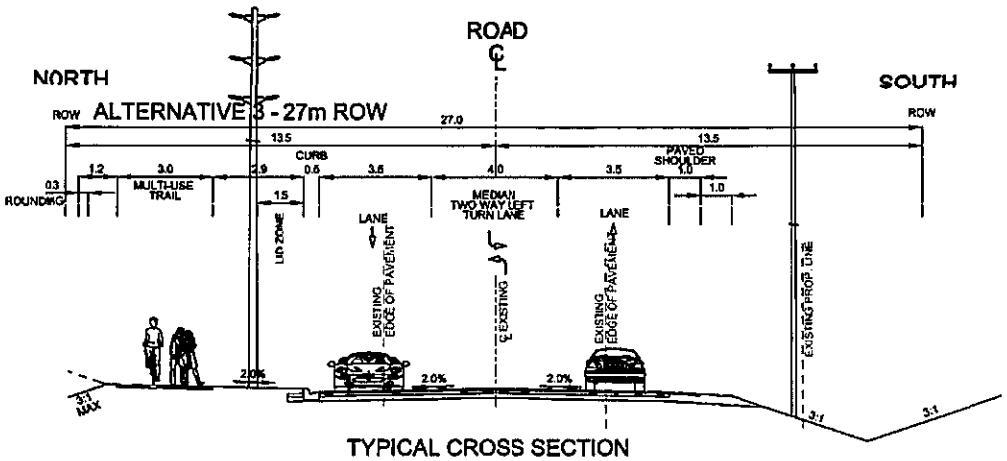
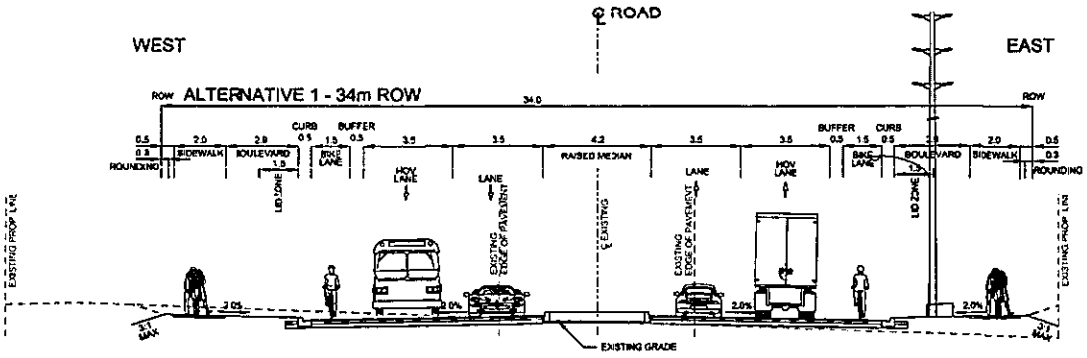
Lockhart Road – East of Barrie Rail Corridor to Phase 1 Boundary – Mitigated Preferred Alternative



TYPICAL CROSS SECTION
3 LANES WITH 3.0m MULTI USE PATH TWO WAY LEFT TURN LANE MEDIAN
DRAFT - NOT FOR CONSTRUCTION

8.2.3 *Yonge Street*

Mapleview Drive East to Lockhart Road



TYPICAL CROSS SECTION
5 LANES WITH BUFFERED BIKE LANES RAISED MEDIAN
DRAFT - NOT FOR CONSTRUCTION

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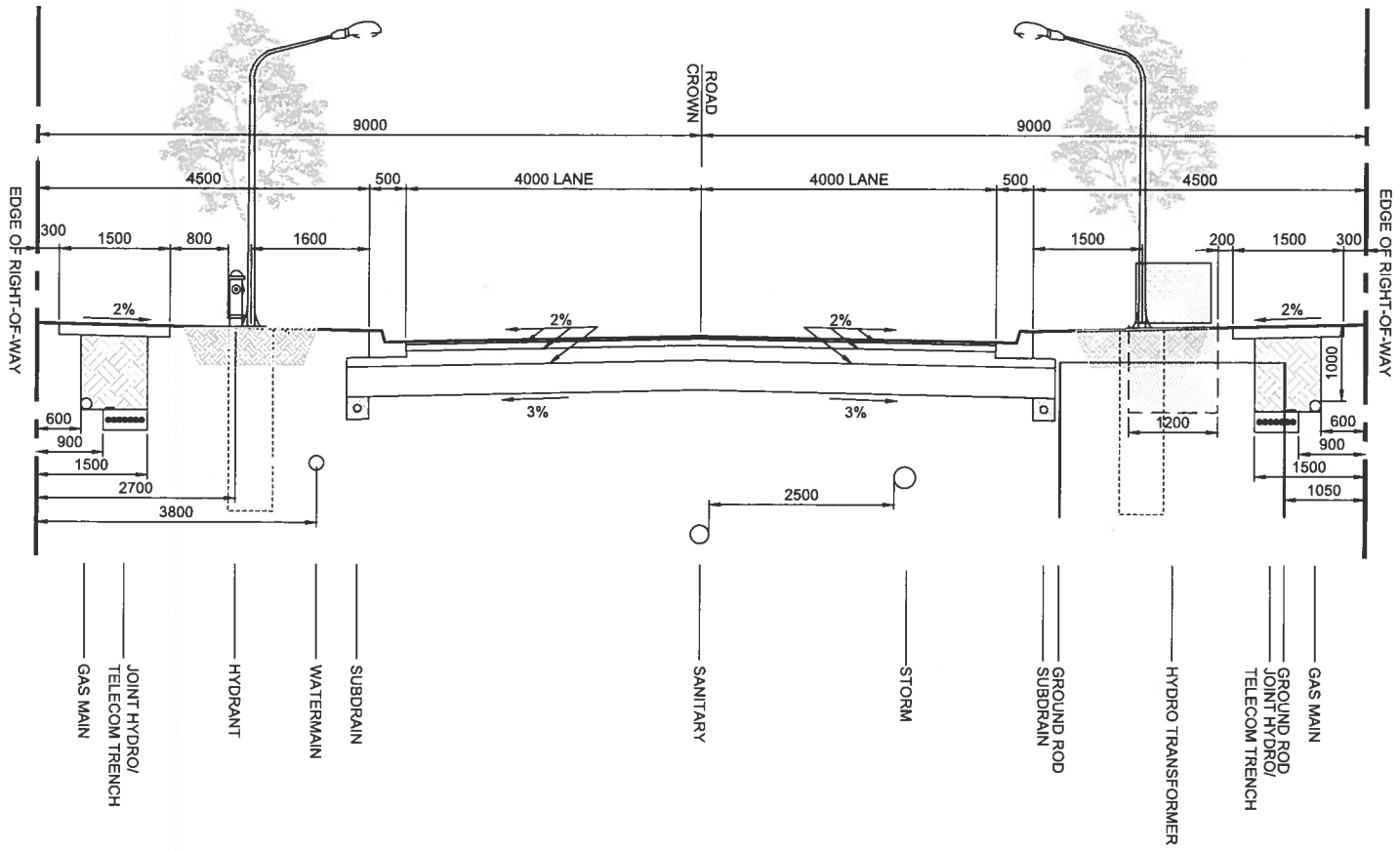


NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. WASTEWATER SYSTEMS, STORMWATER SYSTEMS, INCLUDING LOW IMPACT DEVELOPMENT FACILITIES, AND WATER DISTRIBUTION AND TRANSMISSION SYSTEMS TO BE DESIGNED IN ACCORDANCE WITH CITY OF BARRIE ENGINEERING GUIDELINES AND STANDARDS.
3. REFER TO THE CITY OF BARRIE ROADWAY ILLUMINATION POLICIES AND DESIGN GUIDELINES AND ASSOCIATED BSD'S FOR LIGHT STANDARD AND POLE BASE LOCATION AND DEPTH.
4. REFER TO TRANSPORTATION DESIGN MANUAL FOR PAVEMENT DESIGN METHODOLOGY.
5. TREES TO BE PLACED IN LOCATIONS APPROVED BY THE PARKS, PLANNING, AND DEVELOPMENT BRANCH. (SEE BSD-1315)

Barrie

STANDARD DETAIL

18.0 m LOCAL ROAD ALLOWANCE - RESIDENTIAL 8.0 m ASPHALT

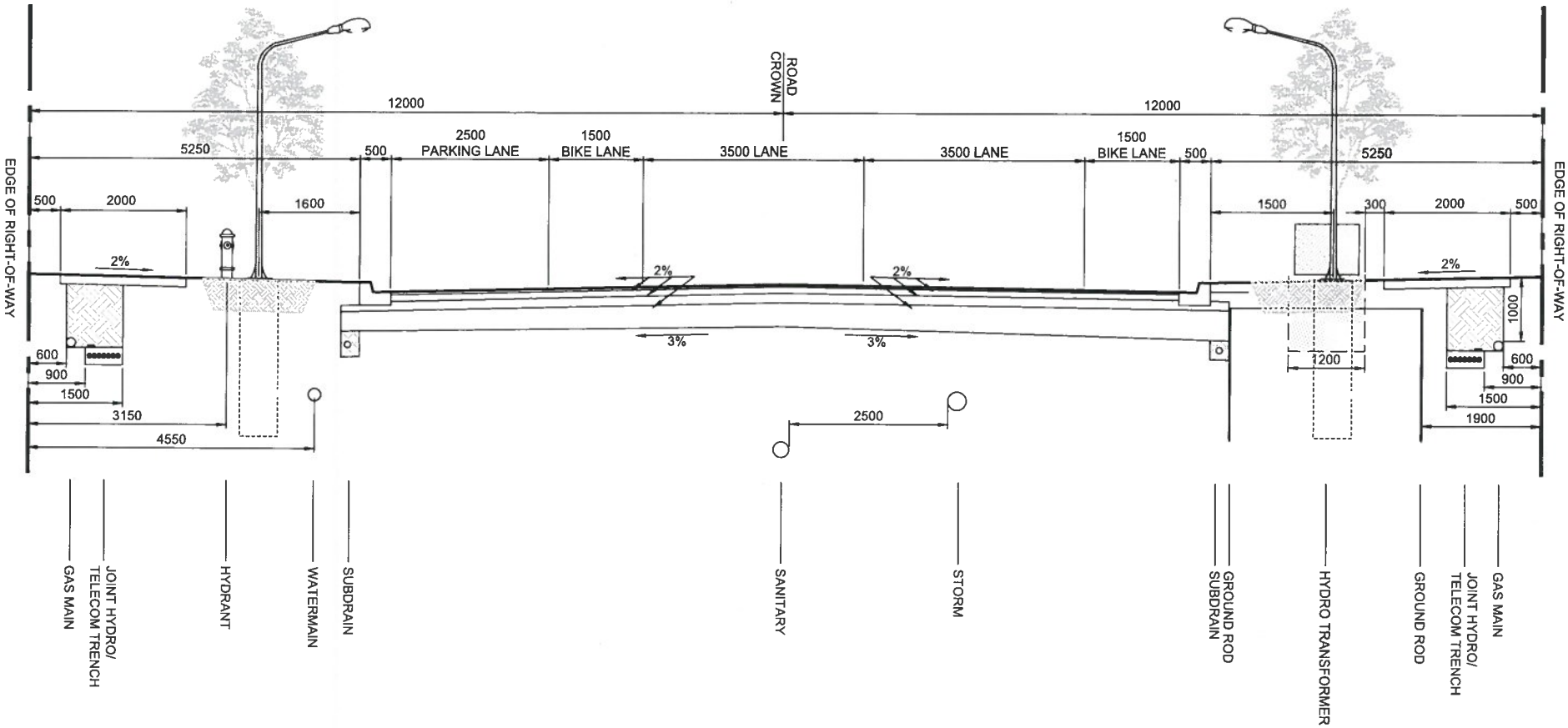
REV No.	DATE: OCT 2017
1	SCALE: N.T.S.

BSD-301

APPROVED

DATE Oct 28/17

DIRECTOR OF ENGINEERING



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. WASTEWATER SYSTEMS, STORMWATER SYSTEMS, INCLUDING LOW IMPACT DEVELOPMENT FACILITIES, AND WATER DISTRIBUTION AND TRANSMISSION SYSTEMS TO BE DESIGNED IN ACCORDANCE WITH CITY OF BARRIE ENGINEERING GUIDELINES AND STANDARDS.
4. REFER TO THE CITY OF BARRIE ROADWAY ILLUMINATION POLICIES AND DESIGN GUIDELINES AND ASSOCIATED BSD'S FOR LIGHT STANDARD AND POLE BASE LOCATION AND DEPTH.
5. REFER TO TRANSPORTATION DESIGN MANUAL FOR PAVEMENT DESIGN METHODOLOGY.
6. TREES TO BE PLACED IN LOCATIONS APPROVED BY THE PARKS, PLANNING, AND DEVELOPMENT BRANCH. (SEE BSD-1315)
7. WIDENINGS MAY BE REQUIRED AT INTERSECTIONS TO ACCOMMODATE REQUIRED TURN-LANES

Barrie

STANDARD DETAIL

24.0 m MINOR COLLECTOR RESIDENTIAL ROAD ALLOWANCE 12.5 m ASPHALT

REV No.	DATE: OCT 2017
1	SCALE: N.T.S.

BSD-303

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DATE Oct. 28/17

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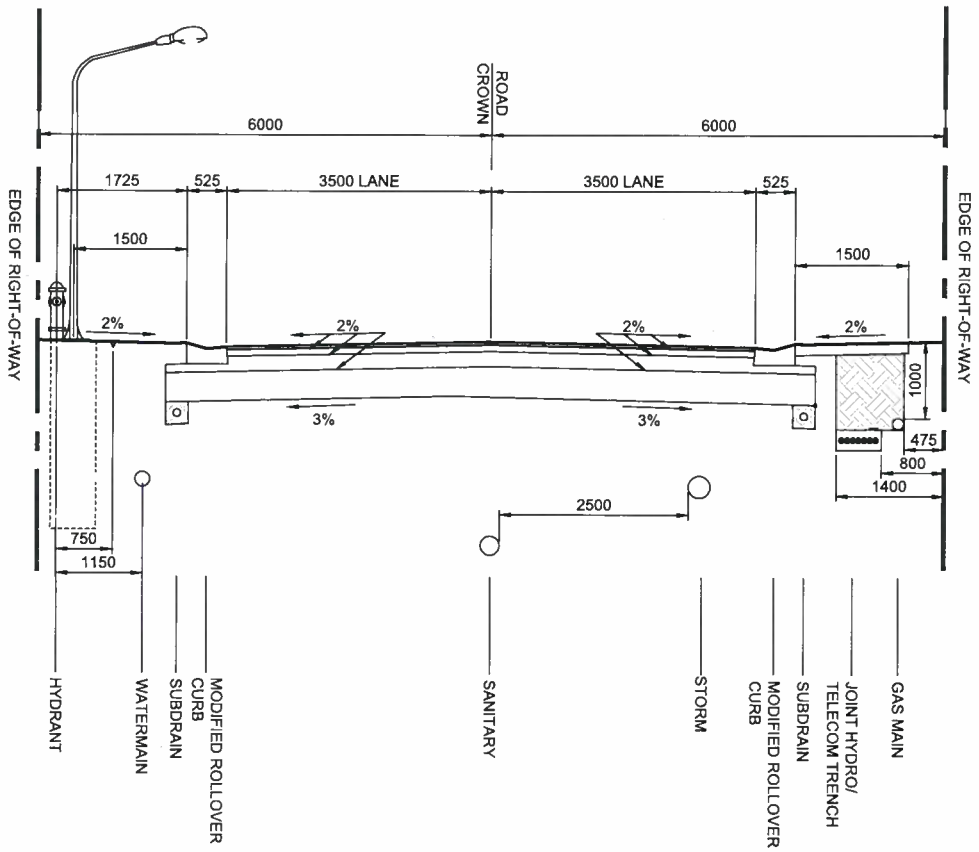
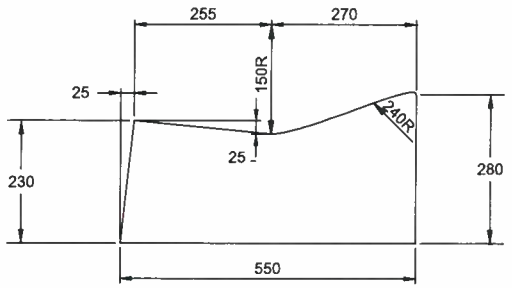


MODIFIED ROLLOVER CURB DETAIL



MODIFIED ROLLOVER CURB NOTES:

1. TOP EDGES OF CURB AND GUTTER TO BE ROUNDED USING AN APPROVED EDGING TOOL.
2. ALL CONCRETE WORK TO CONFORM TO ONTARIO PROVINCIAL SPECIFICATIONS & STANDARDS (OPSS).
3. CLASS OF CONCRETE: 30MPa
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
5. ALL DRIVEWAY & SIDEWALK RAMPS TO BE DESIGNED AND CONSTRUCTED TO APPLICABLE ONTARIO PROVINCIAL STANDARDS AND CITY OF BARRIE STANDARDS.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. WASTEWATER SYSTEMS, STORMWATER SYSTEMS, AND WATER DISTRIBUTION AND TRANSMISSION SYSTEMS TO BE DESIGNED IN ACCORDANCE WITH CITY OF BARRIE ENGINEERING GUIDELINES AND STANDARDS.
3. REFER TO THE CITY OF BARRIE ROADWAY ILLUMINATION POLICIES AND DESIGN GUIDELINES AND ASSOCIATED BSD'S FOR LIGHT STANDARD AND POLE BASE LOCATION AND DEPTH.
4. REFER TO TRANSPORTATION DESIGN MANUAL FOR PAVEMENT DESIGN METHODOLOGY.
5. TREE/LANDSCAPING ARE TO BE ACCOMMODATED WHEREVER POSSIBLE IN LOCATIONS APPROVED BY THE PARKS, PLANNING, AND DEVELOPMENT BRANCH AND IN ACCORDANCE WITH CITY OF BARRIE GUIDELINES.
6. TYPICAL MINIMUM DEPTH FOR UTILITY CROSSINGS SHALL BE 1.0m (TO CLEAR SUBDRAINS).

Barrie

STANDARD DETAIL

12.0 m LANEWAY
ROAD ALLOWANCE
7.0 m ASPHALT

REV No.	DATE: OCT 2017
1	SCALE: N.T.S.

BSD-314

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DIRECTOR OF ENGINEERING

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

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APPENDIX C-1

HYDROLOGY MODELLING

SCS consulting group ltd

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Proposed Conditions
VO5 Parameter Summary

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

STANDHYD

Number	401	203	204	301	302	303	304	501
Description								
DT(min)	1	1	1	1	1	1	1	1
Area (ha)	2.53	6.36	2.01	12.49	5.31	9.87	1.23	1.23
XIMP[1,2]	0.55	0.56	0.50	0.56	0.56	0.56	0.56	0.56
TIMP[2]	0.73	0.75	0.50	0.75	0.75	0.75	0.75	0.75
CN*	62.0	62.0	66.0	54.0	54.0	54.0	54.0	62.0
IA(mm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SLPP(%)	2	2	2	2	2	2	2	2
LGP(m)	40	40	40	40	40	40	40	40
MNP	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DPSI (mm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
SLPI(%)	1	1	1	1	1	1	1	1
LGI(m)	129.89	205.84	115.65	288.53	188.21	256.48	90.51	90.38
MNI	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013

Total Area = 41.0 ha

Proposed Conditions
CN Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

Site Soils per OMAFRA (https://www.gisapplication.lrc.gov.on.ca/AIA/index.html?viewer=AIA.AIA&locale=en-US)

Soil Type	Hydrologic Soil Group
Deundonald/Bondhead Sandy Loam	B
Muck	D

TABLE OF CURVE NUMBERS (CN's)**

Land Use		Hydrologic Soil Type							Manning's 'n'	Source
		A	AB	B	BC	C	CD	D		
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel		76	80.5	85	87	89	90	91	0.30	USDA
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop		66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)		77	82	86	89	91	93	94	0.05	MTO
Low Density Residences		57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved		98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions

Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
401			79.43				20.57	100
203			75.03				24.97	100
204			61.96				38.04	100
301			100.00					100
302			100.00					100
303			100.00					100
304			100.00					100
501			71.35				28.65	100

LAND USE (%) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
401				100.0						100.0
203				100.0						100.0
204				100.0						100.0
301				100.0						100.0
302				100.0						100.0
303				100.0						100.0
304				100.0						100.0
501				100.0						100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
401	0.0	0.0	0.0	64.9	0.0	0.0	0.0	0.0	0.0	65
203	0.0	0.0	0.0	65.7	0.0	0.0	0.0	0.0	0.0	66
204	0.0	0.0	0.0	68.2	0.0	0.0	0.0	0.0	0.0	68
301	0.0	0.0	0.0	61.0	0.0	0.0	0.0	0.0	0.0	61
302	0.0	0.0	0.0	61.0	0.0	0.0	0.0	0.0	0.0	61
303	0.0	0.0	0.0	61.0	0.0	0.0	0.0	0.0	0.0	61
304	0.0	0.0	0.0	61.0	0.0	0.0	0.0	0.0	0.0	61
501	0.0	0.0	0.0	66.4	0.0	0.0	0.0	0.0	0.0	66

** AMC II assumed

Proposed Conditions
CN Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

Step	Input Values									
	Subcatchment:	401		203	204	301	302	303	304	501
1	**CN (AMC II):**	**65**		**66**	**68**	**61**	**61**	**61**	**61**	**66**
2	CN (AMC III) =	82		82	84	78	78	78	78	82
3	100 Year Precipitation, P =	136.79	mm	136.79	136.79	136.79	136.79	136.79	136.79	136.79

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

	Output Values									
	Subcatchment:	401		203	204	301	302	303	304	501
	S_{III} =	55.76	mm	55.76	48.38	71.64	71.64	71.64	71.64	55.76
	SCS Assumption of 0.2 S = Ia =	11.15	mm	11.15	9.68	14.33	14.33	14.33	14.33	11.15
4	Q_{III} =	87.02	mm	87.02	92.07	77.26	77.26	77.26	77.26	87.02
	Preferred Initial Abstraction, Ia =	5.0	mm	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5	S^*_{III} =	67.80	mm	67.80	56.85	93.01	93.01	93.01	93.01	67.80
6	CN^*_{III} =	78.93	mm	78.93	81.71	73.20	73.20	73.20	73.20	78.93
	CN^*_{III}=	**79**	Rounded	**79**	**82**	**73**	**73**	**73**	**73**	**79**
7	**CN^*_{II}=**	**62**	convert	**62**	**66**	**54**	**54**	**54**	**54**	**62**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

Proposed Conditions
CN Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

HYDROLOGIC SOIL TYPE (ha) - Proposed Conditions

Catchment	Hydrologic Soil Type A	AB	B	BC	C	CD	D	TOTAL
401			2.01				0.52	2.53
203			4.77				1.59	6.36
204			1.24				0.76	2.01
301			12.49					12.49
302			5.31					5.31
303			9.87					9.87
304			1.23					1.23
501			0.87				0.35	1.23

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions

Catchment	Hydrologic Soil Type A	AB	B	BC	C	CD	D	TOTAL
401	0.0	0.0	79.4	0.0	0.0	0.0	20.6	100.0
203	0.0	0.0	75.0	0.0	0.0	0.0	25.0	100.0
204	0.0	0.0	62.0	0.0	0.0	0.0	38.0	100.0
301	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
302	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
303	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
304	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
501	0.0	0.0	71.4	0.0	0.0	0.0	28.6	100.0

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions

Catchment	Hydrologic Soil Type A	AB	B	BC	C	CD	D	TOTAL
401			79.4				20.6	100.0
203			75.0				25.0	100.0
204			62.0				38.0	100.0
301			100.0					100.0
302			100.0					100.0
303			100.0					100.0
304			100.0					100.0
501			71.4				28.6	100.0

Proposed Conditions
CN Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

LAND USE (ha) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
401				0.68						0.68
203				1.78						1.78
204				1.00						1.00
301				3.12						3.12
302				1.33						1.33
303				2.47						2.47
304				0.31						0.31
501				0.31						0.31

LAND USE (%) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
401	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
203	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
204	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
301	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
302	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
303	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
304	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
501	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0

LAND USE (%) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
401				100.0						100.0
203				100.0						100.0
204				100.0						100.0
301				100.0						100.0
302				100.0						100.0
303				100.0						100.0
304				100.0						100.0
501				100.0						100.0

Proposed Conditions
IA Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

LAND USE (%) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
401				100.0						100.0
203				100.0						100.0
204				100.0						100.0
301				100.0						100.0
302				100.0						100.0
303				100.0						100.0
304				100.0						100.0
501				100.0						100.0

IA VALUES (mm) - Proposed Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
401				5.0						5.0
203				5.0						5.0
204				5.0						5.0
301				5.0						5.0
302				5.0						5.0
303				5.0						5.0
304				5.0						5.0
501				5.0						5.0

* IA values based on LSRCA guidelines

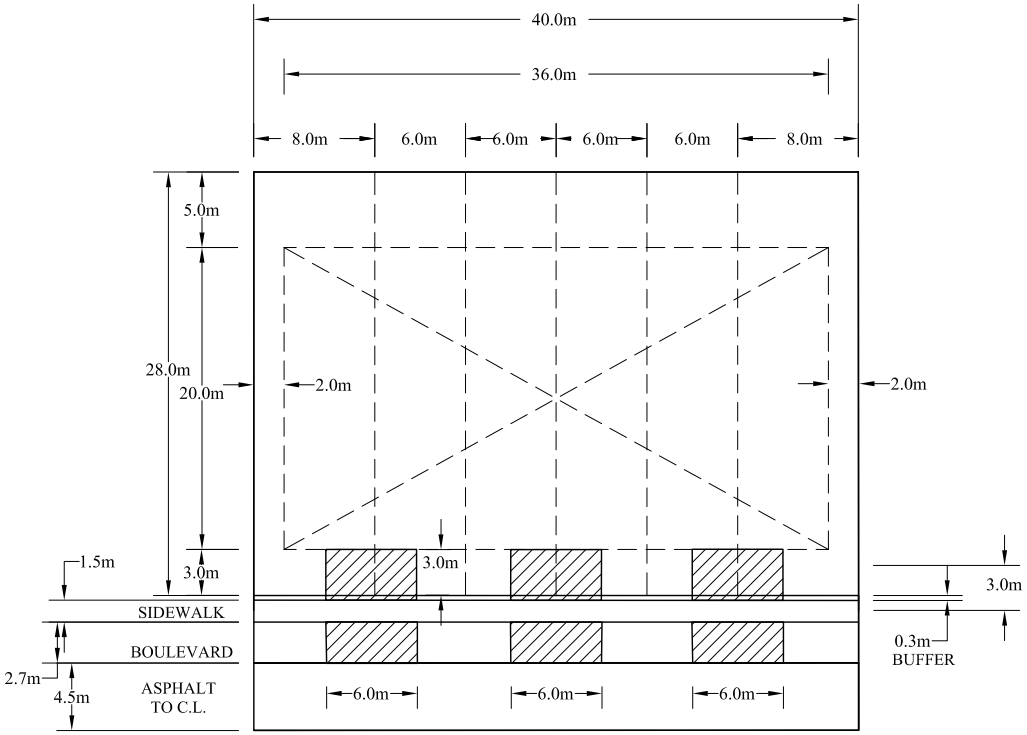
scs consulting group ltd

Proposed Conditions
Percent Impervious Calculations

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: C.M.

Land Use Areas (ha)	StandHyd IDs							
	401	203	204	301	302	303	304	501
Total Impervious Area	1.84	4.75	1.00	9.37	3.99	7.40	0.92	0.92
Total Impervious Area Directly Connected	1.38	3.56	1.00	7.02	2.99	5.55	0.69	0.69
Total Area	2.53	6.36	2.01	12.49	5.31	9.87	1.23	1.23
Total Pervious Area	1.15	2.80	1.00	5.46	2.32	4.32	0.54	0.54
Timp	0.73	0.75	0.50	0.75	0.75	0.75	0.75	0.75
Ximp	0.55	0.56	0.50	0.56	0.56	0.56	0.56	0.56

TYPICAL STREET
TOWNHOUSE DWELLING ON
A 18m ROW



*CALCULATED PERCENT IMPERVIOUS = 72%
NOTE: SETBACKS PER ZONING, MAX LOT COVERAGE = 70%

LEGEND:
DRIVEWAY
BUILDING ENVELOPE

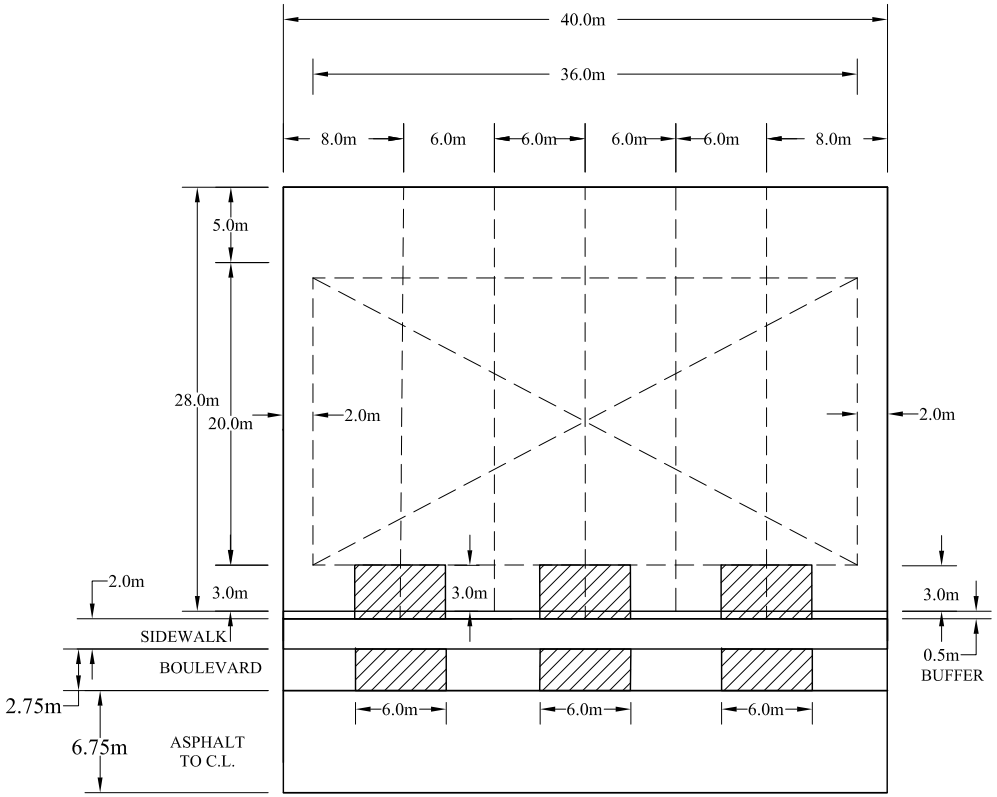
750 LOCKHART ROAD
BALLYMORE - BARRIE

TYPICAL LAYOUT FOR TOWNHOUSE - 18m R.O.W.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: M.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-1
SCALE: 1:500	DATE: MARCH 2019		

TYPICAL STREET
TOWNHOUSE DWELLING ON
A 24m ROW



*CALCULATED PERCENT IMPERVIOUS = 74%

NOTE: SETBACKS PER ZONING, MAX LOT COVERAGE = 70%

LEGEND:

DRIVEWAY

BUILDING ENVELOPE

750 LOCKHART ROAD
BALLYMORE - BARRIE

TYPICAL LAYOUT FOR TOWNHOUSE - 24m R.O.W.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: M.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-2
SCALE: 1:500	DATE: MARCH 2019		

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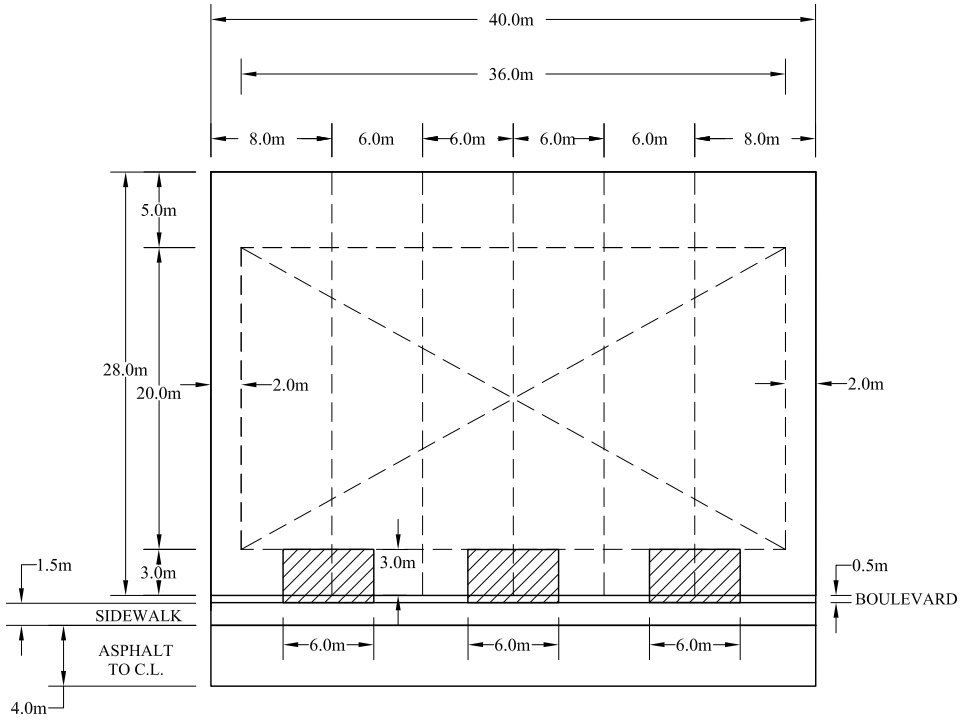
TYPICAL STREET
TOWNHOUSE DWELLING ON
A 12m LANEWAY



*CALCULATED PERCENT IMPERVIOUS = 72%
NOTE: SETBACKS PER ZONING, MAX LOT COVERAGE = 70%
NOTE: ASSUMING SIDEWALK ON ONE SIDE OF ROW

LEGEND:
DRIVEWAY
BUILDING ENVELOPE

750 LOCKHART ROAD
BALLYMORE - BARRIE

TYPICAL LAYOUT FOR TOWNHOUSE - 12m LANEWAY

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: M.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-3
SCALE: 1:500	DATE: MARCH 2019		

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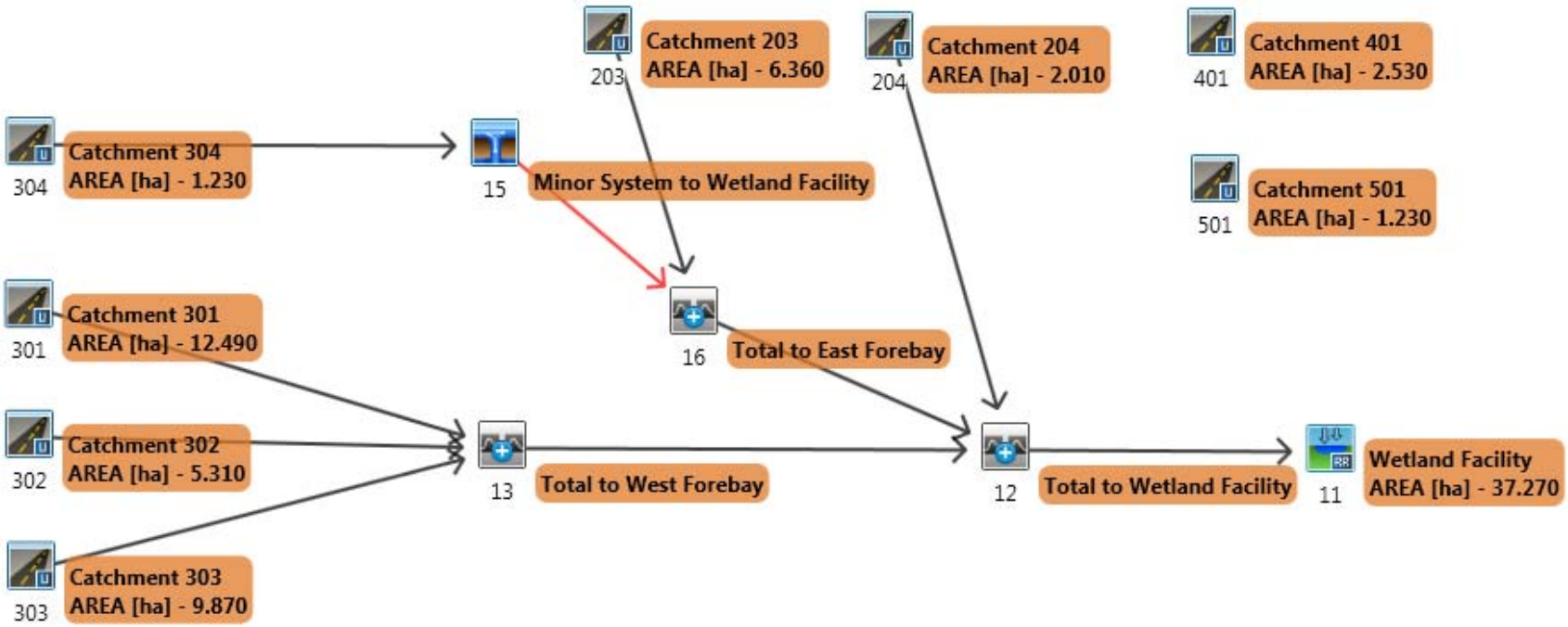
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Catchment 203
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Catchment 204
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Catchment 401
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Catchment 304
AREA [ha] - 1.230
15
Minor System to Wetland Facility
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Catchment 501
AREA [ha] - 1.230
301
Catchment 301
AREA [ha] - 12.490
16
Total to East Forebay
302
Catchment 302
AREA [ha] - 5.310
13
Total to West Forebay
12
Total to Wetland Facility
11
Wetland Facility
AREA [ha] - 37.270
303
Catchment 303
AREA [ha] - 9.870

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================================================================================================
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77335f064566\6cb7c9bc-2a3e-4497-8c59-20d83e286bd0\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\6cb7c9bc-2a3e-4497-8c59-20d83e286bd0\sce


DATE: 03/23/2019                          TIME: 01:00:52

USER:



COMMENTS: _____________________________________________________


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


--------------------
|    READ STORM    |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              3ab0aa47-9ad8-468c-a2c2-b476f58a21e1\df0ee499
| Ptotal= 25.00 mm |    Comments: 25MM4HR
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

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

--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
```



```
                          IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=       1.85         0.68
Dep. Storage     (mm)=       2.00         5.00
Average Slope     (%)=       1.00         1.00
Length            (m)=     129.87       129.41
Mannings n           =      0.013        0.250

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


                    ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.017    2.07 | 1.017    5.70 | 2.017    5.19 |  3.02    2.80
0.033    2.07 | 1.033    5.70 | 2.033    5.19 |  3.03    2.80
0.050    2.07 | 1.050    5.70 | 2.050    5.19 |  3.05    2.80
0.067    2.07 | 1.067    5.70 | 2.067    5.19 |  3.07    2.80
0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
0.100    2.07 | 1.100    5.70 | 2.100    5.19 |  3.10    2.80
0.117    2.07 | 1.117    5.70 | 2.117    5.19 |  3.12    2.80
0.133    2.07 | 1.133    5.70 | 2.133    5.19 |  3.13    2.80
0.150    2.07 | 1.150    5.70 | 2.150    5.19 |  3.15    2.80
0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
0.183    2.27 | 1.183   10.78 | 2.183    4.47 |  3.18    2.62
0.200    2.27 | 1.200   10.78 | 2.200    4.47 |  3.20    2.62
0.217    2.27 | 1.217   10.78 | 2.217    4.47 |  3.22    2.62
0.233    2.27 | 1.233   10.78 | 2.233    4.47 |  3.23    2.62
0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
0.267    2.27 | 1.267   10.78 | 2.267    4.47 |  3.27    2.62
0.283    2.27 | 1.283   10.78 | 2.283    4.47 |  3.28    2.62
0.300    2.27 | 1.300   10.78 | 2.300    4.47 |  3.30    2.62
0.317    2.27 | 1.317   10.78 | 2.317    4.47 |  3.32    2.62
0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
0.350    2.52 | 1.350   50.21 | 2.350    3.95 |  3.35    2.48
0.367    2.52 | 1.367   50.21 | 2.367    3.95 |  3.37    2.48
0.383    2.52 | 1.383   50.21 | 2.383    3.95 |  3.38    2.48
0.400    2.52 | 1.400   50.21 | 2.400    3.95 |  3.40    2.48
0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
0.433    2.52 | 1.433   50.21 | 2.433    3.95 |  3.43    2.48
0.450    2.52 | 1.450   50.21 | 2.450    3.95 |  3.45    2.48
0.467    2.52 | 1.467   50.21 | 2.467    3.95 |  3.47    2.48
0.483    2.52 | 1.483   50.21 | 2.483    3.95 |  3.48    2.48
0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
0.517    2.88 | 1.517   13.37 | 2.517    3.56 |  3.52    2.35
0.533    2.88 | 1.533   13.37 | 2.533    3.56 |  3.53    2.35
0.550    2.88 | 1.550   13.37 | 2.550    3.56 |  3.55    2.35
0.567    2.88 | 1.567   13.37 | 2.567    3.56 |  3.57    2.35
0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
0.600    2.88 | 1.600   13.37 | 2.600    3.56 |  3.60    2.35
0.617    2.88 | 1.617   13.37 | 2.617    3.56 |  3.62    2.35
0.633    2.88 | 1.633   13.37 | 2.633    3.56 |  3.63    2.35
0.650    2.88 | 1.650   13.37 | 2.650    3.56 |  3.65    2.35
0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
0.683    3.38 | 1.683    8.29 | 2.683    3.25 |  3.68    2.23
0.700    3.38 | 1.700    8.29 | 2.700    3.25 |  3.70    2.23
0.717    3.38 | 1.717    8.29 | 2.717    3.25 |  3.72    2.23
0.733    3.38 | 1.733    8.29 | 2.733    3.25 |  3.73    2.23
0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
0.767    3.38 | 1.767    8.29 | 2.767    3.25 |  3.77    2.23
0.783    3.38 | 1.783    8.29 | 2.783    3.25 |  3.78    2.23
0.800    3.38 | 1.800    8.29 | 2.800    3.25 |  3.80    2.23
0.817    3.38 | 1.817    8.29 | 2.817    3.25 |  3.82    2.23
0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
0.850    4.18 | 1.850    6.30 | 2.850    3.01 |  3.85    2.14
0.867    4.18 | 1.867    6.30 | 2.867    3.01 |  3.87    2.14
0.883    4.18 | 1.883    6.30 | 2.883    3.01 |  3.88    2.14
```

```
              0.900    4.18 | 1.900    6.30 | 2.900    3.01 |  3.90    2.14
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              0.933    4.18 | 1.933    6.30 | 2.933    3.01 |  3.93    2.14
              0.950    4.18 | 1.950    6.30 | 2.950    3.01 |  3.95    2.14
              0.967    4.18 | 1.967    6.30 | 2.967    3.01 |  3.97    2.14
              0.983    4.18 | 1.983    6.30 | 2.983    3.01 |  3.98    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         4.37
               over (min)        5.00        66.00
     Storage Coeff.  (min)=      3.94 (ii)   65.42 (ii)
     Unit Hyd. Tpeak (min)=      5.00        66.00
     Unit Hyd. peak  (cms)=      0.26         0.02
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.17         0.00          0.172 (iii)
     TIME TO PEAK    (hrs)=      1.52         2.83          1.52
     RUNOFF VOLUME    (mm)=     23.00         4.19         14.52
     TOTAL RAINFALL   (mm)=     25.00        25.00         25.00
     RUNOFF COEFFICIENT   =      0.92         0.17          0.58


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0501)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.92         0.31
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     90.55        40.00
     Mannings n            =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=     50.21        12.30
               over (min)       5.00        10.00
     Storage Coeff.  (min)=     3.17 (ii)    9.90 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.30         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.09         0.01          0.092 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.63          1.52
     RUNOFF VOLUME    (mm)=    23.00         4.44         14.83
     TOTAL RAINFALL   (mm)=    25.00        25.00         25.00
     RUNOFF COEFFICIENT   =     0.92         0.18          0.59


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0203)|   Area    (ha)=   6.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=      4.77         1.59
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    205.91        40.00
     Mannings n            =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=     50.21        12.30
               over (min)       5.00        12.00
     Storage Coeff.  (min)=     5.19 (ii)   11.92 (ii)
     Unit Hyd. Tpeak (min)=     5.00        12.00
     Unit Hyd. peak  (cms)=     0.22         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.41         0.03          0.427 (iii)
     TIME TO PEAK    (hrs)=     1.52         1.67          1.52
     RUNOFF VOLUME    (mm)=    23.00         4.44         14.83
     TOTAL RAINFALL   (mm)=    25.00        25.00         25.00
     RUNOFF COEFFICIENT   =     0.92         0.18          0.59


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.92         0.31
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     90.55        40.00
     Mannings n            =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=     50.21         9.15
               over (min)       5.00        10.00
     Storage Coeff.  (min)=     3.17 (ii)    9.90 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.30         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.09         0.00          0.091 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.63          1.52
     RUNOFF VOLUME    (mm)=    23.00         3.38         14.36
     TOTAL RAINFALL   (mm)=    25.00        25.00         25.00
     RUNOFF COEFFICIENT   =     0.92         0.14          0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.220|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.09      1.52   14.36
     ====================================================
```

```
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.23      0.09      1.52   14.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.23   0.091     1.52    14.36
     + ID2= 2 (  0203):     6.36   0.427     1.52    14.83
       ====================================================
       ID = 3 (  0016):     7.59   0.518     1.52    14.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21         2.08
               over (min)        5.00        37.00
     Storage Coeff.  (min)=       3.67 (ii)   36.87 (ii)
     Unit Hyd. Tpeak (min)=       5.00        37.00
     Unit Hyd. peak  (cms)=       0.27         0.03
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.00          0.126 (iii)
     TIME TO PEAK    (hrs)=       1.52         2.27           1.52
     RUNOFF VOLUME    (mm)=      23.00         2.65          12.81
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.92         0.11           0.51


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21         9.15
               over (min)        6.00        14.00
     Storage Coeff.  (min)=       6.36 (ii)   13.09 (ii)
```



```
     Unit Hyd. Tpeak (min)=       6.00        14.00
     Unit Hyd. peak  (cms)=       0.18         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.75         0.04          0.766 (iii)
     TIME TO PEAK    (hrs)=       1.53         1.70           1.53
     RUNOFF VOLUME    (mm)=      23.00         3.38          14.37
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.92         0.14           0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21         9.15
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       4.92 (ii)   11.65 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.23         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.02          0.358 (iii)
     TIME TO PEAK    (hrs)=       1.52         1.67           1.52
     RUNOFF VOLUME    (mm)=      23.00         3.38          14.37
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.92         0.14           0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21         9.15
               over (min)        6.00        13.00
     Storage Coeff.  (min)=       5.92 (ii)   12.66 (ii)
     Unit Hyd. Tpeak (min)=       6.00        13.00
     Unit Hyd. peak  (cms)=       0.19         0.09
```

```
                                                    *TOTALS*
     PEAK FLOW      (cms)=       0.60         0.03          0.621 (iii)
     TIME TO PEAK   (hrs)=       1.53         1.68           1.53
     RUNOFF VOLUME   (mm)=      23.00         3.38          14.37
     TOTAL RAINFALL  (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT  =       0.92         0.14           0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   0.766     1.53    14.37
     + ID2= 2 (  0302):     5.31   0.358     1.52    14.37
       ================================================
       ID = 3 (  0013):    17.80   1.120     1.53    14.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   1.120     1.53    14.37
     + ID2= 2 (  0303):     9.87   0.621     1.53    14.37
       ================================================
       ID = 1 (  0013):    27.67   1.741     1.53    14.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   1.741     1.53    14.37
     + ID2= 2 (  0016):     7.59   0.518     1.52    14.75
       ================================================
       ID = 3 (  0012):    35.26   2.253     1.53    14.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.26   2.253     1.53    14.45
     + ID2= 2 (  0204):     2.01   0.126     1.52    12.81
       ================================================
       ID = 1 (  0012):    37.27   2.375     1.53    14.36

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



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--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.4389      1.4219
                          0.1014     0.3040   |  0.9212      1.8498
                          0.1939     0.6475   |  1.2450      2.2118
                          0.2548     1.0211   |  1.6046      2.3050
                          0.2583     1.0470   |  4.5503      2.6235

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.270      2.375      1.53      14.36
   OUTFLOW: ID= 1 (  0011)     37.270      0.132      4.05      14.02

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.56
                 TIME SHIFT OF PEAK FLOW         (min)=151.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.4177

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 FINISH
================================================================================================================
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================================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\42e1e468-d272-4086-83ea-af1dff3aa0e6\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\42e1e468-d272-4086-83ea-af1dff3aa0e6\sce


DATE: 03/23/2019                          TIME: 12:54:27

USER:



COMMENTS: _____


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


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| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\796d67ec
| Ptotal= 55.43 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
--------------------
                       Duration of storm    = 24.00 hrs
                       Mass curve time step = 15.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.62 |  6.25    0.00 | 12.25    7.98 | 18.25    1.00
               0.50    0.60 |  6.50    0.00 | 12.50    7.98 | 18.50    1.00
               0.75    0.62 |  6.75    0.00 | 12.75    4.10 | 18.75    1.00
               1.00    0.60 |  7.00    0.00 | 13.00    4.10 | 19.00    1.00
               1.25    0.62 |  7.25    2.22 | 13.25    0.78 | 19.25    1.00
               1.50    0.60 |  7.50    2.22 | 13.50    0.78 | 19.50    1.00
               1.75    0.62 |  7.75    2.22 | 13.75    4.55 | 19.75    1.00
               2.00    0.60 |  8.00    2.22 | 14.00    4.55 | 20.00    1.00
               2.25    0.73 |  8.25    0.00 | 14.25    1.66 | 20.25    0.67
               2.50    0.71 |  8.50    0.00 | 14.50    1.66 | 20.50    0.67
               2.75    0.73 |  8.75    2.99 | 14.75    1.66 | 20.75    0.67
               3.00    0.71 |  9.00    2.99 | 15.00    1.66 | 21.00    0.67
               3.25    0.73 |  9.25    1.77 | 15.25    1.66 | 21.25    0.67
```



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               3.50    0.71 |  9.50    1.77 | 15.50    1.66 | 21.50    0.67
               3.75    0.73 |  9.75    2.00 | 15.75    1.66 | 21.75    0.67
               4.00    0.71 | 10.00    2.00 | 16.00    1.66 | 22.00    0.67
               4.25    0.89 | 10.25    2.55 | 16.25    1.00 | 22.25    0.67
               4.50    0.89 | 10.50    2.55 | 16.50    1.00 | 22.50    0.67
               4.75    0.89 | 10.75    3.44 | 16.75    1.00 | 22.75    0.67
               5.00    0.89 | 11.00    3.44 | 17.00    1.00 | 23.00    0.67
               5.25    0.89 | 11.25    5.32 | 17.25    1.00 | 23.25    0.67
               5.50    0.89 | 11.50    5.32 | 17.50    1.00 | 23.50    0.67
               5.75    0.89 | 11.75   23.06 | 17.75    1.00 | 23.75    0.67
               6.00    0.89 | 12.00   61.19 | 18.00    1.00 | 24.00    0.67

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--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.017    0.62 | 6.017    0.00 |12.017    8.02 | 18.02    1.00
             0.033    0.62 | 6.033    0.00 |12.033    7.98 | 18.03    1.00
             0.050    0.62 | 6.050    0.00 |12.050    7.98 | 18.05    1.00
             0.067    0.62 | 6.067    0.00 |12.067    7.98 | 18.07    1.00
             0.083    0.62 | 6.083    0.00 |12.083    7.98 | 18.08    1.00
             0.100    0.62 | 6.100    0.00 |12.100    7.98 | 18.10    1.00
             0.117    0.62 | 6.117    0.00 |12.117    7.98 | 18.12    1.00
             0.133    0.62 | 6.133    0.00 |12.133    7.98 | 18.13    1.00
             0.150    0.62 | 6.150    0.00 |12.150    7.98 | 18.15    1.00
             0.167    0.62 | 6.167    0.00 |12.167    7.98 | 18.17    1.00
             0.183    0.62 | 6.183    0.00 |12.183    7.98 | 18.18    1.00
             0.200    0.62 | 6.200    0.00 |12.200    7.98 | 18.20    1.00
             0.217    0.62 | 6.217    0.00 |12.217    7.98 | 18.22    1.00
             0.233    0.62 | 6.233    0.00 |12.233    7.98 | 18.23    1.00
             0.250    0.62 | 6.250    0.00 |12.250    7.98 | 18.25    1.00
             0.267    0.60 | 6.267    0.00 |12.267    7.98 | 18.27    1.00
             0.283    0.60 | 6.283    0.00 |12.283    7.98 | 18.28    1.00
             0.300    0.60 | 6.300    0.00 |12.300    7.98 | 18.30    1.00
             0.317    0.60 | 6.317    0.00 |12.317    7.98 | 18.32    1.00
             0.333    0.60 | 6.333    0.00 |12.333    7.98 | 18.33    1.00
             0.350    0.60 | 6.350    0.00 |12.350    7.98 | 18.35    1.00
             0.367    0.60 | 6.367    0.00 |12.367    7.98 | 18.37    1.00
             0.383    0.60 | 6.383    0.00 |12.383    7.98 | 18.38    1.00
             0.400    0.60 | 6.400    0.00 |12.400    7.98 | 18.40    1.00
             0.417    0.60 | 6.417    0.00 |12.417    7.98 | 18.42    1.00
             0.433    0.60 | 6.433    0.00 |12.433    7.98 | 18.43    1.00
             0.450    0.60 | 6.450    0.00 |12.450    7.98 | 18.45    1.00
             0.467    0.60 | 6.467    0.00 |12.467    7.98 | 18.47    1.00
             0.483    0.60 | 6.483    0.00 |12.483    7.98 | 18.48    1.00
             0.500    0.60 | 6.500    0.00 |12.500    7.98 | 18.50    1.00
             0.517    0.62 | 6.517    0.00 |12.517    4.11 | 18.52    1.00
             0.533    0.62 | 6.533    0.00 |12.533    4.10 | 18.53    1.00
             0.550    0.62 | 6.550    0.00 |12.550    4.10 | 18.55    1.00
             0.567    0.62 | 6.567    0.00 |12.567    4.10 | 18.57    1.00
             0.583    0.62 | 6.583    0.00 |12.583    4.10 | 18.58    1.00
             0.600    0.62 | 6.600    0.00 |12.600    4.10 | 18.60    1.00
```

0.617	0.62	6.617	0.00	12.617	4.10	18.62	1.00
0.633	0.62	6.633	0.00	12.633	4.10	18.63	1.00
0.650	0.62	6.650	0.00	12.650	4.10	18.65	1.00
0.667	0.62	6.667	0.00	12.667	4.10	18.67	1.00
0.683	0.62	6.683	0.00	12.683	4.10	18.68	1.00
0.700	0.62	6.700	0.00	12.700	4.10	18.70	1.00
0.717	0.62	6.717	0.00	12.717	4.10	18.72	1.00
0.733	0.62	6.733	0.00	12.733	4.10	18.73	1.00
0.750	0.62	6.750	0.00	12.750	4.10	18.75	1.00
0.767	0.60	6.767	0.00	12.767	4.10	18.77	1.00
0.783	0.60	6.783	0.00	12.783	4.10	18.78	1.00
0.800	0.60	6.800	0.00	12.800	4.10	18.80	1.00
0.817	0.60	6.817	0.00	12.817	4.10	18.82	1.00
0.833	0.60	6.833	0.00	12.833	4.10	18.83	1.00
0.850	0.60	6.850	0.00	12.850	4.10	18.85	1.00
0.867	0.60	6.867	0.00	12.867	4.10	18.87	1.00
0.883	0.60	6.883	0.00	12.883	4.10	18.88	1.00
0.900	0.60	6.900	0.00	12.900	4.10	18.90	1.00
0.917	0.60	6.917	0.00	12.917	4.10	18.92	1.00
0.933	0.60	6.933	0.00	12.933	4.10	18.93	1.00
0.950	0.60	6.950	0.00	12.950	4.10	18.95	1.00
0.967	0.60	6.967	0.00	12.967	4.10	18.97	1.00
0.983	0.60	6.983	0.00	12.983	4.10	18.98	1.00
1.000	0.60	7.000	0.00	13.000	4.10	19.00	1.00
1.017	0.62	7.017	2.22	13.017	0.78	19.02	1.00
1.033	0.62	7.033	2.22	13.033	0.78	19.03	1.00
1.050	0.62	7.050	2.22	13.050	0.78	19.05	1.00
1.067	0.62	7.067	2.22	13.067	0.78	19.07	1.00
1.083	0.62	7.083	2.22	13.083	0.78	19.08	1.00
1.100	0.62	7.100	2.22	13.100	0.78	19.10	1.00
1.117	0.62	7.117	2.22	13.117	0.78	19.12	1.00
1.133	0.62	7.133	2.22	13.133	0.78	19.13	1.00
1.150	0.62	7.150	2.22	13.150	0.78	19.15	1.00
1.167	0.62	7.167	2.22	13.167	0.78	19.17	1.00
1.183	0.62	7.183	2.22	13.183	0.78	19.18	1.00
1.200	0.62	7.200	2.22	13.200	0.78	19.20	1.00
1.217	0.62	7.217	2.22	13.217	0.78	19.22	1.00
1.233	0.62	7.233	2.22	13.233	0.78	19.23	1.00
1.250	0.62	7.250	2.22	13.250	0.78	19.25	1.00
1.267	0.60	7.267	2.22	13.267	0.78	19.27	1.00
1.283	0.60	7.283	2.22	13.283	0.78	19.28	1.00
1.300	0.60	7.300	2.22	13.300	0.78	19.30	1.00
1.317	0.60	7.317	2.22	13.317	0.78	19.32	1.00
1.333	0.60	7.333	2.22	13.333	0.78	19.33	1.00
1.350	0.60	7.350	2.22	13.350	0.78	19.35	1.00
1.367	0.60	7.367	2.22	13.367	0.78	19.37	1.00
1.383	0.60	7.383	2.22	13.383	0.78	19.38	1.00
1.400	0.60	7.400	2.22	13.400	0.78	19.40	1.00
1.417	0.60	7.417	2.22	13.417	0.78	19.42	1.00
1.433	0.60	7.433	2.22	13.433	0.78	19.43	1.00
1.450	0.60	7.450	2.22	13.450	0.78	19.45	1.00
1.467	0.60	7.467	2.22	13.467	0.78	19.47	1.00
1.483	0.60	7.483	2.22	13.483	0.78	19.48	1.00
1.500	0.60	7.500	2.22	13.500	0.78	19.50	1.00
1.517	0.62	7.517	2.22	13.517	4.54	19.52	1.00
1.533	0.62	7.533	2.22	13.533	4.55	19.53	1.00
1.550	0.62	7.550	2.22	13.550	4.55	19.55	1.00
1.567	0.62	7.567	2.22	13.567	4.55	19.57	1.00
1.583	0.62	7.583	2.22	13.583	4.55	19.58	1.00
1.600	0.62	7.600	2.22	13.600	4.55	19.60	1.00
1.617	0.62	7.617	2.22	13.617	4.55	19.62	1.00
1.633	0.62	7.633	2.22	13.633	4.55	19.63	1.00
1.650	0.62	7.650	2.22	13.650	4.55	19.65	1.00
1.667	0.62	7.667	2.22	13.667	4.55	19.67	1.00
1.683	0.62	7.683	2.22	13.683	4.55	19.68	1.00
1.700	0.62	7.700	2.22	13.700	4.55	19.70	1.00
1.717	0.62	7.717	2.22	13.717	4.55	19.72	1.00

1.733	0.62	7.733	2.22	13.733	4.55	19.73	1.00
1.750	0.62	7.750	2.22	13.750	4.55	19.75	1.00
1.767	0.60	7.767	2.22	13.767	4.55	19.77	1.00
1.783	0.60	7.783	2.22	13.783	4.55	19.78	1.00
1.800	0.60	7.800	2.22	13.800	4.55	19.80	1.00
1.817	0.60	7.817	2.22	13.817	4.55	19.82	1.00
1.833	0.60	7.833	2.22	13.833	4.55	19.83	1.00
1.850	0.60	7.850	2.22	13.850	4.55	19.85	1.00
1.867	0.60	7.867	2.22	13.867	4.55	19.87	1.00
1.883	0.60	7.883	2.22	13.883	4.55	19.88	1.00
1.900	0.60	7.900	2.22	13.900	4.55	19.90	1.00
1.917	0.60	7.917	2.22	13.917	4.55	19.92	1.00
1.933	0.60	7.933	2.22	13.933	4.55	19.93	1.00
1.950	0.60	7.950	2.22	13.950	4.55	19.95	1.00
1.967	0.60	7.967	2.22	13.967	4.55	19.97	1.00
1.983	0.60	7.983	2.22	13.983	4.55	19.98	1.00
2.000	0.60	8.000	2.21	14.000	4.55	20.00	1.00
2.017	0.73	8.017	0.00	14.017	1.67	20.02	0.67
2.033	0.73	8.033	0.00	14.033	1.66	20.03	0.67
2.050	0.73	8.050	0.00	14.050	1.66	20.05	0.67
2.067	0.73	8.067	0.00	14.067	1.66	20.07	0.67
2.083	0.73	8.083	0.00	14.083	1.66	20.08	0.67
2.100	0.73	8.100	0.00	14.100	1.66	20.10	0.67
2.117	0.73	8.117	0.00	14.117	1.66	20.12	0.67
2.133	0.73	8.133	0.00	14.133	1.66	20.13	0.67
2.150	0.73	8.150	0.00	14.150	1.66	20.15	0.67
2.167	0.73	8.167	0.00	14.167	1.66	20.17	0.67
2.183	0.73	8.183	0.00	14.183	1.66	20.18	0.67
2.200	0.73	8.200	0.00	14.200	1.66	20.20	0.67
2.217	0.73	8.217	0.00	14.217	1.66	20.22	0.67
2.233	0.73	8.233	0.00	14.233	1.66	20.23	0.67
2.250	0.73	8.250	0.00	14.250	1.66	20.25	0.67
2.267	0.71	8.267	0.00	14.267	1.66	20.27	0.67
2.283	0.71	8.283	0.00	14.283	1.66	20.28	0.67
2.300	0.71	8.300	0.00	14.300	1.66	20.30	0.67
2.317	0.71	8.317	0.00	14.317	1.66	20.32	0.67
2.333	0.71	8.333	0.00	14.333	1.66	20.33	0.67
2.350	0.71	8.350	0.00	14.350	1.66	20.35	0.67
2.367	0.71	8.367	0.00	14.367	1.66	20.37	0.67
2.383	0.71	8.383	0.00	14.383	1.66	20.38	0.67
2.400	0.71	8.400	0.00	14.400	1.66	20.40	0.67
2.417	0.71	8.417	0.00	14.417	1.66	20.42	0.67
2.433	0.71	8.433	0.00	14.433	1.66	20.43	0.67
2.450	0.71	8.450	0.00	14.450	1.66	20.45	0.67
2.467	0.71	8.467	0.00	14.467	1.66	20.47	0.67
2.483	0.71	8.483	0.00	14.483	1.66	20.48	0.67
2.500	0.71	8.500	0.01	14.500	1.66	20.50	0.67
2.517	0.73	8.517	2.99	14.517	1.66	20.52	0.67
2.533	0.73	8.533	2.99	14.533	1.66	20.53	0.67
2.550	0.73	8.550	2.99	14.550	1.66	20.55	0.67
2.567	0.73	8.567	2.99	14.567	1.66	20.57	0.67
2.583	0.73	8.583	2.99	14.583	1.66	20.58	0.67
2.600	0.73	8.600	2.99	14.600	1.66	20.60	0.67
2.617	0.73	8.617	2.99	14.617	1.66	20.62	0.67
2.633	0.73	8.633	2.99	14.633	1.66	20.63	0.67
2.650	0.73	8.650	2.99	14.650	1.66	20.65	0.67
2.667	0.73	8.667	2.99	14.667	1.66	20.67	0.67
2.683	0.73	8.683	2.99	14.683	1.66	20.68	0.67
2.700	0.73	8.700	2.99	14.700	1.66	20.70	0.67
2.717	0.73	8.717	2.99	14.717	1.66	20.72	0.67
2.733	0.73	8.733	2.99	14.733	1.66	20.73	0.67
2.750	0.73	8.750	2.99	14.750	1.66	20.75	0.67
2.767	0.71	8.767	2.99	14.767	1.66	20.77	0.67
2.783	0.71	8.783	2.99	14.783	1.66	20.78	0.67
2.800	0.71	8.800	2.99	14.800	1.66	20.80	0.67
2.817	0.71	8.817	2.99	14.817	1.66	20.82	0.67
2.833	0.71	8.833	2.99	14.833	1.66	20.83	0.67

2.850	0.71	8.850	2.99	14.850	1.66	20.85	0.67
2.867	0.71	8.867	2.99	14.867	1.66	20.87	0.67
2.883	0.71	8.883	2.99	14.883	1.66	20.88	0.67
2.900	0.71	8.900	2.99	14.900	1.66	20.90	0.67
2.917	0.71	8.917	2.99	14.917	1.66	20.92	0.67
2.933	0.71	8.933	2.99	14.933	1.66	20.93	0.67
2.950	0.71	8.950	2.99	14.950	1.66	20.95	0.67
2.967	0.71	8.967	2.99	14.967	1.66	20.97	0.67
2.983	0.71	8.983	2.99	14.983	1.66	20.98	0.67
3.000	0.71	9.000	2.99	15.000	1.66	21.00	0.67
3.017	0.73	9.017	1.77	15.017	1.66	21.02	0.67
3.033	0.73	9.033	1.77	15.033	1.66	21.03	0.67
3.050	0.73	9.050	1.77	15.050	1.66	21.05	0.67
3.067	0.73	9.067	1.77	15.067	1.66	21.07	0.67
3.083	0.73	9.083	1.77	15.083	1.66	21.08	0.67
3.100	0.73	9.100	1.77	15.100	1.66	21.10	0.67
3.117	0.73	9.117	1.77	15.117	1.66	21.12	0.67
3.133	0.73	9.133	1.77	15.133	1.66	21.13	0.67
3.150	0.73	9.150	1.77	15.150	1.66	21.15	0.67
3.167	0.73	9.167	1.77	15.167	1.66	21.17	0.67
3.183	0.73	9.183	1.77	15.183	1.66	21.18	0.67
3.200	0.73	9.200	1.77	15.200	1.66	21.20	0.67
3.217	0.73	9.217	1.77	15.217	1.66	21.22	0.67
3.233	0.73	9.233	1.77	15.233	1.66	21.23	0.67
3.250	0.73	9.250	1.77	15.250	1.66	21.25	0.67
3.267	0.71	9.267	1.77	15.267	1.66	21.27	0.67
3.283	0.71	9.283	1.77	15.283	1.66	21.28	0.67
3.300	0.71	9.300	1.77	15.300	1.66	21.30	0.67
3.317	0.71	9.317	1.77	15.317	1.66	21.32	0.67
3.333	0.71	9.333	1.77	15.333	1.66	21.33	0.67
3.350	0.71	9.350	1.77	15.350	1.66	21.35	0.67
3.367	0.71	9.367	1.77	15.367	1.66	21.37	0.67
3.383	0.71	9.383	1.77	15.383	1.66	21.38	0.67
3.400	0.71	9.400	1.77	15.400	1.66	21.40	0.67
3.417	0.71	9.417	1.77	15.417	1.66	21.42	0.67
3.433	0.71	9.433	1.77	15.433	1.66	21.43	0.67
3.450	0.71	9.450	1.77	15.450	1.66	21.45	0.67
3.467	0.71	9.467	1.77	15.467	1.66	21.47	0.67
3.483	0.71	9.483	1.77	15.483	1.66	21.48	0.67
3.500	0.71	9.500	1.77	15.500	1.66	21.50	0.67
3.517	0.73	9.517	2.00	15.517	1.66	21.52	0.67
3.533	0.73	9.533	2.00	15.533	1.66	21.53	0.67
3.550	0.73	9.550	2.00	15.550	1.66	21.55	0.67
3.567	0.73	9.567	2.00	15.567	1.66	21.57	0.67
3.583	0.73	9.583	2.00	15.583	1.66	21.58	0.67
3.600	0.73	9.600	2.00	15.600	1.66	21.60	0.67
3.617	0.73	9.617	2.00	15.617	1.66	21.62	0.67
3.633	0.73	9.633	2.00	15.633	1.66	21.63	0.67
3.650	0.73	9.650	2.00	15.650	1.66	21.65	0.67
3.667	0.73	9.667	2.00	15.667	1.66	21.67	0.67
3.683	0.73	9.683	2.00	15.683	1.66	21.68	0.67
3.700	0.73	9.700	2.00	15.700	1.66	21.70	0.67
3.717	0.73	9.717	2.00	15.717	1.66	21.72	0.67
3.733	0.73	9.733	2.00	15.733	1.66	21.73	0.67
3.750	0.73	9.750	2.00	15.750	1.66	21.75	0.67
3.767	0.71	9.767	2.00	15.767	1.66	21.77	0.67
3.783	0.71	9.783	2.00	15.783	1.66	21.78	0.67
3.800	0.71	9.800	2.00	15.800	1.66	21.80	0.67
3.817	0.71	9.817	2.00	15.817	1.66	21.82	0.67
3.833	0.71	9.833	2.00	15.833	1.66	21.83	0.67
3.850	0.71	9.850	2.00	15.850	1.66	21.85	0.67
3.867	0.71	9.867	2.00	15.867	1.66	21.87	0.67
3.883	0.71	9.883	2.00	15.883	1.66	21.88	0.67
3.900	0.71	9.900	2.00	15.900	1.66	21.90	0.67
3.917	0.71	9.917	2.00	15.917	1.66	21.92	0.67
3.933	0.71	9.933	2.00	15.933	1.66	21.93	0.67
3.950	0.71	9.950	2.00	15.950	1.66	21.95	0.67

3.967	0.71	9.967	2.00	15.967	1.66	21.97	0.67
3.983	0.71	9.983	2.00	15.983	1.66	21.98	0.67
4.000	0.71	10.000	2.00	16.000	1.66	22.00	0.67
4.017	0.89	10.017	2.55	16.017	1.00	22.02	0.67
4.033	0.89	10.033	2.55	16.033	1.00	22.03	0.67
4.050	0.89	10.050	2.55	16.050	1.00	22.05	0.67
4.067	0.89	10.067	2.55	16.067	1.00	22.07	0.67
4.083	0.89	10.083	2.55	16.083	1.00	22.08	0.67
4.100	0.89	10.100	2.55	16.100	1.00	22.10	0.67
4.117	0.89	10.117	2.55	16.117	1.00	22.12	0.67
4.133	0.89	10.133	2.55	16.133	1.00	22.13	0.67
4.150	0.89	10.150	2.55	16.150	1.00	22.15	0.67
4.167	0.89	10.167	2.55	16.167	1.00	22.17	0.67
4.183	0.89	10.183	2.55	16.183	1.00	22.18	0.67
4.200	0.89	10.200	2.55	16.200	1.00	22.20	0.67
4.217	0.89	10.217	2.55	16.217	1.00	22.22	0.67
4.233	0.89	10.233	2.55	16.233	1.00	22.23	0.67
4.250	0.89	10.250	2.55	16.250	1.00	22.25	0.67
4.267	0.89	10.267	2.55	16.267	1.00	22.27	0.67
4.283	0.89	10.283	2.55	16.283	1.00	22.28	0.67
4.300	0.89	10.300	2.55	16.300	1.00	22.30	0.67
4.317	0.89	10.317	2.55	16.317	1.00	22.32	0.67
4.333	0.89	10.333	2.55	16.333	1.00	22.33	0.67
4.350	0.89	10.350	2.55	16.350	1.00	22.35	0.67
4.367	0.89	10.367	2.55	16.367	1.00	22.37	0.67
4.383	0.89	10.383	2.55	16.383	1.00	22.38	0.67
4.400	0.89	10.400	2.55	16.400	1.00	22.40	0.67
4.417	0.89	10.417	2.55	16.417	1.00	22.42	0.67
4.433	0.89	10.433	2.55	16.433	1.00	22.43	0.67
4.450	0.89	10.450	2.55	16.450	1.00	22.45	0.67
4.467	0.89	10.467	2.55	16.467	1.00	22.47	0.67
4.483	0.89	10.483	2.55	16.483	1.00	22.48	0.67
4.500	0.89	10.500	2.55	16.500	1.00	22.50	0.67
4.517	0.89	10.517	3.44	16.517	1.00	22.52	0.67
4.533	0.89	10.533	3.44	16.533	1.00	22.53	0.67
4.550	0.89	10.550	3.44	16.550	1.00	22.55	0.67
4.567	0.89	10.567	3.44	16.567	1.00	22.57	0.67
4.583	0.89	10.583	3.44	16.583	1.00	22.58	0.67
4.600	0.89	10.600	3.44	16.600	1.00	22.60	0.67
4.617	0.89	10.617	3.44	16.617	1.00	22.62	0.67
4.633	0.89	10.633	3.44	16.633	1.00	22.63	0.67
4.650	0.89	10.650	3.44	16.650	1.00	22.65	0.67
4.667	0.89	10.667	3.44	16.667	1.00	22.67	0.67
4.683	0.89	10.683	3.44	16.683	1.00	22.68	0.67
4.700	0.89	10.700	3.44	16.700	1.00	22.70	0.67
4.717	0.89	10.717	3.44	16.717	1.00	22.72	0.67
4.733	0.89	10.733	3.44	16.733	1.00	22.73	0.67
4.750	0.89	10.750	3.44	16.750	1.00	22.75	0.67
4.767	0.89	10.767	3.44	16.767	1.00	22.77	0.67
4.783	0.89	10.783	3.44	16.783	1.00	22.78	0.67
4.800	0.89	10.800	3.44	16.800	1.00	22.80	0.67
4.817	0.89	10.817	3.44	16.817	1.00	22.82	0.67
4.833	0.89	10.833	3.44	16.833	1.00	22.83	0.67
4.850	0.89	10.850	3.44	16.850	1.00	22.85	0.67
4.867	0.89	10.867	3.44	16.867	1.00	22.87	0.67
4.883	0.89	10.883	3.44	16.883	1.00	22.88	0.67
4.900	0.89	10.900	3.44	16.900	1.00	22.90	0.67
4.917	0.89	10.917	3.44	16.917	1.00	22.92	0.67
4.933	0.89	10.933	3.44	16.933	1.00	22.93	0.67
4.950	0.89	10.950	3.44	16.950	1.00	22.95	0.67
4.967	0.89	10.967	3.44	16.967	1.00	22.97	0.67
4.983	0.89	10.983	3.44	16.983	1.00	22.98	0.67
5.000	0.89	11.000	3.44	17.000	1.00	23.00	0.67
5.017	0.89	11.017	5.32	17.017	1.00	23.02	0.67
5.033	0.89	11.033	5.32	17.033	1.00	23.03	0.67
5.050	0.89	11.050	5.32	17.050	1.00	23.05	0.67
5.067	0.89	11.067	5.32	17.067	1.00	23.07	0.67

5.083	0.89	11.083	5.32	17.083	1.00	23.08	0.67
5.100	0.89	11.100	5.32	17.100	1.00	23.10	0.67
5.117	0.89	11.117	5.32	17.117	1.00	23.12	0.67
5.133	0.89	11.133	5.32	17.133	1.00	23.13	0.67
5.150	0.89	11.150	5.32	17.150	1.00	23.15	0.67
5.167	0.89	11.167	5.32	17.167	1.00	23.17	0.67
5.183	0.89	11.183	5.32	17.183	1.00	23.18	0.67
5.200	0.89	11.200	5.32	17.200	1.00	23.20	0.67
5.217	0.89	11.217	5.32	17.217	1.00	23.22	0.67
5.233	0.89	11.233	5.32	17.233	1.00	23.23	0.67
5.250	0.89	11.250	5.32	17.250	1.00	23.25	0.67
5.267	0.89	11.267	5.32	17.267	1.00	23.27	0.67
5.283	0.89	11.283	5.32	17.283	1.00	23.28	0.67
5.300	0.89	11.300	5.32	17.300	1.00	23.30	0.67
5.317	0.89	11.317	5.32	17.317	1.00	23.32	0.67
5.333	0.89	11.333	5.32	17.333	1.00	23.33	0.67
5.350	0.89	11.350	5.32	17.350	1.00	23.35	0.67
5.367	0.89	11.367	5.32	17.367	1.00	23.37	0.67
5.383	0.89	11.383	5.32	17.383	1.00	23.38	0.67
5.400	0.89	11.400	5.32	17.400	1.00	23.40	0.67
5.417	0.89	11.417	5.32	17.417	1.00	23.42	0.67
5.433	0.89	11.433	5.32	17.433	1.00	23.43	0.67
5.450	0.89	11.450	5.32	17.450	1.00	23.45	0.67
5.467	0.89	11.467	5.32	17.467	1.00	23.47	0.67
5.483	0.89	11.483	5.32	17.483	1.00	23.48	0.67
5.500	0.89	11.500	5.32	17.500	1.00	23.50	0.67
5.517	0.89	11.517	23.05	17.517	1.00	23.52	0.67
5.533	0.89	11.533	23.06	17.533	1.00	23.53	0.67
5.550	0.89	11.550	23.06	17.550	1.00	23.55	0.67
5.567	0.89	11.567	23.06	17.567	1.00	23.57	0.67
5.583	0.89	11.583	23.06	17.583	1.00	23.58	0.67
5.600	0.89	11.600	23.06	17.600	1.00	23.60	0.67
5.617	0.89	11.617	23.06	17.617	1.00	23.62	0.67
5.633	0.89	11.633	23.06	17.633	1.00	23.63	0.67
5.650	0.89	11.650	23.06	17.650	1.00	23.65	0.67
5.667	0.89	11.667	23.06	17.667	1.00	23.67	0.67
5.683	0.89	11.683	23.06	17.683	1.00	23.68	0.67
5.700	0.89	11.700	23.06	17.700	1.00	23.70	0.67
5.717	0.89	11.717	23.06	17.717	1.00	23.72	0.67
5.733	0.89	11.733	23.06	17.733	1.00	23.73	0.67
5.750	0.89	11.750	23.06	17.750	1.00	23.75	0.67
5.767	0.89	11.767	61.18	17.767	1.00	23.77	0.67
5.783	0.89	11.783	61.19	17.783	1.00	23.78	0.67
5.800	0.89	11.800	61.19	17.800	1.00	23.80	0.67
5.817	0.89	11.817	61.19	17.817	1.00	23.82	0.67
5.833	0.89	11.833	61.19	17.833	1.00	23.83	0.67
5.850	0.89	11.850	61.19	17.850	1.00	23.85	0.67
5.867	0.89	11.867	61.19	17.867	1.00	23.87	0.67
5.883	0.89	11.883	61.19	17.883	1.00	23.88	0.67
5.900	0.89	11.900	61.19	17.900	1.00	23.90	0.67
5.917	0.89	11.917	61.19	17.917	1.00	23.92	0.67
5.933	0.89	11.933	61.19	17.933	1.00	23.93	0.67
5.950	0.89	11.950	61.19	17.950	1.00	23.95	0.67
5.967	0.89	11.967	61.19	17.967	1.00	23.97	0.67
5.983	0.89	11.983	61.19	17.983	1.00	23.98	0.67
6.000	0.89	12.000	61.19	18.000	1.00	24.00	0.67

Max.Eff.Inten.(mm/hr)=	61.19	23.64	
over (min)	5.00	35.00	
Storage Coeff. (min)=	3.64 (ii)	34.93 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	0.28	0.03	
			TOTALS
PEAK FLOW (cms)=	0.23	0.03	0.242 (iii)
TIME TO PEAK (hrs)=	12.00	12.48	12.00
RUNOFF VOLUME (mm)=	53.43	18.84	37.86
TOTAL RAINFALL (mm)=	55.43	55.43	55.43

RUNOFF COEFFICIENT =	0.96	0.34	0.68

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area (ha)= 1.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.92	0.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	90.55	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	61.19	46.30	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.93 (ii)	9.15 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.12	
			TOTALS
PEAK FLOW (cms)=	0.12	0.03	0.142 (iii)
TIME TO PEAK (hrs)=	12.00	12.07	12.00
RUNOFF VOLUME (mm)=	53.43	19.61	38.54
TOTAL RAINFALL (mm)=	55.43	55.43	55.43
RUNOFF COEFFICIENT =	0.96	0.35	0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)= 6.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	4.77	1.59	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	205.91	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	61.19	46.30	
over (min)	5.00	12.00	
Storage Coeff. (min)=	4.80 (ii)	11.02 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	0.23	0.10	
			TOTALS
PEAK FLOW (cms)=	0.58	0.14	0.693 (iii)
TIME TO PEAK (hrs)=	12.00	12.10	12.00
RUNOFF VOLUME (mm)=	53.42	19.61	38.55
TOTAL RAINFALL (mm)=	55.43	55.43	55.43
RUNOFF COEFFICIENT =	0.96	0.35	0.70

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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      61.19        36.93
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.93 (ii)    9.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.02         0.137 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.07         12.00
     RUNOFF VOLUME    (mm)=      53.43        15.75         36.85
     TOTAL RAINFALL   (mm)=      55.43        55.43         55.43
     RUNOFF COEFFICIENT   =       0.96         0.28          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.14     12.00   36.85
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.23      0.14     12.00   36.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     1.23   0.137    12.00    36.85
      + ID2= 2 (  0203):     6.36   0.693    12.00    38.55
        ================================================
        ID = 3 (  0016):     7.59   0.829    12.00    38.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      61.19        18.91
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       3.39 (ii)   11.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.29         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.03         0.196 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.10         12.00
     RUNOFF VOLUME    (mm)=      53.43        14.03         33.73
     TOTAL RAINFALL   (mm)=      55.43        55.43         55.43
     RUNOFF COEFFICIENT   =       0.96         0.25          0.61


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      61.19        36.93
               over (min)        6.00        13.00
     Storage Coeff.  (min)=       5.87 (ii)   12.09 (ii)
     Unit Hyd. Tpeak (min)=       6.00        13.00
     Unit Hyd. peak  (cms)=       0.19         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.09         0.20         1.258 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.12         12.02
     RUNOFF VOLUME    (mm)=      53.42        15.75         36.85
     TOTAL RAINFALL   (mm)=      55.43        55.43         55.43
     RUNOFF COEFFICIENT   =       0.96         0.28          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
```

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--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      61.19        36.93
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       4.54 (ii)   10.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.24         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.49         0.09         0.565 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.08         12.00
     RUNOFF VOLUME    (mm)=      53.42        15.75         36.85
     TOTAL RAINFALL   (mm)=      55.43        55.43         55.43
     RUNOFF COEFFICIENT   =       0.96         0.28          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      61.19        36.93
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       5.47 (ii)   11.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.21         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.16         1.016 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.10         12.00
     RUNOFF VOLUME    (mm)=      53.43        15.75         36.85
     TOTAL RAINFALL   (mm)=      55.43        55.43         55.43
     RUNOFF COEFFICIENT   =       0.96         0.28          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   1.258    12.02    36.85
     + ID2= 2 (  0302):     5.31   0.565    12.00    36.85
```



```
       ==============================================
       ID = 3 (  0013):    17.80   1.819    12.02    36.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   1.819    12.02    36.85
     + ID2= 2 (  0303):     9.87   1.016    12.00    36.85
       ==============================================
       ID = 1 (  0013):    27.67   2.832    12.02    36.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   2.832    12.02    36.85
     + ID2= 2 (  0016):     7.59   0.829    12.00    38.27
       ==============================================
       ID = 3 (  0012):    35.26   3.661    12.00    37.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.26   3.661    12.00    37.16
     + ID2= 2 (  0204):     2.01   0.196    12.00    33.73
       ==============================================
       ID = 1 (  0012):    37.27   3.857    12.00    36.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4389      1.4219
                          0.1014     0.3040   |   0.9212      1.8498
                          0.1939     0.6475   |   1.2450      2.2118
                          0.2548     1.0211   |   1.6046      2.3050
                          0.2583     1.0470   |   4.5503      2.6235

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.270      3.857     12.00      36.97
   OUTFLOW: ID= 1 (  0011)     37.270      0.224     13.10      32.92

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.80
                  TIME SHIFT OF PEAK FLOW         (min)= 66.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8310

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================================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\b8df3ebe-d196-4ac6-8155-946ea7bb7a61\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\b8df3ebe-d196-4ac6-8155-946ea7bb7a61\sce


DATE: 03/23/2019                          TIME: 12:54:28

USER:



COMMENTS: _____


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


--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\6870b935
| Ptotal= 77.82 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
--------------------
                       Duration of storm    = 24.00 hrs
                       Mass curve time step = 15.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.87 |  6.25    0.00 | 12.25   11.21 | 18.25    1.40
               0.50    0.84 |  6.50    0.00 | 12.50   11.21 | 18.50    1.40
               0.75    0.87 |  6.75    0.00 | 12.75    5.76 | 18.75    1.40
               1.00    0.84 |  7.00    0.00 | 13.00    5.76 | 19.00    1.40
               1.25    0.87 |  7.25    3.11 | 13.25    1.09 | 19.25    1.40
               1.50    0.84 |  7.50    3.11 | 13.50    1.09 | 19.50    1.40
               1.75    0.87 |  7.75    3.11 | 13.75    6.38 | 19.75    1.40
               2.00    0.84 |  8.00    3.11 | 14.00    6.38 | 20.00    1.40
               2.25    1.03 |  8.25    0.00 | 14.25    2.33 | 20.25    0.93
               2.50    1.00 |  8.50    0.00 | 14.50    2.33 | 20.50    0.93
               2.75    1.03 |  8.75    4.20 | 14.75    2.33 | 20.75    0.93
               3.00    1.00 |  9.00    4.20 | 15.00    2.33 | 21.00    0.93
               3.25    1.03 |  9.25    2.49 | 15.25    2.33 | 21.25    0.93
```



```
               3.50    1.00 |  9.50    2.49 | 15.50    2.33 | 21.50    0.93
               3.75    1.03 |  9.75    2.80 | 15.75    2.33 | 21.75    0.93
               4.00    1.00 | 10.00    2.80 | 16.00    2.33 | 22.00    0.93
               4.25    1.25 | 10.25    3.58 | 16.25    1.40 | 22.25    0.93
               4.50    1.25 | 10.50    3.58 | 16.50    1.40 | 22.50    0.93
               4.75    1.25 | 10.75    4.82 | 16.75    1.40 | 22.75    0.93
               5.00    1.25 | 11.00    4.82 | 17.00    1.40 | 23.00    0.93
               5.25    1.25 | 11.25    7.47 | 17.25    1.40 | 23.25    0.93
               5.50    1.25 | 11.50    7.47 | 17.50    1.40 | 23.50    0.93
               5.75    1.25 | 11.75   32.37 | 17.75    1.40 | 23.75    0.93
               6.00    1.25 | 12.00   85.91 | 18.00    1.40 | 24.00    0.93

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--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    0.87 | 6.017    0.00 |12.017   11.26 | 18.02    1.40
               0.033    0.87 | 6.033    0.00 |12.033   11.21 | 18.03    1.40
               0.050    0.87 | 6.050    0.00 |12.050   11.21 | 18.05    1.40
               0.067    0.87 | 6.067    0.00 |12.067   11.21 | 18.07    1.40
               0.083    0.87 | 6.083    0.00 |12.083   11.21 | 18.08    1.40
               0.100    0.87 | 6.100    0.00 |12.100   11.21 | 18.10    1.40
               0.117    0.87 | 6.117    0.00 |12.117   11.21 | 18.12    1.40
               0.133    0.87 | 6.133    0.00 |12.133   11.21 | 18.13    1.40
               0.150    0.87 | 6.150    0.00 |12.150   11.21 | 18.15    1.40
               0.167    0.87 | 6.167    0.00 |12.167   11.21 | 18.17    1.40
               0.183    0.87 | 6.183    0.00 |12.183   11.21 | 18.18    1.40
               0.200    0.87 | 6.200    0.00 |12.200   11.21 | 18.20    1.40
               0.217    0.87 | 6.217    0.00 |12.217   11.21 | 18.22    1.40
               0.233    0.87 | 6.233    0.00 |12.233   11.21 | 18.23    1.40
               0.250    0.87 | 6.250    0.00 |12.250   11.21 | 18.25    1.40
               0.267    0.84 | 6.267    0.00 |12.267   11.21 | 18.27    1.40
               0.283    0.84 | 6.283    0.00 |12.283   11.21 | 18.28    1.40
               0.300    0.84 | 6.300    0.00 |12.300   11.21 | 18.30    1.40
               0.317    0.84 | 6.317    0.00 |12.317   11.21 | 18.32    1.40
               0.333    0.84 | 6.333    0.00 |12.333   11.21 | 18.33    1.40
               0.350    0.84 | 6.350    0.00 |12.350   11.21 | 18.35    1.40
               0.367    0.84 | 6.367    0.00 |12.367   11.21 | 18.37    1.40
               0.383    0.84 | 6.383    0.00 |12.383   11.21 | 18.38    1.40
               0.400    0.84 | 6.400    0.00 |12.400   11.21 | 18.40    1.40
               0.417    0.84 | 6.417    0.00 |12.417   11.21 | 18.42    1.40
               0.433    0.84 | 6.433    0.00 |12.433   11.21 | 18.43    1.40
               0.450    0.84 | 6.450    0.00 |12.450   11.21 | 18.45    1.40
               0.467    0.84 | 6.467    0.00 |12.467   11.21 | 18.47    1.40
               0.483    0.84 | 6.483    0.00 |12.483   11.21 | 18.48    1.40
               0.500    0.84 | 6.500    0.00 |12.500   11.21 | 18.50    1.40
               0.517    0.87 | 6.517    0.00 |12.517    5.76 | 18.52    1.40
               0.533    0.87 | 6.533    0.00 |12.533    5.76 | 18.53    1.40
               0.550    0.87 | 6.550    0.00 |12.550    5.76 | 18.55    1.40
               0.567    0.87 | 6.567    0.00 |12.567    5.76 | 18.57    1.40
               0.583    0.87 | 6.583    0.00 |12.583    5.76 | 18.58    1.40
               0.600    0.87 | 6.600    0.00 |12.600    5.76 | 18.60    1.40
```

0.617	0.87	6.617	0.00	12.617	5.76	18.62	1.40
0.633	0.87	6.633	0.00	12.633	5.76	18.63	1.40
0.650	0.87	6.650	0.00	12.650	5.76	18.65	1.40
0.667	0.87	6.667	0.00	12.667	5.76	18.67	1.40
0.683	0.87	6.683	0.00	12.683	5.76	18.68	1.40
0.700	0.87	6.700	0.00	12.700	5.76	18.70	1.40
0.717	0.87	6.717	0.00	12.717	5.76	18.72	1.40
0.733	0.87	6.733	0.00	12.733	5.76	18.73	1.40
0.750	0.87	6.750	0.00	12.750	5.76	18.75	1.40
0.767	0.84	6.767	0.00	12.767	5.76	18.77	1.40
0.783	0.84	6.783	0.00	12.783	5.76	18.78	1.40
0.800	0.84	6.800	0.00	12.800	5.76	18.80	1.40
0.817	0.84	6.817	0.00	12.817	5.76	18.82	1.40
0.833	0.84	6.833	0.00	12.833	5.76	18.83	1.40
0.850	0.84	6.850	0.00	12.850	5.76	18.85	1.40
0.867	0.84	6.867	0.00	12.867	5.76	18.87	1.40
0.883	0.84	6.883	0.00	12.883	5.76	18.88	1.40
0.900	0.84	6.900	0.00	12.900	5.76	18.90	1.40
0.917	0.84	6.917	0.00	12.917	5.76	18.92	1.40
0.933	0.84	6.933	0.00	12.933	5.76	18.93	1.40
0.950	0.84	6.950	0.00	12.950	5.76	18.95	1.40
0.967	0.84	6.967	0.00	12.967	5.76	18.97	1.40
0.983	0.84	6.983	0.00	12.983	5.76	18.98	1.40
1.000	0.84	7.000	0.01	13.000	5.76	19.00	1.40
1.017	0.87	7.017	3.11	13.017	1.10	19.02	1.40
1.033	0.87	7.033	3.11	13.033	1.09	19.03	1.40
1.050	0.87	7.050	3.11	13.050	1.09	19.05	1.40
1.067	0.87	7.067	3.11	13.067	1.09	19.07	1.40
1.083	0.87	7.083	3.11	13.083	1.09	19.08	1.40
1.100	0.87	7.100	3.11	13.100	1.09	19.10	1.40
1.117	0.87	7.117	3.11	13.117	1.09	19.12	1.40
1.133	0.87	7.133	3.11	13.133	1.09	19.13	1.40
1.150	0.87	7.150	3.11	13.150	1.09	19.15	1.40
1.167	0.87	7.167	3.11	13.167	1.09	19.17	1.40
1.183	0.87	7.183	3.11	13.183	1.09	19.18	1.40
1.200	0.87	7.200	3.11	13.200	1.09	19.20	1.40
1.217	0.87	7.217	3.11	13.217	1.09	19.22	1.40
1.233	0.87	7.233	3.11	13.233	1.09	19.23	1.40
1.250	0.87	7.250	3.11	13.250	1.09	19.25	1.40
1.267	0.84	7.267	3.11	13.267	1.09	19.27	1.40
1.283	0.84	7.283	3.11	13.283	1.09	19.28	1.40
1.300	0.84	7.300	3.11	13.300	1.09	19.30	1.40
1.317	0.84	7.317	3.11	13.317	1.09	19.32	1.40
1.333	0.84	7.333	3.11	13.333	1.09	19.33	1.40
1.350	0.84	7.350	3.11	13.350	1.09	19.35	1.40
1.367	0.84	7.367	3.11	13.367	1.09	19.37	1.40
1.383	0.84	7.383	3.11	13.383	1.09	19.38	1.40
1.400	0.84	7.400	3.11	13.400	1.09	19.40	1.40
1.417	0.84	7.417	3.11	13.417	1.09	19.42	1.40
1.433	0.84	7.433	3.11	13.433	1.09	19.43	1.40
1.450	0.84	7.450	3.11	13.450	1.09	19.45	1.40
1.467	0.84	7.467	3.11	13.467	1.09	19.47	1.40
1.483	0.84	7.483	3.11	13.483	1.09	19.48	1.40
1.500	0.84	7.500	3.11	13.500	1.09	19.50	1.40
1.517	0.87	7.517	3.11	13.517	6.37	19.52	1.40
1.533	0.87	7.533	3.11	13.533	6.38	19.53	1.40
1.550	0.87	7.550	3.11	13.550	6.38	19.55	1.40
1.567	0.87	7.567	3.11	13.567	6.38	19.57	1.40
1.583	0.87	7.583	3.11	13.583	6.38	19.58	1.40
1.600	0.87	7.600	3.11	13.600	6.38	19.60	1.40
1.617	0.87	7.617	3.11	13.617	6.38	19.62	1.40
1.633	0.87	7.633	3.11	13.633	6.38	19.63	1.40
1.650	0.87	7.650	3.11	13.650	6.38	19.65	1.40
1.667	0.87	7.667	3.11	13.667	6.38	19.67	1.40
1.683	0.87	7.683	3.11	13.683	6.38	19.68	1.40
1.700	0.87	7.700	3.11	13.700	6.38	19.70	1.40
1.717	0.87	7.717	3.11	13.717	6.38	19.72	1.40

1.733	0.87	7.733	3.11	13.733	6.38	19.73	1.40
1.750	0.87	7.750	3.11	13.750	6.38	19.75	1.40
1.767	0.84	7.767	3.11	13.767	6.38	19.77	1.40
1.783	0.84	7.783	3.11	13.783	6.38	19.78	1.40
1.800	0.84	7.800	3.11	13.800	6.38	19.80	1.40
1.817	0.84	7.817	3.11	13.817	6.38	19.82	1.40
1.833	0.84	7.833	3.11	13.833	6.38	19.83	1.40
1.850	0.84	7.850	3.11	13.850	6.38	19.85	1.40
1.867	0.84	7.867	3.11	13.867	6.38	19.87	1.40
1.883	0.84	7.883	3.11	13.883	6.38	19.88	1.40
1.900	0.84	7.900	3.11	13.900	6.38	19.90	1.40
1.917	0.84	7.917	3.11	13.917	6.38	19.92	1.40
1.933	0.84	7.933	3.11	13.933	6.38	19.93	1.40
1.950	0.84	7.950	3.11	13.950	6.38	19.95	1.40
1.967	0.84	7.967	3.11	13.967	6.38	19.97	1.40
1.983	0.84	7.983	3.11	13.983	6.38	19.98	1.40
2.000	0.84	8.000	3.10	14.000	6.38	20.00	1.40
2.017	1.03	8.017	0.00	14.017	2.34	20.02	0.94
2.033	1.03	8.033	0.00	14.033	2.33	20.03	0.93
2.050	1.03	8.050	0.00	14.050	2.33	20.05	0.93
2.067	1.03	8.067	0.00	14.067	2.33	20.07	0.93
2.083	1.03	8.083	0.00	14.083	2.33	20.08	0.93
2.100	1.03	8.100	0.00	14.100	2.33	20.10	0.93
2.117	1.03	8.117	0.00	14.117	2.33	20.12	0.93
2.133	1.03	8.133	0.00	14.133	2.33	20.13	0.93
2.150	1.03	8.150	0.00	14.150	2.33	20.15	0.93
2.167	1.03	8.167	0.00	14.167	2.33	20.17	0.93
2.183	1.03	8.183	0.00	14.183	2.33	20.18	0.93
2.200	1.03	8.200	0.00	14.200	2.33	20.20	0.93
2.217	1.03	8.217	0.00	14.217	2.33	20.22	0.93
2.233	1.03	8.233	0.00	14.233	2.33	20.23	0.93
2.250	1.03	8.250	0.00	14.250	2.33	20.25	0.93
2.267	1.00	8.267	0.00	14.267	2.33	20.27	0.93
2.283	1.00	8.283	0.00	14.283	2.33	20.28	0.93
2.300	1.00	8.300	0.00	14.300	2.33	20.30	0.93
2.317	1.00	8.317	0.00	14.317	2.33	20.32	0.93
2.333	1.00	8.333	0.00	14.333	2.33	20.33	0.93
2.350	1.00	8.350	0.00	14.350	2.33	20.35	0.93
2.367	1.00	8.367	0.00	14.367	2.33	20.37	0.93
2.383	1.00	8.383	0.00	14.383	2.33	20.38	0.93
2.400	1.00	8.400	0.00	14.400	2.33	20.40	0.93
2.417	1.00	8.417	0.00	14.417	2.33	20.42	0.93
2.433	1.00	8.433	0.00	14.433	2.33	20.43	0.93
2.450	1.00	8.450	0.00	14.450	2.33	20.45	0.93
2.467	1.00	8.467	0.00	14.467	2.33	20.47	0.93
2.483	1.00	8.483	0.00	14.483	2.33	20.48	0.93
2.500	1.00	8.500	0.01	14.500	2.33	20.50	0.93
2.517	1.03	8.517	4.20	14.517	2.33	20.52	0.93
2.533	1.03	8.533	4.20	14.533	2.33	20.53	0.93
2.550	1.03	8.550	4.20	14.550	2.33	20.55	0.93
2.567	1.03	8.567	4.20	14.567	2.33	20.57	0.93
2.583	1.03	8.583	4.20	14.583	2.33	20.58	0.93
2.600	1.03	8.600	4.20	14.600	2.33	20.60	0.93
2.617	1.03	8.617	4.20	14.617	2.33	20.62	0.93
2.633	1.03	8.633	4.20	14.633	2.33	20.63	0.93
2.650	1.03	8.650	4.20	14.650	2.33	20.65	0.93
2.667	1.03	8.667	4.20	14.667	2.33	20.67	0.93
2.683	1.03	8.683	4.20	14.683	2.33	20.68	0.93
2.700	1.03	8.700	4.20	14.700	2.33	20.70	0.93
2.717	1.03	8.717	4.20	14.717	2.33	20.72	0.93
2.733	1.03	8.733	4.20	14.733	2.33	20.73	0.93
2.750	1.03	8.750	4.20	14.750	2.33	20.75	0.93
2.767	1.00	8.767	4.20	14.767	2.33	20.77	0.93
2.783	1.00	8.783	4.20	14.783	2.33	20.78	0.93
2.800	1.00	8.800	4.20	14.800	2.33	20.80	0.93
2.817	1.00	8.817	4.20	14.817	2.33	20.82	0.93
2.833	1.00	8.833	4.20	14.833	2.33	20.83	0.93

2.850	1.00	8.850	4.20	14.850	2.33	20.85	0.93
2.867	1.00	8.867	4.20	14.867	2.33	20.87	0.93
2.883	1.00	8.883	4.20	14.883	2.33	20.88	0.93
2.900	1.00	8.900	4.20	14.900	2.33	20.90	0.93
2.917	1.00	8.917	4.20	14.917	2.33	20.92	0.93
2.933	1.00	8.933	4.20	14.933	2.33	20.93	0.93
2.950	1.00	8.950	4.20	14.950	2.33	20.95	0.93
2.967	1.00	8.967	4.20	14.967	2.33	20.97	0.93
2.983	1.00	8.983	4.20	14.983	2.33	20.98	0.93
3.000	1.00	9.000	4.20	15.000	2.33	21.00	0.93
3.017	1.03	9.017	2.49	15.017	2.33	21.02	0.93
3.033	1.03	9.033	2.49	15.033	2.33	21.03	0.93
3.050	1.03	9.050	2.49	15.050	2.33	21.05	0.93
3.067	1.03	9.067	2.49	15.067	2.33	21.07	0.93
3.083	1.03	9.083	2.49	15.083	2.33	21.08	0.93
3.100	1.03	9.100	2.49	15.100	2.33	21.10	0.93
3.117	1.03	9.117	2.49	15.117	2.33	21.12	0.93
3.133	1.03	9.133	2.49	15.133	2.33	21.13	0.93
3.150	1.03	9.150	2.49	15.150	2.33	21.15	0.93
3.167	1.03	9.167	2.49	15.167	2.33	21.17	0.93
3.183	1.03	9.183	2.49	15.183	2.33	21.18	0.93
3.200	1.03	9.200	2.49	15.200	2.33	21.20	0.93
3.217	1.03	9.217	2.49	15.217	2.33	21.22	0.93
3.233	1.03	9.233	2.49	15.233	2.33	21.23	0.93
3.250	1.03	9.250	2.49	15.250	2.33	21.25	0.93
3.267	1.00	9.267	2.49	15.267	2.33	21.27	0.93
3.283	1.00	9.283	2.49	15.283	2.33	21.28	0.93
3.300	1.00	9.300	2.49	15.300	2.33	21.30	0.93
3.317	1.00	9.317	2.49	15.317	2.33	21.32	0.93
3.333	1.00	9.333	2.49	15.333	2.33	21.33	0.93
3.350	1.00	9.350	2.49	15.350	2.33	21.35	0.93
3.367	1.00	9.367	2.49	15.367	2.33	21.37	0.93
3.383	1.00	9.383	2.49	15.383	2.33	21.38	0.93
3.400	1.00	9.400	2.49	15.400	2.33	21.40	0.93
3.417	1.00	9.417	2.49	15.417	2.33	21.42	0.93
3.433	1.00	9.433	2.49	15.433	2.33	21.43	0.93
3.450	1.00	9.450	2.49	15.450	2.33	21.45	0.93
3.467	1.00	9.467	2.49	15.467	2.33	21.47	0.93
3.483	1.00	9.483	2.49	15.483	2.33	21.48	0.93
3.500	1.00	9.500	2.49	15.500	2.33	21.50	0.93
3.517	1.03	9.517	2.80	15.517	2.33	21.52	0.93
3.533	1.03	9.533	2.80	15.533	2.33	21.53	0.93
3.550	1.03	9.550	2.80	15.550	2.33	21.55	0.93
3.567	1.03	9.567	2.80	15.567	2.33	21.57	0.93
3.583	1.03	9.583	2.80	15.583	2.33	21.58	0.93
3.600	1.03	9.600	2.80	15.600	2.33	21.60	0.93
3.617	1.03	9.617	2.80	15.617	2.33	21.62	0.93
3.633	1.03	9.633	2.80	15.633	2.33	21.63	0.93
3.650	1.03	9.650	2.80	15.650	2.33	21.65	0.93
3.667	1.03	9.667	2.80	15.667	2.33	21.67	0.93
3.683	1.03	9.683	2.80	15.683	2.33	21.68	0.93
3.700	1.03	9.700	2.80	15.700	2.33	21.70	0.93
3.717	1.03	9.717	2.80	15.717	2.33	21.72	0.93
3.733	1.03	9.733	2.80	15.733	2.33	21.73	0.93
3.750	1.03	9.750	2.80	15.750	2.33	21.75	0.93
3.767	1.00	9.767	2.80	15.767	2.33	21.77	0.93
3.783	1.00	9.783	2.80	15.783	2.33	21.78	0.93
3.800	1.00	9.800	2.80	15.800	2.33	21.80	0.93
3.817	1.00	9.817	2.80	15.817	2.33	21.82	0.93
3.833	1.00	9.833	2.80	15.833	2.33	21.83	0.93
3.850	1.00	9.850	2.80	15.850	2.33	21.85	0.93
3.867	1.00	9.867	2.80	15.867	2.33	21.87	0.93
3.883	1.00	9.883	2.80	15.883	2.33	21.88	0.93
3.900	1.00	9.900	2.80	15.900	2.33	21.90	0.93
3.917	1.00	9.917	2.80	15.917	2.33	21.92	0.93
3.933	1.00	9.933	2.80	15.933	2.33	21.93	0.93
3.950	1.00	9.950	2.80	15.950	2.33	21.95	0.93

3.967	1.00	9.967	2.80	15.967	2.33	21.97	0.93
3.983	1.00	9.983	2.80	15.983	2.33	21.98	0.93
4.000	1.00	10.000	2.80	16.000	2.33	22.00	0.93
4.017	1.25	10.017	3.58	16.017	1.40	22.02	0.93
4.033	1.25	10.033	3.58	16.033	1.40	22.03	0.93
4.050	1.25	10.050	3.58	16.050	1.40	22.05	0.93
4.067	1.25	10.067	3.58	16.067	1.40	22.07	0.93
4.083	1.25	10.083	3.58	16.083	1.40	22.08	0.93
4.100	1.25	10.100	3.58	16.100	1.40	22.10	0.93
4.117	1.25	10.117	3.58	16.117	1.40	22.12	0.93
4.133	1.25	10.133	3.58	16.133	1.40	22.13	0.93
4.150	1.25	10.150	3.58	16.150	1.40	22.15	0.93
4.167	1.25	10.167	3.58	16.167	1.40	22.17	0.93
4.183	1.25	10.183	3.58	16.183	1.40	22.18	0.93
4.200	1.25	10.200	3.58	16.200	1.40	22.20	0.93
4.217	1.25	10.217	3.58	16.217	1.40	22.22	0.93
4.233	1.25	10.233	3.58	16.233	1.40	22.23	0.93
4.250	1.25	10.250	3.58	16.250	1.40	22.25	0.93
4.267	1.25	10.267	3.58	16.267	1.40	22.27	0.93
4.283	1.25	10.283	3.58	16.283	1.40	22.28	0.93
4.300	1.25	10.300	3.58	16.300	1.40	22.30	0.93
4.317	1.25	10.317	3.58	16.317	1.40	22.32	0.93
4.333	1.25	10.333	3.58	16.333	1.40	22.33	0.93
4.350	1.25	10.350	3.58	16.350	1.40	22.35	0.93
4.367	1.25	10.367	3.58	16.367	1.40	22.37	0.93
4.383	1.25	10.383	3.58	16.383	1.40	22.38	0.93
4.400	1.25	10.400	3.58	16.400	1.40	22.40	0.93
4.417	1.25	10.417	3.58	16.417	1.40	22.42	0.93
4.433	1.25	10.433	3.58	16.433	1.40	22.43	0.93
4.450	1.25	10.450	3.58	16.450	1.40	22.45	0.93
4.467	1.25	10.467	3.58	16.467	1.40	22.47	0.93
4.483	1.25	10.483	3.58	16.483	1.40	22.48	0.93
4.500	1.25	10.500	3.58	16.500	1.40	22.50	0.93
4.517	1.25	10.517	4.82	16.517	1.40	22.52	0.93
4.533	1.25	10.533	4.82	16.533	1.40	22.53	0.93
4.550	1.25	10.550	4.82	16.550	1.40	22.55	0.93
4.567	1.25	10.567	4.82	16.567	1.40	22.57	0.93
4.583	1.25	10.583	4.82	16.583	1.40	22.58	0.93
4.600	1.25	10.600	4.82	16.600	1.40	22.60	0.93
4.617	1.25	10.617	4.82	16.617	1.40	22.62	0.93
4.633	1.25	10.633	4.82	16.633	1.40	22.63	0.93
4.650	1.25	10.650	4.82	16.650	1.40	22.65	0.93
4.667	1.25	10.667	4.82	16.667	1.40	22.67	0.93
4.683	1.25	10.683	4.82	16.683	1.40	22.68	0.93
4.700	1.25	10.700	4.82	16.700	1.40	22.70	0.93
4.717	1.25	10.717	4.82	16.717	1.40	22.72	0.93
4.733	1.25	10.733	4.82	16.733	1.40	22.73	0.93
4.750	1.25	10.750	4.82	16.750	1.40	22.75	0.93
4.767	1.25	10.767	4.82	16.767	1.40	22.77	0.93
4.783	1.25	10.783	4.82	16.783	1.40	22.78	0.93
4.800	1.25	10.800	4.82	16.800	1.40	22.80	0.93
4.817	1.25	10.817	4.82	16.817	1.40	22.82	0.93
4.833	1.25	10.833	4.82	16.833	1.40	22.83	0.93
4.850	1.25	10.850	4.82	16.850	1.40	22.85	0.93
4.867	1.25	10.867	4.82	16.867	1.40	22.87	0.93
4.883	1.25	10.883	4.82	16.883	1.40	22.88	0.93
4.900	1.25	10.900	4.82	16.900	1.40	22.90	0.93
4.917	1.25	10.917	4.82	16.917	1.40	22.92	0.93
4.933	1.25	10.933	4.82	16.933	1.40	22.93	0.93
4.950	1.25	10.950	4.82	16.950	1.40	22.95	0.93
4.967	1.25	10.967	4.82	16.967	1.40	22.97	0.93
4.983	1.25	10.983	4.82	16.983	1.40	22.98	0.93
5.000	1.25	11.000	4.83	17.000	1.40	23.00	0.93
5.017	1.25	11.017	7.47	17.017	1.40	23.02	0.93
5.033	1.25	11.033	7.47	17.033	1.40	23.03	0.93
5.050	1.25	11.050	7.47	17.050	1.40	23.05	0.93
5.067	1.25	11.067	7.47	17.067	1.40	23.07	0.93

5.083	1.25	11.083	7.47	17.083	1.40	23.08	0.93
5.100	1.25	11.100	7.47	17.100	1.40	23.10	0.93
5.117	1.25	11.117	7.47	17.117	1.40	23.12	0.93
5.133	1.25	11.133	7.47	17.133	1.40	23.13	0.93
5.150	1.25	11.150	7.47	17.150	1.40	23.15	0.93
5.167	1.25	11.167	7.47	17.167	1.40	23.17	0.93
5.183	1.25	11.183	7.47	17.183	1.40	23.18	0.93
5.200	1.25	11.200	7.47	17.200	1.40	23.20	0.93
5.217	1.25	11.217	7.47	17.217	1.40	23.22	0.93
5.233	1.25	11.233	7.47	17.233	1.40	23.23	0.93
5.250	1.25	11.250	7.47	17.250	1.40	23.25	0.93
5.267	1.25	11.267	7.47	17.267	1.40	23.27	0.93
5.283	1.25	11.283	7.47	17.283	1.40	23.28	0.93
5.300	1.25	11.300	7.47	17.300	1.40	23.30	0.93
5.317	1.25	11.317	7.47	17.317	1.40	23.32	0.93
5.333	1.25	11.333	7.47	17.333	1.40	23.33	0.93
5.350	1.25	11.350	7.47	17.350	1.40	23.35	0.93
5.367	1.25	11.367	7.47	17.367	1.40	23.37	0.93
5.383	1.25	11.383	7.47	17.383	1.40	23.38	0.93
5.400	1.25	11.400	7.47	17.400	1.40	23.40	0.93
5.417	1.25	11.417	7.47	17.417	1.40	23.42	0.93
5.433	1.25	11.433	7.47	17.433	1.40	23.43	0.93
5.450	1.25	11.450	7.47	17.450	1.40	23.45	0.93
5.467	1.25	11.467	7.47	17.467	1.40	23.47	0.93
5.483	1.25	11.483	7.47	17.483	1.40	23.48	0.93
5.500	1.25	11.500	7.47	17.500	1.40	23.50	0.93
5.517	1.25	11.517	32.37	17.517	1.40	23.52	0.93
5.533	1.25	11.533	32.37	17.533	1.40	23.53	0.93
5.550	1.25	11.550	32.37	17.550	1.40	23.55	0.93
5.567	1.25	11.567	32.37	17.567	1.40	23.57	0.93
5.583	1.25	11.583	32.37	17.583	1.40	23.58	0.93
5.600	1.25	11.600	32.37	17.600	1.40	23.60	0.93
5.617	1.25	11.617	32.37	17.617	1.40	23.62	0.93
5.633	1.25	11.633	32.37	17.633	1.40	23.63	0.93
5.650	1.25	11.650	32.37	17.650	1.40	23.65	0.93
5.667	1.25	11.667	32.37	17.667	1.40	23.67	0.93
5.683	1.25	11.683	32.37	17.683	1.40	23.68	0.93
5.700	1.25	11.700	32.37	17.700	1.40	23.70	0.93
5.717	1.25	11.717	32.37	17.717	1.40	23.72	0.93
5.733	1.25	11.733	32.37	17.733	1.40	23.73	0.93
5.750	1.25	11.750	32.37	17.750	1.40	23.75	0.93
5.767	1.25	11.767	85.89	17.767	1.40	23.77	0.93
5.783	1.25	11.783	85.91	17.783	1.40	23.78	0.93
5.800	1.25	11.800	85.91	17.800	1.40	23.80	0.93
5.817	1.25	11.817	85.91	17.817	1.40	23.82	0.93
5.833	1.25	11.833	85.91	17.833	1.40	23.83	0.93
5.850	1.25	11.850	85.91	17.850	1.40	23.85	0.93
5.867	1.25	11.867	85.91	17.867	1.40	23.87	0.93
5.883	1.25	11.883	85.91	17.883	1.40	23.88	0.93
5.900	1.25	11.900	85.91	17.900	1.40	23.90	0.93
5.917	1.25	11.917	85.91	17.917	1.40	23.92	0.93
5.933	1.25	11.933	85.91	17.933	1.40	23.93	0.93
5.950	1.25	11.950	85.91	17.950	1.40	23.95	0.93
5.967	1.25	11.967	85.91	17.967	1.40	23.97	0.93
5.983	1.25	11.983	85.91	17.983	1.40	23.98	0.93
6.000	1.24	12.000	85.91	18.000	1.40	24.00	0.93

Max.Eff.Inten.(mm/hr)=	85.91	52.85	
over (min)	5.00	26.00	
Storage Coeff. (min)=	3.18 (ii)	25.86 (ii)	
Unit Hyd. Tpeak (min)=	5.00	26.00	
Unit Hyd. peak (cms)=	0.30	0.04	
			TOTALS
PEAK FLOW (cms)=	0.33	0.06	0.358 (iii)
TIME TO PEAK (hrs)=	12.00	12.32	12.00
RUNOFF VOLUME (mm)=	75.81	33.26	56.67
TOTAL RAINFALL (mm)=	77.82	77.82	77.82

RUNOFF COEFFICIENT = 0.97 0.43 0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area (ha)= 1.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.92	0.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	90.55	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	85.91	81.04	
over (min)	5.00	8.00	
Storage Coeff. (min)=	2.56 (ii)	7.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	8.00	
Unit Hyd. peak (cms)=	0.33	0.14	
			TOTALS
PEAK FLOW (cms)=	0.16	0.05	0.216 (iii)
TIME TO PEAK (hrs)=	12.00	12.03	12.00
RUNOFF VOLUME (mm)=	75.82	34.40	57.59
TOTAL RAINFALL (mm)=	77.82	77.82	77.82
RUNOFF COEFFICIENT =	0.97	0.44	0.74

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)= 6.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	4.77	1.59	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	205.91	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	85.91	81.04	
over (min)	5.00	10.00	
Storage Coeff. (min)=	4.19 (ii)	9.62 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.25	0.12	
			TOTALS
PEAK FLOW (cms)=	0.82	0.26	1.060 (iii)
TIME TO PEAK (hrs)=	12.00	12.07	12.00
RUNOFF VOLUME (mm)=	75.81	34.39	57.59
TOTAL RAINFALL (mm)=	77.82	77.82	77.82
RUNOFF COEFFICIENT =	0.97	0.44	0.74

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.91        66.63
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       2.56 (ii)    7.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.33         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04         0.206 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05         12.00
     RUNOFF VOLUME    (mm)=      75.82        28.40         54.95
     TOTAL RAINFALL   (mm)=      77.82        77.82         77.82
     RUNOFF COEFFICIENT   =       0.97         0.36          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.21     12.00   54.95
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.23      0.21     12.00   54.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.23   0.206    12.00    54.95
     + ID2= 2 (  0203):     6.36   1.060    12.00    57.59
       ================================================
       ID = 3 (  0016):     7.59   1.266    12.00    57.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.91        35.09
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       2.96 (ii)   10.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.31         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.07         0.296 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.08         12.00
     RUNOFF VOLUME    (mm)=      75.81        26.03         50.93
     TOTAL RAINFALL   (mm)=      77.82        77.82         77.82
     RUNOFF COEFFICIENT   =       0.97         0.33          0.65


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.91        66.63
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       5.13 (ii)   10.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.22         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.58         0.40         1.926 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.08         12.00
     RUNOFF VOLUME    (mm)=      75.81        28.40         54.96
     TOTAL RAINFALL   (mm)=      77.82        77.82         77.82
     RUNOFF COEFFICIENT   =       0.97         0.36          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
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--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.91        66.63
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.97 (ii)    9.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.18          0.852 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.07         12.00
     RUNOFF VOLUME    (mm)=      75.81        28.40         54.96
     TOTAL RAINFALL   (mm)=      77.82        77.82         77.82
     RUNOFF COEFFICIENT   =       0.97         0.36          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.91        66.63
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       4.78 (ii)   10.21 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.23         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.26         0.32          1.538 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.08         12.00
     RUNOFF VOLUME    (mm)=      75.81        28.40         54.96
     TOTAL RAINFALL   (mm)=      77.82        77.82         77.82
     RUNOFF COEFFICIENT   =       0.97         0.36          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   1.926    12.00    54.96
     + ID2= 2 (  0302):     5.31   0.852    12.00    54.96
```



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       ================================================
       ID = 3 (  0013):    17.80   2.778    12.00    54.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   2.778    12.00    54.96
     + ID2= 2 (  0303):     9.87   1.538    12.00    54.96
       ================================================
       ID = 1 (  0013):    27.67   4.316    12.00    54.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   4.316    12.00    54.96
     + ID2= 2 (  0016):     7.59   1.266    12.00    57.17
       ================================================
       ID = 3 (  0012):    35.26   5.581    12.00    55.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.26   5.581    12.00    55.43
     + ID2= 2 (  0204):     2.01   0.296    12.00    50.93
       ================================================
       ID = 1 (  0012):    37.27   5.877    12.00    55.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4389      1.4219
                          0.1014     0.3040   |   0.9212      1.8498
                          0.1939     0.6475   |   1.2450      2.2118
                          0.2548     1.0211   |   1.6046      2.3050
                          0.2583     1.0470   |   4.5503      2.6235

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.270      5.877     12.00      55.19
   OUTFLOW: ID= 1 (  0011)     37.270      0.351     13.08      48.24

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.98
                  TIME SHIFT OF PEAK FLOW         (min)= 65.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.2399

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 FINISH
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       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\33ab1e43-89e6-44dd-bf46-cbfa06452379\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\33ab1e43-89e6-44dd-bf46-cbfa06452379\sce


DATE: 03/23/2019                          TIME: 12:54:26

USER:



COMMENTS: _____________________________________________________


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


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| MASS STORM      |    Filename: C:\Users\pturchet\AppD
|                 |              ata\Local\Temp\
|                 |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\d597e0b7
| Ptotal= 92.93 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
-------------------
                     Duration of storm    = 24.00 hrs
                     Mass curve time step = 15.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    1.04 |  6.25    0.00 | 12.25   13.38 | 18.25    1.67
               0.50    1.00 |  6.50    0.00 | 12.50   13.38 | 18.50    1.67
               0.75    1.04 |  6.75    0.00 | 12.75    6.88 | 18.75    1.67
               1.00    1.00 |  7.00    0.00 | 13.00    6.88 | 19.00    1.67
               1.25    1.04 |  7.25    3.72 | 13.25    1.30 | 19.25    1.67
               1.50    1.00 |  7.50    3.72 | 13.50    1.30 | 19.50    1.67
               1.75    1.04 |  7.75    3.72 | 13.75    7.62 | 19.75    1.67
               2.00    1.00 |  8.00    3.72 | 14.00    7.62 | 20.00    1.67
               2.25    1.23 |  8.25    0.00 | 14.25    2.79 | 20.25    1.12
```



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               2.50    1.19 |  8.50    0.00 | 14.50    2.79 | 20.50    1.12
               2.75    1.23 |  8.75    5.02 | 14.75    2.79 | 20.75    1.12
               3.00    1.19 |  9.00    5.02 | 15.00    2.79 | 21.00    1.12
               3.25    1.23 |  9.25    2.97 | 15.25    2.79 | 21.25    1.12
               3.50    1.19 |  9.50    2.97 | 15.50    2.79 | 21.50    1.12
               3.75    1.23 |  9.75    3.35 | 15.75    2.79 | 21.75    1.12
               4.00    1.19 | 10.00    3.35 | 16.00    2.79 | 22.00    1.12
               4.25    1.49 | 10.25    4.27 | 16.25    1.67 | 22.25    1.12
               4.50    1.49 | 10.50    4.27 | 16.50    1.67 | 22.50    1.12
               4.75    1.49 | 10.75    5.76 | 16.75    1.67 | 22.75    1.12
               5.00    1.49 | 11.00    5.76 | 17.00    1.67 | 23.00    1.12
               5.25    1.49 | 11.25    8.92 | 17.25    1.67 | 23.25    1.12
               5.50    1.49 | 11.50    8.92 | 17.50    1.67 | 23.50    1.12
               5.75    1.49 | 11.75   38.66 | 17.75    1.67 | 23.75    1.12
               6.00    1.49 | 12.00  102.59 | 18.00    1.67 | 24.00    1.12

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    1.04 | 6.017    0.00 |12.017   13.44 | 18.02    1.67
               0.033    1.04 | 6.033    0.00 |12.033   13.38 | 18.03    1.67
               0.050    1.04 | 6.050    0.00 |12.050   13.38 | 18.05    1.67
               0.067    1.04 | 6.067    0.00 |12.067   13.38 | 18.07    1.67
               0.083    1.04 | 6.083    0.00 |12.083   13.38 | 18.08    1.67
               0.100    1.04 | 6.100    0.00 |12.100   13.38 | 18.10    1.67
               0.117    1.04 | 6.117    0.00 |12.117   13.38 | 18.12    1.67
               0.133    1.04 | 6.133    0.00 |12.133   13.38 | 18.13    1.67
               0.150    1.04 | 6.150    0.00 |12.150   13.38 | 18.15    1.67
               0.167    1.04 | 6.167    0.00 |12.167   13.38 | 18.17    1.67
               0.183    1.04 | 6.183    0.00 |12.183   13.38 | 18.18    1.67
               0.200    1.04 | 6.200    0.00 |12.200   13.38 | 18.20    1.67
               0.217    1.04 | 6.217    0.00 |12.217   13.38 | 18.22    1.67
               0.233    1.04 | 6.233    0.00 |12.233   13.38 | 18.23    1.67
               0.250    1.04 | 6.250    0.00 |12.250   13.38 | 18.25    1.67
               0.267    1.00 | 6.267    0.00 |12.267   13.38 | 18.27    1.67
               0.283    1.00 | 6.283    0.00 |12.283   13.38 | 18.28    1.67
               0.300    1.00 | 6.300    0.00 |12.300   13.38 | 18.30    1.67
               0.317    1.00 | 6.317    0.00 |12.317   13.38 | 18.32    1.67
               0.333    1.00 | 6.333    0.00 |12.333   13.38 | 18.33    1.67
               0.350    1.00 | 6.350    0.00 |12.350   13.38 | 18.35    1.67
               0.367    1.00 | 6.367    0.00 |12.367   13.38 | 18.37    1.67
               0.383    1.00 | 6.383    0.00 |12.383   13.38 | 18.38    1.67
               0.400    1.00 | 6.400    0.00 |12.400   13.38 | 18.40    1.67
               0.417    1.00 | 6.417    0.00 |12.417   13.38 | 18.42    1.67
               0.433    1.00 | 6.433    0.00 |12.433   13.38 | 18.43    1.67
               0.450    1.00 | 6.450    0.00 |12.450   13.38 | 18.45    1.67
               0.467    1.00 | 6.467    0.00 |12.467   13.38 | 18.47    1.67
               0.483    1.00 | 6.483    0.00 |12.483   13.38 | 18.48    1.67
               0.500    1.00 | 6.500    0.00 |12.500   13.38 | 18.50    1.67
               0.517    1.04 | 6.517    0.00 |12.517    6.88 | 18.52    1.67
               0.533    1.04 | 6.533    0.00 |12.533    6.88 | 18.53    1.67
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0.550	1.04	6.550	0.00	12.550	6.88	18.55	1.67
0.567	1.04	6.567	0.00	12.567	6.88	18.57	1.67
0.583	1.04	6.583	0.00	12.583	6.88	18.58	1.67
0.600	1.04	6.600	0.00	12.600	6.88	18.60	1.67
0.617	1.04	6.617	0.00	12.617	6.88	18.62	1.67
0.633	1.04	6.633	0.00	12.633	6.88	18.63	1.67
0.650	1.04	6.650	0.00	12.650	6.88	18.65	1.67
0.667	1.04	6.667	0.00	12.667	6.88	18.67	1.67
0.683	1.04	6.683	0.00	12.683	6.88	18.68	1.67
0.700	1.04	6.700	0.00	12.700	6.88	18.70	1.67
0.717	1.04	6.717	0.00	12.717	6.88	18.72	1.67
0.733	1.04	6.733	0.00	12.733	6.88	18.73	1.67
0.750	1.04	6.750	0.00	12.750	6.88	18.75	1.67
0.767	1.00	6.767	0.00	12.767	6.88	18.77	1.67
0.783	1.00	6.783	0.00	12.783	6.88	18.78	1.67
0.800	1.00	6.800	0.00	12.800	6.88	18.80	1.67
0.817	1.00	6.817	0.00	12.817	6.88	18.82	1.67
0.833	1.00	6.833	0.00	12.833	6.88	18.83	1.67
0.850	1.00	6.850	0.00	12.850	6.88	18.85	1.67
0.867	1.00	6.867	0.00	12.867	6.88	18.87	1.67
0.883	1.00	6.883	0.00	12.883	6.88	18.88	1.67
0.900	1.00	6.900	0.00	12.900	6.88	18.90	1.67
0.917	1.00	6.917	0.00	12.917	6.88	18.92	1.67
0.933	1.00	6.933	0.00	12.933	6.88	18.93	1.67
0.950	1.00	6.950	0.00	12.950	6.88	18.95	1.67
0.967	1.00	6.967	0.00	12.967	6.88	18.97	1.67
0.983	1.00	6.983	0.00	12.983	6.88	18.98	1.67
1.000	1.00	7.000	0.01	13.000	6.88	19.00	1.67
1.017	1.04	7.017	3.72	13.017	1.31	19.02	1.67
1.033	1.04	7.033	3.72	13.033	1.30	19.03	1.67
1.050	1.04	7.050	3.72	13.050	1.30	19.05	1.67
1.067	1.04	7.067	3.72	13.067	1.30	19.07	1.67
1.083	1.04	7.083	3.72	13.083	1.30	19.08	1.67
1.100	1.04	7.100	3.72	13.100	1.30	19.10	1.67
1.117	1.04	7.117	3.72	13.117	1.30	19.12	1.67
1.133	1.04	7.133	3.72	13.133	1.30	19.13	1.67
1.150	1.04	7.150	3.72	13.150	1.30	19.15	1.67
1.167	1.04	7.167	3.72	13.167	1.30	19.17	1.67
1.183	1.04	7.183	3.72	13.183	1.30	19.18	1.67
1.200	1.04	7.200	3.72	13.200	1.30	19.20	1.67
1.217	1.04	7.217	3.72	13.217	1.30	19.22	1.67
1.233	1.04	7.233	3.72	13.233	1.30	19.23	1.67
1.250	1.04	7.250	3.72	13.250	1.30	19.25	1.67
1.267	1.00	7.267	3.72	13.267	1.30	19.27	1.67
1.283	1.00	7.283	3.72	13.283	1.30	19.28	1.67
1.300	1.00	7.300	3.72	13.300	1.30	19.30	1.67
1.317	1.00	7.317	3.72	13.317	1.30	19.32	1.67
1.333	1.00	7.333	3.72	13.333	1.30	19.33	1.67
1.350	1.00	7.350	3.72	13.350	1.30	19.35	1.67
1.367	1.00	7.367	3.72	13.367	1.30	19.37	1.67
1.383	1.00	7.383	3.72	13.383	1.30	19.38	1.67
1.400	1.00	7.400	3.72	13.400	1.30	19.40	1.67
1.417	1.00	7.417	3.72	13.417	1.30	19.42	1.67
1.433	1.00	7.433	3.72	13.433	1.30	19.43	1.67
1.450	1.00	7.450	3.72	13.450	1.30	19.45	1.67
1.467	1.00	7.467	3.72	13.467	1.30	19.47	1.67
1.483	1.00	7.483	3.72	13.483	1.30	19.48	1.67
1.500	1.00	7.500	3.72	13.500	1.30	19.50	1.67
1.517	1.04	7.517	3.72	13.517	7.61	19.52	1.67
1.533	1.04	7.533	3.72	13.533	7.62	19.53	1.67
1.550	1.04	7.550	3.72	13.550	7.62	19.55	1.67
1.567	1.04	7.567	3.72	13.567	7.62	19.57	1.67
1.583	1.04	7.583	3.72	13.583	7.62	19.58	1.67
1.600	1.04	7.600	3.72	13.600	7.62	19.60	1.67
1.617	1.04	7.617	3.72	13.617	7.62	19.62	1.67
1.633	1.04	7.633	3.72	13.633	7.62	19.63	1.67
1.650	1.04	7.650	3.72	13.650	7.62	19.65	1.67

1.667	1.04	7.667	3.72	13.667	7.62	19.67	1.67
1.683	1.04	7.683	3.72	13.683	7.62	19.68	1.67
1.700	1.04	7.700	3.72	13.700	7.62	19.70	1.67
1.717	1.04	7.717	3.72	13.717	7.62	19.72	1.67
1.733	1.04	7.733	3.72	13.733	7.62	19.73	1.67
1.750	1.04	7.750	3.72	13.750	7.62	19.75	1.67
1.767	1.00	7.767	3.72	13.767	7.62	19.77	1.67
1.783	1.00	7.783	3.72	13.783	7.62	19.78	1.67
1.800	1.00	7.800	3.72	13.800	7.62	19.80	1.67
1.817	1.00	7.817	3.72	13.817	7.62	19.82	1.67
1.833	1.00	7.833	3.72	13.833	7.62	19.83	1.67
1.850	1.00	7.850	3.72	13.850	7.62	19.85	1.67
1.867	1.00	7.867	3.72	13.867	7.62	19.87	1.67
1.883	1.00	7.883	3.72	13.883	7.62	19.88	1.67
1.900	1.00	7.900	3.72	13.900	7.62	19.90	1.67
1.917	1.00	7.917	3.72	13.917	7.62	19.92	1.67
1.933	1.00	7.933	3.72	13.933	7.62	19.93	1.67
1.950	1.00	7.950	3.72	13.950	7.62	19.95	1.67
1.967	1.00	7.967	3.72	13.967	7.62	19.97	1.67
1.983	1.00	7.983	3.72	13.983	7.62	19.98	1.67
2.000	1.00	8.000	3.71	14.000	7.62	20.00	1.67
2.017	1.23	8.017	0.00	14.017	2.80	20.02	1.12
2.033	1.23	8.033	0.00	14.033	2.79	20.03	1.12
2.050	1.23	8.050	0.00	14.050	2.79	20.05	1.12
2.067	1.23	8.067	0.00	14.067	2.79	20.07	1.12
2.083	1.23	8.083	0.00	14.083	2.79	20.08	1.12
2.100	1.23	8.100	0.00	14.100	2.79	20.10	1.12
2.117	1.23	8.117	0.00	14.117	2.79	20.12	1.12
2.133	1.23	8.133	0.00	14.133	2.79	20.13	1.12
2.150	1.23	8.150	0.00	14.150	2.79	20.15	1.12
2.167	1.23	8.167	0.00	14.167	2.79	20.17	1.12
2.183	1.23	8.183	0.00	14.183	2.79	20.18	1.12
2.200	1.23	8.200	0.00	14.200	2.79	20.20	1.12
2.217	1.23	8.217	0.00	14.217	2.79	20.22	1.12
2.233	1.23	8.233	0.00	14.233	2.79	20.23	1.12
2.250	1.23	8.250	0.00	14.250	2.79	20.25	1.12
2.267	1.19	8.267	0.00	14.267	2.79	20.27	1.12
2.283	1.19	8.283	0.00	14.283	2.79	20.28	1.12
2.300	1.19	8.300	0.00	14.300	2.79	20.30	1.12
2.317	1.19	8.317	0.00	14.317	2.79	20.32	1.12
2.333	1.19	8.333	0.00	14.333	2.79	20.33	1.12
2.350	1.19	8.350	0.00	14.350	2.79	20.35	1.12
2.367	1.19	8.367	0.00	14.367	2.79	20.37	1.12
2.383	1.19	8.383	0.00	14.383	2.79	20.38	1.12
2.400	1.19	8.400	0.00	14.400	2.79	20.40	1.12
2.417	1.19	8.417	0.00	14.417	2.79	20.42	1.12
2.433	1.19	8.433	0.00	14.433	2.79	20.43	1.12
2.450	1.19	8.450	0.00	14.450	2.79	20.45	1.12
2.467	1.19	8.467	0.00	14.467	2.79	20.47	1.12
2.483	1.19	8.483	0.00	14.483	2.79	20.48	1.12
2.500	1.19	8.500	0.01	14.500	2.79	20.50	1.12
2.517	1.23	8.517	5.02	14.517	2.79	20.52	1.12
2.533	1.23	8.533	5.02	14.533	2.79	20.53	1.12
2.550	1.23	8.550	5.02	14.550	2.79	20.55	1.12
2.567	1.23	8.567	5.02	14.567	2.79	20.57	1.12
2.583	1.23	8.583	5.02	14.583	2.79	20.58	1.12
2.600	1.23	8.600	5.02	14.600	2.79	20.60	1.12
2.617	1.23	8.617	5.02	14.617	2.79	20.62	1.12
2.633	1.23	8.633	5.02	14.633	2.79	20.63	1.12
2.650	1.23	8.650	5.02	14.650	2.79	20.65	1.12
2.667	1.23	8.667	5.02	14.667	2.79	20.67	1.12
2.683	1.23	8.683	5.02	14.683	2.79	20.68	1.12
2.700	1.23	8.700	5.02	14.700	2.79	20.70	1.12
2.717	1.23	8.717	5.02	14.717	2.79	20.72	1.12
2.733	1.23	8.733	5.02	14.733	2.79	20.73	1.12
2.750	1.23	8.750	5.02	14.750	2.79	20.75	1.12
2.767	1.19	8.767	5.02	14.767	2.79	20.77	1.12

2.783	1.19	8.783	5.02	14.783	2.79	20.78	1.12
2.800	1.19	8.800	5.02	14.800	2.79	20.80	1.12
2.817	1.19	8.817	5.02	14.817	2.79	20.82	1.12
2.833	1.19	8.833	5.02	14.833	2.79	20.83	1.12
2.850	1.19	8.850	5.02	14.850	2.79	20.85	1.12
2.867	1.19	8.867	5.02	14.867	2.79	20.87	1.12
2.883	1.19	8.883	5.02	14.883	2.79	20.88	1.12
2.900	1.19	8.900	5.02	14.900	2.79	20.90	1.12
2.917	1.19	8.917	5.02	14.917	2.79	20.92	1.12
2.933	1.19	8.933	5.02	14.933	2.79	20.93	1.12
2.950	1.19	8.950	5.02	14.950	2.79	20.95	1.12
2.967	1.19	8.967	5.02	14.967	2.79	20.97	1.12
2.983	1.19	8.983	5.02	14.983	2.79	20.98	1.12
3.000	1.19	9.000	5.01	15.000	2.79	21.00	1.12
3.017	1.23	9.017	2.97	15.017	2.79	21.02	1.12
3.033	1.23	9.033	2.97	15.033	2.79	21.03	1.12
3.050	1.23	9.050	2.97	15.050	2.79	21.05	1.12
3.067	1.23	9.067	2.97	15.067	2.79	21.07	1.12
3.083	1.23	9.083	2.97	15.083	2.79	21.08	1.12
3.100	1.23	9.100	2.97	15.100	2.79	21.10	1.12
3.117	1.23	9.117	2.97	15.117	2.79	21.12	1.12
3.133	1.23	9.133	2.97	15.133	2.79	21.13	1.12
3.150	1.23	9.150	2.97	15.150	2.79	21.15	1.12
3.167	1.23	9.167	2.97	15.167	2.79	21.17	1.12
3.183	1.23	9.183	2.97	15.183	2.79	21.18	1.12
3.200	1.23	9.200	2.97	15.200	2.79	21.20	1.12
3.217	1.23	9.217	2.97	15.217	2.79	21.22	1.12
3.233	1.23	9.233	2.97	15.233	2.79	21.23	1.12
3.250	1.23	9.250	2.97	15.250	2.79	21.25	1.12
3.267	1.19	9.267	2.97	15.267	2.79	21.27	1.12
3.283	1.19	9.283	2.97	15.283	2.79	21.28	1.12
3.300	1.19	9.300	2.97	15.300	2.79	21.30	1.12
3.317	1.19	9.317	2.97	15.317	2.79	21.32	1.12
3.333	1.19	9.333	2.97	15.333	2.79	21.33	1.12
3.350	1.19	9.350	2.97	15.350	2.79	21.35	1.12
3.367	1.19	9.367	2.97	15.367	2.79	21.37	1.12
3.383	1.19	9.383	2.97	15.383	2.79	21.38	1.12
3.400	1.19	9.400	2.97	15.400	2.79	21.40	1.12
3.417	1.19	9.417	2.97	15.417	2.79	21.42	1.12
3.433	1.19	9.433	2.97	15.433	2.79	21.43	1.12
3.450	1.19	9.450	2.97	15.450	2.79	21.45	1.12
3.467	1.19	9.467	2.97	15.467	2.79	21.47	1.12
3.483	1.19	9.483	2.97	15.483	2.79	21.48	1.12
3.500	1.19	9.500	2.97	15.500	2.79	21.50	1.12
3.517	1.23	9.517	3.35	15.517	2.79	21.52	1.12
3.533	1.23	9.533	3.35	15.533	2.79	21.53	1.12
3.550	1.23	9.550	3.35	15.550	2.79	21.55	1.12
3.567	1.23	9.567	3.35	15.567	2.79	21.57	1.12
3.583	1.23	9.583	3.35	15.583	2.79	21.58	1.12
3.600	1.23	9.600	3.35	15.600	2.79	21.60	1.12
3.617	1.23	9.617	3.35	15.617	2.79	21.62	1.12
3.633	1.23	9.633	3.35	15.633	2.79	21.63	1.12
3.650	1.23	9.650	3.35	15.650	2.79	21.65	1.12
3.667	1.23	9.667	3.35	15.667	2.79	21.67	1.12
3.683	1.23	9.683	3.35	15.683	2.79	21.68	1.12
3.700	1.23	9.700	3.35	15.700	2.79	21.70	1.12
3.717	1.23	9.717	3.35	15.717	2.79	21.72	1.12
3.733	1.23	9.733	3.35	15.733	2.79	21.73	1.12
3.750	1.23	9.750	3.35	15.750	2.79	21.75	1.12
3.767	1.19	9.767	3.35	15.767	2.79	21.77	1.12
3.783	1.19	9.783	3.35	15.783	2.79	21.78	1.12
3.800	1.19	9.800	3.35	15.800	2.79	21.80	1.12
3.817	1.19	9.817	3.35	15.817	2.79	21.82	1.12
3.833	1.19	9.833	3.35	15.833	2.79	21.83	1.12
3.850	1.19	9.850	3.35	15.850	2.79	21.85	1.12
3.867	1.19	9.867	3.35	15.867	2.79	21.87	1.12
3.883	1.19	9.883	3.35	15.883	2.79	21.88	1.12

3.900	1.19	9.900	3.35	15.900	2.79	21.90	1.12
3.917	1.19	9.917	3.35	15.917	2.79	21.92	1.12
3.933	1.19	9.933	3.35	15.933	2.79	21.93	1.12
3.950	1.19	9.950	3.35	15.950	2.79	21.95	1.12
3.967	1.19	9.967	3.35	15.967	2.79	21.97	1.12
3.983	1.19	9.983	3.35	15.983	2.79	21.98	1.12
4.000	1.19	10.000	3.35	16.000	2.79	22.00	1.12
4.017	1.49	10.017	4.27	16.017	1.68	22.02	1.12
4.033	1.49	10.033	4.27	16.033	1.67	22.03	1.12
4.050	1.49	10.050	4.27	16.050	1.67	22.05	1.12
4.067	1.49	10.067	4.27	16.067	1.67	22.07	1.12
4.083	1.49	10.083	4.27	16.083	1.67	22.08	1.12
4.100	1.49	10.100	4.27	16.100	1.67	22.10	1.12
4.117	1.49	10.117	4.27	16.117	1.67	22.12	1.12
4.133	1.49	10.133	4.27	16.133	1.67	22.13	1.12
4.150	1.49	10.150	4.27	16.150	1.67	22.15	1.12
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.12
4.183	1.49	10.183	4.27	16.183	1.67	22.18	1.12
4.200	1.49	10.200	4.27	16.200	1.67	22.20	1.12
4.217	1.49	10.217	4.27	16.217	1.67	22.22	1.12
4.233	1.49	10.233	4.27	16.233	1.67	22.23	1.12
4.250	1.49	10.250	4.27	16.250	1.67	22.25	1.12
4.267	1.49	10.267	4.27	16.267	1.67	22.27	1.12
4.283	1.49	10.283	4.27	16.283	1.67	22.28	1.12
4.300	1.49	10.300	4.27	16.300	1.67	22.30	1.12
4.317	1.49	10.317	4.27	16.317	1.67	22.32	1.12
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.12
4.350	1.49	10.350	4.27	16.350	1.67	22.35	1.12
4.367	1.49	10.367	4.27	16.367	1.67	22.37	1.12
4.383	1.49	10.383	4.27	16.383	1.67	22.38	1.12
4.400	1.49	10.400	4.27	16.400	1.67	22.40	1.12
4.417	1.49	10.417	4.27	16.417	1.67	22.42	1.12
4.433	1.49	10.433	4.27	16.433	1.67	22.43	1.12
4.450	1.49	10.450	4.27	16.450	1.67	22.45	1.12
4.467	1.49	10.467	4.27	16.467	1.67	22.47	1.12
4.483	1.49	10.483	4.27	16.483	1.67	22.48	1.12
4.500	1.49	10.500	4.28	16.500	1.67	22.50	1.12
4.517	1.49	10.517	5.76	16.517	1.67	22.52	1.12
4.533	1.49	10.533	5.76	16.533	1.67	22.53	1.12
4.550	1.49	10.550	5.76	16.550	1.67	22.55	1.12
4.567	1.49	10.567	5.76	16.567	1.67	22.57	1.12
4.583	1.49	10.583	5.76	16.583	1.67	22.58	1.12
4.600	1.49	10.600	5.76	16.600	1.67	22.60	1.12
4.617	1.49	10.617	5.76	16.617	1.67	22.62	1.12
4.633	1.49	10.633	5.76	16.633	1.67	22.63	1.12
4.650	1.49	10.650	5.76	16.650	1.67	22.65	1.12
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.12
4.683	1.49	10.683	5.76	16.683	1.67	22.68	1.12
4.700	1.49	10.700	5.76	16.700	1.67	22.70	1.12
4.717	1.49	10.717	5.76	16.717	1.67	22.72	1.12
4.733	1.49	10.733	5.76	16.733	1.67	22.73	1.12
4.750	1.49	10.750	5.76	16.750	1.67	22.75	1.12
4.767	1.49	10.767	5.76	16.767	1.67	22.77	1.12
4.783	1.49	10.783	5.76	16.783	1.67	22.78	1.12
4.800	1.49	10.800	5.76	16.800	1.67	22.80	1.12
4.817	1.49	10.817	5.76	16.817	1.67	22.82	1.12
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.12
4.850	1.49	10.850	5.76	16.850	1.67	22.85	1.12
4.867	1.49	10.867	5.76	16.867	1.67	22.87	1.12
4.883	1.49	10.883	5.76	16.883	1.67	22.88	1.12
4.900	1.49	10.900	5.76	16.900	1.67	22.90	1.12
4.917	1.49	10.917	5.76	16.917	1.67	22.92	1.12
4.933	1.49	10.933	5.76	16.933	1.67	22.93	1.12
4.950	1.49	10.950	5.76	16.950	1.67	22.95	1.12
4.967	1.49	10.967	5.76	16.967	1.67	22.97	1.12
4.983	1.49	10.983	5.76	16.983	1.67	22.98	1.12
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.12

5.017	1.49	11.017	8.92	17.017	1.67	23.02	1.12
5.033	1.49	11.033	8.92	17.033	1.67	23.03	1.12
5.050	1.49	11.050	8.92	17.050	1.67	23.05	1.12
5.067	1.49	11.067	8.92	17.067	1.67	23.07	1.12
5.083	1.49	11.083	8.92	17.083	1.67	23.08	1.12
5.100	1.49	11.100	8.92	17.100	1.67	23.10	1.12
5.117	1.49	11.117	8.92	17.117	1.67	23.12	1.12
5.133	1.49	11.133	8.92	17.133	1.67	23.13	1.12
5.150	1.49	11.150	8.92	17.150	1.67	23.15	1.12
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.12
5.183	1.49	11.183	8.92	17.183	1.67	23.18	1.12
5.200	1.49	11.200	8.92	17.200	1.67	23.20	1.12
5.217	1.49	11.217	8.92	17.217	1.67	23.22	1.12
5.233	1.49	11.233	8.92	17.233	1.67	23.23	1.12
5.250	1.49	11.250	8.92	17.250	1.67	23.25	1.12
5.267	1.49	11.267	8.92	17.267	1.67	23.27	1.12
5.283	1.49	11.283	8.92	17.283	1.67	23.28	1.12
5.300	1.49	11.300	8.92	17.300	1.67	23.30	1.12
5.317	1.49	11.317	8.92	17.317	1.67	23.32	1.12
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.12
5.350	1.49	11.350	8.92	17.350	1.67	23.35	1.12
5.367	1.49	11.367	8.92	17.367	1.67	23.37	1.12
5.383	1.49	11.383	8.92	17.383	1.67	23.38	1.12
5.400	1.49	11.400	8.92	17.400	1.67	23.40	1.12
5.417	1.49	11.417	8.92	17.417	1.67	23.42	1.12
5.433	1.49	11.433	8.92	17.433	1.67	23.43	1.12
5.450	1.49	11.450	8.92	17.450	1.67	23.45	1.12
5.467	1.49	11.467	8.92	17.467	1.67	23.47	1.12
5.483	1.49	11.483	8.92	17.483	1.67	23.48	1.12
5.500	1.49	11.500	8.92	17.500	1.67	23.50	1.12
5.517	1.49	11.517	38.65	17.517	1.67	23.52	1.12
5.533	1.49	11.533	38.66	17.533	1.67	23.53	1.12
5.550	1.49	11.550	38.66	17.550	1.67	23.55	1.12
5.567	1.49	11.567	38.66	17.567	1.67	23.57	1.12
5.583	1.49	11.583	38.66	17.583	1.67	23.58	1.12
5.600	1.49	11.600	38.66	17.600	1.67	23.60	1.12
5.617	1.49	11.617	38.66	17.617	1.67	23.62	1.12
5.633	1.49	11.633	38.66	17.633	1.67	23.63	1.12
5.650	1.49	11.650	38.66	17.650	1.67	23.65	1.12
5.667	1.49	11.667	38.66	17.667	1.67	23.67	1.12
5.683	1.49	11.683	38.66	17.683	1.67	23.68	1.12
5.700	1.49	11.700	38.66	17.700	1.67	23.70	1.12
5.717	1.49	11.717	38.66	17.717	1.67	23.72	1.12
5.733	1.49	11.733	38.66	17.733	1.67	23.73	1.12
5.750	1.49	11.750	38.66	17.750	1.67	23.75	1.12
5.767	1.49	11.767	102.56	17.767	1.67	23.77	1.12
5.783	1.49	11.783	102.59	17.783	1.67	23.78	1.12
5.800	1.49	11.800	102.59	17.800	1.67	23.80	1.12
5.817	1.49	11.817	102.59	17.817	1.67	23.82	1.12
5.833	1.49	11.833	102.59	17.833	1.67	23.83	1.12
5.850	1.49	11.850	102.59	17.850	1.67	23.85	1.12
5.867	1.49	11.867	102.59	17.867	1.67	23.87	1.12
5.883	1.49	11.883	102.59	17.883	1.67	23.88	1.12
5.900	1.49	11.900	102.59	17.900	1.67	23.90	1.12
5.917	1.49	11.917	102.59	17.917	1.67	23.92	1.12
5.933	1.49	11.933	102.59	17.933	1.67	23.93	1.12
5.950	1.49	11.950	102.59	17.950	1.67	23.95	1.12
5.967	1.49	11.967	102.59	17.967	1.67	23.97	1.12
5.983	1.49	11.983	102.59	17.983	1.67	23.98	1.12
6.000	1.48	12.000	102.59	18.000	1.67	24.00	1.12

Max.Eff.Inten.(mm/hr)=	102.59	77.08	
over (min)	5.00	23.00	
Storage Coeff. (min)=	2.96 (ii)	22.46 (ii)	
Unit Hyd. Tpeak (min)=	5.00	23.00	
Unit Hyd. peak (cms)=	0.31	0.05	
			TOTALS

PEAK FLOW (cms)=	0.39	0.08	0.441 (iii)
TIME TO PEAK (hrs)=	12.00	12.27	12.00
RUNOFF VOLUME (mm)=	90.93	44.09	69.86
TOTAL RAINFALL (mm)=	92.93	92.93	92.93
RUNOFF COEFFICIENT =	0.98	0.47	0.75

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area (ha)= 1.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.92	0.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	90.55	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	102.59	106.82	
over (min)	5.00	8.00	
Storage Coeff. (min)=	2.38 (ii)	7.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	8.00	
Unit Hyd. peak (cms)=	0.35	0.15	
			TOTALS
PEAK FLOW (cms)=	0.20	0.07	0.267 (iii)
TIME TO PEAK (hrs)=	12.00	12.03	12.00
RUNOFF VOLUME (mm)=	90.92	45.45	70.92
TOTAL RAINFALL (mm)=	92.93	92.93	92.93
RUNOFF COEFFICIENT =	0.98	0.49	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)= 6.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	4.77	1.59	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	205.91	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	102.59	106.82	
over (min)	5.00	9.00	
Storage Coeff. (min)=	3.90 (ii)	8.96 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.26	0.13	
			TOTALS
PEAK FLOW (cms)=	0.99	0.36	1.324 (iii)
TIME TO PEAK (hrs)=	12.00	12.05	12.00
RUNOFF VOLUME (mm)=	90.93	45.45	70.92

```
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.49           0.76


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     102.59        89.33
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       2.38 (ii)    7.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.35         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.06          0.254 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.03          12.00
     RUNOFF VOLUME    (mm)=      90.92        38.10          67.68
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.41           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.25     12.00   67.68
     ==========================================================
     MAJOR SYS.(ID= 2):   0.03      0.05     12.00   67.68
     MINOR SYS.(ID= 3):   1.20      0.21     11.87   67.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.20   0.206    11.87    67.68
     + ID2= 2 (  0203):     6.36   1.324    12.00    70.92
       ==========================================================
       ID = 3 (  0016):     7.56   1.530    12.00    70.41
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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     102.59        47.59
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.76 (ii)    9.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.09          0.370 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.07          12.00
     RUNOFF VOLUME    (mm)=      90.92        35.34          63.13
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.38           0.68


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     102.59        89.33
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.78 (ii)    9.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.90         0.55          2.407 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.07          12.00
     RUNOFF VOLUME    (mm)=      90.92        38.09          67.68
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.41           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     102.59        89.33
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       3.69 (ii)    8.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.27         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.83         0.25          1.062 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05          12.00
     RUNOFF VOLUME    (mm)=      90.92        38.09          67.68
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.41           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     102.59        89.33
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.45 (ii)    9.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.12
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.52         0.44          1.920 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.07          12.00
     RUNOFF VOLUME    (mm)=      90.93        38.09          67.68
     TOTAL RAINFALL   (mm)=      92.93        92.93          92.93
     RUNOFF COEFFICIENT   =       0.98         0.41           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0013)|
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|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   2.407    12.00    67.68
     + ID2= 2 (  0302):     5.31   1.062    12.00    67.68
       ================================================
       ID = 3 (  0013):    17.80   3.468    12.00    67.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   3.468    12.00    67.68
     + ID2= 2 (  0303):     9.87   1.920    12.00    67.68
       ================================================
       ID = 1 (  0013):    27.67   5.388    12.00    67.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   5.388    12.00    67.68
     + ID2= 2 (  0016):     7.56   1.530    12.00    70.41
       ================================================
       ID = 3 (  0012):    35.23   6.918    12.00    68.27

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.23   6.918    12.00    68.27
     + ID2= 2 (  0204):     2.01   0.370    12.00    63.13
       ================================================
       ID = 1 (  0012):    37.24   7.288    12.00    67.99

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.4389      1.4219
                         0.1014     0.3040   |   0.9212      1.8498
                         0.1939     0.6475   |   1.2450      2.2118
                         0.2548     1.0211   |   1.6046      2.3050
                         0.2583     1.0470   |   4.5503      2.6235

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)    37.239      7.288     12.00      67.99
   OUTFLOW: ID= 1 (  0011)    37.239      0.527     13.05      59.49

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.23
                TIME SHIFT OF PEAK FLOW         (min)= 63.00
```

```
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5002

--------------------------------------------------------------------------------
================================================================================================================
========

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\3a4e9b79-1037-443c-ba31-43fd7151030d\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\3a4e9b79-1037-443c-ba31-43fd7151030d\sce


DATE: 03/23/2019                          TIME: 12:54:26

USER:



COMMENTS: _____________________________________________________


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

--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\d334cb9a
| Ptotal=111.56 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
--------------------
                       Duration of storm    = 24.00 hrs
                       Mass curve time step = 15.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    1.25 |  6.25    0.00 | 12.25   16.06 | 18.25    2.01
               0.50    1.20 |  6.50    0.00 | 12.50   16.06 | 18.50    2.01
               0.75    1.25 |  6.75    0.00 | 12.75    8.26 | 18.75    2.01
               1.00    1.20 |  7.00    0.00 | 13.00    8.26 | 19.00    2.01
               1.25    1.25 |  7.25    4.46 | 13.25    1.56 | 19.25    2.01
               1.50    1.20 |  7.50    4.46 | 13.50    1.56 | 19.50    2.01
               1.75    1.25 |  7.75    4.46 | 13.75    9.15 | 19.75    2.01
               2.00    1.20 |  8.00    4.46 | 14.00    9.15 | 20.00    2.01
               2.25    1.47 |  8.25    0.00 | 14.25    3.35 | 20.25    1.34
               2.50    1.43 |  8.50    0.00 | 14.50    3.35 | 20.50    1.34
```



```
               2.75    1.47 |  8.75    6.02 | 14.75    3.35 | 20.75    1.34
               3.00    1.43 |  9.00    6.02 | 15.00    3.35 | 21.00    1.34
               3.25    1.47 |  9.25    3.57 | 15.25    3.35 | 21.25    1.34
               3.50    1.43 |  9.50    3.57 | 15.50    3.35 | 21.50    1.34
               3.75    1.47 |  9.75    4.02 | 15.75    3.35 | 21.75    1.34
               4.00    1.43 | 10.00    4.02 | 16.00    3.35 | 22.00    1.34
               4.25    1.78 | 10.25    5.13 | 16.25    2.01 | 22.25    1.34
               4.50    1.78 | 10.50    5.13 | 16.50    2.01 | 22.50    1.34
               4.75    1.78 | 10.75    6.92 | 16.75    2.01 | 22.75    1.34
               5.00    1.78 | 11.00    6.92 | 17.00    2.01 | 23.00    1.34
               5.25    1.78 | 11.25   10.71 | 17.25    2.01 | 23.25    1.34
               5.50    1.78 | 11.50   10.71 | 17.50    2.01 | 23.50    1.34
               5.75    1.78 | 11.75   46.41 | 17.75    2.01 | 23.75    1.34
               6.00    1.78 | 12.00  123.16 | 18.00    2.01 | 24.00    1.34

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    1.25 | 6.017    0.00 |12.017   16.14 | 18.02    2.01
              0.033    1.25 | 6.033    0.00 |12.033   16.06 | 18.03    2.01
              0.050    1.25 | 6.050    0.00 |12.050   16.06 | 18.05    2.01
              0.067    1.25 | 6.067    0.00 |12.067   16.06 | 18.07    2.01
              0.083    1.25 | 6.083    0.00 |12.083   16.06 | 18.08    2.01
              0.100    1.25 | 6.100    0.00 |12.100   16.06 | 18.10    2.01
              0.117    1.25 | 6.117    0.00 |12.117   16.06 | 18.12    2.01
              0.133    1.25 | 6.133    0.00 |12.133   16.06 | 18.13    2.01
              0.150    1.25 | 6.150    0.00 |12.150   16.06 | 18.15    2.01
              0.167    1.25 | 6.167    0.00 |12.167   16.06 | 18.17    2.01
              0.183    1.25 | 6.183    0.00 |12.183   16.06 | 18.18    2.01
              0.200    1.25 | 6.200    0.00 |12.200   16.06 | 18.20    2.01
              0.217    1.25 | 6.217    0.00 |12.217   16.06 | 18.22    2.01
              0.233    1.25 | 6.233    0.00 |12.233   16.06 | 18.23    2.01
              0.250    1.25 | 6.250    0.00 |12.250   16.06 | 18.25    2.01
              0.267    1.20 | 6.267    0.00 |12.267   16.06 | 18.27    2.01
              0.283    1.20 | 6.283    0.00 |12.283   16.06 | 18.28    2.01
              0.300    1.20 | 6.300    0.00 |12.300   16.06 | 18.30    2.01
              0.317    1.20 | 6.317    0.00 |12.317   16.06 | 18.32    2.01
              0.333    1.20 | 6.333    0.00 |12.333   16.06 | 18.33    2.01
              0.350    1.20 | 6.350    0.00 |12.350   16.06 | 18.35    2.01
              0.367    1.20 | 6.367    0.00 |12.367   16.06 | 18.37    2.01
              0.383    1.20 | 6.383    0.00 |12.383   16.06 | 18.38    2.01
              0.400    1.20 | 6.400    0.00 |12.400   16.06 | 18.40    2.01
              0.417    1.20 | 6.417    0.00 |12.417   16.06 | 18.42    2.01
              0.433    1.20 | 6.433    0.00 |12.433   16.06 | 18.43    2.01
              0.450    1.20 | 6.450    0.00 |12.450   16.06 | 18.45    2.01
              0.467    1.20 | 6.467    0.00 |12.467   16.06 | 18.47    2.01
              0.483    1.20 | 6.483    0.00 |12.483   16.06 | 18.48    2.01
              0.500    1.20 | 6.500    0.00 |12.500   16.06 | 18.50    2.01
              0.517    1.25 | 6.517    0.00 |12.517    8.26 | 18.52    2.01
              0.533    1.25 | 6.533    0.00 |12.533    8.26 | 18.53    2.01
              0.550    1.25 | 6.550    0.00 |12.550    8.26 | 18.55    2.01
```

0.567	1.25	6.567	0.00	12.567	8.26	18.57	2.01
0.583	1.25	6.583	0.00	12.583	8.26	18.58	2.01
0.600	1.25	6.600	0.00	12.600	8.26	18.60	2.01
0.617	1.25	6.617	0.00	12.617	8.26	18.62	2.01
0.633	1.25	6.633	0.00	12.633	8.26	18.63	2.01
0.650	1.25	6.650	0.00	12.650	8.26	18.65	2.01
0.667	1.25	6.667	0.00	12.667	8.26	18.67	2.01
0.683	1.25	6.683	0.00	12.683	8.26	18.68	2.01
0.700	1.25	6.700	0.00	12.700	8.26	18.70	2.01
0.717	1.25	6.717	0.00	12.717	8.26	18.72	2.01
0.733	1.25	6.733	0.00	12.733	8.26	18.73	2.01
0.750	1.25	6.750	0.00	12.750	8.26	18.75	2.01
0.767	1.20	6.767	0.00	12.767	8.26	18.77	2.01
0.783	1.20	6.783	0.00	12.783	8.26	18.78	2.01
0.800	1.20	6.800	0.00	12.800	8.26	18.80	2.01
0.817	1.20	6.817	0.00	12.817	8.26	18.82	2.01
0.833	1.20	6.833	0.00	12.833	8.26	18.83	2.01
0.850	1.20	6.850	0.00	12.850	8.26	18.85	2.01
0.867	1.20	6.867	0.00	12.867	8.26	18.87	2.01
0.883	1.20	6.883	0.00	12.883	8.26	18.88	2.01
0.900	1.20	6.900	0.00	12.900	8.26	18.90	2.01
0.917	1.20	6.917	0.00	12.917	8.26	18.92	2.01
0.933	1.20	6.933	0.00	12.933	8.26	18.93	2.01
0.950	1.20	6.950	0.00	12.950	8.26	18.95	2.01
0.967	1.20	6.967	0.00	12.967	8.26	18.97	2.01
0.983	1.20	6.983	0.00	12.983	8.26	18.98	2.01
1.000	1.20	7.000	0.01	13.000	8.26	19.00	2.01
1.017	1.25	7.017	4.46	13.017	1.57	19.02	2.01
1.033	1.25	7.033	4.46	13.033	1.56	19.03	2.01
1.050	1.25	7.050	4.46	13.050	1.56	19.05	2.01
1.067	1.25	7.067	4.46	13.067	1.56	19.07	2.01
1.083	1.25	7.083	4.46	13.083	1.56	19.08	2.01
1.100	1.25	7.100	4.46	13.100	1.56	19.10	2.01
1.117	1.25	7.117	4.46	13.117	1.56	19.12	2.01
1.133	1.25	7.133	4.46	13.133	1.56	19.13	2.01
1.150	1.25	7.150	4.46	13.150	1.56	19.15	2.01
1.167	1.25	7.167	4.46	13.167	1.56	19.17	2.01
1.183	1.25	7.183	4.46	13.183	1.56	19.18	2.01
1.200	1.25	7.200	4.46	13.200	1.56	19.20	2.01
1.217	1.25	7.217	4.46	13.217	1.56	19.22	2.01
1.233	1.25	7.233	4.46	13.233	1.56	19.23	2.01
1.250	1.25	7.250	4.46	13.250	1.56	19.25	2.01
1.267	1.20	7.267	4.46	13.267	1.56	19.27	2.01
1.283	1.20	7.283	4.46	13.283	1.56	19.28	2.01
1.300	1.20	7.300	4.46	13.300	1.56	19.30	2.01
1.317	1.20	7.317	4.46	13.317	1.56	19.32	2.01
1.333	1.20	7.333	4.46	13.333	1.56	19.33	2.01
1.350	1.20	7.350	4.46	13.350	1.56	19.35	2.01
1.367	1.20	7.367	4.46	13.367	1.56	19.37	2.01
1.383	1.20	7.383	4.46	13.383	1.56	19.38	2.01
1.400	1.20	7.400	4.46	13.400	1.56	19.40	2.01
1.417	1.20	7.417	4.46	13.417	1.56	19.42	2.01
1.433	1.20	7.433	4.46	13.433	1.56	19.43	2.01
1.450	1.20	7.450	4.46	13.450	1.56	19.45	2.01
1.467	1.20	7.467	4.46	13.467	1.56	19.47	2.01
1.483	1.20	7.483	4.46	13.483	1.56	19.48	2.01
1.500	1.20	7.500	4.46	13.500	1.56	19.50	2.01
1.517	1.25	7.517	4.46	13.517	9.13	19.52	2.01
1.533	1.25	7.533	4.46	13.533	9.15	19.53	2.01
1.550	1.25	7.550	4.46	13.550	9.15	19.55	2.01
1.567	1.25	7.567	4.46	13.567	9.15	19.57	2.01
1.583	1.25	7.583	4.46	13.583	9.15	19.58	2.01
1.600	1.25	7.600	4.46	13.600	9.15	19.60	2.01
1.617	1.25	7.617	4.46	13.617	9.15	19.62	2.01
1.633	1.25	7.633	4.46	13.633	9.15	19.63	2.01
1.650	1.25	7.650	4.46	13.650	9.15	19.65	2.01
1.667	1.25	7.667	4.46	13.667	9.15	19.67	2.01

1.683	1.25	7.683	4.46	13.683	9.15	19.68	2.01
1.700	1.25	7.700	4.46	13.700	9.15	19.70	2.01
1.717	1.25	7.717	4.46	13.717	9.15	19.72	2.01
1.733	1.25	7.733	4.46	13.733	9.15	19.73	2.01
1.750	1.25	7.750	4.46	13.750	9.15	19.75	2.01
1.767	1.20	7.767	4.46	13.767	9.15	19.77	2.01
1.783	1.20	7.783	4.46	13.783	9.15	19.78	2.01
1.800	1.20	7.800	4.46	13.800	9.15	19.80	2.01
1.817	1.20	7.817	4.46	13.817	9.15	19.82	2.01
1.833	1.20	7.833	4.46	13.833	9.15	19.83	2.01
1.850	1.20	7.850	4.46	13.850	9.15	19.85	2.01
1.867	1.20	7.867	4.46	13.867	9.15	19.87	2.01
1.883	1.20	7.883	4.46	13.883	9.15	19.88	2.01
1.900	1.20	7.900	4.46	13.900	9.15	19.90	2.01
1.917	1.20	7.917	4.46	13.917	9.15	19.92	2.01
1.933	1.20	7.933	4.46	13.933	9.15	19.93	2.01
1.950	1.20	7.950	4.46	13.950	9.15	19.95	2.01
1.967	1.20	7.967	4.46	13.967	9.15	19.97	2.01
1.983	1.20	7.983	4.46	13.983	9.15	19.98	2.01
2.000	1.20	8.000	4.45	14.000	9.15	20.00	2.01
2.017	1.47	8.017	0.00	14.017	3.36	20.02	1.34
2.033	1.47	8.033	0.00	14.033	3.35	20.03	1.34
2.050	1.47	8.050	0.00	14.050	3.35	20.05	1.34
2.067	1.47	8.067	0.00	14.067	3.35	20.07	1.34
2.083	1.47	8.083	0.00	14.083	3.35	20.08	1.34
2.100	1.47	8.100	0.00	14.100	3.35	20.10	1.34
2.117	1.47	8.117	0.00	14.117	3.35	20.12	1.34
2.133	1.47	8.133	0.00	14.133	3.35	20.13	1.34
2.150	1.47	8.150	0.00	14.150	3.35	20.15	1.34
2.167	1.47	8.167	0.00	14.167	3.35	20.17	1.34
2.183	1.47	8.183	0.00	14.183	3.35	20.18	1.34
2.200	1.47	8.200	0.00	14.200	3.35	20.20	1.34
2.217	1.47	8.217	0.00	14.217	3.35	20.22	1.34
2.233	1.47	8.233	0.00	14.233	3.35	20.23	1.34
2.250	1.47	8.250	0.00	14.250	3.35	20.25	1.34
2.267	1.43	8.267	0.00	14.267	3.35	20.27	1.34
2.283	1.43	8.283	0.00	14.283	3.35	20.28	1.34
2.300	1.43	8.300	0.00	14.300	3.35	20.30	1.34
2.317	1.43	8.317	0.00	14.317	3.35	20.32	1.34
2.333	1.43	8.333	0.00	14.333	3.35	20.33	1.34
2.350	1.43	8.350	0.00	14.350	3.35	20.35	1.34
2.367	1.43	8.367	0.00	14.367	3.35	20.37	1.34
2.383	1.43	8.383	0.00	14.383	3.35	20.38	1.34
2.400	1.43	8.400	0.00	14.400	3.35	20.40	1.34
2.417	1.43	8.417	0.00	14.417	3.35	20.42	1.34
2.433	1.43	8.433	0.00	14.433	3.35	20.43	1.34
2.450	1.43	8.450	0.00	14.450	3.35	20.45	1.34
2.467	1.43	8.467	0.00	14.467	3.35	20.47	1.34
2.483	1.43	8.483	0.00	14.483	3.35	20.48	1.34
2.500	1.43	8.500	0.02	14.500	3.35	20.50	1.34
2.517	1.47	8.517	6.02	14.517	3.35	20.52	1.34
2.533	1.47	8.533	6.02	14.533	3.35	20.53	1.34
2.550	1.47	8.550	6.02	14.550	3.35	20.55	1.34
2.567	1.47	8.567	6.02	14.567	3.35	20.57	1.34
2.583	1.47	8.583	6.02	14.583	3.35	20.58	1.34
2.600	1.47	8.600	6.02	14.600	3.35	20.60	1.34
2.617	1.47	8.617	6.02	14.617	3.35	20.62	1.34
2.633	1.47	8.633	6.02	14.633	3.35	20.63	1.34
2.650	1.47	8.650	6.02	14.650	3.35	20.65	1.34
2.667	1.47	8.667	6.02	14.667	3.35	20.67	1.34
2.683	1.47	8.683	6.02	14.683	3.35	20.68	1.34
2.700	1.47	8.700	6.02	14.700	3.35	20.70	1.34
2.717	1.47	8.717	6.02	14.717	3.35	20.72	1.34
2.733	1.47	8.733	6.02	14.733	3.35	20.73	1.34
2.750	1.47	8.750	6.02	14.750	3.35	20.75	1.34
2.767	1.43	8.767	6.02	14.767	3.35	20.77	1.34
2.783	1.43	8.783	6.02	14.783	3.35	20.78	1.34

2.800	1.43	8.800	6.02	14.800	3.35	20.80	1.34
2.817	1.43	8.817	6.02	14.817	3.35	20.82	1.34
2.833	1.43	8.833	6.02	14.833	3.35	20.83	1.34
2.850	1.43	8.850	6.02	14.850	3.35	20.85	1.34
2.867	1.43	8.867	6.02	14.867	3.35	20.87	1.34
2.883	1.43	8.883	6.02	14.883	3.35	20.88	1.34
2.900	1.43	8.900	6.02	14.900	3.35	20.90	1.34
2.917	1.43	8.917	6.02	14.917	3.35	20.92	1.34
2.933	1.43	8.933	6.02	14.933	3.35	20.93	1.34
2.950	1.43	8.950	6.02	14.950	3.35	20.95	1.34
2.967	1.43	8.967	6.02	14.967	3.35	20.97	1.34
2.983	1.43	8.983	6.02	14.983	3.35	20.98	1.34
3.000	1.43	9.000	6.02	15.000	3.35	21.00	1.34
3.017	1.47	9.017	3.57	15.017	3.35	21.02	1.34
3.033	1.47	9.033	3.57	15.033	3.35	21.03	1.34
3.050	1.47	9.050	3.57	15.050	3.35	21.05	1.34
3.067	1.47	9.067	3.57	15.067	3.35	21.07	1.34
3.083	1.47	9.083	3.57	15.083	3.35	21.08	1.34
3.100	1.47	9.100	3.57	15.100	3.35	21.10	1.34
3.117	1.47	9.117	3.57	15.117	3.35	21.12	1.34
3.133	1.47	9.133	3.57	15.133	3.35	21.13	1.34
3.150	1.47	9.150	3.57	15.150	3.35	21.15	1.34
3.167	1.47	9.167	3.57	15.167	3.35	21.17	1.34
3.183	1.47	9.183	3.57	15.183	3.35	21.18	1.34
3.200	1.47	9.200	3.57	15.200	3.35	21.20	1.34
3.217	1.47	9.217	3.57	15.217	3.35	21.22	1.34
3.233	1.47	9.233	3.57	15.233	3.35	21.23	1.34
3.250	1.47	9.250	3.57	15.250	3.35	21.25	1.34
3.267	1.43	9.267	3.57	15.267	3.35	21.27	1.34
3.283	1.43	9.283	3.57	15.283	3.35	21.28	1.34
3.300	1.43	9.300	3.57	15.300	3.35	21.30	1.34
3.317	1.43	9.317	3.57	15.317	3.35	21.32	1.34
3.333	1.43	9.333	3.57	15.333	3.35	21.33	1.34
3.350	1.43	9.350	3.57	15.350	3.35	21.35	1.34
3.367	1.43	9.367	3.57	15.367	3.35	21.37	1.34
3.383	1.43	9.383	3.57	15.383	3.35	21.38	1.34
3.400	1.43	9.400	3.57	15.400	3.35	21.40	1.34
3.417	1.43	9.417	3.57	15.417	3.35	21.42	1.34
3.433	1.43	9.433	3.57	15.433	3.35	21.43	1.34
3.450	1.43	9.450	3.57	15.450	3.35	21.45	1.34
3.467	1.43	9.467	3.57	15.467	3.35	21.47	1.34
3.483	1.43	9.483	3.57	15.483	3.35	21.48	1.34
3.500	1.43	9.500	3.57	15.500	3.35	21.50	1.34
3.517	1.47	9.517	4.02	15.517	3.35	21.52	1.34
3.533	1.47	9.533	4.02	15.533	3.35	21.53	1.34
3.550	1.47	9.550	4.02	15.550	3.35	21.55	1.34
3.567	1.47	9.567	4.02	15.567	3.35	21.57	1.34
3.583	1.47	9.583	4.02	15.583	3.35	21.58	1.34
3.600	1.47	9.600	4.02	15.600	3.35	21.60	1.34
3.617	1.47	9.617	4.02	15.617	3.35	21.62	1.34
3.633	1.47	9.633	4.02	15.633	3.35	21.63	1.34
3.650	1.47	9.650	4.02	15.650	3.35	21.65	1.34
3.667	1.47	9.667	4.02	15.667	3.35	21.67	1.34
3.683	1.47	9.683	4.02	15.683	3.35	21.68	1.34
3.700	1.47	9.700	4.02	15.700	3.35	21.70	1.34
3.717	1.47	9.717	4.02	15.717	3.35	21.72	1.34
3.733	1.47	9.733	4.02	15.733	3.35	21.73	1.34
3.750	1.47	9.750	4.02	15.750	3.35	21.75	1.34
3.767	1.43	9.767	4.02	15.767	3.35	21.77	1.34
3.783	1.43	9.783	4.02	15.783	3.35	21.78	1.34
3.800	1.43	9.800	4.02	15.800	3.35	21.80	1.34
3.817	1.43	9.817	4.02	15.817	3.35	21.82	1.34
3.833	1.43	9.833	4.02	15.833	3.35	21.83	1.34
3.850	1.43	9.850	4.02	15.850	3.35	21.85	1.34
3.867	1.43	9.867	4.02	15.867	3.35	21.87	1.34
3.883	1.43	9.883	4.02	15.883	3.35	21.88	1.34
3.900	1.43	9.900	4.02	15.900	3.35	21.90	1.34

3.917	1.43	9.917	4.02	15.917	3.35	21.92	1.34
3.933	1.43	9.933	4.02	15.933	3.35	21.93	1.34
3.950	1.43	9.950	4.02	15.950	3.35	21.95	1.34
3.967	1.43	9.967	4.02	15.967	3.35	21.97	1.34
3.983	1.43	9.983	4.02	15.983	3.35	21.98	1.34
4.000	1.43	10.000	4.02	16.000	3.35	22.00	1.34
4.017	1.78	10.017	5.13	16.017	2.01	22.02	1.34
4.033	1.78	10.033	5.13	16.033	2.01	22.03	1.34
4.050	1.78	10.050	5.13	16.050	2.01	22.05	1.34
4.067	1.78	10.067	5.13	16.067	2.01	22.07	1.34
4.083	1.78	10.083	5.13	16.083	2.01	22.08	1.34
4.100	1.78	10.100	5.13	16.100	2.01	22.10	1.34
4.117	1.78	10.117	5.13	16.117	2.01	22.12	1.34
4.133	1.78	10.133	5.13	16.133	2.01	22.13	1.34
4.150	1.78	10.150	5.13	16.150	2.01	22.15	1.34
4.167	1.78	10.167	5.13	16.167	2.01	22.17	1.34
4.183	1.78	10.183	5.13	16.183	2.01	22.18	1.34
4.200	1.78	10.200	5.13	16.200	2.01	22.20	1.34
4.217	1.78	10.217	5.13	16.217	2.01	22.22	1.34
4.233	1.78	10.233	5.13	16.233	2.01	22.23	1.34
4.250	1.78	10.250	5.13	16.250	2.01	22.25	1.34
4.267	1.78	10.267	5.13	16.267	2.01	22.27	1.34
4.283	1.78	10.283	5.13	16.283	2.01	22.28	1.34
4.300	1.78	10.300	5.13	16.300	2.01	22.30	1.34
4.317	1.78	10.317	5.13	16.317	2.01	22.32	1.34
4.333	1.78	10.333	5.13	16.333	2.01	22.33	1.34
4.350	1.78	10.350	5.13	16.350	2.01	22.35	1.34
4.367	1.78	10.367	5.13	16.367	2.01	22.37	1.34
4.383	1.78	10.383	5.13	16.383	2.01	22.38	1.34
4.400	1.78	10.400	5.13	16.400	2.01	22.40	1.34
4.417	1.78	10.417	5.13	16.417	2.01	22.42	1.34
4.433	1.78	10.433	5.13	16.433	2.01	22.43	1.34
4.450	1.78	10.450	5.13	16.450	2.01	22.45	1.34
4.467	1.78	10.467	5.13	16.467	2.01	22.47	1.34
4.483	1.78	10.483	5.13	16.483	2.01	22.48	1.34
4.500	1.78	10.500	5.13	16.500	2.01	22.50	1.34
4.517	1.78	10.517	6.92	16.517	2.01	22.52	1.34
4.533	1.78	10.533	6.92	16.533	2.01	22.53	1.34
4.550	1.78	10.550	6.92	16.550	2.01	22.55	1.34
4.567	1.78	10.567	6.92	16.567	2.01	22.57	1.34
4.583	1.78	10.583	6.92	16.583	2.01	22.58	1.34
4.600	1.78	10.600	6.92	16.600	2.01	22.60	1.34
4.617	1.78	10.617	6.92	16.617	2.01	22.62	1.34
4.633	1.78	10.633	6.92	16.633	2.01	22.63	1.34
4.650	1.78	10.650	6.92	16.650	2.01	22.65	1.34
4.667	1.78	10.667	6.92	16.667	2.01	22.67	1.34
4.683	1.78	10.683	6.92	16.683	2.01	22.68	1.34
4.700	1.78	10.700	6.92	16.700	2.01	22.70	1.34
4.717	1.78	10.717	6.92	16.717	2.01	22.72	1.34
4.733	1.78	10.733	6.92	16.733	2.01	22.73	1.34
4.750	1.78	10.750	6.92	16.750	2.01	22.75	1.34
4.767	1.78	10.767	6.92	16.767	2.01	22.77	1.34
4.783	1.78	10.783	6.92	16.783	2.01	22.78	1.34
4.800	1.78	10.800	6.92	16.800	2.01	22.80	1.34
4.817	1.78	10.817	6.92	16.817	2.01	22.82	1.34
4.833	1.78	10.833	6.92	16.833	2.01	22.83	1.34
4.850	1.78	10.850	6.92	16.850	2.01	22.85	1.34
4.867	1.78	10.867	6.92	16.867	2.01	22.87	1.34
4.883	1.78	10.883	6.92	16.883	2.01	22.88	1.34
4.900	1.78	10.900	6.92	16.900	2.01	22.90	1.34
4.917	1.78	10.917	6.92	16.917	2.01	22.92	1.34
4.933	1.78	10.933	6.92	16.933	2.01	22.93	1.34
4.950	1.78	10.950	6.92	16.950	2.01	22.95	1.34
4.967	1.78	10.967	6.92	16.967	2.01	22.97	1.34
4.983	1.78	10.983	6.92	16.983	2.01	22.98	1.34
5.000	1.78	11.000	6.92	17.000	2.01	23.00	1.34
5.017	1.78	11.017	10.71	17.017	2.01	23.02	1.34

5.033	1.78	11.033	10.71	17.033	2.01	23.03	1.34
5.050	1.78	11.050	10.71	17.050	2.01	23.05	1.34
5.067	1.78	11.067	10.71	17.067	2.01	23.07	1.34
5.083	1.78	11.083	10.71	17.083	2.01	23.08	1.34
5.100	1.78	11.100	10.71	17.100	2.01	23.10	1.34
5.117	1.78	11.117	10.71	17.117	2.01	23.12	1.34
5.133	1.78	11.133	10.71	17.133	2.01	23.13	1.34
5.150	1.78	11.150	10.71	17.150	2.01	23.15	1.34
5.167	1.78	11.167	10.71	17.167	2.01	23.17	1.34
5.183	1.78	11.183	10.71	17.183	2.01	23.18	1.34
5.200	1.78	11.200	10.71	17.200	2.01	23.20	1.34
5.217	1.78	11.217	10.71	17.217	2.01	23.22	1.34
5.233	1.78	11.233	10.71	17.233	2.01	23.23	1.34
5.250	1.78	11.250	10.71	17.250	2.01	23.25	1.34
5.267	1.78	11.267	10.71	17.267	2.01	23.27	1.34
5.283	1.78	11.283	10.71	17.283	2.01	23.28	1.34
5.300	1.78	11.300	10.71	17.300	2.01	23.30	1.34
5.317	1.78	11.317	10.71	17.317	2.01	23.32	1.34
5.333	1.78	11.333	10.71	17.333	2.01	23.33	1.34
5.350	1.78	11.350	10.71	17.350	2.01	23.35	1.34
5.367	1.78	11.367	10.71	17.367	2.01	23.37	1.34
5.383	1.78	11.383	10.71	17.383	2.01	23.38	1.34
5.400	1.78	11.400	10.71	17.400	2.01	23.40	1.34
5.417	1.78	11.417	10.71	17.417	2.01	23.42	1.34
5.433	1.78	11.433	10.71	17.433	2.01	23.43	1.34
5.450	1.78	11.450	10.71	17.450	2.01	23.45	1.34
5.467	1.78	11.467	10.71	17.467	2.01	23.47	1.34
5.483	1.78	11.483	10.71	17.483	2.01	23.48	1.34
5.500	1.78	11.500	10.71	17.500	2.01	23.50	1.34
5.517	1.78	11.517	46.40	17.517	2.01	23.52	1.34
5.533	1.78	11.533	46.41	17.533	2.01	23.53	1.34
5.550	1.78	11.550	46.41	17.550	2.01	23.55	1.34
5.567	1.78	11.567	46.41	17.567	2.01	23.57	1.34
5.583	1.78	11.583	46.41	17.583	2.01	23.58	1.34
5.600	1.78	11.600	46.41	17.600	2.01	23.60	1.34
5.617	1.78	11.617	46.41	17.617	2.01	23.62	1.34
5.633	1.78	11.633	46.41	17.633	2.01	23.63	1.34
5.650	1.78	11.650	46.41	17.650	2.01	23.65	1.34
5.667	1.78	11.667	46.41	17.667	2.01	23.67	1.34
5.683	1.78	11.683	46.41	17.683	2.01	23.68	1.34
5.700	1.78	11.700	46.41	17.700	2.01	23.70	1.34
5.717	1.78	11.717	46.41	17.717	2.01	23.72	1.34
5.733	1.78	11.733	46.41	17.733	2.01	23.73	1.34
5.750	1.78	11.750	46.41	17.750	2.01	23.75	1.34
5.767	1.78	11.767	123.13	17.767	2.01	23.77	1.34
5.783	1.78	11.783	123.16	17.783	2.01	23.78	1.34
5.800	1.78	11.800	123.16	17.800	2.01	23.80	1.34
5.817	1.78	11.817	123.16	17.817	2.01	23.82	1.34
5.833	1.78	11.833	123.16	17.833	2.01	23.83	1.34
5.850	1.78	11.850	123.16	17.850	2.01	23.85	1.34
5.867	1.78	11.867	123.16	17.867	2.01	23.87	1.34
5.883	1.78	11.883	123.16	17.883	2.01	23.88	1.34
5.900	1.78	11.900	123.16	17.900	2.01	23.90	1.34
5.917	1.78	11.917	123.16	17.917	2.01	23.92	1.34
5.933	1.78	11.933	123.16	17.933	2.01	23.93	1.34
5.950	1.78	11.950	123.16	17.950	2.01	23.95	1.34
5.967	1.78	11.967	123.16	17.967	2.01	23.97	1.34
5.983	1.78	11.983	123.16	17.983	2.01	23.98	1.34
6.000	1.78	12.000	123.16	18.000	2.01	24.00	1.34

Max.Eff.Inten.(mm/hr)=	123.16	113.75	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.75 (ii)	19.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.32	0.06	
			TOTALS
PEAK FLOW (cms)=	0.47	0.12	0.551 (iii)

TIME TO PEAK (hrs)=	12.00	12.22	12.00
RUNOFF VOLUME (mm)=	109.55	58.33	86.51
TOTAL RAINFALL (mm)=	111.56	111.56	111.56
RUNOFF COEFFICIENT =	0.98	0.52	0.78

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area (ha)= 1.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.92	0.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	90.55	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	123.16	140.33	
over (min)	5.00	7.00	
Storage Coeff. (min)=	2.21 (ii)	6.92 (ii)	
Unit Hyd. Tpeak (min)=	5.00	7.00	
Unit Hyd. peak (cms)=	0.36	0.16	
			TOTALS
PEAK FLOW (cms)=	0.24	0.10	0.334 (iii)
TIME TO PEAK (hrs)=	12.00	12.03	12.00
RUNOFF VOLUME (mm)=	109.56	59.94	87.73
TOTAL RAINFALL (mm)=	111.56	111.56	111.56
RUNOFF COEFFICIENT =	0.98	0.54	0.79

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)= 6.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	4.77	1.59	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	205.91	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	123.16	140.33	
over (min)	5.00	9.00	
Storage Coeff. (min)=	3.63 (ii)	8.33 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.28	0.13	
			TOTALS
PEAK FLOW (cms)=	1.19	0.48	1.651 (iii)
TIME TO PEAK (hrs)=	12.00	12.05	12.00
RUNOFF VOLUME (mm)=	109.54	59.94	87.73
TOTAL RAINFALL (mm)=	111.56	111.56	111.56

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     RUNOFF COEFFICIENT   =       0.98        0.54          0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92        0.31
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.55       40.00
     Mannings n           =      0.013       0.250

     Max.Eff.Inten.(mm/hr)=     123.16      119.48
               over (min)        5.00        7.00
     Storage Coeff.  (min)=       2.21 (ii)    6.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00        7.00
     Unit Hyd. peak  (cms)=       0.36        0.16
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.24        0.09         0.318 (iii)
     TIME TO PEAK    (hrs)=      12.00       12.03          12.00
     RUNOFF VOLUME    (mm)=     109.56       51.02          83.80
     TOTAL RAINFALL   (mm)=     111.56      111.56         111.56
     RUNOFF COEFFICIENT   =       0.98        0.46           0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.32     12.00   83.80
     ==================================================
     MAJOR SYS.(ID= 2):   0.08      0.11     12.00   83.80
     MINOR SYS.(ID= 3):   1.15      0.21     11.83   83.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     1.15   0.206    11.83    83.80
      + ID2= 2 (  0203):     6.36   1.651    12.00    87.73
        ==================================================
        ID = 3 (  0016):     7.51   1.857    12.00    87.13

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



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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00        1.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     115.76       40.00
     Mannings n           =      0.013       0.250

     Max.Eff.Inten.(mm/hr)=     123.16       64.30
               over (min)        5.00       10.00
     Storage Coeff.  (min)=       2.57 (ii)    9.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.33        0.12
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.34        0.13         0.463 (iii)
     TIME TO PEAK    (hrs)=      12.00       12.07          12.00
     RUNOFF VOLUME    (mm)=     109.56       47.82          78.69
     TOTAL RAINFALL   (mm)=     111.56      111.56         111.56
     RUNOFF COEFFICIENT   =       0.98        0.43           0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37        3.12
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     288.56       40.00
     Mannings n           =      0.013       0.250

     Max.Eff.Inten.(mm/hr)=     123.16      119.48
               over (min)        5.00       10.00
     Storage Coeff.  (min)=       4.44 (ii)    9.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.24        0.12
                                                  *TOTALS*
     PEAK FLOW       (cms)=       2.30        0.76         3.006 (iii)
     TIME TO PEAK    (hrs)=      12.00       12.07          12.00
     RUNOFF VOLUME    (mm)=     109.55       51.01          83.80
     TOTAL RAINFALL   (mm)=     111.56      111.56         111.56
     RUNOFF COEFFICIENT   =       0.98        0.46           0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB           |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     123.16       119.48
               over (min)         5.00         9.00
     Storage Coeff.  (min)=       3.43 (ii)    8.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.29         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.00         0.34          1.323 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05         12.00
     RUNOFF VOLUME    (mm)=     109.55        51.01         83.80
     TOTAL RAINFALL   (mm)=     111.56       111.56        111.56
     RUNOFF COEFFICIENT   =       0.98         0.46          0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB           |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     123.16       119.48
               over (min)         5.00         9.00
     Storage Coeff.  (min)=       4.14 (ii)    8.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.26         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.83         0.62          2.414 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05         12.00
     RUNOFF VOLUME    (mm)=     109.56        51.01         83.80
     TOTAL RAINFALL   (mm)=     111.56       111.56        111.56
     RUNOFF COEFFICIENT   =       0.98         0.46          0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   3.006    12.00    83.80
     + ID2= 2 (  0302):     5.31   1.323    12.00    83.80
       ================================================
       ID = 3 (  0013):    17.80   4.329    12.00    83.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   4.329    12.00    83.80
     + ID2= 2 (  0303):     9.87   2.414    12.00    83.80
       ================================================
       ID = 1 (  0013):    27.67   6.743    12.00    83.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   6.743    12.00    83.80
     + ID2= 2 (  0016):     7.51   1.857    12.00    87.13
       ================================================
       ID = 3 (  0012):    35.18   8.599    12.00    84.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.18   8.599    12.00    84.51
     + ID2= 2 (  0204):     2.01   0.463    12.00    78.69
       ================================================
       ID = 1 (  0012):    37.19   9.063    12.00    84.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.4389      1.4219
                         0.1014     0.3040   |   0.9212      1.8498
                         0.1939     0.6475   |   1.2450      2.2118
                         0.2548     1.0211   |   1.6046      2.3050
                         0.2583     1.0470   |   4.5503      2.6235

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.188      9.063     12.00      84.20
   OUTFLOW: ID= 1 (  0011)     37.188      0.854     12.73      74.45

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.43
                 TIME SHIFT OF PEAK FLOW         (min)= 44.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.7905
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================================================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\6efef0fe-8be6-40d7-a5ce-bef67542576a\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\6efef0fe-8be6-40d7-a5ce-bef67542576a\sce


DATE: 03/23/2019                          TIME: 12:54:27

USER:


COMMENTS: _____________________________________________________


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


--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\4bdc1f29
| Ptotal=125.69 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
--------------------
                     Duration of storm    = 24.00 hrs
                     Mass curve time step = 15.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    1.41 |  6.25    0.00 | 12.25   18.10 | 18.25    2.26
               0.50    1.36 |  6.50    0.00 | 12.50   18.10 | 18.50    2.26
               0.75    1.41 |  6.75    0.00 | 12.75    9.30 | 18.75    2.26
               1.00    1.36 |  7.00    0.00 | 13.00    9.30 | 19.00    2.26
               1.25    1.41 |  7.25    5.03 | 13.25    1.76 | 19.25    2.26
               1.50    1.36 |  7.50    5.03 | 13.50    1.76 | 19.50    2.26
               1.75    1.41 |  7.75    5.03 | 13.75   10.31 | 19.75    2.26
               2.00    1.36 |  8.00    5.03 | 14.00   10.31 | 20.00    2.26
               2.25    1.66 |  8.25    0.00 | 14.25    3.77 | 20.25    1.51
               2.50    1.61 |  8.50    0.00 | 14.50    3.77 | 20.50    1.51
               2.75    1.66 |  8.75    6.79 | 14.75    3.77 | 20.75    1.51
```



```
               3.00    1.61 |  9.00    6.79 | 15.00    3.77 | 21.00    1.51
               3.25    1.66 |  9.25    4.02 | 15.25    3.77 | 21.25    1.51
               3.50    1.61 |  9.50    4.02 | 15.50    3.77 | 21.50    1.51
               3.75    1.66 |  9.75    4.52 | 15.75    3.77 | 21.75    1.51
               4.00    1.61 | 10.00    4.52 | 16.00    3.77 | 22.00    1.51
               4.25    2.01 | 10.25    5.78 | 16.25    2.26 | 22.25    1.51
               4.50    2.01 | 10.50    5.78 | 16.50    2.26 | 22.50    1.51
               4.75    2.01 | 10.75    7.79 | 16.75    2.26 | 22.75    1.51
               5.00    2.01 | 11.00    7.79 | 17.00    2.26 | 23.00    1.51
               5.25    2.01 | 11.25   12.07 | 17.25    2.26 | 23.25    1.51
               5.50    2.01 | 11.50   12.07 | 17.50    2.26 | 23.50    1.51
               5.75    2.01 | 11.75   52.29 | 17.75    2.26 | 23.75    1.51
               6.00    2.01 | 12.00  138.76 | 18.00    2.26 | 24.00    1.51

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--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.017    1.41 | 6.017    0.00 |12.017   18.18 | 18.02    2.26
             0.033    1.41 | 6.033    0.00 |12.033   18.10 | 18.03    2.26
             0.050    1.41 | 6.050    0.00 |12.050   18.10 | 18.05    2.26
             0.067    1.41 | 6.067    0.00 |12.067   18.10 | 18.07    2.26
             0.083    1.41 | 6.083    0.00 |12.083   18.10 | 18.08    2.26
             0.100    1.41 | 6.100    0.00 |12.100   18.10 | 18.10    2.26
             0.117    1.41 | 6.117    0.00 |12.117   18.10 | 18.12    2.26
             0.133    1.41 | 6.133    0.00 |12.133   18.10 | 18.13    2.26
             0.150    1.41 | 6.150    0.00 |12.150   18.10 | 18.15    2.26
             0.167    1.41 | 6.167    0.00 |12.167   18.10 | 18.17    2.26
             0.183    1.41 | 6.183    0.00 |12.183   18.10 | 18.18    2.26
             0.200    1.41 | 6.200    0.00 |12.200   18.10 | 18.20    2.26
             0.217    1.41 | 6.217    0.00 |12.217   18.10 | 18.22    2.26
             0.233    1.41 | 6.233    0.00 |12.233   18.10 | 18.23    2.26
             0.250    1.41 | 6.250    0.00 |12.250   18.10 | 18.25    2.26
             0.267    1.36 | 6.267    0.00 |12.267   18.10 | 18.27    2.26
             0.283    1.36 | 6.283    0.00 |12.283   18.10 | 18.28    2.26
             0.300    1.36 | 6.300    0.00 |12.300   18.10 | 18.30    2.26
             0.317    1.36 | 6.317    0.00 |12.317   18.10 | 18.32    2.26
             0.333    1.36 | 6.333    0.00 |12.333   18.10 | 18.33    2.26
             0.350    1.36 | 6.350    0.00 |12.350   18.10 | 18.35    2.26
             0.367    1.36 | 6.367    0.00 |12.367   18.10 | 18.37    2.26
             0.383    1.36 | 6.383    0.00 |12.383   18.10 | 18.38    2.26
             0.400    1.36 | 6.400    0.00 |12.400   18.10 | 18.40    2.26
             0.417    1.36 | 6.417    0.00 |12.417   18.10 | 18.42    2.26
             0.433    1.36 | 6.433    0.00 |12.433   18.10 | 18.43    2.26
             0.450    1.36 | 6.450    0.00 |12.450   18.10 | 18.45    2.26
             0.467    1.36 | 6.467    0.00 |12.467   18.10 | 18.47    2.26
             0.483    1.36 | 6.483    0.00 |12.483   18.10 | 18.48    2.26
             0.500    1.36 | 6.500    0.00 |12.500   18.10 | 18.50    2.26
             0.517    1.41 | 6.517    0.00 |12.517    9.31 | 18.52    2.26
             0.533    1.41 | 6.533    0.00 |12.533    9.30 | 18.53    2.26
             0.550    1.41 | 6.550    0.00 |12.550    9.30 | 18.55    2.26
             0.567    1.41 | 6.567    0.00 |12.567    9.30 | 18.57    2.26
```

0.583	1.41	6.583	0.00	12.583	9.30	18.58	2.26
0.600	1.41	6.600	0.00	12.600	9.30	18.60	2.26
0.617	1.41	6.617	0.00	12.617	9.30	18.62	2.26
0.633	1.41	6.633	0.00	12.633	9.30	18.63	2.26
0.650	1.41	6.650	0.00	12.650	9.30	18.65	2.26
0.667	1.41	6.667	0.00	12.667	9.30	18.67	2.26
0.683	1.41	6.683	0.00	12.683	9.30	18.68	2.26
0.700	1.41	6.700	0.00	12.700	9.30	18.70	2.26
0.717	1.41	6.717	0.00	12.717	9.30	18.72	2.26
0.733	1.41	6.733	0.00	12.733	9.30	18.73	2.26
0.750	1.41	6.750	0.00	12.750	9.30	18.75	2.26
0.767	1.36	6.767	0.00	12.767	9.30	18.77	2.26
0.783	1.36	6.783	0.00	12.783	9.30	18.78	2.26
0.800	1.36	6.800	0.00	12.800	9.30	18.80	2.26
0.817	1.36	6.817	0.00	12.817	9.30	18.82	2.26
0.833	1.36	6.833	0.00	12.833	9.30	18.83	2.26
0.850	1.36	6.850	0.00	12.850	9.30	18.85	2.26
0.867	1.36	6.867	0.00	12.867	9.30	18.87	2.26
0.883	1.36	6.883	0.00	12.883	9.30	18.88	2.26
0.900	1.36	6.900	0.00	12.900	9.30	18.90	2.26
0.917	1.36	6.917	0.00	12.917	9.30	18.92	2.26
0.933	1.36	6.933	0.00	12.933	9.30	18.93	2.26
0.950	1.36	6.950	0.00	12.950	9.30	18.95	2.26
0.967	1.36	6.967	0.00	12.967	9.30	18.97	2.26
0.983	1.36	6.983	0.00	12.983	9.30	18.98	2.26
1.000	1.36	7.000	0.01	13.000	9.30	19.00	2.26
1.017	1.41	7.017	5.03	13.017	1.77	19.02	2.26
1.033	1.41	7.033	5.03	13.033	1.76	19.03	2.26
1.050	1.41	7.050	5.03	13.050	1.76	19.05	2.26
1.067	1.41	7.067	5.03	13.067	1.76	19.07	2.26
1.083	1.41	7.083	5.03	13.083	1.76	19.08	2.26
1.100	1.41	7.100	5.03	13.100	1.76	19.10	2.26
1.117	1.41	7.117	5.03	13.117	1.76	19.12	2.26
1.133	1.41	7.133	5.03	13.133	1.76	19.13	2.26
1.150	1.41	7.150	5.03	13.150	1.76	19.15	2.26
1.167	1.41	7.167	5.03	13.167	1.76	19.17	2.26
1.183	1.41	7.183	5.03	13.183	1.76	19.18	2.26
1.200	1.41	7.200	5.03	13.200	1.76	19.20	2.26
1.217	1.41	7.217	5.03	13.217	1.76	19.22	2.26
1.233	1.41	7.233	5.03	13.233	1.76	19.23	2.26
1.250	1.41	7.250	5.03	13.250	1.76	19.25	2.26
1.267	1.36	7.267	5.03	13.267	1.76	19.27	2.26
1.283	1.36	7.283	5.03	13.283	1.76	19.28	2.26
1.300	1.36	7.300	5.03	13.300	1.76	19.30	2.26
1.317	1.36	7.317	5.03	13.317	1.76	19.32	2.26
1.333	1.36	7.333	5.03	13.333	1.76	19.33	2.26
1.350	1.36	7.350	5.03	13.350	1.76	19.35	2.26
1.367	1.36	7.367	5.03	13.367	1.76	19.37	2.26
1.383	1.36	7.383	5.03	13.383	1.76	19.38	2.26
1.400	1.36	7.400	5.03	13.400	1.76	19.40	2.26
1.417	1.36	7.417	5.03	13.417	1.76	19.42	2.26
1.433	1.36	7.433	5.03	13.433	1.76	19.43	2.26
1.450	1.36	7.450	5.03	13.450	1.76	19.45	2.26
1.467	1.36	7.467	5.03	13.467	1.76	19.47	2.26
1.483	1.36	7.483	5.03	13.483	1.76	19.48	2.26
1.500	1.36	7.500	5.03	13.500	1.76	19.50	2.26
1.517	1.41	7.517	5.03	13.517	10.29	19.52	2.26
1.533	1.41	7.533	5.03	13.533	10.31	19.53	2.26
1.550	1.41	7.550	5.03	13.550	10.31	19.55	2.26
1.567	1.41	7.567	5.03	13.567	10.31	19.57	2.26
1.583	1.41	7.583	5.03	13.583	10.31	19.58	2.26
1.600	1.41	7.600	5.03	13.600	10.31	19.60	2.26
1.617	1.41	7.617	5.03	13.617	10.31	19.62	2.26
1.633	1.41	7.633	5.03	13.633	10.31	19.63	2.26
1.650	1.41	7.650	5.03	13.650	10.31	19.65	2.26
1.667	1.41	7.667	5.03	13.667	10.31	19.67	2.26
1.683	1.41	7.683	5.03	13.683	10.31	19.68	2.26

1.700	1.41	7.700	5.03	13.700	10.31	19.70	2.26
1.717	1.41	7.717	5.03	13.717	10.31	19.72	2.26
1.733	1.41	7.733	5.03	13.733	10.31	19.73	2.26
1.750	1.41	7.750	5.03	13.750	10.31	19.75	2.26
1.767	1.36	7.767	5.03	13.767	10.31	19.77	2.26
1.783	1.36	7.783	5.03	13.783	10.31	19.78	2.26
1.800	1.36	7.800	5.03	13.800	10.31	19.80	2.26
1.817	1.36	7.817	5.03	13.817	10.31	19.82	2.26
1.833	1.36	7.833	5.03	13.833	10.31	19.83	2.26
1.850	1.36	7.850	5.03	13.850	10.31	19.85	2.26
1.867	1.36	7.867	5.03	13.867	10.31	19.87	2.26
1.883	1.36	7.883	5.03	13.883	10.31	19.88	2.26
1.900	1.36	7.900	5.03	13.900	10.31	19.90	2.26
1.917	1.36	7.917	5.03	13.917	10.31	19.92	2.26
1.933	1.36	7.933	5.03	13.933	10.31	19.93	2.26
1.950	1.36	7.950	5.03	13.950	10.31	19.95	2.26
1.967	1.36	7.967	5.03	13.967	10.31	19.97	2.26
1.983	1.36	7.983	5.03	13.983	10.31	19.98	2.26
2.000	1.36	8.000	5.01	14.000	10.31	20.00	2.26
2.017	1.66	8.017	0.00	14.017	3.79	20.02	1.51
2.033	1.66	8.033	0.00	14.033	3.77	20.03	1.51
2.050	1.66	8.050	0.00	14.050	3.77	20.05	1.51
2.067	1.66	8.067	0.00	14.067	3.77	20.07	1.51
2.083	1.66	8.083	0.00	14.083	3.77	20.08	1.51
2.100	1.66	8.100	0.00	14.100	3.77	20.10	1.51
2.117	1.66	8.117	0.00	14.117	3.77	20.12	1.51
2.133	1.66	8.133	0.00	14.133	3.77	20.13	1.51
2.150	1.66	8.150	0.00	14.150	3.77	20.15	1.51
2.167	1.66	8.167	0.00	14.167	3.77	20.17	1.51
2.183	1.66	8.183	0.00	14.183	3.77	20.18	1.51
2.200	1.66	8.200	0.00	14.200	3.77	20.20	1.51
2.217	1.66	8.217	0.00	14.217	3.77	20.22	1.51
2.233	1.66	8.233	0.00	14.233	3.77	20.23	1.51
2.250	1.66	8.250	0.00	14.250	3.77	20.25	1.51
2.267	1.61	8.267	0.00	14.267	3.77	20.27	1.51
2.283	1.61	8.283	0.00	14.283	3.77	20.28	1.51
2.300	1.61	8.300	0.00	14.300	3.77	20.30	1.51
2.317	1.61	8.317	0.00	14.317	3.77	20.32	1.51
2.333	1.61	8.333	0.00	14.333	3.77	20.33	1.51
2.350	1.61	8.350	0.00	14.350	3.77	20.35	1.51
2.367	1.61	8.367	0.00	14.367	3.77	20.37	1.51
2.383	1.61	8.383	0.00	14.383	3.77	20.38	1.51
2.400	1.61	8.400	0.00	14.400	3.77	20.40	1.51
2.417	1.61	8.417	0.00	14.417	3.77	20.42	1.51
2.433	1.61	8.433	0.00	14.433	3.77	20.43	1.51
2.450	1.61	8.450	0.00	14.450	3.77	20.45	1.51
2.467	1.61	8.467	0.00	14.467	3.77	20.47	1.51
2.483	1.61	8.483	0.00	14.483	3.77	20.48	1.51
2.500	1.61	8.500	0.02	14.500	3.77	20.50	1.51
2.517	1.66	8.517	6.79	14.517	3.77	20.52	1.51
2.533	1.66	8.533	6.79	14.533	3.77	20.53	1.51
2.550	1.66	8.550	6.79	14.550	3.77	20.55	1.51
2.567	1.66	8.567	6.79	14.567	3.77	20.57	1.51
2.583	1.66	8.583	6.79	14.583	3.77	20.58	1.51
2.600	1.66	8.600	6.79	14.600	3.77	20.60	1.51
2.617	1.66	8.617	6.79	14.617	3.77	20.62	1.51
2.633	1.66	8.633	6.79	14.633	3.77	20.63	1.51
2.650	1.66	8.650	6.79	14.650	3.77	20.65	1.51
2.667	1.66	8.667	6.79	14.667	3.77	20.67	1.51
2.683	1.66	8.683	6.79	14.683	3.77	20.68	1.51
2.700	1.66	8.700	6.79	14.700	3.77	20.70	1.51
2.717	1.66	8.717	6.79	14.717	3.77	20.72	1.51
2.733	1.66	8.733	6.79	14.733	3.77	20.73	1.51
2.750	1.66	8.750	6.79	14.750	3.77	20.75	1.51
2.767	1.61	8.767	6.79	14.767	3.77	20.77	1.51
2.783	1.61	8.783	6.79	14.783	3.77	20.78	1.51
2.800	1.61	8.800	6.79	14.800	3.77	20.80	1.51

2.817	1.61	8.817	6.79	14.817	3.77	20.82	1.51
2.833	1.61	8.833	6.79	14.833	3.77	20.83	1.51
2.850	1.61	8.850	6.79	14.850	3.77	20.85	1.51
2.867	1.61	8.867	6.79	14.867	3.77	20.87	1.51
2.883	1.61	8.883	6.79	14.883	3.77	20.88	1.51
2.900	1.61	8.900	6.79	14.900	3.77	20.90	1.51
2.917	1.61	8.917	6.79	14.917	3.77	20.92	1.51
2.933	1.61	8.933	6.79	14.933	3.77	20.93	1.51
2.950	1.61	8.950	6.79	14.950	3.77	20.95	1.51
2.967	1.61	8.967	6.79	14.967	3.77	20.97	1.51
2.983	1.61	8.983	6.79	14.983	3.77	20.98	1.51
3.000	1.61	9.000	6.78	15.000	3.77	21.00	1.51
3.017	1.66	9.017	4.02	15.017	3.77	21.02	1.51
3.033	1.66	9.033	4.02	15.033	3.77	21.03	1.51
3.050	1.66	9.050	4.02	15.050	3.77	21.05	1.51
3.067	1.66	9.067	4.02	15.067	3.77	21.07	1.51
3.083	1.66	9.083	4.02	15.083	3.77	21.08	1.51
3.100	1.66	9.100	4.02	15.100	3.77	21.10	1.51
3.117	1.66	9.117	4.02	15.117	3.77	21.12	1.51
3.133	1.66	9.133	4.02	15.133	3.77	21.13	1.51
3.150	1.66	9.150	4.02	15.150	3.77	21.15	1.51
3.167	1.66	9.167	4.02	15.167	3.77	21.17	1.51
3.183	1.66	9.183	4.02	15.183	3.77	21.18	1.51
3.200	1.66	9.200	4.02	15.200	3.77	21.20	1.51
3.217	1.66	9.217	4.02	15.217	3.77	21.22	1.51
3.233	1.66	9.233	4.02	15.233	3.77	21.23	1.51
3.250	1.66	9.250	4.02	15.250	3.77	21.25	1.51
3.267	1.61	9.267	4.02	15.267	3.77	21.27	1.51
3.283	1.61	9.283	4.02	15.283	3.77	21.28	1.51
3.300	1.61	9.300	4.02	15.300	3.77	21.30	1.51
3.317	1.61	9.317	4.02	15.317	3.77	21.32	1.51
3.333	1.61	9.333	4.02	15.333	3.77	21.33	1.51
3.350	1.61	9.350	4.02	15.350	3.77	21.35	1.51
3.367	1.61	9.367	4.02	15.367	3.77	21.37	1.51
3.383	1.61	9.383	4.02	15.383	3.77	21.38	1.51
3.400	1.61	9.400	4.02	15.400	3.77	21.40	1.51
3.417	1.61	9.417	4.02	15.417	3.77	21.42	1.51
3.433	1.61	9.433	4.02	15.433	3.77	21.43	1.51
3.450	1.61	9.450	4.02	15.450	3.77	21.45	1.51
3.467	1.61	9.467	4.02	15.467	3.77	21.47	1.51
3.483	1.61	9.483	4.02	15.483	3.77	21.48	1.51
3.500	1.61	9.500	4.02	15.500	3.77	21.50	1.51
3.517	1.66	9.517	4.52	15.517	3.77	21.52	1.51
3.533	1.66	9.533	4.52	15.533	3.77	21.53	1.51
3.550	1.66	9.550	4.52	15.550	3.77	21.55	1.51
3.567	1.66	9.567	4.52	15.567	3.77	21.57	1.51
3.583	1.66	9.583	4.52	15.583	3.77	21.58	1.51
3.600	1.66	9.600	4.52	15.600	3.77	21.60	1.51
3.617	1.66	9.617	4.52	15.617	3.77	21.62	1.51
3.633	1.66	9.633	4.52	15.633	3.77	21.63	1.51
3.650	1.66	9.650	4.52	15.650	3.77	21.65	1.51
3.667	1.66	9.667	4.52	15.667	3.77	21.67	1.51
3.683	1.66	9.683	4.52	15.683	3.77	21.68	1.51
3.700	1.66	9.700	4.52	15.700	3.77	21.70	1.51
3.717	1.66	9.717	4.52	15.717	3.77	21.72	1.51
3.733	1.66	9.733	4.52	15.733	3.77	21.73	1.51
3.750	1.66	9.750	4.52	15.750	3.77	21.75	1.51
3.767	1.61	9.767	4.52	15.767	3.77	21.77	1.51
3.783	1.61	9.783	4.52	15.783	3.77	21.78	1.51
3.800	1.61	9.800	4.52	15.800	3.77	21.80	1.51
3.817	1.61	9.817	4.52	15.817	3.77	21.82	1.51
3.833	1.61	9.833	4.52	15.833	3.77	21.83	1.51
3.850	1.61	9.850	4.52	15.850	3.77	21.85	1.51
3.867	1.61	9.867	4.52	15.867	3.77	21.87	1.51
3.883	1.61	9.883	4.52	15.883	3.77	21.88	1.51
3.900	1.61	9.900	4.52	15.900	3.77	21.90	1.51
3.917	1.61	9.917	4.52	15.917	3.77	21.92	1.51

3.933	1.61	9.933	4.52	15.933	3.77	21.93	1.51
3.950	1.61	9.950	4.52	15.950	3.77	21.95	1.51
3.967	1.61	9.967	4.52	15.967	3.77	21.97	1.51
3.983	1.61	9.983	4.52	15.983	3.77	21.98	1.51
4.000	1.61	10.000	4.53	16.000	3.77	22.00	1.51
4.017	2.01	10.017	5.78	16.017	2.27	22.02	1.51
4.033	2.01	10.033	5.78	16.033	2.26	22.03	1.51
4.050	2.01	10.050	5.78	16.050	2.26	22.05	1.51
4.067	2.01	10.067	5.78	16.067	2.26	22.07	1.51
4.083	2.01	10.083	5.78	16.083	2.26	22.08	1.51
4.100	2.01	10.100	5.78	16.100	2.26	22.10	1.51
4.117	2.01	10.117	5.78	16.117	2.26	22.12	1.51
4.133	2.01	10.133	5.78	16.133	2.26	22.13	1.51
4.150	2.01	10.150	5.78	16.150	2.26	22.15	1.51
4.167	2.01	10.167	5.78	16.167	2.26	22.17	1.51
4.183	2.01	10.183	5.78	16.183	2.26	22.18	1.51
4.200	2.01	10.200	5.78	16.200	2.26	22.20	1.51
4.217	2.01	10.217	5.78	16.217	2.26	22.22	1.51
4.233	2.01	10.233	5.78	16.233	2.26	22.23	1.51
4.250	2.01	10.250	5.78	16.250	2.26	22.25	1.51
4.267	2.01	10.267	5.78	16.267	2.26	22.27	1.51
4.283	2.01	10.283	5.78	16.283	2.26	22.28	1.51
4.300	2.01	10.300	5.78	16.300	2.26	22.30	1.51
4.317	2.01	10.317	5.78	16.317	2.26	22.32	1.51
4.333	2.01	10.333	5.78	16.333	2.26	22.33	1.51
4.350	2.01	10.350	5.78	16.350	2.26	22.35	1.51
4.367	2.01	10.367	5.78	16.367	2.26	22.37	1.51
4.383	2.01	10.383	5.78	16.383	2.26	22.38	1.51
4.400	2.01	10.400	5.78	16.400	2.26	22.40	1.51
4.417	2.01	10.417	5.78	16.417	2.26	22.42	1.51
4.433	2.01	10.433	5.78	16.433	2.26	22.43	1.51
4.450	2.01	10.450	5.78	16.450	2.26	22.45	1.51
4.467	2.01	10.467	5.78	16.467	2.26	22.47	1.51
4.483	2.01	10.483	5.78	16.483	2.26	22.48	1.51
4.500	2.01	10.500	5.78	16.500	2.26	22.50	1.51
4.517	2.01	10.517	7.79	16.517	2.26	22.52	1.51
4.533	2.01	10.533	7.79	16.533	2.26	22.53	1.51
4.550	2.01	10.550	7.79	16.550	2.26	22.55	1.51
4.567	2.01	10.567	7.79	16.567	2.26	22.57	1.51
4.583	2.01	10.583	7.79	16.583	2.26	22.58	1.51
4.600	2.01	10.600	7.79	16.600	2.26	22.60	1.51
4.617	2.01	10.617	7.79	16.617	2.26	22.62	1.51
4.633	2.01	10.633	7.79	16.633	2.26	22.63	1.51
4.650	2.01	10.650	7.79	16.650	2.26	22.65	1.51
4.667	2.01	10.667	7.79	16.667	2.26	22.67	1.51
4.683	2.01	10.683	7.79	16.683	2.26	22.68	1.51
4.700	2.01	10.700	7.79	16.700	2.26	22.70	1.51
4.717	2.01	10.717	7.79	16.717	2.26	22.72	1.51
4.733	2.01	10.733	7.79	16.733	2.26	22.73	1.51
4.750	2.01	10.750	7.79	16.750	2.26	22.75	1.51
4.767	2.01	10.767	7.79	16.767	2.26	22.77	1.51
4.783	2.01	10.783	7.79	16.783	2.26	22.78	1.51
4.800	2.01	10.800	7.79	16.800	2.26	22.80	1.51
4.817	2.01	10.817	7.79	16.817	2.26	22.82	1.51
4.833	2.01	10.833	7.79	16.833	2.26	22.83	1.51
4.850	2.01	10.850	7.79	16.850	2.26	22.85	1.51
4.867	2.01	10.867	7.79	16.867	2.26	22.87	1.51
4.883	2.01	10.883	7.79	16.883	2.26	22.88	1.51
4.900	2.01	10.900	7.79	16.900	2.26	22.90	1.51
4.917	2.01	10.917	7.79	16.917	2.26	22.92	1.51
4.933	2.01	10.933	7.79	16.933	2.26	22.93	1.51
4.950	2.01	10.950	7.79	16.950	2.26	22.95	1.51
4.967	2.01	10.967	7.79	16.967	2.26	22.97	1.51
4.983	2.01	10.983	7.79	16.983	2.26	22.98	1.51
5.000	2.01	11.000	7.79	17.000	2.26	23.00	1.51
5.017	2.01	11.017	12.07	17.017	2.26	23.02	1.51
5.033	2.01	11.033	12.07	17.033	2.26	23.03	1.51

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          5.050    2.01 |11.050   12.07 |17.050    2.26 | 23.05    1.51
          5.067    2.01 |11.067   12.07 |17.067    2.26 | 23.07    1.51
          5.083    2.01 |11.083   12.07 |17.083    2.26 | 23.08    1.51
          5.100    2.01 |11.100   12.07 |17.100    2.26 | 23.10    1.51
          5.117    2.01 |11.117   12.07 |17.117    2.26 | 23.12    1.51
          5.133    2.01 |11.133   12.07 |17.133    2.26 | 23.13    1.51
          5.150    2.01 |11.150   12.07 |17.150    2.26 | 23.15    1.51
          5.167    2.01 |11.167   12.07 |17.167    2.26 | 23.17    1.51
          5.183    2.01 |11.183   12.07 |17.183    2.26 | 23.18    1.51
          5.200    2.01 |11.200   12.07 |17.200    2.26 | 23.20    1.51
          5.217    2.01 |11.217   12.07 |17.217    2.26 | 23.22    1.51
          5.233    2.01 |11.233   12.07 |17.233    2.26 | 23.23    1.51
          5.250    2.01 |11.250   12.07 |17.250    2.26 | 23.25    1.51
          5.267    2.01 |11.267   12.07 |17.267    2.26 | 23.27    1.51
          5.283    2.01 |11.283   12.07 |17.283    2.26 | 23.28    1.51
          5.300    2.01 |11.300   12.07 |17.300    2.26 | 23.30    1.51
          5.317    2.01 |11.317   12.07 |17.317    2.26 | 23.32    1.51
          5.333    2.01 |11.333   12.07 |17.333    2.26 | 23.33    1.51
          5.350    2.01 |11.350   12.07 |17.350    2.26 | 23.35    1.51
          5.367    2.01 |11.367   12.07 |17.367    2.26 | 23.37    1.51
          5.383    2.01 |11.383   12.07 |17.383    2.26 | 23.38    1.51
          5.400    2.01 |11.400   12.07 |17.400    2.26 | 23.40    1.51
          5.417    2.01 |11.417   12.07 |17.417    2.26 | 23.42    1.51
          5.433    2.01 |11.433   12.07 |17.433    2.26 | 23.43    1.51
          5.450    2.01 |11.450   12.07 |17.450    2.26 | 23.45    1.51
          5.467    2.01 |11.467   12.07 |17.467    2.26 | 23.47    1.51
          5.483    2.01 |11.483   12.07 |17.483    2.26 | 23.48    1.51
          5.500    2.01 |11.500   12.07 |17.500    2.26 | 23.50    1.51
          5.517    2.01 |11.517   52.28 |17.517    2.26 | 23.52    1.51
          5.533    2.01 |11.533   52.29 |17.533    2.26 | 23.53    1.51
          5.550    2.01 |11.550   52.29 |17.550    2.26 | 23.55    1.51
          5.567    2.01 |11.567   52.29 |17.567    2.26 | 23.57    1.51
          5.583    2.01 |11.583   52.29 |17.583    2.26 | 23.58    1.51
          5.600    2.01 |11.600   52.29 |17.600    2.26 | 23.60    1.51
          5.617    2.01 |11.617   52.29 |17.617    2.26 | 23.62    1.51
          5.633    2.01 |11.633   52.29 |17.633    2.26 | 23.63    1.51
          5.650    2.01 |11.650   52.29 |17.650    2.26 | 23.65    1.51
          5.667    2.01 |11.667   52.29 |17.667    2.26 | 23.67    1.51
          5.683    2.01 |11.683   52.29 |17.683    2.26 | 23.68    1.51
          5.700    2.01 |11.700   52.29 |17.700    2.26 | 23.70    1.51
          5.717    2.01 |11.717   52.29 |17.717    2.26 | 23.72    1.51
          5.733    2.01 |11.733   52.29 |17.733    2.26 | 23.73    1.51
          5.750    2.01 |11.750   52.29 |17.750    2.26 | 23.75    1.51
          5.767    2.01 |11.767  138.72 |17.767    2.26 | 23.77    1.51
          5.783    2.01 |11.783  138.76 |17.783    2.26 | 23.78    1.51
          5.800    2.01 |11.800  138.76 |17.800    2.26 | 23.80    1.51
          5.817    2.01 |11.817  138.76 |17.817    2.26 | 23.82    1.51
          5.833    2.01 |11.833  138.76 |17.833    2.26 | 23.83    1.51
          5.850    2.01 |11.850  138.76 |17.850    2.26 | 23.85    1.51
          5.867    2.01 |11.867  138.76 |17.867    2.26 | 23.87    1.51
          5.883    2.01 |11.883  138.76 |17.883    2.26 | 23.88    1.51
          5.900    2.01 |11.900  138.76 |17.900    2.26 | 23.90    1.51
          5.917    2.01 |11.917  138.76 |17.917    2.26 | 23.92    1.51
          5.933    2.01 |11.933  138.76 |17.933    2.26 | 23.93    1.51
          5.950    2.01 |11.950  138.76 |17.950    2.26 | 23.95    1.51
          5.967    2.01 |11.967  138.76 |17.967    2.26 | 23.97    1.51
          5.983    2.01 |11.983  138.76 |17.983    2.26 | 23.98    1.51
          6.000    2.01 |12.000  138.76 |18.000    2.26 | 24.00    1.51

Max.Eff.Inten.(mm/hr)=     138.76       141.48
          over (min)         5.00        18.00
Storage Coeff.  (min)=       2.62 (ii)   17.92 (ii)
Unit Hyd. Tpeak (min)=       5.00        18.00
Unit Hyd. peak  (cms)=       0.33         0.06
                                              *TOTALS*
PEAK FLOW       (cms)=       0.53         0.15          0.640 (iii)
TIME TO PEAK    (hrs)=      12.00        12.18          12.00
```



```
     RUNOFF VOLUME    (mm)=     123.68        69.64          99.37
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.55           0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0501)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       166.66
               over (min)         5.00         7.00
     Storage Coeff.  (min)=       2.11 (ii)    6.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00         7.00
     Unit Hyd. peak  (cms)=       0.37         0.17
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.12          0.384 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.02          12.00
     RUNOFF VOLUME    (mm)=     123.68        71.42         100.69
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.57           0.80


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0203)|   Area    (ha)=   6.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.77         1.59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     205.91        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       166.66
               over (min)         5.00         8.00
     Storage Coeff.  (min)=       3.46 (ii)    7.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.28         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.35         0.59          1.919 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.03          12.00
     RUNOFF VOLUME    (mm)=     123.68        71.41         100.69
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.57           0.80
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       143.59
               over (min)        5.00         7.00
     Storage Coeff.  (min)=       2.11 (ii)    6.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00         7.00
     Unit Hyd. peak  (cms)=       0.37         0.17
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.10          0.367 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.03          12.00
     RUNOFF VOLUME    (mm)=     123.68        61.39          96.28
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.49           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.37     12.00   96.28
     ================================================
     MAJOR SYS.(ID= 2):   0.11      0.16     12.00   96.28
     MINOR SYS.(ID= 3):   1.12      0.21     11.82   96.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.12   0.206    11.82    96.28
     + ID2= 2 (  0203):     6.36   1.919    12.00   100.69
       ======================================================
       ID = 3 (  0016):     7.48   2.125    12.00   100.03

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



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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76        77.72
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       2.45 (ii)    8.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.34         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.17          0.541 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05          12.00
     RUNOFF VOLUME    (mm)=     123.68        57.90          90.80
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.46           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       143.59
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       4.23 (ii)    8.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.25         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.61         0.95          3.502 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05          12.00
     RUNOFF VOLUME    (mm)=     123.68        61.40          96.28
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.49           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
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```
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       143.59
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       3.27 (ii)    7.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.29         0.14
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.13         0.42          1.538 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.03          12.00
     RUNOFF VOLUME    (mm)=     123.69        61.39          96.28
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.49           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     138.76       143.59
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       3.94 (ii)    8.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.26         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.07         0.76          2.789 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05          12.00
     RUNOFF VOLUME    (mm)=     123.68        61.39          96.28
     TOTAL RAINFALL   (mm)=     125.69       125.69         125.69
     RUNOFF COEFFICIENT   =       0.98         0.49           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
```



```
       ID1= 1 (  0301):    12.49   3.502    12.00    96.28
     + ID2= 2 (  0302):     5.31   1.538    12.00    96.28
       ================================================
       ID = 3 (  0013):    17.80   5.039    12.00    96.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   5.039    12.00    96.28
     + ID2= 2 (  0303):     9.87   2.789    12.00    96.28
       ================================================
       ID = 1 (  0013):    27.67   7.828    12.00    96.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   7.828    12.00    96.28
     + ID2= 2 (  0016):     7.48   2.125    12.00   100.03
       ================================================
       ID = 3 (  0012):    35.15   9.953    12.00    97.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.15   9.953    12.00    97.08
     + ID2= 2 (  0204):     2.01   0.541    12.00    90.80
       ================================================
       ID = 1 (  0012):    37.16  10.494    12.00    96.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.4389      1.4219
                         0.1014     0.3040   |   0.9212      1.8498
                         0.1939     0.6475   |   1.2450      2.2118
                         0.2548     1.0211   |   1.6046      2.3050
                         0.2583     1.0470   |   4.5503      2.6235

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.158     10.494     12.00      96.74
   OUTFLOW: ID= 1 (  0011)     37.158      1.079     12.67      86.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.28
                  TIME SHIFT OF PEAK FLOW         (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.0259
```

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

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\aa6e745d-c236-4362-9f39-1cf9cc8b2a57\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\aa6e745d-c236-4362-9f39-1cf9cc8b2a57\sce


DATE: 03/23/2019                          TIME: 12:54:28

USER:



COMMENTS: _____


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


--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              bdec2d17-d17d-4e5c-a3f9-4c26b0ea920f\10cd1513
| Ptotal=136.79 mm |    Comments: SCS 24 HOUR TYPE II STORM DISTRIBUTION 1
--------------------
                     Duration of storm    = 24.00 hrs
                     Mass curve time step = 15.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    1.53 |  6.25    0.00 | 12.25   19.70 | 18.25    2.46
               0.50    1.48 |  6.50    0.00 | 12.50   19.70 | 18.50    2.46
               0.75    1.53 |  6.75    0.00 | 12.75   10.12 | 18.75    2.46
               1.00    1.48 |  7.00    0.00 | 13.00   10.12 | 19.00    2.46
               1.25    1.53 |  7.25    5.47 | 13.25    1.92 | 19.25    2.46
               1.50    1.48 |  7.50    5.47 | 13.50    1.92 | 19.50    2.46
               1.75    1.53 |  7.75    5.47 | 13.75   11.22 | 19.75    2.46
               2.00    1.48 |  8.00    5.47 | 14.00   11.22 | 20.00    2.46
               2.25    1.81 |  8.25    0.00 | 14.25    4.10 | 20.25    1.64
               2.50    1.75 |  8.50    0.00 | 14.50    4.10 | 20.50    1.64
               2.75    1.81 |  8.75    7.39 | 14.75    4.10 | 20.75    1.64
               3.00    1.75 |  9.00    7.39 | 15.00    4.10 | 21.00    1.64
```



```
               3.25    1.81 |  9.25    4.38 | 15.25    4.10 | 21.25    1.64
               3.50    1.75 |  9.50    4.38 | 15.50    4.10 | 21.50    1.64
               3.75    1.81 |  9.75    4.92 | 15.75    4.10 | 21.75    1.64
               4.00    1.75 | 10.00    4.92 | 16.00    4.10 | 22.00    1.64
               4.25    2.19 | 10.25    6.29 | 16.25    2.46 | 22.25    1.64
               4.50    2.19 | 10.50    6.29 | 16.50    2.46 | 22.50    1.64
               4.75    2.19 | 10.75    8.48 | 16.75    2.46 | 22.75    1.64
               5.00    2.19 | 11.00    8.48 | 17.00    2.46 | 23.00    1.64
               5.25    2.19 | 11.25   13.13 | 17.25    2.46 | 23.25    1.64
               5.50    2.19 | 11.50   13.13 | 17.50    2.46 | 23.50    1.64
               5.75    2.19 | 11.75   56.90 | 17.75    2.46 | 23.75    1.64
               6.00    2.19 | 12.00  151.02 | 18.00    2.46 | 24.00    1.64

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    1.53 | 6.017    0.00 |12.017   19.79 | 18.02    2.46
               0.033    1.53 | 6.033    0.00 |12.033   19.70 | 18.03    2.46
               0.050    1.53 | 6.050    0.00 |12.050   19.70 | 18.05    2.46
               0.067    1.53 | 6.067    0.00 |12.067   19.70 | 18.07    2.46
               0.083    1.53 | 6.083    0.00 |12.083   19.70 | 18.08    2.46
               0.100    1.53 | 6.100    0.00 |12.100   19.70 | 18.10    2.46
               0.117    1.53 | 6.117    0.00 |12.117   19.70 | 18.12    2.46
               0.133    1.53 | 6.133    0.00 |12.133   19.70 | 18.13    2.46
               0.150    1.53 | 6.150    0.00 |12.150   19.70 | 18.15    2.46
               0.167    1.53 | 6.167    0.00 |12.167   19.70 | 18.17    2.46
               0.183    1.53 | 6.183    0.00 |12.183   19.70 | 18.18    2.46
               0.200    1.53 | 6.200    0.00 |12.200   19.70 | 18.20    2.46
               0.217    1.53 | 6.217    0.00 |12.217   19.70 | 18.22    2.46
               0.233    1.53 | 6.233    0.00 |12.233   19.70 | 18.23    2.46
               0.250    1.53 | 6.250    0.00 |12.250   19.70 | 18.25    2.46
               0.267    1.48 | 6.267    0.00 |12.267   19.70 | 18.27    2.46
               0.283    1.48 | 6.283    0.00 |12.283   19.70 | 18.28    2.46
               0.300    1.48 | 6.300    0.00 |12.300   19.70 | 18.30    2.46
               0.317    1.48 | 6.317    0.00 |12.317   19.70 | 18.32    2.46
               0.333    1.48 | 6.333    0.00 |12.333   19.70 | 18.33    2.46
               0.350    1.48 | 6.350    0.00 |12.350   19.70 | 18.35    2.46
               0.367    1.48 | 6.367    0.00 |12.367   19.70 | 18.37    2.46
               0.383    1.48 | 6.383    0.00 |12.383   19.70 | 18.38    2.46
               0.400    1.48 | 6.400    0.00 |12.400   19.70 | 18.40    2.46
               0.417    1.48 | 6.417    0.00 |12.417   19.70 | 18.42    2.46
               0.433    1.48 | 6.433    0.00 |12.433   19.70 | 18.43    2.46
               0.450    1.48 | 6.450    0.00 |12.450   19.70 | 18.45    2.46
               0.467    1.48 | 6.467    0.00 |12.467   19.70 | 18.47    2.46
               0.483    1.48 | 6.483    0.00 |12.483   19.70 | 18.48    2.46
               0.500    1.48 | 6.500    0.00 |12.500   19.70 | 18.50    2.46
               0.517    1.53 | 6.517    0.00 |12.517   10.13 | 18.52    2.46
               0.533    1.53 | 6.533    0.00 |12.533   10.12 | 18.53    2.46
               0.550    1.53 | 6.550    0.00 |12.550   10.12 | 18.55    2.46
               0.567    1.53 | 6.567    0.00 |12.567   10.12 | 18.57    2.46
               0.583    1.53 | 6.583    0.00 |12.583   10.12 | 18.58    2.46
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0.600	1.53	6.600	0.00	12.600	10.12	18.60	2.46
0.617	1.53	6.617	0.00	12.617	10.12	18.62	2.46
0.633	1.53	6.633	0.00	12.633	10.12	18.63	2.46
0.650	1.53	6.650	0.00	12.650	10.12	18.65	2.46
0.667	1.53	6.667	0.00	12.667	10.12	18.67	2.46
0.683	1.53	6.683	0.00	12.683	10.12	18.68	2.46
0.700	1.53	6.700	0.00	12.700	10.12	18.70	2.46
0.717	1.53	6.717	0.00	12.717	10.12	18.72	2.46
0.733	1.53	6.733	0.00	12.733	10.12	18.73	2.46
0.750	1.53	6.750	0.00	12.750	10.12	18.75	2.46
0.767	1.48	6.767	0.00	12.767	10.12	18.77	2.46
0.783	1.48	6.783	0.00	12.783	10.12	18.78	2.46
0.800	1.48	6.800	0.00	12.800	10.12	18.80	2.46
0.817	1.48	6.817	0.00	12.817	10.12	18.82	2.46
0.833	1.48	6.833	0.00	12.833	10.12	18.83	2.46
0.850	1.48	6.850	0.00	12.850	10.12	18.85	2.46
0.867	1.48	6.867	0.00	12.867	10.12	18.87	2.46
0.883	1.48	6.883	0.00	12.883	10.12	18.88	2.46
0.900	1.48	6.900	0.00	12.900	10.12	18.90	2.46
0.917	1.48	6.917	0.00	12.917	10.12	18.92	2.46
0.933	1.48	6.933	0.00	12.933	10.12	18.93	2.46
0.950	1.48	6.950	0.00	12.950	10.12	18.95	2.46
0.967	1.48	6.967	0.00	12.967	10.12	18.97	2.46
0.983	1.48	6.983	0.00	12.983	10.12	18.98	2.46
1.000	1.48	7.000	0.01	13.000	10.12	19.00	2.46
1.017	1.53	7.017	5.47	13.017	1.93	19.02	2.46
1.033	1.53	7.033	5.47	13.033	1.92	19.03	2.46
1.050	1.53	7.050	5.47	13.050	1.92	19.05	2.46
1.067	1.53	7.067	5.47	13.067	1.92	19.07	2.46
1.083	1.53	7.083	5.47	13.083	1.92	19.08	2.46
1.100	1.53	7.100	5.47	13.100	1.92	19.10	2.46
1.117	1.53	7.117	5.47	13.117	1.92	19.12	2.46
1.133	1.53	7.133	5.47	13.133	1.92	19.13	2.46
1.150	1.53	7.150	5.47	13.150	1.92	19.15	2.46
1.167	1.53	7.167	5.47	13.167	1.92	19.17	2.46
1.183	1.53	7.183	5.47	13.183	1.92	19.18	2.46
1.200	1.53	7.200	5.47	13.200	1.92	19.20	2.46
1.217	1.53	7.217	5.47	13.217	1.92	19.22	2.46
1.233	1.53	7.233	5.47	13.233	1.92	19.23	2.46
1.250	1.53	7.250	5.47	13.250	1.92	19.25	2.46
1.267	1.48	7.267	5.47	13.267	1.92	19.27	2.46
1.283	1.48	7.283	5.47	13.283	1.92	19.28	2.46
1.300	1.48	7.300	5.47	13.300	1.92	19.30	2.46
1.317	1.48	7.317	5.47	13.317	1.92	19.32	2.46
1.333	1.48	7.333	5.47	13.333	1.92	19.33	2.46
1.350	1.48	7.350	5.47	13.350	1.92	19.35	2.46
1.367	1.48	7.367	5.47	13.367	1.92	19.37	2.46
1.383	1.48	7.383	5.47	13.383	1.92	19.38	2.46
1.400	1.48	7.400	5.47	13.400	1.92	19.40	2.46
1.417	1.48	7.417	5.47	13.417	1.92	19.42	2.46
1.433	1.48	7.433	5.47	13.433	1.92	19.43	2.46
1.450	1.48	7.450	5.47	13.450	1.92	19.45	2.46
1.467	1.48	7.467	5.47	13.467	1.92	19.47	2.46
1.483	1.48	7.483	5.47	13.483	1.92	19.48	2.46
1.500	1.48	7.500	5.47	13.500	1.92	19.50	2.46
1.517	1.53	7.517	5.47	13.517	11.20	19.52	2.46
1.533	1.53	7.533	5.47	13.533	11.22	19.53	2.46
1.550	1.53	7.550	5.47	13.550	11.22	19.55	2.46
1.567	1.53	7.567	5.47	13.567	11.22	19.57	2.46
1.583	1.53	7.583	5.47	13.583	11.22	19.58	2.46
1.600	1.53	7.600	5.47	13.600	11.22	19.60	2.46
1.617	1.53	7.617	5.47	13.617	11.22	19.62	2.46
1.633	1.53	7.633	5.47	13.633	11.22	19.63	2.46
1.650	1.53	7.650	5.47	13.650	11.22	19.65	2.46
1.667	1.53	7.667	5.47	13.667	11.22	19.67	2.46
1.683	1.53	7.683	5.47	13.683	11.22	19.68	2.46
1.700	1.53	7.700	5.47	13.700	11.22	19.70	2.46

1.717	1.53	7.717	5.47	13.717	11.22	19.72	2.46
1.733	1.53	7.733	5.47	13.733	11.22	19.73	2.46
1.750	1.53	7.750	5.47	13.750	11.22	19.75	2.46
1.767	1.48	7.767	5.47	13.767	11.22	19.77	2.46
1.783	1.48	7.783	5.47	13.783	11.22	19.78	2.46
1.800	1.48	7.800	5.47	13.800	11.22	19.80	2.46
1.817	1.48	7.817	5.47	13.817	11.22	19.82	2.46
1.833	1.48	7.833	5.47	13.833	11.22	19.83	2.46
1.850	1.48	7.850	5.47	13.850	11.22	19.85	2.46
1.867	1.48	7.867	5.47	13.867	11.22	19.87	2.46
1.883	1.48	7.883	5.47	13.883	11.22	19.88	2.46
1.900	1.48	7.900	5.47	13.900	11.22	19.90	2.46
1.917	1.48	7.917	5.47	13.917	11.22	19.92	2.46
1.933	1.48	7.933	5.47	13.933	11.22	19.93	2.46
1.950	1.48	7.950	5.47	13.950	11.22	19.95	2.46
1.967	1.48	7.967	5.47	13.967	11.22	19.97	2.46
1.983	1.48	7.983	5.47	13.983	11.22	19.98	2.46
2.000	1.48	8.000	5.46	14.000	11.22	20.00	2.46
2.017	1.81	8.017	0.00	14.017	4.12	20.02	1.65
2.033	1.81	8.033	0.00	14.033	4.10	20.03	1.64
2.050	1.81	8.050	0.00	14.050	4.10	20.05	1.64
2.067	1.81	8.067	0.00	14.067	4.10	20.07	1.64
2.083	1.81	8.083	0.00	14.083	4.10	20.08	1.64
2.100	1.81	8.100	0.00	14.100	4.10	20.10	1.64
2.117	1.81	8.117	0.00	14.117	4.10	20.12	1.64
2.133	1.81	8.133	0.00	14.133	4.10	20.13	1.64
2.150	1.81	8.150	0.00	14.150	4.10	20.15	1.64
2.167	1.81	8.167	0.00	14.167	4.10	20.17	1.64
2.183	1.81	8.183	0.00	14.183	4.10	20.18	1.64
2.200	1.81	8.200	0.00	14.200	4.10	20.20	1.64
2.217	1.81	8.217	0.00	14.217	4.10	20.22	1.64
2.233	1.81	8.233	0.00	14.233	4.10	20.23	1.64
2.250	1.81	8.250	0.00	14.250	4.10	20.25	1.64
2.267	1.75	8.267	0.00	14.267	4.10	20.27	1.64
2.283	1.75	8.283	0.00	14.283	4.10	20.28	1.64
2.300	1.75	8.300	0.00	14.300	4.10	20.30	1.64
2.317	1.75	8.317	0.00	14.317	4.10	20.32	1.64
2.333	1.75	8.333	0.00	14.333	4.10	20.33	1.64
2.350	1.75	8.350	0.00	14.350	4.10	20.35	1.64
2.367	1.75	8.367	0.00	14.367	4.10	20.37	1.64
2.383	1.75	8.383	0.00	14.383	4.10	20.38	1.64
2.400	1.75	8.400	0.00	14.400	4.10	20.40	1.64
2.417	1.75	8.417	0.00	14.417	4.10	20.42	1.64
2.433	1.75	8.433	0.00	14.433	4.10	20.43	1.64
2.450	1.75	8.450	0.00	14.450	4.10	20.45	1.64
2.467	1.75	8.467	0.00	14.467	4.10	20.47	1.64
2.483	1.75	8.483	0.00	14.483	4.10	20.48	1.64
2.500	1.75	8.500	0.02	14.500	4.10	20.50	1.64
2.517	1.81	8.517	7.39	14.517	4.10	20.52	1.64
2.533	1.81	8.533	7.39	14.533	4.10	20.53	1.64
2.550	1.81	8.550	7.39	14.550	4.10	20.55	1.64
2.567	1.81	8.567	7.39	14.567	4.10	20.57	1.64
2.583	1.81	8.583	7.39	14.583	4.10	20.58	1.64
2.600	1.81	8.600	7.39	14.600	4.10	20.60	1.64
2.617	1.81	8.617	7.39	14.617	4.10	20.62	1.64
2.633	1.81	8.633	7.39	14.633	4.10	20.63	1.64
2.650	1.81	8.650	7.39	14.650	4.10	20.65	1.64
2.667	1.81	8.667	7.39	14.667	4.10	20.67	1.64
2.683	1.81	8.683	7.39	14.683	4.10	20.68	1.64
2.700	1.81	8.700	7.39	14.700	4.10	20.70	1.64
2.717	1.81	8.717	7.39	14.717	4.10	20.72	1.64
2.733	1.81	8.733	7.39	14.733	4.10	20.73	1.64
2.750	1.81	8.750	7.39	14.750	4.10	20.75	1.64
2.767	1.75	8.767	7.39	14.767	4.10	20.77	1.64
2.783	1.75	8.783	7.39	14.783	4.10	20.78	1.64
2.800	1.75	8.800	7.39	14.800	4.10	20.80	1.64
2.817	1.75	8.817	7.39	14.817	4.10	20.82	1.64

2.833	1.75	8.833	7.39	14.833	4.10	20.83	1.64
2.850	1.75	8.850	7.39	14.850	4.10	20.85	1.64
2.867	1.75	8.867	7.39	14.867	4.10	20.87	1.64
2.883	1.75	8.883	7.39	14.883	4.10	20.88	1.64
2.900	1.75	8.900	7.39	14.900	4.10	20.90	1.64
2.917	1.75	8.917	7.39	14.917	4.10	20.92	1.64
2.933	1.75	8.933	7.39	14.933	4.10	20.93	1.64
2.950	1.75	8.950	7.39	14.950	4.10	20.95	1.64
2.967	1.75	8.967	7.39	14.967	4.10	20.97	1.64
2.983	1.75	8.983	7.39	14.983	4.10	20.98	1.64
3.000	1.75	9.000	7.38	15.000	4.10	21.00	1.64
3.017	1.81	9.017	4.38	15.017	4.10	21.02	1.64
3.033	1.81	9.033	4.38	15.033	4.10	21.03	1.64
3.050	1.81	9.050	4.38	15.050	4.10	21.05	1.64
3.067	1.81	9.067	4.38	15.067	4.10	21.07	1.64
3.083	1.81	9.083	4.38	15.083	4.10	21.08	1.64
3.100	1.81	9.100	4.38	15.100	4.10	21.10	1.64
3.117	1.81	9.117	4.38	15.117	4.10	21.12	1.64
3.133	1.81	9.133	4.38	15.133	4.10	21.13	1.64
3.150	1.81	9.150	4.38	15.150	4.10	21.15	1.64
3.167	1.81	9.167	4.38	15.167	4.10	21.17	1.64
3.183	1.81	9.183	4.38	15.183	4.10	21.18	1.64
3.200	1.81	9.200	4.38	15.200	4.10	21.20	1.64
3.217	1.81	9.217	4.38	15.217	4.10	21.22	1.64
3.233	1.81	9.233	4.38	15.233	4.10	21.23	1.64
3.250	1.81	9.250	4.38	15.250	4.10	21.25	1.64
3.267	1.75	9.267	4.38	15.267	4.10	21.27	1.64
3.283	1.75	9.283	4.38	15.283	4.10	21.28	1.64
3.300	1.75	9.300	4.38	15.300	4.10	21.30	1.64
3.317	1.75	9.317	4.38	15.317	4.10	21.32	1.64
3.333	1.75	9.333	4.38	15.333	4.10	21.33	1.64
3.350	1.75	9.350	4.38	15.350	4.10	21.35	1.64
3.367	1.75	9.367	4.38	15.367	4.10	21.37	1.64
3.383	1.75	9.383	4.38	15.383	4.10	21.38	1.64
3.400	1.75	9.400	4.38	15.400	4.10	21.40	1.64
3.417	1.75	9.417	4.38	15.417	4.10	21.42	1.64
3.433	1.75	9.433	4.38	15.433	4.10	21.43	1.64
3.450	1.75	9.450	4.38	15.450	4.10	21.45	1.64
3.467	1.75	9.467	4.38	15.467	4.10	21.47	1.64
3.483	1.75	9.483	4.38	15.483	4.10	21.48	1.64
3.500	1.75	9.500	4.38	15.500	4.10	21.50	1.64
3.517	1.81	9.517	4.92	15.517	4.10	21.52	1.64
3.533	1.81	9.533	4.92	15.533	4.10	21.53	1.64
3.550	1.81	9.550	4.92	15.550	4.10	21.55	1.64
3.567	1.81	9.567	4.92	15.567	4.10	21.57	1.64
3.583	1.81	9.583	4.92	15.583	4.10	21.58	1.64
3.600	1.81	9.600	4.92	15.600	4.10	21.60	1.64
3.617	1.81	9.617	4.92	15.617	4.10	21.62	1.64
3.633	1.81	9.633	4.92	15.633	4.10	21.63	1.64
3.650	1.81	9.650	4.92	15.650	4.10	21.65	1.64
3.667	1.81	9.667	4.92	15.667	4.10	21.67	1.64
3.683	1.81	9.683	4.92	15.683	4.10	21.68	1.64
3.700	1.81	9.700	4.92	15.700	4.10	21.70	1.64
3.717	1.81	9.717	4.92	15.717	4.10	21.72	1.64
3.733	1.81	9.733	4.92	15.733	4.10	21.73	1.64
3.750	1.81	9.750	4.92	15.750	4.10	21.75	1.64
3.767	1.75	9.767	4.92	15.767	4.10	21.77	1.64
3.783	1.75	9.783	4.92	15.783	4.10	21.78	1.64
3.800	1.75	9.800	4.92	15.800	4.10	21.80	1.64
3.817	1.75	9.817	4.92	15.817	4.10	21.82	1.64
3.833	1.75	9.833	4.92	15.833	4.10	21.83	1.64
3.850	1.75	9.850	4.92	15.850	4.10	21.85	1.64
3.867	1.75	9.867	4.92	15.867	4.10	21.87	1.64
3.883	1.75	9.883	4.92	15.883	4.10	21.88	1.64
3.900	1.75	9.900	4.92	15.900	4.10	21.90	1.64
3.917	1.75	9.917	4.92	15.917	4.10	21.92	1.64
3.933	1.75	9.933	4.92	15.933	4.10	21.93	1.64

3.950	1.75	9.950	4.92	15.950	4.10	21.95	1.64
3.967	1.75	9.967	4.92	15.967	4.10	21.97	1.64
3.983	1.75	9.983	4.92	15.983	4.10	21.98	1.64
4.000	1.75	10.000	4.93	16.000	4.10	22.00	1.64
4.017	2.19	10.017	6.29	16.017	2.47	22.02	1.64
4.033	2.19	10.033	6.29	16.033	2.46	22.03	1.64
4.050	2.19	10.050	6.29	16.050	2.46	22.05	1.64
4.067	2.19	10.067	6.29	16.067	2.46	22.07	1.64
4.083	2.19	10.083	6.29	16.083	2.46	22.08	1.64
4.100	2.19	10.100	6.29	16.100	2.46	22.10	1.64
4.117	2.19	10.117	6.29	16.117	2.46	22.12	1.64
4.133	2.19	10.133	6.29	16.133	2.46	22.13	1.64
4.150	2.19	10.150	6.29	16.150	2.46	22.15	1.64
4.167	2.19	10.167	6.29	16.167	2.46	22.17	1.64
4.183	2.19	10.183	6.29	16.183	2.46	22.18	1.64
4.200	2.19	10.200	6.29	16.200	2.46	22.20	1.64
4.217	2.19	10.217	6.29	16.217	2.46	22.22	1.64
4.233	2.19	10.233	6.29	16.233	2.46	22.23	1.64
4.250	2.19	10.250	6.29	16.250	2.46	22.25	1.64
4.267	2.19	10.267	6.29	16.267	2.46	22.27	1.64
4.283	2.19	10.283	6.29	16.283	2.46	22.28	1.64
4.300	2.19	10.300	6.29	16.300	2.46	22.30	1.64
4.317	2.19	10.317	6.29	16.317	2.46	22.32	1.64
4.333	2.19	10.333	6.29	16.333	2.46	22.33	1.64
4.350	2.19	10.350	6.29	16.350	2.46	22.35	1.64
4.367	2.19	10.367	6.29	16.367	2.46	22.37	1.64
4.383	2.19	10.383	6.29	16.383	2.46	22.38	1.64
4.400	2.19	10.400	6.29	16.400	2.46	22.40	1.64
4.417	2.19	10.417	6.29	16.417	2.46	22.42	1.64
4.433	2.19	10.433	6.29	16.433	2.46	22.43	1.64
4.450	2.19	10.450	6.29	16.450	2.46	22.45	1.64
4.467	2.19	10.467	6.29	16.467	2.46	22.47	1.64
4.483	2.19	10.483	6.29	16.483	2.46	22.48	1.64
4.500	2.19	10.500	6.29	16.500	2.46	22.50	1.64
4.517	2.19	10.517	8.48	16.517	2.46	22.52	1.64
4.533	2.19	10.533	8.48	16.533	2.46	22.53	1.64
4.550	2.19	10.550	8.48	16.550	2.46	22.55	1.64
4.567	2.19	10.567	8.48	16.567	2.46	22.57	1.64
4.583	2.19	10.583	8.48	16.583	2.46	22.58	1.64
4.600	2.19	10.600	8.48	16.600	2.46	22.60	1.64
4.617	2.19	10.617	8.48	16.617	2.46	22.62	1.64
4.633	2.19	10.633	8.48	16.633	2.46	22.63	1.64
4.650	2.19	10.650	8.48	16.650	2.46	22.65	1.64
4.667	2.19	10.667	8.48	16.667	2.46	22.67	1.64
4.683	2.19	10.683	8.48	16.683	2.46	22.68	1.64
4.700	2.19	10.700	8.48	16.700	2.46	22.70	1.64
4.717	2.19	10.717	8.48	16.717	2.46	22.72	1.64
4.733	2.19	10.733	8.48	16.733	2.46	22.73	1.64
4.750	2.19	10.750	8.48	16.750	2.46	22.75	1.64
4.767	2.19	10.767	8.48	16.767	2.46	22.77	1.64
4.783	2.19	10.783	8.48	16.783	2.46	22.78	1.64
4.800	2.19	10.800	8.48	16.800	2.46	22.80	1.64
4.817	2.19	10.817	8.48	16.817	2.46	22.82	1.64
4.833	2.19	10.833	8.48	16.833	2.46	22.83	1.64
4.850	2.19	10.850	8.48	16.850	2.46	22.85	1.64
4.867	2.19	10.867	8.48	16.867	2.46	22.87	1.64
4.883	2.19	10.883	8.48	16.883	2.46	22.88	1.64
4.900	2.19	10.900	8.48	16.900	2.46	22.90	1.64
4.917	2.19	10.917	8.48	16.917	2.46	22.92	1.64
4.933	2.19	10.933	8.48	16.933	2.46	22.93	1.64
4.950	2.19	10.950	8.48	16.950	2.46	22.95	1.64
4.967	2.19	10.967	8.48	16.967	2.46	22.97	1.64
4.983	2.19	10.983	8.48	16.983	2.46	22.98	1.64
5.000	2.19	11.000	8.48	17.000	2.46	23.00	1.64
5.017	2.19	11.017	13.13	17.017	2.46	23.02	1.64
5.033	2.19	11.033	13.13	17.033	2.46	23.03	1.64
5.050	2.19	11.050	13.13	17.050	2.46	23.05	1.64

5.067	2.19	11.067	13.13	17.067	2.46	23.07	1.64
5.083	2.19	11.083	13.13	17.083	2.46	23.08	1.64
5.100	2.19	11.100	13.13	17.100	2.46	23.10	1.64
5.117	2.19	11.117	13.13	17.117	2.46	23.12	1.64
5.133	2.19	11.133	13.13	17.133	2.46	23.13	1.64
5.150	2.19	11.150	13.13	17.150	2.46	23.15	1.64
5.167	2.19	11.167	13.13	17.167	2.46	23.17	1.64
5.183	2.19	11.183	13.13	17.183	2.46	23.18	1.64
5.200	2.19	11.200	13.13	17.200	2.46	23.20	1.64
5.217	2.19	11.217	13.13	17.217	2.46	23.22	1.64
5.233	2.19	11.233	13.13	17.233	2.46	23.23	1.64
5.250	2.19	11.250	13.13	17.250	2.46	23.25	1.64
5.267	2.19	11.267	13.13	17.267	2.46	23.27	1.64
5.283	2.19	11.283	13.13	17.283	2.46	23.28	1.64
5.300	2.19	11.300	13.13	17.300	2.46	23.30	1.64
5.317	2.19	11.317	13.13	17.317	2.46	23.32	1.64
5.333	2.19	11.333	13.13	17.333	2.46	23.33	1.64
5.350	2.19	11.350	13.13	17.350	2.46	23.35	1.64
5.367	2.19	11.367	13.13	17.367	2.46	23.37	1.64
5.383	2.19	11.383	13.13	17.383	2.46	23.38	1.64
5.400	2.19	11.400	13.13	17.400	2.46	23.40	1.64
5.417	2.19	11.417	13.13	17.417	2.46	23.42	1.64
5.433	2.19	11.433	13.13	17.433	2.46	23.43	1.64
5.450	2.19	11.450	13.13	17.450	2.46	23.45	1.64
5.467	2.19	11.467	13.13	17.467	2.46	23.47	1.64
5.483	2.19	11.483	13.13	17.483	2.46	23.48	1.64
5.500	2.19	11.500	13.13	17.500	2.46	23.50	1.64
5.517	2.19	11.517	56.89	17.517	2.46	23.52	1.64
5.533	2.19	11.533	56.90	17.533	2.46	23.53	1.64
5.550	2.19	11.550	56.90	17.550	2.46	23.55	1.64
5.567	2.19	11.567	56.90	17.567	2.46	23.57	1.64
5.583	2.19	11.583	56.90	17.583	2.46	23.58	1.64
5.600	2.19	11.600	56.90	17.600	2.46	23.60	1.64
5.617	2.19	11.617	56.90	17.617	2.46	23.62	1.64
5.633	2.19	11.633	56.90	17.633	2.46	23.63	1.64
5.650	2.19	11.650	56.90	17.650	2.46	23.65	1.64
5.667	2.19	11.667	56.90	17.667	2.46	23.67	1.64
5.683	2.19	11.683	56.90	17.683	2.46	23.68	1.64
5.700	2.19	11.700	56.90	17.700	2.46	23.70	1.64
5.717	2.19	11.717	56.90	17.717	2.46	23.72	1.64
5.733	2.19	11.733	56.90	17.733	2.46	23.73	1.64
5.750	2.19	11.750	56.90	17.750	2.46	23.75	1.64
5.767	2.19	11.767	150.97	17.767	2.46	23.77	1.64
5.783	2.19	11.783	151.02	17.783	2.46	23.78	1.64
5.800	2.19	11.800	151.02	17.800	2.46	23.80	1.64
5.817	2.19	11.817	151.02	17.817	2.46	23.82	1.64
5.833	2.19	11.833	151.02	17.833	2.46	23.83	1.64
5.850	2.19	11.850	151.02	17.850	2.46	23.85	1.64
5.867	2.19	11.867	151.02	17.867	2.46	23.87	1.64
5.883	2.19	11.883	151.02	17.883	2.46	23.88	1.64
5.900	2.19	11.900	151.02	17.900	2.46	23.90	1.64
5.917	2.19	11.917	151.02	17.917	2.46	23.92	1.64
5.933	2.19	11.933	151.02	17.933	2.46	23.93	1.64
5.950	2.19	11.950	151.02	17.950	2.46	23.95	1.64
5.967	2.19	11.967	151.02	17.967	2.46	23.97	1.64
5.983	2.19	11.983	151.02	17.983	2.46	23.98	1.64
6.000	2.19	12.000	151.02	18.000	2.46	24.00	1.64

Max.Eff.Inten.(mm/hr)=	151.02	167.10	
over (min)	5.00	17.00	
Storage Coeff. (min)=	2.53 (ii)	16.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	17.00	
Unit Hyd. peak (cms)=	0.34	0.07	
			TOTALS
PEAK FLOW (cms)=	0.58	0.18	0.712 (iii)
TIME TO PEAK (hrs)=	12.00	12.17	12.00
RUNOFF VOLUME (mm)=	134.78	78.77	109.59

TOTAL RAINFALL (mm)=	136.79	136.79	136.79
RUNOFF COEFFICIENT =	0.99	0.58	0.80

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0501)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.92	0.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	90.55	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		151.02	187.74	
over (min)		5.00	7.00	
Storage Coeff. (min)=		2.04 (ii)	6.38 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.37	0.17	
				TOTALS
PEAK FLOW (cms)=		0.29	0.14	0.425 (iii)
TIME TO PEAK (hrs)=		12.00	12.02	12.00
RUNOFF VOLUME (mm)=		134.79	80.67	110.98
TOTAL RAINFALL (mm)=		136.79	136.79	136.79
RUNOFF COEFFICIENT =		0.99	0.59	0.81

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0203)	Area (ha)= 6.36
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.77	1.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	205.91	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		151.02	187.74	
over (min)		5.00	8.00	
Storage Coeff. (min)=		3.34 (ii)	7.68 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.29	0.15	
				TOTALS
PEAK FLOW (cms)=		1.47	0.67	2.123 (iii)
TIME TO PEAK (hrs)=		12.00	12.03	12.00
RUNOFF VOLUME (mm)=		134.77	80.67	110.98
TOTAL RAINFALL (mm)=		136.79	136.79	136.79
RUNOFF COEFFICIENT =		0.99	0.59	0.81

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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92          0.31
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      90.55         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     151.02        163.12
               over (min)        5.00          7.00
     Storage Coeff.  (min)=       2.04 (ii)     6.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00          7.00
     Unit Hyd. peak  (cms)=       0.37          0.17
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.29          0.12          0.406 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.02          12.00
     RUNOFF VOLUME    (mm)=     134.79        69.84          106.21
     TOTAL RAINFALL   (mm)=     136.79        136.79         136.79
     RUNOFF COEFFICIENT   =       0.99          0.51           0.78


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.206|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.41     12.00  106.21
     ======================================================
     MAJOR SYS.(ID= 2):   0.13      0.20     12.00  106.21
     MINOR SYS.(ID= 3):   1.10      0.21     11.82  106.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.10   0.206    11.82   106.21
     + ID2= 2 (  0203):     6.36   2.123    12.00   110.98
       ======================================================
       ID = 3 (  0016):     7.46   2.329    12.00   110.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00          1.00
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     115.76         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     151.02         88.62
               over (min)        5.00          9.00
     Storage Coeff.  (min)=       2.37 (ii)     8.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00          9.00
     Unit Hyd. peak  (cms)=       0.35          0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.42          0.19          0.600 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.05          12.00
     RUNOFF VOLUME    (mm)=     134.78         66.12         100.46
     TOTAL RAINFALL   (mm)=     136.79        136.79         136.79
     RUNOFF COEFFICIENT   =       0.99          0.48           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37          3.12
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     288.56         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     151.02        163.12
               over (min)        5.00          9.00
     Storage Coeff.  (min)=       4.09 (ii)     8.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00          9.00
     Unit Hyd. peak  (cms)=       0.26          0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.85          1.09          3.880 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.05          12.00
     RUNOFF VOLUME    (mm)=     134.77         69.84         106.22
     TOTAL RAINFALL   (mm)=     136.79        136.79         136.79
     RUNOFF COEFFICIENT   =       0.99          0.51           0.78


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
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|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     151.02       163.12
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       3.17 (ii)    7.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.30         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.23         0.49         1.702 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.03          12.00
     RUNOFF VOLUME    (mm)=     134.79        69.84         106.22
     TOTAL RAINFALL   (mm)=     136.79       136.79         136.79
     RUNOFF COEFFICIENT   =       0.99         0.51           0.78


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     151.02       163.12
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       3.81 (ii)    8.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.27         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.26         0.87         3.090 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.05          12.00
     RUNOFF VOLUME    (mm)=     134.79        69.84         106.22
     TOTAL RAINFALL   (mm)=     136.79       136.79         136.79
     RUNOFF COEFFICIENT   =       0.99         0.51           0.78


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   3.880    12.00   106.22
```



```
     + ID2= 2 (  0302):     5.31   1.702    12.00   106.22
       ================================================
       ID = 3 (  0013):    17.80   5.582    12.00   106.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   5.582    12.00   106.22
     + ID2= 2 (  0303):     9.87   3.090    12.00   106.22
       ================================================
       ID = 1 (  0013):    27.67   8.672    12.00   106.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   8.672    12.00   106.22
     + ID2= 2 (  0016):     7.46   2.329    12.00   110.28
       ================================================
       ID = 3 (  0012):    35.13  11.001    12.00   107.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.13  11.001    12.00   107.08
     + ID2= 2 (  0204):     2.01   0.600    12.00   100.46
       ================================================
       ID = 1 (  0012):    37.14  11.601    12.00   106.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.4389      1.4219
                         0.1014     0.3040   |   0.9212      1.8498
                         0.1939     0.6475   |   1.2450      2.2118
                         0.2548     1.0211   |   1.6046      2.3050
                         0.2583     1.0470   |   4.5503      2.6235

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.136     11.601     12.00     106.72
   OUTFLOW: ID= 1 (  0011)     37.136      1.265     12.63      95.66

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.90
                TIME SHIFT OF PEAK FLOW         (min)= 38.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  2.2170

--------------------------------------------------------------------------------
```

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

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\f76d83e1-9bf5-4518-8730-68f7564be7d1\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\f76d83e1-9bf5-4518-8730-68f7564be7d1\sce


DATE: 03/23/2019                          TIME: 12:43:04

USER:



COMMENTS: _____


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


--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\11444f85
| Ptotal= 40.60 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
                       Mass curve time step = 30.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.50    1.62 |  2.00    3.25 |  3.50   10.56 |  5.00    2.44
               1.00    1.62 |  2.50    5.68 |  4.00    4.87 |  5.50    1.62
               1.50    3.25 |  3.00   41.41 |  4.50    3.25 |  6.00    1.62

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
```



```
Average Slope     (%)=       1.00         1.00
Length            (m)=     129.87       129.41
Mannings n           =      0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.017    1.62 | 1.517    3.25 | 3.017   10.56 |  4.52    2.44
0.033    1.62 | 1.533    3.25 | 3.033   10.56 |  4.53    2.44
0.050    1.62 | 1.550    3.25 | 3.050   10.56 |  4.55    2.44
0.067    1.62 | 1.567    3.25 | 3.067   10.56 |  4.57    2.44
0.083    1.62 | 1.583    3.25 | 3.083   10.56 |  4.58    2.44
0.100    1.62 | 1.600    3.25 | 3.100   10.56 |  4.60    2.44
0.117    1.62 | 1.617    3.25 | 3.117   10.56 |  4.62    2.44
0.133    1.62 | 1.633    3.25 | 3.133   10.56 |  4.63    2.44
0.150    1.62 | 1.650    3.25 | 3.150   10.56 |  4.65    2.44
0.167    1.62 | 1.667    3.25 | 3.167   10.56 |  4.67    2.44
0.183    1.62 | 1.683    3.25 | 3.183   10.56 |  4.68    2.44
0.200    1.62 | 1.700    3.25 | 3.200   10.56 |  4.70    2.44
0.217    1.62 | 1.717    3.25 | 3.217   10.56 |  4.72    2.44
0.233    1.62 | 1.733    3.25 | 3.233   10.56 |  4.73    2.44
0.250    1.62 | 1.750    3.25 | 3.250   10.56 |  4.75    2.44
0.267    1.62 | 1.767    3.25 | 3.267   10.56 |  4.77    2.44
0.283    1.62 | 1.783    3.25 | 3.283   10.56 |  4.78    2.44
0.300    1.62 | 1.800    3.25 | 3.300   10.56 |  4.80    2.44
0.317    1.62 | 1.817    3.25 | 3.317   10.56 |  4.82    2.44
0.333    1.62 | 1.833    3.25 | 3.333   10.56 |  4.83    2.44
0.350    1.62 | 1.850    3.25 | 3.350   10.56 |  4.85    2.44
0.367    1.62 | 1.867    3.25 | 3.367   10.56 |  4.87    2.44
0.383    1.62 | 1.883    3.25 | 3.383   10.56 |  4.88    2.44
0.400    1.62 | 1.900    3.25 | 3.400   10.56 |  4.90    2.44
0.417    1.62 | 1.917    3.25 | 3.417   10.56 |  4.92    2.44
0.433    1.62 | 1.933    3.25 | 3.433   10.56 |  4.93    2.44
0.450    1.62 | 1.950    3.25 | 3.450   10.56 |  4.95    2.44
0.467    1.62 | 1.967    3.25 | 3.467   10.56 |  4.97    2.44
0.483    1.62 | 1.983    3.25 | 3.483   10.56 |  4.98    2.44
0.500    1.62 | 2.000    3.25 | 3.500   10.56 |  5.00    2.44
0.517    1.62 | 2.017    5.68 | 3.517    4.87 |  5.02    1.62
0.533    1.62 | 2.033    5.68 | 3.533    4.87 |  5.03    1.62
0.550    1.62 | 2.050    5.68 | 3.550    4.87 |  5.05    1.62
0.567    1.62 | 2.067    5.68 | 3.567    4.87 |  5.07    1.62
0.583    1.62 | 2.083    5.68 | 3.583    4.87 |  5.08    1.62
0.600    1.62 | 2.100    5.68 | 3.600    4.87 |  5.10    1.62
0.617    1.62 | 2.117    5.68 | 3.617    4.87 |  5.12    1.62
0.633    1.62 | 2.133    5.68 | 3.633    4.87 |  5.13    1.62
0.650    1.62 | 2.150    5.68 | 3.650    4.87 |  5.15    1.62
0.667    1.62 | 2.167    5.68 | 3.667    4.87 |  5.17    1.62
0.683    1.62 | 2.183    5.68 | 3.683    4.87 |  5.18    1.62
0.700    1.62 | 2.200    5.68 | 3.700    4.87 |  5.20    1.62
0.717    1.62 | 2.217    5.68 | 3.717    4.87 |  5.22    1.62
0.733    1.62 | 2.233    5.68 | 3.733    4.87 |  5.23    1.62
0.750    1.62 | 2.250    5.68 | 3.750    4.87 |  5.25    1.62
0.767    1.62 | 2.267    5.68 | 3.767    4.87 |  5.27    1.62
0.783    1.62 | 2.283    5.68 | 3.783    4.87 |  5.28    1.62
0.800    1.62 | 2.300    5.68 | 3.800    4.87 |  5.30    1.62
0.817    1.62 | 2.317    5.68 | 3.817    4.87 |  5.32    1.62
0.833    1.62 | 2.333    5.68 | 3.833    4.87 |  5.33    1.62
0.850    1.62 | 2.350    5.68 | 3.850    4.87 |  5.35    1.62
0.867    1.62 | 2.367    5.68 | 3.867    4.87 |  5.37    1.62
0.883    1.62 | 2.383    5.68 | 3.883    4.87 |  5.38    1.62
0.900    1.62 | 2.400    5.68 | 3.900    4.87 |  5.40    1.62
0.917    1.62 | 2.417    5.68 | 3.917    4.87 |  5.42    1.62
0.933    1.62 | 2.433    5.68 | 3.933    4.87 |  5.43    1.62
0.950    1.62 | 2.450    5.68 | 3.950    4.87 |  5.45    1.62
```

0.967	1.62	2.467	5.68	3.967	4.87	5.47	1.62
0.983	1.62	2.483	5.68	3.983	4.87	5.48	1.62
1.000	1.62	2.500	5.68	4.000	4.87	5.50	1.62
1.017	3.25	2.517	41.41	4.017	3.25	5.52	1.62
1.033	3.25	2.533	41.41	4.033	3.25	5.53	1.62
1.050	3.25	2.550	41.41	4.050	3.25	5.55	1.62
1.067	3.25	2.567	41.41	4.067	3.25	5.57	1.62
1.083	3.25	2.583	41.41	4.083	3.25	5.58	1.62
1.100	3.25	2.600	41.41	4.100	3.25	5.60	1.62
1.117	3.25	2.617	41.41	4.117	3.25	5.62	1.62
1.133	3.25	2.633	41.41	4.133	3.25	5.63	1.62
1.150	3.25	2.650	41.41	4.150	3.25	5.65	1.62
1.167	3.25	2.667	41.41	4.167	3.25	5.67	1.62
1.183	3.25	2.683	41.41	4.183	3.25	5.68	1.62
1.200	3.25	2.700	41.41	4.200	3.25	5.70	1.62
1.217	3.25	2.717	41.41	4.217	3.25	5.72	1.62
1.233	3.25	2.733	41.41	4.233	3.25	5.73	1.62
1.250	3.25	2.750	41.41	4.250	3.25	5.75	1.62
1.267	3.25	2.767	41.41	4.267	3.25	5.77	1.62
1.283	3.25	2.783	41.41	4.283	3.25	5.78	1.62
1.300	3.25	2.800	41.41	4.300	3.25	5.80	1.62
1.317	3.25	2.817	41.41	4.317	3.25	5.82	1.62
1.333	3.25	2.833	41.41	4.333	3.25	5.83	1.62
1.350	3.25	2.850	41.41	4.350	3.25	5.85	1.62
1.367	3.25	2.867	41.41	4.367	3.25	5.87	1.62
1.383	3.25	2.883	41.41	4.383	3.25	5.88	1.62
1.400	3.25	2.900	41.41	4.400	3.25	5.90	1.62
1.417	3.25	2.917	41.41	4.417	3.25	5.92	1.62
1.433	3.25	2.933	41.41	4.433	3.25	5.93	1.62
1.450	3.25	2.950	41.41	4.450	3.25	5.95	1.62
1.467	3.25	2.967	41.41	4.467	3.25	5.97	1.62
1.483	3.25	2.983	41.41	4.483	3.25	5.98	1.62
1.500	3.25	3.000	41.41	4.500	3.25	6.00	1.62

Max.Eff.Inten.(mm/hr)=		41.41	15.16	
over (min)		5.00	42.00	
Storage Coeff. (min)=		4.25 (ii)	41.63 (ii)	
Unit Hyd. Tpeak (min)=		5.00	42.00	
Unit Hyd. peak (cms)=		0.25	0.03	
				TOTALS
PEAK FLOW	(cms)=	0.16	0.02	0.165 (iii)
TIME TO PEAK	(hrs)=	3.00	3.63	3.00
RUNOFF VOLUME	(mm)=	38.60	10.79	26.08
TOTAL RAINFALL	(mm)=	40.60	40.60	40.60
RUNOFF COEFFICIENT	=	0.95	0.27	0.64

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area	(ha)=	1.23
ID= 1 DT= 1.0 min	Total Imp(%)=	75.00	Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.55	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		41.41	26.21

over (min)		5.00	11.00
Storage Coeff. (min)=		3.42 (ii)	10.70 (ii)
Unit Hyd. Tpeak (min)=		5.00	11.00
Unit Hyd. peak (cms)=		0.29	0.10
			TOTALS
PEAK FLOW	(cms)=	0.08	0.02 0.095 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08 3.00
RUNOFF VOLUME	(mm)=	38.60	11.30 26.58
TOTAL RAINFALL	(mm)=	40.60	40.60 40.60
RUNOFF COEFFICIENT	=	0.95	0.28 0.65

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area	(ha)=	6.36
ID= 1 DT= 1.0 min	Total Imp(%)=	75.00	Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.77	1.59
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	205.91	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		41.41	26.21
over (min)		6.00	13.00
Storage Coeff. (min)=		5.61 (ii)	12.88 (ii)
Unit Hyd. Tpeak (min)=		6.00	13.00
Unit Hyd. peak (cms)=		0.20	0.09
			TOTALS
PEAK FLOW	(cms)=	0.41	0.08 0.479 (iii)
TIME TO PEAK	(hrs)=	3.00	3.10 3.00
RUNOFF VOLUME	(mm)=	38.60	11.30 26.59
TOTAL RAINFALL	(mm)=	40.60	40.60 40.60
RUNOFF COEFFICIENT	=	0.95	0.28 0.65

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0304)	Area	(ha)=	1.23
ID= 1 DT= 1.0 min	Total Imp(%)=	75.00	Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.55	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		41.41	20.51
over (min)		5.00	11.00
Storage Coeff. (min)=		3.42 (ii)	10.70 (ii)
Unit Hyd. Tpeak (min)=		5.00	11.00

```
     Unit Hyd. peak  (cms)=       0.29         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.01          0.091 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      38.60         8.87          25.51
     TOTAL RAINFALL   (mm)=      40.60        40.60          40.60
     RUNOFF COEFFICIENT   =       0.95         0.22           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.133|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.09      3.00   25.51
     ======================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.23      0.09      3.00   25.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.23   0.091     3.00    25.51
     + ID2= 2 (  0203):     6.36   0.479     3.00    26.59
       ================================================
       ID = 3 (  0016):     7.59   0.571     3.00    26.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      41.41         8.85
               over (min)        5.00        23.00
     Storage Coeff.  (min)=       3.97 (ii)   22.58 (ii)
     Unit Hyd. Tpeak (min)=       5.00        23.00
     Unit Hyd. peak  (cms)=       0.26         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.01          0.124 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.30           3.00
     RUNOFF VOLUME    (mm)=      38.60         7.61          23.10
     TOTAL RAINFALL   (mm)=      40.60        40.60          40.60
     RUNOFF COEFFICIENT   =       0.95         0.19           0.57
```



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      41.41        20.51
               over (min)        7.00        15.00
     Storage Coeff.  (min)=       6.86 (ii)   14.14 (ii)
     Unit Hyd. Tpeak (min)=       7.00        15.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.79         0.12          0.889 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.13           3.00
     RUNOFF VOLUME    (mm)=      38.60         8.87          25.52
     TOTAL RAINFALL   (mm)=      40.60        40.60          40.60
     RUNOFF COEFFICIENT   =       0.95         0.22           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      41.41        20.51
               over (min)        5.00        13.00
     Storage Coeff.  (min)=       5.31 (ii)   12.58 (ii)
     Unit Hyd. Tpeak (min)=       5.00        13.00
     Unit Hyd. peak  (cms)=       0.22         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.05          0.387 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.10           3.00
     RUNOFF VOLUME    (mm)=      38.60         8.87          25.52
     TOTAL RAINFALL   (mm)=      40.60        40.60          40.60
     RUNOFF COEFFICIENT   =       0.95         0.22           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      41.41        20.51
               over (min)        6.00        14.00
     Storage Coeff.  (min)=       6.40 (ii)   13.67 (ii)
     Unit Hyd. Tpeak (min)=       6.00        14.00
     Unit Hyd. peak  (cms)=       0.18         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.63         0.10          0.710 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.12           3.00
     RUNOFF VOLUME    (mm)=      38.60         8.87          25.52
     TOTAL RAINFALL   (mm)=      40.60        40.60          40.60
     RUNOFF COEFFICIENT   =       0.95         0.22           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   0.889     3.00    25.52
     + ID2= 2 (  0302):     5.31   0.387     3.00    25.52
       ====================================================
       ID = 3 (  0013):    17.80   1.276     3.00    25.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   1.276     3.00    25.52
     + ID2= 2 (  0303):     9.87   0.710     3.00    25.52
       ====================================================
       ID = 1 (  0013):    27.67   1.986     3.00    25.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   1.986     3.00    25.52
     + ID2= 2 (  0016):     7.59   0.571     3.00    26.41
       ====================================================
       ID = 3 (  0012):    35.26   2.557     3.00    25.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.26   2.557     3.00    25.71
     + ID2= 2 (  0204):     2.01   0.124     3.00    23.10
       ====================================================
       ID = 1 (  0012):    37.27   2.681     3.00    25.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)    (ha.m.)
                          0.0000     0.0000   |   0.4389      1.4219
                          0.1014     0.3040   |   0.9212      1.8498
                          0.1939     0.6475   |   1.2450      2.2118
                          0.2548     1.0211   |   1.6046      2.3050
                          0.2583     1.0470   |   4.5503      2.6235

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.270      2.681      3.00      25.57
   OUTFLOW: ID= 1 (  0011)     37.270      0.208      4.72      24.80

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.76
                  TIME SHIFT OF PEAK FLOW         (min)=103.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7336

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 FINISH
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      V    V   I    SSSSS  U   U    A    L
      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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\4bffb6bc-6933-4c80-9b8d-d08659277f6e\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\4bffb6bc-6933-4c80-9b8d-d08659277f6e\sce


DATE: 03/23/2019                          TIME: 12:43:01

USER:



COMMENTS: _____________________________________________________


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


--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\0ec9406d
| Ptotal= 55.84 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                     Duration of storm    =  6.00 hrs
                     Mass curve time step = 30.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.50    2.23 |  2.00    4.47 |  3.50   14.52 |  5.00    3.35
               1.00    2.23 |  2.50    7.82 |  4.00    6.70 |  5.50    2.23
               1.50    4.47 |  3.00   56.96 |  4.50    4.47 |  6.00    2.23

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    2.23 | 1.517    4.47 | 3.017   14.52 |  4.52    3.35
              0.033    2.23 | 1.533    4.47 | 3.033   14.52 |  4.53    3.35
              0.050    2.23 | 1.550    4.47 | 3.050   14.52 |  4.55    3.35
              0.067    2.23 | 1.567    4.47 | 3.067   14.52 |  4.57    3.35
              0.083    2.23 | 1.583    4.47 | 3.083   14.52 |  4.58    3.35
              0.100    2.23 | 1.600    4.47 | 3.100   14.52 |  4.60    3.35
              0.117    2.23 | 1.617    4.47 | 3.117   14.52 |  4.62    3.35
              0.133    2.23 | 1.633    4.47 | 3.133   14.52 |  4.63    3.35
              0.150    2.23 | 1.650    4.47 | 3.150   14.52 |  4.65    3.35
```



```
              0.167    2.23 | 1.667    4.47 | 3.167   14.52 |  4.67    3.35
              0.183    2.23 | 1.683    4.47 | 3.183   14.52 |  4.68    3.35
              0.200    2.23 | 1.700    4.47 | 3.200   14.52 |  4.70    3.35
              0.217    2.23 | 1.717    4.47 | 3.217   14.52 |  4.72    3.35
              0.233    2.23 | 1.733    4.47 | 3.233   14.52 |  4.73    3.35
              0.250    2.23 | 1.750    4.47 | 3.250   14.52 |  4.75    3.35
              0.267    2.23 | 1.767    4.47 | 3.267   14.52 |  4.77    3.35
              0.283    2.23 | 1.783    4.47 | 3.283   14.52 |  4.78    3.35
              0.300    2.23 | 1.800    4.47 | 3.300   14.52 |  4.80    3.35
              0.317    2.23 | 1.817    4.47 | 3.317   14.52 |  4.82    3.35
              0.333    2.23 | 1.833    4.47 | 3.333   14.52 |  4.83    3.35
              0.350    2.23 | 1.850    4.47 | 3.350   14.52 |  4.85    3.35
              0.367    2.23 | 1.867    4.47 | 3.367   14.52 |  4.87    3.35
              0.383    2.23 | 1.883    4.47 | 3.383   14.52 |  4.88    3.35
              0.400    2.23 | 1.900    4.47 | 3.400   14.52 |  4.90    3.35
              0.417    2.23 | 1.917    4.47 | 3.417   14.52 |  4.92    3.35
              0.433    2.23 | 1.933    4.47 | 3.433   14.52 |  4.93    3.35
              0.450    2.23 | 1.950    4.47 | 3.450   14.52 |  4.95    3.35
              0.467    2.23 | 1.967    4.47 | 3.467   14.52 |  4.97    3.35
              0.483    2.23 | 1.983    4.47 | 3.483   14.52 |  4.98    3.35
              0.500    2.23 | 2.000    4.47 | 3.500   14.52 |  5.00    3.35
              0.517    2.23 | 2.017    7.82 | 3.517    6.70 |  5.02    2.23
              0.533    2.23 | 2.033    7.82 | 3.533    6.70 |  5.03    2.23
              0.550    2.23 | 2.050    7.82 | 3.550    6.70 |  5.05    2.23
              0.567    2.23 | 2.067    7.82 | 3.567    6.70 |  5.07    2.23
              0.583    2.23 | 2.083    7.82 | 3.583    6.70 |  5.08    2.23
              0.600    2.23 | 2.100    7.82 | 3.600    6.70 |  5.10    2.23
              0.617    2.23 | 2.117    7.82 | 3.617    6.70 |  5.12    2.23
              0.633    2.23 | 2.133    7.82 | 3.633    6.70 |  5.13    2.23
              0.650    2.23 | 2.150    7.82 | 3.650    6.70 |  5.15    2.23
              0.667    2.23 | 2.167    7.82 | 3.667    6.70 |  5.17    2.23
              0.683    2.23 | 2.183    7.82 | 3.683    6.70 |  5.18    2.23
              0.700    2.23 | 2.200    7.82 | 3.700    6.70 |  5.20    2.23
              0.717    2.23 | 2.217    7.82 | 3.717    6.70 |  5.22    2.23
              0.733    2.23 | 2.233    7.82 | 3.733    6.70 |  5.23    2.23
              0.750    2.23 | 2.250    7.82 | 3.750    6.70 |  5.25    2.23
              0.767    2.23 | 2.267    7.82 | 3.767    6.70 |  5.27    2.23
              0.783    2.23 | 2.283    7.82 | 3.783    6.70 |  5.28    2.23
              0.800    2.23 | 2.300    7.82 | 3.800    6.70 |  5.30    2.23
              0.817    2.23 | 2.317    7.82 | 3.817    6.70 |  5.32    2.23
              0.833    2.23 | 2.333    7.82 | 3.833    6.70 |  5.33    2.23
              0.850    2.23 | 2.350    7.82 | 3.850    6.70 |  5.35    2.23
              0.867    2.23 | 2.367    7.82 | 3.867    6.70 |  5.37    2.23
              0.883    2.23 | 2.383    7.82 | 3.883    6.70 |  5.38    2.23
              0.900    2.23 | 2.400    7.82 | 3.900    6.70 |  5.40    2.23
              0.917    2.23 | 2.417    7.82 | 3.917    6.70 |  5.42    2.23
              0.933    2.23 | 2.433    7.82 | 3.933    6.70 |  5.43    2.23
              0.950    2.23 | 2.450    7.82 | 3.950    6.70 |  5.45    2.23
              0.967    2.23 | 2.467    7.82 | 3.967    6.70 |  5.47    2.23
              0.983    2.23 | 2.483    7.82 | 3.983    6.70 |  5.48    2.23
              1.000    2.23 | 2.500    7.82 | 4.000    6.70 |  5.50    2.23
              1.017    4.47 | 2.517   56.95 | 4.017    4.47 |  5.52    2.23
              1.033    4.47 | 2.533   56.96 | 4.033    4.47 |  5.53    2.23
              1.050    4.47 | 2.550   56.96 | 4.050    4.47 |  5.55    2.23
              1.067    4.47 | 2.567   56.96 | 4.067    4.47 |  5.57    2.23
              1.083    4.47 | 2.583   56.96 | 4.083    4.47 |  5.58    2.23
              1.100    4.47 | 2.600   56.96 | 4.100    4.47 |  5.60    2.23
              1.117    4.47 | 2.617   56.96 | 4.117    4.47 |  5.62    2.23
              1.133    4.47 | 2.633   56.96 | 4.133    4.47 |  5.63    2.23
              1.150    4.47 | 2.650   56.96 | 4.150    4.47 |  5.65    2.23
              1.167    4.47 | 2.667   56.96 | 4.167    4.47 |  5.67    2.23
              1.183    4.47 | 2.683   56.96 | 4.183    4.47 |  5.68    2.23
              1.200    4.47 | 2.700   56.96 | 4.200    4.47 |  5.70    2.23
              1.217    4.47 | 2.717   56.96 | 4.217    4.47 |  5.72    2.23
              1.233    4.47 | 2.733   56.96 | 4.233    4.47 |  5.73    2.23
              1.250    4.47 | 2.750   56.96 | 4.250    4.47 |  5.75    2.23
              1.267    4.47 | 2.767   56.96 | 4.267    4.47 |  5.77    2.23
```

1.283	4.47	2.783	56.96	4.283	4.47	5.78	2.23
1.300	4.47	2.800	56.96	4.300	4.47	5.80	2.23
1.317	4.47	2.817	56.96	4.317	4.47	5.82	2.23
1.333	4.47	2.833	56.96	4.333	4.47	5.83	2.23
1.350	4.47	2.850	56.96	4.350	4.47	5.85	2.23
1.367	4.47	2.867	56.96	4.367	4.47	5.87	2.23
1.383	4.47	2.883	56.96	4.383	4.47	5.88	2.23
1.400	4.47	2.900	56.96	4.400	4.47	5.90	2.23
1.417	4.47	2.917	56.96	4.417	4.47	5.92	2.23
1.433	4.47	2.933	56.96	4.433	4.47	5.93	2.23
1.450	4.47	2.950	56.96	4.450	4.47	5.95	2.23
1.467	4.47	2.967	56.96	4.467	4.47	5.97	2.23
1.483	4.47	2.983	56.96	4.483	4.47	5.98	2.23
1.500	4.47	3.000	56.96	4.500	4.47	6.00	2.23

Max.Eff.Inten.(mm/hr)=		56.96	32.78	
over (min)		5.00	32.00	
Storage Coeff. (min)=		3.74 (ii)	31.20 (ii)	
Unit Hyd. Tpeak (min)=		5.00	32.00	
Unit Hyd. peak (cms)=		0.27	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.22	0.04	0.237 (iii)
TIME TO PEAK	(hrs)=	3.00	3.43	3.00
RUNOFF VOLUME	(mm)=	53.84	19.09	38.20
TOTAL RAINFALL	(mm)=	55.84	55.84	55.84
RUNOFF COEFFICIENT	=	0.96	0.34	0.68

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0501)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.55	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		56.96	45.65
over (min)		5.00	10.00
Storage Coeff. (min)=		3.01 (ii)	9.42 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00
Unit Hyd. peak (cms)=		0.31	0.12
			TOTALS
PEAK FLOW	(cms)=	0.11	0.03 0.139 (iii)
TIME TO PEAK	(hrs)=	3.00	3.05 3.00
RUNOFF VOLUME	(mm)=	53.84	19.86 38.88
TOTAL RAINFALL	(mm)=	55.84	55.84 55.84
RUNOFF COEFFICIENT	=	0.96	0.36 0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0203)	Area (ha)= 6.36
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.77	1.59
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	205.91	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		56.96	45.65
over (min)		5.00	12.00
Storage Coeff. (min)=		4.94 (ii)	11.34 (ii)
Unit Hyd. Tpeak (min)=		5.00	12.00
Unit Hyd. peak (cms)=		0.23	0.10
			TOTALS
PEAK FLOW	(cms)=	0.56	0.15 0.703 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08 3.00
RUNOFF VOLUME	(mm)=	53.84	19.86 38.89
TOTAL RAINFALL	(mm)=	55.84	55.84 55.84
RUNOFF COEFFICIENT	=	0.96	0.36 0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0304)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.55	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		56.96	36.66
over (min)		5.00	10.00
Storage Coeff. (min)=		3.01 (ii)	9.42 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00
Unit Hyd. peak (cms)=		0.31	0.12
			TOTALS
PEAK FLOW	(cms)=	0.11	0.03 0.133 (iii)
TIME TO PEAK	(hrs)=	3.00	3.05 3.00
RUNOFF VOLUME	(mm)=	53.84	15.96 37.17
TOTAL RAINFALL	(mm)=	55.84	55.84 55.84
RUNOFF COEFFICIENT	=	0.96	0.29 0.67

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 54.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0015)
Inlet Cap.= 0.133

```
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.13      3.00   37.17
     ======================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.23      0.13      3.00   37.17

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

```
--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.23   0.133     3.00    37.17
     + ID2= 2 (  0203):     6.36   0.703     3.00    38.89
       ================================================
       ID = 3 (  0016):     7.59   0.835     3.00    38.61

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

```
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      56.96        18.92
               over (min)        5.00        13.00
     Storage Coeff.  (min)=       3.49 (ii)   12.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00        13.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04         0.192 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.10          3.00
     RUNOFF VOLUME    (mm)=      53.84        14.23         34.03
     TOTAL RAINFALL   (mm)=      55.84        55.84         55.84
     RUNOFF COEFFICIENT   =       0.96         0.25          0.61


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250
```



```
     Max.Eff.Inten.(mm/hr)=      56.96        36.66
               over (min)        6.00        13.00
     Storage Coeff.  (min)=       6.04 (ii)   12.45 (ii)
     Unit Hyd. Tpeak (min)=       6.00        13.00
     Unit Hyd. peak  (cms)=       0.19         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.10         0.23          1.301 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.10          3.00
     RUNOFF VOLUME    (mm)=      53.84        15.96         37.17
     TOTAL RAINFALL   (mm)=      55.84        55.84         55.84
     RUNOFF COEFFICIENT   =       0.96         0.29          0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      56.96        36.66
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       4.68 (ii)   11.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.24         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.10          0.563 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08          3.00
     RUNOFF VOLUME    (mm)=      53.84        15.96         37.17
     TOTAL RAINFALL   (mm)=      55.84        55.84         55.84
     RUNOFF COEFFICIENT   =       0.96         0.29          0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      56.96        36.66
               over (min)        6.00        13.00
```

```
     Storage Coeff.  (min)=       5.63 (ii)   12.03 (ii)
     Unit Hyd. Tpeak (min)=       6.00        13.00
     Unit Hyd. peak  (cms)=       0.20         0.09
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.87         0.18          1.032 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.10           3.00
     RUNOFF VOLUME    (mm)=      53.84        15.96          37.17
     TOTAL RAINFALL   (mm)=      55.84        55.84          55.84
     RUNOFF COEFFICIENT   =       0.96         0.29           0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   1.301     3.00    37.17
     + ID2= 2 (  0302):     5.31   0.563     3.00    37.17
       ================================================
       ID = 3 (  0013):    17.80   1.863     3.00    37.17

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

```
--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   1.863     3.00    37.17
     + ID2= 2 (  0303):     9.87   1.032     3.00    37.17
       ================================================
       ID = 1 (  0013):    27.67   2.896     3.00    37.17

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

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   2.896     3.00    37.17
     + ID2= 2 (  0016):     7.59   0.835     3.00    38.61
       ================================================
       ID = 3 (  0012):    35.26   3.731     3.00    37.48

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

```
--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.26   3.731     3.00    37.48
     + ID2= 2 (  0204):     2.01   0.192     3.00    34.03
       ================================================
       ID = 1 (  0012):    37.27   3.923     3.00    37.30
```



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

```
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.4389      1.4219
                          0.1014     0.3040   |  0.9212      1.8498
                          0.1939     0.6475   |  1.2450      2.2118
                          0.2548     1.0211   |  1.6046      2.3050
                          0.2583     1.0470   |  4.5503      2.6235

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.270     3.923      3.00      37.30
   OUTFLOW: ID= 1 (  0011)     37.270     0.279      4.92      36.01

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.11
                TIME SHIFT OF PEAK FLOW         (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.0899
```

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

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\9b7db3c7-c452-4439-833a-fb3bcb068b31\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\9b7db3c7-c452-4439-833a-fb3bcb068b31\sce


DATE: 03/23/2019                          TIME: 12:43:03

USER:


COMMENTS: _____
```

```
--------
  **********************************************
  ** SIMULATION : Run 03                       **
  **********************************************
```

```
--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\69e44c7d
| Ptotal= 66.14 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
                       Mass curve time step = 30.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.50    2.65 |  2.00    5.29 |  3.50   17.20 |  5.00    3.97
               1.00    2.65 |  2.50    9.26 |  4.00    7.94 |  5.50    2.65
               1.50    5.29 |  3.00   67.46 |  4.50    5.29 |  6.00    2.65

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    2.65 | 1.517    5.29 | 3.017   17.20 |  4.52    3.97
               0.033    2.65 | 1.533    5.29 | 3.033   17.20 |  4.53    3.97
               0.050    2.65 | 1.550    5.29 | 3.050   17.20 |  4.55    3.97
               0.067    2.65 | 1.567    5.29 | 3.067   17.20 |  4.57    3.97
               0.083    2.65 | 1.583    5.29 | 3.083   17.20 |  4.58    3.97
               0.100    2.65 | 1.600    5.29 | 3.100   17.20 |  4.60    3.97
               0.117    2.65 | 1.617    5.29 | 3.117   17.20 |  4.62    3.97
               0.133    2.65 | 1.633    5.29 | 3.133   17.20 |  4.63    3.97
               0.150    2.65 | 1.650    5.29 | 3.150   17.20 |  4.65    3.97
               0.167    2.65 | 1.667    5.29 | 3.167   17.20 |  4.67    3.97
               0.183    2.65 | 1.683    5.29 | 3.183   17.20 |  4.68    3.97
               0.200    2.65 | 1.700    5.29 | 3.200   17.20 |  4.70    3.97
               0.217    2.65 | 1.717    5.29 | 3.217   17.20 |  4.72    3.97
               0.233    2.65 | 1.733    5.29 | 3.233   17.20 |  4.73    3.97
               0.250    2.65 | 1.750    5.29 | 3.250   17.20 |  4.75    3.97
               0.267    2.65 | 1.767    5.29 | 3.267   17.20 |  4.77    3.97
               0.283    2.65 | 1.783    5.29 | 3.283   17.20 |  4.78    3.97
               0.300    2.65 | 1.800    5.29 | 3.300   17.20 |  4.80    3.97
               0.317    2.65 | 1.817    5.29 | 3.317   17.20 |  4.82    3.97
               0.333    2.65 | 1.833    5.29 | 3.333   17.20 |  4.83    3.97
               0.350    2.65 | 1.850    5.29 | 3.350   17.20 |  4.85    3.97
               0.367    2.65 | 1.867    5.29 | 3.367   17.20 |  4.87    3.97
               0.383    2.65 | 1.883    5.29 | 3.383   17.20 |  4.88    3.97
               0.400    2.65 | 1.900    5.29 | 3.400   17.20 |  4.90    3.97
               0.417    2.65 | 1.917    5.29 | 3.417   17.20 |  4.92    3.97
               0.433    2.65 | 1.933    5.29 | 3.433   17.20 |  4.93    3.97
               0.450    2.65 | 1.950    5.29 | 3.450   17.20 |  4.95    3.97
               0.467    2.65 | 1.967    5.29 | 3.467   17.20 |  4.97    3.97
               0.483    2.65 | 1.983    5.29 | 3.483   17.20 |  4.98    3.97
               0.500    2.65 | 2.000    5.29 | 3.500   17.20 |  5.00    3.97
               0.517    2.65 | 2.017    9.26 | 3.517    7.94 |  5.02    2.65
               0.533    2.65 | 2.033    9.26 | 3.533    7.94 |  5.03    2.65
               0.550    2.65 | 2.050    9.26 | 3.550    7.94 |  5.05    2.65
```



```
               0.567    2.65 | 2.067    9.26 | 3.567    7.94 |  5.07    2.65
               0.583    2.65 | 2.083    9.26 | 3.583    7.94 |  5.08    2.65
               0.600    2.65 | 2.100    9.26 | 3.600    7.94 |  5.10    2.65
               0.617    2.65 | 2.117    9.26 | 3.617    7.94 |  5.12    2.65
               0.633    2.65 | 2.133    9.26 | 3.633    7.94 |  5.13    2.65
               0.650    2.65 | 2.150    9.26 | 3.650    7.94 |  5.15    2.65
               0.667    2.65 | 2.167    9.26 | 3.667    7.94 |  5.17    2.65
               0.683    2.65 | 2.183    9.26 | 3.683    7.94 |  5.18    2.65
               0.700    2.65 | 2.200    9.26 | 3.700    7.94 |  5.20    2.65
               0.717    2.65 | 2.217    9.26 | 3.717    7.94 |  5.22    2.65
               0.733    2.65 | 2.233    9.26 | 3.733    7.94 |  5.23    2.65
               0.750    2.65 | 2.250    9.26 | 3.750    7.94 |  5.25    2.65
               0.767    2.65 | 2.267    9.26 | 3.767    7.94 |  5.27    2.65
               0.783    2.65 | 2.283    9.26 | 3.783    7.94 |  5.28    2.65
               0.800    2.65 | 2.300    9.26 | 3.800    7.94 |  5.30    2.65
               0.817    2.65 | 2.317    9.26 | 3.817    7.94 |  5.32    2.65
               0.833    2.65 | 2.333    9.26 | 3.833    7.94 |  5.33    2.65
               0.850    2.65 | 2.350    9.26 | 3.850    7.94 |  5.35    2.65
               0.867    2.65 | 2.367    9.26 | 3.867    7.94 |  5.37    2.65
               0.883    2.65 | 2.383    9.26 | 3.883    7.94 |  5.38    2.65
               0.900    2.65 | 2.400    9.26 | 3.900    7.94 |  5.40    2.65
               0.917    2.65 | 2.417    9.26 | 3.917    7.94 |  5.42    2.65
               0.933    2.65 | 2.433    9.26 | 3.933    7.94 |  5.43    2.65
               0.950    2.65 | 2.450    9.26 | 3.950    7.94 |  5.45    2.65
               0.967    2.65 | 2.467    9.26 | 3.967    7.94 |  5.47    2.65
               0.983    2.65 | 2.483    9.26 | 3.983    7.94 |  5.48    2.65
               1.000    2.65 | 2.500    9.26 | 4.000    7.94 |  5.50    2.65
               1.017    5.29 | 2.517   67.46 | 4.017    5.29 |  5.52    2.65
               1.033    5.29 | 2.533   67.46 | 4.033    5.29 |  5.53    2.65
               1.050    5.29 | 2.550   67.46 | 4.050    5.29 |  5.55    2.65
               1.067    5.29 | 2.567   67.46 | 4.067    5.29 |  5.57    2.65
               1.083    5.29 | 2.583   67.46 | 4.083    5.29 |  5.58    2.65
               1.100    5.29 | 2.600   67.46 | 4.100    5.29 |  5.60    2.65
               1.117    5.29 | 2.617   67.46 | 4.117    5.29 |  5.62    2.65
               1.133    5.29 | 2.633   67.46 | 4.133    5.29 |  5.63    2.65
               1.150    5.29 | 2.650   67.46 | 4.150    5.29 |  5.65    2.65
               1.167    5.29 | 2.667   67.46 | 4.167    5.29 |  5.67    2.65
               1.183    5.29 | 2.683   67.46 | 4.183    5.29 |  5.68    2.65
               1.200    5.29 | 2.700   67.46 | 4.200    5.29 |  5.70    2.65
               1.217    5.29 | 2.717   67.46 | 4.217    5.29 |  5.72    2.65
               1.233    5.29 | 2.733   67.46 | 4.233    5.29 |  5.73    2.65
               1.250    5.29 | 2.750   67.46 | 4.250    5.29 |  5.75    2.65
               1.267    5.29 | 2.767   67.46 | 4.267    5.29 |  5.77    2.65
               1.283    5.29 | 2.783   67.46 | 4.283    5.29 |  5.78    2.65
               1.300    5.29 | 2.800   67.46 | 4.300    5.29 |  5.80    2.65
               1.317    5.29 | 2.817   67.46 | 4.317    5.29 |  5.82    2.65
               1.333    5.29 | 2.833   67.46 | 4.333    5.29 |  5.83    2.65
               1.350    5.29 | 2.850   67.46 | 4.350    5.29 |  5.85    2.65
               1.367    5.29 | 2.867   67.46 | 4.367    5.29 |  5.87    2.65
               1.383    5.29 | 2.883   67.46 | 4.383    5.29 |  5.88    2.65
               1.400    5.29 | 2.900   67.46 | 4.400    5.29 |  5.90    2.65
               1.417    5.29 | 2.917   67.46 | 4.417    5.29 |  5.92    2.65
               1.433    5.29 | 2.933   67.46 | 4.433    5.29 |  5.93    2.65
               1.450    5.29 | 2.950   67.46 | 4.450    5.29 |  5.95    2.65
               1.467    5.29 | 2.967   67.46 | 4.467    5.29 |  5.97    2.65
               1.483    5.29 | 2.983   67.46 | 4.483    5.29 |  5.98    2.65
               1.500    5.29 | 3.000   67.46 | 4.500    5.29 |  6.00    2.64

Max.Eff.Inten.(mm/hr)=      67.46        47.03
          over (min)         5.00        28.00
Storage Coeff.  (min)=       3.50 (ii)   27.26 (ii)
Unit Hyd. Tpeak (min)=       5.00        28.00
Unit Hyd. peak  (cms)=       0.28         0.04

                                                  *TOTALS*
PEAK FLOW       (cms)=       0.26         0.05          0.290 (iii)
TIME TO PEAK    (hrs)=       3.00         3.35          3.00
RUNOFF VOLUME    (mm)=      64.14        25.46         46.73
```

```
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.38           0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0501)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        60.37
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       2.82 (ii)    8.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.32         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.04          0.171 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      64.14        26.40          47.53
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.40           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0203)|   Area    (ha)=   6.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.77         1.59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     205.91        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        60.37
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       4.61 (ii)   10.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.24         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.67         0.21          0.864 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.07          3.00
     RUNOFF VOLUME    (mm)=      64.14        26.40          47.53
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.40           0.72
```



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        49.22
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       2.82 (ii)    8.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.32         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.03          0.163 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      64.14        21.51          45.38
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.33           0.69


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.133|
| #of Inlets=    1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.16      3.00   45.38
     ==========================================================
     MAJOR SYS.(ID= 2):   0.05      0.03      3.00   45.38
     MINOR SYS.(ID= 3):   1.18      0.13      2.68   45.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.18   0.133     2.68    45.38
     + ID2= 2 (  0203):     6.36   0.864     3.00    47.53
       ================================================
       ID = 3 (  0016):     7.54   0.997     3.00    47.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
```

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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        25.76
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       3.26 (ii)   11.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.29         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.05          0.237 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      64.14        19.47          41.80
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.29           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        49.22
               over (min)        6.00        12.00
     Storage Coeff.  (min)=       5.65 (ii)   11.63 (ii)
     Unit Hyd. Tpeak (min)=       6.00        12.00
     Unit Hyd. peak  (cms)=       0.20         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.30         0.32          1.595 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      64.14        21.51          45.38
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.33           0.69


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
```



```
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        49.22
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       4.37 (ii)   10.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.25         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.14          0.690 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.07           3.00
     RUNOFF VOLUME    (mm)=      64.14        21.51          45.38
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.33           0.69


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      67.46        49.22
               over (min)        5.00        12.00
     Storage Coeff.  (min)=       5.26 (ii)   11.25 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.22         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.03         0.25          1.266 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      64.14        21.51          45.38
     TOTAL RAINFALL   (mm)=      66.14        66.14          66.14
     RUNOFF COEFFICIENT   =       0.97         0.33           0.69


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   1.595     3.00    45.38
```

```
      + ID2= 2 (  0302):     5.31   0.690     3.00    45.38
        ================================================
        ID = 3 (  0013):    17.80   2.285     3.00    45.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0013):    17.80   2.285     3.00    45.38
      + ID2= 2 (  0303):     9.87   1.266     3.00    45.38
        ================================================
        ID = 1 (  0013):    27.67   3.551     3.00    45.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    27.67   3.551     3.00    45.38
      + ID2= 2 (  0016):     7.54   0.997     3.00    47.20
        ================================================
        ID = 3 (  0012):    35.21   4.548     3.00    45.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0012):    35.21   4.548     3.00    45.77
      + ID2= 2 (  0204):     2.01   0.237     3.00    41.80
        ================================================
        ID = 1 (  0012):    37.22   4.785     3.00    45.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4389      1.4219
                          0.1014     0.3040   |   0.9212      1.8498
                          0.1939     0.6475   |   1.2450      2.2118
                          0.2548     1.0211   |   1.6046      2.3050
                          0.2583     1.0470   |   4.5503      2.6235

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.215     4.785      3.00      45.56
   OUTFLOW: ID= 1 (  0011)     37.215     0.385      4.63      43.98

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.05
                  TIME SHIFT OF PEAK FLOW         (min)= 98.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.3104

--------------------------------------------------------------------------------
```



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

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\a0f3f4c4-29d8-49fd-ab42-4dd477b27ac7\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\a0f3f4c4-29d8-49fd-ab42-4dd477b27ac7\sce


DATE: 03/23/2019                          TIME: 12:43:03

USER:


COMMENTS: _____

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

--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\87dcef57
| Ptotal= 79.04 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                         Duration of storm    =  6.00 hrs
                         Mass curve time step = 30.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.50    3.16 |  2.00    6.32 |  3.50   20.55 |  5.00    4.74
               1.00    3.16 |  2.50   11.07 |  4.00    9.48 |  5.50    3.16
               1.50    6.32 |  3.00   80.62 |  4.50    6.32 |  6.00    3.16

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
```

Average Slope	(%)=	1.00	1.00
Length	(m)=	129.87	129.41
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	1.517	6.32	3.017	20.56	4.52	4.74
0.033	3.16	1.533	6.32	3.033	20.55	4.53	4.74
0.050	3.16	1.550	6.32	3.050	20.55	4.55	4.74
0.067	3.16	1.567	6.32	3.067	20.55	4.57	4.74
0.083	3.16	1.583	6.32	3.083	20.55	4.58	4.74
0.100	3.16	1.600	6.32	3.100	20.55	4.60	4.74
0.117	3.16	1.617	6.32	3.117	20.55	4.62	4.74
0.133	3.16	1.633	6.32	3.133	20.55	4.63	4.74
0.150	3.16	1.650	6.32	3.150	20.55	4.65	4.74
0.167	3.16	1.667	6.32	3.167	20.55	4.67	4.74
0.183	3.16	1.683	6.32	3.183	20.55	4.68	4.74
0.200	3.16	1.700	6.32	3.200	20.55	4.70	4.74
0.217	3.16	1.717	6.32	3.217	20.55	4.72	4.74
0.233	3.16	1.733	6.32	3.233	20.55	4.73	4.74
0.250	3.16	1.750	6.32	3.250	20.55	4.75	4.74
0.267	3.16	1.767	6.32	3.267	20.55	4.77	4.74
0.283	3.16	1.783	6.32	3.283	20.55	4.78	4.74
0.300	3.16	1.800	6.32	3.300	20.55	4.80	4.74
0.317	3.16	1.817	6.32	3.317	20.55	4.82	4.74
0.333	3.16	1.833	6.32	3.333	20.55	4.83	4.74
0.350	3.16	1.850	6.32	3.350	20.55	4.85	4.74
0.367	3.16	1.867	6.32	3.367	20.55	4.87	4.74
0.383	3.16	1.883	6.32	3.383	20.55	4.88	4.74
0.400	3.16	1.900	6.32	3.400	20.55	4.90	4.74
0.417	3.16	1.917	6.32	3.417	20.55	4.92	4.74
0.433	3.16	1.933	6.32	3.433	20.55	4.93	4.74
0.450	3.16	1.950	6.32	3.450	20.55	4.95	4.74
0.467	3.16	1.967	6.32	3.467	20.55	4.97	4.74
0.483	3.16	1.983	6.32	3.483	20.55	4.98	4.74
0.500	3.16	2.000	6.32	3.500	20.55	5.00	4.74
0.517	3.16	2.017	11.07	3.517	9.49	5.02	3.16
0.533	3.16	2.033	11.07	3.533	9.48	5.03	3.16
0.550	3.16	2.050	11.07	3.550	9.48	5.05	3.16
0.567	3.16	2.067	11.07	3.567	9.48	5.07	3.16
0.583	3.16	2.083	11.07	3.583	9.48	5.08	3.16
0.600	3.16	2.100	11.07	3.600	9.48	5.10	3.16
0.617	3.16	2.117	11.07	3.617	9.48	5.12	3.16
0.633	3.16	2.133	11.07	3.633	9.48	5.13	3.16
0.650	3.16	2.150	11.07	3.650	9.48	5.15	3.16
0.667	3.16	2.167	11.07	3.667	9.48	5.17	3.16
0.683	3.16	2.183	11.07	3.683	9.48	5.18	3.16
0.700	3.16	2.200	11.07	3.700	9.48	5.20	3.16
0.717	3.16	2.217	11.07	3.717	9.48	5.22	3.16
0.733	3.16	2.233	11.07	3.733	9.48	5.23	3.16
0.750	3.16	2.250	11.07	3.750	9.48	5.25	3.16
0.767	3.16	2.267	11.07	3.767	9.48	5.27	3.16
0.783	3.16	2.283	11.07	3.783	9.48	5.28	3.16
0.800	3.16	2.300	11.07	3.800	9.48	5.30	3.16
0.817	3.16	2.317	11.07	3.817	9.48	5.32	3.16
0.833	3.16	2.333	11.07	3.833	9.48	5.33	3.16
0.850	3.16	2.350	11.07	3.850	9.48	5.35	3.16
0.867	3.16	2.367	11.07	3.867	9.48	5.37	3.16
0.883	3.16	2.383	11.07	3.883	9.48	5.38	3.16
0.900	3.16	2.400	11.07	3.900	9.48	5.40	3.16
0.917	3.16	2.417	11.07	3.917	9.48	5.42	3.16
0.933	3.16	2.433	11.07	3.933	9.48	5.43	3.16
0.950	3.16	2.450	11.07	3.950	9.48	5.45	3.16

0.967	3.16	2.467	11.07	3.967	9.48	5.47	3.16
0.983	3.16	2.483	11.07	3.983	9.48	5.48	3.16
1.000	3.16	2.500	11.07	4.000	9.48	5.50	3.16
1.017	6.32	2.517	80.61	4.017	6.32	5.52	3.16
1.033	6.32	2.533	80.62	4.033	6.32	5.53	3.16
1.050	6.32	2.550	80.62	4.050	6.32	5.55	3.16
1.067	6.32	2.567	80.62	4.067	6.32	5.57	3.16
1.083	6.32	2.583	80.62	4.083	6.32	5.58	3.16
1.100	6.32	2.600	80.62	4.100	6.32	5.60	3.16
1.117	6.32	2.617	80.62	4.117	6.32	5.62	3.16
1.133	6.32	2.633	80.62	4.133	6.32	5.63	3.16
1.150	6.32	2.650	80.62	4.150	6.32	5.65	3.16
1.167	6.32	2.667	80.62	4.167	6.32	5.67	3.16
1.183	6.32	2.683	80.62	4.183	6.32	5.68	3.16
1.200	6.32	2.700	80.62	4.200	6.32	5.70	3.16
1.217	6.32	2.717	80.62	4.217	6.32	5.72	3.16
1.233	6.32	2.733	80.62	4.233	6.32	5.73	3.16
1.250	6.32	2.750	80.62	4.250	6.32	5.75	3.16
1.267	6.32	2.767	80.62	4.267	6.32	5.77	3.16
1.283	6.32	2.783	80.62	4.283	6.32	5.78	3.16
1.300	6.32	2.800	80.62	4.300	6.32	5.80	3.16
1.317	6.32	2.817	80.62	4.317	6.32	5.82	3.16
1.333	6.32	2.833	80.62	4.333	6.32	5.83	3.16
1.350	6.32	2.850	80.62	4.350	6.32	5.85	3.16
1.367	6.32	2.867	80.62	4.367	6.32	5.87	3.16
1.383	6.32	2.883	80.62	4.383	6.32	5.88	3.16
1.400	6.32	2.900	80.62	4.400	6.32	5.90	3.16
1.417	6.32	2.917	80.62	4.417	6.32	5.92	3.16
1.433	6.32	2.933	80.62	4.433	6.32	5.93	3.16
1.450	6.32	2.950	80.62	4.450	6.32	5.95	3.16
1.467	6.32	2.967	80.62	4.467	6.32	5.97	3.16
1.483	6.32	2.983	80.62	4.483	6.32	5.98	3.16
1.500	6.32	3.000	80.62	4.500	6.32	6.00	3.16

Max.Eff.Inten.(mm/hr)=		80.62	65.92
over (min)		5.00	25.00
Storage Coeff. (min)=		3.26 (ii)	24.02 (ii)
Unit Hyd. Tpeak (min)=		5.00	25.00
Unit Hyd. peak (cms)=		0.29	0.05

				TOTALS
PEAK FLOW	(cms)=	0.31	0.07	0.361 (iii)
TIME TO PEAK	(hrs)=	3.00	3.30	3.00
RUNOFF VOLUME	(mm)=	77.04	34.12	57.72
TOTAL RAINFALL	(mm)=	79.04	79.04	79.04
RUNOFF COEFFICIENT	=	0.97	0.43	0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0501)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 56.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.55	40.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	80.62	80.12

```
               over (min)        5.00         9.00
     Storage Coeff.  (min)=      2.62 (ii)    8.20 (ii)
     Unit Hyd. Tpeak (min)=      5.00         9.00
     Unit Hyd. peak  (cms)=      0.33         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.15         0.06          0.212 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.03          3.00
     RUNOFF VOLUME    (mm)=     77.04        35.26         58.65
     TOTAL RAINFALL   (mm)=     79.04        79.04         79.04
     RUNOFF COEFFICIENT   =      0.97         0.45          0.74


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0203)|   Area    (ha)=   6.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.77         1.59
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    205.91        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        80.12
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      4.30 (ii)    9.87 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.25         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.80         0.29          1.075 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=     77.04        35.26         58.66
     TOTAL RAINFALL   (mm)=     79.04        79.04         79.04
     RUNOFF COEFFICIENT   =      0.97         0.45          0.74


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.92         0.31
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     90.55        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        66.43
               over (min)        5.00         9.00
     Storage Coeff.  (min)=      2.62 (ii)    8.20 (ii)
     Unit Hyd. Tpeak (min)=      5.00         9.00
```



```
     Unit Hyd. peak  (cms)=      0.33         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.15         0.05          0.201 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.03          3.00
     RUNOFF VOLUME    (mm)=     77.04        29.16         55.97
     TOTAL RAINFALL   (mm)=     79.04        79.04         79.04
     RUNOFF COEFFICIENT   =      0.97         0.37          0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.133|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.20      3.00   55.97
     ==========================================================
     MAJOR SYS.(ID= 2):   0.14      0.07      3.00   55.97
     MINOR SYS.(ID= 3):   1.09      0.13      2.62   55.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     1.09   0.133     2.62    55.97
      + ID2= 2 (  0203):     6.36   1.075     3.00    58.66
        ================================================
        ID = 3 (  0016):     7.45   1.208     3.00    58.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
-------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.00         1.00
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    115.76        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        35.20
               over (min)        5.00        11.00
     Storage Coeff.  (min)=      3.04 (ii)   10.73 (ii)
     Unit Hyd. Tpeak (min)=      5.00        11.00
     Unit Hyd. peak  (cms)=      0.31         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.23         0.08          0.296 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.07          3.00
     RUNOFF VOLUME    (mm)=     77.04        26.75         51.89
     TOTAL RAINFALL   (mm)=     79.04        79.04         79.04
     RUNOFF COEFFICIENT   =      0.97         0.34          0.66
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  66.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      9.37         3.12
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    288.56        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        66.43
               over (min)       5.00        11.00
     Storage Coeff.  (min)=      5.26 (ii)   10.83 (ii)
     Unit Hyd. Tpeak (min)=      5.00        11.00
     Unit Hyd. peak  (cms)=      0.22         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.56         0.45          1.982 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.07           3.00
     RUNOFF VOLUME    (mm)=     77.04        29.16          55.97
     TOTAL RAINFALL   (mm)=     79.04        79.04          79.04
     RUNOFF COEFFICIENT   =      0.97         0.37           0.71


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  54.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.98         1.33
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    188.15        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        66.43
               over (min)       5.00        10.00
     Storage Coeff.  (min)=      4.07 (ii)    9.64 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.26         0.12
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.67         0.20          0.855 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.05           3.00
     RUNOFF VOLUME    (mm)=     77.04        29.16          55.97
     TOTAL RAINFALL   (mm)=     79.04        79.04          79.04
     RUNOFF COEFFICIENT   =      0.97         0.37           0.71


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  54.0    Ia = Dep. Storage  (Above)
```



```
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      7.40         2.47
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    256.52        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     80.62        66.43
               over (min)       5.00        11.00
     Storage Coeff.  (min)=      4.90 (ii)   10.47 (ii)
     Unit Hyd. Tpeak (min)=      5.00        11.00
     Unit Hyd. peak  (cms)=      0.23         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.23         0.36          1.572 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.07           3.00
     RUNOFF VOLUME    (mm)=     77.04        29.16          55.97
     TOTAL RAINFALL   (mm)=     79.04        79.04          79.04
     RUNOFF COEFFICIENT   =      0.97         0.37           0.71


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  54.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   1.982     3.00    55.97
     + ID2= 2 (  0302):     5.31   0.855     3.00    55.97
       ================================================
       ID = 3 (  0013):    17.80   2.837     3.00    55.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   2.837     3.00    55.97
     + ID2= 2 (  0303):     9.87   1.572     3.00    55.97
       ================================================
       ID = 1 (  0013):    27.67   4.409     3.00    55.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   4.409     3.00    55.97
     + ID2= 2 (  0016):     7.45   1.208     3.00    58.26
       ================================================
       ID = 3 (  0012):    35.12   5.617     3.00    56.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.12   5.617     3.00    56.46
     + ID2= 2 (  0204):     2.01   0.296     3.00    51.89
       ================================================
       ID = 1 (  0012):    37.13   5.912     3.00    56.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4389     1.4219
                          0.1014     0.3040   |   0.9212     1.8498
                          0.1939     0.6475   |   1.2450     2.2118
                          0.2548     1.0211   |   1.6046     2.3050
                          0.2583     1.0470   |   4.5503     2.6235

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.129      5.912      3.00      56.21
   OUTFLOW: ID= 1 (  0011)     37.129      0.599      4.23      54.35

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.13
                  TIME SHIFT OF PEAK FLOW         (min)= 74.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5641

------------------------------------------------------------------------------
==============================================================================================
========

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\5e4566b8-923f-4372-8e10-bc93e6eb99ae\sce
```



```
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\5e4566b8-923f-4372-8e10-bc93e6eb99ae\sce


DATE: 03/23/2019                          TIME: 12:43:01

USER:


COMMENTS: _____

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

--------------------
| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\f98e9093
| Ptotal= 88.35 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
                       Mass curve time step = 30.00 min

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.50    3.53 |  2.00    7.07 |  3.50   22.97 |  5.00    5.30
               1.00    3.53 |  2.50   12.37 |  4.00   10.60 |  5.50    3.53
               1.50    7.07 |  3.00   90.12 |  4.50    7.07 |  6.00    3.53

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85         0.68
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     129.87       129.41
     Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    3.53 | 1.517    7.07 | 3.017   22.98 |  4.52    5.30
              0.033    3.53 | 1.533    7.07 | 3.033   22.97 |  4.53    5.30
              0.050    3.53 | 1.550    7.07 | 3.050   22.97 |  4.55    5.30
              0.067    3.53 | 1.567    7.07 | 3.067   22.97 |  4.57    5.30
              0.083    3.53 | 1.583    7.07 | 3.083   22.97 |  4.58    5.30
              0.100    3.53 | 1.600    7.07 | 3.100   22.97 |  4.60    5.30
              0.117    3.53 | 1.617    7.07 | 3.117   22.97 |  4.62    5.30
              0.133    3.53 | 1.633    7.07 | 3.133   22.97 |  4.63    5.30
              0.150    3.53 | 1.650    7.07 | 3.150   22.97 |  4.65    5.30
              0.167    3.53 | 1.667    7.07 | 3.167   22.97 |  4.67    5.30
              0.183    3.53 | 1.683    7.07 | 3.183   22.97 |  4.68    5.30
              0.200    3.53 | 1.700    7.07 | 3.200   22.97 |  4.70    5.30
              0.217    3.53 | 1.717    7.07 | 3.217   22.97 |  4.72    5.30
              0.233    3.53 | 1.733    7.07 | 3.233   22.97 |  4.73    5.30
```

0.250	3.53	1.750	7.07	3.250	22.97	4.75	5.30
0.267	3.53	1.767	7.07	3.267	22.97	4.77	5.30
0.283	3.53	1.783	7.07	3.283	22.97	4.78	5.30
0.300	3.53	1.800	7.07	3.300	22.97	4.80	5.30
0.317	3.53	1.817	7.07	3.317	22.97	4.82	5.30
0.333	3.53	1.833	7.07	3.333	22.97	4.83	5.30
0.350	3.53	1.850	7.07	3.350	22.97	4.85	5.30
0.367	3.53	1.867	7.07	3.367	22.97	4.87	5.30
0.383	3.53	1.883	7.07	3.383	22.97	4.88	5.30
0.400	3.53	1.900	7.07	3.400	22.97	4.90	5.30
0.417	3.53	1.917	7.07	3.417	22.97	4.92	5.30
0.433	3.53	1.933	7.07	3.433	22.97	4.93	5.30
0.450	3.53	1.950	7.07	3.450	22.97	4.95	5.30
0.467	3.53	1.967	7.07	3.467	22.97	4.97	5.30
0.483	3.53	1.983	7.07	3.483	22.97	4.98	5.30
0.500	3.53	2.000	7.07	3.500	22.97	5.00	5.30
0.517	3.53	2.017	12.37	3.517	10.60	5.02	3.53
0.533	3.53	2.033	12.37	3.533	10.60	5.03	3.53
0.550	3.53	2.050	12.37	3.550	10.60	5.05	3.53
0.567	3.53	2.067	12.37	3.567	10.60	5.07	3.53
0.583	3.53	2.083	12.37	3.583	10.60	5.08	3.53
0.600	3.53	2.100	12.37	3.600	10.60	5.10	3.53
0.617	3.53	2.117	12.37	3.617	10.60	5.12	3.53
0.633	3.53	2.133	12.37	3.633	10.60	5.13	3.53
0.650	3.53	2.150	12.37	3.650	10.60	5.15	3.53
0.667	3.53	2.167	12.37	3.667	10.60	5.17	3.53
0.683	3.53	2.183	12.37	3.683	10.60	5.18	3.53
0.700	3.53	2.200	12.37	3.700	10.60	5.20	3.53
0.717	3.53	2.217	12.37	3.717	10.60	5.22	3.53
0.733	3.53	2.233	12.37	3.733	10.60	5.23	3.53
0.750	3.53	2.250	12.37	3.750	10.60	5.25	3.53
0.767	3.53	2.267	12.37	3.767	10.60	5.27	3.53
0.783	3.53	2.283	12.37	3.783	10.60	5.28	3.53
0.800	3.53	2.300	12.37	3.800	10.60	5.30	3.53
0.817	3.53	2.317	12.37	3.817	10.60	5.32	3.53
0.833	3.53	2.333	12.37	3.833	10.60	5.33	3.53
0.850	3.53	2.350	12.37	3.850	10.60	5.35	3.53
0.867	3.53	2.367	12.37	3.867	10.60	5.37	3.53
0.883	3.53	2.383	12.37	3.883	10.60	5.38	3.53
0.900	3.53	2.400	12.37	3.900	10.60	5.40	3.53
0.917	3.53	2.417	12.37	3.917	10.60	5.42	3.53
0.933	3.53	2.433	12.37	3.933	10.60	5.43	3.53
0.950	3.53	2.450	12.37	3.950	10.60	5.45	3.53
0.967	3.53	2.467	12.37	3.967	10.60	5.47	3.53
0.983	3.53	2.483	12.37	3.983	10.60	5.48	3.53
1.000	3.53	2.500	12.37	4.000	10.60	5.50	3.53
1.017	7.07	2.517	90.11	4.017	7.07	5.52	3.53
1.033	7.07	2.533	90.12	4.033	7.07	5.53	3.53
1.050	7.07	2.550	90.12	4.050	7.07	5.55	3.53
1.067	7.07	2.567	90.12	4.067	7.07	5.57	3.53
1.083	7.07	2.583	90.12	4.083	7.07	5.58	3.53
1.100	7.07	2.600	90.12	4.100	7.07	5.60	3.53
1.117	7.07	2.617	90.12	4.117	7.07	5.62	3.53
1.133	7.07	2.633	90.12	4.133	7.07	5.63	3.53
1.150	7.07	2.650	90.12	4.150	7.07	5.65	3.53
1.167	7.07	2.667	90.12	4.167	7.07	5.67	3.53
1.183	7.07	2.683	90.12	4.183	7.07	5.68	3.53
1.200	7.07	2.700	90.12	4.200	7.07	5.70	3.53
1.217	7.07	2.717	90.12	4.217	7.07	5.72	3.53
1.233	7.07	2.733	90.12	4.233	7.07	5.73	3.53
1.250	7.07	2.750	90.12	4.250	7.07	5.75	3.53
1.267	7.07	2.767	90.12	4.267	7.07	5.77	3.53
1.283	7.07	2.783	90.12	4.283	7.07	5.78	3.53
1.300	7.07	2.800	90.12	4.300	7.07	5.80	3.53
1.317	7.07	2.817	90.12	4.317	7.07	5.82	3.53
1.333	7.07	2.833	90.12	4.333	7.07	5.83	3.53
1.350	7.07	2.850	90.12	4.350	7.07	5.85	3.53

1.367	7.07	2.867	90.12	4.367	7.07	5.87	3.53
1.383	7.07	2.883	90.12	4.383	7.07	5.88	3.53
1.400	7.07	2.900	90.12	4.400	7.07	5.90	3.53
1.417	7.07	2.917	90.12	4.417	7.07	5.92	3.53
1.433	7.07	2.933	90.12	4.433	7.07	5.93	3.53
1.450	7.07	2.950	90.12	4.450	7.07	5.95	3.53
1.467	7.07	2.967	90.12	4.467	7.07	5.97	3.53
1.483	7.07	2.983	90.12	4.483	7.07	5.98	3.53
1.500	7.07	3.000	90.12	4.500	7.07	6.00	3.53

Max.Eff.Inten.(mm/hr)=	90.12	79.77		
over (min)	5.00	23.00		
Storage Coeff. (min)=	3.12 (ii)	22.35 (ii)		
Unit Hyd. Tpeak (min)=	5.00	23.00		
Unit Hyd. peak (cms)=	0.30	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.35	0.09	0.415 (iii)	
TIME TO PEAK (hrs)=	3.00	3.25	3.00	
RUNOFF VOLUME (mm)=	86.35	40.75	65.83	
TOTAL RAINFALL (mm)=	88.35	88.35	88.35	
RUNOFF COEFFICIENT =	0.98	0.46	0.75	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0501)	Area (ha)= 1.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.92	0.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	90.55	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	90.12	95.06	
over (min)	5.00	8.00	
Storage Coeff. (min)=	2.51 (ii)	7.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	8.00	
Unit Hyd. peak (cms)=	0.34	0.14	
		TOTALS	
PEAK FLOW (cms)=	0.17	0.07	0.243 (iii)
TIME TO PEAK (hrs)=	3.00	3.03	3.00
RUNOFF VOLUME (mm)=	86.35	42.03	66.85
TOTAL RAINFALL (mm)=	88.35	88.35	88.35
RUNOFF COEFFICIENT =	0.98	0.48	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)= 6.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00	

```
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.77         1.59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     205.91        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        95.06
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.11 (ii)    9.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.89         0.35         1.228 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      86.35        42.03         66.85
     TOTAL RAINFALL   (mm)=      88.35        88.35         88.35
     RUNOFF COEFFICIENT   =       0.98         0.48          0.76


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB           |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        79.68
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       2.51 (ii)    7.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.34         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.06         0.230 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.03          3.00
     RUNOFF VOLUME    (mm)=      86.35        35.08         63.79
     TOTAL RAINFALL   (mm)=      88.35        88.35         88.35
     RUNOFF COEFFICIENT   =       0.98         0.40          0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.133|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.23      3.00   63.79
     ================================================
```



```
     MAJOR SYS.(ID= 2):   0.20      0.10      3.00   63.79
     MINOR SYS.(ID= 3):   1.03      0.13      2.60   63.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):     1.03   0.133     2.60    63.79
      + ID2= 2 (  0203):     6.36   1.228     3.00    66.85
        ================================================
        ID = 3 (  0016):     7.39   1.361     3.00    66.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        42.51
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       2.91 (ii)   10.27 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.31         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.09          0.339 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.07          3.00
     RUNOFF VOLUME    (mm)=      86.35        32.43         59.39
     TOTAL RAINFALL   (mm)=      88.35        88.35         88.35
     RUNOFF COEFFICIENT   =       0.98         0.37          0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        79.68
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       5.03 (ii)   10.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
```

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     Unit Hyd. peak  (cms)=       0.23         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.74         0.55          2.264 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.07           3.00
     RUNOFF VOLUME    (mm)=      86.35        35.08          63.79
     TOTAL RAINFALL   (mm)=      88.35        88.35          88.35
     RUNOFF COEFFICIENT   =       0.98         0.40           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        79.68
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.89 (ii)    9.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.74         0.24          0.977 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05           3.00
     RUNOFF VOLUME    (mm)=      86.35        35.08          63.79
     TOTAL RAINFALL   (mm)=      88.35        88.35          88.35
     RUNOFF COEFFICIENT   =       0.98         0.40           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      90.12        79.68
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       4.69 (ii)   10.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.24         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.38         0.44          1.795 (iii)
```



```
     TIME TO PEAK    (hrs)=       3.00         3.07           3.00
     RUNOFF VOLUME    (mm)=      86.35        35.08          63.79
     TOTAL RAINFALL   (mm)=      88.35        88.35          88.35
     RUNOFF COEFFICIENT   =       0.98         0.40           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0301):    12.49   2.264     3.00    63.79
     + ID2= 2 (  0302):     5.31   0.977     3.00    63.79
       ================================================
       ID = 3 (  0013):    17.80   3.241     3.00    63.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0013):    17.80   3.241     3.00    63.79
     + ID2= 2 (  0303):     9.87   1.795     3.00    63.79
       ================================================
       ID = 1 (  0013):    27.67   5.036     3.00    63.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):    27.67   5.036     3.00    63.79
     + ID2= 2 (  0016):     7.39   1.361     3.00    66.42
       ================================================
       ID = 3 (  0012):    35.06   6.397     3.00    64.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0012):    35.06   6.397     3.00    64.34
     + ID2= 2 (  0204):     2.01   0.339     3.00    59.39
       ================================================
       ID = 1 (  0012):    37.07   6.736     3.00    64.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| RESERVOIR(  0011)|
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```
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4389     1.4219
                          0.1014     0.3040   |   0.9212     1.8498
                          0.1939     0.6475   |   1.2450     2.2118
                          0.2548     1.0211   |   1.6046     2.3050
                          0.2583     1.0470   |   4.5503     2.6235

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.075     6.736      3.00      64.08
   OUTFLOW: ID= 1 (  0011)     37.075     0.793      4.12      62.09

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.77
                  TIME SHIFT OF PEAK FLOW         (min)= 67.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.7361

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

       V    V   I    SSSSS  U   U    A    L
       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 5.0\VO2\voin.dat
  Output  filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\5f9e88c9-92a6-423d-a2e5-6014f0f0fe4b\sce
  Summary filename: C:\Users\pturchet\AppData\Local\Civica\VH5\e30f8554-2f84-4f00-962b-
77335f064566\5f9e88c9-92a6-423d-a2e5-6014f0f0fe4b\sce


DATE: 03/23/2019                          TIME: 12:43:02

USER:


COMMENTS: _____________________________________________________


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


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| MASS STORM       |    Filename: C:\Users\pturchet\AppD
|                  |              ata\Local\Temp\
|                  |              cdbcea38-bf5a-4812-84cf-0ddf6486444d\6a93260e
| Ptotal= 97.13 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
```



```
--------------------
                        Duration of storm    =  6.00 hrs
                        Mass curve time step = 30.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.50    3.89 |  2.00    7.77 |  3.50   25.25 |  5.00    5.83
                1.00    3.89 |  2.50   13.60 |  4.00   11.66 |  5.50    3.89
                1.50    7.77 |  3.00   99.07 |  4.50    7.77 |  6.00    3.89

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--------------------
| CALIB            |
| STANDHYD (  0401)|   Area    (ha)=   2.53
|ID= 1 DT= 1.0 min |   Total Imp(%)=  73.00   Dir. Conn.(%)=  55.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.85          0.68
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     129.87        129.41
     Mannings n           =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    3.89 | 1.517    7.77 | 3.017   25.26 |  4.52    5.83
               0.033    3.89 | 1.533    7.77 | 3.033   25.25 |  4.53    5.83
               0.050    3.89 | 1.550    7.77 | 3.050   25.25 |  4.55    5.83
               0.067    3.89 | 1.567    7.77 | 3.067   25.25 |  4.57    5.83
               0.083    3.89 | 1.583    7.77 | 3.083   25.25 |  4.58    5.83
               0.100    3.89 | 1.600    7.77 | 3.100   25.25 |  4.60    5.83
               0.117    3.89 | 1.617    7.77 | 3.117   25.25 |  4.62    5.83
               0.133    3.89 | 1.633    7.77 | 3.133   25.25 |  4.63    5.83
               0.150    3.89 | 1.650    7.77 | 3.150   25.25 |  4.65    5.83
               0.167    3.89 | 1.667    7.77 | 3.167   25.25 |  4.67    5.83
               0.183    3.89 | 1.683    7.77 | 3.183   25.25 |  4.68    5.83
               0.200    3.89 | 1.700    7.77 | 3.200   25.25 |  4.70    5.83
               0.217    3.89 | 1.717    7.77 | 3.217   25.25 |  4.72    5.83
               0.233    3.89 | 1.733    7.77 | 3.233   25.25 |  4.73    5.83
               0.250    3.89 | 1.750    7.77 | 3.250   25.25 |  4.75    5.83
               0.267    3.89 | 1.767    7.77 | 3.267   25.25 |  4.77    5.83
               0.283    3.89 | 1.783    7.77 | 3.283   25.25 |  4.78    5.83
               0.300    3.89 | 1.800    7.77 | 3.300   25.25 |  4.80    5.83
               0.317    3.89 | 1.817    7.77 | 3.317   25.25 |  4.82    5.83
               0.333    3.89 | 1.833    7.77 | 3.333   25.25 |  4.83    5.83
               0.350    3.89 | 1.850    7.77 | 3.350   25.25 |  4.85    5.83
               0.367    3.89 | 1.867    7.77 | 3.367   25.25 |  4.87    5.83
               0.383    3.89 | 1.883    7.77 | 3.383   25.25 |  4.88    5.83
               0.400    3.89 | 1.900    7.77 | 3.400   25.25 |  4.90    5.83
               0.417    3.89 | 1.917    7.77 | 3.417   25.25 |  4.92    5.83
               0.433    3.89 | 1.933    7.77 | 3.433   25.25 |  4.93    5.83
               0.450    3.89 | 1.950    7.77 | 3.450   25.25 |  4.95    5.83
               0.467    3.89 | 1.967    7.77 | 3.467   25.25 |  4.97    5.83
               0.483    3.89 | 1.983    7.77 | 3.483   25.25 |  4.98    5.83
               0.500    3.89 | 2.000    7.77 | 3.500   25.25 |  5.00    5.83
               0.517    3.89 | 2.017   13.60 | 3.517   11.66 |  5.02    3.89
               0.533    3.89 | 2.033   13.60 | 3.533   11.66 |  5.03    3.89
               0.550    3.89 | 2.050   13.60 | 3.550   11.66 |  5.05    3.89
               0.567    3.89 | 2.067   13.60 | 3.567   11.66 |  5.07    3.89
               0.583    3.89 | 2.083   13.60 | 3.583   11.66 |  5.08    3.89
               0.600    3.89 | 2.100   13.60 | 3.600   11.66 |  5.10    3.89
               0.617    3.89 | 2.117   13.60 | 3.617   11.66 |  5.12    3.89
               0.633    3.89 | 2.133   13.60 | 3.633   11.66 |  5.13    3.89
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0.650	3.89	2.150	13.60	3.650	11.66	5.15	3.89
0.667	3.89	2.167	13.60	3.667	11.66	5.17	3.89
0.683	3.89	2.183	13.60	3.683	11.66	5.18	3.89
0.700	3.89	2.200	13.60	3.700	11.66	5.20	3.89
0.717	3.89	2.217	13.60	3.717	11.66	5.22	3.89
0.733	3.89	2.233	13.60	3.733	11.66	5.23	3.89
0.750	3.89	2.250	13.60	3.750	11.66	5.25	3.89
0.767	3.89	2.267	13.60	3.767	11.66	5.27	3.89
0.783	3.89	2.283	13.60	3.783	11.66	5.28	3.89
0.800	3.89	2.300	13.60	3.800	11.66	5.30	3.89
0.817	3.89	2.317	13.60	3.817	11.66	5.32	3.89
0.833	3.89	2.333	13.60	3.833	11.66	5.33	3.89
0.850	3.89	2.350	13.60	3.850	11.66	5.35	3.89
0.867	3.89	2.367	13.60	3.867	11.66	5.37	3.89
0.883	3.89	2.383	13.60	3.883	11.66	5.38	3.89
0.900	3.89	2.400	13.60	3.900	11.66	5.40	3.89
0.917	3.89	2.417	13.60	3.917	11.66	5.42	3.89
0.933	3.89	2.433	13.60	3.933	11.66	5.43	3.89
0.950	3.89	2.450	13.60	3.950	11.66	5.45	3.89
0.967	3.89	2.467	13.60	3.967	11.66	5.47	3.89
0.983	3.89	2.483	13.60	3.983	11.66	5.48	3.89
1.000	3.89	2.500	13.60	4.000	11.66	5.50	3.89
1.017	7.77	2.517	99.06	4.017	7.77	5.52	3.89
1.033	7.77	2.533	99.07	4.033	7.77	5.53	3.89
1.050	7.77	2.550	99.07	4.050	7.77	5.55	3.89
1.067	7.77	2.567	99.07	4.067	7.77	5.57	3.89
1.083	7.77	2.583	99.07	4.083	7.77	5.58	3.89
1.100	7.77	2.600	99.07	4.100	7.77	5.60	3.89
1.117	7.77	2.617	99.07	4.117	7.77	5.62	3.89
1.133	7.77	2.633	99.07	4.133	7.77	5.63	3.89
1.150	7.77	2.650	99.07	4.150	7.77	5.65	3.89
1.167	7.77	2.667	99.07	4.167	7.77	5.67	3.89
1.183	7.77	2.683	99.07	4.183	7.77	5.68	3.89
1.200	7.77	2.700	99.07	4.200	7.77	5.70	3.89
1.217	7.77	2.717	99.07	4.217	7.77	5.72	3.89
1.233	7.77	2.733	99.07	4.233	7.77	5.73	3.89
1.250	7.77	2.750	99.07	4.250	7.77	5.75	3.89
1.267	7.77	2.767	99.07	4.267	7.77	5.77	3.89
1.283	7.77	2.783	99.07	4.283	7.77	5.78	3.89
1.300	7.77	2.800	99.07	4.300	7.77	5.80	3.89
1.317	7.77	2.817	99.07	4.317	7.77	5.82	3.89
1.333	7.77	2.833	99.07	4.333	7.77	5.83	3.89
1.350	7.77	2.850	99.07	4.350	7.77	5.85	3.89
1.367	7.77	2.867	99.07	4.367	7.77	5.87	3.89
1.383	7.77	2.883	99.07	4.383	7.77	5.88	3.89
1.400	7.77	2.900	99.07	4.400	7.77	5.90	3.89
1.417	7.77	2.917	99.07	4.417	7.77	5.92	3.89
1.433	7.77	2.933	99.07	4.433	7.77	5.93	3.89
1.450	7.77	2.950	99.07	4.450	7.77	5.95	3.89
1.467	7.77	2.967	99.07	4.467	7.77	5.97	3.89
1.483	7.77	2.983	99.07	4.483	7.77	5.98	3.89
1.500	7.77	3.000	99.07	4.500	7.77	6.00	3.88

Max.Eff.Inten.(mm/hr)=	99.07	94.44	
over (min)	5.00	21.00	
Storage Coeff. (min)=	3.00 (ii)	20.98 (ii)	
Unit Hyd. Tpeak (min)=	5.00	21.00	
Unit Hyd. peak (cms)=	0.31	0.05	
			TOTALS
PEAK FLOW (cms)=	0.38	0.11	0.469 (iii)
TIME TO PEAK (hrs)=	3.00	3.22	3.00
RUNOFF VOLUME (mm)=	95.13	47.24	73.58
TOTAL RAINFALL (mm)=	97.13	97.13	97.13
RUNOFF COEFFICIENT =	0.98	0.49	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0501)	Area (ha)= 1.23			
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00		
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.92	0.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	90.55	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		99.07	109.58	
over (min)		5.00	8.00	
Storage Coeff. (min)=		2.42 (ii)	7.55 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.34	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.19	0.08	0.272 (iii)
TIME TO PEAK	(hrs)=	3.00	3.02	3.00
RUNOFF VOLUME	(mm)=	95.13	48.65	74.67
TOTAL RAINFALL	(mm)=	97.13	97.13	97.13
RUNOFF COEFFICIENT	=	0.98	0.50	0.77

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0203)	Area (ha)= 6.36			
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00	Dir. Conn.(%)= 56.00		
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.77	1.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	205.91	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		99.07	109.58	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.96 (ii)	9.09 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.26	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.98	0.41	1.376 (iii)
TIME TO PEAK	(hrs)=	3.00	3.05	3.00
RUNOFF VOLUME	(mm)=	95.13	48.65	74.68
TOTAL RAINFALL	(mm)=	97.13	97.13	97.13
RUNOFF COEFFICIENT	=	0.98	0.50	0.77

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

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--------------------
| CALIB            |
| STANDHYD (  0304)|   Area    (ha)=   1.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.55        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      99.07        92.71
               over (min)        5.00         8.00
     Storage Coeff.  (min)=       2.42 (ii)    7.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=       0.34         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.07          0.258 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.03          3.00
     RUNOFF VOLUME    (mm)=      95.13        40.93         71.28
     TOTAL RAINFALL   (mm)=      97.13        97.13         97.13
     RUNOFF COEFFICIENT   =       0.98         0.42          0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0015)|
| Inlet Cap.= 0.133|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.23      0.26      3.00   71.28
     ======================================================
     MAJOR SYS.(ID= 2):   0.24      0.12      3.00   71.28
     MINOR SYS.(ID= 3):   0.99      0.13      2.58   71.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     0.99   0.133     2.58    71.28
     + ID2= 2 (  0203):     6.36   1.376     3.00    74.68
       ======================================================
       ID = 3 (  0016):     7.35   1.509     3.00    74.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   2.01
|ID= 1 DT= 1.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00         1.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     115.76        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      99.07        49.72
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.80 (ii)    9.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.11          0.383 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      95.13        38.06         66.60
     TOTAL RAINFALL   (mm)=      97.13        97.13         97.13
     RUNOFF COEFFICIENT   =       0.98         0.39          0.69


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0301)|   Area    (ha)=  12.49
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.37         3.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.56        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      99.07        92.71
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.84 (ii)    9.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.92         0.65          2.547 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      95.13        40.92         71.28
     TOTAL RAINFALL   (mm)=      97.13        97.13         97.13
     RUNOFF COEFFICIENT   =       0.98         0.42          0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0302)|   Area    (ha)=   5.31
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.98         1.33
     Dep. Storage     (mm)=       2.00         5.00
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     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      99.07        92.71
               over (min)        5.00         9.00
     Storage Coeff.  (min)=       3.75 (ii)    8.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00         9.00
     Unit Hyd. peak  (cms)=       0.27         0.13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.82         0.29         1.098 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.03          3.00
     RUNOFF VOLUME    (mm)=      95.13        40.92         71.28
     TOTAL RAINFALL   (mm)=      97.13        97.13         97.13
     RUNOFF COEFFICIENT   =       0.98         0.42          0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| STANDHYD (  0303)|   Area    (ha)=   9.87
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  56.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.40         2.47
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.52        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      99.07        92.71
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.51 (ii)    9.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.52         0.52         2.019 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.05          3.00
     RUNOFF VOLUME    (mm)=      95.13        40.93         71.28
     TOTAL RAINFALL   (mm)=      97.13        97.13         97.13
     RUNOFF COEFFICIENT   =       0.98         0.42          0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  54.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0301):    12.49   2.547     3.00    71.28
      + ID2= 2 (  0302):     5.31   1.098     3.00    71.28
        ================================================
        ID = 3 (  0013):    17.80   3.645     3.00    71.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0013)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0013):    17.80   3.645     3.00    71.28
      + ID2= 2 (  0303):     9.87   2.019     3.00    71.28
        ================================================
        ID = 1 (  0013):    27.67   5.664     3.00    71.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    27.67   5.664     3.00    71.28
      + ID2= 2 (  0016):     7.35   1.509     3.00    74.22
        ================================================
        ID = 3 (  0012):    35.02   7.172     3.00    71.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0012):    35.02   7.172     3.00    71.90
      + ID2= 2 (  0204):     2.01   0.383     3.00    66.60
        ================================================
        ID = 1 (  0012):    37.03   7.556     3.00    71.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0011)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.4389      1.4219
                         0.1014     0.3040   |   0.9212      1.8498
                         0.1939     0.6475   |   1.2450      2.2118
                         0.2548     1.0211   |   1.6046      2.3050
                         0.2583     1.0470   |   4.5503      2.6235

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     37.034     7.556      3.00      71.61
   OUTFLOW: ID= 1 (  0011)     37.034     0.966      4.07      69.52

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.78
                 TIME SHIFT OF PEAK FLOW         (min)= 64.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.8998

--------------------------------------------------------------------------------
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APPENDIX C-2

SWMF #5 SIZING

WEIGHTED IMPERVIOUSNESS

750 Lockhart Road
Job Number: 1964
Date: March 2019
Designer Initials: M.T.T.

Catchment 401

	Imperviousness	Area (ha)	Weighted Imperviousness
Towns on 18m ROW	0.72	0.95	0.27
Towns on 24m ROW	0.74	0.40	0.12
Towns on 12m Row	0.72	0.60	0.17
24m Row	0.74	0.58	0.17
TOTAL		2.53	0.73

Catchment 202

	Imperviousness	Area (ha)	Weighted Imperviousness
Natural Heritage Area and Buffer	0	14.76	0
TOTAL		14.76	0

Catchment 203

	Imperviousness	Area (ha)	Weighted Imperviousness
Blocks 22 and 23	0.75	1.72	0.20
24m ROW	0.74	2.01	0.23
Block 24	0.75	2.63	0.31
TOTAL		6.36	0.75

Catchment 204

	Imperviousness	Area (ha)	Weighted Imperviousness
SWM Pond Block	0.50	2.01	0.50
TOTAL		2.01	0.50

WEIGHTED IMPERVIOUSNESS

750 Lockhart Road
Job Number: 1964
Date: March 2019
Designer Initials: M.T.T.

Catchment 301

	Imperviousness	Area (ha)	Weighted Imperviousness
Catchment 301	0.75	12.49	0.75
TOTAL		12.49	0.75

Catchment 302

	Imperviousness	Area (ha)	Weighted Imperviousness
Catchment 302	0.75	5.31	0.75
TOTAL		5.31	0.75

Catchment 303

	Imperviousness	Area (ha)	Weighted Imperviousness
Catchment 303	0.75	9.87	0.75
TOTAL		9.87	0.75

Catchment 304

	Imperviousness	Area (ha)	Weighted Imperviousness
Catchment 304	0.75	1.23	0.75
TOTAL		1.23	0.75

Catchment 501

	Imperviousness	Area (ha)	Weighted Imperviousness
Catchment 501	0.75	1.23	0.75
TOTAL		1.23	0.75

ALLOWABLE RELEASE RATE
WETLAND

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: M.T.T.

Weighted Impervious Calculation

Catchment ID	Total Area	Imperviousness	Impervious Area
	(ha)	(%)	(ha)
203	6.36	75	4.75
204	2.01	50	1.00
301	12.49	75	9.37
302	5.31	75	3.99
303	9.87	75	7.40
304	1.23	75	0.92
Total	**37.26**	**74**	**27.42**

Allowable Release Rates

Storm	Unit Release Rate	Area	Allowable
	(m^3/s)	(ha)	Release Rate (m^3/s)
2 Year	0.006	37.26	0.224
5 Year	0.011		0.410
10 Year	0.016		0.596
25 Year	0.023		0.857
50 Year	0.029		1.081
100 Year	0.036		1.341

Permanent Pool and Extended Detention Sizing

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: M.T.T.

PERMANENT POOL

Level of Protection = Enhanced (Level 1)

Weighted Impervious = 74 %

Drainage Area = 37.26 ha

SWMP Type = 2. Wetlands

Required Permanent Pool (including 40m^3/ha for extended detention)= 124.8 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 85 m^3/ha

Required Permanent Pool = 3160 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 14.36 mm x 37.26 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 5350 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 37.26 ha

Extended Detention Volume (V) = 1490 m^3

Governing Volume (V) = 5350 m^3

Permanent Pool and Extended Detention Sizing

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: M.T.T.

Elevation (m)	Area (m^2)	Area (m^2)	H (m)	Vol (m^3)	Volume (m^3)	Storage (m^3)	Depth (m)	
258	330				0		0	
		1214	0.5	606.75				
258.5	2097				607		0.5	
		2705	0.4	1082				
258.9	3313				1689		0.9	
		5316	0.1	531.6				
259	7319				2220		1	
		8391	0.5	4196				
259.5	**9463**				**6416**		**1.5**	**N.W.L.**
		10581	0.5	5290				
260	11698				11706	0	2	
		13963	1.5	20945				
261.5	16228				32651	20945	3.5	

Permanent Pool Volume Required = 3160 m^3
Permanent Pool Volume Provided = 6416 m^3

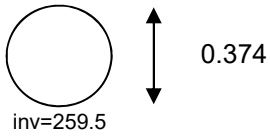
Extended Detention volume required = 5350 m^3

Control Structure Summary

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: H.D.

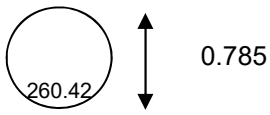
Orifice 1

Invert =	259.5	m
Size =	0.374	m
Orifice Coefficient, C =	0.62	
Obvert =	259.874	m



Orifice 2 (Round Only)

Invert =	260.42	m
Size =	0.785	m
C =	0.62	
Obvert =	261.2	m



Control Structure Summary

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: H.D.

Starting Water Level (m) = 259.5
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO5 modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Weir 1 Outflow (cms)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	Design Storm 1 6Hr SCS	Design Storm 2 24Hr SCS
259.50	0.000	0.000	0.000	0.000	0	0.0	Orifice 1	
259.52	0.001	0.000	0.000	0.001	190	0.0		
259.54	0.002	0.000	0.000	0.002	382	0.0		
259.56	0.005	0.000	0.000	0.005	576	16.1		
259.58	0.008	0.000	0.000	0.008	771	24.7		
259.60	0.012	0.000	0.000	0.012	969	30.1		
259.62	0.017	0.000	0.000	0.017	1168	33.8		
259.64	0.023	0.000	0.000	0.023	1369	36.6		
259.66	0.030	0.000	0.000	0.030	1571	38.7		
259.68	0.037	0.000	0.000	0.037	1776	40.4		
259.70	0.037	0.000	0.000	0.037	1982	42.0		
259.72	0.055	0.000	0.000	0.055	2190	43.2		
259.74	0.069	0.000	0.000	0.069	2400	44.2		
259.76	0.082	0.000	0.000	0.082	2611	44.9		
259.78	0.092	0.000	0.000	0.092	2825	45.6		
259.80	0.101	0.000	0.000	0.101	3040	46.2		
259.82	0.110	0.000	0.000	0.110	3257	46.8		
259.84	0.118	0.000	0.000	0.118	3476	47.4		
259.86	0.125	0.000	0.000	0.125	3696	47.9		
259.88	0.133	0.000	0.000	0.133	3919	48.3		
259.90	0.139	0.000	0.000	0.139	4143	48.8		
259.92	0.146	0.000	0.000	0.146	4369	49.2		
259.94	0.152	0.000	0.000	0.152	4596	49.7		
259.96	0.158	0.000	0.000	0.158	4826	50.1		
259.98	0.163	0.000	0.000	0.163	5057	50.5		
260.00	0.169	0.000	0.000	0.169	5290	50.9	EXT DET	
260.02	0.174	0.000	0.000	0.174	5525	51.2		
260.04	0.179	0.000	0.000	0.179	5761	51.6		
260.06	0.184	0.000	0.000	0.184	5998	52.0		
260.08	0.189	0.000	0.000	0.189	6236	52.3		
260.10	0.194	0.000	0.000	0.194	6475	52.7		
260.12	0.199	0.000	0.000	0.199	6716	53.0		
260.14	0.203	0.000	0.000	0.203	6958	53.3		
260.16	0.207	0.000	0.000	0.207	7201	53.7		
260.18	0.212	0.000	0.000	0.212	7445	54.0	2 Year	
260.20	0.216	0.000	0.000	0.216	7690	54.3		
260.22	0.220	0.000	0.000	0.220	7937	54.6		
260.24	0.224	0.000	0.000	0.224	8185	54.9		
260.26	0.228	0.000	0.000	0.228	8434	55.3		2 Year
260.28	0.232	0.000	0.000	0.232	8684	55.6		
260.30	0.236	0.000	0.000	0.236	8936	55.9		
260.32	0.240	0.000	0.000	0.240	9188	56.1		
260.34	0.244	0.000	0.000	0.244	9442	56.4		
260.36	0.248	0.000	0.000	0.248	9697	56.7		
260.38	0.251	0.000	0.000	0.251	9954	57.0		
260.40	0.255	0.000	0.000	0.255	10211	57.3		
260.42	0.258	0.000	0.000	0.258	10470	57.6	Orifice 2	
260.44	0.262	0.001	0.000	0.263	10730	57.9		
260.46	0.265	0.003	0.000	0.268	10991	58.1	5 Year	
260.48	0.269	0.007	0.000	0.276	11253	58.4		
260.50	0.272	0.012	0.000	0.284	11517	58.7		
260.52	0.275	0.019	0.000	0.294	11781	58.9		
260.54	0.279	0.027	0.000	0.305	12047	59.2		
260.56	0.282	0.036	0.000	0.318	12315	59.4		5 Year
260.58	0.285	0.047	0.000	0.332	12583	59.6		

Control Structure Summary

750 Lockhart Road
Project Number: 1964
Date: March 2019
Designer Initials: H.D.

Starting Water Level (m) = 259.5
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO5 modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Weir 1 Outflow (cms)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	Design Storm 1 6Hr SCS	Design Storm 2 24Hr SCS
260.60	0.288	0.059	0.000	0.347	12853	59.8		
260.62	0.291	0.072	0.000	0.363	13123	60.1	10 Year	
260.64	0.295	0.086	0.000	0.380	13395	60.3		
260.66	0.298	0.101	0.000	0.399	13669	60.5		
260.68	0.301	0.118	0.000	0.418	13943	60.6		
260.70	0.304	0.135	0.000	0.439	14219	60.8		
260.72	0.307	0.154	0.000	0.460	14496	61.0		
260.74	0.310	0.173	0.000	0.483	14774	61.2		
260.76	0.313	0.193	0.000	0.506	15053	61.3		10 Year
260.78	0.315	0.214	0.000	0.530	15333	61.5		
260.80	0.318	0.236	0.000	0.554	15615	61.6	25 Year	
260.82	0.321	0.236	0.000	0.557	15898	61.7		
260.84	0.324	0.236	0.000	0.560	16182	61.9		
260.86	0.327	0.290	0.000	0.616	16467	62.0		
260.88	0.330	0.345	0.000	0.675	16754	62.1		
260.90	0.332	0.393	0.000	0.725	17042	62.3		
260.92	0.335	0.436	0.000	0.771	17330	62.4	50 Year	
260.94	0.338	0.475	0.000	0.812	17621	62.5		
260.96	0.340	0.510	0.000	0.851	17912	62.6		25 Year
260.98	0.343	0.544	0.000	0.887	18204	62.7		
261.00	0.346	0.576	0.000	0.921	18498	62.7		
261.02	0.348	0.605	0.000	0.954	18793	62.8		
261.04	0.351	0.634	0.000	0.985	19089	62.9	100 Year	
261.06	0.354	0.661	0.000	1.015	19387	63.0		
261.08	0.356	0.687	0.000	1.044	19685	63.1		
261.10	0.359	0.713	0.000	1.071	19985	63.2		
261.12	0.361	0.737	0.000	1.098	20286	63.2		50 Year
261.14	0.364	0.761	0.000	1.124	20588	63.3		
261.16	0.366	0.784	0.000	1.150	20892	63.4		
261.18	0.369	0.806	0.000	1.174	21196	63.5		
261.20	0.371	0.827	0.000	1.198	21502	63.5		
261.22	0.374	0.848	0.000	1.222	21809	63.6		
261.24	0.376	0.869	0.000	1.245	22118	63.7		100 Year
261.26	0.378	0.889	0.055	1.322	22427	63.7		
261.28	0.381	0.909	0.157	1.447	22738	63.8		
261.30	0.383	0.928	0.293	1.605	23050	63.9		
261.32	0.386	0.947	0.459	1.791	23363	63.9		
261.34	0.388	0.965	0.650	2.003	23677	64.0		
261.36	0.390	0.983	0.867	2.241	23992	64.0		
261.38	0.393	1.001	1.108	2.502	24309	64.0		
261.40	0.395	1.019	1.373	2.787	24627	64.1		
261.42	0.397	1.036	1.661	3.094	24946	64.1		
261.44	0.399	1.053	1.972	3.425	25266	64.1		
261.46	0.402	1.070	2.306	3.778	25588	64.2		
261.48	0.404	1.086	2.663	4.153	25911	64.2		
261.50	0.406	1.102	3.042	4.550	26235	64.2		

1. Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
258.5	905				226	0.0
		1017	0.4	407		
258.9	1128				633	0.4
		1173	0.1	117		
259.0	1218				750	0.5
		1475	0.5	737		
259.5	1731				1487	1.0

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
258.0	330				0	0.0
		1214	0.5	607		
258.5	2097				607	0.5
		2705	0.4	1082		
258.9	3313				1689	0.9
		5316	0.1	532		
259.0	7319				2220	1.0
		8391	0.5	4196		
259.5	9463				6416	1.5

Minimum Criteria (per MECP guidelines)

Forebay area is **18** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MECP guidelines is satisfied

2. Forebay Settling Length

Dist = $(r \times Q_p / V_s)^{0.5}$ where:

Dist = $(2.03 \times 0.13 / 0.0003)^{0.5}$

Dist = 36.1

Dist = forebay length (m)
r = length to width ratio
= 2.30
Q_p = peak flow rate from pond during design quality storm (m^3/s)
= 0.17
V_s = settling velocity (m/s)
= 0.0003

Minimum forebay length is (m)	**36.1**
Actual forebay length is (m)	**69.1**
	CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = $(8 \times Q) / (d \times V_f)$ where:

Dist = $(8 \times 4.32) / (1.0 \times 0.5)$

Dist = 69.1

Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (5-year flow from VO Node 13)
= 4.32
d = depth of permanent pool in forebay (m)
= 1
V_f = desired velocity in forebay (m/s)
0.5

Minimum forebay length is (m)	**69.1**
Actual forebay length is (m)	**69.1**
	CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8 where:

Width = 36.1 / 8

Width = 4.5

Width = minimum forebay bottom width (m)
Dist = minimum forebay length (m)
= 36.1

Minimum bottom width is (m)	**4.5**
Actual bottom width is (m)	**22.2**
	CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A where:

V = 4.32 / 100.5

V = 0.04

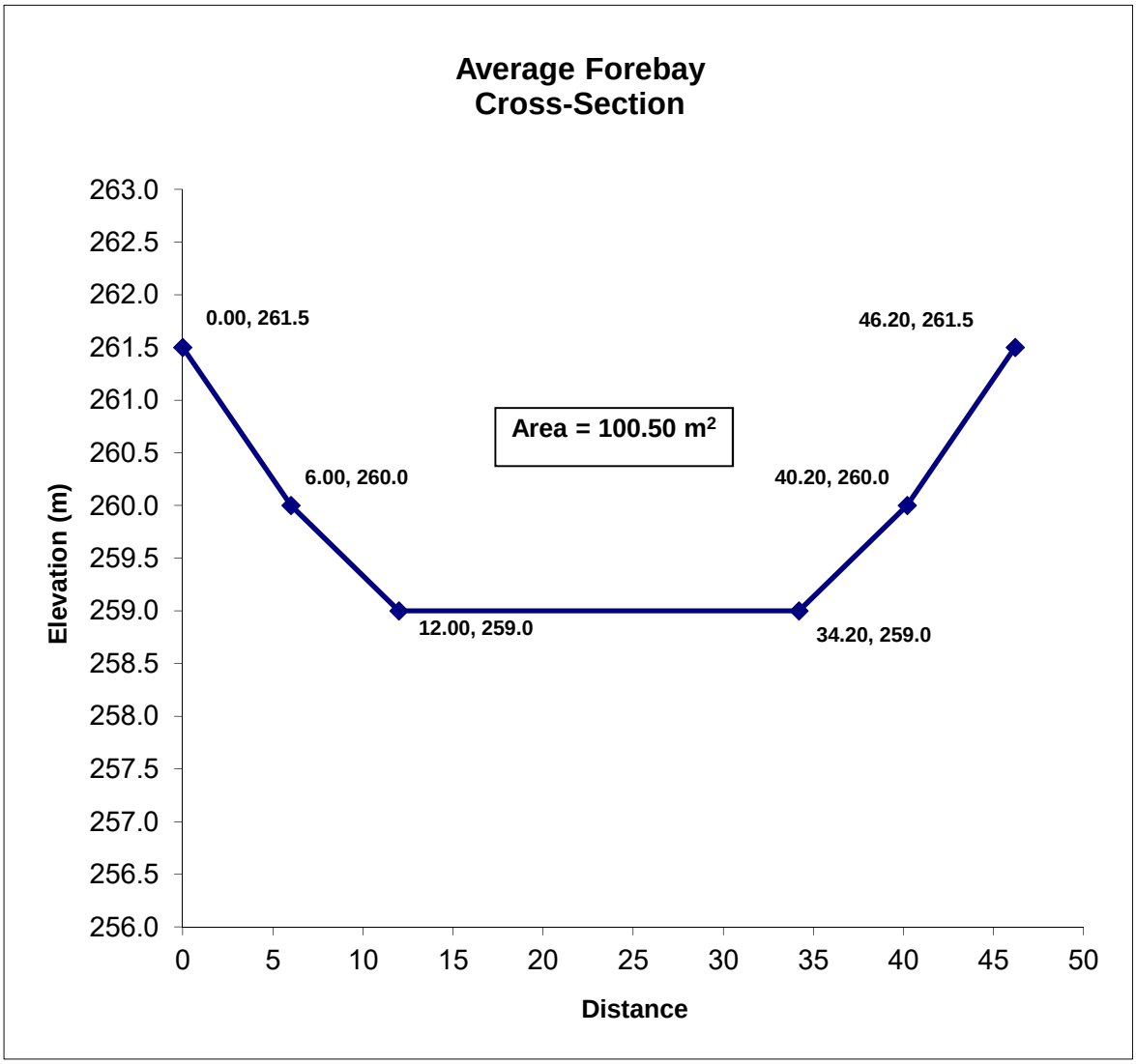
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (5-year flow from VO Node 13)
= 4.32
A = average cross-sectional area of entire forebay (m^2) (see **Page 3**)
= 101

Maximum velocity permitted is (m/s)	**0.15**
Actual velocity is (m/s)	**0.04**
	CRITERIA SATISFIED

West Forebay Sizing Calculations

Distance (m)	Elevation (m)
0.00	261.5
6.00	260.0
12.00	259.0
34.20	259.0
40.20	260.0
46.20	261.5

Area (m^2) = 100.50



1. Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
258.0	0				0	0.0
		349	0.5	175		
258.5	699				175	0.0
		816	0.4	327		
258.9	934				501	0.4
		983	0.1	98		
259.0	1032				600	0.5
		1304	0.5	652		
259.5	1576				1252	1.0

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
258.0	330				0	0.0
		1214	0.5	607		
258.5	2097				607	0.5
		2705	0.4	1082		
258.9	3313				1689	0.9
		5316	0.1	532		
259.0	7319				2220	1.0
		8391	0.5	4196		
259.5	9463				6416	1.5

Minimum Criteria (per MECP guidelines)

Forebay area is **17** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MECP guidelines is satisfied

2. Forebay Settling Length

Dist = (r x Q_p / V_s)$^{0.5}$

Dist = (2.03 x 0.13 / 0.0003)$^{0.5}$

Dist = 40.5

where:
Dist = forebay length (m)
r = length to width ratio
= 2.90
Q_p = peak flow rate from pond during design quality storm (m^3/s)
= 0.17
V_s = settling velocity (m/s)
= 0.0003

Minimum forebay length is (m) **40.5**
Actual forebay length is (m) **83.8**
CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = (8 x Q) / (d x V_f)

Dist = (8 x 1.509) / (1.0 x 0.5)

Dist = 24.1

where:
Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (5-year flow from VO Node 16)
= 1.509
d = depth of permanent pool in forebay (m)
= 1
V_f = desired velocity in forebay (m/s)
0.5

Minimum forebay length is (m) **24.1**
Actual forebay length is (m) **83.8**
CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8

Width = 24.1 / 8

Width = 3.0

where:
Width = minimum forebay bottom width (m)
Dist = minimum forebay length (m)
= 24.1

Minimum bottom width is (m) **3.0**
Actual bottom width is (m) **19.6**
CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A

V = 1.509 / 94

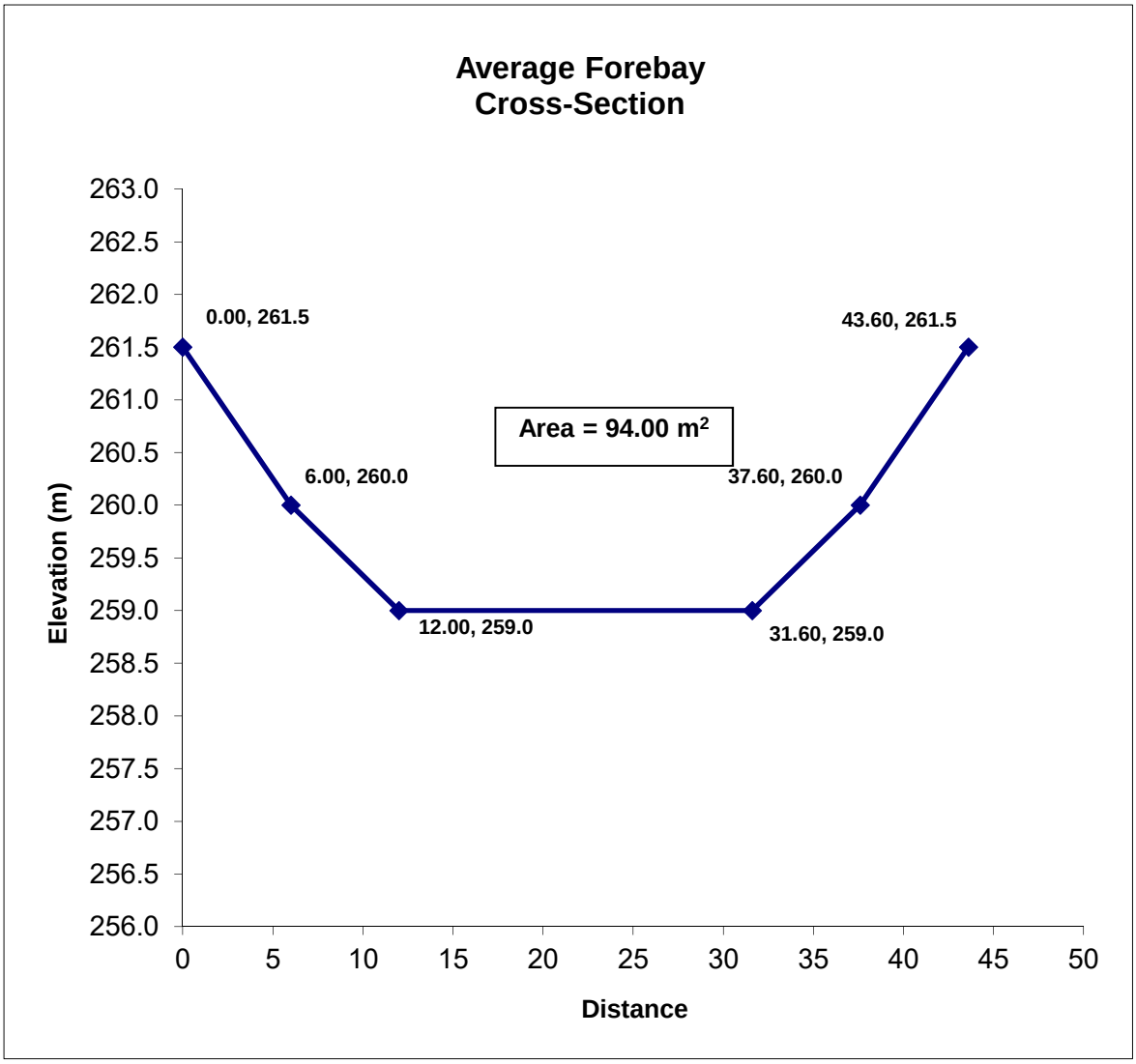
V = 0.02

where:
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (5-year flow from VO Node 16)
= 1.509
A = average cross-sectional area of entire forebay (m^2) (see **Page 3**)
= 94

Maximum velocity permitted is (m/s) **0.15**
Actual velocity is (m/s) **0.02**
CRITERIA SATISFIED

Distance (m)	Elevation (m)
0.00	261.5
6.00	260.0
12.00	259.0
31.60	259.0
37.60	260.0
43.60	261.5

Area (m^2) = 94.00



APPENDIX C-3

LIDS AND VOLUME CONTROL CALCULATIONS

SCS consulting group ltd

SCS consulting group ltd

VOLUME CONTROL REQUIREMENTS

750 Lockhart Road
Job Number: 1964
Date: March 2019
Designer Initials: H.D.

Phase 1 - North Lands

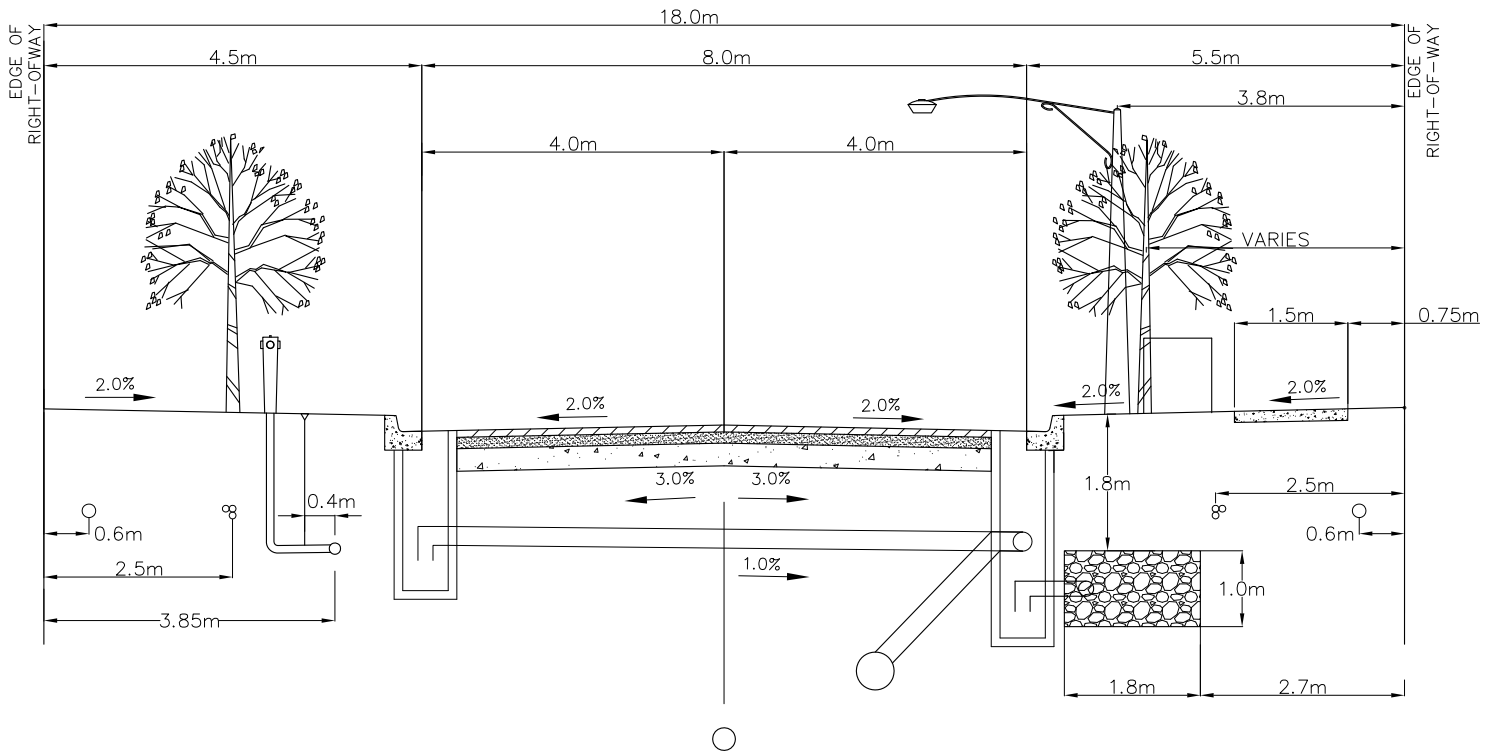
	Imperviousness	Total Area (ha)	Weighted Imperviousness
401	0.73	2.53	0.73
TOTAL		2.53	0.73

Volume Required in LIDs for Filtration = 460 m^3 *25 mm over impervious areas per SIS

Phase 3 - South Lands

	Imperviousness	Total Area (ha)	Weighted Imperviousness
202	0.00	14.76	0.00
203	0.75	6.36	0.21
204	0.50	2.01	0.04
TOTAL		23.12	0.25

Volume Required in LIDs for Infiltration = 287 m^3 *5 mm over impervious areas per SIS
Volume Required in LIDs for Filtration = 1150 m^3 *20 mm over impervious areas per SIS



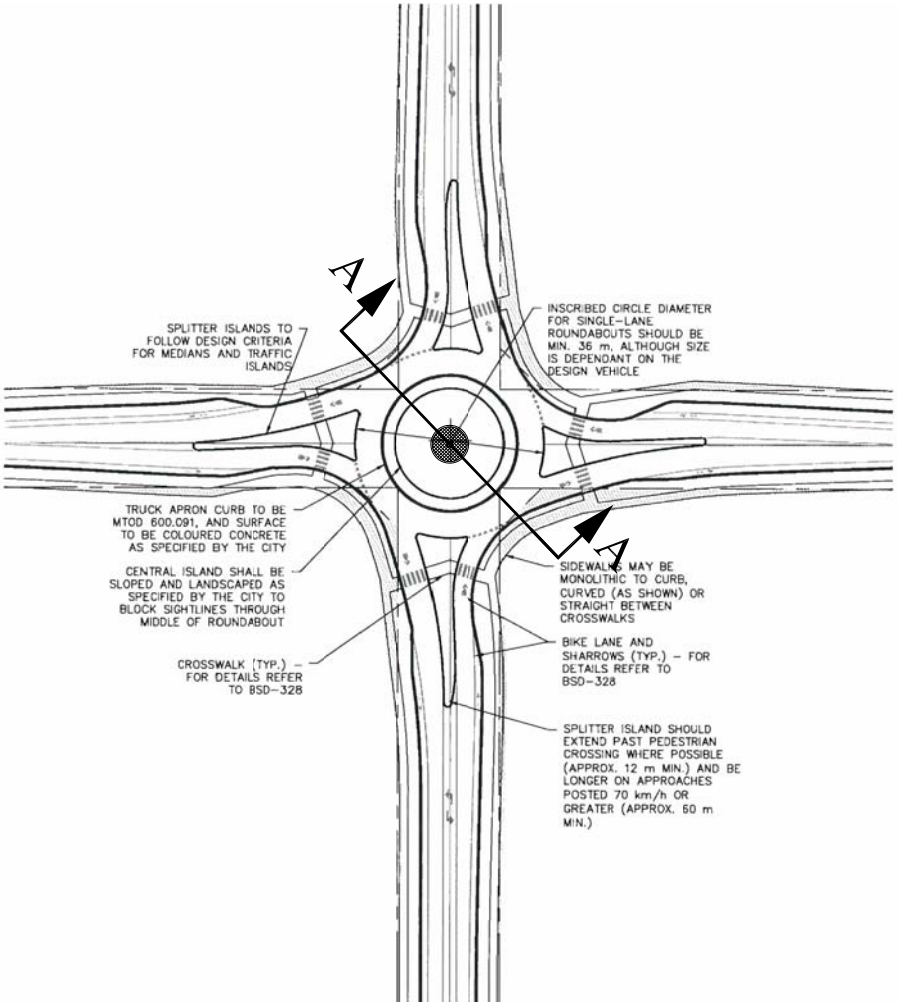
750 LOCKHART ROAD BALLYMORE - BARRIE

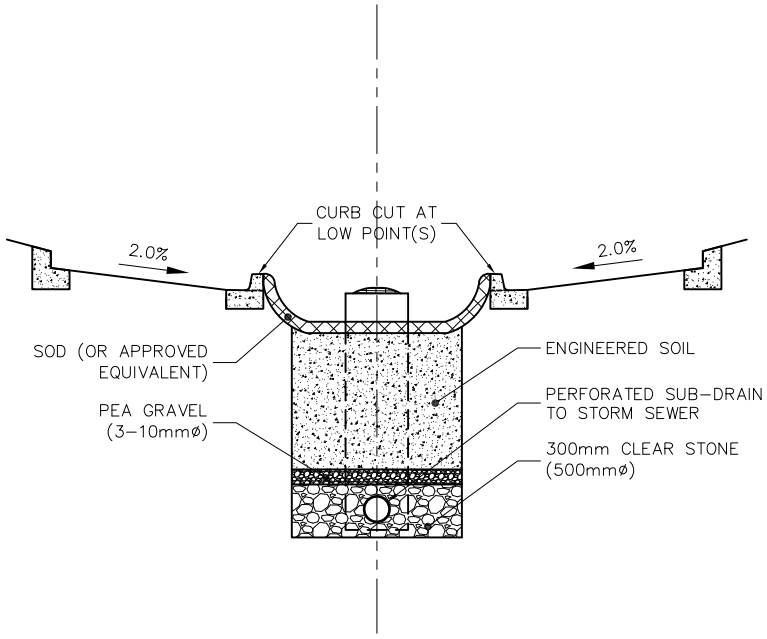
PRELIMINARY EXFILTRATION TRENCH LAYOUT IN 18m R.O.W.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: H.D.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-4
SCALE: N.T.S.	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-DETL-C-4.dwg – Revised by <ILIN> : Tue, Mar 19 2019 – 5:31pm





SECTION A-A

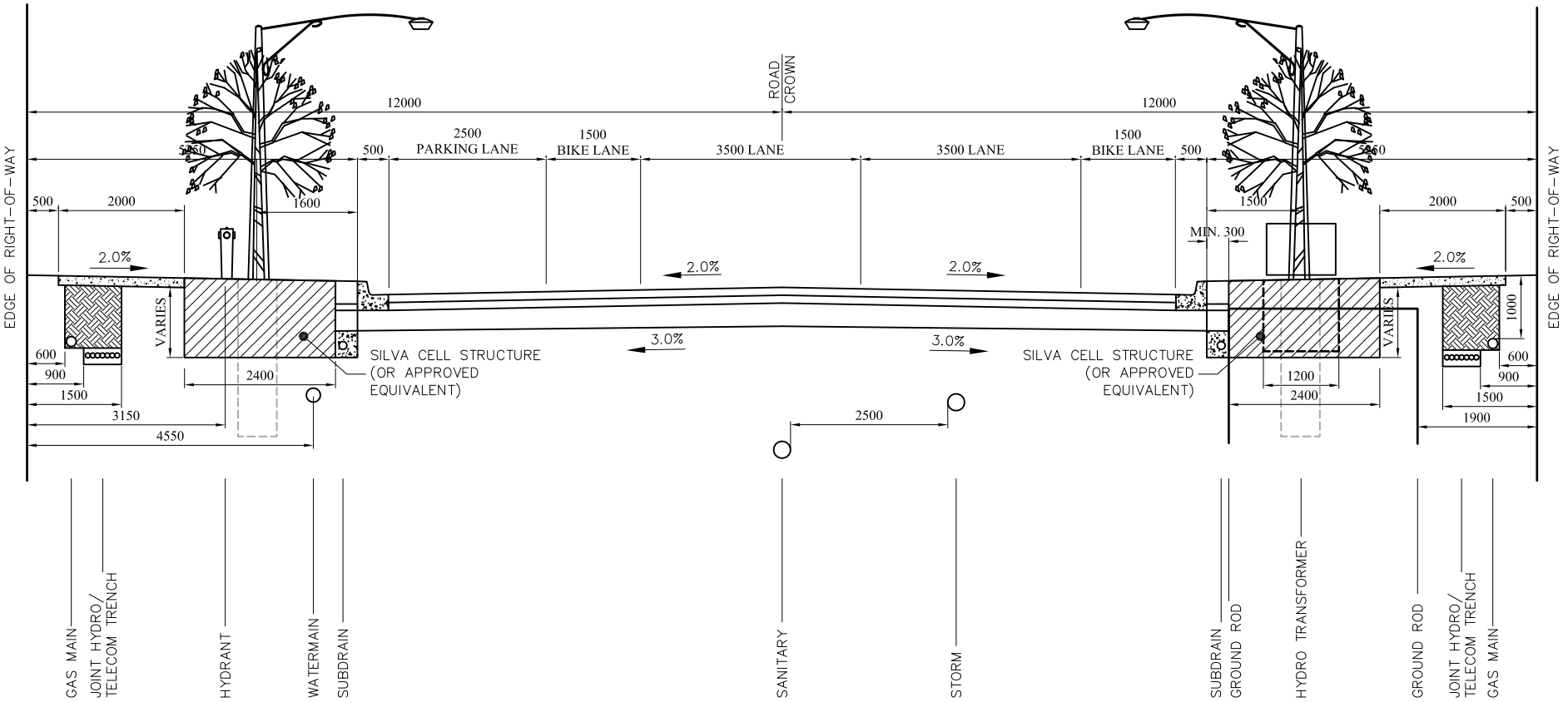
NOT TO SCALE

750 LOCKHART ROAD BALLYMORE - BARRIE

PRELIMINARY RAIN GARDEN LAYOUT IN ROUNDABOUT

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: H.D.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-5
SCALE: N.T.S.	DATE: MARCH 2019		



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. DEPTH OF SILVA CELL STRUCTURE VARIES, MIN 0.5m, MAX 1.0m

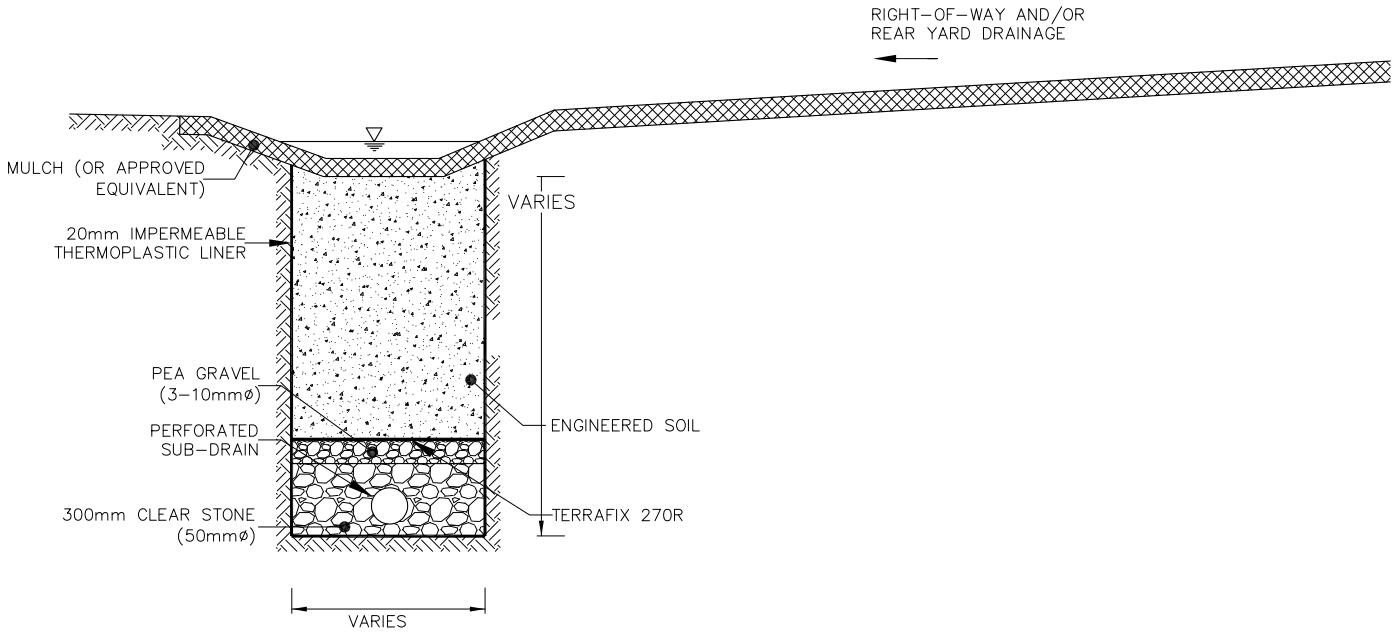
750 LOCKHART ROAD BALLYMORE - BARRIE

PRELIMINARY TREE PIT LID LAYOUT IN 24m R.O.W.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: H.D.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-6
SCALE: N.T.S.	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-DETL-C-6.dwg – Revised by <ILIN> : Wed, Mar 20 2019 – 2:31pm



750 LOCKHART ROAD
BALLYMORE - BARRIE

PRELIMINARY
BIOSWALE LAYOUT

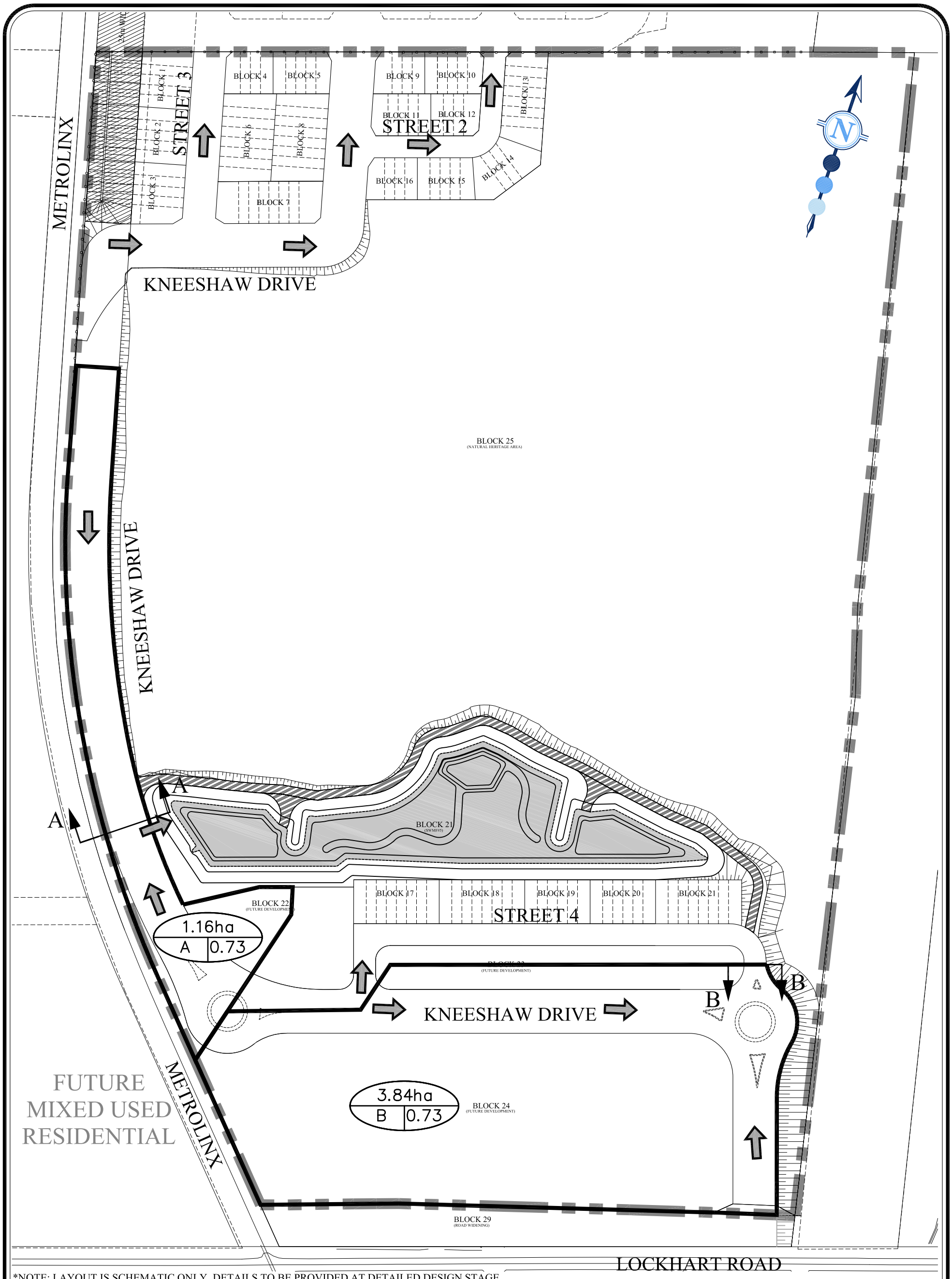
SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWING BY: H.D.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-7
SCALE: N.T.S.	DATE: MARCH 2019		

APPENDIX C-4

OVERLAND FLOW AND ROW CAPACITY

SCS consulting group ltd



*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

PROPERTY BOUNDARY

OVERLAND FLOW ROUTE

1.16ha — DRAINAGE AREA (HECTARES)
A | 0.73 — RUNOFF COEFFICIENT
CATCHMENT ID

750 LOCKHART ROAD BALLYMORE - BARRIE

OVERLAND FLOW AND ROW CAPACITY

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.T.T.	CHECKED BY: J.M.P.	PROJECT No: 1964	FIGURE No: C-8
SCALE: 1:2000	DATE: MARCH 2019		

File: P:\1964 750 Lockhart Road – Ballymore – Barrie\Drawings\FSP\Fig\Report Figures\1964P-DETL-C-8.dwg – Revised by <ILIN> : Wed, Mar 20 2019 – 2:41pm

Catchment A	Return Period
	5 Year
Area (ha)=	1.12
Return Period Factor =	1.00
Runoff Coeff. =	0.73
T_c (min)=	10.00
a =	**853.608**
b =	**4.699**
c =	**0.766**
Intensity (mm/hr) =	108.92
Runoff (m^3/s) =	**0.247**

Catchment A	Return Period
	100 Year
Area (ha)=	1.12
Return Period Factor =	1.25
Runoff Coeff. =	0.91
T_c (min)=	10.00
a =	**1426.408**
b =	**5.273**
c =	**0.759**
Intensity (mm/hr) =	180.15
Runoff (m^3/s) =	**0.512**

*100 Year runoff coefficient bump-up per City of Barrie criteria

*Area and Runoff coefficient per **Figure C-8**
*IDF parameters per City of Barrie

5 Year Flow (Catchment A)

Q_{5yr} (m^3/s) = 0.247

100 Year Flow (Catchment A)

Q_{100yr} (m^3/s) = 0.512

Required 100 Year Capture Capacity

$Q_{100-5yr}$ (m^3/s) = 0.264

Cross Section for 24 m ROW Capacity (A-A)

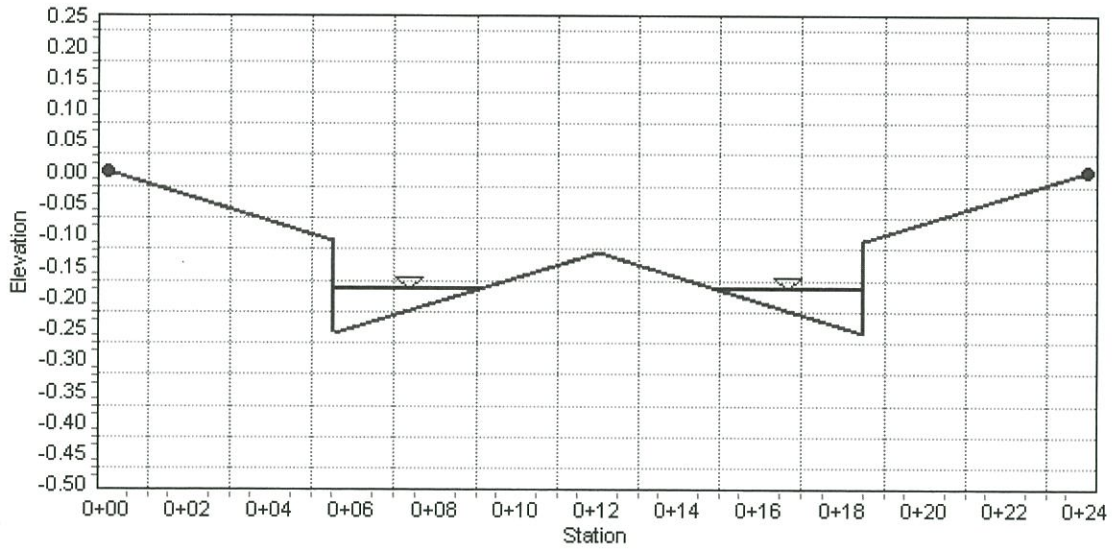
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.3	%
Normal Depth	0.07	m
Discharge	0.264	m³/s

Cross Section Image



24 m ROW Capacity (A-A)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.3	%
Discharge	0.512	m³/s

Section Definitions

Station (m)	Elevation (m)
0+00	0.00
0+06	-0.11
0+06	-0.26
0+12	-0.13
0+19	-0.26
0+19	-0.11
0+24	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+24, 0.00)	0.013

Results

Normal Depth		0.10	m
Elevation Range	-0.26 to 0.00 m		
Flow Area		0.45	m²
Wetted Perimeter		9.69	m
Top Width		9.50	m
Normal Depth		0.10	m
Critical Depth		0.12	m
Critical Slope		0.00439	m/m
Velocity		1.13	m/s
Velocity Head		0.07	m
Specific Energy		0.16	m

24 m ROW Capacity (A-A)

Results

Froude Number	1.66	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.10	m
Critical Depth	0.12	m
Channel Slope	0.01300	m/m
Critical Slope	0.00439	m/m

Catchment B	Return Period
	5 Year
Area (ha)=	3.84
Return Period Factor =	1.00
Runoff Coeff. =	0.73
T_c (min)=	10.00
a =	**853.608**
b =	**4.699**
c =	**0.766**
Intensity (mm/hr) =	108.92
Runoff (m^3/s) =	**0.848**

Catchment B	Return Period
	100 Year
Area (ha)=	3.84
Return Period Factor =	1.25
Runoff Coeff. =	0.91
T_c (min)=	10.00
a =	**1426.408**
b =	**5.273**
c =	**0.759**
Intensity (mm/hr) =	180.15
Runoff (m^3/s) =	**1.754**

*100 Year runoff coefficient bump-up per City of Barrie criteria

*Area and Runoff coefficient per **Figure C-8**
*IDF parameters per City of Barrie

5 Year Flow (Catchment B)

Q_{5yr} (m^3/s) = 0.848

100 Year Flow(Catchment B)

Q_{100yr} (m^3/s) = 1.754

Required 100 Year Capture Capacity

$Q_{100-5yr}$ (m^3/s) = 0.905

12 m Laneway Capacity (B-B)

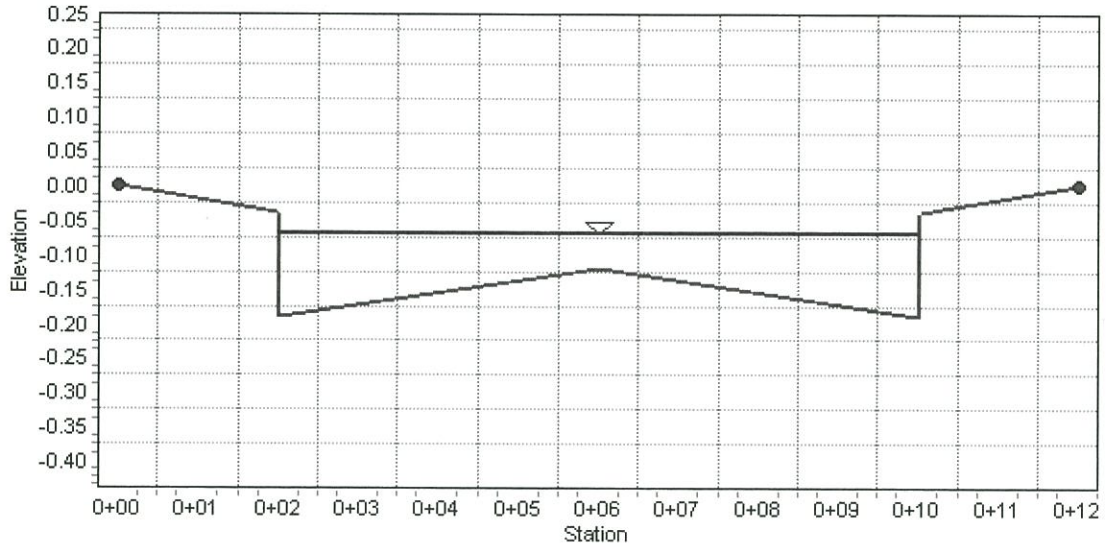
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.0	%
Normal Depth	0.12	m
Discharge	0.905	m³/s

Cross Section Image



12 m Laneway Capacity (B-B)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.0	%
Discharge	0.905	m³/s

Section Definitions

Station (m)	Elevation (m)
0+00	0.00
0+02	-0.04
0+02	-0.19
0+06	-0.12
0+10	-0.19
0+10	-0.04
0+12	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+12, 0.00)	0.013

Results

Normal Depth		0.12	m
Elevation Range	-0.19 to 0.00 m		
Flow Area		0.64	m²
Wetted Perimeter		8.23	m
Top Width		8.04	m
Normal Depth		0.12	m
Critical Depth		0.14	m
Critical Slope		0.00361	m/m
Velocity		1.41	m/s
Velocity Head		0.10	m
Specific Energy		0.22	m

12 m Laneway Capacity (B-B)

Results

Froude Number	1.59	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.12	m
Critical Depth	0.14	m
Channel Slope	0.01000	m/m
Critical Slope	0.00361	m/m

APPENDIX C-5

PHOSPHORUS BUDGET

SCS consulting group ltd

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 2.0 Release Update
Update Date: 30-Mar-12

Project DEVELOPMENT Summary

DEVELOPMENT: 1964 - 750 Lockhart Road - North Lands
Subwatershed: Hewitts Creek

Total Pre-Development Area (ha):	**2.66**	Total Pre-Development Phosphorus Load (kg/yr):	**0.49**

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Cropland	2.53	0.19	0.48
Forest	0.13	0.05	0.01

DEVELOPMENT: 1964 - 750 Lockhart Road - North Lands

Subwatershed: Hewitts Creek

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency		P Load (kg/yr)
High Intensity - Residential	0.68	1.32	Treatment Train Approach	95%	0.04
Residential development to tree pit LIDs or exfiltration in 18m ROW LIDs (87%) then to external wet pond (63%)					
High Intensity - Residential	1.56	1.32	Wet Detention Ponds	63%	0.76
Residential development to external wet pond					
High Intensity - Residential	0.18	1.32	Other	80%	0.05
Residential development to rear lot bioswale then to external wet pond					
Low Intensity Development	0.09	0.13	NONE	0%	0.01
Porion of berm drains uncontrolled towards Metrolinx					
Low Intensity Development	0.15	0.13	Wet Detention Ponds	63%	0.01
Rear lots and berm to external wet pond					

Post-Development Area Altered:	**2.66**
Total Pre-Development Area:	**2.66**
Unaffected Area:	**0**

	P Load (kg/yr)
Pre-Development:	**0.49**
Post-Development:	**3.23**
Change (Pre - Post):	**-2.74**
562% Net Increase in Load	
Post-Development (with BMPs):	**0.87**
Change (Pre - Post):	**-0.38**
79.01% Net Increase in Load	

DEVELOPMENT: 1964 - 750 Lockhart Road - North Lands
Subwatershed: Hewitts Creek

CONSTRUCTION PHASE LOAD

SUMMARY WITH IMPLEMENTATION OF BMPs	P Load (kg/yr)
Pre-Development:	**0.49**
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	**0.87**
Post-Development + Amortized Construction:	**to be determined**
Pre-Development Load - Post-Development Load:	**-0.38**
Conclusion:	**79% Increase in Load**
Pre-Development Load - (Post-Development + Amortized Construction Load):	**to be determined**
Conclusion:	**to be determined**

Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:

Not approve development as site specific appropriate

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 2.0 Release Update
Update Date: 30-Mar-12

Project DEVELOPMENT Summary

DEVELOPMENT: 1964 - 750 Lockhart Road - South Lands
Subwatershed: Hewitts Creek

Total Pre-Development Area (ha):	**8.33**	Total Pre-Development Phosphorus Load (kg/yr):	**1.29**

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Cropland	5.81	0.19	1.10
Forest	1.82	0.05	0.09
Low Intensity Development	0.7	0.13	0.09

DEVELOPMENT: 1964 - 750 Lockhart Road - South Lands
Subwatershed: Hewitts Creek

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency		P Load (kg/yr)
High Intensity - Residential	2.89	1.32	Bioretention Systems	**80%**	0.76
			Future site plan development with on-site controls to Wetland		
NOTE: BMP efficiency has been adjusted from the reference provided value by 80% (from 0% to 80%)					
High Intensity - Residential	1.88	1.32	Constructed Wetlands	77%	0.57
			Residential development to Wetland		
High Intensity - Residential	1.11	1.32	Treatment Train Approach	97%	0.04
			Residential development to Tree Pit LIDs then to Wetland		
High Intensity - Residential	0.47	1.32	Other	91%	0.06
			ROW to Rain Garden LIDs in the roundabouts then to Wetland		
Low Intensity Development	1.98	0.13	Constructed Wetlands	77%	0.06
			Pond block area to Wetland		

		P Load (kg/yr)
Post-Development Area Altered:	**8.33**	
Total Pre-Development Area:	**8.33**	
Unaffected Area:	**0**	
Pre-Development:		**1.29**
Post-Development:		**8.64**
Change (Pre - Post):		**-7.35**
572% Net Increase in Load		
Post-Development (with BMPs):		**1.49**
Change (Pre - Post):		**-0.21**
16.08% Net Increase in Load		

Interim Condition

Future site plan blocks undeveloped (assume cropland) are treated by wetland only (77%).

$P\ Load\ (untreated) = 2.89\ ha \times 0.19\ kg/ha/yr = 0.55\ kg/yr$

$P\ Load\ (treated) = 0.55\ kg/yr \times 77\% = 0.13\ kg/yr$

Total proposed Development

$P\ Load\ (untreated) = 8.64\ kg/yr - [(2.89\ ha \times 1.32\ kg/ha/yr) - 0.55\ kg/yr]$
$= 5.38\ kg/yr$

$P\ Load\ (treated) = 1.49\ kg/yr - [0.76\ kg/yr - 0.13\ kg/yr]$
$= 0.86\ kg/yr$

DEVELOPMENT: 1964 - 750 Lockhart Road - South Lands
Subwatershed: Hewitts Creek

CONSTRUCTION PHASE LOAD

SUMMARY WITH IMPLEMENTATION OF BMPs	**P Load (kg/yr)**
Pre-Development:	**1.29**
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	**1.49**
Post-Development + Amortized Construction:	**to be determined**
Pre-Development Load - Post-Development Load:	**-0.21**
Conclusion:	**16% Increase in Load**
Pre-Development Load - (Post-Development + Amortized Construction Load):	**to be determined**
Conclusion:	**to be determined**

Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:

Not approve development as site specific appropriate

APPENDIX C-6

STORM DESIGN SHEET

100-Year Storm Design
750 Lockhart Road

Ballymore, Barrie

Rainfall Intensity (i) = $\frac{A}{(T_c+B)^c}$

A= 1426.408
B= 5.273
c= 0.759

Starting T_c (min)= 10

Project: 750 Lockhart Road
Project No. 1964
Date: 21-Mar-19
Designed By: P.A.T.
Reviewed By: J.M.P.

P:\1964 750 Lockhart Road - Ballymore - Barrie\Design\Pipe Design\Storm\[1964-Preliminary Storm Design Sheet.xlsm]Design

LOCATION			100 YEAR						TOTAL FLOW	PIPE DATA						
STREET	MANHOLE		100-YEAR AREA	RUNOFF COEFF.	"AR"	ACCUM. "AR"	RAINFALL INTENSITY	ACCUM. FLOW	TOTAL (Qdes)	LENGTH	SLOPE	PIPE DIAMETER	FULL FLOW CAPACITY	FULL FLOW VELOCITY	TIME OF CONC.	ACCUM. TIME OF CONC.
	FROM	TO	(ha)	"R"			(mm/hr)	(m3/s)	(m3/s)	(m)	(%)	(mm)	(m3/s)	(m/s)	(min)	(min)
WEST OF YONGE STREET	EXT1	STM1	12.490	0.730	9.118	9.118	180.15	4.563	4.563	100.0	0.70	1500	5.911	3.347	0.50	10.50
YONGE STREET	EXT2	STM1	5.310	0.725	3.850	3.850	180.15	1.927	1.927	100.0	0.50	1500	4.996	2.829	0.59	10.59
FUTURE MIXED USE & RES	EXT3	STM1	9.870	0.725	7.156	7.156	180.15	3.581	3.581	100.0	0.50	1500	4.996	2.829	0.59	10.59
EXTERNAL	STM1	STM2	0.000	0.000	0.000	20.123	175.05	9.785	9.785	100.0	1.00	1800	11.489	4.517	0.37	10.96
KNEESHAW DRIVE	STM2	HW1	0.000	0.000	0.000	20.123	172.02	9.616	9.616	100.0	1.00	1800	11.489	4.517	0.37	11.33
KNEESHAW DRIVE	STM3	STM4	0.000	0.000	0.000	0.000	180.15	0.000	0.000	100.0	0.50	825	1.014	1.899	0.88	10.88
STREET4	STM5	STM4	0.000	0.000	0.000	0.000	180.15	0.000	0.000	100.0	0.50	600	0.434	1.536	1.09	11.09
KNEESHAW DRIVE	STM4	HW2	0.000	0.000	0.000	0.000	171.01	0.000	0.000	100.0	0.50	900	1.279	2.012	0.83	11.91

APPENDIX D

DESIGN CHARETTE MINUTES

SCS consulting group ltd

SCS consulting group ltd

MEETING MINUTES

File #: 1964
Date: March 25, 2019

Project:	**750 Lockhart Road - Ballymore**
Purpose:	**Design Charrette**
Date/Time of Meeting:	**December 13, 2018/1:00 PM**
Location:	**City of Barrie**

	Recipient(s):	Email:
Attendees:	Frank Palka, City of Barrie	frank.palka@barrie.ca
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The following is considered to be a true and accurate record of the items discussed. Any errors or omissions in these minutes should be provided in writing to the author immediately.

Item:

1.0 Existing Site Conditions

1.1 Site generally slopes down at 2-5% to the wetland.

1.2 Soils consist of silt, sand/silt till, sand and sandy silt with hydraulic conductivity ranging from 70 to 84 mm/hr.

1.3 Groundwater ranges from 4 m below existing grade to at grade.

2.0 Sub-watershed Impact Study (SIS) Criteria

2.1 Phase 1 Lands: Best efforts infiltration and 25 mm filtration over impervious areas to be provided on site.

2.2 Phase 3 Lands: 5 mm of infiltration and 20 mm of filtration over impervious areas to be provided on site.

2.3 School block and Recreation Centre assumed to provide 5 mm infiltration on-site.

2.4 "Enhanced" TSS Protection

2.5 Phosphorus – Greater of:

- Match existing loading rates
- 80% Reduction in Phosphorus Loading Rates
- Goal is "zero" export

3.0 Proposed Conditions:

3.1 Phase 1 lands: Grading to conform generally to SIS. The proposed development to drain north to future SWM Facility 6.

3.2 Phase 1 lands: The majority of the proposed elevations are 0 to 2 m above the existing groundwater table. However, it is noted that the elevations could potentially be raised in through further coordination with the lands to the north. A figure was presented showing groundwater elevations vs proposed elevation.

3.3 Phase 3 lands: Grading to conform generally to the SIS, with the caveat that the SWM facility is raised upwards of 3m from the SIS. Lands to drain to proposed SWM Facility 5 in the proposed development. SWM Facility 5 is also proposed to accept approximately 27 ha of external drainage from the west. It was noted that of the total proposed drainage area to proposed SWM Facility 5 of 35.4 ha, 35% are municipal lands.

3.4 Phase 3 lands: The proposed elevations range from at the groundwater table in the northwest to more than 4 m above the existing groundwater table in the southeast. A figure was presented showing groundwater elevations vs proposed elevation.

4.0 Potential Low Impact Developments (LIDs)

4.1 Phase 1 lands: Designs for proposed ROW based and rear lot based LIDs proposed in the external lands to the north were discussed as and presented as an option for the Phase 1 lands within the proposed development. It was noted that as groundwater is close to the surface in the Phase 1 lands, these LIDs may not be feasible to provide infiltration but may be used for filtration.

4.2 Phase 3 lands: Roundabout based LIDs on collector roads were discussed as means by which infiltration could occur in the central landscaped area of the proposed roundabouts. In areas with high groundwater these LIDs could be lined to provide filtration.

4.3 Phase 3 lands: ROW based LIDs could provide infiltration within the boulevards of the north/south proposed collector ROWs and could be lined in areas of high groundwater to provide filtration. It is acknowledged that City of Barrie has not been supportive of LIDs in collector roads in the past, however due to limited space available in the Phase 3 lands they have been proposed.

5.0 Stormwater Management Solutions

5.1 A suite of potential LIDs was presented illustrating potential locations for LIDs throughout the Phase 1 and Phase 3 lands of the development. Within the Phase 1 lands potential locations were in the rear yards adjacent to the rail berm and wetland as well as ROW based LIDs on Street 3. Within the Phase 3 lands, potential locations were in roundabouts and within the ROW along sections of the collector roads running north/south.

5.2 Phase 3 lands: SWM Facility 5 discussed to be a wetland as opposed to a wet pond.

6.0 Feature Based Water Balance

6.1 The infiltration deficit in the feature-based water balance was discussed based on the proposed scenario without mitigation. Opportunities to mitigate the infiltration deficit through directing additional flows to the respective wetlands were discussed.

7.0 Stormwater Management Solution Discussions

7.1 Rear lot LIDs not to be located in Phase 1 lands adjacent to rail berm due to maintenance access concerns.

7.2 Phase 3 lands: No opposition to LIDs within turning circles on collector ROWs.

7.3 Phase 3 lands: Tree box based LIDs to be explored along the north/south sections of the collector road as suggested by LSRCA and acknowledged by City.

7.4 The potential for LIDs along the collector road to discharge to the wetland thereby contributing to mitigation of the proposed infiltration deficit.

7.5 It is acknowledged that the proposed development is not in a salt vulnerable area in the Lake Simcoe watershed.

7.6 City of Barrie to provide plans for proposed trail system to run along the natural heritage system on the east limit of the site.

7.7 Phase 3 lands: Upstream site plans required to provide full filtration and infiltration requirements as required by the SIS. City of Barrie to discuss with upstream site plan land owners.

7.8 Phase 3 lands: Opportunity for recreation centre to provide phosphorus offsetting to be explored.

7.9 Phase 3 lands: SWM Facility 5 to be a wetland to maximize phosphorus removal.

SCS Consulting Group Ltd.

John Priamo, P.Eng.
jpriamo@scsconsultinggroup.com

Attachments: Presentation and Supporting Materials

P:\2000 Barrie Lockhart Road - Sorbara\Correspondence\Minutes of Meetings\2018 07(Jul)06 - Meeting Minutes\2000 - Design Charrette Minutes _ MT.docx

Design Charrette

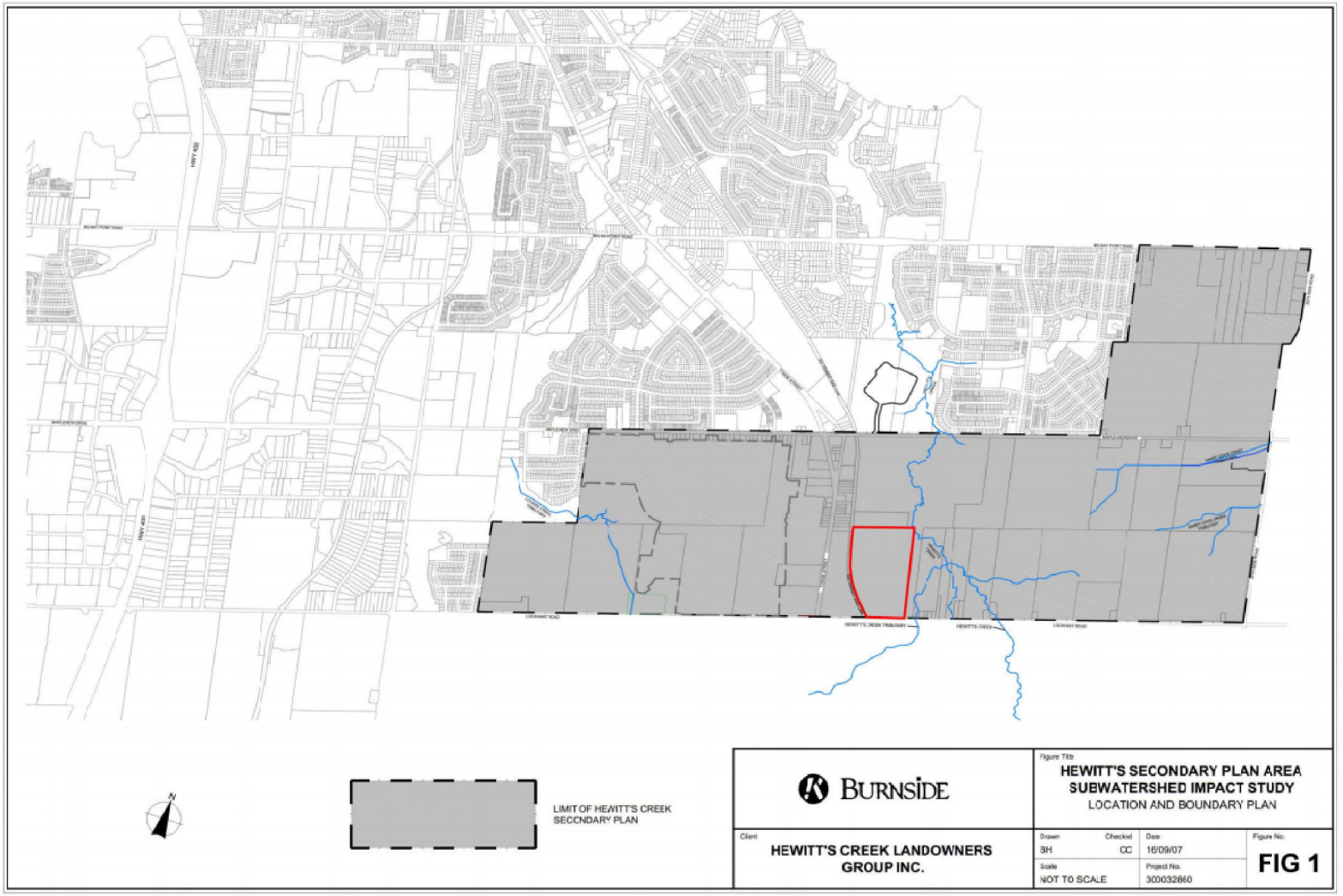
750 Lockhart Road – Ballymore

Overview

- Review Existing Site Conditions
- Review Approved Criteria at Secondary Plan Level
- Review Proposed Conditions
- Review & Brainstorm Potential Solutions

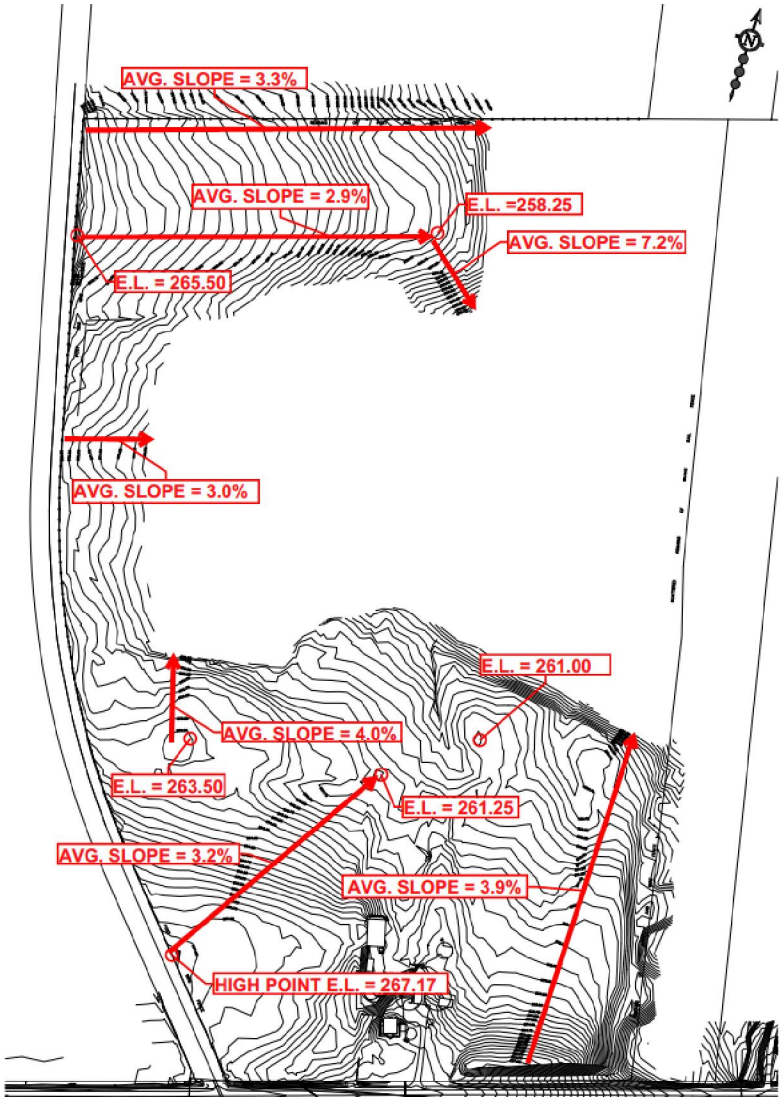
Purpose: Develop Stormwater Management Solution acceptable to all parties which provides treatment as prescribed through all applicable policies, criteria and standards.

Hewitt's Secondary Plan - Area



Existing Conditions

Existing Topography



Existing Soils

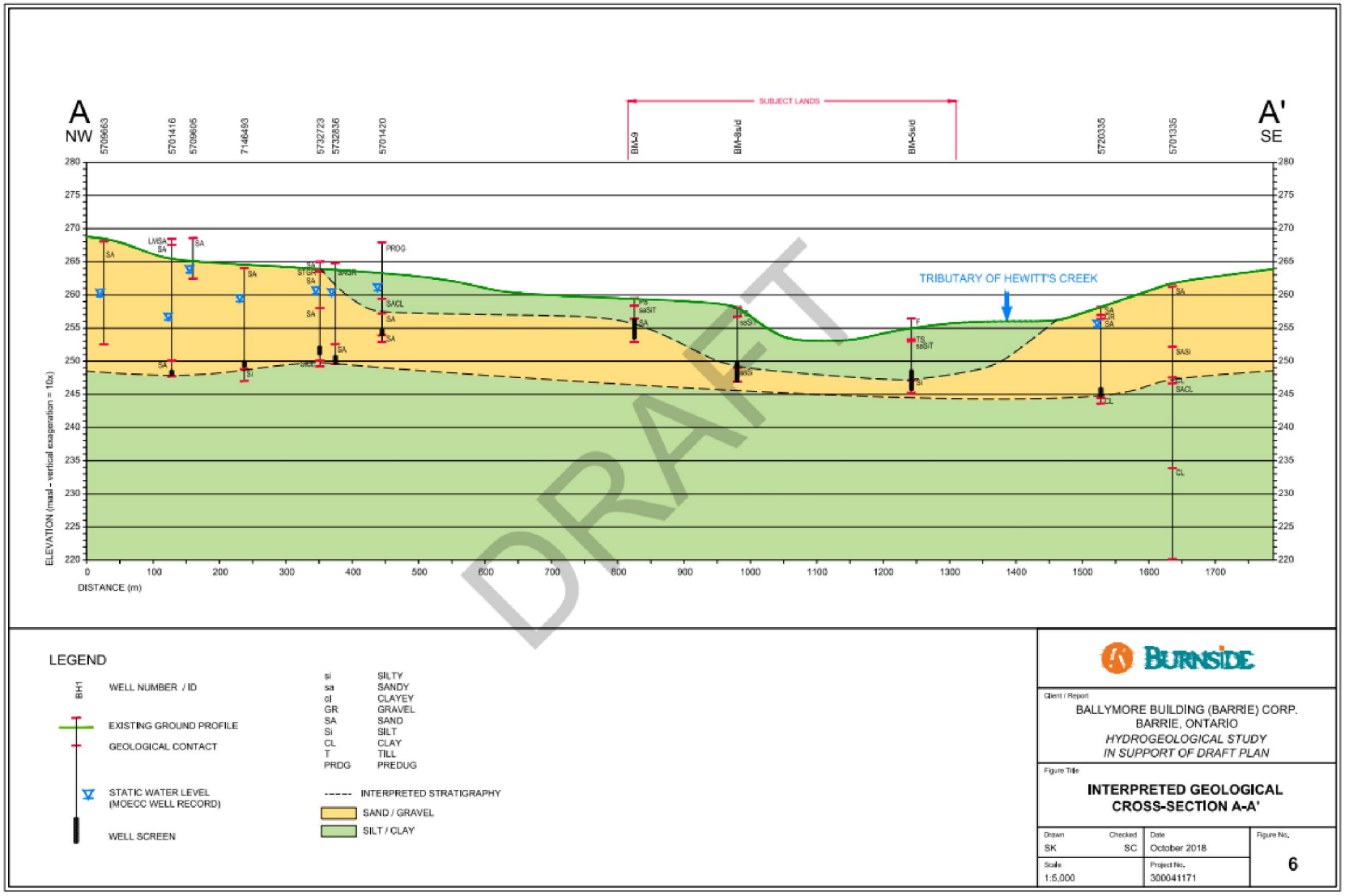
- Silt
  - Encountered throughout the site at elevations of approximately 261.7 to 260.9 (BH10 and BH1) along the west limit of the site and 249.0 to 250.9 on the east side of the site (BH5).
- Sand
  - Encountered throughout the site at depths of approximately 255.3 to 266.6
- Sandy Silt Till
  - Encountered throughout the site at depths of approximately 257.9 to 266.1
- Sandy Silt
  - Encountered on the south west edge of the development (BH4, area at a depth of 261.1 to 262.1
- Hydraulic Conductivity from 4.3×10^{-4} to 1.1×10^{-3} (infiltration rate 70-84 mm/hr)

Table 2: Single Well Response Testing Results

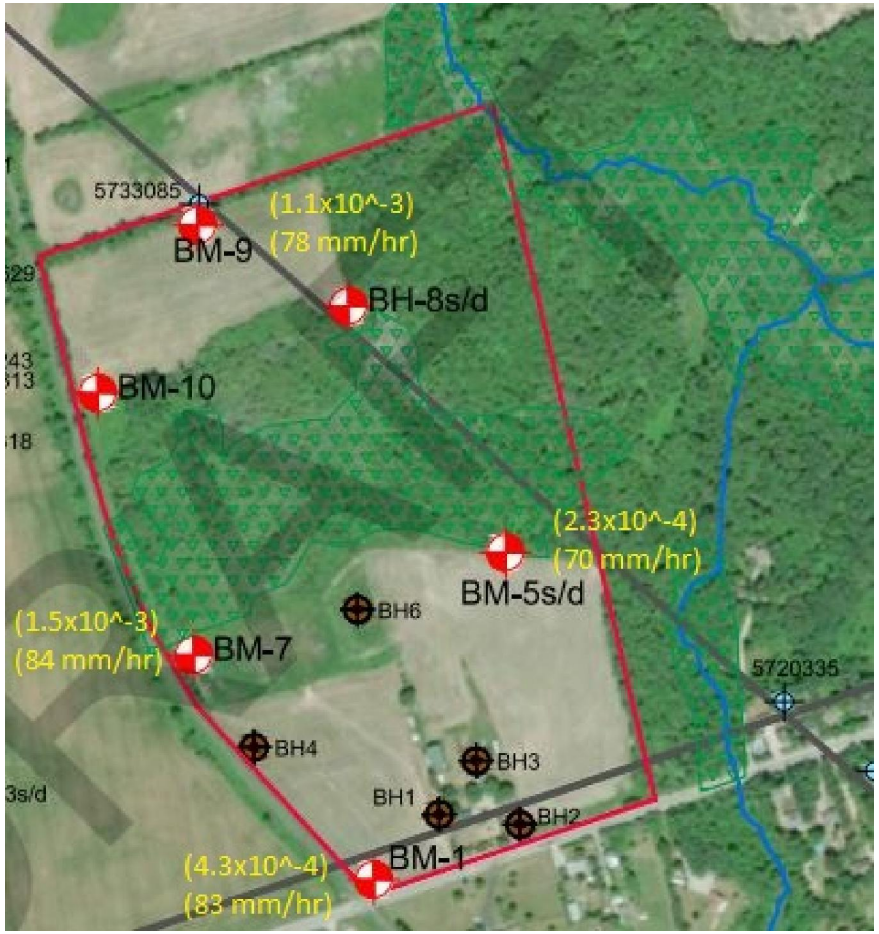
Monitoring Well	Screen Interval (mbgs)*	Formation Screened	Hydraulic Conductivity (cm/sec)
BM-1	1.7 - 5.3	Sandy Silt, Sand and Silt	4.3×10^{-4}
BM-5d	7.1 - 10.6	Sandy Silt Till, Silt	2.3×10^{-4}
BM-7	0.4 - 3.6	Sandy Silt Till and Sand	1.5×10^{-3}
BM-9	2.4 - 5.9	Sandy Silt Till and Sand	1.1×10^{-3}

*metres below ground surface

Existing Soils

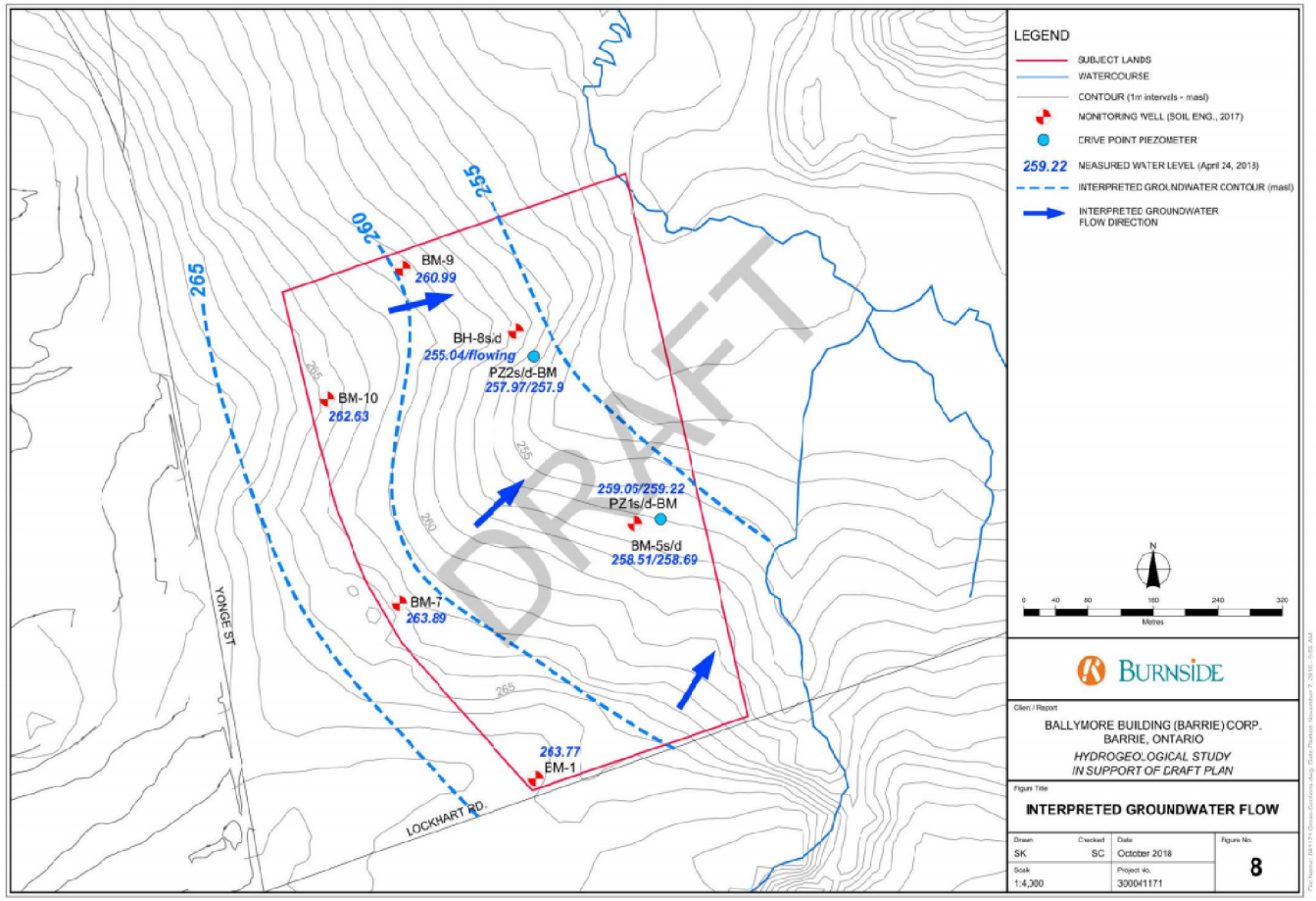


Existing Soils – Infiltration Rate



Existing Groundwater Conditions

- Groundwater
  - Ranging from 0 to 4 m below existing ground surface.



Existing Groundwater Conditions

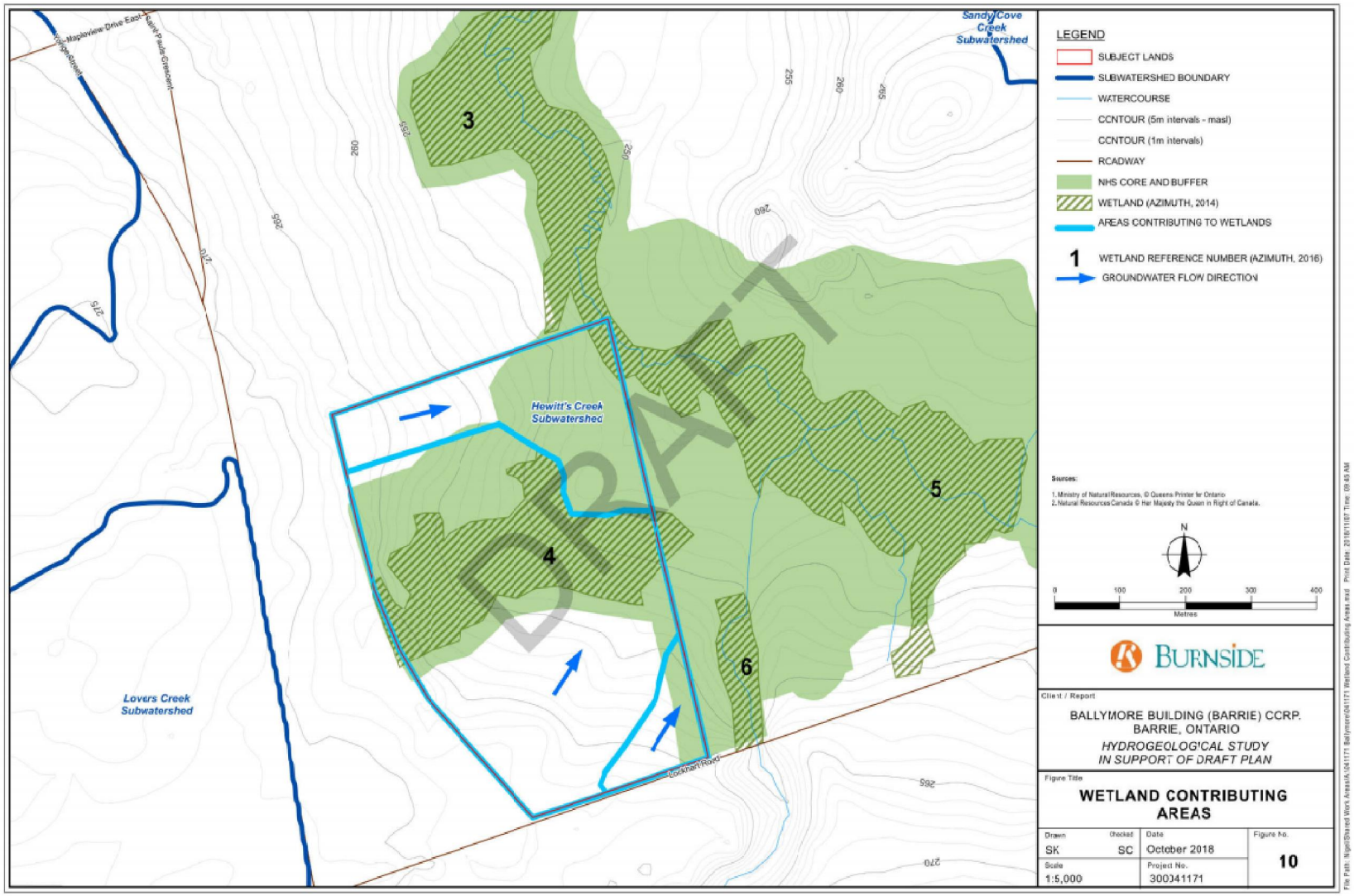
Table D-1
Groundwater Elevations

	Well Depth (mbgs)	Ground Surface Elevation (masl)	24-Apr-2018		17-May-2018		28-Jun-2018		14-Aug-2018	
			Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)	Water Level (mbgs)	Water Elevation (masl)
BM-1	5.32	267.10	3.33	263.77	3.28	263.82	3.66	263.44	4.07	263.03
BM-5s	4.60	260.20	1.69	258.51	2.23	257.97	2.50	257.70	2.20	258.00
BM-5d	10.57	260.20	1.51	258.69	1.87	258.33	2.19	258.01	2.68	257.52
BM-7	3.64	264.30	0.41	263.89	0.68	263.62	1.03	263.27	1.30	263.00
BM-8s	4.50	255.70	0.66	255.04	0.97	254.73	1.28	254.42	1.50	254.20
BM-8d	11.28	255.70	Flowing	Flowing	Flowing	Flowing	Flowing	Flowing	Flowing	Flowing
BM-9	5.93	262.00	1.01	260.99	1.43	260.57	1.75	260.25	2.01	259.99
BM-10	5.89	264.00	1.37	262.63	1.54	262.46	1.88	262.12	2.16	261.84
PZ1s-BM	1.30	**259.00**	-0.06	259.06	0.00	259.00	0.06	258.94	0.18	258.82
PZ1d-BM	1.91	**259.00**	-0.22	259.22	-0.11	259.11	-0.05	259.05	0.04	258.96
PZ2s-BM	1.31	**258.00**	0.03	257.97	0.10	257.90	0.21	257.79	0.27	257.73
PZ2d-BM	1.90	**258.00**	0.10	257.90	-0.04	258.04	-0.02	258.02	-0.06	258.06

Notes:
"-" denotes data unavailable
mbgs - meters below ground surface
masl - meters above sea level
Ground elevations from Soil Eng, 2016 borehole logs.
Bold ground elevations estimated from Google Earth.

DRAFT

Existing Feature Based Water Balance



Hewitt's Secondary Plan Area Criteria

Criteria – SIS – Phase 1 Lands

Per Subwatershed Impact Study, the Criteria for the Charrette lands are:

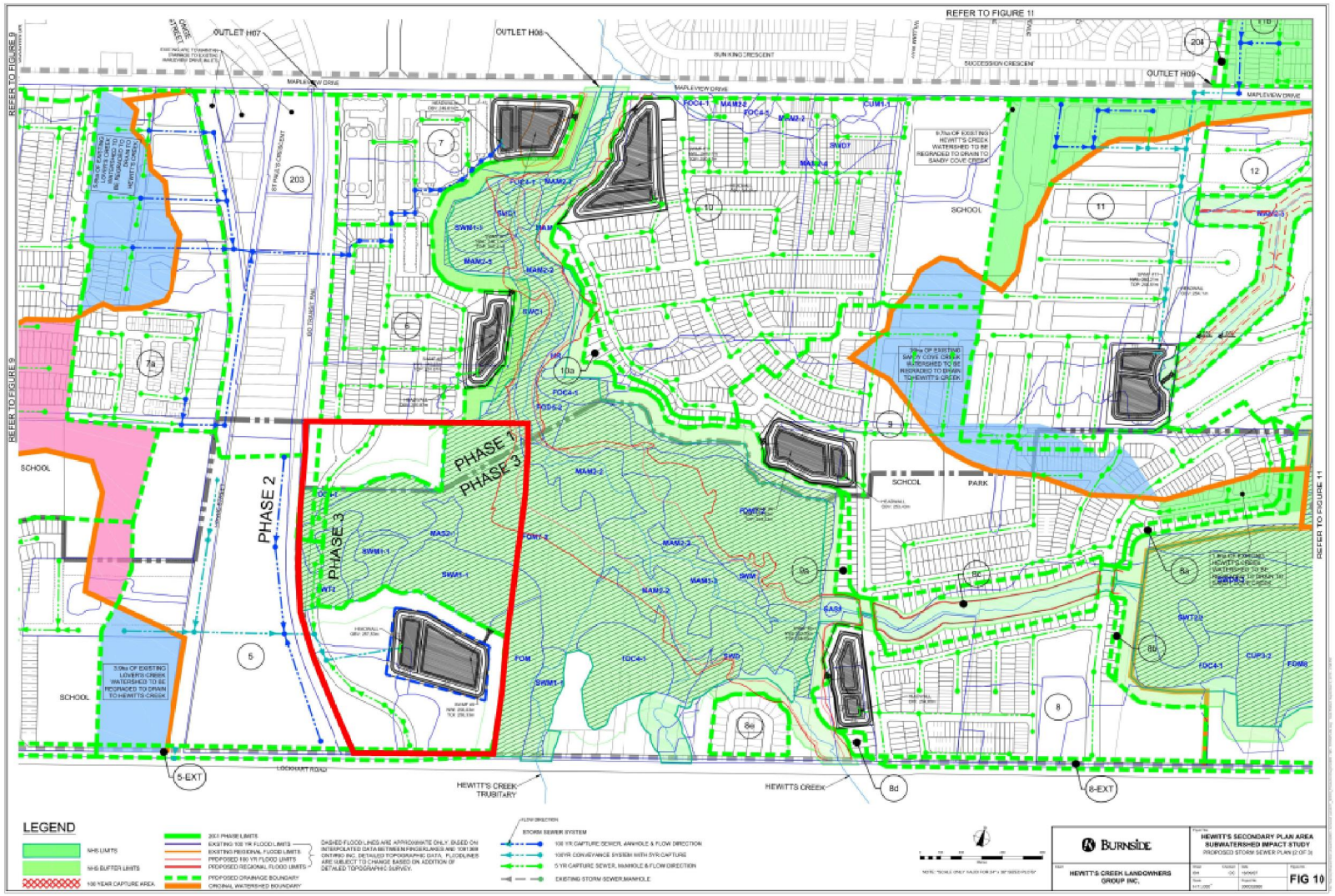
- Quantity Control
  - Control to the allowable release rates outlined in the SIS for 2 through 100 year storms
- Quality Control
  - "Enhanced" TSS protection
  - Phosphorus – Greater of:
    - Match Existing Loading Rates
    - 80% Reduction of Proposed Loading Rates
    - Goal is "zero" export
- LID Considerations (Phase 1 lands)
  - Infiltration – Best effort
  - Filtration – 25 mm

Criteria – SIS – Phase 3 Lands

Per Subwatershed Impact Study, the Criteria for the Charrette lands are:

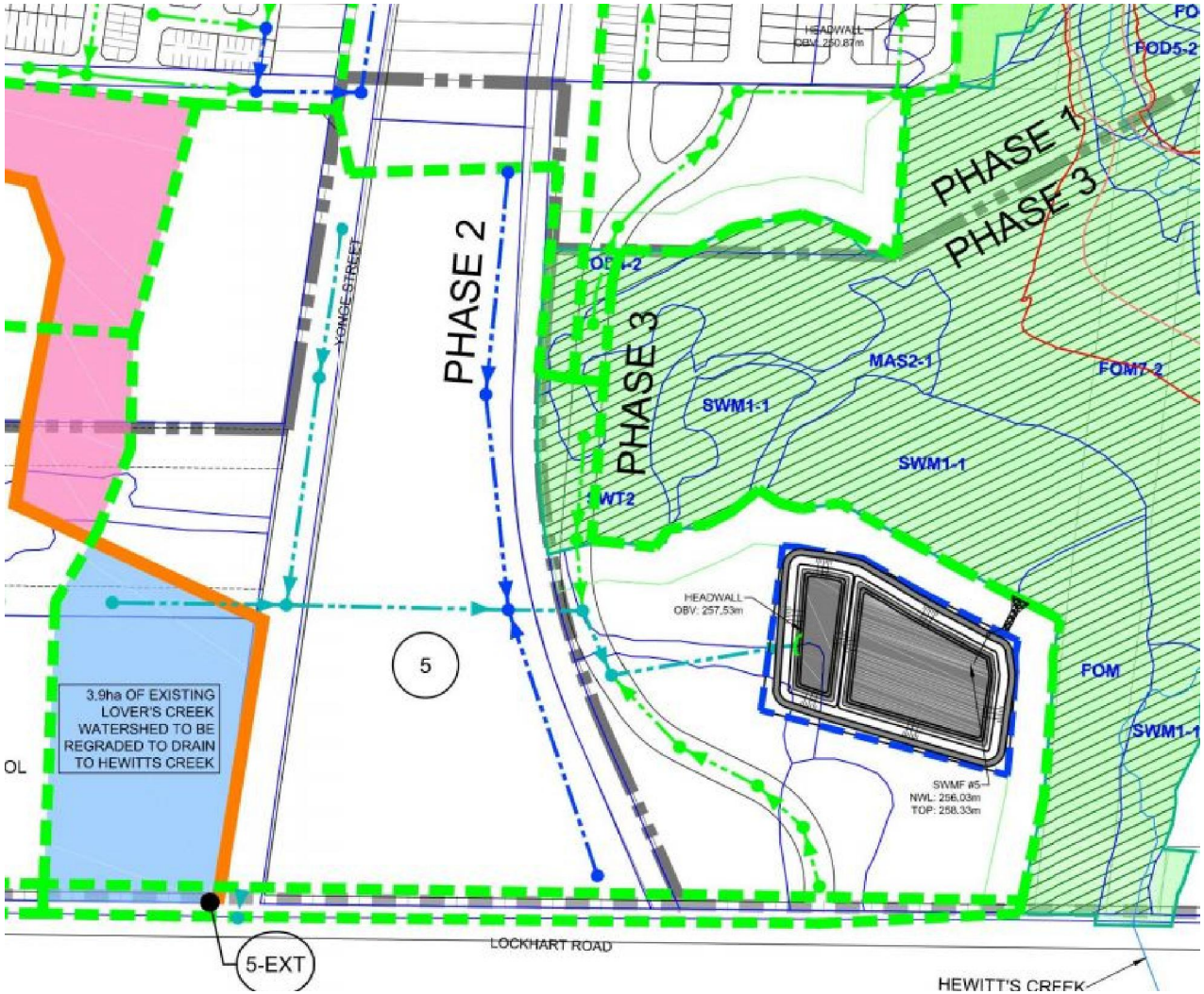
- Quantity Control
  - Control to the allowable release rates outlined in the SIS for 2 through 100 year storms
- Quality Control
  - "Enhanced" TSS protection
  - Phosphorus – Greater of:
    - Match Existing Loading Rates
    - 80% Reduction of Proposed Loading Rates
    - Goal is "zero" export
- LID Considerations (Phase 3 lands)
  - Infiltration – 5 mm
  - Filtration – 20 mm

Hewitt's Secondary Plan – SIS Drainage

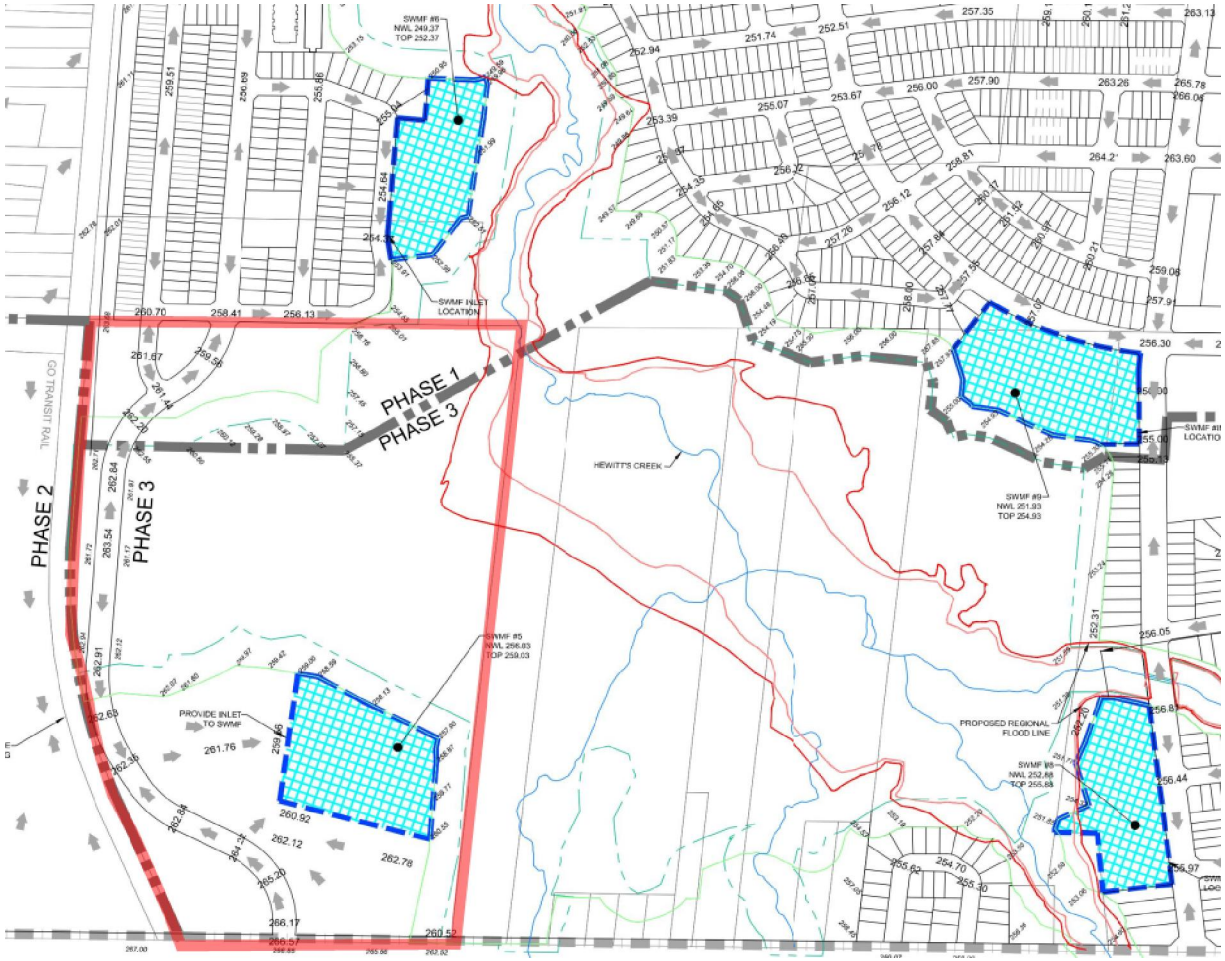


Hewitt's Secondary Plan
SIS Drainage – Phase 1

Hewitt's Secondary Plan
SIS Drainage – Phase 3

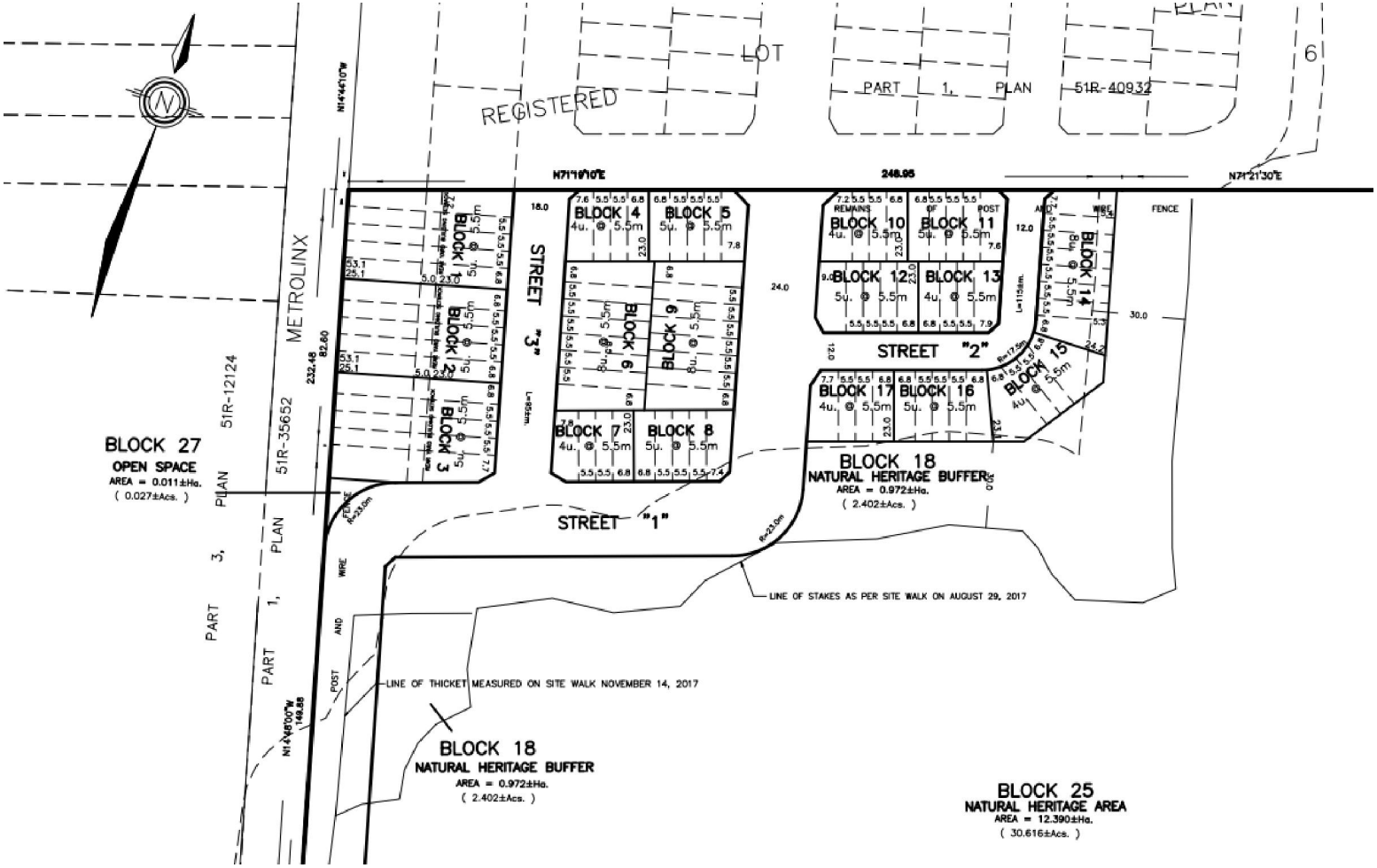


Hewitt's Secondary Plan
SIS Grading



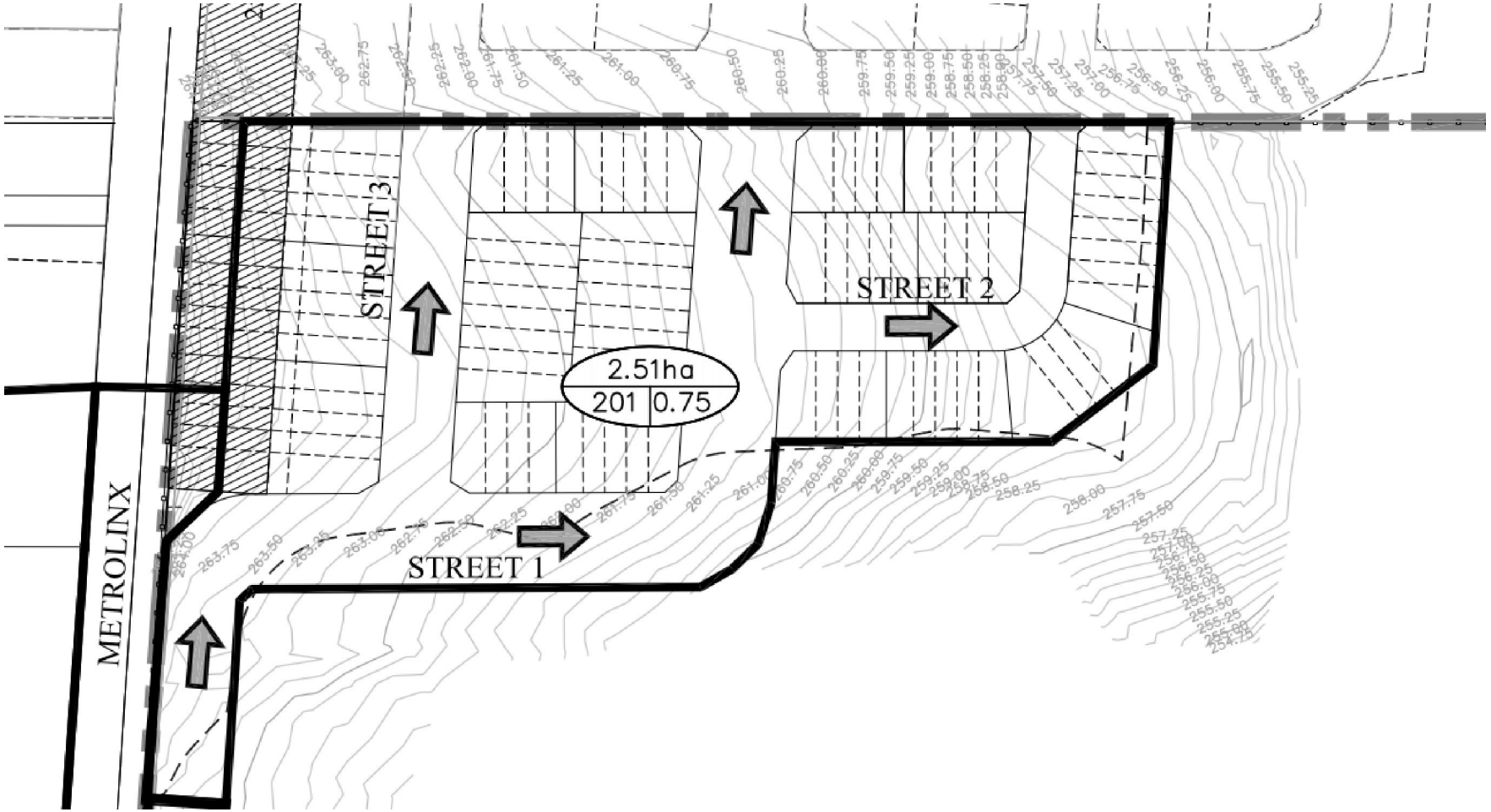
Proposed Conditions – Phase 1

Concept Plan – Phase 1

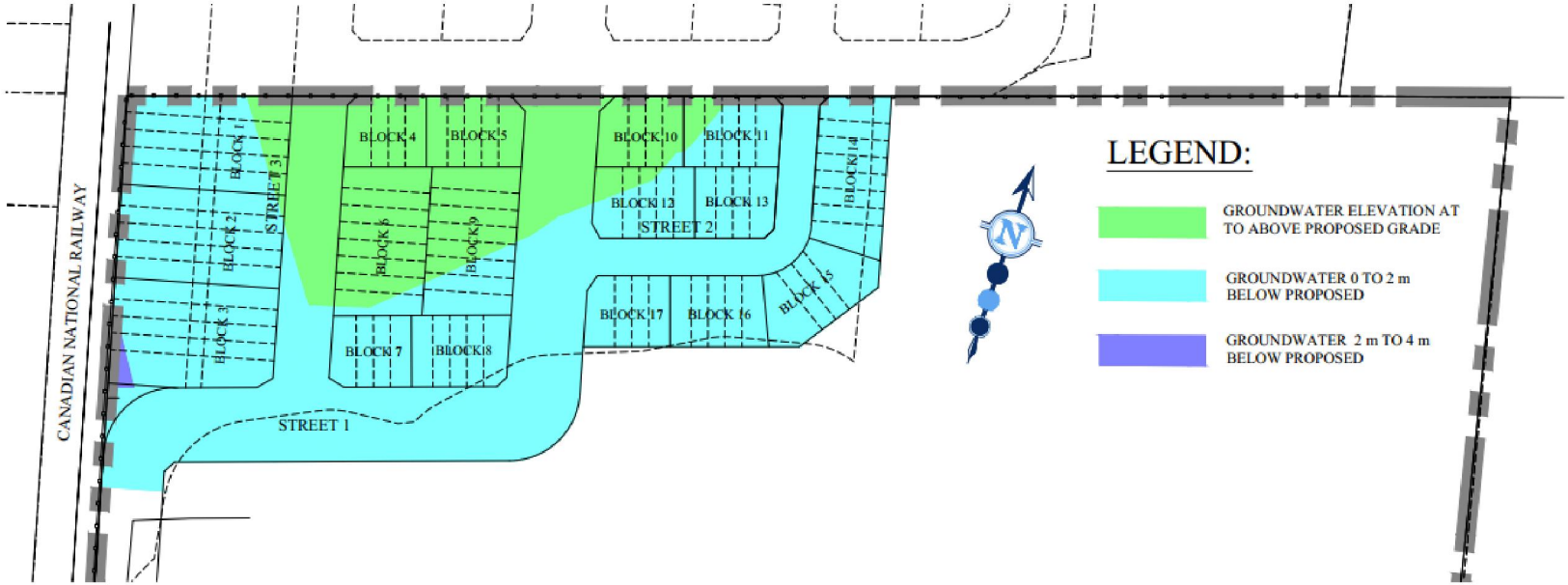


Preliminary Proposed Grading - Phase 1

Preliminary Proposed Drainage - Phase 1

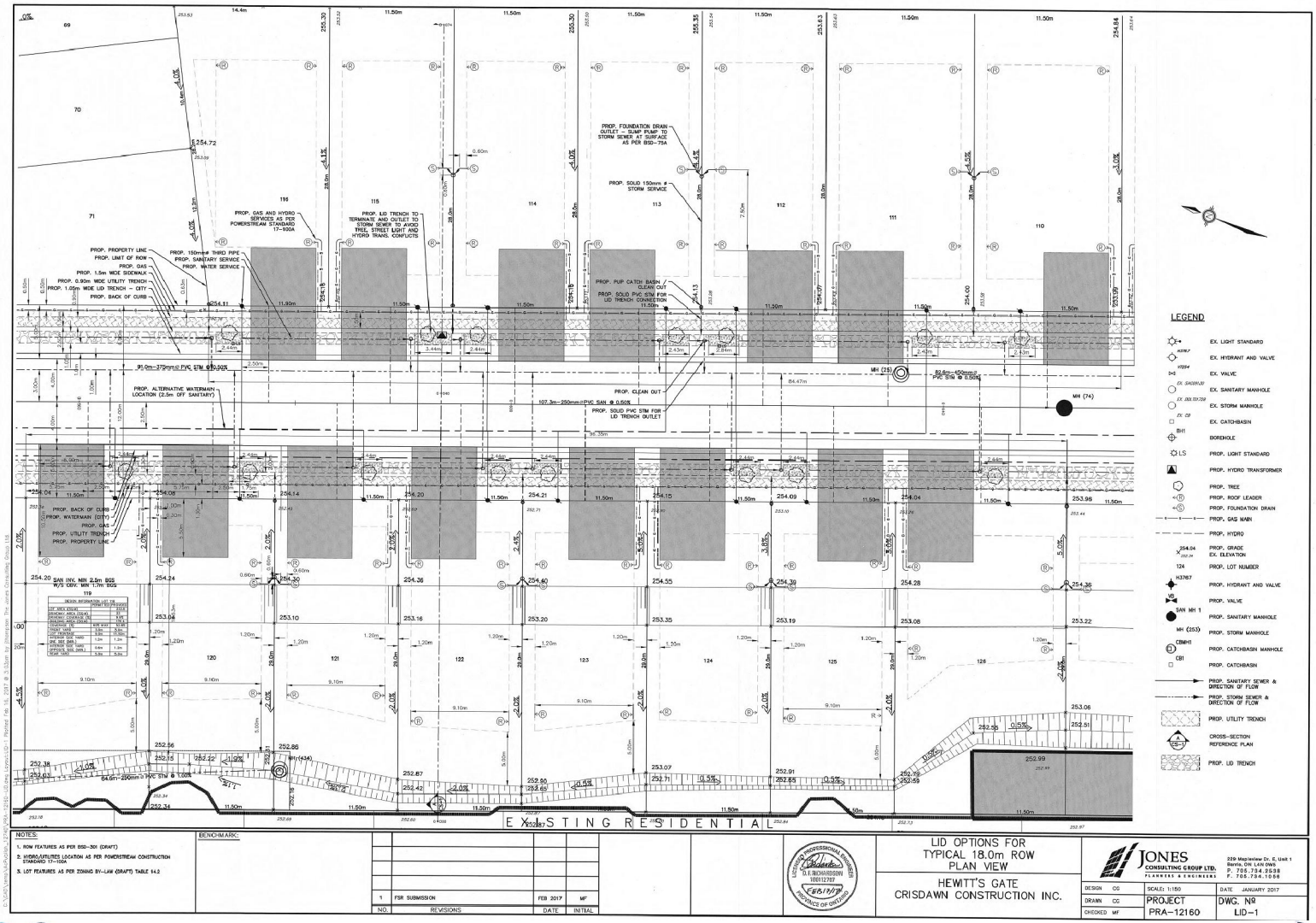


Proposed Groundwater Conditions – Phase 1

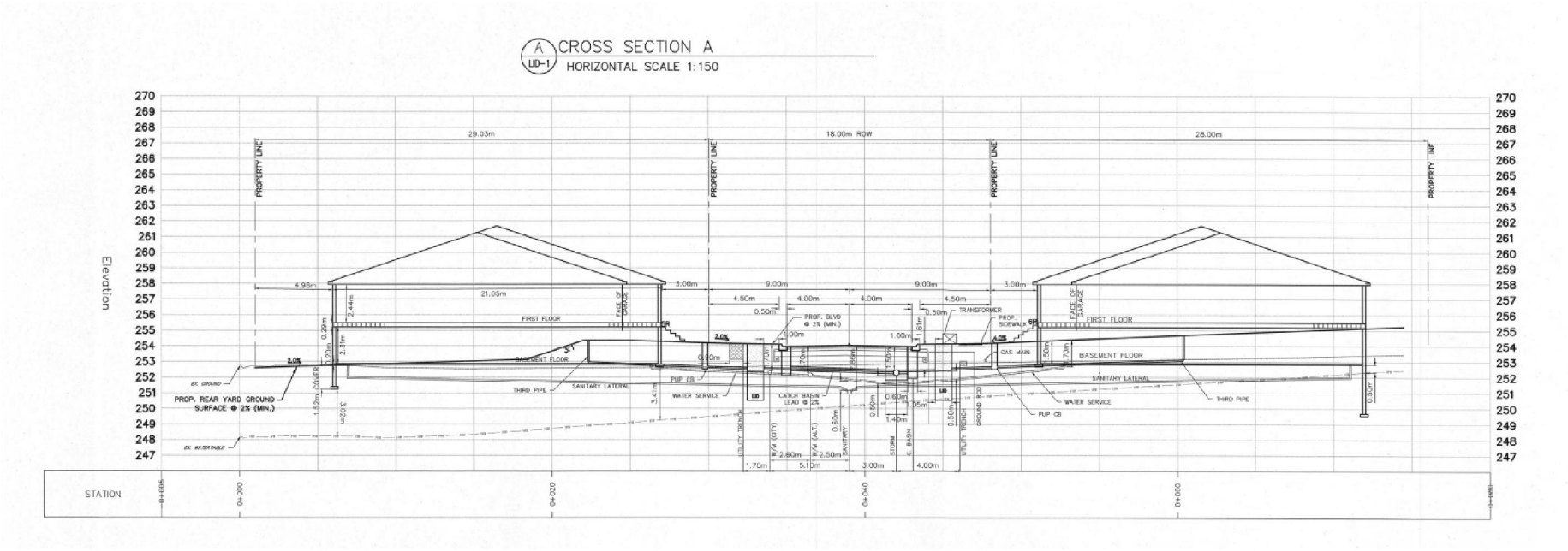


Phase 1 - Potential LIDs

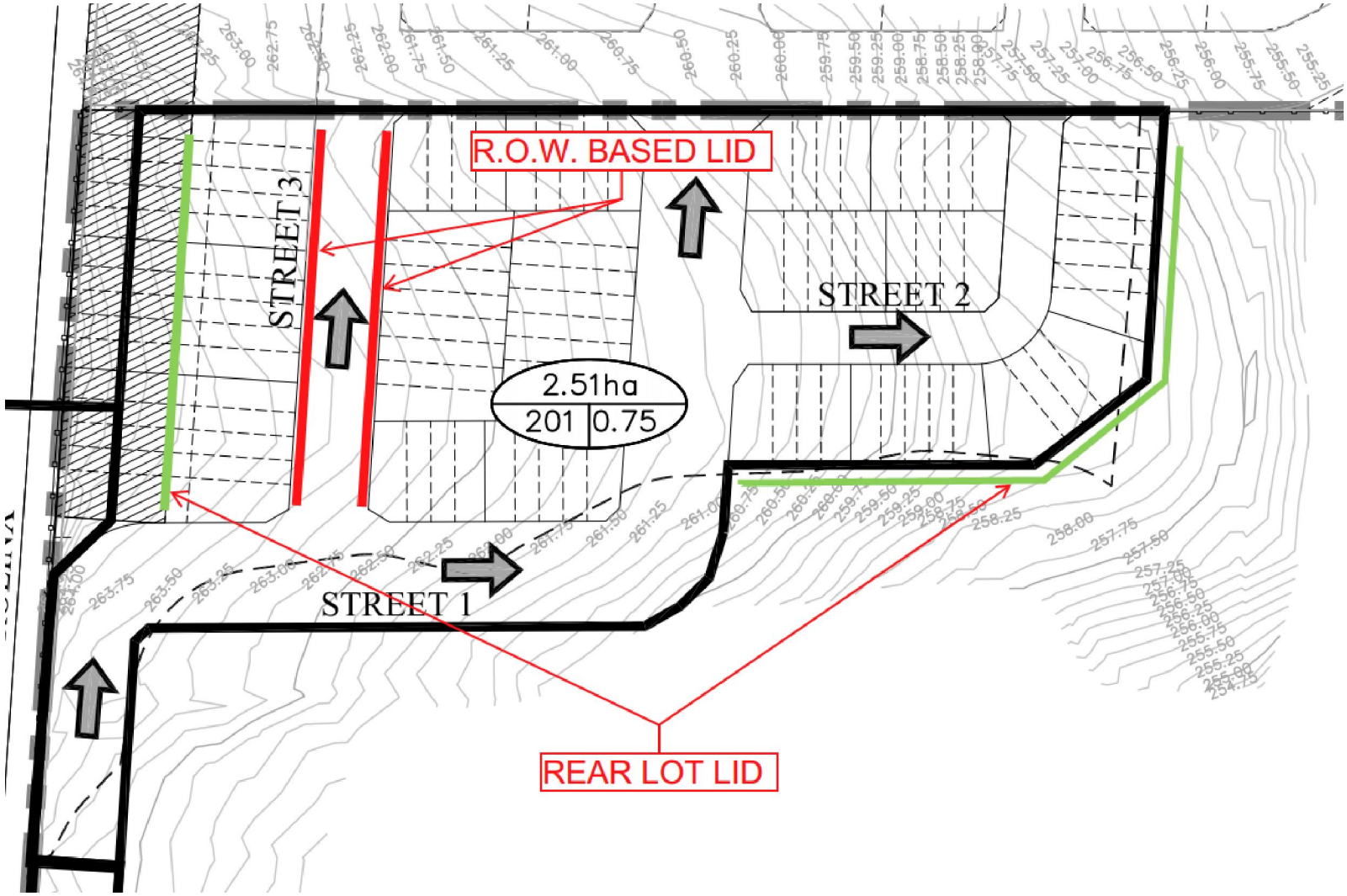
Potential LIDs – Phase 1



Potential LIDs – Phase 1

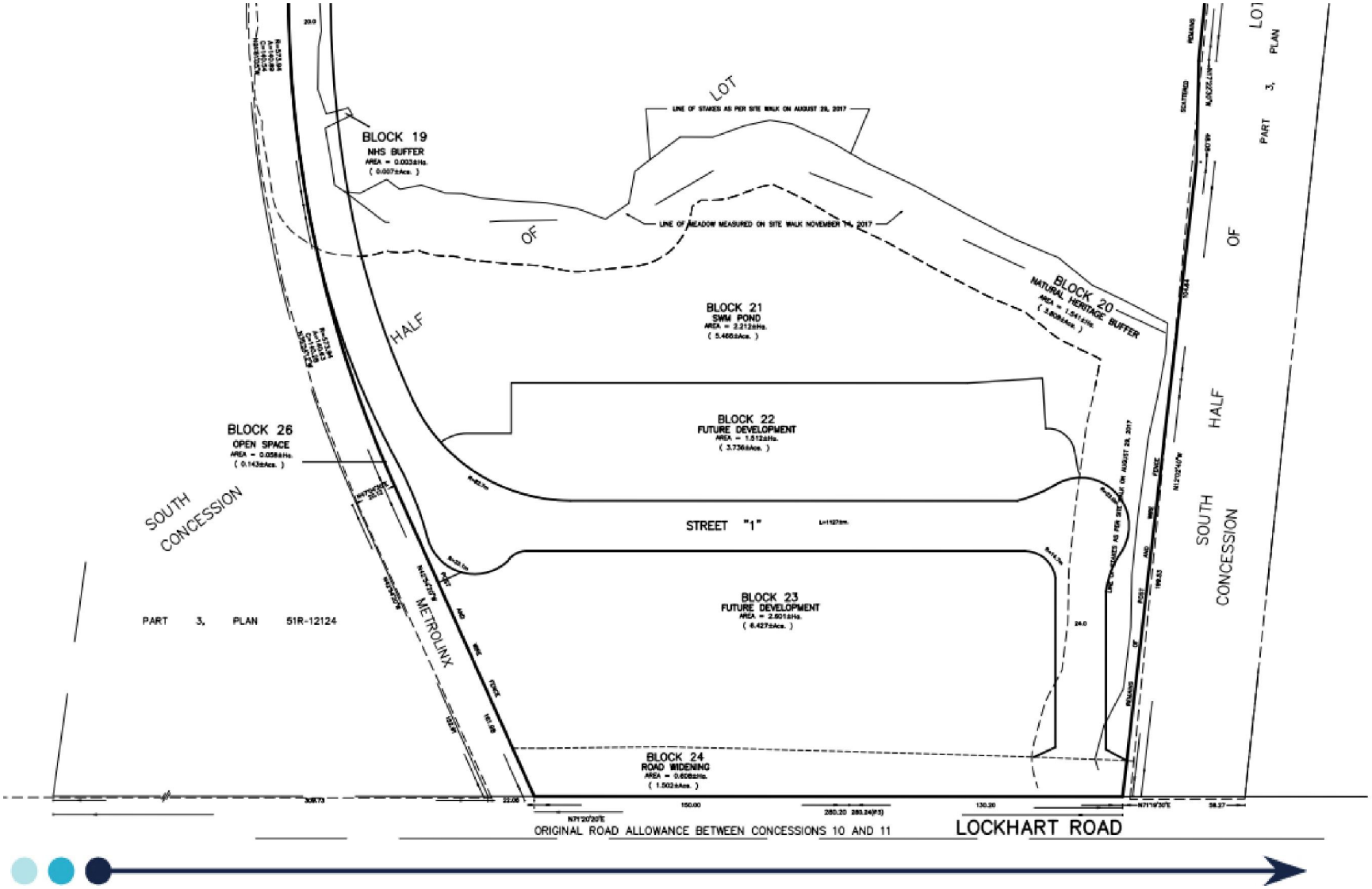


Potential LIDs – Phase 1

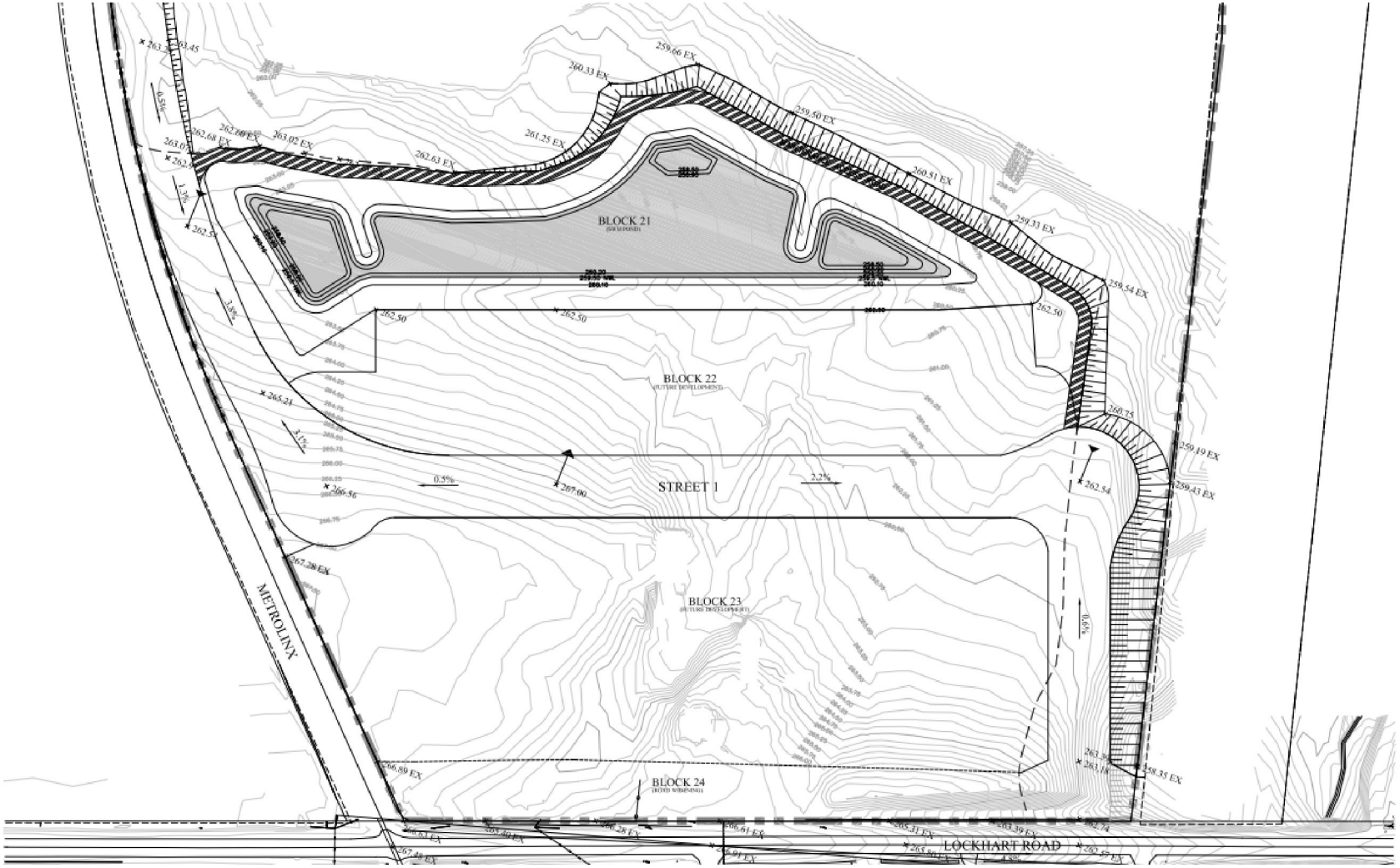


Proposed Conditions – Phase 3

Concept Plan – Phase 3



Preliminary Proposed Grading - Phase 3



Preliminary Proposed Drainage - Phase 3

Upstream Drainage – Phase 3

Land Use	Area (ha)
Recreation Centre Block	7.3
Crown	2.2
School Block	3.1
Yonge Street	2.2
ASA Lands	9.9
Proposed Development	8.2
Lockhart Road	2.6
Total	**35.4**

- The upstream drainage area to SWMF 5 is approximately 35% municipal lands.

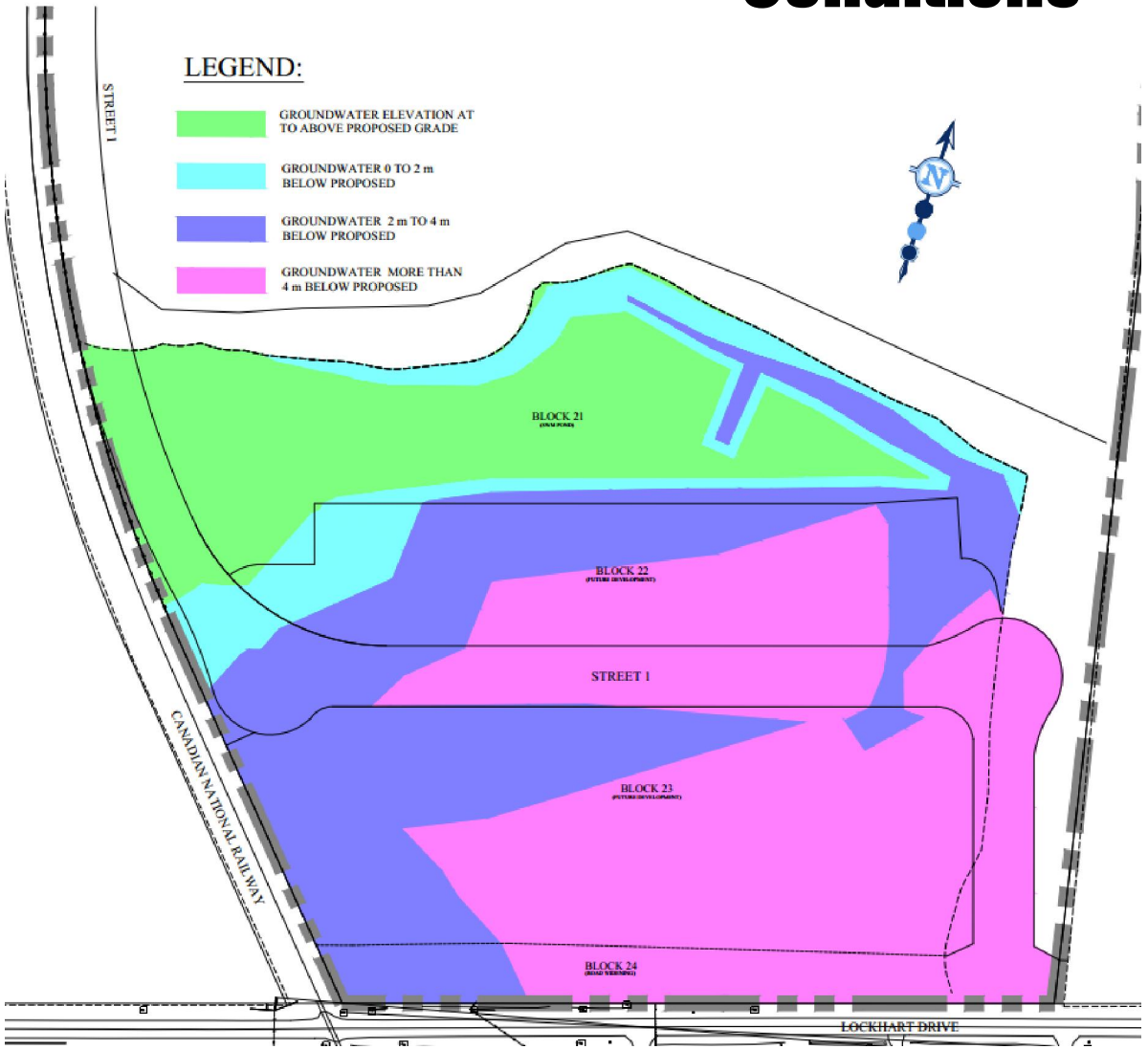
Upstream Drainage – Phase 3

Per SIS the filtration target is 20 mm and the infiltration target is 5 mm over impervious surfaces.

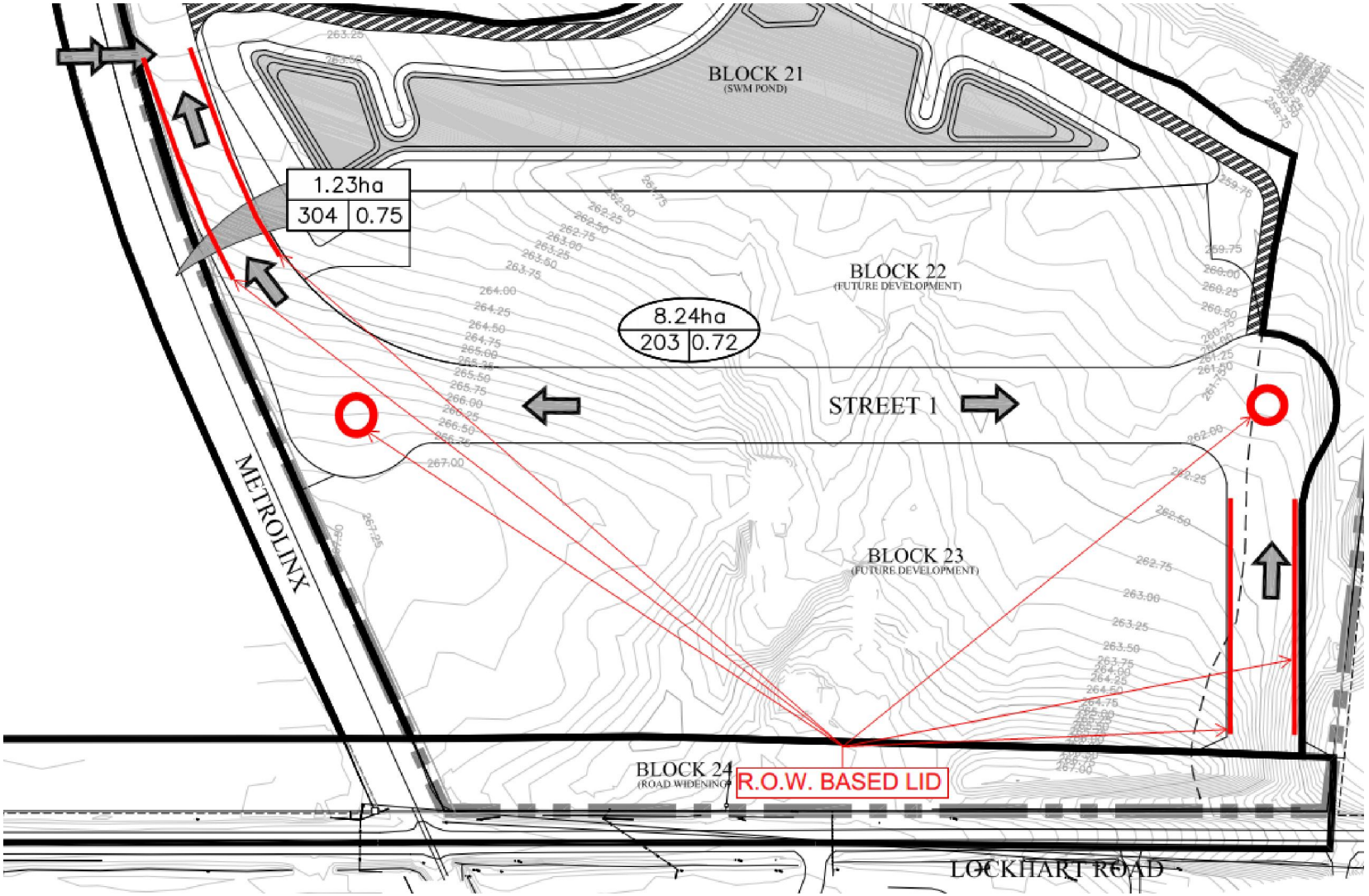
- Recreation Centre Block and School Block are assumed to provide 5 mm of infiltration on site.

- The ASA and Crown Lands assumed to provide and 5 mm of infiltration on site.

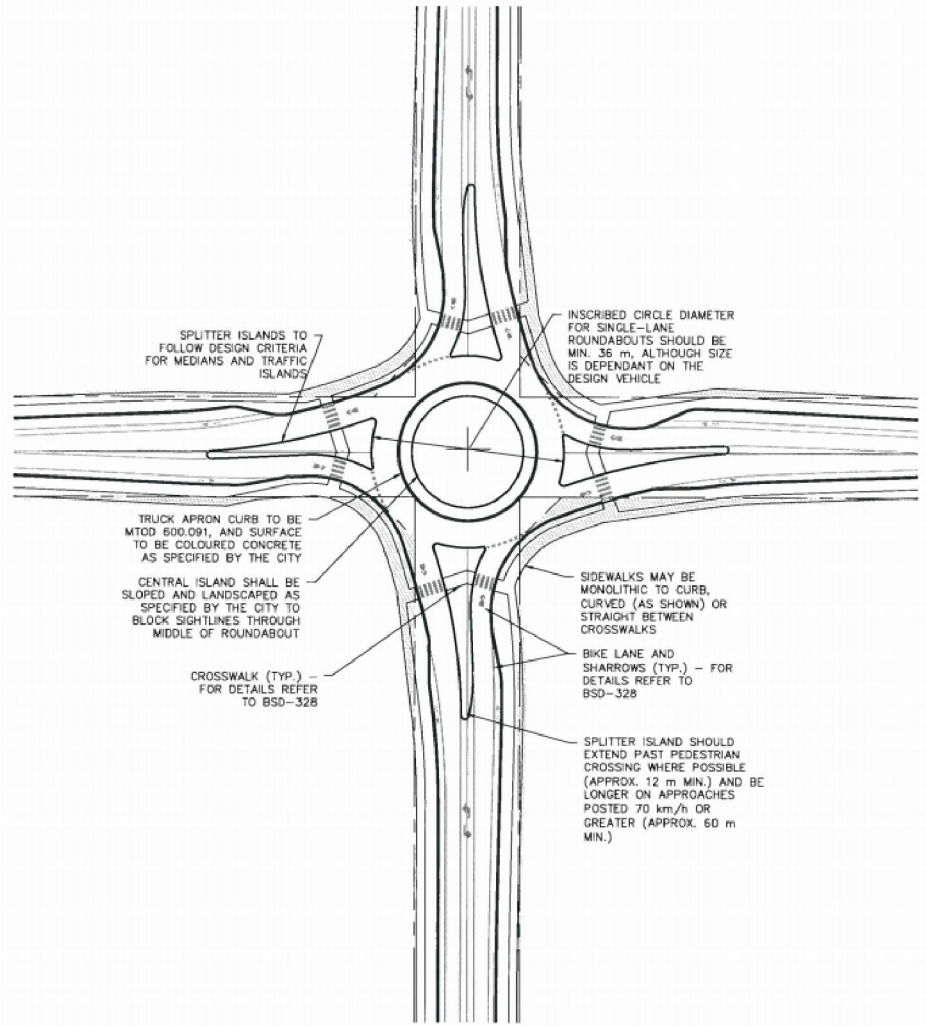
Proposed Groundwater Conditions – Phase 3



Potential LIDs – Phase 3



R.O.W. Based LID – Phase 3



Proposed Conditions
Feature Based Water Balance

Hydrogeological Study in Support of Draft Plan
November 2018

Table 5: Summary of Post-Development Infiltration Values (without LID measures)

Wetland Catchment	Post-Development Infiltration (m^3/year)	Post-Development Infiltration Deficit (m^3/year)	Percentage Change
3	11,300	4,500	-28%
4	15,300	14,500	-49%
6	1,500	2,200	-59%
TOTAL	**28,100**	**21,200**	

Next Steps

- Meeting Minutes will be circulated to all parties outlining agreed upon solutions.
- Minutes to be reviewed and final minutes to be signed by all parties.
- Additional information requested/required to be circulated ASAP for review alongside minutes.
- Accepted Stormwater Management Solution to be incorporated into Functional Servicing Report.

CASE STUDY

Sustainable Technologies
EVALUATION PROGRAM

Low Impact Development Series

The Queensway Sustainable Sidewalk Pilot Project

The Sustainable Sidewalk project was initiated as a solution to address the disturbance of street tree roots associated with the removal of sidewalks for utility cuts. A working group with participants from various City of Toronto Divisions, was formed in order to investigate sidewalk designs and underground structures that promoted tree growth while reducing the impact and restoration work associated with utility cuts. After much review the working group decided to use soil cells and in the fall of 2008 constructed The Queensway Sustainable Sidewalk Pilot Project. The design included two underground bioretention areas supporting four trees, constructed in the parking lay-by on the north side of the street. The site became the first installation of the Silva Cell system in the world where stormwater was routed into soil cells for the purpose of filtering the water and quality control. Stormwater management performance was evaluated along with street tree survival.

Two common reasons that street trees struggle are (i) they do not receive enough water and (ii) their roots struggle in tight soils which have been compacted to meet the loading requirements of sidewalks or parking areas. Soil cells like the Silva Cell system include frames that protect soils from compaction while still providing the structural support to accommodate the weight of vehicles. With the frames meeting the loading requirements, tree roots are able to grow freely in the uncompacted soil. To ensure the trees receive enough water, stormwater from the surrounding area can be directed into the system. The potential stormwater management benefits of the system will also increase over time as the trees grow, since larger trees will provide more opportunities for rainwater interception and evapotranspiration. The benefits include retention, and contaminant reduction through filtering particulate, biotic activity, and tree uptake.

Featured practice:

- Bioretention

Groups involved:

- City of Toronto: Transportation Services, Urban Forestry and City Planning
- Toronto Water
- Deep Root Canada
- Ryerson University

Construction date:

October 2008

STUDY SITE

Located in a primarily commercial area, the two biorentention systems are located in the parking lay-by between Moynes and Berl Avenues on north side of The Queensway. All of the surface runoff from the roadway and adjacent sidewalk - approximately 385 m^2 per system - can be directed to the bioretention systems though typical stormwater catchbasins. Unlike daylighted bioretention or rain gardens which take up approximately 6 to 10% of the drainage area, underground systems such as these require very little surface land area, leaving more space for public use. Despite this, their stormwater control performance is similar to surface installations, since key process - filtration, infiltration and evaporation - are still occuring below surface in the extensive soil system.

Figure 1. Study site location

Project Objectives

- Evaluate a solution that minimizes the impact of sidewalk removal during utility cuts on the health of street trees
- Research sustainable boulevard design to reduce time, impact and restoration needs associated with utility installations, improve tree health, and increase tree canopy
- Mitigate the negative effects of high stormwater runoff volumes and contaminant loads by using soil cells
- Determine the feasibility of adding stormwater management to a suspended pavement system
- Evaluate the effect of on- and off-line systems on tree health

PLANNING AND REGULATIONS

Urban trees are an important climate change adaptation tool as they help to moderate temperatures and reduce the impact of storm events on city infrastructure and the community. Current street tree health is often quite poor and many trees die before they can grow large enough to realize their full potential with respect to stormwater and urban heat island benefits. Barriers to street tree health have been identified as poor soil quality, insufficient soil and water quantities, salt contamination from roadways and sidewalks, damage during infrastructure replacement, and reduced water availability due to evaporation from hot pavement surfaces. While not a formal policy when this project began, the City's street tree survival initiatives are referenced in many policies and reports. In 2004, Urban Forestry Services started promoting the concept of a working tree, highlighting the environmental and social benefits of street trees which, from an economic perspective, pay for themselves many times over.

While Urban Forestry Services manages the City's street trees, this project required multiple Divisions to work collaboratively to fund and implement the project. The working group consisted of members from City Planning, Transportation Services, Urban Forestry, Urban Planning and Toronto Water. Transportation Services funded the engineering works, City Planning funded the soil cells, and Toronto Water funded the stormwater works and monitoring. The group enlisted Deep Root Canada Corporation, the Canadian supplier of Silva Cells, to provide technical support and design the system based on the catchment area and the rainfall event they wanted to manage. The design provides for adequate soil volumes for the trees, incorporates the use of captured rainwater for their irrigatation, and satisfies the City's structural loading requirements.

DESIGN

The design uses Silva Cells for large bioretention systems underneath the sidewalks. The soil in the bioretention systems promote healthy root growth and adequate room for the roots to spread as the tree grows. Though designed and built in the same way the two underground bioretention systems at the Queensway Sustainable Sidewalk became a side-by-side comparison of two different design options after the trees had established themselves. The east bioretention treats and infiltrates stormwater from the adjacent road, while the west bioretenion only receives water from the opening at the surface around the tree trunk. This comparison allows for evaluation of the effect of both strategies on tree health, and quantification of the added stormwater management benefit of the first option. Through rainfall interception, evapotranspiration, and infiltration, street trees reduce total runoff volumes and delay peak flows to the sewer system. Plus the resulting exfiltration from the cells into the surrounding soils - the Queensway study cells are isolated from the surrounding soils (bathtubs essentially) for the study but that is not the current standard design.

Figure 2. Silva Cell "top" deck prior to organic layer and screenings for pavers. (Image courtesy of City of Toronto)

Figure 3. Trees in fall 2014, left is the west bioretention which were isolated from road run-off and on the right is the east bioretention which remained on-line. (Image courtesy of Deep Root Canada)

Bioretention

Two sets of underground bioretention systems were installed using an 800 mm deep Silva Cell system around existing utilities. For each biroetention, one double catch basin was constructed to divert road runoff into the cells. Stormwater runoff enters the first catchbasin and is directed to the top of the underground bioretention cells and is distributed through the system by a perforated pipe which sits on top of the soil. This allows the water to infiltrate through the soil until it reaches the bottom of the system. If the system reaches its storage capacity the catchbasin would fill up and overflow. The excess flow travels downstream to the first set of standard catchbasins connected directly to the storm sewer. The stormwater collected in the Silva Cell eventually flows to the storm sewer - but only after some volume reduction (root uptake) and soil wetting. The outlet is a 3/4 inch opening versus an 8 inch inlet pipe. This restriction allows for extended contact time for biotic activity and tree uptake and retention with slow release of stormwater to the storm sewer which results in a reduced impact to the receiving waters (both volume and velocity).

Figure 4. Distribution pipe on top of soil (image courtesy of City of Toronto)

The trees are two American Liberty elms (*Ulmus americana 'libertas'*) and two Freeman hybrid maples (*Acer x fremanii*). Silva Cell designs aim for 30 m^3 of soil per tree, but in a shared cell this may sometimes be reduced to 15 m^3 per tree. At this site each tree has approximately 16 m^3 of bioretention soil - a 64 m^3 combined total for the site. The soil mix is 80% sand, 20% unscreened topsoil, and has a void space of 10-20%.

Monitoring

Ryerson University researchers were retained to evaluate the stormwater performance of the system, designing a monitoring program and equipment layout plan prior to construction. An impermeable membrane was installed in order to facilitate monitoring - an element that would not normally be included in a system of this kind. Prior to the monitoring program commencing in 2012 the west bioretention cells catchbasins were sealed, isolating them from road runoff to act as a control against the east set. This was done in order to evaluate its stormwater management performance as well as the effect of road runoff on tree health.

CONSTRUCTION AND COMMISSIONING

In the fall of 2008 construction took place over three days with a crew of five. Pave-Al excavated the area for the trenches and Silva Cell installed the boxes. The City completed the surface works as part of the road improvement projects, including granite sidewalks and seasonal flower beds. Since it was a retrofit, the design had to work around existing infrastructure, such as concrete ducts for telecommunications and gas laterals. Due to the modular and open structure of the Silva Cell there was no disruption to exisiting infrastructure during construction.

OPERATION AND MAINTENANCE

Proper maintenance of LID practices is crucial for optimizing performance, cost effectiveness, and aesthetics, especially during the initial establishment of vegetation. In some cases it is necessary to follow-up with the contractor to ensure that the activities specified within the maintenance agreement are taking place.

The estimated design life of the Silva Cell is over 100 years. When properly designed and installed, the units themselves are

not expected to require maintenance within their design life.

Compared to a daylighted bioretention set-up the maintenance is consideraly less. In a daylighted system all the total suspended solids (TSS) build up on the surface creating a potential problem with sediment layer/barrier reducing infilration. To restore infiltration this film must be scraped off. While with the underground system the TSS is managed in the sump of the catchbasin. Therefore the only maintenance is catchbasin cleaning which can be done at the same time as other typical catchbasins in the area which is based on the TSS loads for the area. Initially the City believe they would need to maintain the distribution pipe on a regular basis but after blowing it out a few times they have decided it is not needed. Experience from other sites has indicated that emergency repairs for other infrastructure in the area will cost marginally more at soil cell sites compared to the typical street tree designs.

ACHIEVEMENTS

Increased Urban Tree Canopy. The pilot project demonstrated that the system can be used to increase the urban street canopy while using minimal surface area.

Stormwater management benefits. The city used the Silva Cell system to achieve the improved stormwater quality and reduced volumes provided by this type of street tree system.

Functional design. The location and design promoted LID use in an urban setting without the increased maintenance cost associated with daylighted bioretention swales

Joint partnership. All partners worked together to ensure the success of this project.

LESSONS LEARNED

- Trees that continued to receive stormwater runoff showed signs of improved health compared to isolated trees and displayed no negative impacts from choloride even though runoff is directed to the soil cells and root system
- Monitoring results have shown that the soils were able to reduce TSS and heavy metal concentrations in the road run off that entered the system. The TSS removal rate exceeded the 80% TSS reduction that most regulators require and was close to 90%. Also the outlet flow meter did not show any flow release after a rainfall of 3 mm that was preceded by a period of no rain.
- Post construction monitoring can evaluate when technologies are most effective and when they fail and can provide recommendations on how to improve technologies and implementation plans.
- Losses in soil porosity will not occur since tree root growth and die-off will continue to provide porosity.
- Ideally the inlet should be at the upstream end of the system to ensure water is evenly distributed. If the inlet must be in the middle of the system or when there is a grade issue, the use of a bed of clear crushed aggregate around the distribution pipe can be used to change the grade as needed.
- Water was not running in the upstream portion of the distribution pipe which could have been a result of the pipe settling due to the weight of the pipe. An elbow was installed in the catchbasin to compensate for this issue to ensure that water reaches all of the soil before it overflows into the catchbasin. To avoid this issue at new installations, larger distribution pipes (6"- 10") are placed on top of a Silva Cells deck to evenly support the weight of the pipe. Additionally, this design provides the additional capacity to change the grade of the pipe independent of the slope of the street to keep it flat.
- In-line cleanouts are easier to maintain, as cleanouts with corners catch more material and make it more difficult to create the force needed to flush the distribution pipes clean.
- Soil percolation rate can be a limiting factor in the amount of water into the system. By designing a system with a void space inside the Silva Cell above the soil, a larger storage area is created, allowing for more even distribution of water to the soil surface and more opportunity for infiltration.
- A trash hood/elbow on the inlet pipe in the catchbasin could further reduce the need for maintenance of the system's pipes by reducing the influent of floatables and other materials that could cause blockages in the distribution pipe

This communication has been prepared by the Toronto and Region Conservation Authority under the Sustainable Technologies Evaluation Program (STEP). Funding support was provided by Region of Peel, Region of York, City of Toronto, and the Government of Canada's Great Lakes Sustainability Fund. The contents of this case study do not necessarily represent the policies of the supporting agencies and funding does not indicate an endorsement of the contents.

Visit us at www.sustainabletechnologies.ca for more information about STEP and our studies related to urban runoff and low impact development.

About STEP

The water component of the Sustainable Technologies Evaluation Program (STEP) is a partnership between Toronto and Region Conservation Authority, Credit Valley Conservation, and Lake Simcoe Region Conservation Authority. Contact us at STEP@trca.on.ca.

Toronto and Region Conservation Authority

APPENDIX E

SANITARY FLOW CALCULATIONS

Sanitary Design Sheet
750 Lockhart Road

Ballymore - Barrie

Minimum Sewer Diameter (mm) =	**200**	**Avg. Domestic Flow (l/cap/day) =**	**364**
Mannings n =	**0.013**	**Infiltration Rate (l/s/ha) =**	**0.1**
Minimum Velocity (m/s) =	**0.60**	**Max. Harmon Peaking Factor =**	**3.8**
Maximum Velocity (m/s) =	**3**	**Min. Harmon Peaking Factor =**	**2.0**
Minimum Pipe Slope (%) =	**0.40**	**NOMINAL PIPE SIZE USED**	

Project: 750 Lockhart Road
Project No. 1964
Date: 20-Mar-18
Designed By: P.A.T.
Reviewed By: J.M.P.

P:\1964 750 Lockhart Road - Ballymore - Barrie\Design\Pipe Design\Sanitary\[1964-Preliminary Sanitary Sheet Design.xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA				
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY
	FROM	TO	(ha)	(ha)	(#)	PER UNIT (p/unit)	PER HA (p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)
SERVICING EASEMENT-YONGE STREET	EXT2	EXT1	0	0	0			0	0	2.2	2.2	0	0.1	0	0.2	0	0.0	0.0	3.80	0.0	0.2	0.4	30.0	300	0.40	61.1	0.86
SERVICING EASEMENT	EXT1	SAN1	14.87	14.87	1487	1.67		2483.29	2483.29	13.47	15.67	0	0.324	0	3.1	2483.29	10.5	10.5	3.51	36.7	4.6	44.4	20.0	300	0.40	61.1	0.86
KNEESHAW DRIVE	SAN2	SAN1	0	0	563	1.70		959.32	959.32	0	0	0	0	0	0.0	959.32	4.0	4.0	3.80	15.4	0.0	15.4	20.0	200	0.40	20.7	0.66
KNEESHAW DRIVE	SAN1	SAN3	0	14.87	0			0	3442.61	1.04	16.71	0	0.1	0	3.2	3442.61	0.0	14.5	3.39	49.2	4.7	57.0	100.0	375	0.40	110.8	1.00
KNEESHAW DRIVE	SAN3	SAN13	1.62	16.49	45	1.67		75.15	3517.76	0	16.71	0	0	0	3.3	3517.76	0.3	14.8	3.38	50.1	4.7	58.1	100.0	375	0.40	110.8	1.00

APPENDIX F

WATER DISTRIBUTION ANALYSIS

SCS consulting group ltd

Municipal Engineering Solutions

March 18, 2019 Project No. 17002-51

Sent via email
Ms. Sharon Dionne MCIP RPP
Ballymore Development (Barrie) Corp. C/O Ballymore Development Corporation
12840 Yonge Street, Suite 200
Richmond Hill, Ontario
L4E 4H1

Subject: Ballymore Lockhart Watermain Analysis
City of Barrie

Dear Ms. Sharon Dionne,

We are pleased to submit our report entitled "Ballymore Lockhart Watermain Analysis" outlining the results of our water distribution analysis for a residential development in the City of Barrie.

This development was incorporated into an Infowater sub-model of the development site and modeled utilizing the design information provided to Municipal Engineering Solutions. The findings of our analysis are summarized in the following report.

We trust you find this report satisfactory. Should you have any questions or require further clarification, please call.

Yours truly,

Municipal Engineering Solutions

John C. Bourrie

Per: John C. Bourrie, P.Eng.

/LMC

File Location: D:\Projects\2019\19-001 Ballymore Barrie 17002-51\3.0 Report\Final report\17002-51_Ballymore Lockhart Watermain Analysis_20190.docx

55 Gilbank Drive, Aurora, Ontario L4G 6H9
Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

BALLYMORE LOCKHART

WATERMAIN ANALYSIS

PREPARED BY:

MUNICIPAL ENGINEERING SOLUTIONS

FOR:

BALLYMORE DEVELOPMENT (BARRIE) CORP.
March 2019

Project Number: 17002-51

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APPENDICES

Appendix A Demands
Appendix B Model Results

Section 1 – INTRODUCTION

Municipal Engineering Solutions ("MES") was retained by Ballymore Development (Barrie) Corp. to conduct a hydraulic water analysis for the proposed Ballymore Lockhart Development located in the City of Barrie. As part of this hydraulic assessment MES was requested to undertake the following:

1. Calculate/verify water demands for the proposed development using City of Barrie, provincial and industry design standards;
2. Add the subject watermains/development/boundary information to development water model;
3. Run the model to size the subject mains to achieve service criteria during Average Day, and fire flow during Maximum Day demand; and
4. Prepare a Report summarizing the modeling results for agency review and design purposes.

1.1 Development Background

The Ballymore Lockhart site is located on the north side of Lockhart Road, east of Yonge Street in the City of Barrie. The residential development consists of 123 townhomes and 346 apartments. The demands for the site are shown in **Appendix A**. The proposed development is shown below on **Figure 1**.

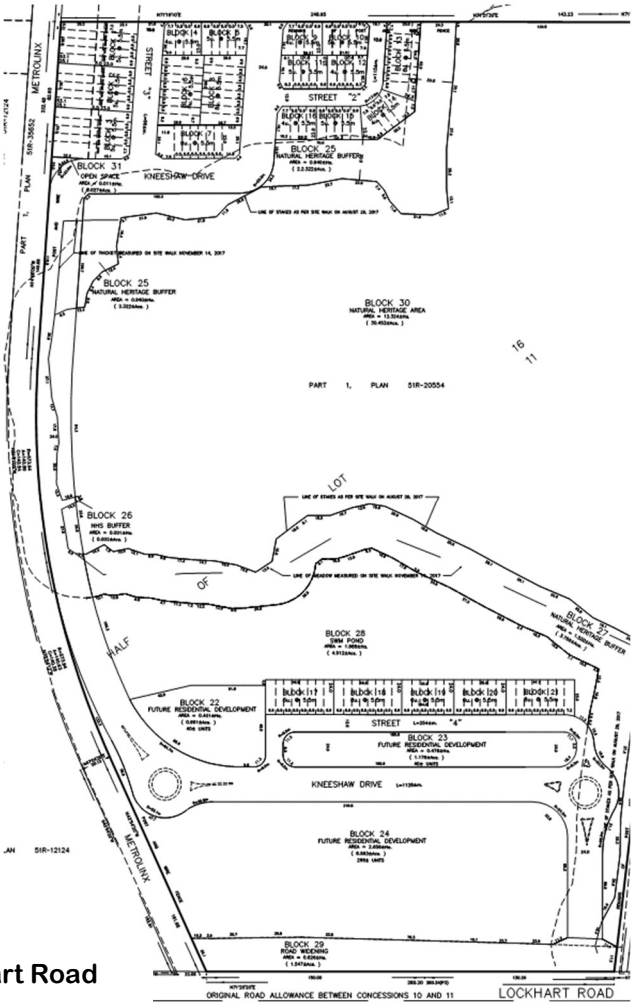


Figure 1 - Proposed Ballymore Lockhart Development

Section 2 – WATERMAIN DESIGN CRITERIA

The design criteria utilized to estimate the water demands for the hydraulic water model follows general industry standards and is calculated using the design criteria and guidelines outlined in the City of Barrie Water Transmission & Distribution Policies Design Guidelines, the Ministry of the Environment Conservation and Parks (MECP) Watermain Design Criteria, and the Fire Underwriters Survey.

The following sections summarize the specific design criteria used to carry out the hydraulic watermain assessment for this development.

2.1 Equivalent Population Densities & Water Design Factors

To calculate the equivalent population and water design factors for this development MES used City of Barrie standard population densities as noted in the *"Water Transmission & Distribution Policies Design Guidelines Dec 2017"* and *"Sanitary Sewage Collection System Policies and Design Guidelines Oct 2017"*. **Table 1** summarizes the population densities and **Table 2** summarizes the average daily demand and peaking factors used for this analysis.

Table 1 – Equivalent Population Density

Type of Development	Equivalent Population (Persons/Unit)
Single Family	3.13
Townhouse	2.34
Apartment	1.67

Source: Sanitary Sewage Collection System Policies & Design Guidelines Oct 2017

Table 2 - Water Design Factors

Type of Development	Average Daily Demand (L per capita)	Maximum Daily Demand Peaking Factor
Residential & ICI	225	2.5

Source: Water Transmission & Distribution Policies & Design Guidelines Dec 2017, Sanitary Sewage Collection System Policies & Design Guidelines Oct 2017 and MECP

Section 3 –FLOW DEMANDS

Utilizing the equivalent population data from Table 1 and the corresponding Average Day and Maximum Day data from Table 2 the water demands for this development were calculated.

3.1 Equivalent Population Flow Demands

The calculated demands for the development are summarized in **Table 3**. For additional details on the development water demands and assigned demand nodes used in the water model see **Appendix A**.

Table 3 – Water Demand for Ballymore Lockhart Development

	Average Day Demand (L/S)	Maximum Day Demand (L/S)
Ballymore Lockhart	2.25	5.64

3.2 Fire Flow Demands

The fire demands for this development based on the City of Barrie Engineering Design Standards & Criteria, December 2017. The City's 'Preferred' fire flows are shown in **Table 4**.

Table 4 – City Criteria Fire Flow Requirements

Type of Development	Fire Flow (L/S)
Single Family Homes	76
Townhomes	None
Institutional/Convenience Commercial	114
Industrial/ Commercial	152
Downtown Commercial	189

Source: City of Barrie Engineering Design Standards & Criteria, December 2017

It should be noted that the site will comprise of townhomes and apartments and the City's criteria does not have values for townhomes or apartment units. Many municipalities are moving towards using the Fire Underwriters Survey ("FUS") formula for calculating the fire flow requirements but the formula requires building details that may not be available at the early stages of planning. In the absence of building design information, the FUS does have some minimum flow recommendations based on exposure distances between homes. The most recent City of Barrie "*Water Storage and Distribution Master Plan Oct 2013*" reviewed the City's fire flows. While the report did breakdown the types of land use differently and increased the flows for ICI developments, there still was no value for townhomes so the minimum FUS values have been used within this report for townhomes and mixed use.

In the absence of complete City fire flow requirements, the following fire flows have been assumed for this report are shown in **Table 5** with the source noted.

Table 5 - Fire Flow Requirements

Type of Development	Fire Flow (L/S)
Single Family Homes – Design Criteria	76
Townhomes - FUS	133* (Min.)
Apartments – Master Plan	117*
Institutional – Master Plan	167
Commercial/Mixed Use – Master Plan	283*

*value assumed for modeling purposes, required flow to be confirmed when additional building information known.

Source: Engineering Design Standards & Criteria, December 2017, Fire Underwriters Survey, Water Storage and Distribution Master Plan, Oct 2013

3.3 External Demands

The InfoWater model provided by the City contained external demands.

Section 4 – OTHER SYSTEM REQUIREMENTS

4.1 System Pressure Requirements

In addition to meeting the various flow requirements, the system must also satisfy minimum and maximum pressure requirements as outlined by the City of Barrie. The City's pressure requirements are outlined in the Design Criteria and stipulate the following:

1. The minimum system pressure shall not be less than 140 kPa (20 psi) at any point in the water system under fire flow conditions.

2. The minimum pressure shall be 350 kPa (50 psi).
3. The maximum pressure shall be 550 kPa (80 psi). Pressure reducing valves may need to be installed on individual services.

4.2 Watermain Sizing

The City of Barrie also stipulates that all watermains are adequately sized to maintain demand flows at the required pressures without causing excessive energy loss or result in water quality decay. The watermain system must therefore be designed to accommodate the Maximum day plus fire demand.

For distribution systems providing fire protection the minimum pipe size shall be 150 mm diameter in accordance with Ministry of the Environment Conservation and Parks (MOECP) and NFPA requirements.

To provide appropriate fire protection, reliable supply and pressures the water distribution system should be looped wherever possible to improve supply security and water quality and also have two connections to the existing system where possible.

4.3 Watermain C-Factor

In designing and modeling of the pipes the Coefficient of Roughness (C-Factor) factors are not mentioned in the design criteria. All pipe sizes in the provided water model were assigned the same C-Factor of 130. As all of the pipe in the new development will be PVC, this C-Factor was used for the new pipes. The Coefficient of Roughness assigned to each pipe size in summarized in **Table 6** below.

Table 6 - Hazen-Williams Coefficient of Roughness (C-Factors)

Size of Pipe (Diameter in mm)	Coefficient of Roughness (C)
150 mm	130
200 mm to 250 mm	130
Greater Than 300 mm	130

Source: City of Barrie Water Model

Section 5 – ANALYSIS & MODELING RESULTS

To conduct the hydraulic water analysis for the proposed development the water demands were estimated by MES using the design criteria previously discussed and incorporated the demands into an InfoWater model provided by the City. The following sections discusses the model setup and results.

5.1 Model Setup

The City of Barrie provided an InfoWater model with existing and future planning scenarios for average day and maximum day demands for the 2S and 3S zones combined. It was assumed that supply to site would come from the watermains in the development to the north on the continuation of Streets '2', '3' and Kneeshaw. Timing of the other external watermains was based on the timing in the model except for the future mid-block watermain from Yonge Street (pipe ANNEX_12130 with construction in 2013 in the City's original model) which was assumed to be completed under the future conditions. The townhome units on the north side of the Ballymore site would be on a looped water system while the units on the southern portion would be supplied via a single supply along Kneeshaw Drive until the watermain on Lockhart is constructed.

The Ballymore development is located within the City of Barrie water system in the 2S Zone that has top water elevation of 308 m. Elevations within the development range from 258 m to 266 m and should be adequately serviced by this zone.

The development was modeled under two planning scenarios – existing and future for average day and maximum day demands.

New nodes were created to add the flow demands and the elevation information from the development to an Infowater hydraulic water distribution model created for the development. Friction factor for the pipes were assigned according to Table 6.

5.2 Watermain Sizing and System Pressures

The analysis was conducted under existing and future servicing conditions for Average Day, Maximum Day and Maximum day plus Fire demands to size the watermains and meet the pressure requirements. The pipe size and layout are shown in **Appendix B**.

The Ballymore Development is located on the north side of Lockhart Road. The are no existing watermains in the area so the following pipes from the north are required to provide supply to the development and were included in the existing scenario:

- 200 mm watermains along Streets '2' & '3';
- 300 mm watermain along Kneeshaw Drive.

The future model provided additional connections to the future watermains along Lockhart Drive and to Yonge Street as shown in the schematics.

Modeled service pressures are summarized in **Table 7**. It should be noted that the City does not request minimum hour or peak hour scenarios to be examined so pressure may be higher under low demand periods and lower during high demand periods.

Fire flow demand can be met under maximum day conditions under existing and future conditions based on the assumptions outlined in this report.

Detailed pipe and node tables for the various scenarios modelled are attached to this report in **Appendix B**.

Table 7 - Modeled Service Pressures

Scenario	Average Day	Maximum Day	Max. Day + Fire
Existing	60.2 to 70.7 psi (415 to 487 kPa)	59.3 to 69.9 psi (409 to 482 kPa)	166 to 279 L/s @ 20 psi (140 kPa)
Future	62.8 to 73.3 psi (433 to 505 kPa)	60.9 to 71.5 psi (420 to 493 kPa)	228 to 741 L/s @ 20 psi (140 kPa)

Section 6 – CONCLUSIONS/RECOMMENDATIONS

The proposed watermain layout for the Ballymore Lockhart development can achieve hydraulic requirements as prescribed by the City of Barrie watermain design criteria as summarized below.

- The service pressures are expected to range from 59.3 to 70.7 psi (409 to 487 kPa) under existing conditions and 60.9 to 73.3 psi (420 to 505 kPa) under future conditions.
- It was assumed that under interim conditions that supply would be provided by the watermains from the development to the north on the continuation of Streets '2', '3' and Kneeshaw. The modeling must be reviewed as additional information and timing becomes available for the future residential properties to the north of the

Ballymore development if the timing is different from this assumption. As there are no existing nearby watermains to supply the site, this development cannot proceed without the external watermains being constructed.

- Pressures may be below the City's preferred minimum pressure of 50 psi (345 kPa) during peak hour conditions.
- The available fire flow within the site meets or exceeds the fire flow demands as noted in Table 5 at the minimum pressure of 20 psi (140 kPa) based on the proposed watermain configuration under both existing and future conditions.
- Until the watermain along Lockhart Drive is constructed and the system looped, there will be many units, including apartments, supplied by a single feed. While the single feed does adequately supply all of the development, it is recommended that the Kneeshaw watermain be connected to the Lockhart watermain as soon as it becomes available and that the number of units to be serviced off the single supply be discussed with the City.
- Should it be determined, based on the final site, building design and discussions with the City, that greater fire flows than those noted in Table 5 are required or fire flows must be calculated using the Fire Underwriters survey formula, the fire flows must be reviewed and updated where necessary. Fire walls and/or sprinkler systems will likely be required for the FUS calculated flow for the townhomes, apartments, mixed use and institutional blocks to meet the available modeled flow.
- Required fire flows for all proposed buildings must be confirmed with the appropriate designer (architect or mechanical designer) as well as the City to determine the appropriate level of fire protection required.
- Confirmation and/or changes to the criteria should also be provided to and reviewed with MES prior to the finalization of the detailed design drawings and construction of the watermain system. Final design parameters are to be provided to MES prior to construction for further review to confirm that the actual (final) site conditions and building design(s) reflect those modeled by MES within this report.
- This report, including all modeling assumptions used, is to be submitted to and reviewed by the water operating authority (municipality) to confirm that the modeling parameters used are acceptable to the operating authority and/or confirm if modified domestic or fire flow requirements are required or should be implemented for this particular development.

Appendix A

Demands

Barrie Design Criteria

Water Transmission & Distribution Policies Design Guidelines Dec 2017 (unless otherwise stated)

Equivalent Population by Unit

(Sanitary Sewage Collection System Policies and Design Guidelines Oct 2017 for population and Average Day Demand)

Type of Development	Equivalent Population Density *(Person/Unit)*
Single Family or Semi-Detached	3.13
Townhouse	2.34
Apartment	1.67

Equivalent Population by Area

Type of Development	Equivalent Population Density *(Person/Hectare)*	Average Day Demands *(m3/ha/day)*
Single Family, Duplex, Semis	78.25	
Triplex and 4-plex	81.9	
Townhouse	110	
Apartments (>6 stories)	500	
Light Commercial Areas	124	28.00
Community Services	124	28.00
Light Industrial Areas	155	35.00
Hospitals (persons/bed)		

Water Design Factors

Average Daily Demand (m3/capita)	0.225	
Maximum Daily Demand P.F.	2.5	MOECC
Maximum Hourly Demand P.F.		
Residential		
I/C/I		

Cofficient of Roughness

Size of Pipe (mm Dia.)	Coefficient of Roughness (C)
150	130
200-250	130
300-600	130
Over 600	130

Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Designed for Fire Protection	150
Domestic supply only	75

Working Pressures

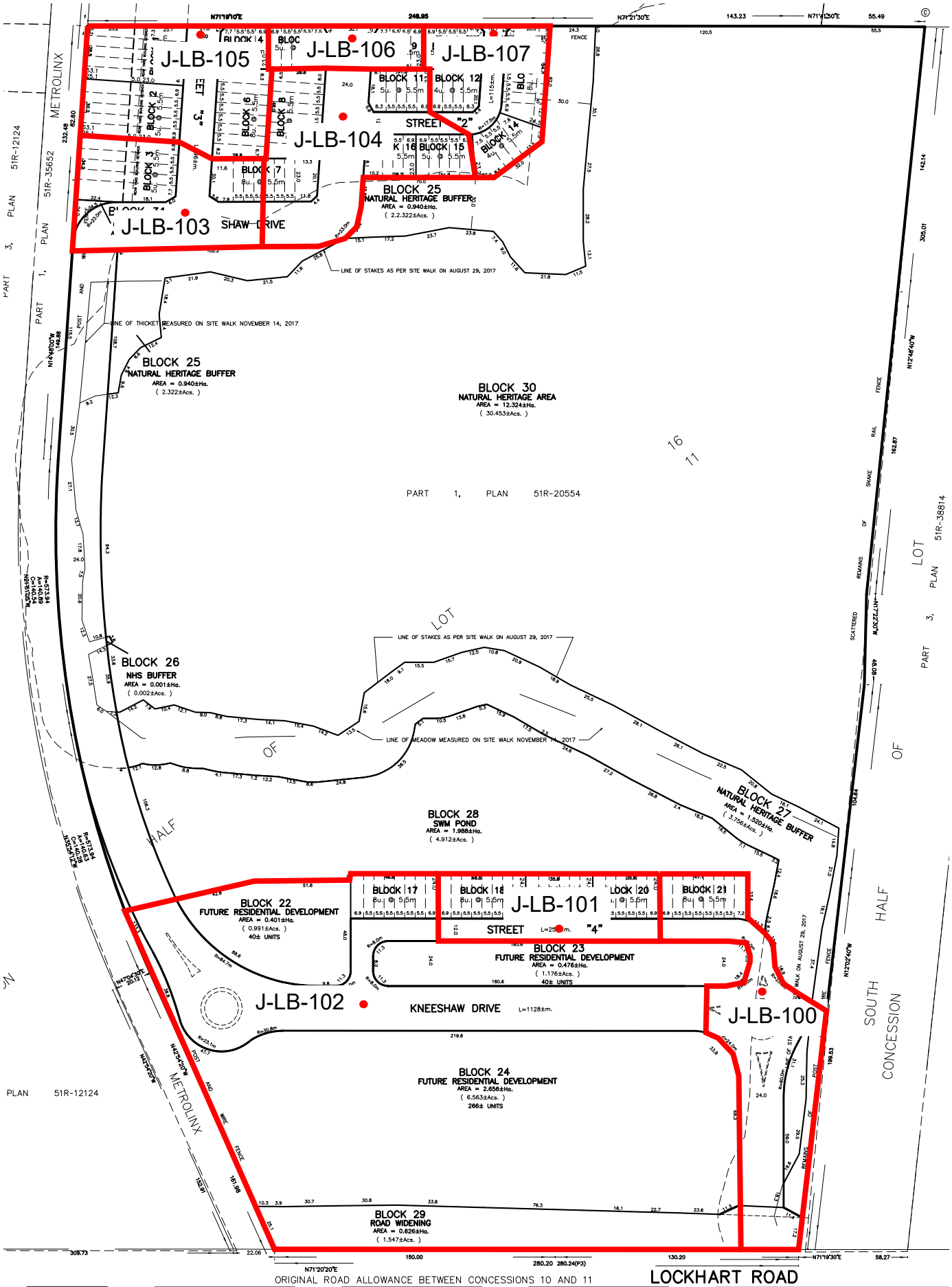
Parameter	Pressure
Normal Condition	
Minimum Pressure	345kPa (50 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum	620 kPa (90 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Water Demand
Ballymore Lockhart, Innisfil, ON
February 20, 2019

Municipal Engineering Solutions

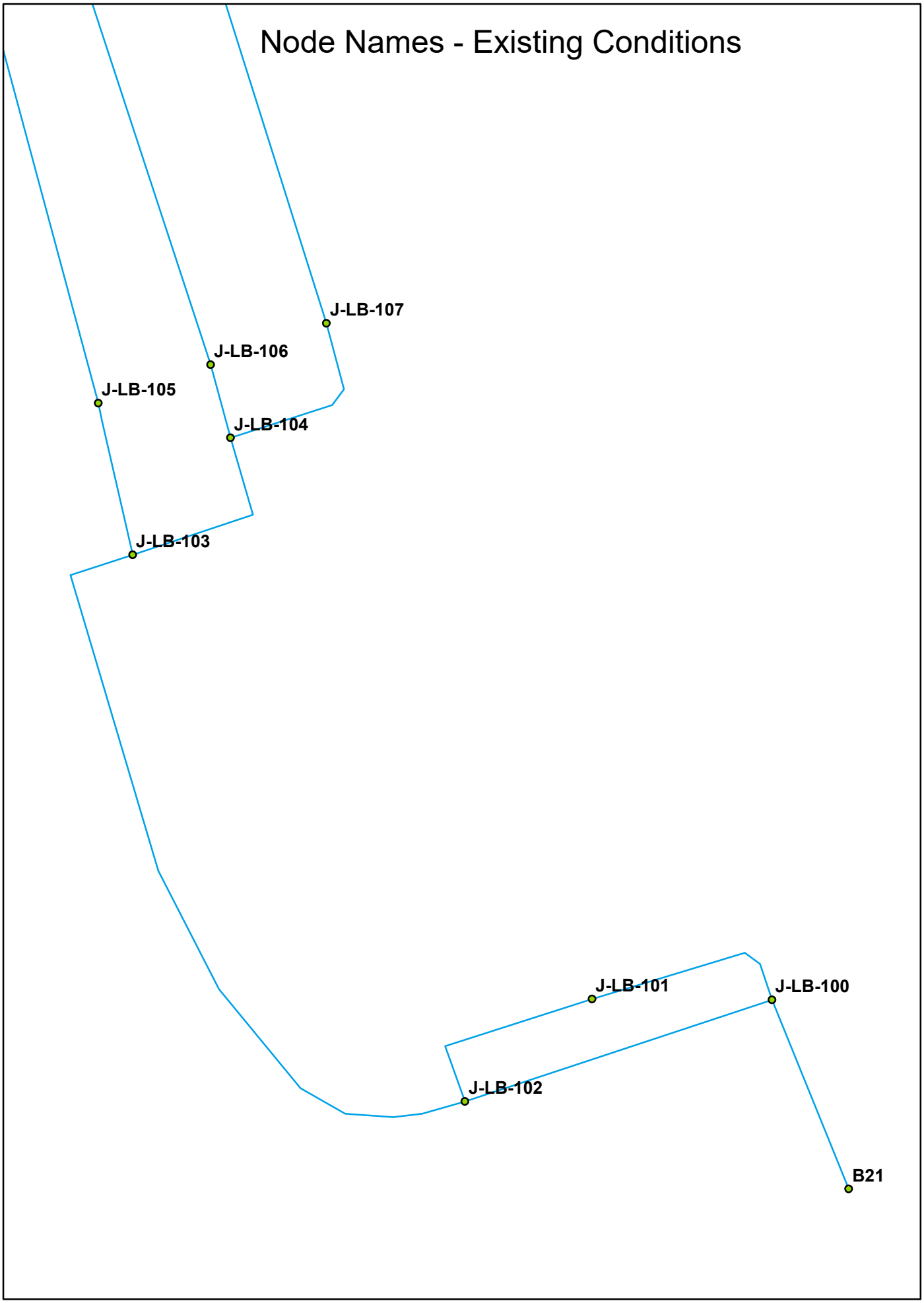
Node	Phase	Elevation	Type of Development						Equivalent Population		Demands		
			Single Family	Townhouse	Apartments	Mixed Use	Commercial	Institutional	Total Population	Total Population	ADD	MDD	Fire Flow Demands
		(m)	*(units)*	*(units)*	*(units)*	(ha)	*(ha)*	*(ha)*	*(Residential)*	*(ICI)*	*(L/s)*	*(L/s)*	*(L/s)*
J-LB-100		263.09		8					19	0	0.05	0.12	133
J-LB-101		263.91		20					47	0	0.12	0.30	133
J-LB-102		265.45		8	346				597	0	1.55	3.88	133
J-LB-103		262.45		9					21	0	0.05	0.14	133
J-LB-104		260.72		26					61	0	0.16	0.40	133
J-LB-105		261.50		22					51	0	0.13	0.34	133
J-LB-106		260.40		9					21	0	0.05	0.14	133
J-LB-107		258.04		21					49	0	0.13	0.32	133
B21		262.57							0	0	0.00	0.00	133
Total			**0**	**123**	**346**	**0.00**	**0.00**	**0.00**	**866**	**0**	**2.25**	**5.64**	

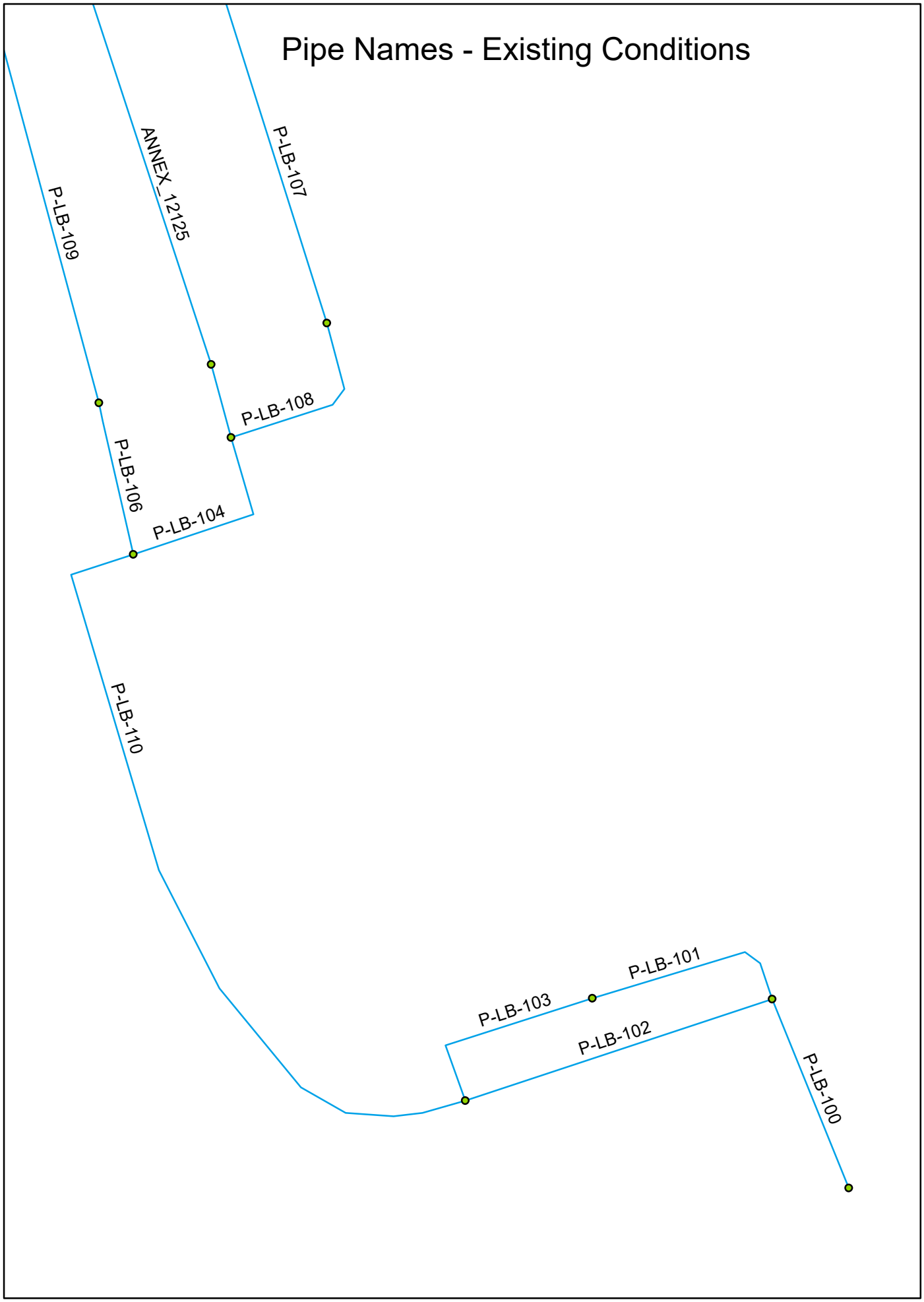
Demand Layout



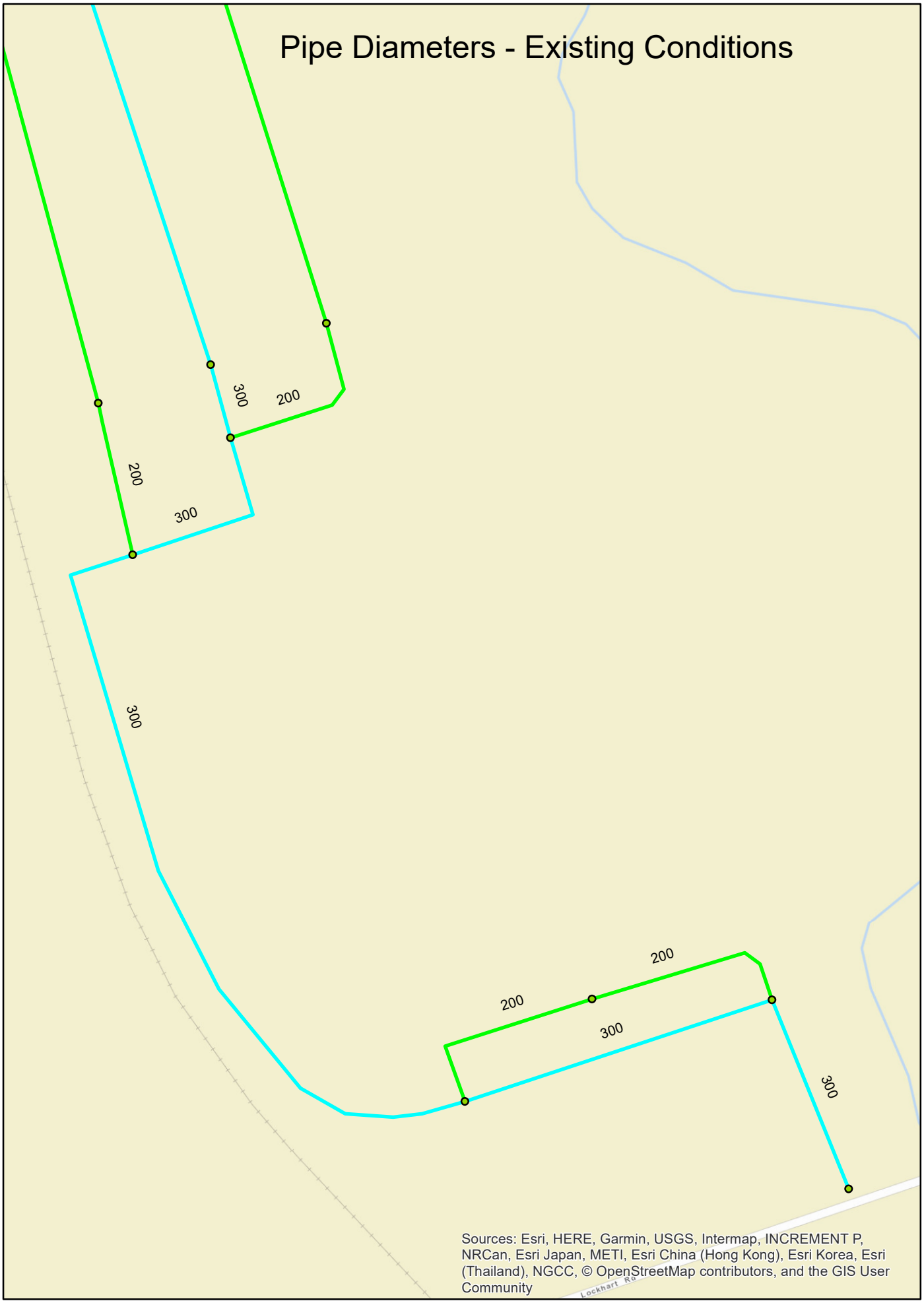
Appendix B

Model Results


Node Names - Existing Conditions
J-LB-107
J-LB-106
J-LB-105
J-LB-104
J-LB-103
J-LB-101
J-LB-100
J-LB-102
B21

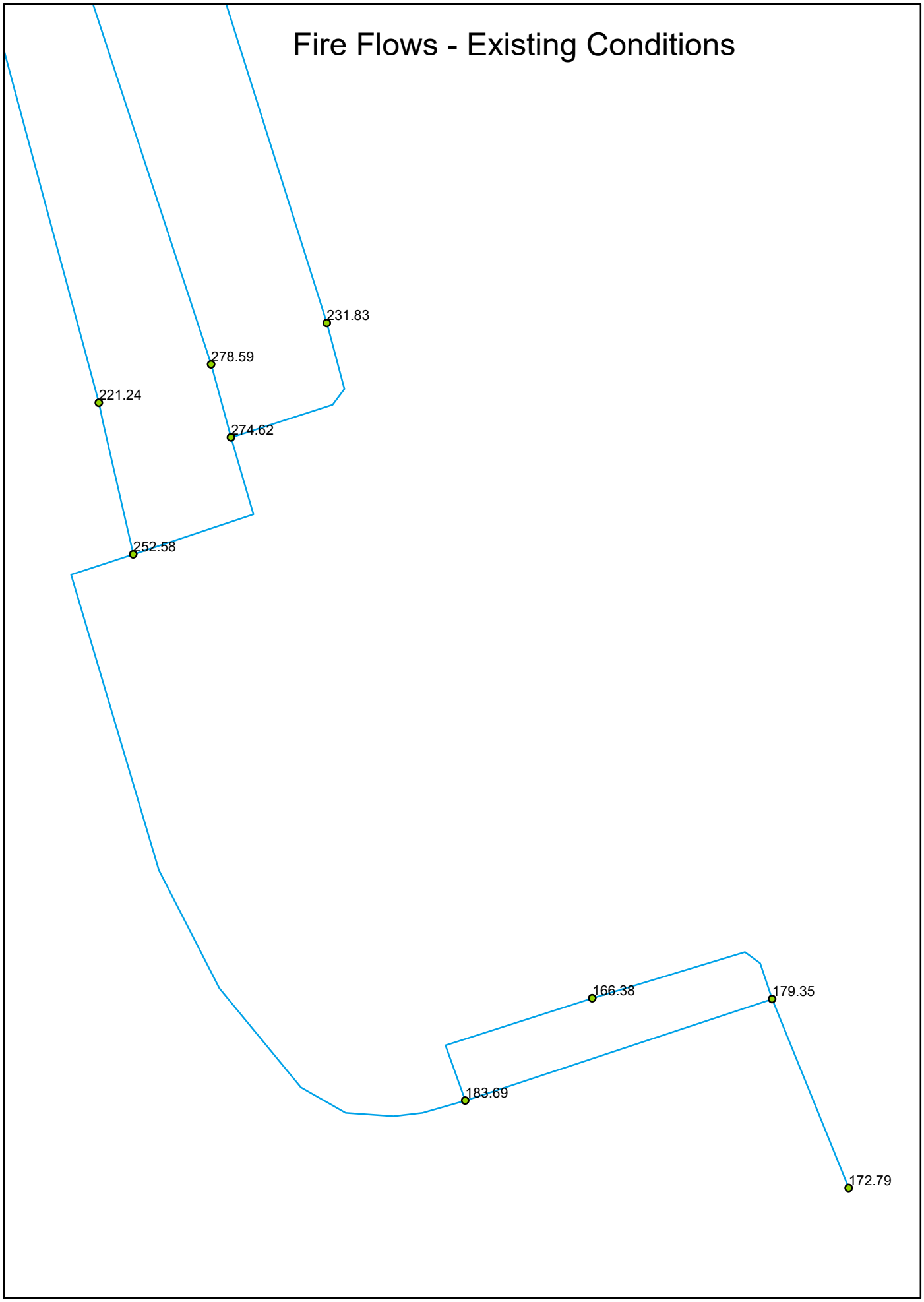

Pipe Names - Existing Conditions
P-LB-109
ANNEX_12125
P-LB-107
P-LB-108
P-LB-106
P-LB-104
P-LB-110
P-LB-101
P-LB-103
P-LB-102
P-LB-100

Pipe Diameters - Existing Conditions



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Fire Flows - Existing Conditions



Existing Conditions
Ballymore Lockhart, Innisfil ON
March 18, 2019

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
B21	0.00	262.57	307.80	64.29
J-LB-100	0.05	263.09	307.80	63.55
J-LB-101	0.12	263.91	307.80	62.39
J-LB-102	1.55	265.45	307.80	60.20
J-LB-103	0.05	262.45	307.80	64.47
J-LB-104	0.16	260.72	307.80	66.93
J-LB-105	0.13	261.50	307.80	65.82
J-LB-106	0.05	260.40	307.80	67.38
J-LB-107	0.13	258.04	307.80	70.74

MIN		**258.04**		**60.20**
MAX		**265.45**		**70.74**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-LB-100	B21	J-LB-100	135.11	300	130	0.00	0.00
P-LB-101	J-LB-100	J-LB-101	143.22	200	130	0.05	0.00
P-LB-102	J-LB-102	J-LB-100	214.03	300	130	0.10	0.00
P-LB-103	J-LB-101	J-LB-102	141.09	200	130	-0.07	0.00
P-LB-104	J-LB-103	J-LB-104	137.01	300	130	-1.43	0.02
P-LB-105	J-LB-104	J-LB-106	50.15	300	130	-1.32	0.02
P-LB-106	J-LB-105	J-LB-103	102.99	200	130	0.34	0.01
P-LB-108	J-LB-104	J-LB-107	128.92	200	130	-0.26	0.01
P-LB-110	J-LB-102	J-LB-103	535.42	300	130	-1.72	0.02

Maximum Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
B21	0.00	262.57	307.19	63.44
J-LB-100	0.12	263.09	307.19	62.70
J-LB-101	0.30	263.91	307.19	61.53
J-LB-102	3.88	265.45	307.19	59.34
J-LB-103	0.14	262.45	307.20	63.62
J-LB-104	0.40	260.72	307.21	66.08
J-LB-105	0.34	261.50	307.20	64.97
J-LB-106	0.14	260.40	307.21	66.54
J-LB-107	0.32	258.04	307.21	69.89

MIN		**258.04**		**59.34**
MAX		**265.45**		**69.89**

Pipe Table

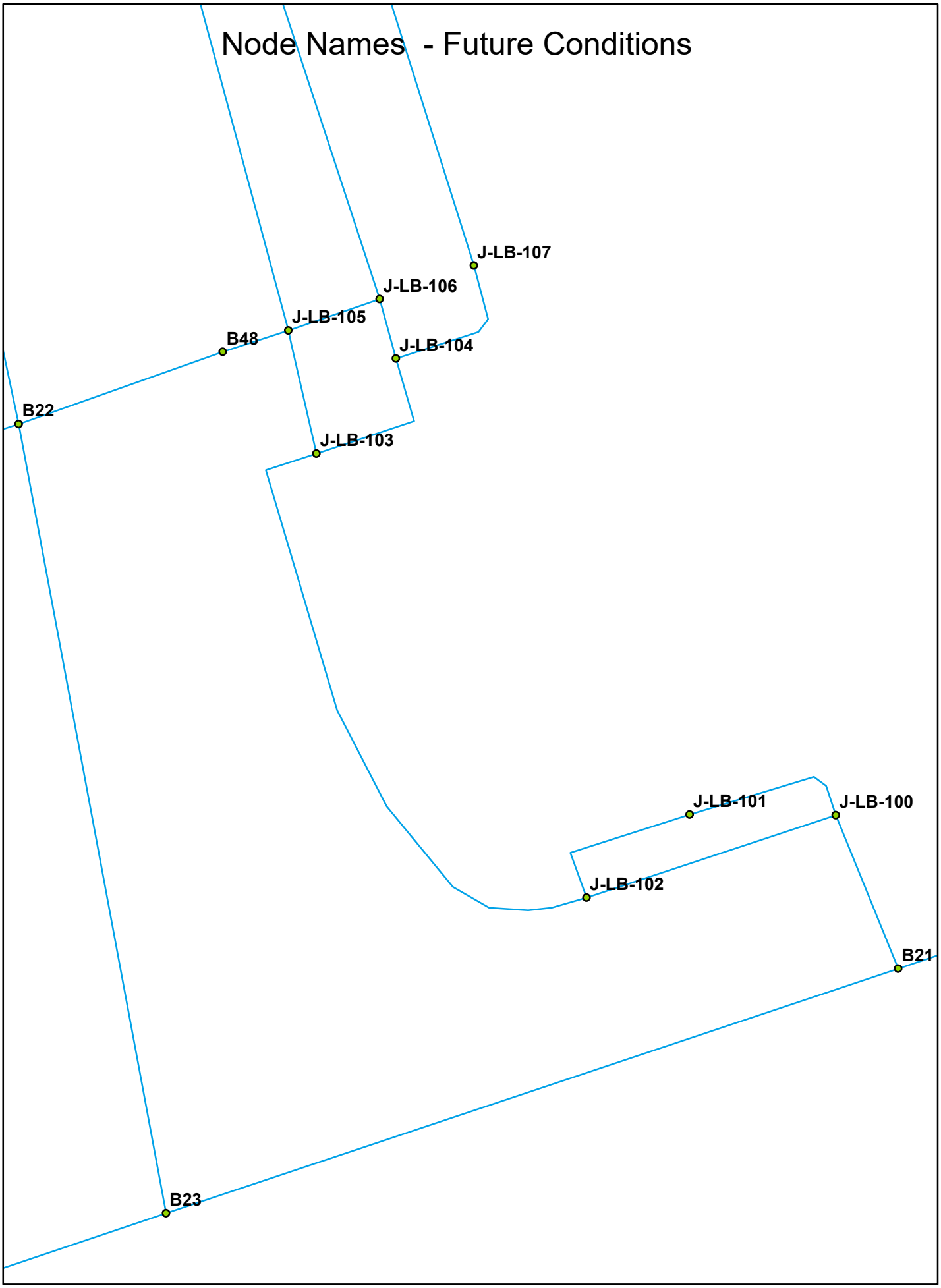
ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-LB-100	B21	J-LB-100	135.11	300	130	0.00	0.00
P-LB-101	J-LB-100	J-LB-101	143.22	200	130	0.13	0.00
P-LB-102	J-LB-102	J-LB-100	214.03	300	130	0.25	0.00
P-LB-103	J-LB-101	J-LB-102	141.09	200	130	-0.17	0.01
P-LB-104	J-LB-103	J-LB-104	137.01	300	130	-3.59	0.05
P-LB-105	J-LB-104	J-LB-106	50.15	300	130	-3.32	0.05
P-LB-106	J-LB-105	J-LB-103	102.99	200	130	0.85	0.03
P-LB-108	J-LB-104	J-LB-107	128.92	200	130	-0.67	0.02
P-LB-110	J-LB-102	J-LB-103	535.42	300	130	-4.30	0.06

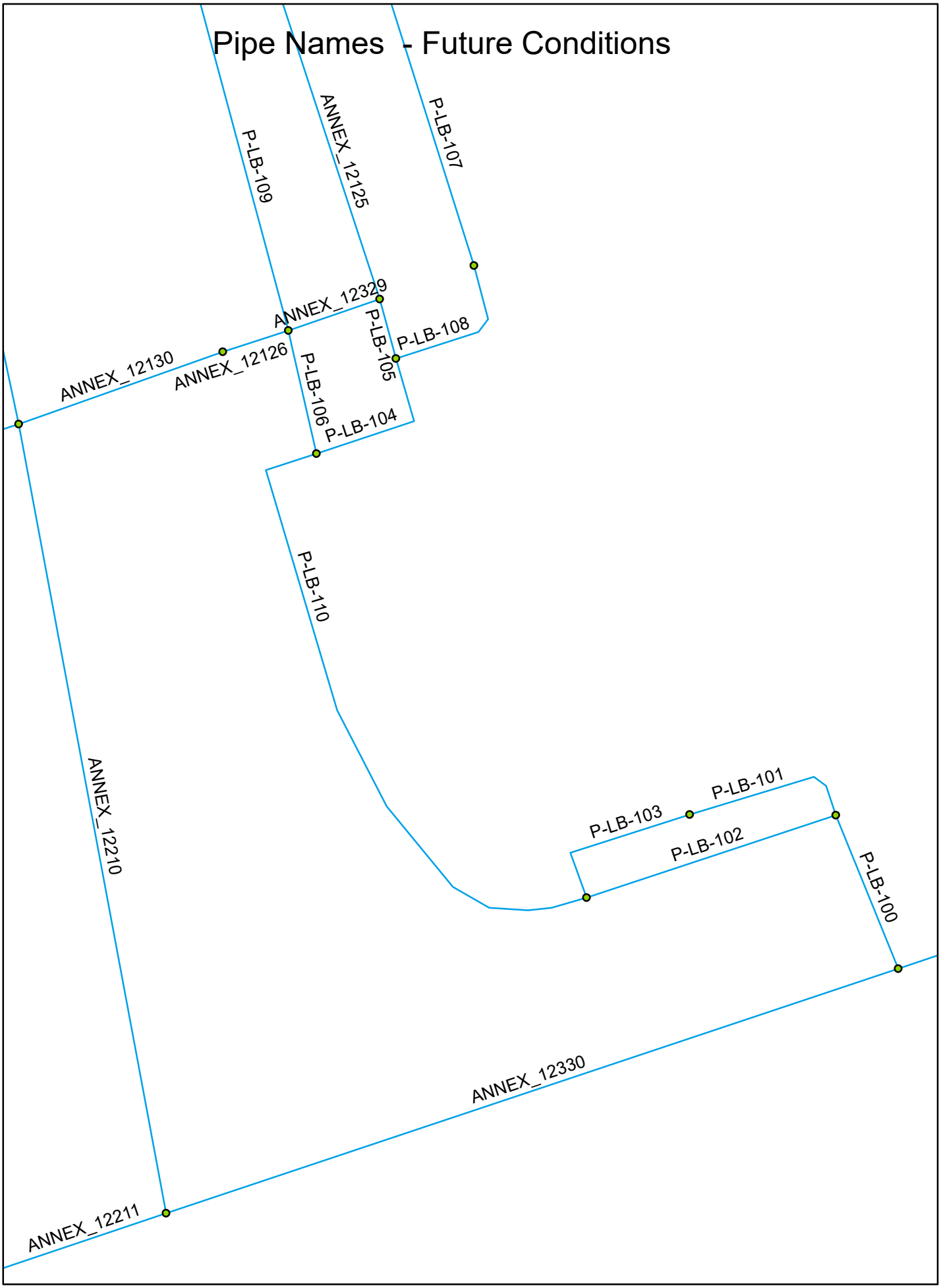
Fire Flow Table

ID	Total Demand	Available Flow	Fire Flow Met?
	(L/s)	*(L/s)*	
B21	133.00	172.79	TRUE
J-LB-100	133.12	179.35	TRUE
J-LB-101	133.30	166.38	TRUE
J-LB-102	136.88	183.69	TRUE
J-LB-103	133.14	252.58	TRUE
J-LB-104	133.40	274.62	TRUE
J-LB-105	133.34	221.24	TRUE
J-LB-106	133.14	278.59	TRUE
J-LB-107	133.32	231.83	TRUE

@20 psi (140 kPa)

	MIN	**166.38**
	MAX	**278.59**


Node Names - Future Conditions
J-LB-107
J-LB-106
J-LB-105
B48
J-LB-104
B22
J-LB-103
J-LB-101
J-LB-100
J-LB-102
B21
B23


Pipe Names - Future Conditions
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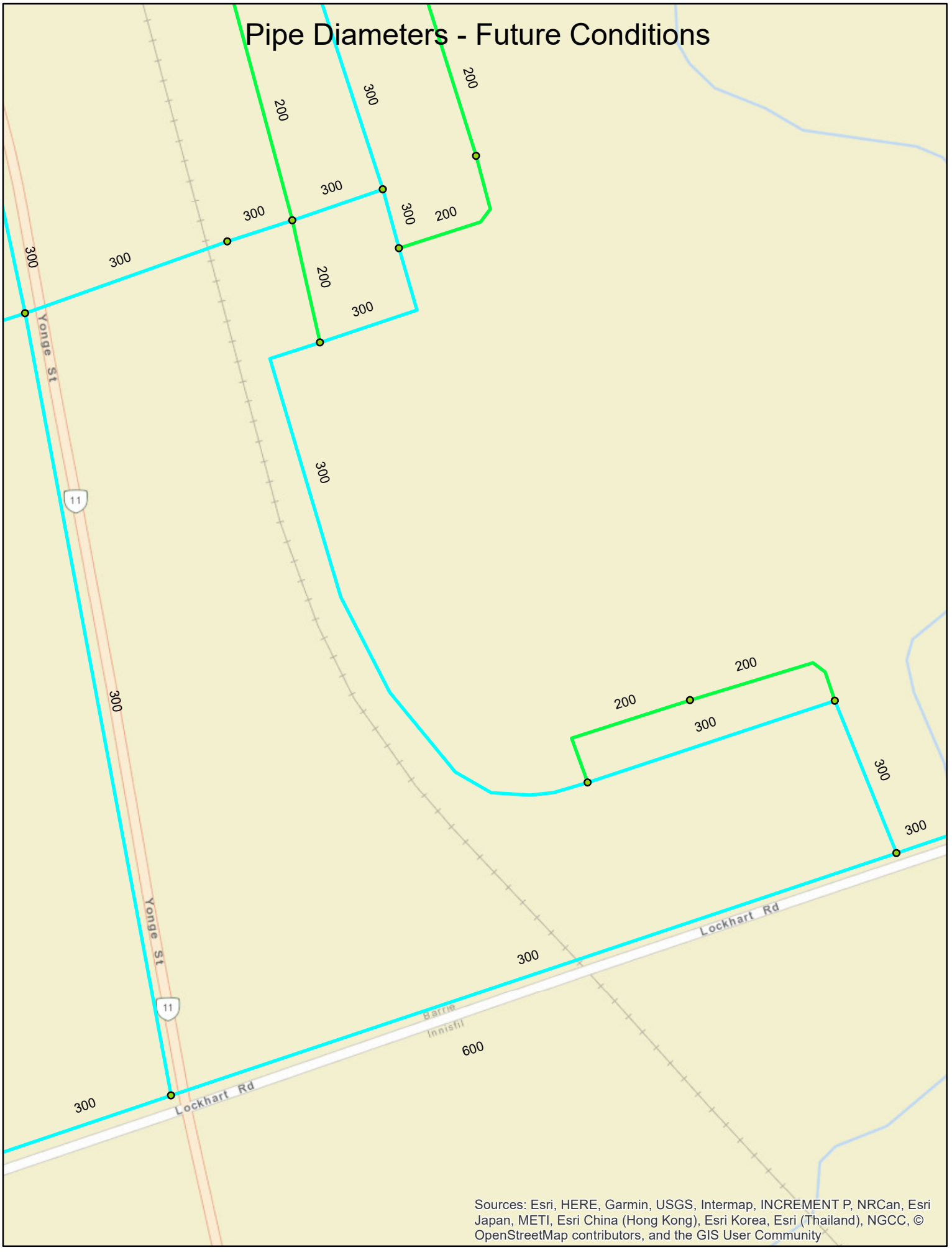
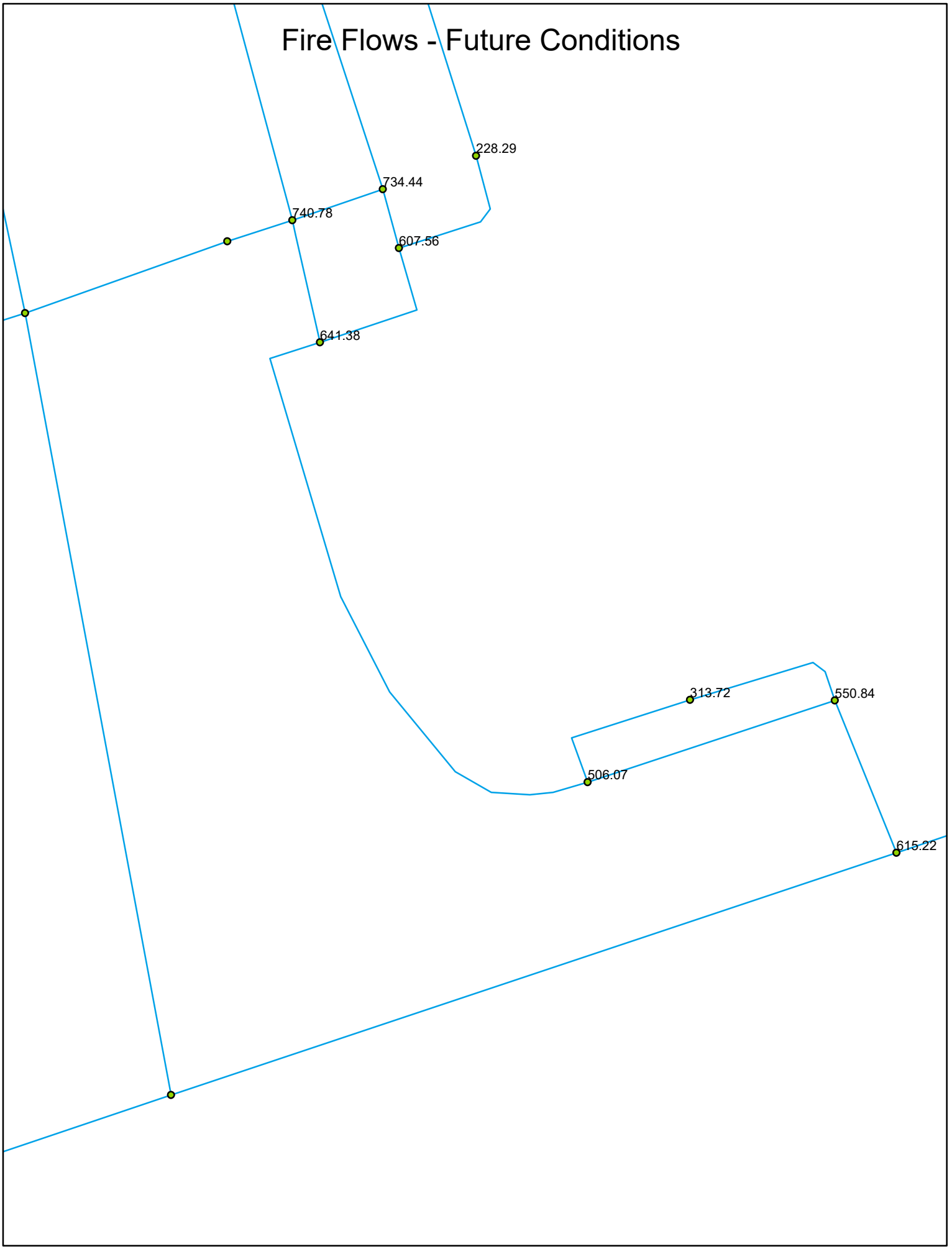
ANNEX_12125
P-LB-107
ANNEX_12329
P-LB-105
P-LB-108
ANNEX_12130
ANNEX_12126
P-LB-106
P-LB-104
P-LB-110
ANNEX_12210
P-LB-103
P-LB-101
P-LB-102
P-LB-100
ANNEX_12330
ANNEX_12211

Pipe Diameters - Future Conditions



Fire Flows - Future Conditions



Future Conditions
Ballymore Lockhart, Innisfil ON
March 18, 2019

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
B21	0.68	262.57	309.61	66.87
J-LB-100	0.05	263.09	309.60	66.12
J-LB-101	0.12	263.91	309.60	64.95
J-LB-102	1.55	265.45	309.60	62.76
J-LB-103	0.05	262.45	309.59	67.02
J-LB-104	0.16	260.72	309.59	69.48
J-LB-105	0.13	261.50	309.59	68.36
J-LB-106	0.05	260.40	309.59	69.93
J-LB-107	0.13	258.04	309.60	73.30
MIN		**258.04**		**62.76**
MAX		**265.45**		**73.30**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
ANNEX_12329	J-LB-105	J-LB-106	78.65	300	130	-10.23	0.14
P-LB-100	B21	J-LB-100	135.11	300	130	4.69	0.07
P-LB-101	J-LB-100	J-LB-101	143.22	200	130	1.10	0.04
P-LB-102	J-LB-102	J-LB-100	214.03	300	130	-3.54	0.05
P-LB-103	J-LB-101	J-LB-102	141.09	200	130	0.98	0.03
P-LB-104	J-LB-103	J-LB-104	137.01	300	130	-0.16	0.00
P-LB-105	J-LB-104	J-LB-106	50.15	300	130	1.74	0.02
P-LB-106	J-LB-105	J-LB-103	102.99	200	130	-3.08	0.10
P-LB-108	J-LB-104	J-LB-107	128.92	200	130	-2.06	0.07
P-LB-110	J-LB-102	J-LB-103	535.42	300	130	2.97	0.04

Maximum Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
B21	1.46	262.57	308.30	65.01
J-LB-100	0.12	263.09	308.30	64.27
J-LB-101	0.30	263.91	308.30	63.10
J-LB-102	3.88	265.45	308.30	60.91
J-LB-103	0.14	262.45	308.30	65.17
J-LB-104	0.40	260.72	308.30	67.63
J-LB-105	0.34	261.50	308.29	66.51
J-LB-106	0.14	260.40	308.30	68.09
J-LB-107	0.32	258.04	308.30	71.45
MIN		**258.04**		**60.91**
MAX		**265.45**		**71.45**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
ANNEX_12329	J-LB-105	J-LB-106	78.65	300	130	-10.62	0.15
P-LB-100	B21	J-LB-100	135.11	300	130	4.77	0.07
P-LB-101	J-LB-100	J-LB-101	143.22	200	130	1.17	0.04
P-LB-102	J-LB-102	J-LB-100	214.03	300	130	-3.48	0.05
P-LB-103	J-LB-101	J-LB-102	141.09	200	130	0.87	0.03
P-LB-104	J-LB-103	J-LB-104	137.01	300	130	-2.60	0.04
P-LB-105	J-LB-104	J-LB-106	50.15	300	130	-0.42	0.01
P-LB-106	J-LB-105	J-LB-103	102.99	200	130	-2.93	0.09
P-LB-108	J-LB-104	J-LB-107	128.92	200	130	-2.59	0.08
P-LB-110	J-LB-102	J-LB-103	535.42	300	130	0.47	0.01

Fire Flow Table

ID	Total Demand	Available Flow	Fire Flow Met?
	(L/s)	*(L/s)*	
B21	134.46	615.22	TRUE
J-LB-100	133.12	550.84	TRUE
J-LB-101	133.30	313.72	TRUE
J-LB-102	136.88	506.07	TRUE
J-LB-103	133.14	641.38	TRUE
J-LB-104	133.40	607.56	TRUE
J-LB-105	133.34	740.78	TRUE
J-LB-106	133.14	734.44	TRUE
J-LB-107	133.32	228.29	TRUE

@20 psi (140 kPa)

	MIN	**228.29**
	MAX	**740.78**

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