PRELIMINARY ENGINEERING AND STORMWATER MANAGEMENT REPORT

for

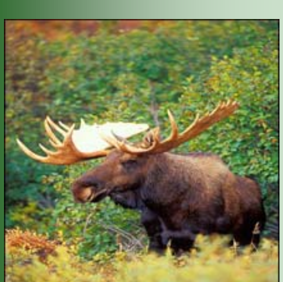
HALL'S LAKE ESTATES

Report Prepared for:

Riteland Development Corporation
1862 Albion Road
Rexdale, Ontario
M9W 5T2

Prepared by:

Calder Engineering Ltd.



February 2015
Reference: 11-167

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APPENDICES

1.0 INTRODUCTION

Calder Engineering Ltd. has been retained by Riteland Development Corporation to complete a Preliminary Engineering and Stormwater Management Report for the proposed Hall's Lake Estates residential development in the Palgrave area of the Town of Caledon. The report is supporting documentation for the respective subdivision Draft Plan application and has been prepared to meet requirements of sections 7.1.18.7 and 7.1.18.8 of the Town of Caledon Official Plan.

The site location is shown in Figure 1.1. The site is bounded by Mount Wolfe Road to the west, an unopened road allowance and agricultural land to the north, an unopened road allowance and open space to the east, and a single family home and agricultural lands to the south. The legal description of the property is Part of Lot 20, Concession 10, former Township of Albion, Town of Caledon, Regional Municipality of Peel.

The overall site comprises 56.12 hectares (ha). It is proposed to develop the site with 28 estate residential lots using a combined rural and urban road cross-section, individual private septic systems for sewage disposal, and municipal water. Drainage and storm water would be managed with the application of Low Impact Development (LID) practices.

The objective of this report is to describe preliminary road grades, proposed methods for site sanitary and water servicing, plan for drainage and stormwater management, site grading, and other proposed facilities. The information provided herein is preliminary and subject to detailed design. Detailed design of the road system, site sanitary and water services, and drainage and stormwater management infrastructure would be undertaken following Draft Plan Approval.

This Preliminary Engineering and Stormwater Management Report, prepared by Calder Engineering Ltd., supercedes the Function Servicing and Stormwater Management Report prepared by Calder Engineering Ltd. (2013), Functional Servicing and Stormwater Management Report prepared by C.F. Crozier & Associates Inc. (2010), and Functional Engineering Design Report prepared by LGI Consulting Engineers Inc. (2006).

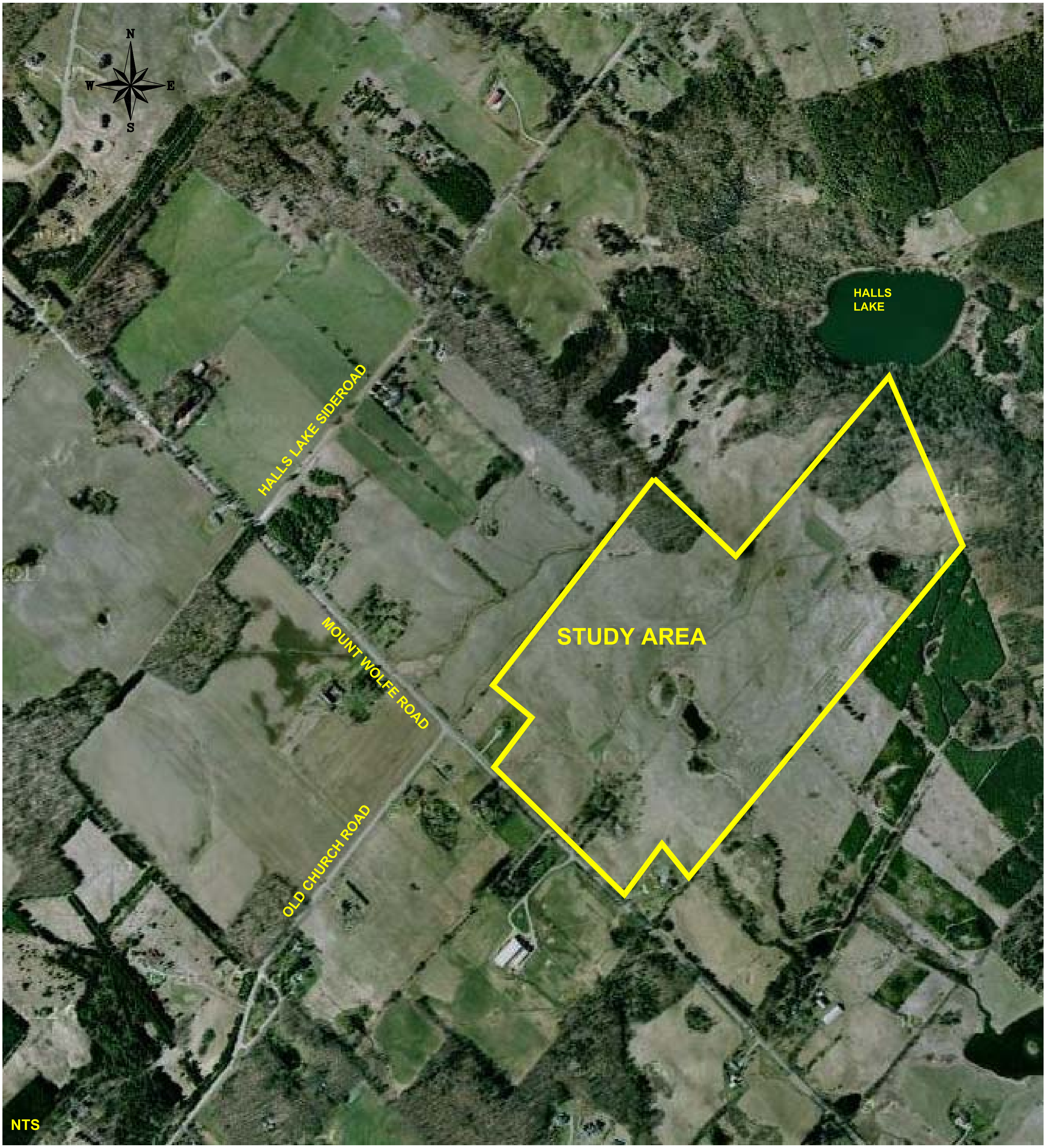

FIGURE 1.1
HALL'S LAKE ESTATES STUDY AREA LOCATION

Reference: Aerial Image from Google Earth

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2.0 STUDY AREA

2.1 General

The site is located in the Palgrave area of the Town of Caledon and is bounded by Mount Wolfe Road to the west, an unopened road allowance and agricultural land to the north, an unopened road allowance and open space to the east, and a single family home and agricultural lands to the south. The legal description of the property is Part of Lot 20, Concession 10, former Township of Albion, Town of Caledon, Regional Municipality of Peel.

The overall site comprises 56.12 ha. It is proposed to develop the site with 28 estate residential lots using a combined rural and urban road cross-section, individual private septic systems for sewage disposal, and municipal water. Drainage and storm water would be managed with the application of Low Impact Development (LID) practices. A Site Plan showing the proposed lot pattern and road alignment is shown on Figure 2.1.

2.2 Physiography and Landform

As reported by SAAR Environmental Limited (2010), the site is part of the Palgrave Moraine, an ice-contact stratified area of sands, gravel, and silts that originated as kame outwash deposits. The Palgrave Moraine is a strip of hummocky topography 5 to 7 kilometres in width extending from Caledon East to the Palgrave and Mount Wolfe area, and then east to King City (White, 1975).

2.3 Topography

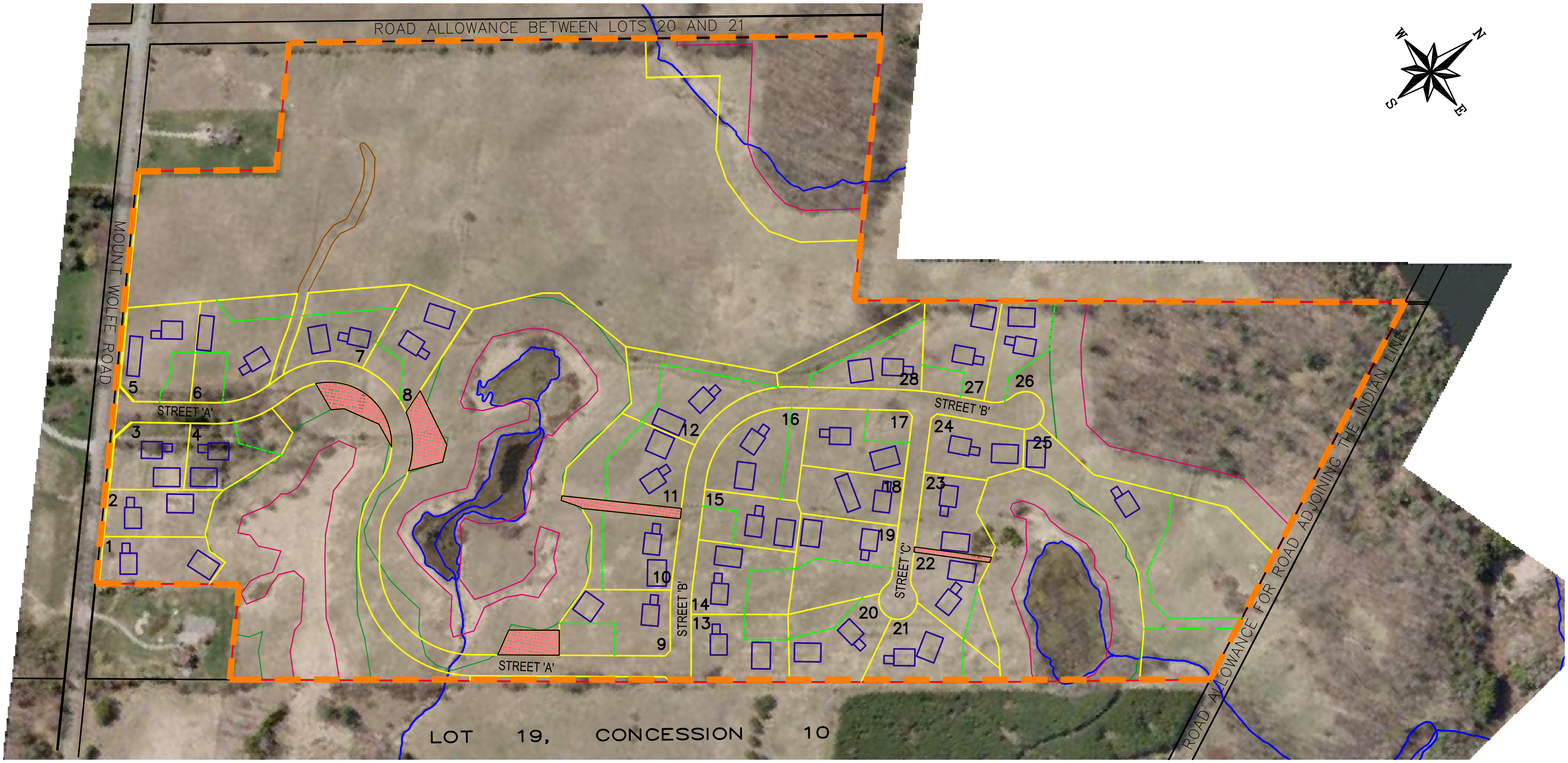
The site comprises hummocky terrain consisting of hills, two low-lying wetland areas, and a northwest to southeast trending topographic ridge which divides drainage. Lands to the south and west of the ridge drain to the Humber River Watershed. Lands to the north and east of the ridge drain to Hall's Lake and the Hall's Creek lowlands which are part of the Holland River Watershed.

The highest point in the surrounding area is Mount Wolfe which is approximately at elevation 367 metres. The highest elevation on the site occurs in the northwest corner of the property (approximately 330 metres) and the lowest elevation in the eastern extremity adjacent the Hall's Creek lowlands (approximately 280 metres).

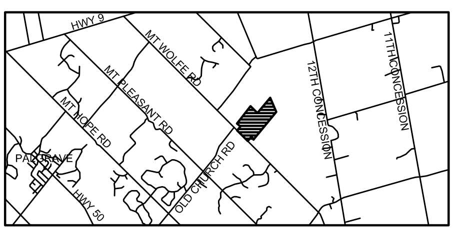
2.4 Pre-Development Drainage Patterns and Land Uses

As described in Section 2.3, a portion of the site drains southward towards a tributary of the Humber River Watershed, and a portion of the site drains to the southeast which is part of the Holland River Watershed. As such, the site falls within the jurisdiction of two conservation authorities: the Lake Simcoe Region Conservation Authority (LSRCA) and the Toronto Region Conservation Authority (TRCA). It is the understanding of Calder Engineering Ltd. that the Toronto Region Conservation Authority has agreed to review documentation related to the subdivision Draft Plan application on behalf of both conservation authorities.

The pre-development drainage patterns have been broken down into 10 catchments as shown in Figure 2.2a. Catchments 1 to 6 drain to a tributary of the Humber River (Humber River Watershed), and Catchments 7 to 10 drain towards Hall's Lake and the Hall's Creek



KEY PLAN



NTS

LEGEND

- PROPERTY LINE
- LOT LINES
- STRUCTURAL ENVELOPE
- ORMCP KEY NATURAL HERITAGE FEATURE (KNHF)
- ORMCP MINIMUM VEGETATION PROTECTION ZONE (MVPZ)
- EX. DRY SWALE
- CONCEPTUAL HOME LOCATION
- CONCEPTUAL SEPTIC BED LOCATION
- POTENTIAL DRAINAGE BLOCK

NOTES

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HALL'S LAKE ESTATES
DRAFT PLAN APPLICATION (21T-98001C)
PART OF LOT 20, CONCESSION 10 (ALBION)
TOWN OF CALEDON, REGION OF PEEL

FIGURE 2.1
SITE PLAN

lowlands (Holland River Watershed). Shown in Figure 2.2b is the external drainage area that makes up part of Catchment 4.

The land was historically cleared and farmed, however, over the past number of years the land has been occasionally plowed but not been actively farmed. For this project, the existing land use has been considered and modeled primarily as a grassland meadow.

There are two wetland areas on the site: one is located in Catchment 3 and is designated as Wetland No. 35, and the other is located in Catchment 8 and is designated as Wetland No. 36. These wetlands are part of the provincially significant Hall Lake-Kennifick Wetland Complex. An intermittent dry swale drains through Catchment 2. The lower segment of this swale is considered part of Wetland No. 51 associated with the provincially significant Hall Lake-Kennifick Wetland Complex.

2.5 Surficial Soils

A geotechnical investigation was performed by Soil Engineers Limited (2015) comprising 10 boreholes ranging from 4.7 to 5.0 metres in depth. The boreholes locations and borehole logs are provided in Appendix B. Generally, the site consists of an approximately 250 to 400 millimetre layer of topsoil, which overlays silty clay or silty sand till.

It is indicated in the geotechnical investigation that the silty clay till is practically impervious with an estimated coefficient of permeability of 10^{-6} centimetres per second (cm/s) and the silty sand till has a moderate to relatively low permeability with an estimated coefficient of permeability in the range of 10^{-4} to 10^{-5} cm/s. The silty sand till dominates soil stratigraphy along the southern boundary of the site.

The presence of groundwater was detected at two of the ten boreholes: Borehole 2 at a depth of 0.6 metres and Borehole 8 at a depth of 2.4 metres. The observed groundwater was attributed to precipitation trapped in the fissures of weathered soil, and in the sand and silt layers laminated in the tills. The colour of the soil remained brown to the maximum investigated depth, indicating that the soils have oxidized and the permanent groundwater regime lies below the maximum investigated depth of approximately 5 metres.

Based on these findings, it is assumed that the site soils could be classified as either Hydrologic Soil Group B or C with CN values ranging from 65 to 70.

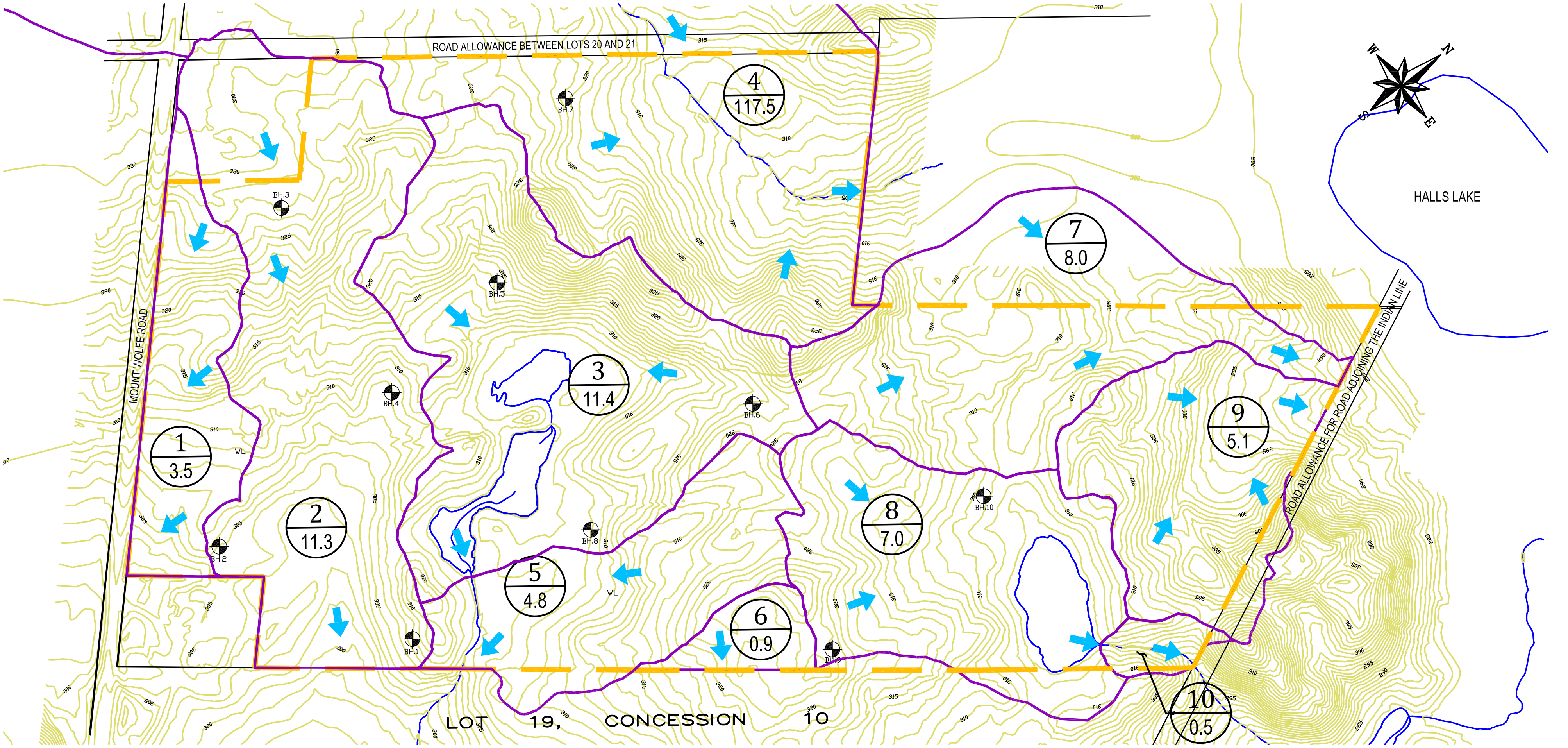
2.6 Geology

A description of site geology has been provided by LGI Consulting Engineers Inc. (2006), SAAR Environmental Limited (2010), and White (1975).

2.7 Hydrogeology and Groundwater

A description of site hydrogeology and groundwater has been provided by Calder Engineering Ltd. (2015) and LGI Consulting Engineers Inc. (2006). The subject lands are located in the headwater regions of the Lake Ontario and Georgian Bay watersheds and more specifically, the headwaters of the Humber River and Holland River.

Locally, the site is located partially in the physiographic areas of the Mount Wolfe South Slopes and Hall's Lake Lowlands. The Mount Wolfe South Slopes are considered regional



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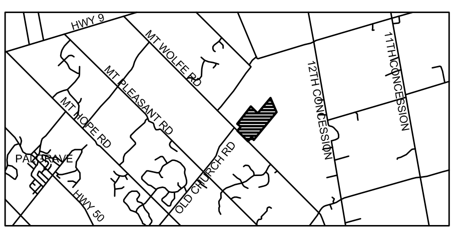

NTS

LEGEND

- PROPERTY LINE
- BOREHOLE LOCATION (BH.10)
- DRAINAGE BOUNDARY
- 2 SUB-CATCHMENT ID / 11.3 SUB-CATCHMENT AREA (ha)
- MAJOR FLOW DIRECTION

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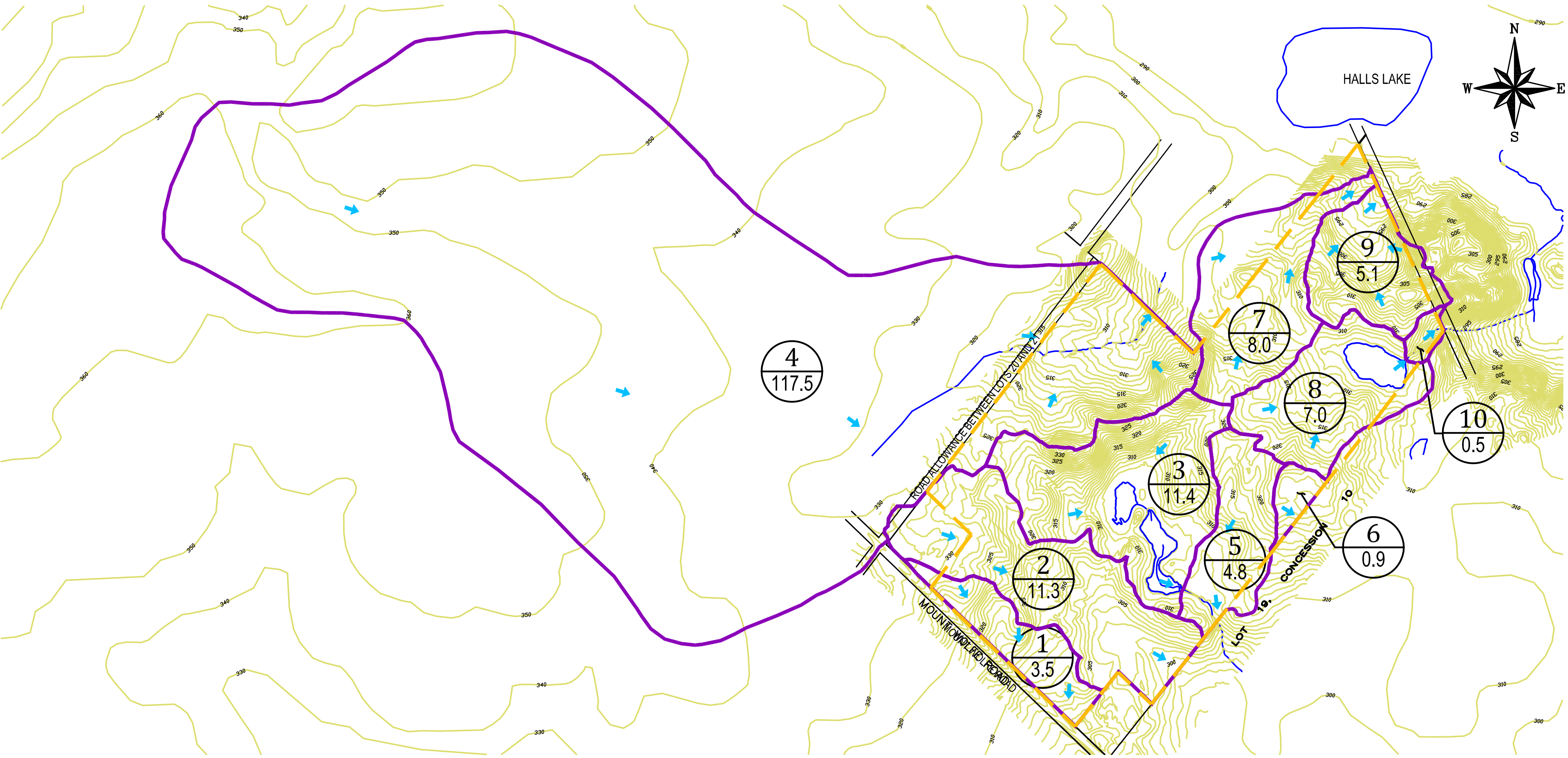
FIGURE 2.2a

EXISTING DRAINAGE BOUNDARIES
SITE



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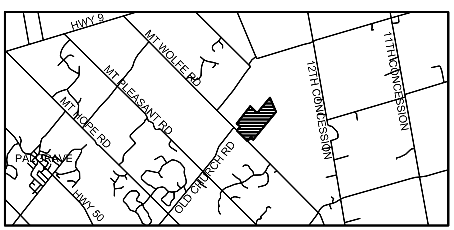

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LEGEND

PROPERTY LINE

DRAINAGE BOUNDARY

2 — CATCHMENT ID

11.3 — CATCHMENT AREA (ha)

MAJOR FLOW DIRECTION

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FIGURE 2.2b

EXISTING DRAINAGE BOUNDARIES EXTERNAL

groundwater recharge areas and the Hall’s Lake Lowlands represent an area of groundwater discharge for local unconfined aquifers.

Groundwater flow can generally be described in terms of shallow and deep systems. Shallow groundwater flow on the site will follow surface topography and flow down slope. The ridge on the site forms a local divide for groundwater flow. To the north of the ridge, shallow groundwater will flow northeasterly towards the Hall’s Lake and the Hall’s Creek lowlands. South of the ridge, shallow groundwater will flow southward to the low lying areas on the south half of the site and off-site to topographic lows.

Flow direction in the deeper confined aquifer(s) and regional groundwater system has not been assessed. Description of the geology and groundwater resources at a regional scale has been provided by Toronto and Region Conservation (2008).

2.8 Environmental Features

A description of environmental features on the site has been provided by Savanta Inc. (2014) and SAAR Environmental Limited (2010). As reported by SAAR Environmental Limited, the site supports three types of key natural heritage features:

- Provincially Significant Wetlands;
- Significant Woodlands; and
- Riparian Valley.

Two wetland features have been identified on the project site that are part of the provincially significant Hall Lake-Kennifick Wetland Complex. These features were staked and surveyed in November 2007. Site walks in 2013 by Savanta Inc. have indicated that the wetland feature boundaries are similar to what was previously established.

Further to the above, correspondence received from the Ministry of Natural Resources dated March 16th, 2009 confirms that wetland boundaries and vegetation communities for two wetland features are associated with wetlands numbers 35 and 36 of the provincially significant Hall Lake-Kenniflick Wetland Complex. In addition, it was identified in this correspondence that part of the dry swale in the western part of the site is associated with Wetland No. 51 of this complex. This correspondence is provided in Appendix C. Discussion of these wetland features has been provided by SAAR Environmental Limited (2010) and Savanta Inc. (2014).

2.9 Background Studies and Reports

The following background documents and reports have been prepared as supporting information for the subdivision Draft Plan application and should be reviewed in conjunction with this report:

- Draft Plan of Subdivision prepared by KLM Planning Partners Inc. (Appendix A);

- Technical Supporting Maps prepared by Calder Engineering Ltd. illustrating site physical conditions and environmental constraints;

- Natural Heritage Evaluation, Hall's Lake, dated December 2010 and prepared by SAAR Environmental Limited;
- Oak Ridges Moraine Natural Heritage Evaluation – Proposed Hall's Lake Estates Subdivision, Town of Caledon, dated January 2014 and prepared by Savanta Inc.
- A Soil Investigation for Proposed Residential Development, Mount Wolfe Road and Hall's Lake Sideroad, Town of Caledon, dated January 2015 and prepared by Soil Engineers Ltd.;
- Scoped Hydrogeology Report for Hall's Lake Estates, dated February 2015 and prepared by Calder Engineering Ltd.; and
- Functional Engineering Design Report for the proposed Hall's Lake Estates Subdivision, dated February 2006, prepared by LGI Consulting Engineers Inc.

The latter Functional Engineering Design Report prepared LGI Consulting Engineers Inc., although for a different version of the Draft Plan, contains a detailed summary of the project history and original planning context, and site physical conditions including topography and drainage, soils, geology, and hydrogeology and groundwater.

3.0 DRAINAGE AND STORMWATER MANAGEMENT

3.1 Minor and Major Drainage Systems

The minor and major drainage system for the subdivision will consist of both the proposed road system and grassed swales. As much as practical the existing natural drainage patterns will be maintained. The drainage system will be designed to manage storm water for up to the 100-year design storm consistent with Town of Caledon Development Standards, Policies, and Guidelines (2009).

3.2 Stormwater Management Plan

Lot level controls and Low Impact Development (LID) practices will be implemented, wherever feasible, to reduce the volume of runoff and provide, as far as practical, a natural hydrologic response. These measures are as follows:

- recharge of residential roof and driveway storm water by direction to grassed and naturalized areas to promote filtering and natural infiltration;
- discharge of foundation drain water to rear and side lot areas;
- by lot grading, direction of structure envelope drainage, via sheet flow, towards grassed and naturalized areas versus the road right of way; and
- application of grassed swales for road drainage versus a piped storm sewer system.

In addition to the above, sufficient on-line linear storage will be provided to limit peak flows from the site to pre-development levels for up to the 100-year return period.

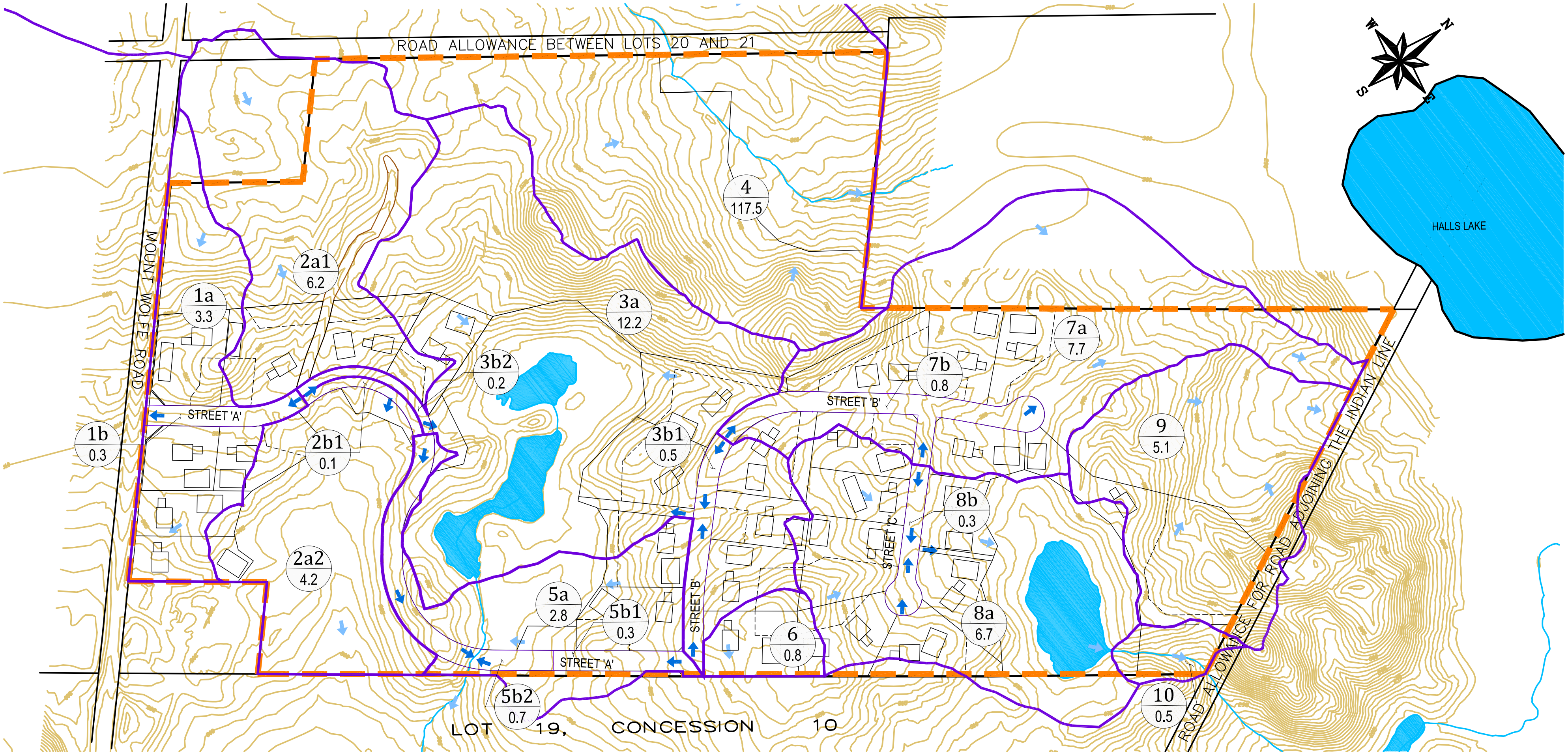
3.2.1 Contributing Drainage Area

The subject site was delineated into 10 catchments. Catchment area delineation is shown in Figure 2.2a. The catchments were further broken down into sub-basins, with identification numbers followed by "a" or "b". Sub-basin identification numbers followed by a "b" represent the road allowance areas, and sub-basin identification numbers followed by "a" represent the remaining area within the catchment. Sub-basin delineation is shown in Figure 3.1.

3.2.2 Stormwater Management Criteria

Per the Town of Caledon Official Plan (2008), the following stormwater management criteria are specified:

- estate residential plans of subdivision will be required to minimize the amount of stormwater draining from the site and adhere to the zero increase of stormwater runoff principle in a manner acceptable to the Town of Caledon and the Conservation Authority (e.g., post-development flows will be less than or equal to pre-development flows);



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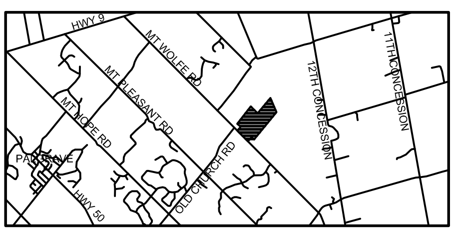

NTS

LEGEND

- PROPERTY LINE
- DRAINAGE BOUNDARY
- 2 / 11.3 — SUB-BASIN ID / SUB-BASIN AREA (ha)
- MAJOR FLOW DIRECTION
- PROPOSED FLOW DIRECTION

NOTES

WHERE THE CATCHMENT IS DIVIDED INTO SUB-BASINS, THE ROAD RIGHT-OF-WAY IS CONTAINED IN SUB-BASINS LABELED WITH 'b' AND THE REMAINING CATCHMENT AREA IS LABELED WITH 'a'

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TOWN OF CALEDON, REGION OF PEEL

FIGURE 3.1

PROPOSED DRAINAGE BOUNDARIES

- wherever possible, the 100-year design storm water runoff will be detained and recharged to the groundwater aquifers or slowly released from the site in an environmentally acceptable manner; and
- during detail design, a sediment and erosion control plan is to be prepared which conforms to the Town's latest guidelines.

In addition, Toronto and Region Conservation stormwater management criteria are as follows:

- Quantity Control – control of 2 to 100-year post-development peak flows to pre-development peak flows based on applicable Unit Flow Equations

- Quality Control – enhance level of treatment (Level 1)

- Erosion Control – 25 millimetres of storm runoff detained and released over a 48 hour period

- Water Balance – retention of storm runoff from the first 5 mm of rainfall on the site through infiltration, evapotranspiration, and/or reuse

3.2.3 Hydrologic Modelling Approach

A hydrologic model (SWMHYMO Version 4.07 dated July 1999) was set up to reflect the existing (pre-development) condition provided in Figure 2.2a and Figure 2.2b, and post-development condition shown in Figure 3.1. Available soils, land use, and topographic information was used to calculate SWMHYMO parameters, including curve number (CN), time to peak (tp), and catchment slope. Due to the estate residential nature of the subdivision and large associated open space blocks, the catchments typically had a total imperviousness (TIMP) of less than 20% and were modeled using the Calibrate NASHYD command. The time to peak was calculated using the Airport method. The AES 6 hour and 12 hour duration storms were applied to determine the critical storm duration for the study area. Based on this analysis, the AES 6 hour duration storm was determined to be the critical design storm and applied.

For this report, it was assumed that only areas within the proposed road allowance would require control to pre-development flow rates. These sub-basins, labeled with "b", were modeled using the STANDHYD command in SWMHYMO. The remaining sub-basins, will drain typically by sheet flow to grassed or naturalized areas. The change in percent imperviousness in these basins would only be associated with houses and driveways, and typically be less than 5 percent. Furthermore, only the areas within lot structure envelopes, would be subject to grading.

Summarized in Table 3.1 for each sub-basin "b" is drainage area, drainage outlet, and receiver. The road allowance areas comprise 3.15 hectares which represents approximately 5.6 percent of the overall site. As the road allowance includes both paved and grassed areas, the increase in percent impervious associated with the proposed road network will be less than 5%.

TABLE 3.1
SUMMARY OF SUB-BASIN "b" CHARACTERISTICS

Sub-basin	Drainage Area (ha)	Outlet	Receiver
1b	0.32	Mount Wolfe Road Ditch	Humber River Tributary, Humber River Watershed
2b1	0.14	Catchment 2 and Dry Swale (Part Wetland No. 51)	Humber River Tributary, Humber River Watershed
3b1	0.45	Catchment 3 and Wetland No. 35	Humber River Tributary, Humber River Watershed
3b2	0.16	Catchment 3 and Wetland No. 35	Humber River Tributary, Humber River Watershed
5b1	0.28	Catchment 5 and unnamed tributary from Wetland No. 35	Humber River Tributary, Humber River Watershed
5b2	0.69	Catchment 5 and unnamed tributary from Wetland No. 35	Humber River Tributary, Humber River Watershed
7b	0.79	Catchment 7 and unnamed intermittent tributary to Hall's Lake	Hall's Lake, Holland River Watershed
8b	0.31	Catchment 8 and Wetland No. 36	Hall's Creek, Holland River Watershed
Total:	3.15		

Note:
1. Units: ha – hectares.
2. Refer to Figure 3.1 for sub-basin delineation.

The TRCA Humber River unit flow rate equations were used to calculate pre-development peak flow rates for the site and were used as target flow rates to be managed under post-development conditions. The unit flow rates were calculated using Equation C for Sub-basin 10 from Table E.1: Summary of Unit Flow Relationships, Humber River Watershed, Appendix A of the Toronto and Region Conservation document entitled Stormwater Management Criteria (2012).

The storage volume requirement to control to calculated pre-development flow rates was estimated using the COMPUTE VOLUME command in SWMHYMO. Based on the hydrologic modeling, the pre-development peak flow rates established for the site drainage areas and determined storage volumes are summarized in Table 3.2 for the 100-year design event. Estimated pre-development peak flow rates and storage volumes for the 2-year through 50-year design events are summarized in Appendix C.

TABLE 3.2
SUMMARY OF PRE-DEVELOPMENT FLOW RATES
AND STORAGE VOLUME REQUIREMENTS FOR THE 100-YEAR DESIGN EVENT

Sub-basin	Drainage Area (ha)	Unit Flow Rate (cms)	Storage Volume Required (cu.m)
1b	0.32	0.005	81
2b1	0.14	0.002	38
3b1	0.45	0.007	133
3b2	0.16	0.003	43
5b1	0.28	0.004	84
5b2	0.69	0.010	209
7b	0.79	0.011	241
8b	0.31	0.005	87

Note:
1. Units: ha - hectares; cms - cubic meters per second; cu.m - cubic meters.
2. Unit Flow Rate calculated using Equation C for Sub-basin 10 from Table E.1: Summary of Unit Flow Relationships, Humber River Watershed, Appendix A of the Toronto and Region Conservation document entitled Stormwater Management Criteria (2012).
3. Refer to Figure 3.1 for sub-basin delineation.
4. Refer to Appendix C for estimated 2-year through 50-year pre-development peak flow rates and storage volumes.

A summary of model parameters are provided in Appendix C, Table C.1 and Table C.2. The SWMHYMO input and output files are provided in Appendix C.

3.3 Grassed Swales

3.3.1 Grassed Swale Design – Storage Volumes

Grassed swales are proposed to be provided with a subdrain, and granular and filter media to provide filtration and management of the frequent small rainfall events. At this stage, storage has been provided to manage up to the first 15 millimetres of rainfall from the road right of way in the underlying granular media. Peak flow control would also be provided through a combination of storage in the granular media and on-line storage in the grassed swale system. Refer to Figure 3.2 and Appendix C, Table C.10 for a sketch of typical cross-section of proposed grassed swales. Detailed design of the grassed swales would be undertaken following Draft Plan approval.

Summarized in Table 3.3 is available storage in the grassed swale filtration trenches and required storage for the estimated 100-year 6 hour storm event. Storage calculations are provided in Table C.10, Appendix C. As shown, sufficient storage has been provided to manage up to the 100-year design event. Notwithstanding this, and given the potential for freezing conditions to limit effectiveness of storage, linear on-line storage will also be provided in the grassed swale system. The preliminary location of grassed swales is shown in Figure 3.3. It should be noted that filtration trench storage volumes do not include storage volume in either the subdrain or overlying filtration media.

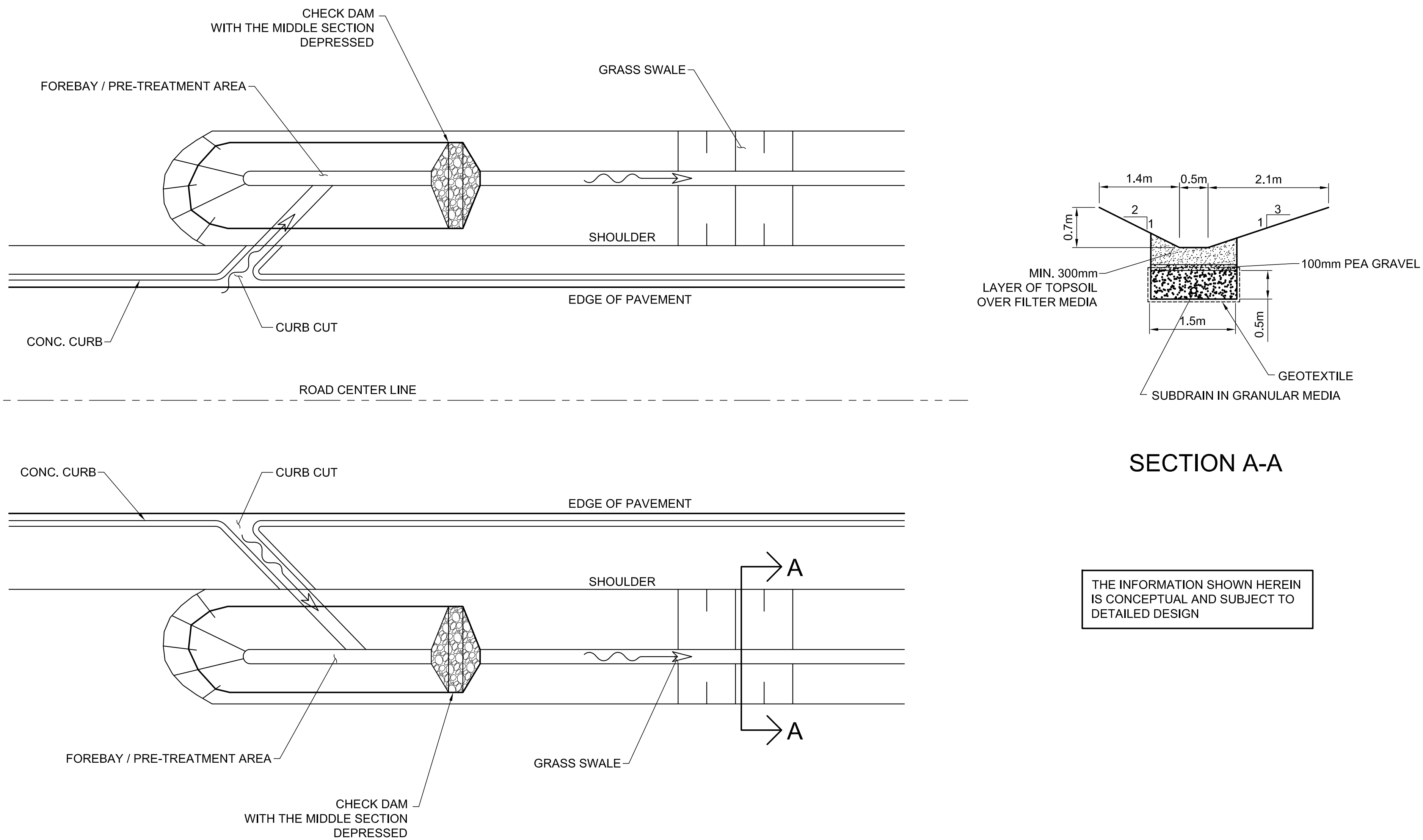

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FIGURE 3.2
GRASS SWALE PLAN VIEW AND TYPICAL SECTION

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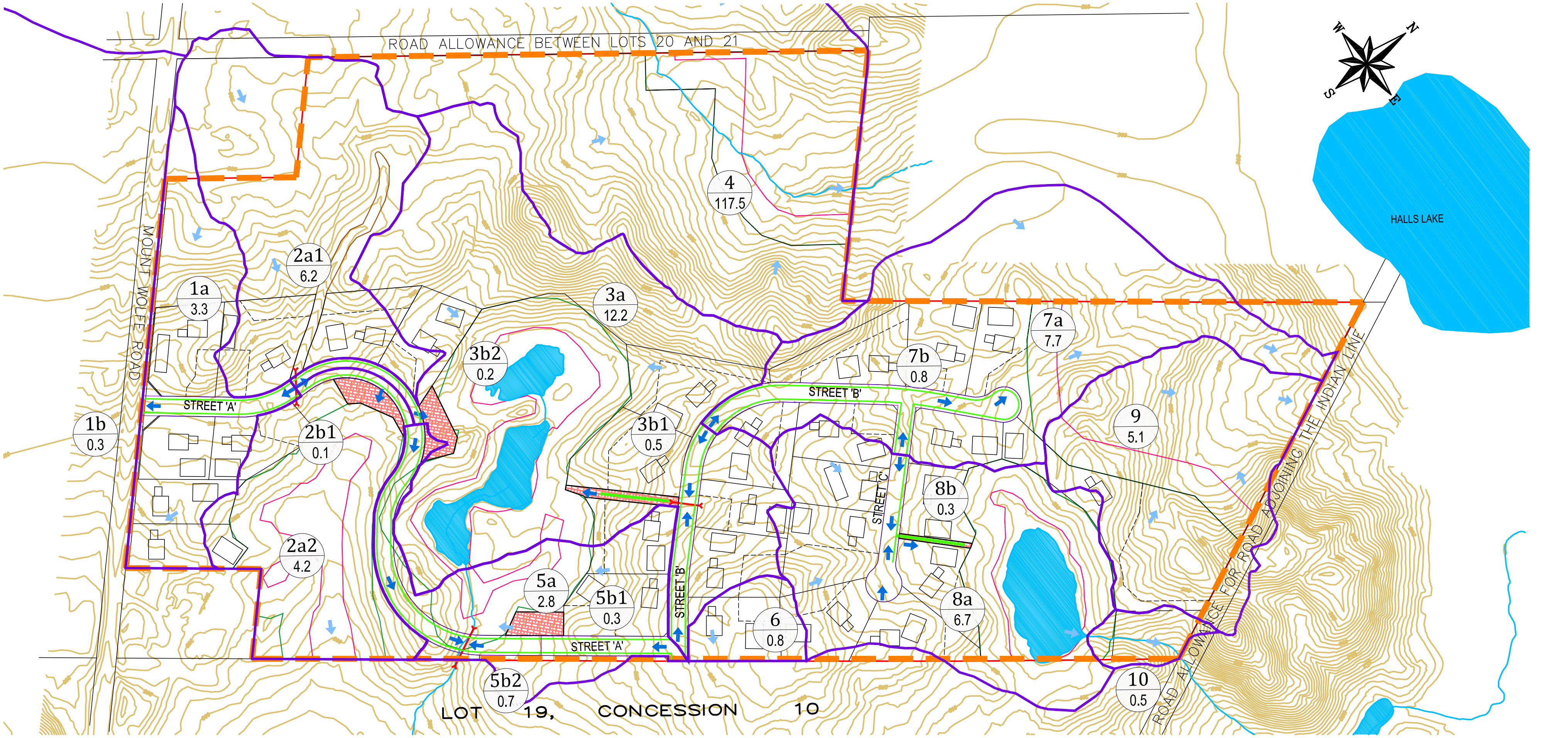

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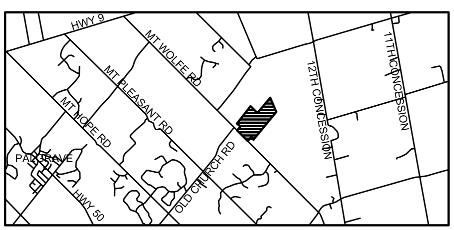

NTS

LEGEND

- PROPERTY LINE
- DRAINAGE BOUNDARY
- 2b — SUB-BASIN ID
- 11.3 — SUB-BASIN AREA (ha)
- MAJOR FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- PROPOSED DRY SWALE FILTRATION TRENCH
- PROPOSED CULVERT
- PROPOSED DRAINAGE BLOCK

NOTES

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FIGURE 3.3
PROPOSED STORMWATER MANAGEMENT PLAN

TABLE 3.3
ESTIMATED STORAGE VOLUMES FOR GRASSED SWALE FILTRATION TRENCHES

Sub-Basin/ROW Area	Storage Volume Required (cu.m)	Storage Volume Provided (cu.m)
1b	81	114
2b1	38	48
3b1	133	166
3b2	43	62
5b1	84	95
5b2	209	249
7b	241	274
8b[4]	87	100

Notes:
1. Units: cu.m-cubic meters.
2. Storage Volume Required is estimated volume generated from a 100-year 6 hour storm.
3. Storage Volume Provided does not include storage in the subdrain pipe or storage available above ground in the dry swale or roadway.
4. Storage Volume Provided for "8b" includes filtration trench perpendicular to Street C.
5. The estimated storage volumes are preliminary and subject to detailed design.

3.3.2 Grassed Swale Design – Peak Flow Control

Summarized in Table 3.4 are estimated pre-development and post-development peak flow rates from the road allowance areas for the 100-year design event. As shown, peak flow will be maintained below pre-development levels. Peak flow control will be achieved by conveyance of surface and subsurface flow in the grassed swales to enlarged linear swale sections and release from these areas via a small diameter pipe outlet. The enlarged linear swale sections will be located either within the road allowance or the designated storm drainage blocks. This is shown conceptually in Figure 3.2 with general locations shown in Figure 3.3.

For the 2-year through 50–year design events, it is anticipated that over control will be achieved due to volume of storage provided, slow release rate through filtration and granular media, and secondary end-of-pipe control with enlarge swale sections. Release of flow from the filtration trenches to subdrains has been estimated at 1 litre per second per 100 metres of subdrain per Table VI of the Drainage Guide for Ontario (Ontario Ministry of Agriculture and Food, 1986) and assumption of a sandy loam filtration media. Detailed design of the grassed swales and associated outlet works would be undertaken following Draft Plan approval.

3.3.3 Grassed Swale Design – Pre-treatment

A pre-treatment forebay will be provided for the grassed swales. Storm water from the road portion of the road allowance will be directed by curb outlets to pre-treatment forebays prior to entering the section with subdrains and filtration media. A checkdam type design will be used to separate the pre-treatment forebay from the filtration section of the grassed swale.

4.0 SITE FEATURES BASED WATER BALANCE

As summarized in Section 2.8, two wetland features and an intermittent swale feature have been identified on the project site that are part of the provincially significant Hall Lake-Kennifick Wetland Complex. These features were staked and surveyed in November 2007. Current site walks in 2013 by environmental consultants for the Project (Savanta) have indicated that the feature boundaries are similar to what was previously established.

A features based water balance will be undertaken in two stages. The first stage will involve monitoring and baseline data collection to establish the current hydrologic and ecological conditions. The second stage will involve detailed technical analyses and assessment.

4.1 Pre-Consultation

In support of the features based water balance, a pre-consultation meeting was held on May 31st, 2013 with staff of the Town of Caledon and Toronto and Region Conservation Authority. In the meeting there was general agreement with the proposed two stage approach as outlined below.

For the Draft Plan Approval application, the following was proposed to be provided for the features based water balance:

- an outline of the proposed monitoring program
- a summary of preliminary hydrologic information collected to-date (instrumentation was installed in May 2013 in the two wetland features)
- a discussion on the ecological function of the wetland features based on the information collected to-date
- an outline of the proposed technical (modelling and analyses) approach that will be used to assess impact of the proposed development
- a discussion of stormwater management and Low Impact Development techniques that will be evaluated and considered
- an outline of the proposed stormwater management and drainage system for the project

The submission of results of the monitoring program, data evaluation and discussion, detailed technical analyses, and coordination of hydrologic and ecologic aspects was proposed be made a Condition of Draft Plan Approval. This condition would be addressed by submission of a detailed technical report for review and approval by the Authority and Town of Caledon that includes:

- a summary of baseline monitoring and environmental inventory programs conducted as part of the project, including data presentation, evaluation, and discussion
- plans illustrating how the proposed drainage system will tie into surrounding drainage systems and features, and proposed stormwater management techniques

- a summary of proposed stormwater management techniques, including Low Impact Development approaches, that will be used to manage storm water and mitigate the impacts of the development on the quality and quantity of surface and ground water, and how they relate to terrestrial and aquatic species and their habitat, in addition to natural features and systems

- a summary of proposed stormwater management techniques, including Low Impact Development approaches, that will be used to maintain the pre-development water balance and infiltration levels to the greatest extent feasible and consistent with current Authority Guidelines

- proposed construction phasing and erosion and sediment controls

- location and description of all outlets and other facilities, grading, site alterations or development which may require an Authority permit

- plans illustrating development constraint mapping and environmental buffers

- site grading plans

- an outline of potential mitigation measures and contingency planning

4.2 Monitoring Program

With respect to monitoring, continuous water level recorders have been installed in the two wetland features to monitor water level fluctuations, identify wetland hydroperiods, and provide information for water balance computations. Two nested piezometers will be installed in the westerly swale feature (e.g., Part of Wetland No. 51) to monitor both surface and groundwater levels (i.e., this is an intermittent drainage feature that is seasonally dry). Manual water level measurements for Wetland No. 51 will be made on a monthly basis, excluding winter months. It is anticipated that the hydrologic monitoring program will extend for a three year period.

4.2.1 Surface Water Monitoring Installations

Two continuous water level monitoring installations have been installed: one in Wetland No. 35 and one in Wetland No. 36. Each installation comprises an automatic water level and temperature recording device with integral datalogger, and steel equipment enclosure. The supplied equipment is HOBO Water Level Data Logger instrumentation.

The HOBO Water Level Data Logger instrumentation measures absolute pressure and therefore compensation is required for atmospheric pressure fluctuations. Barometric pressure compensation is achieved using an additional HOBO Water Level Data Logger, installed out of the water at the site, to measure barometric pressure.

Summarized in Table 4.1 is information related to the water level monitoring locations.

TABLE 4.1
SUMMARY OF WATER LEVEL MONITORING INSTALLATIONS

Location	Northing	Easting	Installed Equipment
Wetland No. 35	4,867,840	598,992	HOBO Water Level Data Logger
Wetland No. 36	4,868,197	599,380	HOBO Water Level Data Logger

Note:
1. Northing and easting coordinates are referenced to Grid - UTM Zone 17: Datum - NAD 84.
2. Units: m – metres.

A third water level monitoring installation is planned to be installed prior to the spring melt of 2014. Two nested piezometers will be installed in the westerly swale feature to monitor both surface and groundwater levels (i.e., this is an intermittent drainage feature that is seasonally dry). Manual water level measurements will be made on a monthly basis, excluding winter months.

4.2.2 Installation and Programming

The water level and barometric pressure monitoring installations were installed by staff of Calder Engineering Ltd. on May 16th, 2013 and programmed to record information on a 15 minute basis.

4.2.3 Monitoring Period

It is anticipated that the hydrologic monitoring program will extend for a three year period.

4.3 Preliminary Hydrologic Monitoring Information Collected To-Date

Illustrated on Figure 4.1 and Figure 4.2 is water level and water temperature information collected to-date for the wetland features. Also provided on Figure 4.1 is daily rainfall from the Toronto Pearson Climate Station. Summarized on the figures are monthly mean values for water level and water temperature, and respective minimum and maximum values.

4.4 Wetland Ecological Function

With respect to ecology, the ecological land classification and a number of vegetation and wildlife surveys have been completed and summarized by SAAR Environmental Limited (2010). This information will be reviewed and compiled, and discussed to establish the ecological form and function of the wetland features.

Ecologically, the wetlands function by providing baseflow and hydrologic connections to downstream wetlands and surface water features. The wetland features, specifically Wetland No. 35 and Wetland No. 36, have submergent and emergent wetland vegetation communities. Wetland No. 51 (part on the site), is seasonally wet, and dominated by narrow leaved and robust emergent vegetation. It has been reported that the wetlands and vegetation communities supports turtles, breeding amphibians, and waterfowl staging/breeding (Varga, 2009).

4.5 Preliminary Desktop Water Balance Assessment

A preliminary "desktop" water balance assessment was undertaken consistent with the Stormwater Management Planning and Design Manual (Ministry of the Environment, 2003). The water balance was completed on an annual basis. Soils and land use information were used to calculate weighted evapotranspiration values and weighted water surplus quantities. Per the methodology, a weighted infiltration factor was calculated and surplus quantities were then split into runoff and infiltration components for existing and proposed conditions. Additional information on the water balance calculations and computational details are provided in Appendix C.

4.5.1 Pre-Development Water Balance Quantities

The results of the annual water balance analysis for existing conditions are presented in Table 4.3.

4.5.2 Post-Development Water Balance Quantities

Four scenarios were modeled for the post-development condition. These were as follows:

- "No Infiltration BMP's"
- "With Roof Infiltration BMP's
- "With Roof and Driveway Infiltration BMP's"
- "With Roof, Driveway, and Road Infiltration BMP's"

The results of the water balance analysis for proposed conditions are summarized in Table 4.3. As shown in Table 4.3, pre-development water balance conditions can be achieved by application of Best Management Practices (BMP's) and Low Impact Development (LID) practices. Calculations and computational details are presented in Tables C.3 to C.9, Appendix C.

4.5.3 Site Infiltration Considerations

In an effort to minimize the impact of development on the future water balance for the site, Best Management Practices (BMP's) and Low Impact Development (LID) practices will be promoted and incorporated. Accordingly, the following proposed BMP's and LID practices are proposed for implementation where feasible:

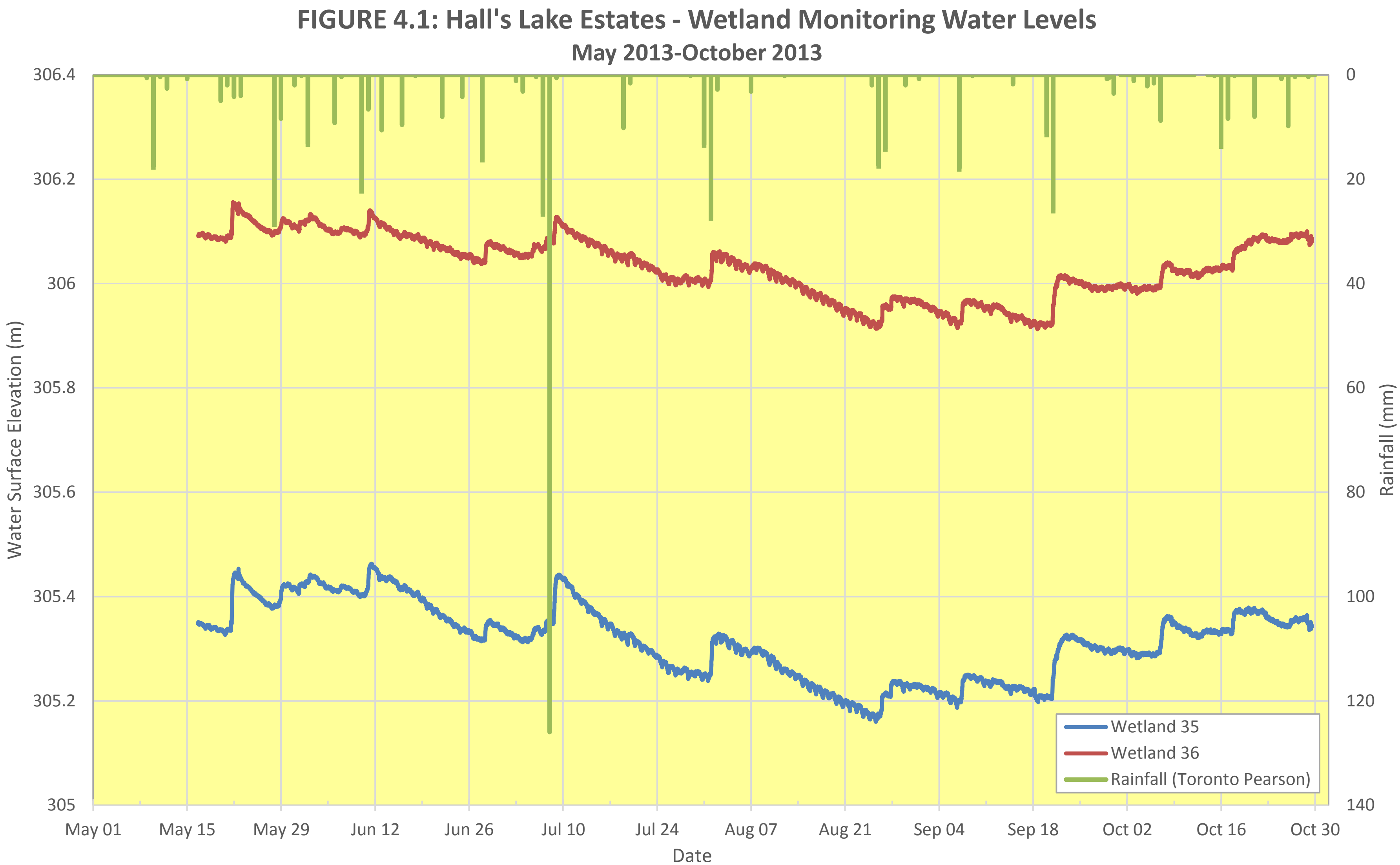
- recharge of residential roof and driveway storm water by direction to grassed and naturalized areas to promote filtering and natural infiltration;

- discharge of foundation drain water to rear and side lot areas;

- by lot grading, direction of structure envelope drainage, via sheet flow, towards grassed and naturalized areas versus the road right of way;

- application of grassed swales for road drainage versus a piped storm sewer system; and

- maintenance of natural drainage patterns.



WETLAND NO. 35 WATER SURFACE (m) STATISTICS

Month	May	June	July	August	September	October
Mean	305.39	305.39	305.33	305.24	305.25	305.34
Min	305.33	305.31	305.24	305.16	305.19	305.28
Max	305.45	305.46	305.44	305.33	305.33	305.38

WETLAND NO. 36 WATER SURFACE (m) STATISTICS

Month	May	June	July	August	September	October
Mean	306.11	306.09	306.05	305.99	305.96	306.04
Min	306.08	306.04	305.99	305.91	305.91	305.98
Max	306.16	306.14	306.13	306.06	306.02	306.10

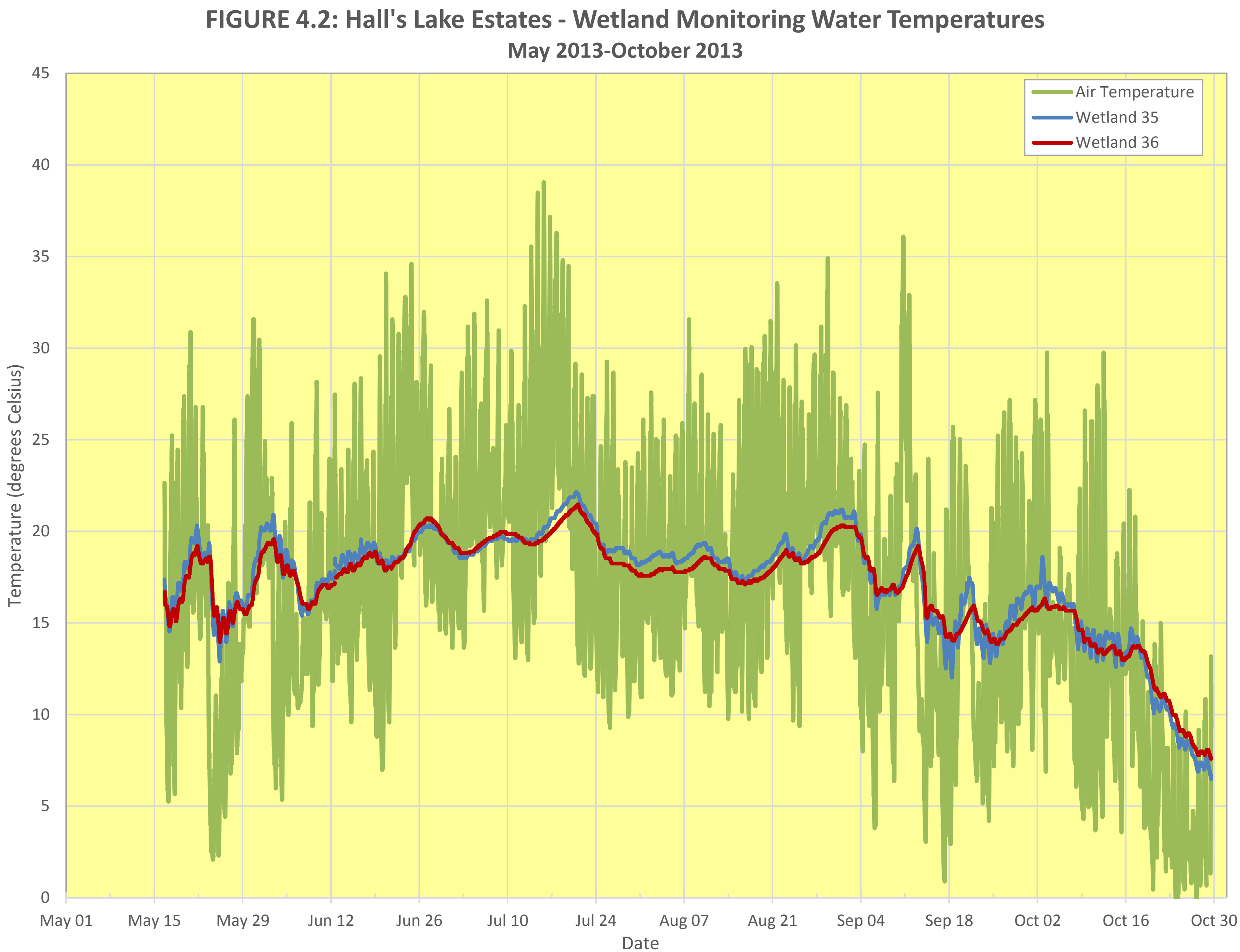


FIGURE 4.2: Hall's Lake Estates - Wetland Monitoring Water Temperatures
May 2013-October 2013
Temperature (degrees Celsius)
45
40
35
30
25
20
15
10
5
0
May 01
May 15
May 29
Jun 12
Jun 26
Jul 10
Jul 24
Aug 07
Aug 21
Sep 04
Sep 18
Oct 02
Oct 16
Oct 30
Date
Air Temperature
Wetland 35
Wetland 36

As far as practical, drainage from the lot areas will be conveyed to grassed and naturalized areas, and not drain to the road or storm sewer system.

TABLE 4.3
SITE WATER BALANCE QUANTITIES
COMPARISON OF EXISTING AND PROPOSED CONDITIONS
FOR HALLS LAKE ESTATES SUBDIVISION

Condition	Precipitation (m^3)	Evapo-transpiration (m^3)	Runoff (m^3)	Infiltration (m^3)	% of Existing Infiltration
CATCHMENT 1					
Existing	32,736	19,452	4,999	9,285	100.0
Proposed (No Infiltration BMP's)	32,736	17,306	8,169	8,260	89.0
Proposed (With Roof Infiltration BMP's)	32,736	18,314	6,621	8,801	94.8
Proposed (With Roof nd Driveway Infiltration BMP's)	32,736	18,636	6,127	8,974	96.6
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	32,736	19,345	5,037	9,354	100.7
CATCHMENT 2					
Existing	104,116	60,033	15,429	28,654	100.0
Proposed (No Infiltration BMP's)	104,116	57,632	18,976	27,504	96.0
Proposed (With Roof Infiltration BMP's)	104,116	58,035	18,356	27,724	96.8
Proposed (With Roof and Driveway Infiltration BMP's)	104,116	58,164	18,159	27,794	97.0
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	104,116	59,913	15,471	28,732	100.3
CATCHMENT 3					
Existing	107,345	61,895	15,908	29,543	100.0
Proposed (No Infiltration BMP's)	107,345	60,088	18,577	28,680	97.1
Proposed (With Roof Infiltration BMP's)	107,345	60,742	17,572	29,031	98.3
Proposed (With Roof and Driveway Infiltration BMP's)	107,345	60,935	17,276	29,135	98.6
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	107,345	61,805	15,939	29,601	100.2

CATCHMENT 5					
Existing	46,521	27,022	6,825	12,674	100.0
Proposed (No Infiltration BMP's)	46,521	24,368	10,723	11,430	90.2
Proposed (With Roof Infiltration BMP's)	46,521	25,275	9,330	11,916	94.0
Proposed (With Roof and Driveway Infiltration BMP's)	46,521	25,565	8,885	12,072	95.2
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	46,521	26,871	6,877	12,772	100.8
CATCHMENT 7					
Existing	75,712	43,978	11,107	20,628	100.0
Proposed (No Infiltration BMP's)	75,712	40,864	15,681	19,167	92.9
Proposed (With Roof Infiltration BMP's)	75,712	41,871	14,134	19,707	95.5
Proposed (With Roof and Driveway Infiltration BMP's)	75,712	42,193	13,639	19,880	96.4
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	75,712	43,801	11,169	20,742	100.6
CATCHMENT 8					
Existing	66,398	38,285	9,840	18,273	100.0
Proposed (No Infiltration BMP's)	66,398	35473	13,994	16,931	92.7
Proposed (With Roof Infiltration BMP's)	66,398	36,883	11,827	17,688	96.8
Proposed (With Roof and Driveway Infiltration BMP's)	66,398	37,334	11,134	17,930	98.1
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	66,398	38,144	9,889	18,364	100.5
CATCHMENT 9					
Existing	48,171	27,980	7,067	13,124	100.0
Proposed (No Infiltration BMP's)	48,171	27,688	7,4962	12,987	99.0
Proposed (With Roof Infiltration BMP's)	48,171	27,861	7,231	13,080	99.7
Proposed (With Roof and Driveway Infiltration BMP's)	48,171	27,964	7,073	13,135	100.1
Proposed (With Roof, Driveway, and Road Infiltration BMP's)	48,171	27,964	7,073	13,135	100.1

Note:
1. Units: m^3 - cubic meters.
2. The "% of Existing Infiltration" column represents a percentage of infiltration relative to the existing infiltration. As such, a percentage value greater than 100 infers that the proposed condition would enhance existing infiltration conditions.
3. Refer to Figure 2.2a for Catchment delineation under existing conditions, and Figure 3.1 for Sub-basin delineation under proposed conditions.

4.6 Features Based Water Balance Modeling Approach

A features based water balance will be conducted consistent with Section 6 of the Toronto and Region Conservation document entitled Stormwater Management Criteria (2012). It will assess the potential impact to hydrologic and ecological functions of the natural features, and identify mitigation measures for the post-development scenario, if required.

At this stage, it is anticipated that a continuous hydrologic modeling approach will be applied to assess pre and post-development hydrologic regime and hydroperiod of site wetland features. The modeling will incorporate results of the baseline monitoring program.

4.7 Contingency and Mitigation Planning

At this stage, it is anticipated that a Contingency and Mitigation Plan would be implemented and carried through to assumption of the Subdivision. This would include on-going water level and environmental monitoring of the wetland features, and annual reporting. The Contingency and Mitigation Plan would identify procedures and processes that the Owner should follow in the event that identified critical water level elevations in wetland features are exceeded or vegetation communities are identified as being impacted during the course of routine monitoring.

The Contingency and Mitigation Plan would be developed at the detailed engineering design stage following Draft Plan approval

5.0 MINOR AND MAJOR DRAINAGE SYSTEM DESIGN

The minor and major drainage system will consist of both the proposed road system and grassed swales. As much as practical, the existing natural drainage patterns will be maintained. The drainage system will be designed to manage storm water for up to the 100-year design storm consistent with Town of Caledon Development Standards, Policies, and Guidelines (2009) and Toronto and Region Conservation stormwater management criteria.

The road system will drain to grassed swales which will subsequently drain to natural low points. The grassed swales would be designed in general conformance with LID-12 Fact Sheet as described in the Credit Valley Conservation Authority/Toronto and Region Conservation Authority SWM Design Guideline Manual. A copy of the LID-12 Fact sheet is provided in Appendix D.

The grassed swales would be provided with a subdrain and granular media to provide filtration and management of the frequent small rainfall events. At this stage, storage has been provided to manage up to the first 15 millimetres of rainfall from the road right of way in the underlying granular media. Peak flow control would also be provided through a combination of storage in the granular media and on-line storage in the grassed swale system.

Should any storm sewer sections be required within the road right-of-way, they would be designed to collect and convey the 2-year peak flow. Road crossings on Street 'A' for the dry swale and stream would be sized to convey the 100-year design event and not result in flooding of private property under the Regional Flood.

6.0 DRAINAGE SYSTEM OPERATION AND MAINTENANCE CONSIDERATIONS

Listed below are operation and maintenance considerations for the drainage system and stormwater management features.

1. Construction of the drainage works, specifically Low Impact Development (LID) practices. be scheduled and phased to ensure integrity is not compromised during construction.

2. Drainage works and stormwater management features be inspected on a routine basis to verify they are functioning as intended.

3. The grassed swale system be maintained on a routine basis to remove any accumulated trash, mow grass, and remove woody material. It is anticipated that significant portions of the system will be maintained by the adjacent private property owners.

4. The grassed swale system be inspected on a routine basis and any identified erosion, gullies, rills, or bare spots repaired.

5. Signage be posted indicating natural or environmental protection areas, and that they are not to be disturbed or altered without authorization from the Town of Caledon or Toronto Region Conservation Authority.

7.0 SANITARY AND WATER SERVICING PLAN

7.1 Sanitary Servicing Plan

Sanitary servicing for the proposed subdivision will be by individual on-site sewage disposal systems (e.g., septic systems). Subject to detailed design, it is anticipated that the on-site sewage disposal systems would comprise a septic tank(s) sized at twice the daily design flow, effluent filter, tertiary treatment unit, area bed, and ancillary piping, pumping system(s), and controls. A tertiary treatment unit is anticipated to be required to fit the respective area bed within the lot structure envelope in conjunction with the dwelling and driveway features. Alternative tertiary treatment units can be found in Supplementary Standard SB-5, Approved Treatment Units, of the Ontario Building Code. The requirement for a tertiary treatment unit would be determined following Draft Plan approval and in conjunction with the Building Permit application process.

Illustrated on Figure 2.1 is the respective lot layout for the subdivision with the proposed structure envelopes, and preliminary sitings of the dwellings and area beds. As shown, the area beds have been sited on lands within structure envelopes where the slope is less than 10%. It should be noted that the maximum slope for siting of area or leaching beds, per the Ontario Building Code, is 25% (e.g., 4 horizontal to 1 vertical).

The septic system area bed sizes shown on Figure 2.1 are based on the following assumptions:

- the lots will be serviced with an area bed of 450 square metres; and
- in-situ soil percolation rate or `T` time is greater than 50 minutes per centimeter.

With a typical tertiary treatment system, an area bed with a size of 450 square metres and in-situ soil percolation rate or `T` time of greater than 50 minutes per centimeter can accommodate a maximum daily design flow of 3,600 litres per day.

By way of example, a maximum daily design flow of 3,600 litres per day is representative of an approximately 360 square metre (3,875 square foot) home with four bedrooms. This is consistent with the size of homes anticipated for the proposed subdivision.

It is anticipated that the on-site sewage disposal systems would be preliminary designed and sited at the detailed engineering design stage following Draft Plan approval, with detailed engineering design being undertaken at the Building Permit application stage and reflect site specific soil conditions and house designs. Detailed design of the on-site sewage disposal systems would be in general conformance with the Ontario Building Code.

7.2 Water Servicing Plan

7.2.1 Water Demand

The proposed subdivision comprises 28 estate lots. The estimated water demand is summarized in Table 7.1.

TABLE 7.1
ESTIMATED WATER DEMAND
HALL'S LAKE ESTATES

Population Type	Number of Units	Population Density	Average Consumption Rate (L/cap/day)	Subdivision Average Day Consumption (L/day)	Subdivision Max. Day Consumption (L/day)	Subdivision Peak Hour Consumption (L/hour)
Residential	28	2.7	280	21,280	42,560	2,660

Note:
1. Units: L/cap/day – litres per capita per day; L/day – litres per day; L/hour – litres per hour.
2. Consumption values determined by rounding the total subdivision population to 76 people.

7.2.2 Water Supply and Distribution

It is proposed that Hall's Lake Estates be serviced by municipal water. There is an existing 300 millimetre diameter watermain approximately 1 kilometre south of the subdivision at the intersection of Mount Wolfe Road and Bruno Ridge Drive. It is proposed that the Hall's Lake Estate subdivision will be serviced by municipal water by connecting to the existing watermain at Bruno Ridge Drive. Subject to detailed design, it is anticipated that the external watermain along Mount Wolfe Road and internal watermain for Street 'A' will be 300 millimetres in diameter, and the internal watermains for the cul-de-sacs (streets 'B' and 'C') will be 200 millimetres in diameter. The proposed watermain servicing layout is shown in Figure 7.1. The watermains would be complete with required appurtenances such as valving, hydrants, check valves, and vacuum breaker/air release chambers. The water distribution system would be designed, supplied, and installed in general conformance with the Region of Peel Public Works Design, Specifications and Procedures Manual (2012).

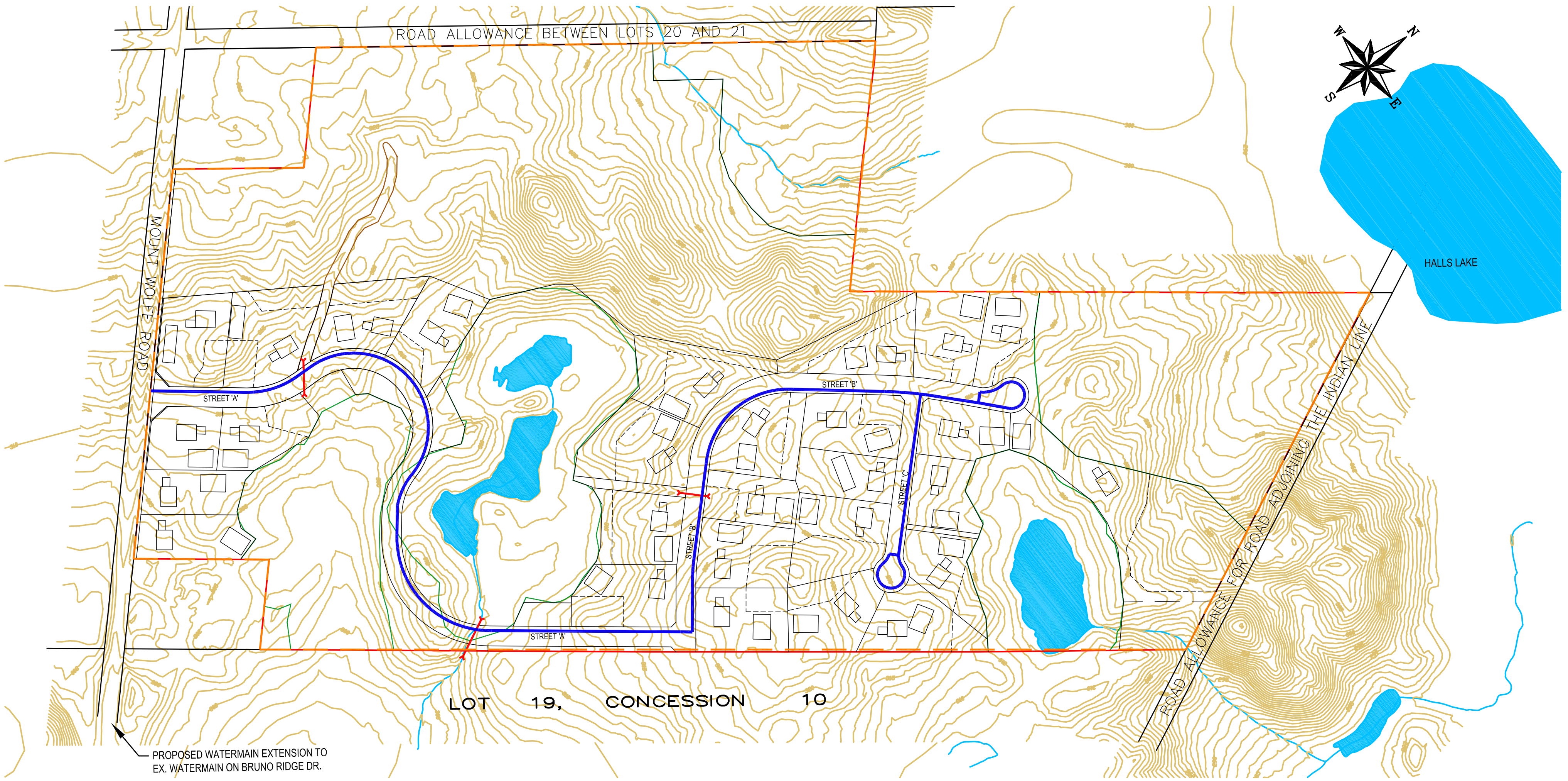
Pressure testing of the existing watermain at the intersection of Mount Wolfe Road and Bruno Ridge Drive was conducted at 10:15 AM on September 7th, 2011. The results were as follows:

- Static Pressure – 75 pounds per square inch (psi)
- Residual Pressure at 1,353 USGPM (307,300 L/hour) – 60 psi

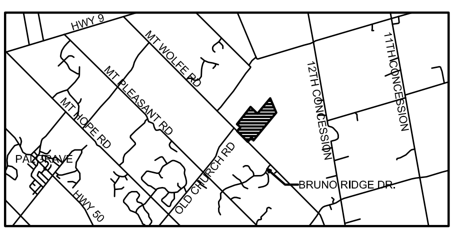
These results are shown graphically in Appendix E. The elevation of the fire hydrant used for pressure testing was surveyed by Calder Engineering Ltd. and determined to be at elevation 287.52 metres.

The lots and potential building locations associated with the proposed subdivision vary in elevation. Subject to detailed building siting and lot layout, main floor elevations are anticipated to be as follows:

- lots 1 to 8 – elevation 300 to 315 metres
- lots 9 to 12 – elevation 312 to 316 metres
- lots 13 to 15 – elevation 320 to 322 metres
- lots 16 to 21 – elevation 316 to 319 metres
- lots 22 to 28 – elevation 310 to 315 metres



KEY PLAN



NTS

LEGEND

- PROPERTY LINE
- PROPOSED CULVERT
- PROPOSED WATERMAIN

NOTES

Calder Engineering Ltd.

THE CORPORATION OF THE TOWN OF CALEDON

RITELAND DEVELOPMENT CORPORATION

HALL'S LAKE ESTATES
DRAFT PLAN APPLICATION (21T-98001C)
PART OF LOT 20, CONCESSION 10 (ALBION)
TOWN OF CALEDON, REGION OF PEEL

FIGURE 7.1

PROPOSED WATERMAIN SERVICING

Based on a static pressure of 75 psi at elevation 287.52 metres, desk top calculations indicate that a pressure of 40 psi could be achieved up to approximately elevation 317.5 metres. The minimum Region of Peel operating pressure is 40 psi.

This suggests that the operating pressure for several lots may fall to in the order of 30 psi and individual booster systems would be required to increase pressure accordingly. Therefore, it is proposed that individual private booster or constant pressure systems be implemented where the main floor elevation is at elevation 317 metres or greater. Appropriate clauses to this effect would be placed in the Owner's agreements of purchase and sale.

Hydraulic water distribution system modeling is required to confirm if minimum pressure requirements are met under fire flow conditions on Street 'C' and parts of Street 'A'. Should the minimum pressure requirements under fire flow conditions not be met, then dry hydrants with applicable storage would be provided.

In addition, to the above, it will be pursued with the Town of Caledon to restrict siting of the dwellings in the lot structure envelopes such that the main floor elevation is below a specific elevation (e.g., identification of maximum house elevations), through the zoning by-law.

7.2.3 Water Services

All water services will be single service connections that are supplied and installed in general conformance with the Region of Peel Public Works Design, Specifications and Procedures Manual (2012). Subject to detailed design it is proposed that the water service size be 37.5 milllimetres.

7.2.4 Private Booster or Constant Pressure Systems

Further to Section 7.2.2, packaged systems are commercially available to provide either boosted or constant water pressure. The systems typically utilize variable frequency drives to control pumps to either boost or maintain line pressure in conjunction with water use. The systems are installed on the private water service and connect to a small pressure tank that feeds the dwelling. As water demand increases, an inline unit will pump faster keeping the pressure from dropping due to increased water demand.

Review of specifications for commercially available units indicate a minimum incoming pressure requirement of 3 psi.

8.0 ROADWAY AND GRADING

8.1 General Description and Location

Access to the proposed Halls Lake Estates Subdivision will be from Mount Wolfe Road. The internal road layout is shown in Figure 2.1. As shown in Figure 2.1, the road network comprises three streets designated as 'A', 'B', and 'C'. Street 'A' starts at Mount Wolfe Road and extends eastward, winds between site wetland features and associated 30 metre minimum vegetation protection zone (MVPZ), and then terminates at an intersection with Street 'B'. The Street 'A'/Street 'B' intersection provides for potential future connection to lands to the south. Both Street 'B' and Street 'C' terminate with cul-de-sacs.

The proposed road will comprise a combined rural and urban road cross-section. The right of way width for Street 'A' and Street 'B' would be 20 metres, and for Street 'C' would be 18 metres. The pavement width would be 7.9 metres consistent with Town of Caledon Standard No. 202.

The proposed rural and urban cross-section would comprise a curbed road with open grass swales and ditches to better reflect the rural setting, accept drainage from adjacent lots where applicable, control the rate of flow through incorporation of linear on-line storage, and encourage filtration for water quality benefit. Within the road right of way, driveway culverts would be provided for the lots and also, if required, to access infrastructure such as fire hydrants and transformers. Where possible, the utilities and services would be located along one side of the road. Drainage from the paved section of road to the grass swales would be via curb outlets.

Subject to detailed design, the paved section of the road may not be curbed in the lower flat areas in vicinity of the watercourse and dry swale crossings.

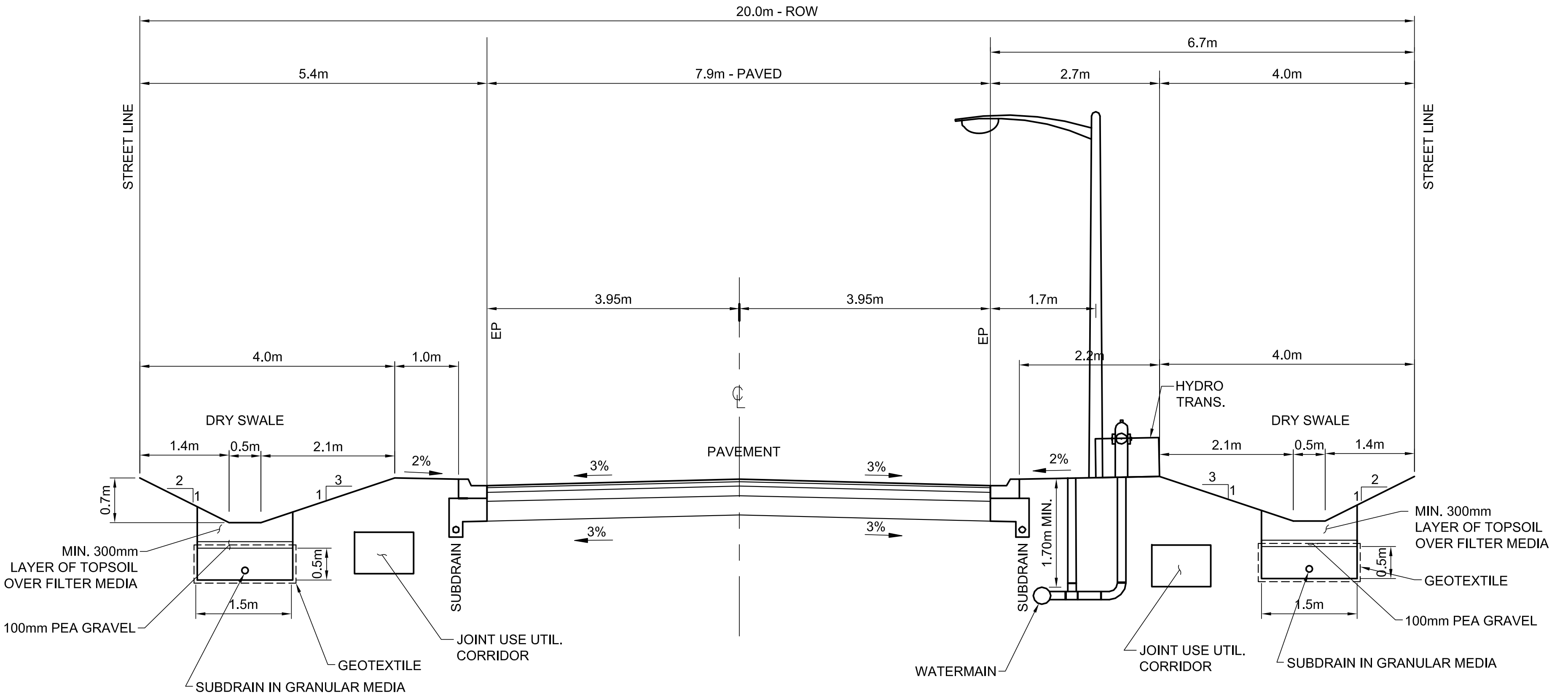
8.2 Road Design

The proposed road alignment and preliminary road grades are shown on the preliminary engineering drawings provided in Appendix F. Design of the road in both plan and profile would be in conformance with Town of Caledon Development Standards, Policies, and Guidelines. A schematic of the typical road cross-section is provided in Figure 8.1.

It should be noted that one section of Street 'A" has a horizontal radius of 70 metres versus the Town of Caledon minimum standard of 90 metres. It is indicated in the 1984 MEA Municipal Works Design Manual that local streets may be designed for tighter curves than a 90 metre radius with an appropriate reduction in posted speed. In this regard, the required design speed for the 70 metre radius section would be in the range of 35 to 40 kilometres per hour (km/h). Traffic calming measures can also be incorporated to assist.

8.3 Natural Features Encroachment

The proposed road alignment follows along part of the MVPZ of Wetland No. 51 and encroaches into the MVPZ associated with Wetland No. 35. Summarized in Table 8.1 and in Table 8.2 are statistics related to encroachment into the environmental buffer associated with the two wetland features (e.g., MVPZ).



SCALE: N.T.S.

FIGURE 8.1
HALLS LAKE ESTATES TYPICAL ROAD CROSS-SECTION

Calder Engineering Ltd.

TABLE 8.1
SUMMARY OF NATURAL FEATURES ENCROACHMENT BY FEATURE LENGTH

Feature	Shoreline Perimeter (m)	Linear Encroachment (m)	Percent Encroachment
Wetland No. 51	682	0	0%
Wetland No. 35	1,180	176	14.9%
Totals:	1,862	176	9.4%

Note:
1. Units: m – metres.
2. Linear encroachment is perimeter length of MVPZ affected: no encroachment into feature only MVPZ.

TABLE 8.2
SUMMARY OF NATURAL FEATURES ENCROACHMENT BY AREA

Feature	MVPZ Area (sq.m)	Encroachment Area (sq.m)	Percent Encroachment
Wetland No. 51	30,022	0	0%
Wetland No. 35	54,688	2,122	3.9%
Totals:	84,710	2,122	2.5%

Note:
1. Units: sq.m – square metres.
2. MVPZ – Minimum Vegetation Protection Zone (30 metre vegetated buffer from natural feature).

Per 7.1.9.29 of the Town of Caledon Official Plan (2008), a buffer of vegetation, a minimum of 30 metres wide over at least 90 percent of the shore frontage, will normally be required around every pond and stream and its inlet water courses to minimize the impacts of development. If the existing buffer of natural vegetation covers less than 90 percent of the shore frontage, rehabilitative plantings will be required to the satisfaction of the Town and Conservation Authority in order to achieve this standard. Rehabilitation plantings will normally qualify as a credit towards environmental bonus lots and will be included on the Environmental Management/Reforestation Plan.

As shown in Table 8.1 and Table 8.2, the road alignment results in an encroachment of 9.4% relative to shoreline perimeter and an encroachment of 2.5% relative to area of the environmental buffer (e.g., MVPZ). Based on this information, the proposed encroachment is in general compliance with provisions of the Town of Caledon Official Plan.

9.0 EROSION AND SEDIMENT CONTROL

9.1 General

An Erosion and Sediment Control Plan will be prepared during the detailed design phase following Draft Plan Approval. The Erosion and Sediment Control Plan would be prepared consistent with the Town of Caledon Development Standards, Policies & Guidelines (2009) and the Erosion & Sediment Control Guideline for Urban Construction prepared by the Greater Golden Horseshoe Area Conservation Authorities (2006).

For project construction, the key items will be limiting construction activities to defined working areas, managing water from dewatering activities, and managing surface runoff. Summarized in Table 9.1 are general procedures and mitigation measures to be implemented to avoid impacts.

TABLE 9.1
GENERAL PROCEDURES AND MITIGATION MEASURES FOR EROSION AND SEDIMENT CONTROL

Principle No.	Description
1.	Prepare a typical Erosion and Sediment Control Plan for the project construction outside of stream crossings and water bodies.
2.	Install temporary sediment controls prior to the start of construction per the typical details on the Erosion and Sediment Control Plan.
3.	Delineate the working area prior to the start of construction and confine operations to the defined area.
4.	Enclose temporary topsoil and subsoil stockpile areas with sediment control fence.
5.	Maintain construction accesses, working areas, and temporary material storage areas in good repair.
6.	Operate machinery in a manner that minimizes disturbance to the environment: - protect entrances at machinery access points (e.g., using swamp mats, log mats, or rock pads), and establish single site entry and exit points. - construction equipment and machinery to arrive on site in a clean condition and be maintained free of fluid leaks. - no equipment operation on the streambed and in flowing water. - wash, refuel and service machinery and store fuel and other materials in designated areas away from water bodies. - keep an emergency spill kit on site in case of fluid leaks or spills.
7.	Inspect, maintain, and repair sediment controls until completion of construction and site restoration.
8.	Keep additional erosion and sediment control materials, such as sediment control fencing and clearstone, on-site for emergencies and repairs.
9.	Remove and dispose temporary sediment controls following completion of construction and site restoration.
10.	Vegetate any disturbed areas by planting and seeding preferably with native grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with mulch, straw, or erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following growing season.

Note:
1. The information in this table is for general construction outside of stream crossings and water bodies.

The erosion and sediment controls comprise management actions and measures to be implemented prior to any land grading or construction activities on the site. Consistent with the Town of Caledon Development Standards, Policies & Guidelines (2009), erosion and temporary sediment controls would be inspected on a weekly basis and after each rain event 10 millimetres or greater or a significant snow melt. These inspections would ensure that the controls are in proper working condition and maintained. A permanent record of these inspections is required to be forwarded to the Town of Caledon Public Works and Engineering Department within five days of the inspection.

All disturbed ground left inactive, including topsoil stockpiles, would be stabilized by seeding, sodding, mulching or covering, or equivalent control measures. The period of time of inactivity shall not exceed 30 days, unless otherwise authorized by the Project Manager.

9.2 Stream and Dry Swale Crossings

For the purpose of this document, the terms "Dam and Pump" and "Flume" temporary stream crossings means crossing techniques that allows watercourse crossing installation to be carried out "in-the-dry" while diverting the natural flow around the site during construction. Natural flow is maintained downstream by installing dams up and downstream of the site, and conveying all of the natural upstream flow into a flume, or pumping it around the isolated area. General procedures and mitigation measures for Dam and Pump and Flume temporary stream crossings are outlined in Table 9.2.

In general, if the watercourse crossing can be completed in less than one working day and the stream flow is low (e.g., can be managed by available pumping capacity), the Dam and Pump approach can be applied. Otherwise, stream flow would have to be bypassed by use of a flume.

TABLE 9.2
GENERAL PROCEDURES AND MITIGATION MEASURES FOR (I) DAM AND PUMP AND (II) FLUME TEMPORARY STREAM CROSSINGS

Principle No.	Description
General	General conformance with procedures and mitigation measures identified in Table 9.1.
Dam and Pump Temporary Stream Crossing	
1.	Prepare a typical Erosion and Sediment Control Plan for Dam and Pump temporary stream crossings. Typical mitigation measures include: - enclose temporary topsoil and subsoil stockpile areas with sediment control fence. - maintain workings areas and construction accesses in good repair. - procedures for trench dewatering. - keep additional erosion and sediment control materials, such as silt fencing and clearstone readily available on-site for emergencies. - stabilize all disturbed areas and exposed soil on completion of construction. - remove and dispose temporary sediment controls following completion of construction and site restoration.

2.	Implement pumping system operational Best Management Practices, including: - ensure the pumping system is sized to accommodate expected stream high flows during the construction period. - ensure pumping system intakes are operated and maintained in a manner that prevents streambed disturbance and the pumping of streambed sediments, and fish mortality. - keep an emergency spill kit on site in case of fluid leaks or spills. - protect pump discharge area(s) to prevent erosion and the release of suspended sediments downstream (e.g., anchor pipe discharge and direct flow on to a rock pad), and remove this material when the works have been completed.
3.	Stabilize the streambed and restore the original channel shape, bottom gradient, and substrate to the pre-construction condition.
4.	Ensure banks are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.
Flume Temporary Stream Crossing	
1.	Prepare a typical Erosion and Sediment Control Plan for Flume temporary stream crossings. Typical mitigation measures include: - enclose temporary topsoil and subsoil stockpile areas with sediment control fence. - procedures for trench dewatering. - maintain working areas and construction accesses in good repair. - keep additional erosion and sediment control materials, such as silt fencing and clearstone on-site for emergencies. - stabilize all disturbed areas and exposed soil on completion of construction. - remove and dispose temporary sediment controls following completion of construction and site restoration.
2.	Time stream watercourse crossing construction to protect sensitive fish life stages.
3.	Use dams made of non-earthen material, such as water inflated portable dams, pea gravel bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs, to separate the dewatered work site from flowing water. - if granular material is used to build dams, use clean or washed material that is adequately sized (i.e., moderately sized rock and not sand or gravel) to withstand anticipated flows during the construction and if necessary, line the outside face of dams with semi-impermeable material to reduce water volumes to be managed. - material to build these dams should not be taken from the stream banks and bed of any water body. - design dams to accommodate any expected high flows of the watercourse during the construction period
4.	Before dewatering and starting construction, relocate any trapped fish from within the isolated work area to the main water body.
5.	Pump sediment laden dewatering discharge into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering any water body.
6.	Remove accumulated sediment and excess spoil from the isolated area before removing dams. - if minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, log mats, or rock pads) should be used provided they do not constrict flows or block fish passage. - grading of the stream banks for the approaches should not occur.
7.	Stabilize the streambed and restore the original channel shape, bottom gradient and substrate to pre-construction condition before removing dams.
8.	Ensure banks are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.
9.	If rock is used to stabilize banks, it should be clean, free of fine materials, and of sufficient size to resist displacement during peak flood events. The rock should be

	placed at the original stream bank grade to ensure there is no infilling or narrowing of the watercourse.
10.	Gradually remove the downstream dam first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.
11.	During the final removal of dams, restore the original channel shape, bottom gradient and substrate at these locations.

9.3 Topsoil Management Plan

Consistent with the Town of Caledon Development Standards, Policies & Guidelines (2009), all stockpiles containing more than 100 cubic metres of material shall be located a minimum of 10 metres away from the roadway, drainage channels, or an occupied residential lot. The maximum side-slopes for topsoil stockpiles shall be 1.5 horizontal to 1.0 vertical. Location of topsoil stockpiles on lands to be dedicated to the public is prohibited. Topsoil stockpiles shall be located, where possible, on private lands between houses and on rear yards.

The Geotechnical Report for the project prepared by Soil Engineers Ltd. (2006) has identified a 250 to 400 mm layer of topsoil across the site. Construction of site services will involve stripping and stockpiling of topsoil associated with the road right of way and a strip along the right of way to facilitate grading. The lots would not be graded until house construction.

Based on an assumed average topsoil depth of 300 mm, it is estimated that the volume of topsoil to be managed during the site servicing phase is 14,200 cubic metres. The estimated 14,200 cubic metres of topsoil would be managed as follows:

- 14,200 cubic metres stripped from the road right-of-way plus an average width of 5 metres and stockpiled

- 10,200 cubic metres of topsoil removed from the stockpiles and placed on the boulevard areas

- the remaining 4,000 cubic metres of topsoil from the stockpiles spread on the lots as lot and house construction progresses.

At this stage, it is anticipated that no topsoil will be either exported from the site or imported to the site.

Each estate lot, within the structure envelope, will be individually graded based on house design and orientation, and driveway and septic system design. Topsoil would remain on the property during grading. Once house, driveway, septic system construction, and lot grading is completed, the topsoil would be spread and seeded. Any lots with a topsoil deficit could have material supplemented from the topsoil stockpiles.

The location of topsoil stockpiles would be determined following Draft Plan approval at the detailed design stage. For erosion and sediment control planning, it would be specified that any stockpiles remaining at the end of the season will be hydroseeded with a native seed mixture and closed off with full perimeter siltation fencing.

9.4 Emergency Contact Information

As part of the erosion and sediment control planning process, a copy of emergency contact numbers would be kept on-site and readily available. An example emergency contact list is provided in Table 9.1. The applicable contacts would be confirmed at the detailed design stage following Draft Plan approval and information provided on the Erosion and Sediment Control Plan.

TABLE 9.1
EMERGENCY CONTACT LIST

Name/Agency	Phone Number
Town of Caledon	(905) 584-2272
Toronto and Region Conservation	(416) 661-6600
Ministry of Environment Spills Reporting	(416) 325-3000
Toronto Water 24 hour Spills Reporting	(416) 338-8888
Owner – Riteland Development Corporation	(416) 674-0521
Project Engineer – Calder Engineering Ltd.	(905) 857-7600

10.0 UTILITY SERVICES

It is proposed that private gas and communication utilities will be provided for Hall’s Lake Estates by connection to existing utilities in vicinity of the intersection of Mount Wolfe Road and Bruno Ridge Drive. Bruno Ridge Drive is located approximately 1 kilometre south of the Hall’s Lake Estates. Electrical power to the site will be provided by connection to existing power line infrastructure on Mount Wolfe Road.

11.0 SUMMARY

1. Calder Engineering Ltd. has been retained by Riteland Development Corporation to complete a Preliminary Engineering and Stormwater Management Report for the proposed Hall's Lake Estates residential development in the Palgrave area of the Town of Caledon. The report is supporting documentation for the respective subdivision Draft Plan application and has been prepared to meet requirements of sections 7.1.18.7 and 7.1.18.8 of the Town of Caledon Official Plan.

2. The overall site comprises 56.12 ha. It is proposed to develop the site with 28 estate residential lots using a combined rural and urban road cross-section, individual private septic systems for sewage disposal, and municipal water. Drainage and storm water will be managed with the application of Low Impact Development (LID) practices.

3. The site generally drains southward towards a tributary of the Humber River Watershed. However, a portion drains to the southeast and is part of the Holland River Watershed. As such, the site falls within the jurisdiction of two conservation authorities: the Lake Simcoe Region Conservation Authority (LSRC) and the Toronto Region Conservation Authority (TRCA). It is the understanding of Calder Engineering Ltd. that the Toronto Region Conservation Authority has agreed to review documentation related to the subdivision Draft Plan application on behalf of both conservation authorities.

4. The minor and major drainage system for the subdivision will consist of both the proposed road system and grassed swales. As much as practical the existing natural drainage patterns will be maintained. The drainage system will be designed to manage storm water for up to the 100-year design storm consistent with Town of Caledon Development Standards, Policies, and Guidelines (2009).

5. Lot level controls and Low Impact Development (LID) practices will be implemented, wherever feasible, to reduce the volume of runoff and provide, as far as practical, a natural hydrologic response. These measures are as follows:

   - recharge of residential roof and driveway storm water by direction to grassed and naturalized areas to promote filtering and natural infiltration;
   - discharge of foundation drain water to rear and side lot areas;
   - by lot grading, direction of structure envelope drainage, via sheet flow, towards grassed and naturalized areas versus the road right of way;
   - application of grassed swales for road drainage versus a piped storm sewer system; and
   - maintenance of natural drainage patterns.

6. In support of the features based water balance, a pre-consultation meeting was held on May 31st, 2013 with staff of the Town of Caledon and Toronto and Region Conservation Authority. Based on the meeting, the features based water balance will be undertaken in two stages. The first stage will involve monitoring and baseline data collection to

establish the current hydrologic and ecological conditions. This stage would be initiated at the Draft Plan application stage: hydrologic monitoring was started in May 2013. The second stage will involve detailed technical analyses and assessment, and be completed at the detailed design stage following Draft Plan approval.

7. As previously noted, the road system will drain to grassed swales which will subsequently drain to natural low points. The grassed swales would be designed in general conformance with LID-12 Fact Sheet as described in the Credit Valley Conservation Authority/Toronto and Region Conservation Authority SWM Design Guideline Manual. The grassed swales would be provided with a subdrain and granular media to provide filtration and management of the frequent small (e.g., less than 5 millimetre) rainfall events. At this stage, storage has been provided to manage up to the first 15 millimetres of rainfall from the road right of way in the underlying granular media. Peak flow control would also be provided through a combination of storage in the granular media and on-line linear storage in the grassed swale system.

8. Sanitary servicing for the proposed subdivision will be by individual on-site sewage disposal systems (e.g., septic systems). Subject to detailed design, it is anticipated that the on-site sewage disposal systems would comprise a septic tank(s) sized at twice the daily design flow, effluent filter, tertiary treatment unit, area bed, and ancillary piping, pumping system(s), and controls. A tertiary treatment unit is anticipated required to fit the respective area bed within the lot structure envelope in conjunction with the dwelling and driveway features.

9. It is proposed that Halls Lake Estates Subdivision be serviced by municipal water. There is an existing 300 millimetre diameter watermain approximately 1 kilometre south of the subdivision at the intersection of Mount Wolfe Road and Bruno Ridge Drive. It is proposed that the Halls Lake Estate subdivision will be serviced by municipal water by connecting to the existing watermain at Bruno Ridge Drive.

10. With respect to water servicing, there is the potential that the operating pressure for several lots may fall to in the order of 30 psi and individual private booster systems would be required to increase pressure accordingly. The minimum Region of Peel operating pressure is 40 psi. Therefore, it is proposed that individual private booster or constant pressure systems be implemented where the main floor elevation is at elevation 312 metres or greater. In addition to the above, it will be pursued with the Town of Caledon to restrict siting of the dwellings in the lot structure envelopes such that the main floor elevation is below a specific elevation (e.g., identification of maximum house elevations), through the zoning by-law.

11. Hydraulic water distribution system modeling is required to confirm if minimum pressure requirements are met under fire flow conditions on Street 'C' and parts of Street 'A'. Should the minimum pressure requirements under fire flow conditions not be met, then dry hydrants with applicable storage would be provided.

12. Considerations were provided for erosion and sediment control planning. An Erosion and Sediment Control Plan will be prepared during the detailed design phase following Draft Plan Approval. The Erosion and Sediment Control Plan would be prepared consistent with the Town of Caledon Development Standards, Policies & Guidelines (2009) and the Erosion & Sediment Control Guideline for Urban Construction prepared by the Greater Golden Horseshoe Area Conservation Authorities (2006).

Respectfully submitted,

CALDER ENGINEERING LTD.

Robert J. Whyte, M.Sc., P.Eng.
Project Manager

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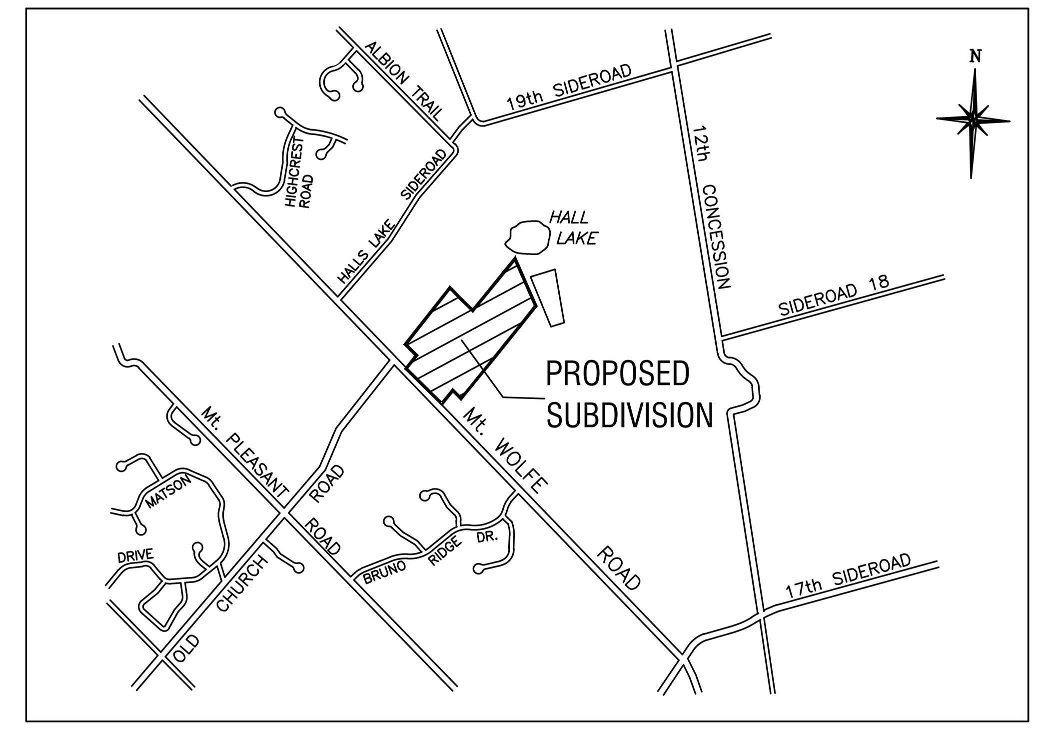
APPENDIX A

DRAFT PLAN

DRAFT PLAN OF SUBDIVISION
PART OF LOT 20, CONCESSION 10
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SCALE 1:2000

DRAFT PLAN T–



KEY PLAN

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. 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 ------------, 2015

TED VAN LANKVELD OLS

OWNER'S CERTIFICATE

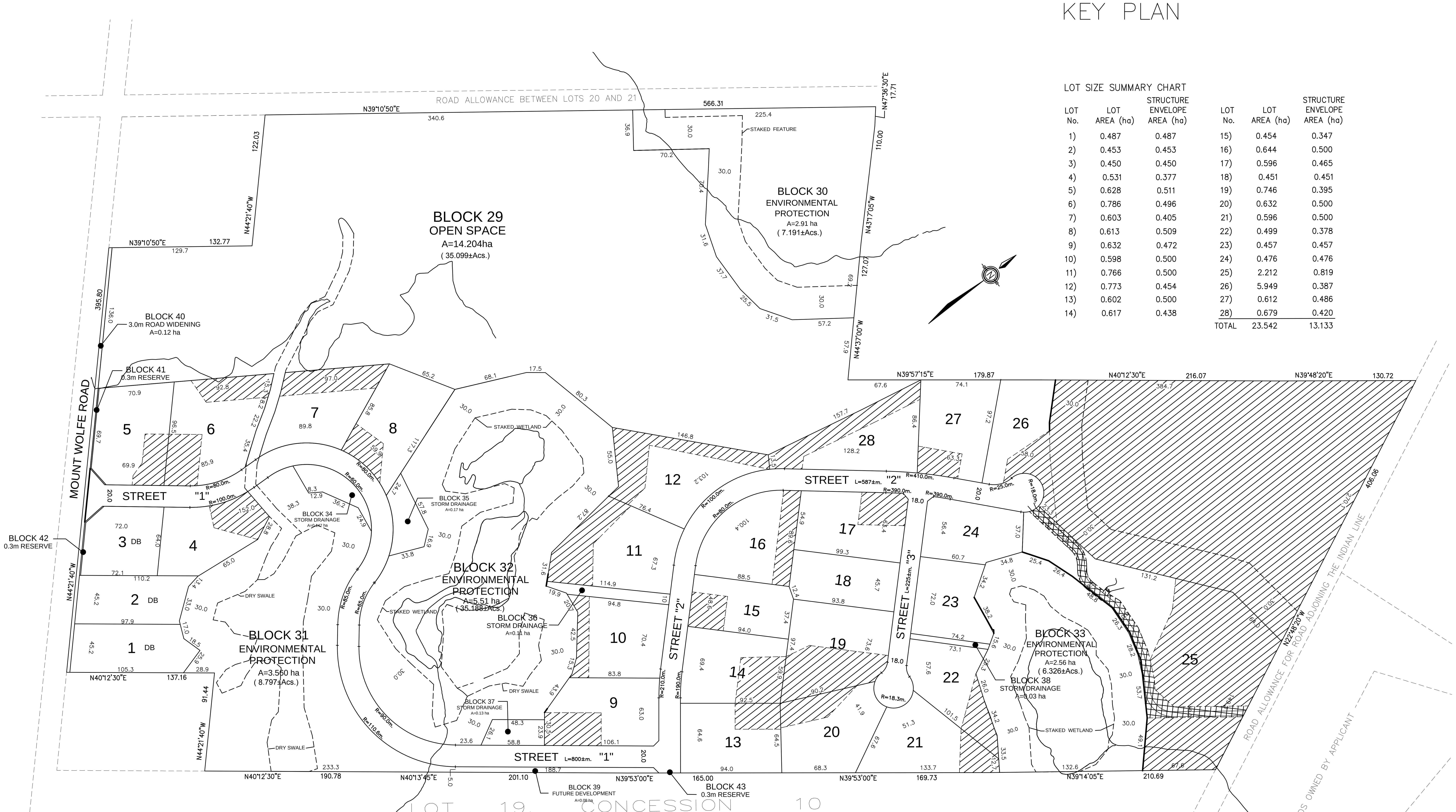
I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF CALEDON FOR APPROVAL.

OWNER

RITELAND DEVELOPMENT CORP.

1862 ALBION RD.
REXDALE, ONTARIO
M9W 5T2

ANTONIO FERRARA A.S.O.



LOT SIZE SUMMARY CHART

LOT No.	LOT AREA (ha)	STRUCTURE ENVELOPE AREA (ha)	LOT No.	LOT AREA (ha)	STRUCTURE ENVELOPE AREA (ha)
1)	0.487	0.487	15)	0.454	0.347
2)	0.453	0.453	16)	0.644	0.500
3)	0.450	0.450	17)	0.596	0.465
4)	0.531	0.377	18)	0.451	0.451
5)	0.628	0.511	19)	0.746	0.395
6)	0.786	0.496	20)	0.632	0.500
7)	0.603	0.405	21)	0.596	0.500
8)	0.613	0.509	22)	0.499	0.378
9)	0.632	0.472	23)	0.457	0.457
10)	0.598	0.500	24)	0.476	0.476
11)	0.766	0.500	25)	2.212	0.819
12)	0.773	0.454	26)	5.949	0.387
13)	0.602	0.500	27)	0.612	0.486
14)	0.617	0.438	28)	0.679	0.420
			TOTAL	23.542	13.133

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED = 56.263±Ha. (139.029±Acs)

DETACHED DWELLINGS	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
LOTS 1–28 (MIN. LOT FRONTAGE=15.3m. MIN LOT AREA=4490sq.m.)		28	28	23.542	58.174
SUBTOTAL		28	28	23.542	58.174
BLOCK 29 – OPEN SPACE	1			14.204	35.099
BLOCKS 30–33 – ENVIRONMENTAL PROTECTION	4			14.540	35.929
BLOCKS 34–38 – STORM DRAINAGE	5			0.587	1.451
BLOCK 39 – FUTURE DEVELOPMENT	1			0.080	0.198
BLOCK 40 – ROAD WIDENING	1			0.120	0.297
BLOCKS 41–43 – 0.3m. RESERVE	3			0.010	0.025
STREETS				3.180	7.857
20.0m. WIDE TOTAL LENGTH=1387±m. AREA= 2.774±Ha.					
18.0m. WIDE TOTAL LENGTH= 225±m. AREA= 0.406±Ha.					
TOTAL LENGTH=1612±m. AREA= 3.180±Ha.					
TOTAL	15	28	28	56.263	139.029

NATURAL AREA

EASEMENT TO OTHER LANDS OWNED BY APPLICANT

DB DENSITY BONUS

PROJECT No. P-2520

SCALE 1:2000 FEB. 4, 2015

(2520DES1) X-REF: (2520MAS & 2520TOPO)

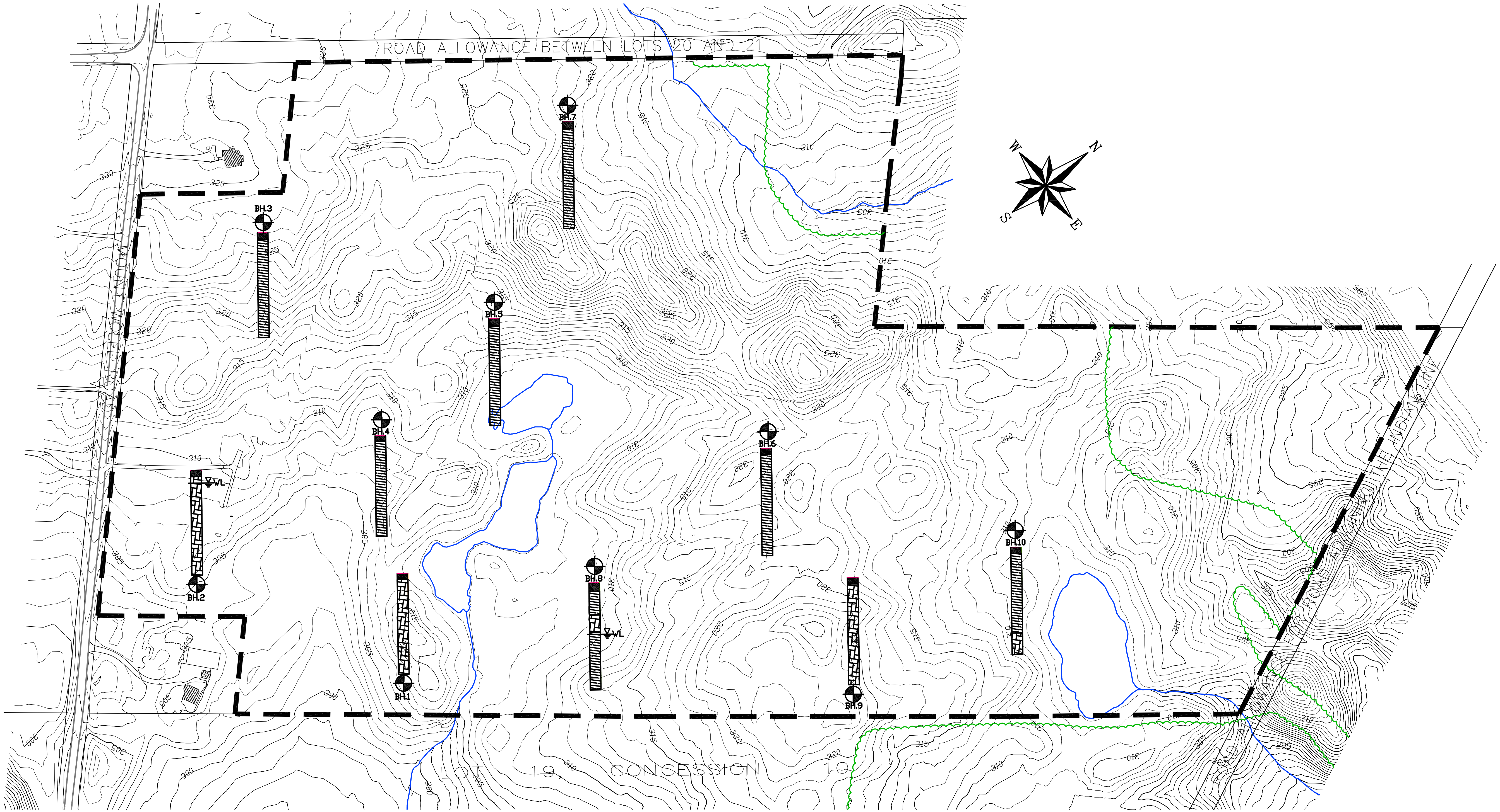
DWG. No. - 15:1

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

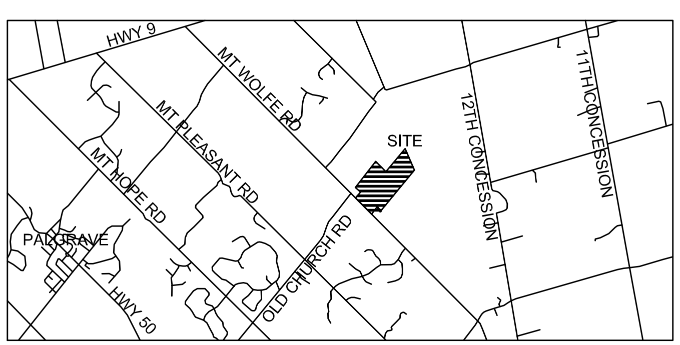
NOTE – ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM

APPENDIX B

GEOTECHNICAL DOCUMENTS



KEY PLAN



TOWN OF CALEDON

NTS

LEGEND

- SITE BOUNDARY
- EXISTING BUILDING
- TREE LINE
- STREAM OR WATER BODY
- EXISTING PAVED ROAD
- 315 MAJOR CONTOUR (5m INTERVALS)
- WL OBSERVED WATER LEVEL OR CAVE-IN ELEVATION
- BH.10 BOREHOLE LOCATION
- TOPSOIL
- SILTY CLAY TILL
- SILTY SAND TILL

NOTES

1. CONTOURS AND SPOT ELEVATIONS FROM FIRST BASE SOLUTIONS INC. TOPOGRAPHY DEVELOPED FROM ORTHOPHOTOGRAPHY TAKEN IN THE SPRING OF 2009.
2. MAJOR CONTOUR INTERVAL IS 5m, MINOR CONTOUR INTERVAL IS 1m.
3. BOREHOLE RECORDS ADAPTED FROM "A SOIL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT, MOUNT WOLFE ROAD AND HALL'S LAKE SIDEROAD" BY SOIL ENGINEERS LTD. AND DATED 2015.
4. FEATURE LOCATIONS (e.g. TREELINES, BUILDINGS, ETC.) ARE APPROXIMATE.
5. IF NO OBSERVED WATER LEVEL SHOWN, THE BOREHOLE WAS DRY ON COMPLETION.

100m 0 100m 200m

SCALE 1:4000

Calder Engineering Ltd.
T 905-857-7600 E calder@caldereng.com W www.caldereng.com

THE CORPORATION OF THE TOWN OF CALEDON

RITELAND DEVELOPMENT CORPORATION

HALL'S LAKE ESTATES

DRAFT PLAN APPLICATION (21T-98001C)

PART OF LOT 20, CONCESSION 10 (ALBION)

TOWN OF CALEDON, REGION OF PEEL

MAP 4A

SOIL AND SOIL CLASSIFICATION MAP - BOREHOLES

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

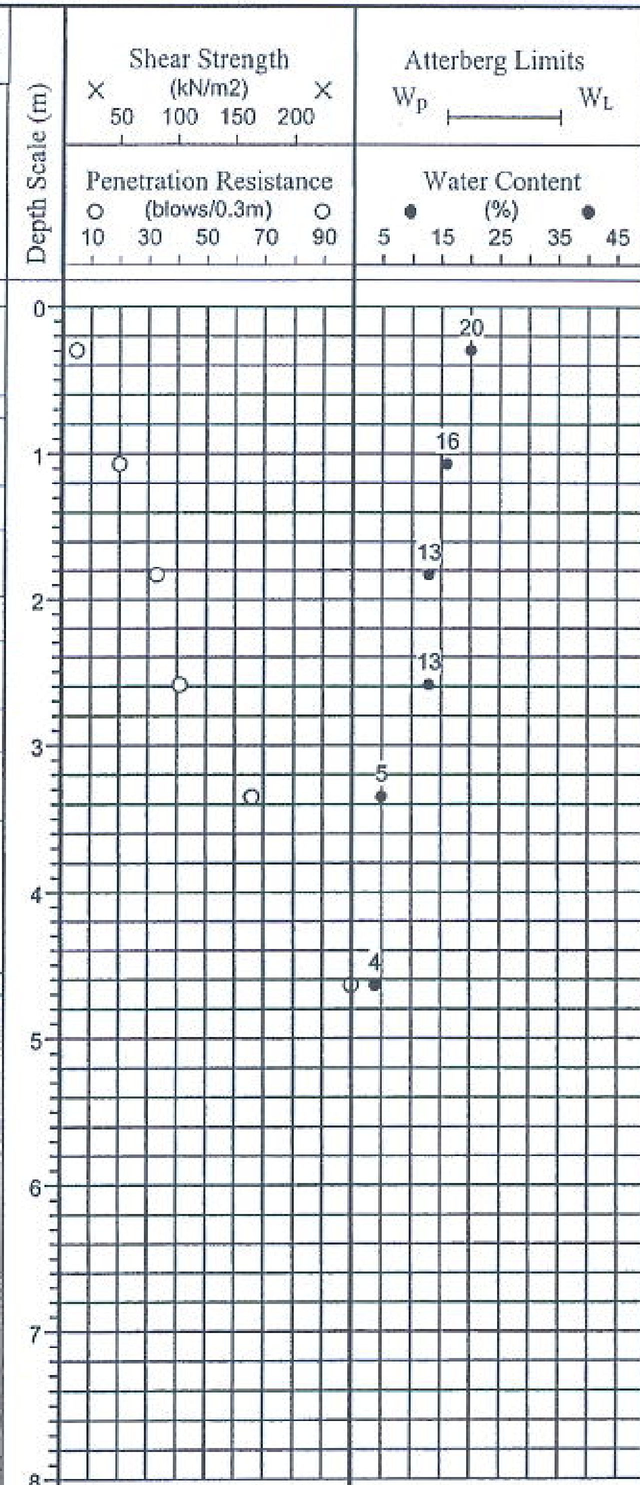
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Sample Number	Type	N-Value	Water Content (%)	WATER LEVEL
307.4	Ground Surface					
0.0	28cm TOPSOIL					
	Brown, loose to very dense; weathered	1	DO	5	20	Dry on completion
	a tr. of roots	2	DO	20	16	
	SILTY SAND, Till	3	DO	33	13	
		4	DO	41	13	
	a tr. to some clay; a tr. of gravel; occ. silt and sand seams and layers, cobbles and boulders	5	DO	66	5	
302.7 / 4.7		6	DO	100+	4	
	END OF BOREHOLE					



Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

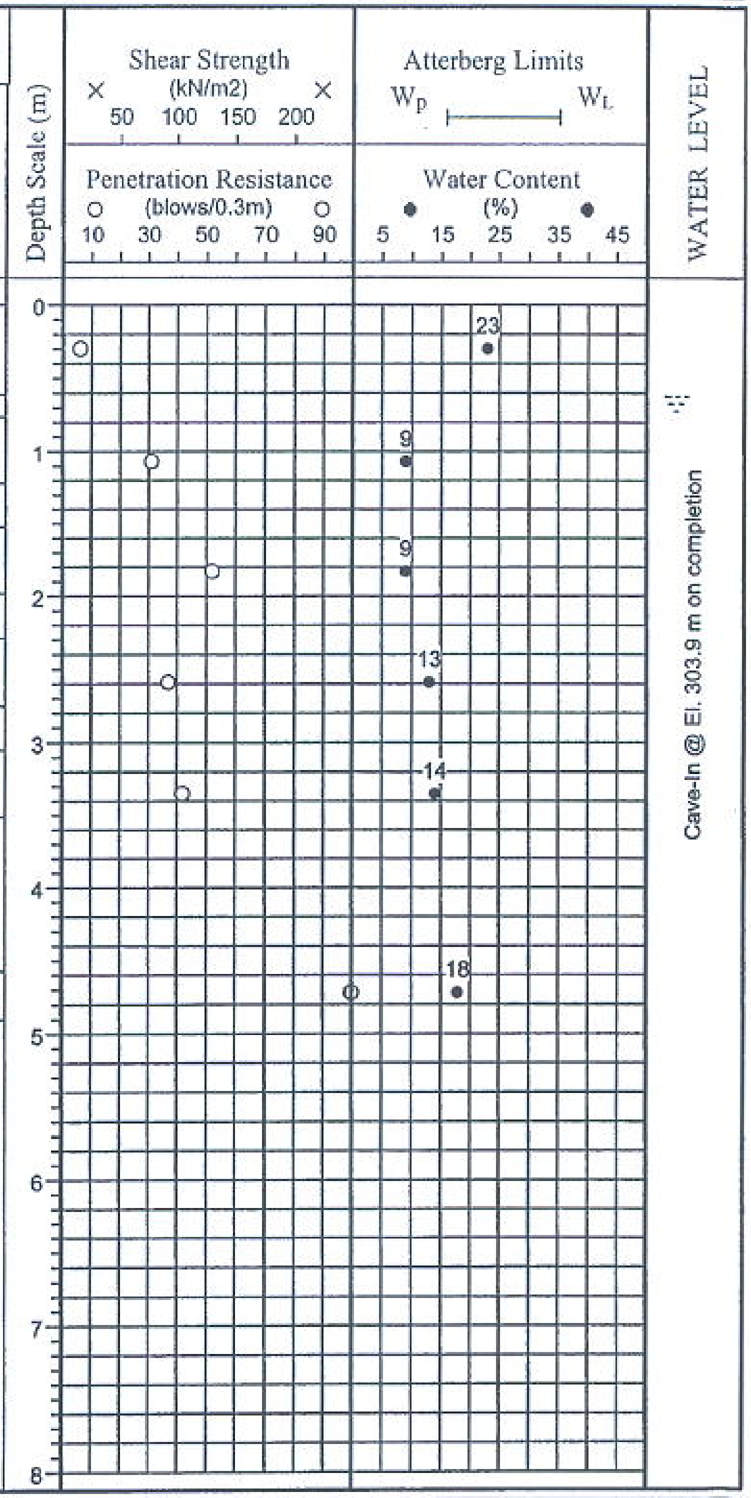
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
304.5	Ground Surface			
0.0	**30cm TOPSOIL**			
	weathered	1	DO	6
	Brown, loose to very dense; some gravel	2	DO	31
	SILTY SAND, Till	3	DO	52
		4	DO	37
	a tr. to some clay a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	5	DO	42
299.6 / 4.9		6	DO	100+
	END OF BOREHOLE			



Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

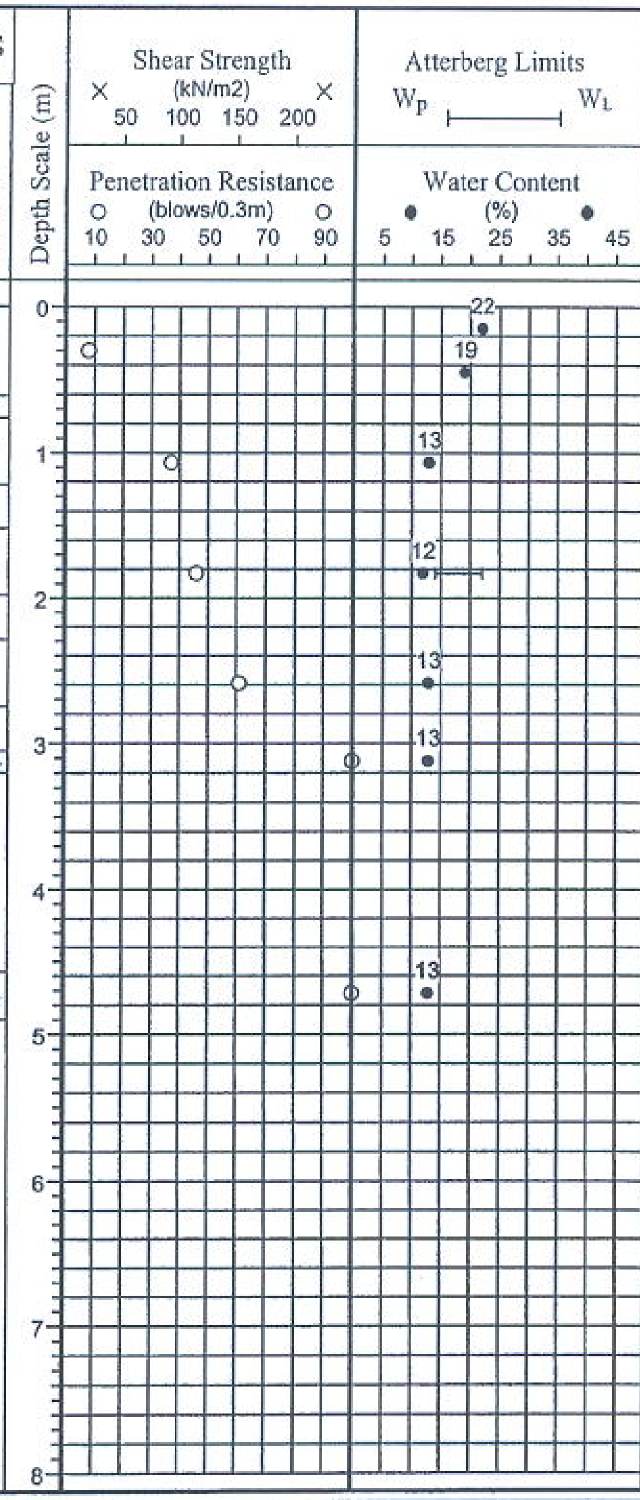
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. Depth (m)	SOIL DESCRIPTION	Number	Type	N-Value
327.2	Ground Surface			
0.0	**30cm TOPSOIL**			
	Brown, firm to hard; weathered; a tr. of roots	1	DO	8
		2	DO	37
	SILTY CLAY, Till	3	DO	46
		4	DO	61
	some sand to sandy; a tr. of gravel; occ. silt and sand seams and layers, cobbles and boulders	5	DO	100+
322.3		6	DO	100+
4.9	**END OF BOREHOLE**			



WATER LEVEL: Dry on completion

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. Depth (m)	SOIL DESCRIPTION	Sample Number	Type	N-Value	Depth Scale (m)	Penetration Resistance (blows/0.3m)	Water Content (%)	WATER LEVEL
307.7	Ground Surface							
0.0	**25cm TOPSOIL**				0			Dry on completion
	weathered	1	DO	6			19	
	Brown, firm to hard	2	DO	31	1		18	
	SILTY CLAY, Till	3	DO	100+			16	
		4	DO	72	2		14	
	some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	5	DO	100+	3		12	
303.0		6	DO	100+	4		12	
4.7	**END OF BOREHOLE**				5			

Shear Strength (kN/m2): 50 100 150 200
Atterberg Limits: W_P — W_L
Penetration Resistance (blows/0.3m): 10 30 50 70 90
Water Content (%): 5 15 25 35 45
Depth Scale (m): 0 1 2 3 4 5 6 7 8

Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 5

FIGURE NO.: 5

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Samples: Number	Type	N-Value	Water Content (%)
314.2	Ground Surface				
0.0	**35cm TOPSOIL**				
	Brown, soft to hard	1	DO	4	21
	weathered	2	DO	8	18
	a tr. of roots				
	SILTY CLAY, Till	3	DO	17	15
		4	DO	62	14
	some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	5	DO	63	12
309.2		6	DO	63	13
5.0	**END OF BOREHOLE**				

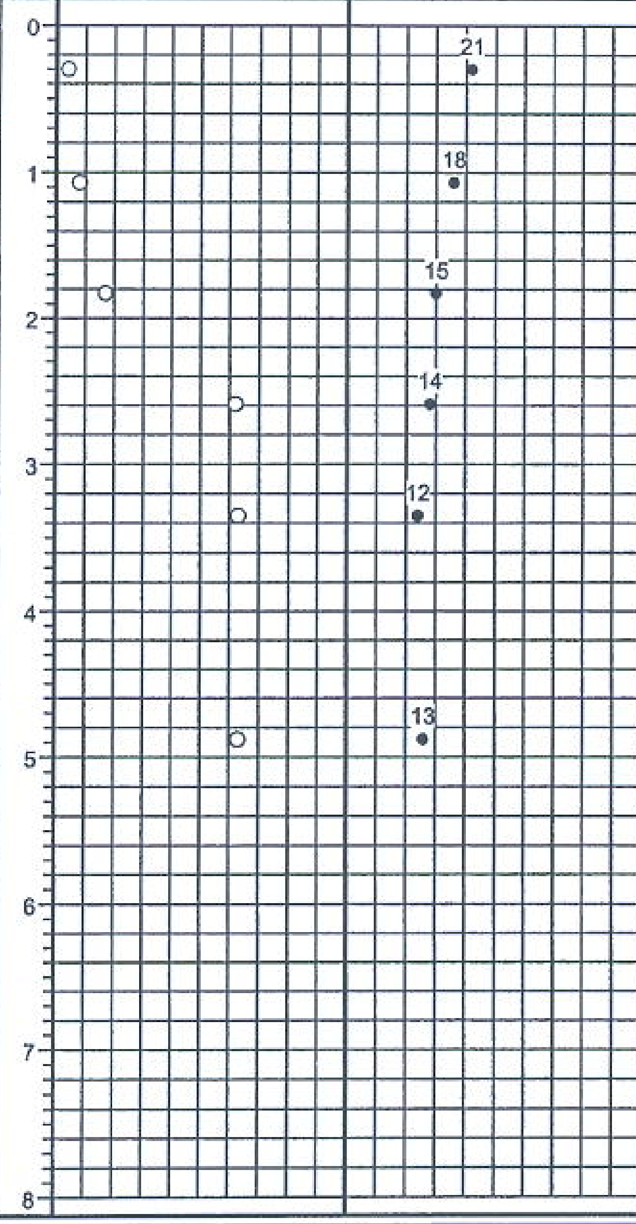
Depth Scale (m)

Shear Strength (kN/m2) × 50 100 150 200 ×

Penetration Resistance ○ (blows/0.3m) ○ 10 30 50 70 90

Atterberg Limits W_P —— W_L

Water Content ● (%) ● 5 15 25 35 45



WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 6

FIGURE NO.: 6

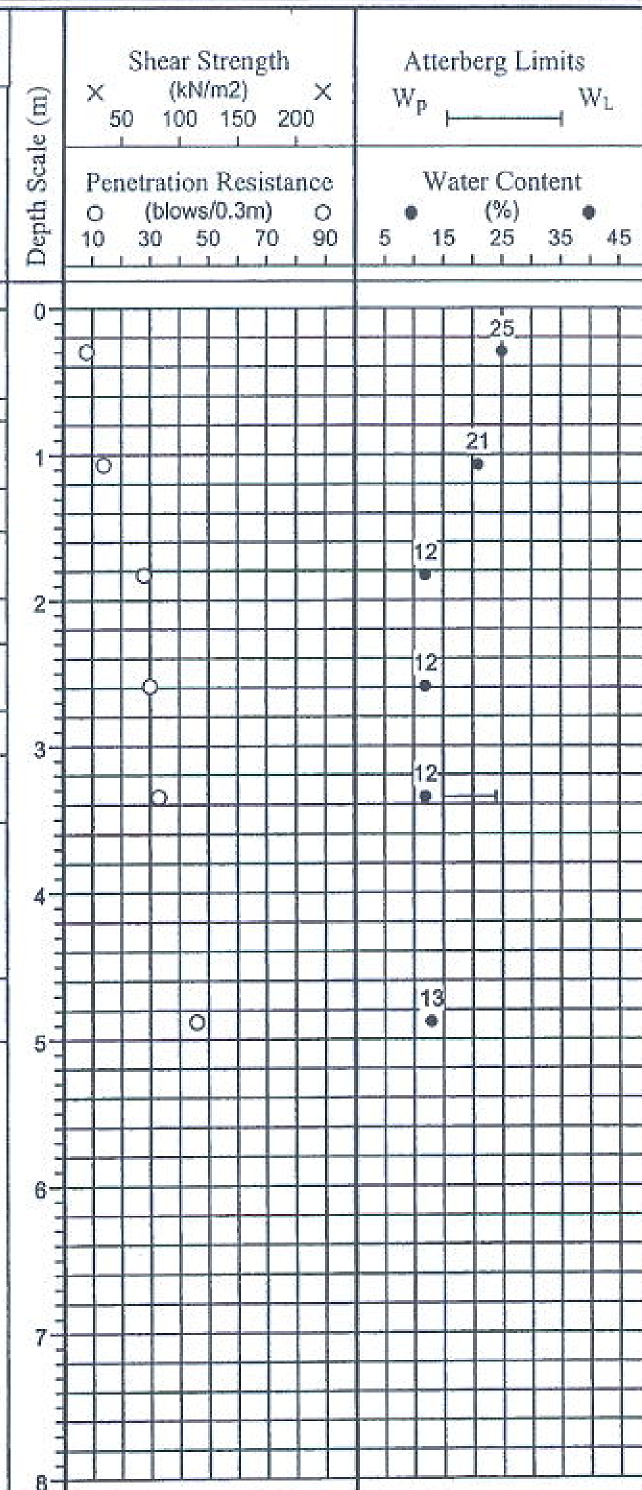
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	WATER LEVEL
316.3	Ground Surface				
0.0	**28cm TOPSOIL**	1	DO	8	
	Brown, firm to hard weathered a tr. of roots	2	DO	14	
	SILTY CLAY, Till	3	DO	28	Dry on completion
		4	DO	30	
	some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	5	DO	33	
311.3 5.0	**END OF BOREHOLE**	6	DO	46	



JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 7

FIGURE NO.: 7

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad, Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Sample Number	Type	N-Value	Depth Scale (m)	Penetration Resistance (blows/0.3m)	Water Content (%)	WATER LEVEL
320.0	Ground Surface							
0.0	35cm TOPSOIL	1	DO	5	0	5	23	Dry on completion
	Brown, firm to hard; weathered	2	DO	10	1	10	21	
	a tr. of roots; sand lenses	3	DO	16		16	14	
	SILTY CLAY, Till	4	DO	40	2	40	14	
	sand layers; some sand to sandy, a tr. of gravel, occ. silt and sand seams and layers, cobbles and boulders	5	DO	51	3	51	13	
315.0 / 5.0		6	DO	50	4	50	18	
	END OF BOREHOLE				5			

Shear Strength (kN/m2): × 50 100 150 200 ×

Penetration Resistance (blows/0.3m): ○ 10 30 50 70 90 ○

Atterberg Limits: Wp |———| WL

Water Content (%): ● 5 15 25 35 45 ●

Depth Scale (m): 0 1 2 3 4 5 6 7 8

Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 8

FIGURE NO.: 8

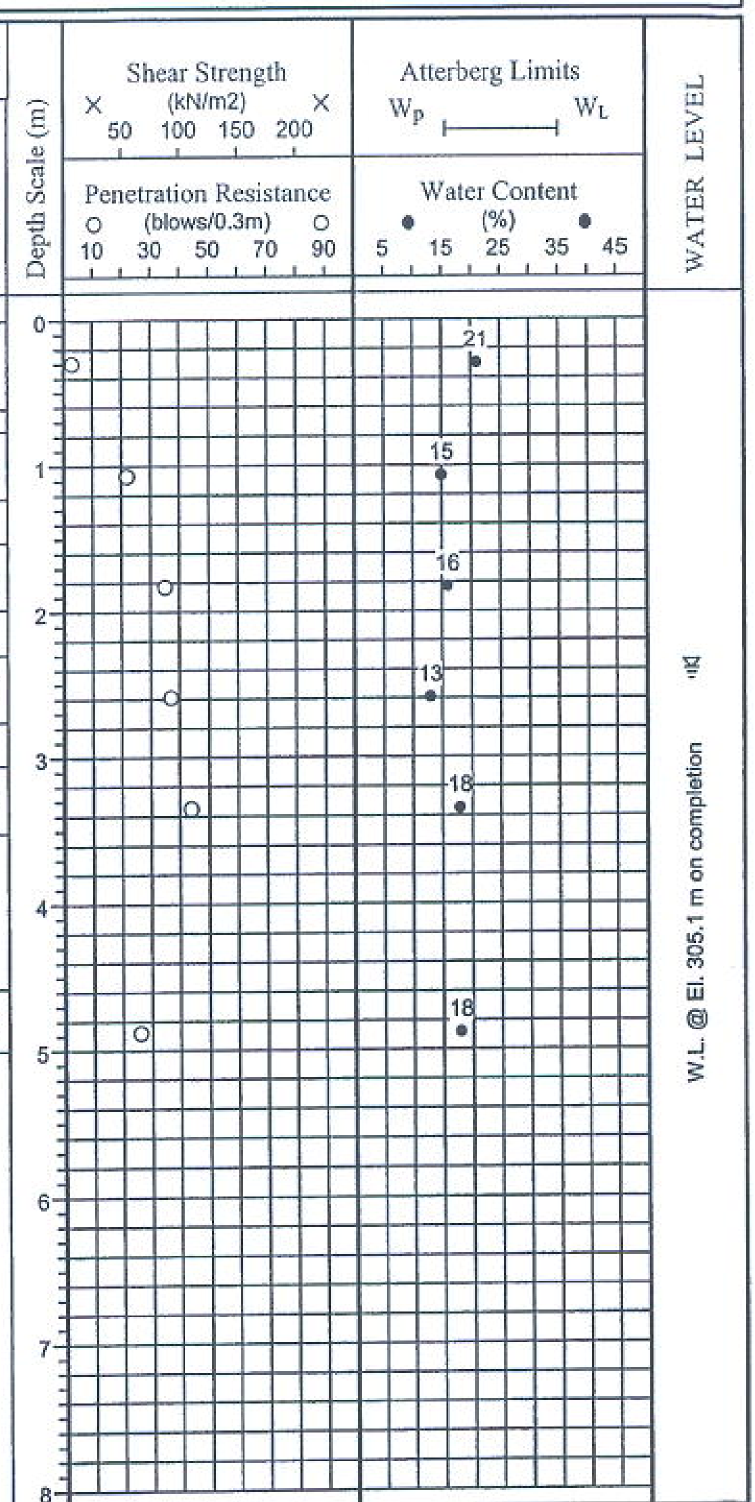
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Sample Number	Type	N-Value
307.5	Ground Surface			
0.0	**40cm TOPSOIL** Brown, soft to very stiff **SILTY CLAY, Till** (weathered) some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	1	DO	3
		2	DO	22
306.0 / 1.5	Brown, dense **SILTY SAND, Till** a tr. to some clay, a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	3	DO	35
305.2 / 2.3	Brown, very stiff to hard **SILTY CLAY, Till** some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	4	DO	37
		5	DO	44
		6	DO	26
302.5 / 5.0	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 9

FIGURE NO.: 9

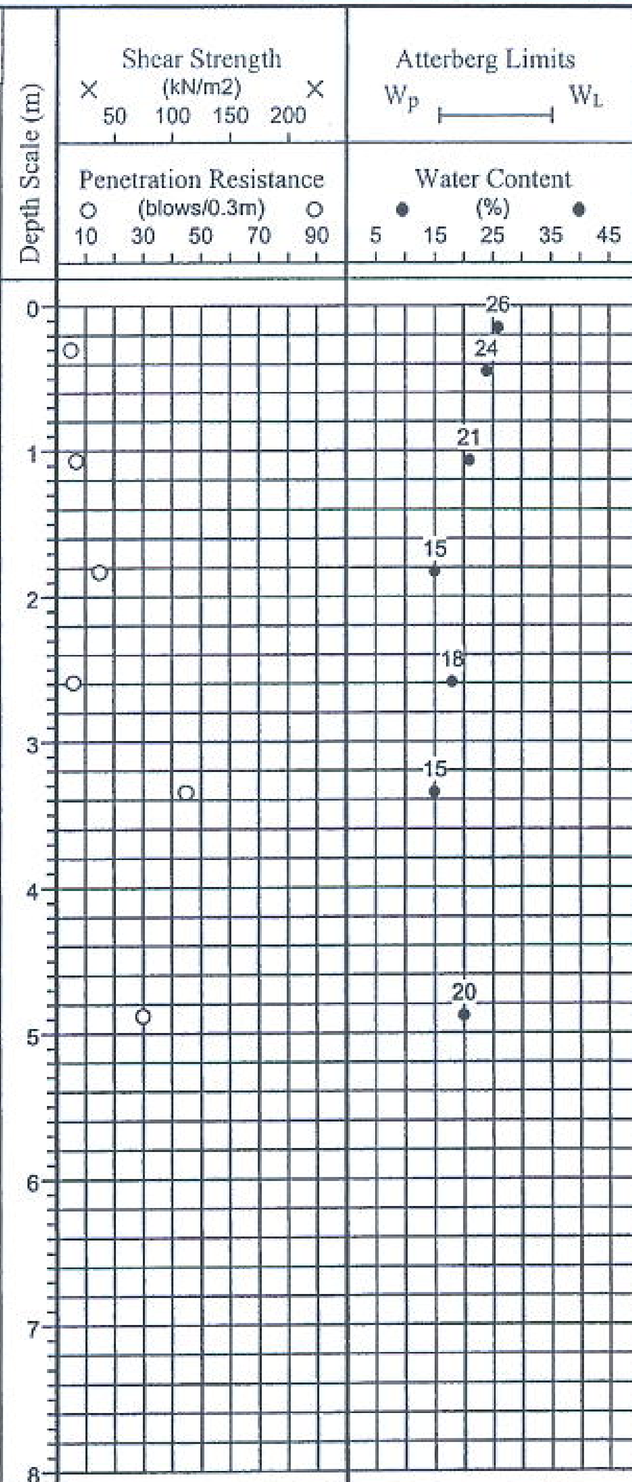
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Sample Number	Type	N-Value
321.9 / 0.0	Ground Surface			
	30cm TOPSOIL	1	DO	5
	Brown, loose to dense; weathered --- a tr. of roots	2	DO	7
	SILTY SAND, Till	3	DO	15
		4	DO	6
		5	DO	45
	a tr. to some clay, a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	6	DO	30
316.9 / 5.0	**END OF BOREHOLE**			



WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO.: 0511-S088

LOG OF BOREHOLE NO.: 10

FIGURE NO.: 10

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Mount Wolfe Rd./Hall's Lake Sideroad
Town of Caledon

METHOD OF BORING: Flight-Auger

DATE: January 6, 2006

Elev. / Depth (m)	SOIL DESCRIPTION	Sample Number	Sample Type	N-Value	Water Content (%)	WATER LEVEL
309.0	Ground Surface					
0.0	**28cm TOPSOIL**					
	Brown, firm to hard	1	DO	5	19	Dry on completion
	weathered	2	DO	9	19	
	a tr. of roots					
	SILTY CLAY, Till	3	DO	23	16	
		4	DO	65	13	
	some sand to sandy a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	5	DO	42	21	
305.0 4.0	Brown, very dense **SILTY SAND, Till** a tr. to some clay, a tr. of gravel occ. silt and sand seams and layers, cobbles and boulders	6	DO	70	12	
304.0 5.0	**END OF BOREHOLE**					

Depth Scale (m): 0 1 2 3 4 5 6 7 8

Shear Strength (kN/m2) × 50 100 150 200 ×

Penetration Resistance ○ (blows/0.3m) ○ 10 30 50 70 90

Atterberg Limits W_P —— W_L

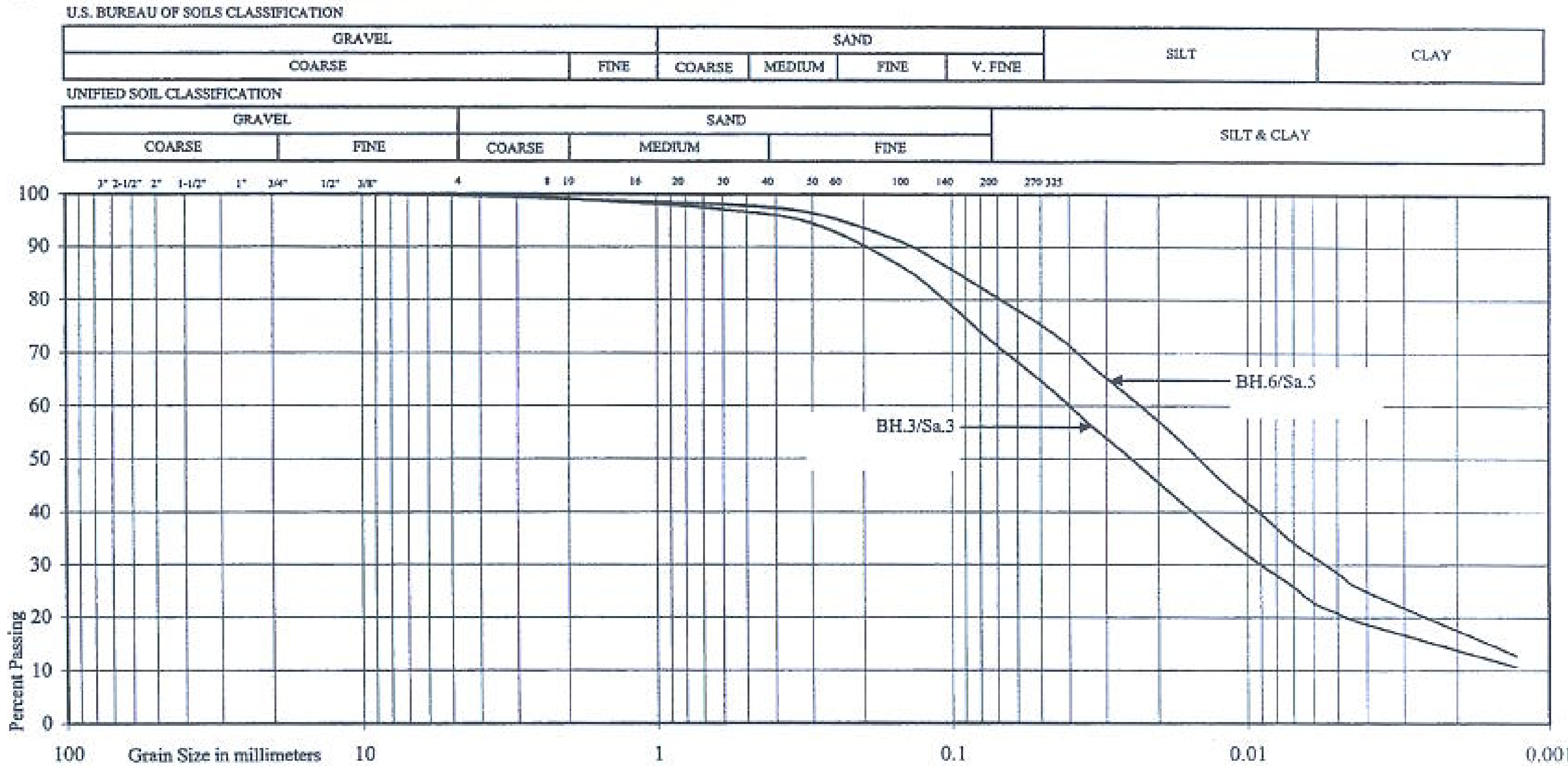
Water Content (%) ● 5 15 25 35 45 ●

Soil Engineers Ltd.

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0511-S088



Project:	Proposed Residential Development		
Location:	Mount Wolfe Rd./Hall's Lake Sideroad, Town of Caledon		
Borehole No:	3	6	
Sample No:	3	5	
Depth (m):	1.8	3.4	
Elevation (m):	325.4	312.9	

BH./Sa.	3/3	6/5
Liquid Limit (%) =	22	24
Plastic Limit (%) =	14	15
Plasticity Index (%) =	9	9
Moisture Content (%) =	12	12
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-6}

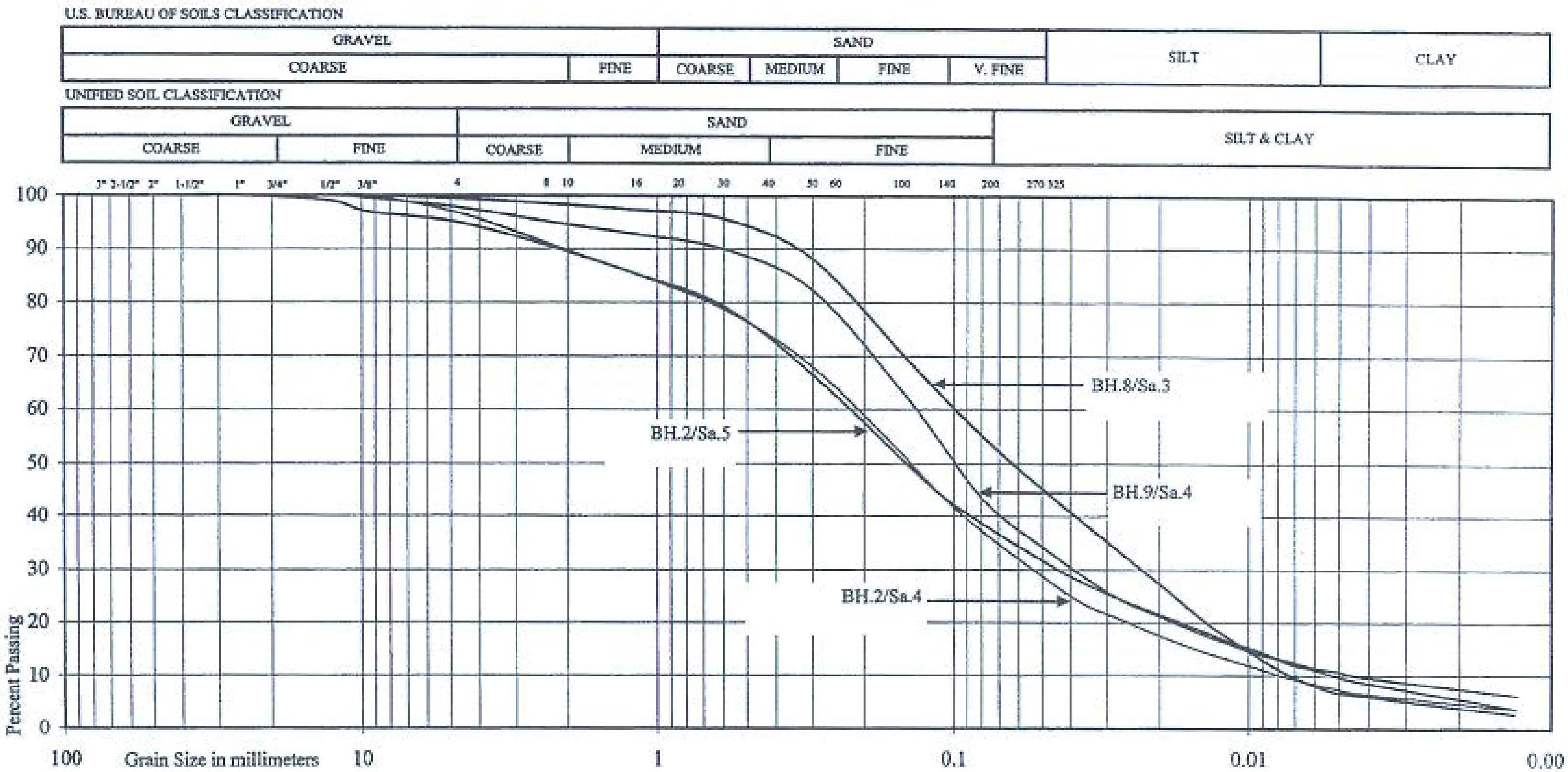
Classification of Sample [& Group Symbol]: SILTY CLAY, Till
some sand to sandy, a tr. of gravel

Figure: 11

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0511-S088



Project:	Proposed Residential Development			
Location:	Mount Wolfe Rd./Hall's Lake Sideroad, Town of Caledon			
Borehole No:	2	2	8	9
Sample No:	4	5	3	4
Depth (m):	2.6	3.4	1.8	2.6
Elevation (m):	301.9	301.1	305.7	319.3

BH./Sa.	2/4	2/5	8/3	9/4
Liquid Limit (%) =	-	-	-	-
Plastic Limit (%) =	-	-	-	-
Plasticity Index (%) =	-	-	-	-
Moisture Content (%) =	13	14	16	18
Estimated Permeability (cm./sec.) =	10^{-4}	10^{-5}	10^{-4}	10^{-5}

Classification of Sample [& Group Symbol]: SILTY SAND, Till
a tr. to some clay, a tr. of gravel

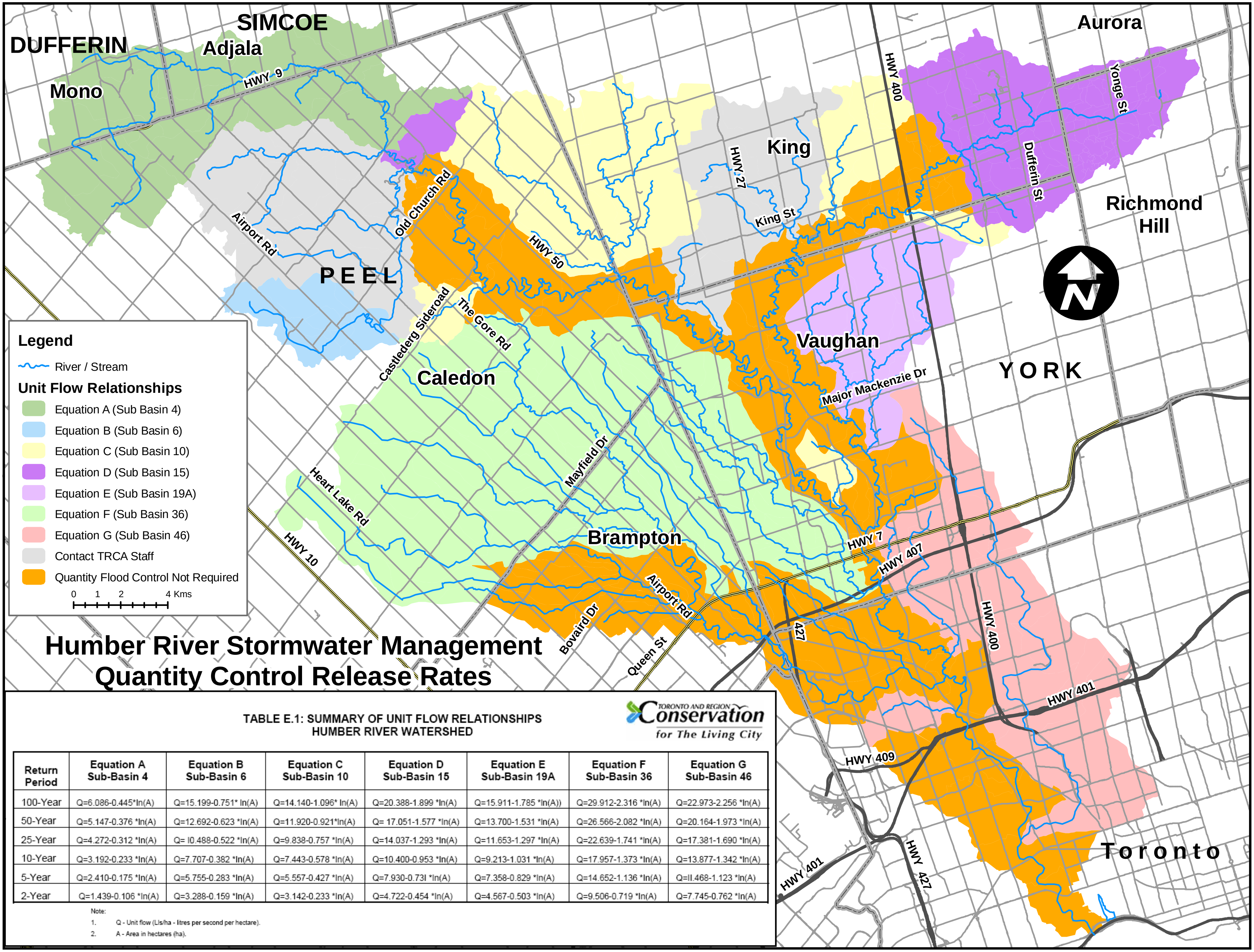
Figure: 12

APPENDIX C

STORMWATER MANAGEMENT SUPPORTING CALCULATIONS

- **TRCA HUMBER RIVER STORMWATER MANAGEMENT QUANTITY CONTROL RELEASE RATES**
- **HYDROLOGY MODEL PARAMETERS**
- **SWMHYMO MODEL INPUT/OUTPUT FILES**

Humber River Stormwater Management Quantity Control Release Rates



TORONTO AND REGION Conservation for The Living City

TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS
HUMBER RIVER WATERSHED

Return Period	Equation A Sub-Basin 4	Equation B Sub-Basin 6	Equation C Sub-Basin 10	Equation D Sub-Basin 15	Equation E Sub-Basin 19A	Equation F Sub-Basin 36	Equation G Sub-Basin 46
100-Year	Q=6.086-0.445*In(A)	Q=15.199-0.751* In(A)	Q=14.140-1.096* In(A)	Q=20.388-1.899 *In(A)	Q=15.911-1.785 *In(A))	Q=29.912-2.316 *In(A)	Q=22.973-2.256 *In(A)
50-Year	Q=5.147-0.376 *In(A)	Q=12.692-0.623 *In(A)	Q=11.920-0.921*In(A)	Q= 17.051-1.577 *In(A)	Q=13.700-1.531 *In(A)	Q=26.566-2.082 *In(A)	Q=20.164-1.973 *In(A)
25-Year	Q=4.272-0.312 *In(A)	Q= I0.488-0.522 *In(A)	Q=9.838-0.757 *In(A)	Q=14.037-1.293 *In(A)	Q=11.653-1.297 *In(A)	Q=22.639-1.741 *In(A)	Q=17.381-1.690 *In(A)
10-Year	Q=3.192-0.233 *In(A)	Q=7.707-0.382 *In(A)	Q=7.443-0.578 *In(A)	Q=10.400-0.953 *In(A)	Q=9.213-1.031 *In(A)	Q=17.957-1.373 *In(A)	Q=13.877-1.342 *In(A)
5-Year	Q=2.410-0.175 *In(A)	Q=5.755-0.283 *In(A)	Q=5.557-0.427 *In(A)	Q=7.930-0.73I *In(A)	Q=7.358-0.829 *In(A)	Q=14.652-1.136 *In(A)	Q=II.468-1.123 *In(A)
2-Year	Q=1.439-0.106 *In(A)	Q=3.288-0.159 *In(A)	Q=3.142-0.233 *In(A)	Q=4.722-0.454 *In(A)	Q=4.567-0.503 *In(A)	Q=9.506-0.719 *In(A)	Q=7.745-0.762 *In(A)

Note:

1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).

Table C.1
HALL'S LAKE ESTATES - SWMHYMO PARAMETERS
EXISTING CONDITIONS

NASHYD PARAMETERS

Catchment	NHYD	DT min	Area ha	DWF cms	CN/C Group	CN/C	IA mm	N	TP hrs	Runoff Coeff. C	Slope (%)
1	A1	1	3.5	0	BC	65	10	3	0.37	0.20	6.62
2	A2	1	11.3	0	BC	65	10	3	0.49	0.20	4.89
3	A3	1	11.4	0	C	70	12	3	0.30	0.15	6.83
4	A4	1	117.5	0	C	70	10	3	1.01	0.20	2.93
5	A5	1	4.1	0	C	70	10	3	0.39	0.15	4.46
6	A6	1	0.9	0	BC	65	10	3	0.16	0.15	4.74
7	A7	1	8.1	0	C	70	10	3	0.44	0.20	5.55
8	A8	1	7.0	0	C	70	10	3	0.33	0.15	5.26
9	A9	1	5.1	0	C	70	10	3	0.23	0.20	10.51
10	A10	1	0.5	0	C	70	12	3	0.16	0.20	6.49

Notes:
1. Assumed pasture with good drainage , in B to BC soil category -> CN range 61 to 74
   Reference: MTO Design Chart 1.09: Soil/Land Use Curve Numbers
2. Time to Peak (TP) was calculated using Airport Method. TP=2/3 of Time of Concentration.

Table C.2
HALL'S LAKE ESTATES - SWMHYMO PARAMETERS
PROPOSED CONDITIONS

NASHYD PARAMETERS

Sub-Basin	NHYD ID	DT min	Area ha	DWF cms	CN/C Group	Weighted CN	IA mm	N	TP hrs
1a	1A	1	3.28	0	BC	68	10	3	0.17
2a1	2A1	1	6.15	0	BC	66	10	3	0.35
2a2	2A2	1	4.15	0	BC	65	10	3	0.32
3a	3A	1	12.19	0	C	71	12	3	0.54
4a	4A	1	117.51	0	C	70	10	3	1.01
5a	5A	1	2.79	0	C	71	10	3	0.38
6a	6A	1	0.82	0	BC	67	10	3	0.23
7a	7A	1	7.72	0	C	71	10	3	0.44
8a	8A	1	6.68	0	C	72	10	3	0.33
9a	9A	1	5.12	0	C	70	10	3	0.23
10a	10A	1	0.54	0	C	70	12	3	0.16

STANDHYD PARAMETERS

Sub-Basin	NHYD ID	Area ha	CN	TIMP	XIMP	IAPer mm	SLPP %	LGP m	MNP	SCP min	IAimp mm	SLPI %	LGI m	MNI	SCI min
1b	1B	0.32	65	0.44	0	10	0.9%	5	0.25	0	0.7	0.9%	160.0	0.013	0
2b1	2B1	0.14	65	0.46	0	10	2.5%	5	0.25	0	0.7	2.5%	150.0	0.013	0
3b1	3B1	0.45	70	0.44	0	10	2.0%	5	0.25	0	0.7	2.0%	225.0	0.013	0
3b2	3B2	0.16	70	0.40	0	10	2.5%	5	0.25	0	0.7	2.5%	150.0	0.013	0
5b1	5B1	0.28	70	0.43	0	10	5.5%	5	0.25	0	0.7	5.5%	140.0	0.013	0
5b2	5B2	0.69	70	0.44	0	10	0.8%	5	0.25	0	0.7	0.8%	350.0	0.013	0
7b	7B	0.79	70	0.43	0	10	2.2%	5	0.25	0	0.7	2.2%	385.0	0.013	0
8b	8B	0.31	70	0.41	0	10	1.4%	5	0.25	0	0.7	1.4%	145.0	0.013	0

Table C.2.1

HALL'S LAKE ESTATES - WEIGHTED CN VALUES
PROPOSED CONDITIONS

NASHYD PARAMETERS

Catchment	NHYD	total Nashyd area (ha)	total Nashyd area (sq.m)	Pervious Grassed (sq.m)	Impervious Roof/driveway (sq.m)	Pervious CN	Impervious CN	Weighted CN
1A	1A	3.28	32,759	30,178	2,581	65	98	68
2A1	2A1	6.15	61,550	60,517	1,032	65	98	66
2A2	2A2	4.15	41,510	41,510	0	65	98	65
3A	3A	12.19	121,886	119,047	2,839	70	98	71
4A	4A	117.51	1,175,064	1,175,064	0	70	98	70
5A	5A	2.79	27,924	26,892	1,032	70	98	71
6A	6A	0.82	8,220	7,704	516	65	98	67
7A	7A	7.72	77,235	74,912	2,323	70	98	71
8A	8A	6.68	66,848	63,234	3,614	70	98	72
9A	9A	5.12	51,246	50,711	535	70	98	70
10A	10A	0.54	5,367	5,367	0	70	98	70

Notes:
1. Assumed pasture with good drainage , in B to BC soil category -> CN range 61 to 74
   Reference: MTO Design Chart 1.09: Soil/Land Use Curve Numbers
2. Units: ha-hectares; sq.m-square meters.

Table C.2.2

HALL'S LAKE ESTATES - TIME TO PEAK CALCULATIONS

Bransby Williams Method

$$T_c = \frac{0.057L}{S^{0.2}A^{0.1}}$$

Where; T_c = Time of Concentration (min.)
L = Length of watershed (m)
S = slope of watershed (%)
A = watershed area (ha.)

Kirpich Formula

$$T_c = \frac{0.06628L^{0.77}}{S^{0.385}}$$

Where; T_c = Time of Concentration (hr.)
L = Length of watershed (km)
S = slope of watershed (m/m)

Watt & Chow

$$T_c = 0.0293(L/S^{0.5})^{0.79}$$

Where; T_c = Time of Concentration (min.)
L = Length of watershed (m)
S = slope of watershed (m/m)

Airport Method

$$T_c = \frac{3.26(1.1-C)L^{0.5}}{S^{0.33}}$$

Where; T_c = Time of Concentration (min.)
C = Runoff Coefficient
L = Length of watershed (m)
S = slope of watershed (%)

Catchment	Catchment					T_c							$T_p = {}^2/_3T_c$				
	Area (sq.m)	Area (ha.)	Length (m)	Runoff Coeff. C	Slope (%)	Bransby Williams (min.)	Bransby Williams (hr.)	Kirpich (hr.)	Watt & Chow (min.)	Watt & Chow (hr.)	Airport Method (min.)	Airport Method (hr.)	Bransby Willian (hr.)	Kirpich (hr.)	Watt & Chow (hr.)	Airport Method (hr.)	Airport Method (min)
EXISTING CONDITIONS (NASHYD)																	
1.0	34,876	3.5	452.89	0.20	6.62	16	0.3	0.1	10.7	0.2	33.46	0.56	0.17	0.10	0.12	0.37	22.3
2.0	112,913	11.3	634.33	0.20	4.89	21	0.3	0.1	15.8	0.3	43.78	0.73	0.23	0.15	0.18	0.49	29.2
3.0	114,197	11.4	278.15	0.15	6.83	8	0.1	0.1	7.2	0.1	27.40	0.46	0.09	0.07	0.08	0.30	18.3
4.0	1,175,064	117.5	1948.07	0.20	2.93	56	0.9	0.4	46.9	0.8	90.86	1.51	0.62	0.43	0.52	1.01	60.6
5.0	40,506	4.1	336.47	0.15	4.46	12	0.2	0.1	9.9	0.2	34.69	0.58	0.14	0.09	0.11	0.39	23.1
6.0	9,079	0.9	63.3	0.15	4.74	3	0.0	0.0	2.6	0.0	14.75	0.25	0.03	0.03	0.03	0.16	9.8
7.0	80,545	8.1	567.51	0.20	5.55	19	0.3	0.1	13.8	0.2	39.70	0.66	0.21	0.13	0.15	0.44	26.5
8.0	69,951	7.0	275.61	0.15	5.26	9	0.2	0.1	7.9	0.1	29.73	0.50	0.10	0.08	0.09	0.33	19.8
9.0	51,246	5.1	237.9	0.20	10.51	7	0.1	0.1	5.4	0.1	20.82	0.35	0.08	0.05	0.06	0.23	13.9
10.0	5,367	0.5	84.81	0.20	6.49	4	0.1	0.0	2.9	0.0	14.58	0.24	0.04	0.03	0.03	0.16	9.7

Notes:

1. assumed Pasture land, and between sand/silt loam
2. Runoff coeff < 0.4 therefore used airport method

Catchment	Catchment					T_c							$T_p = {}^2/_3T_c$				
	Area (sq.m)	Area (ha.)	Length (m)	Runoff Coeff. C	Slope (%)	Bransby Williams (min.)	Bransby Williams (hr.)	Kirpich (hr.)	Watt & Chow (min.)	Watt & Chow (hr.)	Airport Method (min.)	Airport Method (hr.)	Bransby Willian (hr.)	Kirpich (hr.)	Watt & Chow (hr.)	Airport Method (hr.)	Airport Method (min)
PROPOSED CONDITIONS (NASHYD)																	
1A	32,759	3.3	97	0.20	7.19	3	0.1	0.0	3.1	0.1	15.10	0.25	0.04	0.03	0.03	0.17	10.1
2A1	61,550	6.2	342	0.20	5.26	12	0.2	0.1	9.4	0.2	31.37	0.52	0.13	0.09	0.10	0.35	20.9
2A2	41,510	4.2	256	0.20	4.30	9	0.2	0.1	8.1	0.1	29.00	0.48	0.10	0.08	0.09	0.32	19.3
3A	121,886	12.2	557	0.15	3.41	19	0.3	0.2	16.4	0.3	48.77	0.81	0.22	0.16	0.18	0.54	32.5
4A	1,175,064	117.5	1,948	0.20	2.93	56	0.9	0.4	46.9	0.8	90.86	1.51	0.62	0.43	0.52	1.01	60.6
5A	27,924	2.8	321	0.15	4.36	12	0.2	0.1	9.7	0.2	34.16	0.57	0.14	0.09	0.11	0.38	22.8
6A	8,220	0.8	124	0.15	4.84	5	0.1	0.0	4.4	0.1	20.48	0.34	0.06	0.04	0.05	0.23	13.7
7A	77,235	7.7	568	0.20	5.55	19	0.3	0.1	13.8	0.2	39.70	0.66	0.21	0.13	0.15	0.44	26.5
8A	66,848	6.7	276	0.15	5.26	9	0.2	0.1	7.9	0.1	29.73	0.50	0.10	0.08	0.09	0.33	19.8
9A	51,246	5.1	238	0.20	10.51	7	0.1	0.1	5.4	0.1	20.82	0.35	0.08	0.05	0.06	0.23	13.9
10A	5,367	0.5	85	0.20	6.49	4	0.1	0.0	2.9	0.0	14.58	0.24	0.04	0.03	0.03	0.16	9.7

```
2     Metric units
*#*******************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 10-01-2012
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*******************************************************************************
*# Existing Conditions
*#*******************************************************************************
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                   [100Y6.STM]
*%-----------------|-------------------------------------------------------------|
READ STORM          STORM_FILENAME=["100Y6.STM"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID=[  1 ], NHYD=["A1"], DT=[ 1 ]min, AREA=[  3.5  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 65 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[  0.37 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID=[ 2 ], NHYD=["A2"], DT=[ 1]min, AREA=[11.3 ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10 ](mm),
                    N=[ 3  ], TP=[  0.49 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [3 ], NHYD=["A3"], DT=[ 1 ]min, AREA=[ 11.4  ](ha),
                    DWF=[  0](cms),  CN/C=[ 70 ], IA=[ 12 ](mm),
                    N=[  3 ], TP=[ 0.30  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [4 ], NHYD=["A5 "], DT=[ 1 ]min, AREA=[ 4.8   ](ha),
                    DWF=[  0](cms),  CN/C=[ 70  ], IA=[ 10](mm),
                    N=[  3 ], TP=[ 0.39  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 5 ], NHYD=["A3+A5"], IDs to add=[ 3+4 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 3 ], NHYD=[" A4 "], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[  1.01 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 4 ], NHYD=[" A6 "], DT=[1 ]min, AREA=[  0.9  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[65  ], IA=[10  ](mm),
                    N=[  3 ], TP=[ 0.16  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 6 ], NHYD=[" A7 "], DT=[ 1 ]min, AREA=[  8.1  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[ 0.44  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 7 ], NHYD=[" A8 "], DT=[ 1 ]min, AREA=[  7.0  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10  ](mm),
                    N=[  3 ], TP=[ 0.33  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 8 ], NHYD=[" A10 "], DT=[ 1 ]min, AREA=[  0.5  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                    N=[  3 ], TP=[ 0.16  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 9 ], NHYD=["A8+A10"], IDs to add=[7+8  ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 7 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.1  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[ 0.23 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
FINISH
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S       W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9  Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999   9999  July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9  =========
                                                      9   9  9   9  # 3375279
      StormWater Management HYdrologic Model          999    999  =========

 ****************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 ******************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                OTTHYMO-83 and OTTHYMO-89.                   *******
 ****************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199            *******
 *******                 Gatineau, Quebec: (819) 243-6858            *******
 *******                 E-Mail: swmhymo@jfsa.Com                    *******
 ****************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: Calder Engineering Ltd.                      +++++++
 +++++++                Bolton              SERIAL#:3375279          +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ****************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******           Maximum value for ID numbers  :     10            *******
 *******           Max. number of rainfall points:  15000            *******
 *******           Max. number of flow points    :  15000            *******
 ****************************************************************************


 *******************   D E T A I L E D   O U T P U T   *******************
 ****************************************************************************
 *      DATE: 2012-10-03     TIME: 13:44:55     RUN COUNTER: 000100         *
 ****************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\Projects\Hall\hall-ex.dat          *
 * Output  filename: C:\PROGRA~1\SWMHYMO\Projects\Hall\hall-ex.out          *
 * Summary filename: C:\PROGRA~1\SWMHYMO\Projects\Hall\hall-ex.sum          *
 * User comments:                                                           *
 * 1:_______________________________________________________________________*
 * 2:_______________________________________________________________________*
 * 3:_______________________________________________________________________*
 ****************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 10-01-2012
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   : 3375279
*#******************************************************************************
*# Existing Conditions
*#******************************************************************************
--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\Hall\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\Hall\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\Hall\100Y6.
| Ptotal=  80.31 mm|    Comments: 100yr/6hr
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .000 |   2.00  27.300 |   3.75  11.240 |   5.50   1.610
               .50   1.610 |   2.25  27.300 |   4.00   6.420 |   5.75   1.610
               .75   1.610 |   2.50  73.880 |   4.25   6.420 |   6.00   1.610
              1.00   1.610 |   2.75  73.880 |   4.50   3.210 |   6.25   1.610
              1.25   1.610 |   3.00  20.880 |   4.75   3.210 |
              1.50   9.640 |   3.25  20.880 |   5.00   1.610 |
              1.75   9.640 |   3.50  11.240 |   5.25   1.610 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=    3.50   Curve Number   (CN)=65.00
| 01:A1     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .370

     Unit Hyd Qpeak  (cms)=     .361

     PEAK FLOW       (cms)=     .161 (i)
     TIME TO PEAK    (hrs)=    3.033
     RUNOFF VOLUME    (mm)=   23.872
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .297

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

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=   11.30   Curve Number   (CN)=65.00
| 02:A2     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .490

     Unit Hyd Qpeak  (cms)=     .881

     PEAK FLOW       (cms)=     .443 (i)
     TIME TO PEAK    (hrs)=    3.217
     RUNOFF VOLUME    (mm)=   23.872
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .297

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

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=   11.40   Curve Number   (CN)=70.00
| 03:A3     DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .300

     Unit Hyd Qpeak  (cms)=    1.451

     PEAK FLOW       (cms)=     .657 (i)
     TIME TO PEAK    (hrs)=    2.933
     RUNOFF VOLUME    (mm)=   26.338
     TOTAL RAINFALL   (mm)=   80.310
```

```
     RUNOFF COEFFICIENT   =     .328

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

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=    4.80   Curve Number   (CN)=70.00
| 04:A5     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .390

     Unit Hyd Qpeak  (cms)=     .470

     PEAK FLOW       (cms)=     .251 (i)
     TIME TO PEAK    (hrs)=    3.050
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
--------------------
| ADD HYD (A3+A5 ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 03:A3        11.40     .657    2.93  26.34    .000
                +ID2 04:A5         4.80     .251    3.05  27.59    .000
                 ===============================================
                 SUM 05:A3+A5     16.20     .900    2.97  26.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
| 03: A4    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    1.010

     Unit Hyd Qpeak  (cms)=    4.443

     PEAK FLOW       (cms)=    3.463 (i)
     TIME TO PEAK    (hrs)=    3.917
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=     .90   Curve Number   (CN)=65.00
| 04: A6    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .160

     Unit Hyd Qpeak  (cms)=     .215

     PEAK FLOW       (cms)=     .062 (i)
     TIME TO PEAK    (hrs)=    2.800
     RUNOFF VOLUME    (mm)=   23.872
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .297

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

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=    8.10   Curve Number   (CN)=70.00
| 06: A7    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .440

     Unit Hyd Qpeak  (cms)=     .703

     PEAK FLOW       (cms)=     .394 (i)
     TIME TO PEAK    (hrs)=    3.117
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=    7.00   Curve Number   (CN)=70.00
| 07: A8    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .330

     Unit Hyd Qpeak  (cms)=     .810

     PEAK FLOW       (cms)=     .402 (i)
     TIME TO PEAK    (hrs)=    2.967
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
----------------------
| CALIB NASHYD        |   Area    (ha)=     .50   Curve Number   (CN)=70.00
| 08: A10   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=     .160

     Unit Hyd Qpeak  (cms)=     .119

     PEAK FLOW       (cms)=     .039 (i)
     TIME TO PEAK    (hrs)=    2.800
     RUNOFF VOLUME    (mm)=   26.338
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .328

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

-------------------------------------------------------------------------------
001:0013-----------------------------------------------------------------------
--------------------
| ADD HYD (A8+A10) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 07: A8        7.00     .402    2.97  27.59    .000
                +ID2 08: A10        .50     .039    2.80  26.34    .000
                 ===============================================
                 SUM 09:A8+A10     7.50     .431    2.95  27.51    .000

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

```
------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=    5.10   Curve Number   (CN)=70.00
| 07: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .847

     PEAK FLOW       (cms)=     .355 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

------------------------------------------------------------------------------
001:0015----------------------------------------------------------------------
      FINISH
------------------------------------------------------------------------------
******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2012-10-03     at 13:44:55
==============================================================================
```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date         : 2015-02-12
*#  Modeller     : [    MYS    ]
*#  Company      : Calder Engineering Ltd.
*#  License #    :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [2Y6.STM]
*%-----------------|-------------------------------------------------------------|
READ STORM           STORM_FILENAME=["2Y6.STM"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  0.17 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                          LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                     N=[ 3 ], TP=[  0.35 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                     N=[ 3 ], TP=[  0.32 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                          LGI=[150](m), MNI=[0.013], SCI=[0](min)
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.54 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                          LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.002 ](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                          LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.001 ](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                     N=[  3 ], TP=[ 0.38  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                          LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[3 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                          LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[6  ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  1.01 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                     N=[  3 ], TP=[ 0.23  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.44  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                          LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                     N=[  3 ], TP=[ 0.33  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                     XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                          LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.16  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.23 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
FINISH
```

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999     =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9    Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999    Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9    =========
                                                        9   9  9   9    # 3375279
        StormWater Management HYdrologic Model           999    999     =========

 ******************************************************************************
 ****************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********      based on the principles of HYMO and its successors     *********
 *********                OTTHYMO-83 and OTTHYMO-89.                   *********
 ******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ******************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                     +++++++++
 +++++++++                Bolton                  SERIAL#:3375279     +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ******************************************************************************
 *********            ++++++ PROGRAM ARRAY DIMENSIONS ++++++          *********
 *********            Maximum value for ID numbers  :     10          *********
 *********            Max. number of rainfall points: 105408          *********
 *********            Max. number of flow points    : 105408          *********
 ******************************************************************************


 *********************    D E T A I L E D   O U T P U T    *********************
 ******************************************************************************
 *         DATE: 2015-02-12     TIME: 14:49:51     RUN COUNTER: 000105         *
 ******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP2.dat            *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP2.out            *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP2.sum            *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
 ******************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------   Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
-------------------
| READ STORM       |     Filename: 2yr/6hr
| Ptotal=  36.00 mm|     Comments: 2yr/6hr
-------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .25    .000 |   2.00  12.240 |   3.75   5.040 |   5.50    .720
                .50    .720 |   2.25  12.240 |   4.00   2.880 |   5.75    .720
                .75    .720 |   2.50  33.120 |   4.25   2.880 |   6.00    .720
               1.00    .720 |   2.75  33.120 |   4.50   1.440 |   6.25    .720
               1.25    .720 |   3.00   9.360 |   4.75   1.440 |
               1.50   4.320 |   3.25   9.360 |   5.00    .720 |
               1.75   4.320 |   3.50   5.040 |   5.25    .720 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=     .737

     PEAK FLOW       (cms)=     .040 (i)
     TIME TO PEAK    (hrs)=    2.833
     RUNOFF VOLUME    (mm)=    4.645
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .129

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

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .32
| 02:1B     DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .18
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=        .90          .90
     Length            (m)=     160.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      33.12        19.63
               over (min)       5.00        10.00
     Storage Coeff.  (min)=       5.44 (ii)   10.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=        .22          .11
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .008 (iii)
     TIME TO PEAK    (hrs)=       2.63         2.82         2.817
     RUNOFF VOLUME    (mm)=      35.30         8.63         8.656
     TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
     RUNOFF COEFFICIENT   =        .98          .24          .240

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:02  (1B    )  |            DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       2.053
           INFLOW HYD. PEAKS AT     .008       2.817
           STOP  CONTROLLING AT     .001       4.422

           REQUIRED STORAGE VOLUME (ha.m.)=    .0020
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0028
           % OF HYDROGRAPH TO STORE       =  72.7309

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .001  (cms).

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:1A            3.28     .040    2.83   4.65    .000
                    +ID2 02:1B             .32     .008    2.82   8.66    .000
                     ==========================================================
                     SUM 03:1A+1B         3.60     .048    2.83   5.00    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .671

     PEAK FLOW       (cms)=     .047 (i)
     TIME TO PEAK    (hrs)=    3.100
     RUNOFF VOLUME    (mm)=    4.310
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .120

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

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .320

     Unit Hyd Qpeak  (cms)=     .495

     PEAK FLOW       (cms)=     .032 (i)
     TIME TO PEAK    (hrs)=    3.050
     RUNOFF VOLUME    (mm)=    4.153
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .115

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

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .14
| 04:2B1    DT= 1.00 |   Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .08
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     150.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      33.12        21.82
               over (min)       4.00         7.00
     Storage Coeff.  (min)=       3.85 (ii)    7.34 (ii)
     Unit Hyd. Tpeak (min)=       4.00         7.00
     Unit Hyd. peak  (cms)=        .30          .16
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .00          .004 (iii)
     TIME TO PEAK    (hrs)=       2.50         2.78         2.783
     RUNOFF VOLUME    (mm)=      35.30         8.96         8.982
     TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
     RUNOFF COEFFICIENT   =        .98          .25          .249

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:04  (2B1   )  |            DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       2.091
           INFLOW HYD. PEAKS AT     .004       2.783
           STOP  CONTROLLING AT     .001       3.529

           REQUIRED STORAGE VOLUME (ha.m.)=    .0006
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0013
           % OF HYDROGRAPH TO STORE       =  50.3711

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .001  (cms).

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:2A1           6.15     .047    3.10   4.31    .000
                    +ID2 02:2A2           4.15     .032    3.05   4.15    .000
                    +ID3 04:2B1            .14     .004    2.78   8.98    .000
                     ==========================================================
                     SUM 05:2A1+2A2+2B   10.44     .081    3.07   4.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .862

     PEAK FLOW       (cms)=     .079 (i)
     TIME TO PEAK    (hrs)=    3.483
     RUNOFF VOLUME    (mm)=    4.509
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .125

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

```
 
 ---------------------------------------------------------------------------------
 001:0013-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .45
 | 02:3B1    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .20          .25
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.00         2.00
      Length            (m)=     225.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      33.12        23.34
                 over (min)       5.00         9.00
      Storage Coeff.  (min)=       5.25 (ii)    8.88 (ii)
      Unit Hyd. Tpeak (min)=       5.00         9.00
      Unit Hyd. peak  (cms)=        .22          .13
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .01          .013 (iii)
      TIME TO PEAK    (hrs)=       2.65         2.80         2.800
      RUNOFF VOLUME    (mm)=      35.30        10.11        10.131
      TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
      RUNOFF COEFFICIENT   =        .98          .28          .281

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0014-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:02  (3B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       2.058
            INFLOW HYD. PEAKS AT     .013       2.800
            STOP  CONTROLLING AT     .002       4.238

            REQUIRED STORAGE VOLUME (ha.m.)=    .0031
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0046
            % OF HYDROGRAPH TO STORE       =  69.0352

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .002  (cms).

 ---------------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .16
 | 03:3B2    DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .06          .10
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.50         2.50
      Length            (m)=     150.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      33.12        20.91
                 over (min)       4.00         7.00
      Storage Coeff.  (min)=       3.85 (ii)    7.40 (ii)
      Unit Hyd. Tpeak (min)=       4.00         7.00
      Unit Hyd. peak  (cms)=        .30          .16
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .00          .005 (iii)
      TIME TO PEAK    (hrs)=       2.50         2.78         2.783
      RUNOFF VOLUME    (mm)=      35.30         9.43         9.459
      TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
      RUNOFF COEFFICIENT   =        .98          .26          .263

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (3B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       2.113
            INFLOW HYD. PEAKS AT     .005       2.783
            STOP  CONTROLLING AT     .001       3.842

            REQUIRED STORAGE VOLUME (ha.m.)=    .0009
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0015
            % OF HYDROGRAPH TO STORE       =  58.7360

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .001  (cms).

 ---------------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------------
 -----------------------
 | ADD HYD (3A+3B1+3B2) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:3A           12.19     .079    3.48   4.51    .000
                    +ID2 02:3B1            .45     .013    2.80  10.13    .000
                    +ID3 03:3B2            .16     .005    2.78   9.46    .000
                     ==========================================================
                     SUM 04:3A+3B1+3B2   12.80     .084    3.42   4.77    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    2.79   Curve Number   (CN)=71.00
 | 01:5A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .380

      Unit Hyd Qpeak  (cms)=     .280

      PEAK FLOW       (cms)=     .025 (i)
      TIME TO PEAK    (hrs)=    3.167
      RUNOFF VOLUME    (mm)=    5.210
      TOTAL RAINFALL   (mm)=   36.000
      RUNOFF COEFFICIENT   =     .145

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

 ---------------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .28
 | 03:5B1    DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .12          .16
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       5.50         5.50
      Length            (m)=     140.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      33.12        23.31
                 over (min)       3.00         6.00
      Storage Coeff.  (min)=       2.92 (ii)    5.60 (ii)
      Unit Hyd. Tpeak (min)=       3.00         6.00
      Unit Hyd. peak  (cms)=        .39          .20
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .01          .009 (iii)
      TIME TO PEAK    (hrs)=       2.48         2.77         2.767
      RUNOFF VOLUME    (mm)=      35.30         9.93         9.957
      TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
      RUNOFF COEFFICIENT   =        .98          .28          .277

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (5B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       2.035
            INFLOW HYD. PEAKS AT     .009       2.767
            STOP  CONTROLLING AT     .001       4.337

            REQUIRED STORAGE VOLUME (ha.m.)=    .0021
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0028
            % OF HYDROGRAPH TO STORE       =  74.1342

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .001  (cms).

 ---------------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .69
 | 06:5B2    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .30          .39
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=        .80          .80
      Length            (m)=     350.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      33.12        21.99
                 over (min)       9.00        14.00
      Storage Coeff.  (min)=       9.01 (ii)   13.90 (ii)
      Unit Hyd. Tpeak (min)=       9.00        14.00
      Unit Hyd. peak  (cms)=        .13          .08
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .02          .017 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.88         2.883
      RUNOFF VOLUME    (mm)=      35.30        10.11        10.131
      TOTAL RAINFALL   (mm)=      36.00        36.00        36.000
      RUNOFF COEFFICIENT   =        .98          .28          .281

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (5B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       2.065
            INFLOW HYD. PEAKS AT     .017       2.883
            STOP  CONTROLLING AT     .002       4.664

            REQUIRED STORAGE VOLUME (ha.m.)=    .0053
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0070
            % OF HYDROGRAPH TO STORE       =  76.4753

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .002  (cms).

 ---------------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------------
 -----------------------
 | ADD HYD (3s+5s     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04:3A+3B1+3B2   12.80     .084    3.42   4.77    .000
                    +ID2 01:5A            2.79     .025    3.17   5.21    .000
                    +ID3 03:5B1            .28     .009    2.77   9.96    .000
                    +ID4 06:5B2            .69     .017    2.88  10.13    .000
                     ==========================================================
                     SUM 02:3s+5s        16.56     .121    3.32   5.15    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
 | 01:4      DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=   1.010

      Unit Hyd Qpeak  (cms)=    4.443

      PEAK FLOW       (cms)=     .605 (i)
      TIME TO PEAK    (hrs)=    4.117
      RUNOFF VOLUME    (mm)=    5.013
      TOTAL RAINFALL   (mm)=   36.000
      RUNOFF COEFFICIENT   =     .139

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

 ---------------------------------------------------------------------------------
 001:0025-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .82   Curve Number   (CN)=67.00
 | 02: 6     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .230

      Unit Hyd Qpeak  (cms)=     .136

      PEAK FLOW       (cms)=     .008 (i)
      TIME TO PEAK    (hrs)=    2.900
      RUNOFF VOLUME    (mm)=    4.473
      TOTAL RAINFALL   (mm)=   36.000
      RUNOFF COEFFICIENT   =     .124

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

```

-----------------------------------------------------------------------------
001:0026---------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    7.72   Curve Number   (CN)=71.00
| 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .440

     Unit Hyd Qpeak  (cms)=     .670

     PEAK FLOW       (cms)=     .065 (i)
     TIME TO PEAK    (hrs)=    3.300
     RUNOFF VOLUME    (mm)=    5.210
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .145

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

-----------------------------------------------------------------------------
001:0027---------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .79
| 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .34          .45
     Dep. Storage     (mm)=       .70        10.00
     Average Slope     (%)=      2.20         2.20
     Length            (m)=    385.00         5.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     33.12        22.05
                over (min)       7.00        11.00
     Storage Coeff.  (min)=      7.04 (ii)   10.65 (ii)
     Unit Hyd. Tpeak (min)=      7.00        11.00
     Unit Hyd. peak  (cms)=       .16          .11
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .00          .02          .021 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.83         2.833
     RUNOFF VOLUME    (mm)=     35.30         9.93         9.957
     TOTAL RAINFALL   (mm)=     36.00        36.00        36.000
     RUNOFF COEFFICIENT   =       .98          .28          .277

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-----------------------------------------------------------------------------
001:0028---------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:06  (7B    )  |             DISCHARGE      TIME
-------------------                (cms)       (hrs)
           START CONTROLLING AT     .000       2.072
           INFLOW HYD. PEAKS AT     .021       2.833
           STOP  CONTROLLING AT     .003       4.404

           REQUIRED STORAGE VOLUME (ha.m.)=    .0057
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0079
           % OF HYDROGRAPH TO STORE       =  71.8871

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

-----------------------------------------------------------------------------
001:0029---------------------------------------------------------------------
-----------------------
| ADD HYD (7A+7B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 7A           7.72      .065    3.30   5.21    .000
                    +ID2 06:7B             .79      .021    2.83   9.96    .000
                     ==========================================================
                     SUM 08:7A+7B         8.51      .076    3.25   5.65    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0030---------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    6.68   Curve Number   (CN)=72.00
| 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .773

     PEAK FLOW       (cms)=     .067 (i)
     TIME TO PEAK    (hrs)=    3.050
     RUNOFF VOLUME    (mm)=    5.418
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .150

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

-----------------------------------------------------------------------------
001:0031---------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .31
| 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .13          .18
     Dep. Storage     (mm)=       .70        10.00
     Average Slope     (%)=      1.40         1.40
     Length            (m)=    145.00         5.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     33.12        21.12
                over (min)       4.00         9.00
     Storage Coeff.  (min)=      4.49 (ii)    8.69 (ii)
     Unit Hyd. Tpeak (min)=      4.00         9.00
     Unit Hyd. peak  (cms)=       .27          .13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .00          .01          .009 (iii)
     TIME TO PEAK    (hrs)=      2.57         2.80         2.800
     RUNOFF VOLUME    (mm)=     35.30         9.60         9.621
     TOTAL RAINFALL   (mm)=     36.00        36.00        36.000
     RUNOFF COEFFICIENT   =       .98          .27          .267

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-----------------------------------------------------------------------------
001:0032---------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:06  (8B    )  |             DISCHARGE      TIME
-------------------                (cms)       (hrs)
           START CONTROLLING AT     .000       2.067
           INFLOW HYD. PEAKS AT     .009       2.800
           STOP  CONTROLLING AT     .001       4.421

           REQUIRED STORAGE VOLUME (ha.m.)=    .0022
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0030
           % OF HYDROGRAPH TO STORE       =  74.5881

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .001  (cms).

-----------------------------------------------------------------------------
001:0033---------------------------------------------------------------------
-----------------------
| ADD HYD (8A+8B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 8A           6.68      .067    3.05   5.42    .000
                    +ID2 06:8B             .31      .009    2.80   9.62    .000
                     ==========================================================
                     SUM 09:8A+8B         6.99      .072    3.03   5.60    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0034---------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=     .54   Curve Number   (CN)=70.00
| 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .160

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    2.833
     RUNOFF VOLUME    (mm)=    4.335
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .120

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

-----------------------------------------------------------------------------
001:0035---------------------------------------------------------------------
-----------------------
| ADD HYD (8+10      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 09:8A+8B         6.99      .072    3.03   5.60    .000
                    +ID2 03: 10A           .54      .006    2.83   4.33    .000
                     ==========================================================
                     SUM 06:8+10          7.53      .077    3.02   5.51    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0036---------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    5.12   Curve Number   (CN)=70.00
| 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .850

     PEAK FLOW       (cms)=     .058 (i)
     TIME TO PEAK    (hrs)=    2.900
     RUNOFF VOLUME    (mm)=    5.013
     TOTAL RAINFALL   (mm)=   36.000
     RUNOFF COEFFICIENT   =     .139

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

-----------------------------------------------------------------------------
001:0037---------------------------------------------------------------------
      FINISH
-----------------------------------------------------------------------------
*****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2015-02-12     at 14:49:51
=============================================================================

```

```
2     Metric units
*#****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#****************************************************************************
*# Proposed Conditions - Revised February 2015
*#****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [5Y6.STM]
*%-----------------|------------------------------------------------------------|
READ STORM           STORM_FILENAME=["5Y6.STM"]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  0.17 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                          LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                     N=[ 3 ], TP=[  0.35 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                     N=[ 3 ], TP=[  0.32 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                          LGI=[150](m), MNI=[0.013], SCI=[0](min)
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.54 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                          LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.003 ](cms)
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                          LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.001 ](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                     N=[  3 ], TP=[ 0.38  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                          LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[3 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                          LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[6  ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  1.01 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                     N=[  3 ], TP=[ 0.23  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.44  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                          LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                     N=[  3 ], TP=[ 0.33  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                     XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                          LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.16  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.23 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
FINISH
```

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO         999    999     =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9  9   9    Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O        9999   9999    Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9    =========
                                                          9   9  9   9   # 3375279
        StormWater Management HYdrologic Model             999    999    =========

 *******************************************************************************
 ****************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********      based on the principles of HYMO and its successors      *********
 *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                   Ottawa, Ontario: (613) 836-3884            *********
 *********                   Gatineau, Quebec: (819) 243-6858           *********
 *********                   E-Mail: swmhymo@jfsa.Com                   *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                     +++++++++
 +++++++++                 Bolton                SERIAL#:3375279      +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10             *********
 *********           Max. number of rainfall points: 105408             *********
 *********           Max. number of flow points    : 105408             *********
 *******************************************************************************


 *********************   D E T A I L E D   O U T P U T   *********************
 *******************************************************************************
 *        DATE: 2015-02-12     TIME: 14:47:50     RUN COUNTER: 000104         *
 *******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP5.dat           *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP5.out           *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP5.sum           *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
 *******************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------   Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
-------------------
| READ STORM        |    Filename: 5yr/6hr
| Ptotal=  47.81 mm|    Comments: 5yr/6hr
-------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .25    .000 |   2.00  16.250 |   3.75   6.690 |   5.50    .960
                .50    .960 |   2.25  16.250 |   4.00   3.820 |   5.75    .960
                .75    .960 |   2.50  43.980 |   4.25   3.820 |   6.00    .960
               1.00    .960 |   2.75  43.980 |   4.50   1.910 |   6.25    .960
               1.25    .960 |   3.00  12.430 |   4.75   1.910 |
               1.50   5.740 |   3.25  12.430 |   5.00    .960 |
               1.75   5.740 |   3.50   6.690 |   5.25    .960 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=     .737

     PEAK FLOW      (cms)=     .082 (i)
     TIME TO PEAK   (hrs)=    2.817
     RUNOFF VOLUME   (mm)=    9.086
     TOTAL RAINFALL  (mm)=   47.810
     RUNOFF COEFFICIENT  =     .190

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

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .32
| 02:1B     DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14         .18
     Dep. Storage     (mm)=        .70       10.00
     Average Slope     (%)=        .90         .90
     Length            (m)=     160.00        5.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=      43.98       33.83
                over (min)        5.00        9.00
     Storage Coeff.  (min)=       4.86 (ii)   8.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00        9.00
     Unit Hyd. peak  (cms)=        .23         .13
                                                           *TOTALS*
     PEAK FLOW      (cms)=         .00         .01           .014 (iii)
     TIME TO PEAK   (hrs)=        2.75        2.80          2.800
     RUNOFF VOLUME   (mm)=       47.11       14.98         15.016
     TOTAL RAINFALL  (mm)=       47.81       47.81         47.810
     RUNOFF COEFFICIENT  =         .99         .31           .314

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:02  (1B    )  |             DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       1.947
           INFLOW HYD. PEAKS AT     .014       2.800
           STOP  CONTROLLING AT     .002       4.229

           REQUIRED STORAGE VOLUME (ha.m.)=    .0034
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0048
           % OF HYDROGRAPH TO STORE       =  69.7568

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .002  (cms).

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:1A            3.28      .082    2.82   9.09    .000
                    +ID2 02:1B             .32      .014    2.80  15.02    .000
                     ==========================================================
                     SUM 03:1A+1B         3.60      .096    2.82   9.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .671

     PEAK FLOW      (cms)=     .098 (i)
     TIME TO PEAK   (hrs)=    3.050
     RUNOFF VOLUME   (mm)=    8.476
     TOTAL RAINFALL  (mm)=   47.810
     RUNOFF COEFFICIENT  =     .177

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

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .320

     Unit Hyd Qpeak  (cms)=     .495

     PEAK FLOW      (cms)=     .067 (i)
     TIME TO PEAK   (hrs)=    3.000
     RUNOFF VOLUME   (mm)=    8.189
     TOTAL RAINFALL  (mm)=   47.810
     RUNOFF COEFFICIENT  =     .171

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

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .14
| 04:2B1    DT= 1.00 |   Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06         .08
     Dep. Storage     (mm)=        .70       10.00
     Average Slope     (%)=       2.50        2.50
     Length            (m)=     150.00        5.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=      43.98       37.11
                over (min)        3.00        6.00
     Storage Coeff.  (min)=       3.44 (ii)   6.26 (ii)
     Unit Hyd. Tpeak (min)=       3.00        6.00
     Unit Hyd. peak  (cms)=        .35         .18
                                                           *TOTALS*
     PEAK FLOW      (cms)=         .00         .01           .007 (iii)
     TIME TO PEAK   (hrs)=        2.75        2.77          2.767
     RUNOFF VOLUME   (mm)=       47.11       15.46         15.488
     TOTAL RAINFALL  (mm)=       47.81       47.81         47.810
     RUNOFF COEFFICIENT  =         .99         .32           .324

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:04  (2B1   )  |             DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       1.917
           INFLOW HYD. PEAKS AT     .007       2.767
           STOP  CONTROLLING AT     .001       3.944

           REQUIRED STORAGE VOLUME (ha.m.)=    .0015
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0022
           % OF HYDROGRAPH TO STORE       =  66.9801

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .001  (cms).

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:2A1           6.15      .098    3.05   8.48    .000
                    +ID2 02:2A2           4.15      .067    3.00   8.19    .000
                    +ID3 04:2B1            .14      .007    2.77  15.49    .000
                     ==========================================================
                     SUM 05:2A1+2A2+2B   10.44      .168    3.02   8.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .862

     PEAK FLOW      (cms)=     .167 (i)
     TIME TO PEAK   (hrs)=    3.400
     RUNOFF VOLUME   (mm)=    9.189
     TOTAL RAINFALL  (mm)=   47.810
     RUNOFF COEFFICIENT  =     .192

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

```

 -----------------------------------------------------------------------------
 001:0013---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .45
 | 02:3B1    DT= 1.00 |   Total Imp(%)=  44.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .20          .25
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.00         2.00
      Length            (m)=     225.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        39.30
                 over (min)       5.00         8.00
      Storage Coeff.  (min)=       4.69 (ii)    7.63 (ii)
      Unit Hyd. Tpeak (min)=       5.00         8.00
      Unit Hyd. peak  (cms)=        .24          .15
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .02          .024 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.78         2.783
      RUNOFF VOLUME    (mm)=      47.11        17.25        17.285
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .36          .362

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0014---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:02  (3B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.936
            INFLOW HYD. PEAKS AT     .024       2.783
            STOP  CONTROLLING AT     .003       4.289

            REQUIRED STORAGE VOLUME (ha.m.)=    .0056
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0078
            % OF HYDROGRAPH TO STORE       =  72.2158

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .003  (cms).

 -----------------------------------------------------------------------------
 001:0015---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .16
 | 03:3B2    DT= 1.00 |   Total Imp(%)=  40.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .06          .10
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.50         2.50
      Length            (m)=     150.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        35.51
                 over (min)       3.00         6.00
      Storage Coeff.  (min)=       3.44 (ii)    6.31 (ii)
      Unit Hyd. Tpeak (min)=       3.00         6.00
      Unit Hyd. peak  (cms)=        .35          .18
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .01          .008 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.77         2.767
      RUNOFF VOLUME    (mm)=      47.11        16.30        16.335
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .34          .342

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0016---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (3B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.945
            INFLOW HYD. PEAKS AT     .008       2.767
            STOP  CONTROLLING AT     .001       4.290

            REQUIRED STORAGE VOLUME (ha.m.)=    .0019
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0026
            % OF HYDROGRAPH TO STORE       =  72.7949

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .001  (cms).

 -----------------------------------------------------------------------------
 001:0017---------------------------------------------------------------------
 -----------------------
 | ADD HYD (3A+3B1+3B2) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:3A           12.19      .167    3.40   9.19    .000
                     +ID2 02:3B1            .45      .024    2.78  17.29    .000
                     +ID3 03:3B2            .16      .008    2.77  16.34    .000
                      ========================================================
                      SUM 04:3A+3B1+3B2   12.80      .178    3.35   9.56    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0018---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    2.79   Curve Number   (CN)=71.00
 | 01:5A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .380

      Unit Hyd Qpeak  (cms)=     .280

      PEAK FLOW       (cms)=     .051 (i)
      TIME TO PEAK    (hrs)=    3.100
      RUNOFF VOLUME    (mm)=   10.099
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .211

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

 -----------------------------------------------------------------------------
 001:0019---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .28
 | 03:5B1    DT= 1.00 |   Total Imp(%)=  43.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .12          .16
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       5.50         5.50
      Length            (m)=     140.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        39.11
                 over (min)       3.00         5.00
      Storage Coeff.  (min)=       2.60 (ii)    4.78 (ii)
      Unit Hyd. Tpeak (min)=       3.00         5.00
      Unit Hyd. peak  (cms)=        .41          .23
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .02          .016 (iii)
      TIME TO PEAK    (hrs)=       2.73         2.75         2.750
      RUNOFF VOLUME    (mm)=      47.11        17.01        17.041
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .36          .356

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0020---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (5B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.920
            INFLOW HYD. PEAKS AT     .016       2.750
            STOP  CONTROLLING AT     .002       3.958

            REQUIRED STORAGE VOLUME (ha.m.)=    .0033
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0048
            % OF HYDROGRAPH TO STORE       =  69.5204

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .002  (cms).

 -----------------------------------------------------------------------------
 001:0021---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .69
 | 06:5B2    DT= 1.00 |   Total Imp(%)=  44.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .30          .39
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=        .80          .80
      Length            (m)=     350.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        37.88
                 over (min)       8.00        12.00
      Storage Coeff.  (min)=       8.05 (ii)   11.98 (ii)
      Unit Hyd. Tpeak (min)=       8.00        12.00
      Unit Hyd. peak  (cms)=        .14          .09
                                                            *TOTALS*
      PEAK FLOW       (cms)=        .00          .03          .031 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.83         2.833
      RUNOFF VOLUME    (mm)=      47.11        17.25        17.285
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .36          .362

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (5B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.958
            INFLOW HYD. PEAKS AT     .031       2.833
            STOP  CONTROLLING AT     .004       4.448

            REQUIRED STORAGE VOLUME (ha.m.)=    .0088
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0119
            % OF HYDROGRAPH TO STORE       =  73.9998

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .004  (cms).

 -----------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 -----------------------
 | ADD HYD (3s+5s     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 04:3A+3B1+3B2   12.80      .178    3.35   9.56    .000
                     +ID2 01:5A            2.79      .051    3.10  10.10    .000
                     +ID3 03:5B1            .28      .016    2.75  17.04    .000
                     +ID4 06:5B2            .69      .031    2.83  17.29    .000
                      ========================================================
                      SUM 02:3s+5s        16.56      .246    3.28  10.10    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0024---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
 | 01:4      DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=   1.010

      Unit Hyd Qpeak  (cms)=    4.443

      PEAK FLOW       (cms)=    1.196 (i)
      TIME TO PEAK    (hrs)=    4.017
      RUNOFF VOLUME    (mm)=    9.747
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .204

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

 -----------------------------------------------------------------------------
 001:0025---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .82   Curve Number   (CN)=67.00
 | 02: 6     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .230

      Unit Hyd Qpeak  (cms)=     .136

      PEAK FLOW       (cms)=     .017 (i)
      TIME TO PEAK    (hrs)=    2.883
      RUNOFF VOLUME    (mm)=    8.775
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .184

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

```

 ----------------------------------------------------------------------------
 001:0026--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    7.72   Curve Number   (CN)=71.00
 | 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .440

      Unit Hyd Qpeak  (cms)=     .670

      PEAK FLOW       (cms)=     .131 (i)
      TIME TO PEAK    (hrs)=    3.200
      RUNOFF VOLUME    (mm)=   10.099
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .211

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

 ----------------------------------------------------------------------------
 001:0027--------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .79
 | 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .34          .45
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.20         2.20
      Length            (m)=     385.00         5.00
      Mannings n          =       .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        37.78
                 over (min)       6.00         9.00
      Storage Coeff.  (min)=       6.29 (ii)    9.20 (ii)
      Unit Hyd. Tpeak (min)=       6.00         9.00
      Unit Hyd. peak  (cms)=        .18          .12
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .04          .039 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.80         2.800
      RUNOFF VOLUME    (mm)=      47.11        17.01        17.041
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .36          .356

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ----------------------------------------------------------------------------
 001:0028--------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (7B    )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000        1.939
            INFLOW HYD. PEAKS AT     .039        2.800
            STOP  CONTROLLING AT     .004        4.438

            REQUIRED STORAGE VOLUME (ha.m.)=    .0103
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0135
            % OF HYDROGRAPH TO STORE       =  76.5524

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .004  (cms).

 ----------------------------------------------------------------------------
 001:0029--------------------------------------------------------------------
 -----------------------
 | ADD HYD (7A+7B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 7A           7.72      .131    3.20  10.10    .000
                    +ID2 06:7B             .79      .039    2.80  17.04    .000
                     ========================================================
                     SUM 08:7A+7B         8.51      .149    3.17  10.74    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0030--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    6.68   Curve Number   (CN)=72.00
 | 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .330

      Unit Hyd Qpeak  (cms)=     .773

      PEAK FLOW       (cms)=     .138 (i)
      TIME TO PEAK    (hrs)=    3.017
      RUNOFF VOLUME    (mm)=   10.466
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .219

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

 ----------------------------------------------------------------------------
 001:0031--------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .31
 | 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .13          .18
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       1.40         1.40
      Length            (m)=     145.00         5.00
      Mannings n          =       .013         .250

      Max.eff.Inten.(mm/hr)=      43.98        36.24
                 over (min)       4.00         7.00
      Storage Coeff.  (min)=       4.01 (ii)    7.39 (ii)
      Unit Hyd. Tpeak (min)=       4.00         7.00
      Unit Hyd. peak  (cms)=        .29          .16
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .02          .016 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.77         2.767
      RUNOFF VOLUME    (mm)=      47.11        16.54        16.566
      TOTAL RAINFALL   (mm)=      47.81        47.81        47.810
      RUNOFF COEFFICIENT   =        .99          .35          .346

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ----------------------------------------------------------------------------
 001:0032--------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (8B    )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000        1.948
            INFLOW HYD. PEAKS AT     .016        2.767
            STOP  CONTROLLING AT     .002        4.286

            REQUIRED STORAGE VOLUME (ha.m.)=    .0037
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0051
            % OF HYDROGRAPH TO STORE       =  72.1510

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .002  (cms).

 ----------------------------------------------------------------------------
 001:0033--------------------------------------------------------------------
 -----------------------
 | ADD HYD (8A+8B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 8A           6.68      .138    3.02  10.47    .000
                    +ID2 06:8B             .31      .016    2.77  16.57    .000
                     ========================================================
                     SUM 09:8A+8B         6.99      .146    3.00  10.74    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0034--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .54   Curve Number   (CN)=70.00
 | 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .160

      Unit Hyd Qpeak  (cms)=     .129

      PEAK FLOW       (cms)=     .013 (i)
      TIME TO PEAK    (hrs)=    2.817
      RUNOFF VOLUME    (mm)=    8.864
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .185

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

 ----------------------------------------------------------------------------
 001:0035--------------------------------------------------------------------
 -----------------------
 | ADD HYD (8+10      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 09:8A+8B         6.99      .146    3.00  10.74    .000
                    +ID2 03: 10A           .54      .013    2.82   8.86    .000
                     ========================================================
                     SUM 06:8+10          7.53      .156    2.97  10.60    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0036--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    5.12   Curve Number   (CN)=70.00
 | 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .230

      Unit Hyd Qpeak  (cms)=     .850

      PEAK FLOW       (cms)=     .120 (i)
      TIME TO PEAK    (hrs)=    2.883
      RUNOFF VOLUME    (mm)=    9.747
      TOTAL RAINFALL   (mm)=   47.810
      RUNOFF COEFFICIENT   =     .204

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

 ----------------------------------------------------------------------------
 001:0037--------------------------------------------------------------------
       FINISH
 ----------------------------------------------------------------------------
 ****************************************************************************
      WARNINGS / ERRORS / NOTES
      -------------------------
    Simulation ended on 2015-02-12     at 14:47:50
 ============================================================================

```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date          : 2015-02-12
*#  Modeller      : [    MYS    ]
*#  Company       : Calder Engineering Ltd.
*#  License #    :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [10Y6.STM]
*%-----------------|-------------------------------------------------------------|
READ STORM           STORM_FILENAME=["10Y6.STM"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  0.17 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                          LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                     N=[ 3 ], TP=[  0.35 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                     N=[ 3 ], TP=[  0.32 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                          LGI=[150](m), MNI=[0.013], SCI=[0](min)
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.001](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.54 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                          LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.004 ](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                          LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.001 ](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                     N=[  3 ], TP=[ 0.38  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                          LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[3 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                          LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[6  ], STRATE=[-100](cms), RELRATE=[0.005](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  1.01 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                     N=[  3 ], TP=[ 0.23  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.44  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                          LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.006](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                     N=[  3 ], TP=[ 0.33  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                     XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                          LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.16  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD         ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.23 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
FINISH
```

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O      9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9   =========
                                                        9   9  9   9  # 3375279
        StormWater Management HYdrologic Model           999    999   =========

 *******************************************************************************
 ***************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********      based on the principles of HYMO and its successors      *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                   *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884            *********
 *********                  Gatineau, Quebec: (819) 243-6858            *********
 *********                  E-Mail: swmhymo@jfsa.Com                    *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                     +++++++++
 +++++++++               Bolton                SERIAL#:3375279        +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *********
 *********            Maximum value for ID numbers  :     10           *********
 *********            Max. number of rainfall points: 105408           *********
 *********            Max. number of flow points    : 105408           *********
 *******************************************************************************


 *********************   D E T A I L E D   O U T P U T   *********************
 *******************************************************************************
 *         DATE: 2015-02-12     TIME: 14:46:15     RUN COUNTER: 000102         *
 *******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP10.dat           *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP10.out           *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP10.sum           *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
 *******************************************************************************

--------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date         : 2015-02-12
*#  Modeller     : [    MYS    ]
*#  Company      : Calder Engineering Ltd.
*#  License #    :  3375279
*#******************************************************************************
*# Proposed Conditions - Revised February 2015
*#******************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
-------------------
| READ STORM       |     Filename: 10yr/6hr
| Ptotal=  55.69 mm|     Comments: 10yr/6hr
-------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .25    .000 |  2.00  18.940 |  3.75   7.800 |  5.50   1.110
               .50   1.110 |  2.25  18.940 |  4.00   4.460 |  5.75   1.110
               .75   1.110 |  2.50  51.240 |  4.25   4.460 |  6.00   1.110
              1.00   1.110 |  2.75  51.240 |  4.50   2.230 |  6.25   1.110
              1.25   1.110 |  3.00  14.480 |  4.75   2.230 |
              1.50   6.680 |  3.25  14.480 |  5.00   1.110 |
              1.75   6.680 |  3.50   7.800 |  5.25   1.110 |

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=     .737

     PEAK FLOW       (cms)=     .116 (i)
     TIME TO PEAK    (hrs)=    2.817
     RUNOFF VOLUME    (mm)=   12.635
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .227

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

--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .32
| 02:1B     DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14         .18
     Dep. Storage     (mm)=        .70       10.00
     Average Slope     (%)=        .90         .90
     Length            (m)=     160.00        5.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=      51.24       44.59
                over (min)        5.00        8.00
     Storage Coeff.  (min)=       4.57 (ii)   8.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00        8.00
     Unit Hyd. peak  (cms)=        .24         .14
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .00         .02           .019 (iii)
     TIME TO PEAK    (hrs)=       2.62        2.78          2.783
     RUNOFF VOLUME    (mm)=      54.99       19.79         19.825
     TOTAL RAINFALL   (mm)=      55.69       55.69         55.690
     RUNOFF COEFFICIENT   =        .99         .36           .356

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:02  (1B    )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000       1.900
           INFLOW HYD. PEAKS AT     .019       2.783
           STOP  CONTROLLING AT     .003       3.972

           REQUIRED STORAGE VOLUME (ha.m.)=    .0042
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0063
           % OF HYDROGRAPH TO STORE       =  66.1553

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:1A            3.28      .116    2.82  12.64    .000
                   +ID2 02:1B             .32      .019    2.78  19.83    .000
                    ======================================================
                    SUM 03:1A+1B         3.60      .134    2.82  13.27    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .671

     PEAK FLOW       (cms)=     .140 (i)
     TIME TO PEAK    (hrs)=    3.033
     RUNOFF VOLUME    (mm)=   11.825
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .212

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

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .320

     Unit Hyd Qpeak  (cms)=     .495

     PEAK FLOW       (cms)=     .096 (i)
     TIME TO PEAK    (hrs)=    2.983
     RUNOFF VOLUME    (mm)=   11.441
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .205

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

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .14
| 04:2B1    DT= 1.00 |   Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06         .08
     Dep. Storage     (mm)=        .70       10.00
     Average Slope     (%)=       2.50        2.50
     Length            (m)=     150.00        5.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=      51.24       48.22
                over (min)        3.00        6.00
     Storage Coeff.  (min)=       3.23 (ii)   5.77 (ii)
     Unit Hyd. Tpeak (min)=       3.00        6.00
     Unit Hyd. peak  (cms)=        .36         .19
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .00         .01           .009 (iii)
     TIME TO PEAK    (hrs)=       2.53        2.77          2.767
     RUNOFF VOLUME    (mm)=      54.99       20.36         20.391
     TOTAL RAINFALL   (mm)=      55.69       55.69         55.690
     RUNOFF COEFFICIENT   =        .99         .37           .366

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  65.0    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.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:04  (2B1   )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000       1.837
           INFLOW HYD. PEAKS AT     .009       2.767
           STOP  CONTROLLING AT     .001       4.312

           REQUIRED STORAGE VOLUME (ha.m.)=    .0021
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0029
           % OF HYDROGRAPH TO STORE       =  74.3697

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .001  (cms).

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:2A1           6.15      .140    3.03  11.83    .000
                   +ID2 02:2A2           4.15      .096    2.98  11.44    .000
                   +ID3 04:2B1            .14      .009    2.77  20.39    .000
                    ======================================================
                    SUM 05:2A1+2A2+2B   10.44      .239    3.02  11.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .862

     PEAK FLOW       (cms)=     .240 (i)
     TIME TO PEAK    (hrs)=    3.367
     RUNOFF VOLUME    (mm)=   12.947
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .232

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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 ---------------------------------------------------------------------------
 001:0013-------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .45
 | 02:3B1    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .20          .25
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.00         2.00
      Length            (m)=     225.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      51.24        51.12
                 over (min)       4.00         7.00
      Storage Coeff.  (min)=       4.41 (ii)    7.06 (ii)
      Unit Hyd. Tpeak (min)=       4.00         7.00
      Unit Hyd. peak  (cms)=        .27          .16
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .03          .032 (iii)
      TIME TO PEAK    (hrs)=       2.63         2.77         2.767
      RUNOFF VOLUME    (mm)=      54.99        22.58        22.610
      TOTAL RAINFALL   (mm)=      55.69        55.69        55.690
      RUNOFF COEFFICIENT   =        .99          .41          .406

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------
 001:0014-------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:02  (3B1   )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.883
            INFLOW HYD. PEAKS AT     .032       2.767
            STOP  CONTROLLING AT     .004       4.101

            REQUIRED STORAGE VOLUME (ha.m.)=    .0072
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0102
            % OF HYDROGRAPH TO STORE       =  71.0471

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .004  (cms).

 ---------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .16
 | 03:3B2    DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .06          .10
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       2.50         2.50
      Length            (m)=     150.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      51.24        46.01
                 over (min)       3.00         6.00
      Storage Coeff.  (min)=       3.23 (ii)    5.82 (ii)
      Unit Hyd. Tpeak (min)=       3.00         6.00
      Unit Hyd. peak  (cms)=        .36          .19
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .01          .011 (iii)
      TIME TO PEAK    (hrs)=       2.53         2.77         2.767
      RUNOFF VOLUME    (mm)=      54.99        21.45        21.487
      TOTAL RAINFALL   (mm)=      55.69        55.69        55.690
      RUNOFF COEFFICIENT   =        .99          .39          .386

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (3B2   )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.885
            INFLOW HYD. PEAKS AT     .011       2.767
            STOP  CONTROLLING AT     .001       4.364

            REQUIRED STORAGE VOLUME (ha.m.)=    .0027
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0034
            % OF HYDROGRAPH TO STORE       =  77.5151

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .001  (cms).

 ---------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------
 -----------------------
 | ADD HYD (3A+3B1+3B2) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:3A             12.19      .240    3.37  12.95    .000
                  +ID2 02:3B1              .45      .032    2.77  22.61    .000
                  +ID3 03:3B2              .16      .011    2.77  21.49    .000
                  ==========================================================
                   SUM 04:3A+3B1+3B2     12.80      .254    3.32  13.39    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    2.79   Curve Number   (CN)=71.00
 | 01:5A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .380

      Unit Hyd Qpeak  (cms)=     .280

      PEAK FLOW       (cms)=     .072 (i)
      TIME TO PEAK    (hrs)=    3.067
      RUNOFF VOLUME    (mm)=   13.970
      TOTAL RAINFALL   (mm)=   55.690
      RUNOFF COEFFICIENT   =     .251

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

 ---------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .28
 | 03:5B1    DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .12          .16
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=       5.50         5.50
      Length            (m)=     140.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      51.24        50.78
                 over (min)       2.00         4.00
      Storage Coeff.  (min)=       2.45 (ii)    4.41 (ii)
      Unit Hyd. Tpeak (min)=       2.00         4.00
      Unit Hyd. peak  (cms)=        .49          .26
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .02          .021 (iii)
      TIME TO PEAK    (hrs)=       2.52         2.75         2.750
      RUNOFF VOLUME    (mm)=      54.99        22.29        22.321
      TOTAL RAINFALL   (mm)=      55.69        55.69        55.690
      RUNOFF COEFFICIENT   =        .99          .40          .401

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (5B1   )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.838
            INFLOW HYD. PEAKS AT     .021       2.750
            STOP  CONTROLLING AT     .002       4.307

            REQUIRED STORAGE VOLUME (ha.m.)=    .0048
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0063
            % OF HYDROGRAPH TO STORE       =  76.4300

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .002  (cms).

 ---------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .69
 | 06:5B2    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .30          .39
      Dep. Storage     (mm)=        .70        10.00
      Average Slope     (%)=        .80          .80
      Length            (m)=     350.00         5.00
      Mannings n          =        .013         .250

      Max.eff.Inten.(mm/hr)=      51.24        49.51
                 over (min)       8.00        11.00
      Storage Coeff.  (min)=       7.57 (ii)   11.10 (ii)
      Unit Hyd. Tpeak (min)=       8.00        11.00
      Unit Hyd. peak  (cms)=        .15          .10
                                                           *TOTALS*
      PEAK FLOW       (cms)=        .00          .04          .042 (iii)
      TIME TO PEAK    (hrs)=       2.75         2.82         2.817
      RUNOFF VOLUME    (mm)=      54.99        22.58        22.610
      TOTAL RAINFALL   (mm)=      55.69        55.69        55.690
      RUNOFF COEFFICIENT   =        .99          .41          .406

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    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.

 ---------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (5B2   )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
            START CONTROLLING AT     .000       1.904
            INFLOW HYD. PEAKS AT     .042       2.817
            STOP  CONTROLLING AT     .005       4.430

            REQUIRED STORAGE VOLUME (ha.m.)=    .0117
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0156
            % OF HYDROGRAPH TO STORE       =  75.0714

            NOTE:  Storage was computed to reduce the Inflow
                   peak to     .005  (cms).

 ---------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------
 -----------------------
 | ADD HYD (3s+5s     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 04:3A+3B1+3B2     12.80      .254    3.32  13.39    .000
                  +ID2 01:5A              2.79      .072    3.07  13.97    .000
                  +ID3 03:5B1              .28      .021    2.75  22.32    .000
                  +ID4 06:5B2              .69      .042    2.82  22.61    .000
                  ==========================================================
                   SUM 02:3s+5s          16.56      .347    3.27  14.03    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
 | 01:4      DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=   1.010

      Unit Hyd Qpeak  (cms)=    4.443

      PEAK FLOW       (cms)=    1.670 (i)
      TIME TO PEAK    (hrs)=    3.983
      RUNOFF VOLUME    (mm)=   13.508
      TOTAL RAINFALL   (mm)=   55.690
      RUNOFF COEFFICIENT   =     .243

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

 ---------------------------------------------------------------------------
 001:0025-------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .82   Curve Number   (CN)=67.00
 | 02: 6     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .230

      Unit Hyd Qpeak  (cms)=     .136

      PEAK FLOW       (cms)=     .024 (i)
      TIME TO PEAK    (hrs)=    2.883
      RUNOFF VOLUME    (mm)=   12.222
      TOTAL RAINFALL   (mm)=   55.690
      RUNOFF COEFFICIENT   =     .219

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

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 ---------------------------------------------------------------------------------
 001:0026-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    7.72   Curve Number   (CN)=71.00
 | 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .440

     Unit Hyd Qpeak  (cms)=     .670

     PEAK FLOW       (cms)=     .184 (i)
     TIME TO PEAK    (hrs)=    3.167
     RUNOFF VOLUME    (mm)=   13.970
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .251

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

 ---------------------------------------------------------------------------------
 001:0027-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .79
 | 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .34           .45
     Dep. Storage     (mm)=        .70         10.00
     Average Slope     (%)=       2.20          2.20
     Length            (m)=     385.00          5.00
     Mannings n          =        .013          .250

     Max.eff.Inten.(mm/hr)=      51.24         48.89
                over (min)       6.00          9.00
     Storage Coeff.  (min)=      5.92 (ii)     8.54 (ii)
     Unit Hyd. Tpeak (min)=      6.00          9.00
     Unit Hyd. peak  (cms)=       .19           .13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .00           .05            .052 (iii)
     TIME TO PEAK    (hrs)=      2.75          2.78           2.783
     RUNOFF VOLUME    (mm)=     54.99         22.29          22.321
     TOTAL RAINFALL   (mm)=     55.69         55.69          55.690
     RUNOFF COEFFICIENT   =       .99           .40            .401

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0028-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (7B    )  |             DISCHARGE      TIME
 -------------------                (cms)       (hrs)
           START CONTROLLING AT     .000       1.896
           INFLOW HYD. PEAKS AT     .052       2.783
           STOP  CONTROLLING AT     .006       4.361

           REQUIRED STORAGE VOLUME (ha.m.)=    .0131
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0176
           % OF HYDROGRAPH TO STORE       =  74.5169

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .006  (cms).

 ---------------------------------------------------------------------------------
 001:0029-------------------------------------------------------------------------
 -----------------------
 | ADD HYD (7A+7B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04: 7A            7.72      .184    3.17  13.97    .000
                   +ID2 06:7B              .79      .052    2.78  22.32    .000
                    ==========================================================
                    SUM 08:7A+7B          8.51      .208    3.13  14.74    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------------
 001:0030-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    6.68   Curve Number   (CN)=72.00
 | 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .773

     PEAK FLOW       (cms)=     .195 (i)
     TIME TO PEAK    (hrs)=    3.000
     RUNOFF VOLUME    (mm)=   14.450
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .259

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

 ---------------------------------------------------------------------------------
 001:0031-------------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .31
 | 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .13           .18
     Dep. Storage     (mm)=        .70         10.00
     Average Slope     (%)=       1.40          1.40
     Length            (m)=     145.00          5.00
     Mannings n          =        .013          .250

     Max.eff.Inten.(mm/hr)=      51.24         46.93
                over (min)       4.00          7.00
     Storage Coeff.  (min)=      3.77 (ii)     6.82 (ii)
     Unit Hyd. Tpeak (min)=      4.00          7.00
     Unit Hyd. peak  (cms)=       .30           .16
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .00           .02            .021 (iii)
     TIME TO PEAK    (hrs)=      2.57          2.77           2.767
     RUNOFF VOLUME    (mm)=     54.99         21.73          21.760
     TOTAL RAINFALL   (mm)=     55.69         55.69          55.690
     RUNOFF COEFFICIENT   =       .99           .39            .391

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 ---------------------------------------------------------------------------------
 001:0032-------------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (8B    )  |             DISCHARGE      TIME
 -------------------                (cms)       (hrs)
           START CONTROLLING AT     .000       1.902
           INFLOW HYD. PEAKS AT     .021       2.767
           STOP  CONTROLLING AT     .003       3.965

           REQUIRED STORAGE VOLUME (ha.m.)=    .0046
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0067
           % OF HYDROGRAPH TO STORE       =  68.0517

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

 ---------------------------------------------------------------------------------
 001:0033-------------------------------------------------------------------------
 -----------------------
 | ADD HYD (8A+8B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04: 8A            6.68      .195    3.00  14.45    .000
                   +ID2 06:8B              .31      .021    2.77  21.76    .000
                    ==========================================================
                    SUM 09:8A+8B          6.99      .205    2.98  14.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------------
 001:0034-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .54   Curve Number   (CN)=70.00
 | 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .160

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .019 (i)
     TIME TO PEAK    (hrs)=    2.817
     RUNOFF VOLUME    (mm)=   12.512
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .225

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

 ---------------------------------------------------------------------------------
 001:0035-------------------------------------------------------------------------
 -----------------------
 | ADD HYD (8+10      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 09:8A+8B          6.99      .205    2.98  14.77    .000
                   +ID2 03: 10A            .54      .019    2.82  12.51    .000
                    ==========================================================
                    SUM 06:8+10           7.53      .220    2.95  14.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------------
 001:0036-------------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    5.12   Curve Number   (CN)=70.00
 | 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .850

     PEAK FLOW       (cms)=     .169 (i)
     TIME TO PEAK    (hrs)=    2.883
     RUNOFF VOLUME    (mm)=   13.508
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT   =     .243

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

 ---------------------------------------------------------------------------------
 001:0037-------------------------------------------------------------------------
      FINISH
 ---------------------------------------------------------------------------------
 *********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2015-02-12     at 14:46:16
 =================================================================================
```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date         : 2015-02-12
*#  Modeller     : [    MYS    ]
*#  Company      : Calder Engineering Ltd.
*#  License #    :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [25Y6.STM]
*%-----------------|-----------------------------------------------------------|
READ STORM           STORM_FILENAME=["25Y6.STM"]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  0.17 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                          LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                     N=[ 3 ], TP=[  0.35 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                     N=[ 3 ], TP=[  0.32 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                          LGI=[150](m), MNI=[0.013], SCI=[0](min)
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.54 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                          LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.005  ](cms)
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                          LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.002 ](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                     N=[  3 ], TP=[ 0.38  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                          LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[3 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                          LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[6  ], STRATE=[-100](cms), RELRATE=[0.007](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  1.01 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                     N=[  3 ], TP=[ 0.23  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.44  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                          LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.008](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                     N=[  3 ], TP=[ 0.33  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                     XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                          LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.003](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.16  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.23 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
===============================================================================
   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9 9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9 9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O      9999  9999    Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9    =========
                                                        9   9 9   9   # 3375279
        StormWater Management HYdrologic Model          999   999     =========
 ******************************************************************************
 ****************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model *********
 *********     based on the principles of HYMO and its successors     *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                 *********
 ******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.         *********
 *********                  Ottawa,  Ontario: (613) 836-3884          *********
 *********                  Gatineau, Quebec: (819) 243-6858          *********
 *********                  E-Mail: swmhymo@jfsa.Com                  *********
 ******************************************************************************
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                    +++++++++
 +++++++++                Bolton                 SERIAL#:3375279     +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 ******************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *********
 *********           Maximum value for ID numbers  :     10           *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points    : 105408           *********
 ******************************************************************************
 *********************  D E T A I L E D   O U T P U T  *********************
 ******************************************************************************
 *        DATE: 2015-02-12     TIME: 14:39:53     RUN COUNTER: 000100        *
 ******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP25.dat         *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP25.out         *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP25.sum         *
 * User comments:                                                             *
 * 1:_________________________________________________________________________*
 * 2:_________________________________________________________________________*
 * 3:_________________________________________________________________________*
 ******************************************************************************
-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------   Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
-------------------
| READ STORM       |     Filename: 25yr/6hr
| Ptotal=  65.59 mm|     Comments: 25yr/6hr
-------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .000 |   2.00  22.300 |   3.75   9.180 |   5.50   1.310
               .50   1.310 |   2.25  22.300 |   4.00   5.250 |   5.75   1.310
               .75   1.310 |   2.50  60.350 |   4.25   5.250 |   6.00   1.310
              1.00   1.310 |   2.75  60.350 |   4.50   2.620 |   6.25   1.310
              1.25   1.310 |   3.00  17.060 |   4.75   2.620 |
              1.50   7.870 |   3.25  17.060 |   5.00   1.310 |
              1.75   7.870 |   3.50   9.180 |   5.25   1.310 |
-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .170
     Unit Hyd Qpeak  (cms)=     .737
     PEAK FLOW       (cms)=     .164 (i)
     TIME TO PEAK    (hrs)=    2.817
     RUNOFF VOLUME    (mm)=   17.646
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .269
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .32
| 02:1B     DT= 1.00 |    Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .18
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=        .90          .90
     Length            (m)=     160.00         5.00
     Mannings n          =        .013         .250
     Max.eff.Inten.(mm/hr)=      60.35        59.02
               over (min)       4.00         7.00
     Storage Coeff.  (min)=      4.28 (ii)    7.46 (ii)
     Unit Hyd. Tpeak (min)=      4.00         7.00
     Unit Hyd. peak  (cms)=       .27          .15
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .03           .026 (iii)
     TIME TO PEAK    (hrs)=       2.72         2.77          2.767
     RUNOFF VOLUME    (mm)=      64.89        26.33         26.369
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.590
     RUNOFF COEFFICIENT   =        .99          .40           .402
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.
-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:02  (1B    )  |            DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       1.817
           INFLOW HYD. PEAKS AT     .026       2.767
           STOP  CONTROLLING AT     .003       4.306
           REQUIRED STORAGE VOLUME (ha.m.)=    .0062
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0084
           % OF HYDROGRAPH TO STORE       =  73.7899
           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).
-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)    (cms)   (hrs)   (mm)   (cms)
                         ID1 01:1A          3.28     .164    2.82  17.65    .000
                        +ID2 02:1B           .32     .026    2.77  26.37    .000
                         =======================================================
                         SUM 03:1A+1B       3.60     .188    2.80  18.42    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .350
     Unit Hyd Qpeak  (cms)=     .671
     PEAK FLOW       (cms)=     .200 (i)
     TIME TO PEAK    (hrs)=    3.017
     RUNOFF VOLUME    (mm)=   16.575
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .253
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .320
     Unit Hyd Qpeak  (cms)=     .495
     PEAK FLOW       (cms)=     .137 (i)
     TIME TO PEAK    (hrs)=    2.983
     RUNOFF VOLUME    (mm)=   16.065
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .245
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .14
| 04:2B1    DT= 1.00 |    Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .08
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     150.00         5.00
     Mannings n          =        .013         .250
     Max.eff.Inten.(mm/hr)=      60.35        63.48
               over (min)       3.00         5.00
     Storage Coeff.  (min)=      3.03 (ii)    5.30 (ii)
     Unit Hyd. Tpeak (min)=      3.00         5.00
     Unit Hyd. peak  (cms)=       .38          .22
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .01           .012 (iii)
     TIME TO PEAK    (hrs)=       2.65         2.75          2.750
     RUNOFF VOLUME    (mm)=      64.89        27.01         27.046
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.590
     RUNOFF COEFFICIENT   =        .99          .41           .412
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.
-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:04  (2B1   )  |            DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000       1.805
           INFLOW HYD. PEAKS AT     .012       2.750
           STOP  CONTROLLING AT     .002       3.832
           REQUIRED STORAGE VOLUME (ha.m.)=    .0024
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0038
           % OF HYDROGRAPH TO STORE       =  64.5197
           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .002  (cms).
-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)    (cms)   (hrs)   (mm)   (cms)
                         ID1 01:2A1         6.15     .200    3.02  16.58    .000
                        +ID2 02:2A2         4.15     .137    2.98  16.06    .000
                        +ID3 04:2B1          .14     .012    2.75  27.05    .000
                         =======================================================
                         SUM 05:2A1+2A2+2B   10.44     .341    3.00  16.51    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |    Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .540
     Unit Hyd Qpeak  (cms)=     .862
     PEAK FLOW       (cms)=     .344 (i)
     TIME TO PEAK    (hrs)=    3.333
     RUNOFF VOLUME    (mm)=   18.253
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .278
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .45
| 02:3B1    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .25
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     225.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=      60.35        66.26
                over (min)       4.00         7.00
     Storage Coeff.  (min)=       4.13 (ii)    6.52 (ii)
     Unit Hyd. Tpeak (min)=       4.00         7.00
     Unit Hyd. peak  (cms)=        .28          .17
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .04          .042 (iii)
     TIME TO PEAK    (hrs)=       2.65         2.77         2.767
     RUNOFF VOLUME    (mm)=      64.89        29.73        29.771
     TOTAL RAINFALL   (mm)=      65.59        65.59        65.590
     RUNOFF COEFFICIENT   =        .99          .45          .454

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

--------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:02  (3B1   )  |              DISCHARGE      TIME
-------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.816
           INFLOW HYD. PEAKS AT     .042       2.767
           STOP  CONTROLLING AT     .005       4.100

           REQUIRED STORAGE VOLUME (ha.m.)=    .0097
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0134
           % OF HYDROGRAPH TO STORE       =  72.2386

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .005  (cms).

--------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .16
| 03:3B2    DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .10
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     150.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=      60.35        60.31
                over (min)       3.00         5.00
     Storage Coeff.  (min)=       3.03 (ii)    5.35 (ii)
     Unit Hyd. Tpeak (min)=       3.00         5.00
     Unit Hyd. peak  (cms)=        .38          .22
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .015 (iii)
     TIME TO PEAK    (hrs)=       2.63         2.75         2.750
     RUNOFF VOLUME    (mm)=      64.89        28.41        28.447
     TOTAL RAINFALL   (mm)=      65.59        65.59        65.590
     RUNOFF COEFFICIENT   =        .99          .43          .434

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

--------------------------------------------------------------------------------
001:0016------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:03  (3B2   )  |              DISCHARGE      TIME
-------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.824
           INFLOW HYD. PEAKS AT     .015       2.750
           STOP  CONTROLLING AT     .002       3.897

           REQUIRED STORAGE VOLUME (ha.m.)=    .0031
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0046
           % OF HYDROGRAPH TO STORE       =  68.6398

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .002  (cms).

--------------------------------------------------------------------------------
001:0017------------------------------------------------------------------------
-----------------------
| ADD HYD (3A+3B1+3B2) | ID: NHYD         AREA     QPEAK    TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 01:3A            12.19      .344     3.33  18.25    .000
                   +ID2 02:3B1             .45      .042     2.77  29.77    .000
                   +ID3 03:3B2             .16      .015     2.75  28.45    .000
                   ==========================================================
                    SUM 04:3A+3B1+3B2    12.80      .362     3.30  18.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0018------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=    2.79   Curve Number   (CN)=71.00
| 01:5A     DT= 1.00 |   Ia       (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .380

     Unit Hyd Qpeak  (cms)=     .280

     PEAK FLOW       (cms)=     .102 (i)
     TIME TO PEAK    (hrs)=    3.050
     RUNOFF VOLUME    (mm)=   19.394
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .296

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

--------------------------------------------------------------------------------
001:0019------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .28
| 03:5B1    DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .12          .16
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       5.50         5.50
     Length            (m)=     140.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=      60.35        65.73
                over (min)       2.00         4.00
     Storage Coeff.  (min)=       2.29 (ii)    4.06 (ii)
     Unit Hyd. Tpeak (min)=       2.00         4.00
     Unit Hyd. peak  (cms)=        .51          .28
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .03          .028 (iii)
     TIME TO PEAK    (hrs)=       2.55         2.75         2.750
     RUNOFF VOLUME    (mm)=      64.89        29.40        29.431
     TOTAL RAINFALL   (mm)=      65.59        65.59        65.590
     RUNOFF COEFFICIENT   =        .99          .45          .449

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

--------------------------------------------------------------------------------
001:0020------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:03  (5B1   )  |              DISCHARGE      TIME
-------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.801
           INFLOW HYD. PEAKS AT     .028       2.750
           STOP  CONTROLLING AT     .003       4.017

           REQUIRED STORAGE VOLUME (ha.m.)=    .0060
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0082
           % OF HYDROGRAPH TO STORE       =  72.8817

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

--------------------------------------------------------------------------------
001:0021------------------------------------------------------------------------
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .69
| 06:5B2    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .30          .39
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=        .80          .80
     Length            (m)=     350.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=      60.35        64.90
                over (min)       7.00        10.00
     Storage Coeff.  (min)=       7.09 (ii)   10.26 (ii)
     Unit Hyd. Tpeak (min)=       7.00        10.00
     Unit Hyd. peak  (cms)=        .16          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .06          .058 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.80         2.800
     RUNOFF VOLUME    (mm)=      64.89        29.73        29.771
     TOTAL RAINFALL   (mm)=      65.59        65.59        65.590
     RUNOFF COEFFICIENT   =        .99          .45          .454

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

--------------------------------------------------------------------------------
001:0022------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:06  (5B2   )  |              DISCHARGE      TIME
-------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.832
           INFLOW HYD. PEAKS AT     .058       2.800
           STOP  CONTROLLING AT     .007       4.360

           REQUIRED STORAGE VOLUME (ha.m.)=    .0152
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0205
           % OF HYDROGRAPH TO STORE       =  74.2125

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .007  (cms).

--------------------------------------------------------------------------------
001:0023------------------------------------------------------------------------
-----------------------
| ADD HYD (3s+5s      ) | ID: NHYD         AREA     QPEAK    TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 04:3A+3B1+3B2    12.80      .362     3.30  18.79    .000
                   +ID2 01:5A             2.79      .102     3.05  19.39    .000
                   +ID3 03:5B1             .28      .028     2.75  29.43    .000
                   +ID4 06:5B2             .69      .058     2.80  29.77    .000
                    ==========================================================
                    SUM 02:3s+5s         16.56      .490     3.25  19.53    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0024------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
| 01:4      DT= 1.00 |   Ia       (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.010

     Unit Hyd Qpeak  (cms)=    4.443

     PEAK FLOW       (cms)=    2.341 (i)
     TIME TO PEAK    (hrs)=    3.950
     RUNOFF VOLUME    (mm)=   18.792
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .287

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

--------------------------------------------------------------------------------
001:0025------------------------------------------------------------------------
---------------------
| CALIB NASHYD        |   Area    (ha)=     .82   Curve Number   (CN)=67.00
| 02: 6     DT= 1.00 |   Ia       (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .136

     PEAK FLOW       (cms)=     .035 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   17.102
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .261

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

```

 -----------------------------------------------------------------------------
 001:0026--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    7.72   Curve Number   (CN)=71.00
 | 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .440

     Unit Hyd Qpeak  (cms)=     .670

     PEAK FLOW      (cms)=     .260 (i)
     TIME TO PEAK    (hrs)=    3.150
     RUNOFF VOLUME    (mm)=   19.394
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .296

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

 -----------------------------------------------------------------------------
 001:0027--------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .79
 | 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .34          .45
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=        2.20         2.20
     Length            (m)=      385.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=       60.35        64.03
                over (min)         6.00         8.00
     Storage Coeff.  (min)=        5.54 (ii)    7.90 (ii)
     Unit Hyd. Tpeak (min)=        6.00         8.00
     Unit Hyd. peak  (cms)=         .20          .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .00          .07          .070 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.78         2.783
     RUNOFF VOLUME    (mm)=       64.89        29.39        29.431
     TOTAL RAINFALL   (mm)=       65.59        65.59        65.590
     RUNOFF COEFFICIENT   =         .99          .45          .449

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0028--------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (7B    )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.825
           INFLOW HYD. PEAKS AT     .070       2.783
           STOP  CONTROLLING AT     .008       4.319

           REQUIRED STORAGE VOLUME (ha.m.)=    .0173
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0233
           % OF HYDROGRAPH TO STORE       =  74.5161

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .008  (cms).

 -----------------------------------------------------------------------------
 001:0029--------------------------------------------------------------------
 -----------------------
 | ADD HYD (7A+7B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 7A           7.72      .260    3.15  19.39    .000
                    +ID2 06:7B             .79      .070    2.78  29.43    .000
                     =======================================================
                     SUM 08:7A+7B         8.51      .290    3.12  20.33    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0030--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    6.68   Curve Number   (CN)=72.00
 | 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .773

     PEAK FLOW      (cms)=     .275 (i)
     TIME TO PEAK    (hrs)=    2.983
     RUNOFF VOLUME    (mm)=   20.019
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .305

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

 -----------------------------------------------------------------------------
 001:0031--------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .31
 | 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .13          .18
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=        1.40         1.40
     Length            (m)=      145.00         5.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=       60.35        61.50
                over (min)         4.00         6.00
     Storage Coeff.  (min)=        3.53 (ii)    6.27 (ii)
     Unit Hyd. Tpeak (min)=        4.00         6.00
     Unit Hyd. peak  (cms)=         .31          .18
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .00          .03          .028 (iii)
     TIME TO PEAK    (hrs)=        2.65         2.77         2.767
     RUNOFF VOLUME    (mm)=       64.89        28.73        28.770
     TOTAL RAINFALL   (mm)=       65.59        65.59        65.590
     RUNOFF COEFFICIENT   =         .99          .44          .439

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0032--------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (8B    )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.820
           INFLOW HYD. PEAKS AT     .028       2.767
           STOP  CONTROLLING AT     .003       4.310

           REQUIRED STORAGE VOLUME (ha.m.)=    .0067
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0089
           % OF HYDROGRAPH TO STORE       =  75.2959

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

 -----------------------------------------------------------------------------
 001:0033--------------------------------------------------------------------
 -----------------------
 | ADD HYD (8A+8B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04: 8A           6.68      .275    2.98  20.02    .000
                    +ID2 06:8B             .31      .028    2.77  28.77    .000
                     =======================================================
                     SUM 09:8A+8B         6.99      .288    2.97  20.41    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0034--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .54   Curve Number   (CN)=70.00
 | 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .160

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW      (cms)=     .028 (i)
     TIME TO PEAK    (hrs)=    2.817
     RUNOFF VOLUME    (mm)=   17.678
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .270

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

 -----------------------------------------------------------------------------
 001:0035--------------------------------------------------------------------
 -----------------------
 | ADD HYD (8+10      ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 09:8A+8B         6.99      .288    2.97  20.41    .000
                    +ID2 03: 10A           .54      .028    2.82  17.68    .000
                     =======================================================
                     SUM 06:8+10          7.53      .310    2.93  20.21    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0036--------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    5.12   Curve Number   (CN)=70.00
 | 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .850

     PEAK FLOW      (cms)=     .239 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   18.792
     TOTAL RAINFALL   (mm)=   65.590
     RUNOFF COEFFICIENT   =     .287

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

 -----------------------------------------------------------------------------
 001:0037--------------------------------------------------------------------
      FINISH
 -----------------------------------------------------------------------------
 ******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2015-02-12     at 14:39:54
 ==============================================================================

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```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date         : 2015-02-12
*#  Modeller     : [    MYS    ]
*#  Company      : Calder Engineering Ltd.
*#  License #    :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                   [50Y6.STM]
*%-----------------|-------------------------------------------------------------|
READ STORM          STORM_FILENAME=["50Y6.STM"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[  0.17 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                    XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 65  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                         LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                    N=[ 3 ], TP=[  0.35 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                    N=[ 3 ], TP=[  0.32 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                    XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 65  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                         LGI=[150](m), MNI=[0.013], SCI=[0](min)
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                    DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                    N=[  3 ], TP=[ 0.54 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                    XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                         LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.006   ](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                    XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                         LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.002 ](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                    DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                    N=[  3 ], TP=[ 0.38  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                    XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                         LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[3 ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                    XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                         LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[6  ], STRATE=[-100](cms), RELRATE=[0.009](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[  1.01 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                    N=[  3 ], TP=[ 0.23  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[ 0.44  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                    XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                         LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.010](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                    N=[  3 ], TP=[ 0.33  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD      ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                    XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                    SCS curve number CN=[ 70  ],
                    Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                         LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                    Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                         LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
COMPUTE VOLUME      ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                    N=[  3 ], TP=[ 0.16  ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD        ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                    DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                    N=[  3 ], TP=[ 0.23 ]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
FINISH
```

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999     =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9 9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9 9   9    Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O      9999  9999    Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9    =========
                                                       9   9 9   9    # 3375279
        StormWater Management HYdrologic Model          999   999     =========

 *******************************************************************************
 ***************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********      based on the principles of HYMO and its successors     *********
 *********                OTTHYMO-83 and OTTHYMO-89.                   *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.           *********
 *********                  Ottawa, Ontario: (613) 836-3884            *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                     +++++++++
 +++++++++                Bolton                SERIAL#:3375279        +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *********
 *********            Maximum value for ID numbers  :     10           *********
 *********            Max. number of rainfall points: 105408           *********
 *********            Max. number of flow points    : 105408           *********
 *******************************************************************************


 *********************   D E T A I L E D   O U T P U T   *********************
 *******************************************************************************
 *        DATE: 2015-02-12     TIME: 14:37:50     RUN COUNTER: 000098          *
 *******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP50.dat           *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP50.out           *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP50.sum           *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
 *******************************************************************************

--------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#******************************************************************************
*# Proposed Conditions - Revised February 2015
*#******************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------   Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
-------------------
| READ STORM       |     Filename: 50yr/6hr
| Ptotal=  73.00 mm|     Comments: 50yr/6hr
-------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .25    .000 |   2.00  24.820 |   3.75  10.220 |   5.50   1.460
                .50   1.460 |   2.25  24.820 |   4.00   5.840 |   5.75   1.460
                .75   1.460 |   2.50  67.160 |   4.25   5.840 |   6.00   1.460
               1.00   1.460 |   2.75  67.160 |   4.50   2.920 |   6.25   1.460
               1.25   1.460 |   3.00  18.980 |   4.75   2.920 |
               1.50   8.760 |   3.25  18.980 |   5.00   1.460 |
               1.75   8.760 |   3.50  10.220 |   5.25   1.460 |

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=     .737

     PEAK FLOW      (cms)=     .202 (i)
     TIME TO PEAK   (hrs)=    2.817
     RUNOFF VOLUME   (mm)=   21.744
     TOTAL RAINFALL  (mm)=   73.000
     RUNOFF COEFFICIENT   =     .298

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

--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .32
| 02:1B     DT= 1.00 |    Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .14          .18
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=         .90          .90
     Length            (m)=      160.00         5.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       67.16        70.00
                over (min)        4.00         7.00
     Storage Coeff.  (min)=        4.10 (ii)    7.07 (ii)
     Unit Hyd. Tpeak (min)=        4.00         7.00
     Unit Hyd. peak  (cms)=         .28          .16
                                                             *TOTALS*
     PEAK FLOW      (cms)=          .00          .03           .031 (iii)
     TIME TO PEAK   (hrs)=         2.75         2.77          2.767
     RUNOFF VOLUME   (mm)=        72.30        31.53         31.569
     TOTAL RAINFALL  (mm)=        73.00        73.00         73.000
     RUNOFF COEFFICIENT   =         .99          .43           .432

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.

--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:02  (1B    )  |             DISCHARGE      TIME
```

```
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000       1.795
           INFLOW HYD. PEAKS AT     .031       2.767
           STOP  CONTROLLING AT     .004       4.035

           REQUIRED STORAGE VOLUME (ha.m.)=    .0071
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0101
           % OF HYDROGRAPH TO STORE       =  70.4660

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .004  (cms).

--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                         ID1 01:1A           3.28     .202    2.82  21.74    .000
                        +ID2 02:1B            .32     .031    2.77  31.57    .000
                         =======================================================
                         SUM 03:1A+1B        3.60     .232    2.80  22.62    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .671

     PEAK FLOW      (cms)=     .249 (i)
     TIME TO PEAK   (hrs)=    3.000
     RUNOFF VOLUME   (mm)=   20.475
     TOTAL RAINFALL  (mm)=   73.000
     RUNOFF COEFFICIENT   =     .280

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

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .320

     Unit Hyd Qpeak  (cms)=     .495

     PEAK FLOW      (cms)=     .171 (i)
     TIME TO PEAK   (hrs)=    2.967
     RUNOFF VOLUME   (mm)=   19.868
     TOTAL RAINFALL  (mm)=   73.000
     RUNOFF COEFFICIENT   =     .272

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

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .14
| 04:2B1    DT= 1.00 |    Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .06          .08
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=        2.50         2.50
     Length            (m)=      150.00         5.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       67.16        75.08
                over (min)        3.00         5.00
     Storage Coeff.  (min)=        2.90 (ii)    5.03 (ii)
     Unit Hyd. Tpeak (min)=        3.00         5.00
     Unit Hyd. peak  (cms)=         .39          .23
                                                             *TOTALS*
     PEAK FLOW      (cms)=          .00          .01           .015 (iii)
     TIME TO PEAK   (hrs)=         2.75         2.75          2.750
     RUNOFF VOLUME   (mm)=        72.30        32.28         32.325
     TOTAL RAINFALL  (mm)=        73.00        73.00         73.000
     RUNOFF COEFFICIENT   =         .99          .44           .443

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:04  (2B1   )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000       1.776
           INFLOW HYD. PEAKS AT     .015       2.750
           STOP  CONTROLLING AT     .002       3.880

           REQUIRED STORAGE VOLUME (ha.m.)=    .0031
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0045
           % OF HYDROGRAPH TO STORE       =  68.3991

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .002  (cms).

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                         ID1 01:2A1          6.15     .249    3.00  20.47    .000
                        +ID2 02:2A2          4.15     .171    2.97  19.87    .000
                        +ID3 04:2B1           .14     .015    2.75  32.32    .000
                         =======================================================
                         SUM 05:2A1+2A2+2B  10.44     .425    2.98  20.39    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |    Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .862

     PEAK FLOW      (cms)=     .429 (i)
     TIME TO PEAK   (hrs)=    3.317
     RUNOFF VOLUME   (mm)=   22.586
     TOTAL RAINFALL  (mm)=   73.000
     RUNOFF COEFFICIENT   =     .309

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

```

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .45
 | 02:3B1    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=      .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .20          .25
     Dep. Storage      (mm)=         .70        10.00
     Average Slope      (%)=        2.00         2.00
     Length             (m)=      225.00         5.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=        67.16        78.43
                over (min)          4.00         6.00
     Storage Coeff.  (min)=         3.96 (ii)    6.19 (ii)
     Unit Hyd. Tpeak (min)=         4.00         6.00
     Unit Hyd. peak  (cms)=          .29          .18
                                                         *TOTALS*
     PEAK FLOW       (cms)=          .00          .05        .050 (iii)
     TIME TO PEAK    (hrs)=         2.75         2.77       2.767
     RUNOFF VOLUME    (mm)=        72.30        35.37      35.406
     TOTAL RAINFALL   (mm)=        73.00        73.00      73.000
     RUNOFF COEFFICIENT   =          .99          .48        .485

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0014----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:02  (3B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
          START CONTROLLING AT     .000       1.787
          INFLOW HYD. PEAKS AT     .050       2.767
          STOP  CONTROLLING AT     .006       4.016

          REQUIRED STORAGE VOLUME (ha.m.)=    .0115
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0159
          % OF HYDROGRAPH TO STORE       =  71.9008

          NOTE:  Storage was computed to reduce the Inflow
                 peak to     .006  (cms).

 ------------------------------------------------------------------------------
 001:0015----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .16
 | 03:3B2    DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=      .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .06          .10
     Dep. Storage      (mm)=         .70        10.00
     Average Slope      (%)=        2.50         2.50
     Length             (m)=      150.00         5.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=        67.16        71.12
                over (min)          3.00         5.00
     Storage Coeff.  (min)=         2.90 (ii)    5.07 (ii)
     Unit Hyd. Tpeak (min)=         3.00         5.00
     Unit Hyd. peak  (cms)=          .39          .22
                                                         *TOTALS*
     PEAK FLOW       (cms)=          .00          .02        .018 (iii)
     TIME TO PEAK    (hrs)=         2.75         2.75       2.750
     RUNOFF VOLUME    (mm)=        72.30        33.91      33.944
     TOTAL RAINFALL   (mm)=        73.00        73.00      73.000
     RUNOFF COEFFICIENT   =          .99          .46        .465

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0016----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (3B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
          START CONTROLLING AT     .000       1.794
          INFLOW HYD. PEAKS AT     .018       2.750
          STOP  CONTROLLING AT     .002       4.019

          REQUIRED STORAGE VOLUME (ha.m.)=    .0039
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0054
          % OF HYDROGRAPH TO STORE       =  72.4923

          NOTE:  Storage was computed to reduce the Inflow
                 peak to     .002  (cms).

 ------------------------------------------------------------------------------
 001:0017----------------------------------------------------------------------
 -----------------------
 | ADD HYD (3A+3B1+3B2) | ID: NHYD         AREA      QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)      (cms)   (hrs)   (mm)   (cms)
                    ID1 01:3A             12.19       .429    3.32  22.59    .000
                   +ID2 02:3B1              .45       .050    2.77  35.41    .000
                   +ID3 03:3B2              .16       .018    2.75  33.94    .000
                    ==========================================================
                    SUM 04:3A+3B1+3B2     12.80       .451    3.28  23.18    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0018----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     2.79   Curve Number   (CN)=71.00
 | 01:5A     DT= 1.00 |   Ia      (mm)=   10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .380

     Unit Hyd Qpeak  (cms)=      .280

     PEAK FLOW       (cms)=      .127 (i)
     TIME TO PEAK    (hrs)=     3.050
     RUNOFF VOLUME    (mm)=    23.802
     TOTAL RAINFALL   (mm)=    73.000
     RUNOFF COEFFICIENT   =      .326

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

 ------------------------------------------------------------------------------
 001:0019----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .28
 | 03:5B1    DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=      .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .12          .16
     Dep. Storage      (mm)=         .70        10.00
     Average Slope      (%)=        5.50         5.50
     Length             (m)=      140.00         5.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=        67.16        77.27
                over (min)          2.00         4.00
     Storage Coeff.  (min)=         2.20 (ii)    3.86 (ii)
     Unit Hyd. Tpeak (min)=         2.00         4.00
     Unit Hyd. peak  (cms)=          .53          .29
                                                         *TOTALS*
     PEAK FLOW       (cms)=          .00          .03        .033 (iii)
     TIME TO PEAK    (hrs)=         2.75         2.75       2.750
     RUNOFF VOLUME    (mm)=        72.30        34.99      35.032
     TOTAL RAINFALL   (mm)=        73.00        73.00      73.000
     RUNOFF COEFFICIENT   =          .99          .48        .480

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0020----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:03  (5B1   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
          START CONTROLLING AT     .000       1.777
          INFLOW HYD. PEAKS AT     .033       2.750
          STOP  CONTROLLING AT     .004       3.872

          REQUIRED STORAGE VOLUME (ha.m.)=    .0069
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0098
          % OF HYDROGRAPH TO STORE       =  70.4663

          NOTE:  Storage was computed to reduce the Inflow
                 peak to     .004  (cms).

 ------------------------------------------------------------------------------
 001:0021----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .69
 | 06:5B2    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=      .10
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .30          .39
     Dep. Storage      (mm)=         .70        10.00
     Average Slope      (%)=         .80          .80
     Length             (m)=      350.00         5.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=        67.16        76.50
                over (min)          7.00        10.00
     Storage Coeff.  (min)=         6.79 (ii)    9.76 (ii)
     Unit Hyd. Tpeak (min)=         7.00        10.00
     Unit Hyd. peak  (cms)=          .17          .12
                                                         *TOTALS*
     PEAK FLOW       (cms)=          .00          .07        .069 (iii)
     TIME TO PEAK    (hrs)=         2.75         2.80       2.800
     RUNOFF VOLUME    (mm)=        72.30        35.37      35.406
     TOTAL RAINFALL   (mm)=        73.00        73.00      73.000
     RUNOFF COEFFICIENT   =          .99          .48        .485

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0022----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (5B2   )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
          START CONTROLLING AT     .000       1.833
          INFLOW HYD. PEAKS AT     .069       2.800
          STOP  CONTROLLING AT     .009       4.252

          REQUIRED STORAGE VOLUME (ha.m.)=    .0177
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0244
          % OF HYDROGRAPH TO STORE       =  72.5166

          NOTE:  Storage was computed to reduce the Inflow
                 peak to     .009  (cms).

 ------------------------------------------------------------------------------
 001:0023----------------------------------------------------------------------
 -----------------------
 | ADD HYD (3s+5s     ) | ID: NHYD         AREA      QPEAK   TPEAK   R.V.    DWF
 -----------------------                   (ha)      (cms)   (hrs)   (mm)   (cms)
                    ID1 04:3A+3B1+3B2     12.80       .451    3.28  23.18    .000
                   +ID2 01:5A              2.79       .127    3.05  23.80    .000
                   +ID3 03:5B1              .28       .033    2.75  35.03    .000
                   +ID4 06:5B2              .69       .069    2.80  35.41    .000
                    ==========================================================
                    SUM 02:3s+5s          16.56       .607    3.23  23.99    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0024----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=   117.50   Curve Number   (CN)=70.00
 | 01:4      DT= 1.00 |   Ia      (mm)=   10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    1.010

     Unit Hyd Qpeak  (cms)=     4.443

     PEAK FLOW       (cms)=     2.888 (i)
     TIME TO PEAK    (hrs)=     3.933
     RUNOFF VOLUME    (mm)=    23.095
     TOTAL RAINFALL   (mm)=    73.000
     RUNOFF COEFFICIENT   =      .316

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

 ------------------------------------------------------------------------------
 001:0025----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=      .82   Curve Number   (CN)=67.00
 | 02: 6     DT= 1.00 |   Ia      (mm)=   10.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .230

     Unit Hyd Qpeak  (cms)=      .136

     PEAK FLOW       (cms)=      .043 (i)
     TIME TO PEAK    (hrs)=     2.867
     RUNOFF VOLUME    (mm)=    21.099
     TOTAL RAINFALL   (mm)=    73.000
     RUNOFF COEFFICIENT   =      .289

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

```

 ------------------------------------------------------------------------------
 001:0026----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     7.72   Curve Number   (CN)=71.00
 | 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .440

     Unit Hyd Qpeak  (cms)=     .670

     PEAK FLOW       (cms)=     .323 (i)
     TIME TO PEAK    (hrs)=    3.133
     RUNOFF VOLUME    (mm)=   23.802
     TOTAL RAINFALL   (mm)=   73.000
     RUNOFF COEFFICIENT   =     .326

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

 ------------------------------------------------------------------------------
 001:0027----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .79
 | 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .34          .45
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.20         2.20
     Length            (m)=     385.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      67.16        75.45
                over (min)       5.00         8.00
     Storage Coeff.  (min)=       5.31 (ii)    7.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00         8.00
     Unit Hyd. peak  (cms)=        .22          .15
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .08          .084 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.77         2.767
     RUNOFF VOLUME    (mm)=      72.30        34.99        35.032
     TOTAL RAINFALL   (mm)=      73.00        73.00        73.000
     RUNOFF COEFFICIENT   =        .99          .48          .480

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0028----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (7B    )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.801
           INFLOW HYD. PEAKS AT     .084       2.767
           STOP  CONTROLLING AT     .010       4.192

           REQUIRED STORAGE VOLUME (ha.m.)=    .0202
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0277
           % OF HYDROGRAPH TO STORE       =  73.1368

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .010  (cms).

 ------------------------------------------------------------------------------
 001:0029----------------------------------------------------------------------
 -----------------------
 | ADD HYD (7A+7B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04: 7A           7.72      .323    3.13  23.80    .000
                   +ID2 06:7B             .79      .084    2.77  35.03    .000
                    ==========================================================
                    SUM 08:7A+7B         8.51      .357    3.10  24.84    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0030----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     6.68   Curve Number   (CN)=72.00
 | 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .773

     PEAK FLOW       (cms)=     .341 (i)
     TIME TO PEAK    (hrs)=    2.967
     RUNOFF VOLUME    (mm)=   24.534
     TOTAL RAINFALL   (mm)=   73.000
     RUNOFF COEFFICIENT   =     .336

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

 ------------------------------------------------------------------------------
 001:0031----------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .31
 | 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .13          .18
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       1.40         1.40
     Length            (m)=     145.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      67.16        72.51
                over (min)       3.00         6.00
     Storage Coeff.  (min)=       3.38 (ii)    5.95 (ii)
     Unit Hyd. Tpeak (min)=       3.00         6.00
     Unit Hyd. peak  (cms)=        .35          .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .03          .034 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.77         2.767
     RUNOFF VOLUME    (mm)=      72.30        34.26        34.301
     TOTAL RAINFALL   (mm)=      73.00        73.00        73.000
     RUNOFF COEFFICIENT   =        .99          .47          .470

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 ------------------------------------------------------------------------------
 001:0032----------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (8B    )  |             DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.797
           INFLOW HYD. PEAKS AT     .034       2.767
           STOP  CONTROLLING AT     .004       4.026

           REQUIRED STORAGE VOLUME (ha.m.)=    .0076
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0106
           % OF HYDROGRAPH TO STORE       =  71.9417

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .004  (cms).

 ------------------------------------------------------------------------------
 001:0033----------------------------------------------------------------------
 -----------------------
 | ADD HYD (8A+8B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04: 8A           6.68      .341    2.97  24.53    .000
                   +ID2 06:8B             .31      .034    2.77  34.30    .000
                    ==========================================================
                    SUM 09:8A+8B         6.99      .356    2.95  24.97    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0034----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=      .54   Curve Number   (CN)=70.00
 | 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .160

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .035 (i)
     TIME TO PEAK    (hrs)=    2.800
     RUNOFF VOLUME    (mm)=   21.906
     TOTAL RAINFALL   (mm)=   73.000
     RUNOFF COEFFICIENT   =     .300

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

 ------------------------------------------------------------------------------
 001:0035----------------------------------------------------------------------
 -----------------------
 | ADD HYD (8+10      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 09:8A+8B         6.99      .356    2.95  24.97    .000
                   +ID2 03: 10A           .54      .035    2.80  21.91    .000
                    ==========================================================
                    SUM 06:8+10          7.53      .383    2.93  24.75    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0036----------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     5.12   Curve Number   (CN)=70.00
 | 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .850

     PEAK FLOW       (cms)=     .296 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   23.095
     TOTAL RAINFALL   (mm)=   73.000
     RUNOFF COEFFICIENT   =     .316

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

 ------------------------------------------------------------------------------
 001:0037----------------------------------------------------------------------
      FINISH
 ------------------------------------------------------------------------------
 ******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2015-02-12     at 14:37:50
 ==============================================================================

```

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*************************************************************************
*# Proposed Conditions - Revised February 2015
*#*************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [100Y6.STM]
*%-----------------|-----------------------------------------------------------|
READ STORM           STORM_FILENAME=["100Y6.STM"]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[  1 ], NHYD=["1A"], DT=[ 1 ]min, AREA=[  3.28  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 68 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  0.17 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["1B "], DT=[ 1  ](min), AREA=[ 0.32 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.9  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25], SCP=[ 0](min)
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.9 ](%),
                                          LGI=[ 160](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 2 ], STRATE=[-100](cms), RELRATE=[0.005](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[3 ], NHYD=["1A+1B"], IDs to add=[1+2  ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[ 1 ], NHYD=["2A1"], DT=[ 1]min, AREA=[6.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 66  ], IA=[ 10 ](mm),
                     N=[ 3 ], TP=[  0.35 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID=[ 2 ], NHYD=["2A2"], DT=[  1 ]min, AREA=[4.15 ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 65  ], IA=[ 10  ](mm),
                     N=[ 3 ], TP=[  0.32 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[4 ], NHYD=["2B1"], DT=[ 1  ](min), AREA=[ 0.14 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.46  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 65  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5 ](%),
                                          LGI=[150](m), MNI=[0.013], SCI=[0](min)
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 4 ], STRATE=[-100](cms), RELRATE=[0.002](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["2A1+2A2+2B1"], IDs to add=[1+2+4]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["3A"], DT=[ 1 ]min, AREA=[ 12.19 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71 ], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.54 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[2 ], NHYD=["3B1"], DT=[ 1  ](min), AREA=[ 0.45 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.0  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.0](%),
                                          LGI=[ 225](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[2  ], STRATE=[ -100 ](cms), RELRATE=[0.007   ](cms)
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["3B2"], DT=[ 1  ](min), AREA=[ 0.16 ](ha),
                     XIMP=[0.001  ], TIMP=[ 0.40  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 2.5](%),
                                          LGI=[ 150](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 3 ], STRATE=[-100 ](cms), RELRATE=[0.003 ](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[4 ], NHYD=["3A+3B1+3B2"], IDs to add=[1+2+3 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [1 ], NHYD=["5A"], DT=[ 1 ]min, AREA=[ 2.79 ](ha),
                     DWF=[  0](cms),  CN/C=[ 71  ], IA=[ 10](mm),
                     N=[  3 ], TP=[ 0.38  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[3 ], NHYD=["5B1"], DT=[ 1  ](min), AREA=[ 0.28 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 5.5  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 5.5](%),
                                          LGI=[ 140](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[3 ], STRATE=[-100](cms), RELRATE=[0.004](cms)
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["5B2"], DT=[ 1  ](min), AREA=[ 0.69 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.44  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 0.8  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[ 0.8](%),
                                          LGI=[ 350](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[6  ], STRATE=[-100](cms), RELRATE=[0.010](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[2 ], NHYD=["3s+5s"], IDs to add=[4+1+3+6]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 1 ], NHYD=["4"], DT=[ 1 ]min, AREA=[ 117.5  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[ 70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[  1.01 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 2 ], NHYD=[" 6"], DT=[1 ]min, AREA=[  0.82  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[67  ], IA=[10  ](mm),
                     N=[  3 ], TP=[ 0.23  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [4 ], NHYD=[" 7A "], DT=[ 1 ]min, AREA=[  7.72  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[71 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.44  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["7B "], DT=[ 1  ](min), AREA=[ 0.79 ](ha),
                     XIMP=[ 0.001  ], TIMP=[ 0.43  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 2.2  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[2.2](%),
                                          LGI=[ 385](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.011](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[8  ], NHYD=["7A+7B"], IDs to add=[4+6 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 4], NHYD=[" 8A "], DT=[ 1 ]min, AREA=[  6.68  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[72 ], IA=[ 10  ](mm),
                     N=[  3 ], TP=[ 0.33  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
CALIB STANDHYD       ID=[6 ], NHYD=["8B "], DT=[ 1  ](min), AREA=[ 0.31 ](ha),
                     XIMP=[ 0.001 ], TIMP=[ 0.41  ], DWF=[ 0  ](cms), LOSS=[2],
                     SCS curve number CN=[ 70  ],
                     Pervious   surfaces: IAper=[ 10  ](mm), SLPP=[ 1.4  ](%),
                                          LGP=[ 5](m), MNP=[ 0.25 ], SCP=[ 0](min
                     Impervious surfaces: IAimp=[ 0.7  ](mm), SLPI=[1.4](%),
                                          LGI=[ 145](m), MNI=[0.013], SCI=[0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
COMPUTE VOLUME       ID=[ 6 ], STRATE=[-100](cms), RELRATE=[0.005](cms)
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[9  ], NHYD=["8A+8B"], IDs to add=[4+6 ]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [3], NHYD=[" 10A "], DT=[ 1 ]min, AREA=[  0.54  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70], IA=[ 12 ](mm),
                     N=[  3 ], TP=[ 0.16  ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[6  ], NHYD=["8+10"], IDs to add=[9+3]
*%-----------------|-----------------------------------------------------------|
CALIB NASHYD         ID= [ 4 ], NHYD=[" A9 "], DT=[ 1 ]min, AREA=[  5.12  ](ha),
                     DWF=[ 0 ](cms),  CN/C=[70 ], IA=[ 10 ](mm),
                     N=[  3 ], TP=[ 0.23 ]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------|
FINISH
```

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO      999   999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O    9   9 9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ## 9   9 9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O      9999  9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9   =========
                                                       9   9 9   9   # 3375279
        StormWater Management HYdrologic Model          999   999    =========

 *******************************************************************************
 ***************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********               OTTHYMO-83 and OTTHYMO-89.                   *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Calder Engineering Ltd.                     +++++++++
 +++++++++                Bolton                  SERIAL#:3375279      +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10            *********
 *********           Max. number of rainfall points: 105408            *********
 *********           Max. number of flow points    : 105408            *********
 *******************************************************************************


 *********************   D E T A I L E D   O U T P U T   *********************
 *******************************************************************************
 *         DATE: 2015-02-12     TIME: 14:30:10     RUN COUNTER: 000095         *
 *******************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP100.dat           *
 * Output  filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP100.out           *
 * Summary filename: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\hallP100.sum           *
 * User comments:                                                               *
 * 1:___________________________________________________________________________*
 * 2:___________________________________________________________________________*
 * 3:___________________________________________________________________________*
 *******************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Hall's Lake]    Project Number: [ 11-167 ]
*#  Date        : 2015-02-12
*#  Modeller    : [    MYS    ]
*#  Company     : Calder Engineering Ltd.
*#  License #   :  3375279
*#*****************************************************************************
*# Proposed Conditions - Revised February 2015
*#*****************************************************************************
-------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
-------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\PROJECTS\Hall15\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
-------------------
| READ STORM       |    Filename: 100yr/6hr
| Ptotal=  80.31 mm|    Comments: 100yr/6hr
-------------------
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .25    .000 |  2.00  27.300 |  3.75  11.240 |  5.50   1.610
                .50   1.610 |  2.25  27.300 |  4.00   6.420 |  5.75   1.610
                .75   1.610 |  2.50  73.880 |  4.25   6.420 |  6.00   1.610
               1.00   1.610 |  2.75  73.880 |  4.50   3.210 |  6.25   1.610
               1.25   1.610 |  3.00  20.880 |  4.75   3.210 |
               1.50   9.640 |  3.25  20.880 |  5.00   1.610 |
               1.75   9.640 |  3.50  11.240 |  5.25   1.610 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    3.28   Curve Number   (CN)=68.00
| 01:1A     DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=     .737

     PEAK FLOW       (cms)=     .243 (i)
     TIME TO PEAK    (hrs)=    2.817
     RUNOFF VOLUME    (mm)=   26.040
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .324

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

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .32
| 02:1B     DT= 1.00 |    Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .14          .18
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=         .90          .90
     Length            (m)=      160.00         5.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       73.88        81.17
                over (min)         4.00         7.00
     Storage Coeff.  (min)=        3.95 (ii)    6.75 (ii)
     Unit Hyd. Tpeak (min)=        4.00         7.00
     Unit Hyd. peak  (cms)=         .29          .17
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .00          .04          .036 (iii)
     TIME TO PEAK    (hrs)=        2.73         2.77         2.767
     RUNOFF VOLUME    (mm)=       79.61        36.87        36.910
     TOTAL RAINFALL   (mm)=       80.31        80.31        80.310
     RUNOFF COEFFICIENT   =         .99          .46          .460

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:02  (1B    )  |            DISCHARGE      TIME
--------------------                (cms)      (hrs)
           START CONTROLLING AT      .000      1.773
           INFLOW HYD. PEAKS AT      .036      2.767
           STOP  CONTROLLING AT      .005      3.950

           REQUIRED STORAGE VOLUME (ha.m.)=    .0081
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0118
           % OF HYDROGRAPH TO STORE       =  68.9917

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .005  (cms).

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
-----------------------
| ADD HYD (1A+1B     ) | ID: NHYD        AREA    QPEAK   TPEAK   R.V.    DWF
-----------------------                 (ha)    (cms)   (hrs)   (mm)   (cms)
                       ID1 01:1A          3.28     .243    2.82  26.04    .000
                      +ID2 02:1B           .32     .036    2.77  36.91    .000
                       =======================================================
                       SUM 03:1A+1B       3.60     .278    2.80  27.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    6.15   Curve Number   (CN)=66.00
| 01:2A1    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .671

     PEAK FLOW       (cms)=     .301 (i)
     TIME TO PEAK    (hrs)=    3.000
     RUNOFF VOLUME    (mm)=   24.575
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .306

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

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=    4.15   Curve Number   (CN)=65.00
| 02:2A2    DT= 1.00 |    Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .320

     Unit Hyd Qpeak  (cms)=     .495

     PEAK FLOW       (cms)=     .207 (i)
     TIME TO PEAK    (hrs)=    2.967
     RUNOFF VOLUME    (mm)=   23.872
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .297

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

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |    Area    (ha)=     .14
| 04:2B1    DT= 1.00 |    Total Imp(%)=   46.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .06          .08
     Dep. Storage     (mm)=         .70        10.00
     Average Slope     (%)=        2.50         2.50
     Length            (m)=      150.00         5.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       73.88        86.84
                over (min)         3.00         5.00
     Storage Coeff.  (min)=        2.79 (ii)    4.80 (ii)
     Unit Hyd. Tpeak (min)=        3.00         5.00
     Unit Hyd. peak  (cms)=         .40          .23
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .00          .02          .017 (iii)
     TIME TO PEAK    (hrs)=        2.72         2.75         2.750
     RUNOFF VOLUME    (mm)=       79.61        37.70        37.740
     TOTAL RAINFALL   (mm)=       80.31        80.31        80.310
     RUNOFF COEFFICIENT   =         .99          .47          .470

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    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.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME   |
| ID:04  (2B1   )  |            DISCHARGE      TIME
--------------------                (cms)      (hrs)
           START CONTROLLING AT      .000      1.763
           INFLOW HYD. PEAKS AT      .017      2.750
           STOP  CONTROLLING AT      .002      3.954

           REQUIRED STORAGE VOLUME (ha.m.)=    .0038
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0053
           % OF HYDROGRAPH TO STORE       =  71.5294

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .002  (cms).

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
-----------------------
| ADD HYD (2A1+2A2+2B) | ID: NHYD        AREA    QPEAK   TPEAK   R.V.    DWF
-----------------------                 (ha)    (cms)   (hrs)   (mm)   (cms)
                       ID1 01:2A1         6.15     .301    3.00  24.58    .000
                      +ID2 02:2A2         4.15     .207    2.97  23.87    .000
                      +ID3 04:2B1          .14     .017    2.75  37.74    .000
                       =======================================================
                       SUM 05:2A1+2A2+2B 10.44     .515    2.98  24.47    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |    Area    (ha)=   12.19   Curve Number   (CN)=71.00
| 01:3A     DT= 1.00 |    Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .862

     PEAK FLOW       (cms)=     .519 (i)
     TIME TO PEAK    (hrs)=    3.300
     RUNOFF VOLUME    (mm)=   27.120
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .338

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

```

-------------------------------------------------------------------------------
001:0013-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .45
| 02:3B1    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .25
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     225.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        90.25
                over (min)        4.00         6.00
     Storage Coeff.  (min)=       3.81 (ii)    5.92 (ii)
     Unit Hyd. Tpeak (min)=       4.00         6.00
     Unit Hyd. peak  (cms)=        .29          .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .06          .058 (iii)
     TIME TO PEAK    (hrs)=       2.73         2.75         2.750
     RUNOFF VOLUME    (mm)=      79.61        41.12        41.156
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.310
     RUNOFF COEFFICIENT   =        .99          .51          .512

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-------------------------------------------------------------------------------
001:0014-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:02  (3B1   )  |              DISCHARGE       TIME
-------------------                 (cms)        (hrs)
           START CONTROLLING AT      .000        1.760
           INFLOW HYD. PEAKS AT      .058        2.750
           STOP  CONTROLLING AT      .007        3.980

           REQUIRED STORAGE VOLUME (ha.m.)=    .0133
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0185
           % OF HYDROGRAPH TO STORE       =  71.7836

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .007  (cms).

-------------------------------------------------------------------------------
001:0015-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .16
| 03:3B2    DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .10
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.50         2.50
     Length            (m)=     150.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        82.03
                over (min)        3.00         5.00
     Storage Coeff.  (min)=       2.79 (ii)    4.85 (ii)
     Unit Hyd. Tpeak (min)=       3.00         5.00
     Unit Hyd. peak  (cms)=        .40          .23
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .02          .021 (iii)
     TIME TO PEAK    (hrs)=       2.72         2.75         2.750
     RUNOFF VOLUME    (mm)=      79.61        39.53        39.566
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.310
     RUNOFF COEFFICIENT   =        .99          .49          .493

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-------------------------------------------------------------------------------
001:0016-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:03  (3B2   )  |              DISCHARGE       TIME
-------------------                 (cms)        (hrs)
           START CONTROLLING AT      .000        1.778
           INFLOW HYD. PEAKS AT      .021        2.750
           STOP  CONTROLLING AT      .003        3.844

           REQUIRED STORAGE VOLUME (ha.m.)=    .0043
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0063
           % OF HYDROGRAPH TO STORE       =  67.4406

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .003  (cms).

-------------------------------------------------------------------------------
001:0017-----------------------------------------------------------------------
-----------------------
| ADD HYD (3A+3B1+3B2) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:3A            12.19      .519    3.30  27.12    .000
                   +ID2 02:3B1             .45      .058    2.75  41.16    .000
                   +ID3 03:3B2             .16      .021    2.75  39.57    .000
                    ==========================================================
                    SUM 04:3A+3B1+3B2    12.80      .544    3.28  27.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0018-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    2.79   Curve Number   (CN)=71.00
| 01:5A     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .380

     Unit Hyd Qpeak  (cms)=     .280

     PEAK FLOW       (cms)=     .153 (i)
     TIME TO PEAK    (hrs)=    3.033
     RUNOFF VOLUME    (mm)=   28.401
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .354

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

-------------------------------------------------------------------------------
001:0019-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .28
| 03:5B1    DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .12          .16
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       5.50         5.50
     Length            (m)=     140.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        88.90
                over (min)        2.00         4.00
     Storage Coeff.  (min)=       2.12 (ii)    3.68 (ii)
     Unit Hyd. Tpeak (min)=       2.00         4.00
     Unit Hyd. peak  (cms)=        .54          .30
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .04          .038 (iii)
     TIME TO PEAK    (hrs)=       2.70         2.75         2.750
     RUNOFF VOLUME    (mm)=      79.61        40.71        40.750
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.310
     RUNOFF COEFFICIENT   =        .99          .51          .507

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-------------------------------------------------------------------------------
001:0020-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:03  (5B1   )  |              DISCHARGE       TIME
-------------------                 (cms)        (hrs)
           START CONTROLLING AT      .000        1.748
           INFLOW HYD. PEAKS AT      .038        2.750
           STOP  CONTROLLING AT      .004        3.967

           REQUIRED STORAGE VOLUME (ha.m.)=    .0084
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0114
           % OF HYDROGRAPH TO STORE       =  73.4736

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .004  (cms).

-------------------------------------------------------------------------------
001:0021-----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .69
| 06:5B2    DT= 1.00 |   Total Imp(%)=   44.00   Dir. Conn.(%)=     .10
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .30          .39
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=        .80          .80
     Length            (m)=     350.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        88.73
                over (min)        7.00         9.00
     Storage Coeff.  (min)=       6.54 (ii)    9.34 (ii)
     Unit Hyd. Tpeak (min)=       7.00         9.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .08          .082 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.78         2.783
     RUNOFF VOLUME    (mm)=      79.61        41.12        41.156
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.310
     RUNOFF COEFFICIENT   =        .99          .51          .512

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
-------------------
| COMPUTE VOLUME    |
| ID:06  (5B2   )  |              DISCHARGE       TIME
-------------------                 (cms)        (hrs)
           START CONTROLLING AT      .000        1.779
           INFLOW HYD. PEAKS AT      .082        2.783
           STOP  CONTROLLING AT      .010        4.272

           REQUIRED STORAGE VOLUME (ha.m.)=    .0209
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0284
           % OF HYDROGRAPH TO STORE       =  73.6621

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .010  (cms).

-------------------------------------------------------------------------------
001:0023-----------------------------------------------------------------------
-----------------------
| ADD HYD (3s+5s     ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04:3A+3B1+3B2    12.80      .544    3.28  27.77    .000
                   +ID2 01:5A             2.79      .153    3.03  28.40    .000
                   +ID3 03:5B1             .28      .038    2.75  40.75    .000
                   +ID4 06:5B2             .69      .082    2.78  41.16    .000
                    ==========================================================
                    SUM 02:3s+5s         16.56      .729    3.22  28.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0024-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=  117.50   Curve Number   (CN)=70.00
| 01:4      DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.010

     Unit Hyd Qpeak  (cms)=    4.443

     PEAK FLOW       (cms)=    3.463 (i)
     TIME TO PEAK    (hrs)=    3.917
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

-------------------------------------------------------------------------------
001:0025-----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=     .82   Curve Number   (CN)=67.00
| 02: 6     DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .136

     PEAK FLOW       (cms)=     .052 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   25.297
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .315

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

```

 -----------------------------------------------------------------------------
 001:0026---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    7.72   Curve Number   (CN)=71.00
 | 04: 7A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .440

     Unit Hyd Qpeak  (cms)=     .670

     PEAK FLOW       (cms)=     .388 (i)
     TIME TO PEAK    (hrs)=    3.117
     RUNOFF VOLUME    (mm)=   28.402
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .354

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

 -----------------------------------------------------------------------------
 001:0027---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .79
 | 06:7B     DT= 1.00 |   Total Imp(%)=   43.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .34          .45
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       2.20         2.20
     Length            (m)=     385.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        87.46
                over (min)       5.00         7.00
     Storage Coeff.  (min)=       5.11 (ii)    7.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00         7.00
     Unit Hyd. peak  (cms)=        .22          .16
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .10           .098 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.77          2.767
     RUNOFF VOLUME    (mm)=      79.61        40.71         40.750
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.310
     RUNOFF COEFFICIENT   =        .99          .51           .507

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0028---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (7B    )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.771
           INFLOW HYD. PEAKS AT     .098       2.767
           STOP  CONTROLLING AT     .011       4.273

           REQUIRED STORAGE VOLUME (ha.m.)=    .0241
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0322
           % OF HYDROGRAPH TO STORE       =  74.7739

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .011  (cms).

 -----------------------------------------------------------------------------
 001:0029---------------------------------------------------------------------
 -----------------------
 | ADD HYD (7A+7B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 04: 7A           7.72      .388    3.12  28.40    .000
                     +ID2 06:7B             .79      .098    2.77  40.75    .000
                      ==========================================================
                      SUM 08:7A+7B         8.51      .427    3.08  29.55    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0030---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    6.68   Curve Number   (CN)=72.00
 | 04: 8A    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .773

     PEAK FLOW       (cms)=     .409 (i)
     TIME TO PEAK    (hrs)=    2.967
     RUNOFF VOLUME    (mm)=   29.236
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .364

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

 -----------------------------------------------------------------------------
 001:0031---------------------------------------------------------------------
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .31
 | 06:8B     DT= 1.00 |   Total Imp(%)=   41.00   Dir. Conn.(%)=     .10
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .13          .18
     Dep. Storage     (mm)=        .70        10.00
     Average Slope     (%)=       1.40         1.40
     Length            (m)=     145.00         5.00
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      73.88        83.62
                over (min)       3.00         6.00
     Storage Coeff.  (min)=       3.26 (ii)    5.68 (ii)
     Unit Hyd. Tpeak (min)=       3.00         6.00
     Unit Hyd. peak  (cms)=        .36          .20
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .04           .039 (iii)
     TIME TO PEAK    (hrs)=       2.72         2.75          2.750
     RUNOFF VOLUME    (mm)=      79.61        39.91         39.954
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.310
     RUNOFF COEFFICIENT   =        .99          .50           .498

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    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.

 -----------------------------------------------------------------------------
 001:0032---------------------------------------------------------------------
 -------------------
 | COMPUTE VOLUME   |
 | ID:06  (8B    )  |              DISCHARGE      TIME
 -------------------                 (cms)       (hrs)
           START CONTROLLING AT     .000       1.776
           INFLOW HYD. PEAKS AT     .039       2.750
           STOP  CONTROLLING AT     .005       3.933

           REQUIRED STORAGE VOLUME (ha.m.)=    .0087
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0124
           % OF HYDROGRAPH TO STORE       =  70.4454

           NOTE:  Storage was computed to reduce the Inflow
                  peak to     .005  (cms).

 -----------------------------------------------------------------------------
 001:0033---------------------------------------------------------------------
 -----------------------
 | ADD HYD (8A+8B     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 04: 8A           6.68      .409    2.97  29.24    .000
                     +ID2 06:8B             .31      .039    2.75  39.95    .000
                      ==========================================================
                      SUM 09:8A+8B         6.99      .427    2.95  29.71    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0034---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=     .54   Curve Number   (CN)=70.00
 | 03: 10A   DT= 1.00 |   Ia      (mm)=  12.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .160

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .042 (i)
     TIME TO PEAK    (hrs)=    2.800
     RUNOFF VOLUME    (mm)=   26.338
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .328

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

 -----------------------------------------------------------------------------
 001:0035---------------------------------------------------------------------
 -----------------------
 | ADD HYD (8+10      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 -----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 09:8A+8B         6.99      .427    2.95  29.71    .000
                     +ID2 03: 10A           .54      .042    2.80  26.34    .000
                      ==========================================================
                      SUM 06:8+10          7.53      .460    2.92  29.47    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0036---------------------------------------------------------------------
 ---------------------
 | CALIB NASHYD       |   Area    (ha)=    5.12   Curve Number   (CN)=70.00
 | 04: A9    DT= 1.00 |   Ia      (mm)=  10.000   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .230

     Unit Hyd Qpeak  (cms)=     .850

     PEAK FLOW       (cms)=     .356 (i)
     TIME TO PEAK    (hrs)=    2.867
     RUNOFF VOLUME    (mm)=   27.591
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .344

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

 -----------------------------------------------------------------------------
 001:0037---------------------------------------------------------------------
       FINISH
 -----------------------------------------------------------------------------
 *****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2015-02-12     at 14:30:10
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WATER BALANCE CALCULATIONS

TABLE C.3
Hall's Lake Estates- Site Water Balance Calculations (Annual)
For Catchment 1

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
							TOTAL SITE VOLUMES				
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**Evapotranspiration (m^3)**	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
		Area (ha)	3.59	0.00	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Existing	3.6	Evapotranspiration (mm)	542	0	531	33,736	19,452	14,284	4,999	9,285	100.0
		Surplus (mm)	398	940	409						
		Infiltration (mm)	259	0	266						
		Runoff (mm)	139	940	143						
		Area (ha)	3.19	0.40	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (No Infiltration BMP's)	3.6	Evapotranspiration (mm)	542	0	515	33,736	17,306	16,430	8,169	8,260	89.0
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	3.19	0.20	0.20						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof Infiltration BMP's)	3.6	Evapotranspiration (mm)	542	0	515	33,736	18,314	15,422	6,621	8,801	94.8
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	3.19	0.14	0.26						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof and Driveway Infiltration BMP's)	3.6	Evapotranspiration (mm)	542	0	515	33,736	18,636	15,100	6,127	8,974	96.6
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	3.19	0.00	0.40						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	3.6	Evapotranspiration (mm)	542	0	515	33,736	19,345	14,391	5,037	9,354	100.7
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty sand - therefore used BC values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.4
Hall's Lake Estates - Site Water Balance Calculations (Annual)
For Catchment 2

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**TOTAL SITE VOLUMES** Evapotranspiration (m^3)	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
		Area (ha)	11.08	0.00	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Existing	11.1	Evapotranspiration (mm)	542	0	531	104,116	60,033	44,083	15,429	28,654	100.0
		Surplus (mm)	398	940	409						
		Infiltration (mm)	259	0	266						
		Runoff (mm)	139	940	143						
		Area (ha)	10.63	0.44	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (No Infiltration BMP's)	11.1	Evapotranspiration (mm)	542	0	515	104,116	57,632	46,484	18,976	27,508	96.0
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	10.63	0.36	0.08						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof Infiltration BMP's)	11.1	Evapotranspiration (mm)	542	0	515	104,116	58,035	46,081	18,356	27,724	96.8
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	10.63	0.34	0.10						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof and Driveway Infiltration BMP's)	11.1	Evapotranspiration (mm)	542	0	515	104,116	58,164	45,952	18,159	27,794	97.0
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
		Area (ha)	10.63	0.00	0.44						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	11.1	Evapotranspiration (mm)	542	0	515	104,116	59,913	44,203	15,471	28,732	100.3
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty sand - therefore used BC values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.5
Hall;s Lake Estates- Site Water Balance Calculations (Annual)
For Catchment 3

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
							TOTAL SITE VOLUMES				
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**Evapotranspiration (m^3)**	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
Existing	11.4	Area (ha)	11.42	0.00	0.00	107,345	61,895	45,450	15,908	29,543	100.0
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	531						
		Surplus (mm)	398	940	409						
		Infiltration (mm)	259	0	266						
		Runoff (mm)	139	940	143						
Proposed (No Infiltration BMP's)	11.4	Area (ha)	11.09	0.33	0.00	107,345	60,088	47,257	18,577	28,680	97.1
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof Infiltration BMP's)	11.4	Area (ha)	11.09	0.21	0.13	107,345	60,742	46,603	17,572	29,031	98.3
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof and Driveway Infiltration BMP's)	11.4	Area (ha)	11.09	0.17	0.16	107,345	60,935	46,410	17,276	29,135	98.6
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	11.4	Area (ha)	11.09	0.00	0.33	107,345	61,805	45,540	15,939	29,601	100.2
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty sand - therefore used BC values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.6
Hall;s Lake Estates- Site Water Balance Calculations (Annual)
For Catchment 5

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
						TOTAL SITE VOLUMES					
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**Evapotranspiration (m^3)**	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
		Area (ha)	4.95	0.00	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Existing	4.9	Evapotranspiration (mm)	546	0	531	46,521	27,022	19,499	6,825	12,674	100.0
		Surplus (mm)	394	940	409						
		Infiltration (mm)	256	0	266						
		Runoff (mm)	138	940	143						
		Area (ha)	4.46	0.49	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (No Infiltration BMP's)	4.9	Evapotranspiration (mm)	546	0	515	46,521	24,368	22,153	10,723	11,430	90.2
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	4.46	0.31	0.18						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof Infiltration BMP's)	4.9	Evapotranspiration (mm)	546	0	515	46,521	25,275	21,246	9,330	11,916	94.0
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	4.46	0.25	0.23						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof and Driveway Infiltration BMP's)	4.9	Evapotranspiration (mm)	546	0	515	46,521	25,565	20,956	8,885	12,072	95.2
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	4.46	0.00	0.49						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	4.9	Evapotranspiration (mm)	546	0	515	46,521	26,871	19,650	6,877	12,772	100.8
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty clay - therefore used C values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.7
Hall's Lake Estates- Site Water Balance Calculations (Annual)
For Catchment 7

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**TOTAL SITE VOLUMES** **Precipitation (m^3)**	**Evapotranspiration (m^3)**	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
		Area (ha)	8.05	0.00	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Existing	8.1	Evapotranspiration (mm)	546	0	531	75,712	43,978	31,735	11,107	20,628	100.0
		Surplus (mm)	394	940	409						
		Infiltration (mm)	256	0	266						
		Runoff (mm)	138	940	143						
		Area (ha)	7.48	0.57	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (No Infiltration BMP's)	8.1	Evapotranspiration (mm)	546	0	515	75,712	40,864	34,849	15,681	19,167	92.9
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	7.48	0.37	0.20						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof Infiltration BMP's)	8.1	Evapotranspiration (mm)	546	0	515	75,712	41,871	33,841	14,134	19,707	95.5
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	7.48	0.31	0.26						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof and Driveway Infiltration BMP's)	8.1	Evapotranspiration (mm)	546	0	515	75,712	42,193	33,519	13,639	19,880	96.4
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	7.48	0.00	0.57						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	8.1	Evapotranspiration (mm)	546	0	515	75,712	43,801	31,911	11,169	20,742	100.6
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty clay - therefore used C values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.8
Hall's Lake Estates- Site Water Balance Calculations (Annual)
For Catchment 8

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
						TOTAL SITE VOLUMES					
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**Evapotranspiration (m^3)**	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
Existing	7.1	Area (ha)	7.06	0.00	0.00	66,398	38,285	28,113	9,840	18,273	100.0
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	531						
		Surplus (mm)	398	940	409						
		Infiltration (mm)	259	0	266						
		Runoff (mm)	139	940	143						
Proposed (No Infiltration BMP's)	7.1	Area (ha)	6.54	0.52	0.00	66,398	35,473	30,925	13,994	16,931	92.7
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof Infiltration BMP's)	7.1	Area (ha)	6.54	0.24	0.27	66,398	36,883	29,515	11,827	17,688	96.8
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof and Driveway Infiltration BMP's)	7.1	Area (ha)	6.54	0.16	0.36	66,398	37,334	29,064	11,134	17,930	98.1
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	7.1	Area (ha)	6.54	0.00	0.52	66,398	38,144	28,253	9,889	18,364	100.5
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
		Evapotranspiration (mm)	542	0	515						
		Surplus (mm)	398	940	425						
		Infiltration (mm)	259	0	276						
		Runoff (mm)	139	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty sand - therefore used BC values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

TABLE C.9
Hall's Lake Estates - Site Water Balance Calculations (Annual)
For Catchment 9

Column A	Column B		Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
Condition	**Site Area (ha)**	**Water Balance Components**	**Pervious Area**	**Impervious Area Without Infiltration BMP's**	**Impervious Area With Infiltration BMP's**	**Precipitation (m^3)**	**TOTAL SITE VOLUMES** Evapotranspiration (m^3)	**Surplus (m^3)**	**Runoff (m^3)**	**Infiltration (m^3)**	**Percent of Existing Infiltration (%)**
		Area (ha)	5.12	0.00	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Existing	5.1	Evapotranspiration (mm)	546	0	531	48,171	27,980	20,191	7,067	13,124	100.0
		Surplus (mm)	394	940	409						
		Infiltration (mm)	256	0	266						
		Runoff (mm)	138	940	143						
		Area (ha)	5.07	0.05	0.00						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (No Infiltration BMP's)	5.1	Evapotranspiration (mm)	546	0	515	48,171	27,688	20,483	7,496	12,987	99.0
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	5.07	0.02	0.03						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof Infiltration BMP's)	5.1	Evapotranspiration (mm)	546	0	515	48,171	27,861	20,311	7,231	13,080	99.7
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	5.07	0.00	0.05						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof and Driveway Infiltration BMP's)	5.1	Evapotranspiration (mm)	546	0	515	48,171	27,964	20,208	7,073	13,135	100.1
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						
		Area (ha)	5.07	0.00	0.05						
		Infiltration Factor	0.65	0.00	0.65						
		Precipitation (mm)	940	940	940						
Proposed (With Roof, Driveway, & Road Infiltration BMP's)	5.1	Evapotranspiration (mm)	546	0	515	48,171	27,964	20,208	7,073	13,135	100.1
		Surplus (mm)	394	940	425						
		Infiltration (mm)	256	0	276						
		Runoff (mm)	138	940	149						

Notes:
1. Site water balance calculations based on methodology per *Stormwater Management Planning and Design Manual* (MOE, March 2003).

Site area represents area within developmemt limits
Soil Type classified as silty clay - therefore used C values from Table 3.1 of BMP

Column C:
Area (ha)= Represents pervious area
Infiltration Factor= 0.1 (topo) + 0.4 (soils) + 0.15 (cover) -->Table 3.1 BMP 2003
Precipitation (mm)= Table 3.1 BMP 2003
Evapotranspiration (mm)= Table 3.1 BMP 2003
Surplus (mm)= Precipition - Evapotranspiration
Infiltration (mm)= Area x infiltration factor
Runoff (mm)= Surplus - Infiltration

Column G: Precipitation= (Precipation x Pervious area) + (Precipation x impervious area w/o Infiltration BMP) + (Precipation x impervious area w Infiltration BMP)
Column H: Evaportranspiration= (Evaportranspiration x Pervious area) + (Evaportranspiration x impervious area w/o Infiltration BMP) + (Evaportranspiration x impervious area w Infiltration BMP)
Column I: Surplus= (Surplus x Pervious area) + (Surplus x impervious area w/o Infiltration BMP) + (Surplus x impervious area w Infiltration BMP)
Column J: Runoff= (Runoff x Pervious area) + (Runoff x impervious area w/o Infiltration BMP) + (Runoff x impervious area w Infiltration BMP)
Column K: Infiltration (Infiltration x Pervious area) + (Infiltration x impervious area w/o Infiltration BMP) + (Infiltration x impervious area w Infiltration BMP)

Column L: Percent of Existing Infiltration= (Infiltration vol./Existing infiltration vol.)/100

LID-DRY SWALE FILTRATION TRENCH
STORAGE VOLUME CALCULATIONS

TABLE C.10

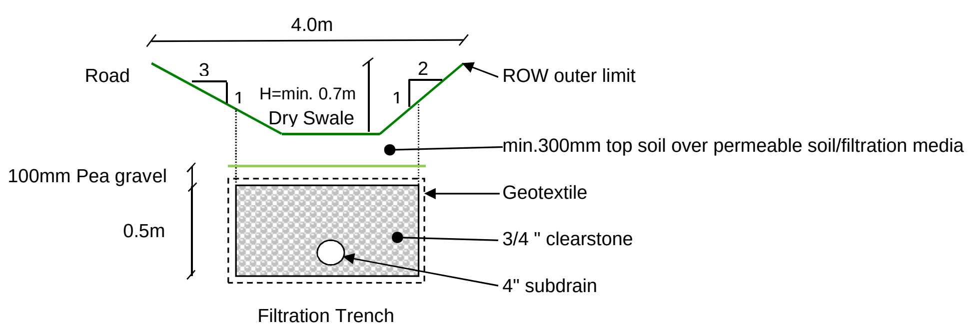
HALL'S LAKE ESTATES - DRY SWALE FILTRATION TRENCH STORAGE VOLUMES AND ESTIMATED INFLOW RATES

VOLUME IN DRY SWALE FILTRATION TRENCH (UNDERGROUND STORAGE) n= 0.4

Sub-Basin	Storage Volume Required (cu.m)	Filtration Trench Volume Provided (cu.m)	North/West Filtration Trench Length (m)	North/West Filtration Trench depth (m)	North/West Filtration Trench Width (m)	South/East filtration Trench Length (m)	South/East Filtration Trench depth (m)	South/East Filtration Trench Width (m)	North/West Filtration Trench Volume (cu.m)	South/East Filtration Trench Volume (cu.m)	TOTAL Filtration Trench Length (m)	TOTAL Filtration Trench Inflow Rate (L/s)
1B	81	114	152	0.6	1.5	166	0.6	1.5	55	60	318	3.2
2B1	38	48	0	0.6	1.5	132	0.6	1.5	0	48	132	1.3
3B1	133	166	225	0.6	1.5	235	0.6	1.5	81	85	460	4.6
3B2	43	62	172	0.6	1.5	0	0.6	1.5	62	0	172	1.7
5B1	84	95	128	0.6	1.5	135	0.6	1.5	46	49	263	2.6
5B2	209	249	333	0.6	1.5	360	0.6	1.5	120	130	693	6.9
7B	241	274	353	0.6	1.5	409	0.6	1.5	127	147	762	7.6
8B[6]	87	100	0	0.6	2.5	167	0.6	2.5	0	100	167	1.7

Notes:
1. Total Filtration Trench Volume does not include storage volume in 4" subdrain pipe and overlaying filtration media.
2. Filtration Trench gravel material (3/4 inch clearstone and pea stone) ->> Void ratio n = 0.4
3. Roadway width =7.9m paved
4. Assumed swale dimensions:
   - Base Width= 0.5m
   - inner side slope= 3H:1V
   - outer side slope= 2H:1V
   - main swale depth= 0.7m
   - cul-de-sac swale depth= 0.7m
5. Refer to Figure 3.2 for proposed dry swale filtration trench locations.
6. Volume Provided is for filtration trench on east side of Street C, and filtration trench perpendicular to Street C.
7. Filtration Trench infiltration rate assumed as 1.0 L/s per 100m of subdrain per Table IV of Ontario Ministry of Agriculture and Road Drainage Guide for Ontario.

SKETCH C1: Grassed Dry Swale (typ.)



APPENDIX D

LID CONCEPT DETAILS

DRY SWALES

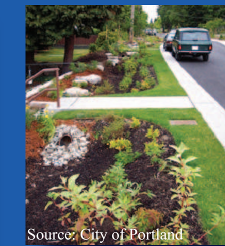
CVC/TRCA LOW IMPACT DEVELOPMENT
PLANNING AND DESIGN GUIDE - FACT SHEET

GENERAL DESCRIPTION

A dry swale can be thought of as an enhanced grass swale that incorporates an engineered filter media bed and optional perforated pipe underdrain or a bioretention cell configured as a linear open channel. They can also be referred to as infiltration swales or bio-swales. Dry swales are similar to enhanced grass swales in terms of the design of their surface geometry, slope, check dams and pretreatment devices. They are similar to bioretention cells in terms of the design of the filter media bed, gravel storage layer and optional underdrain. In general, they are open channels designed to convey, treat and attenuate stormwater runoff. Vegetation or aggregate material on the surface of the swale slows the runoff water to allow sedimentation, filtration through the root zone and engineered soil bed, evapotranspiration, and infiltration into the underlying native soil.


Source: TRCA


Source: Seattle Public Utilities


Source: City of Portland


Source: Lynn Richards


Source: Portland Public Schools


Source: Lake County Illinois

DESIGN GUIDANCE

GEOMETRY AND SITE LAYOUT

- SHAPE: A parabolic shape is preferable for aesthetic, maintenance and hydraulic reasons. However, design may be simplified with a trapezoidal cross-section as long as the engineered soil (filter media) bed boundaries lay in the flat bottom areas. Swale length between culverts should be 5 metres or greater.
- BOTTOM WIDTH: For the trapezoidal cross section, the bottom width should be between 0.75 and 2 metres. When greater widths are desired, bioretention cell designs should be used.
- SIDE SLOPES: Should be no steeper than 3:1 for maintenance considerations (mowing). Flatter slopes are encouraged where adequate space is available to provide pretreatment for sheet flows entering the swale.
- LONGITUDINAL SLOPE: Should be as gradual as possible to permit the temporary ponding of the water quality storage requirement. Should be designed with longitudinal slopes generally ranging from 0.5 to 4%, and no greater than 6%. On slopes steeper than 3%, check dams should be used. Check dam spacing should be based on the slope and desired ponding volume. They should be spaced far enough apart to allow access for maintenance equipment (e.g., mowers).

PRE-TREATMENT

Pretreatment prevents premature clogging by capturing coarse sediments before they reach the filter bed. Where runoff source areas produce little sediment, such as roofs, dry swales can function effectively without pretreatment. To treat parking area or road runoff, a two-cell design that incorporates a forebay is recommended. Pretreatment practices that may be feasible, depending on conveyance method and availability of space include:

- SEDIMENTATION FOREBAY (TWO-CELL DESIGN): Forebay ponding volume should account for 25% of the water quality storage requirement and be designed with a 2:1 length to width ratio.
- VEGETATED FILTER STRIP (SHEET FLOW): Should ideally be a minimum of three (3) metres in width. If smaller strips are used, more frequent maintenance of the filter bed can be anticipated.
- GRAVEL DIAPHRAGM (SHEET FLOW): A small trench filled with pea gravel, which is perpendicular to the flow path between the edge of the pavement and the dry swale will promote settling out of sediment and maintain sheet flow into the facility. A drop of 50-150 mm into the gravel diaphragm can be used to dissipate energy and promote settling.
- RIP RAP AND/OR DENSE VEGETATION (CHANNEL FLOW): Suitable for small dry swales with drainage areas less than 100 square metres.

GRAVEL STORAGE LAYER

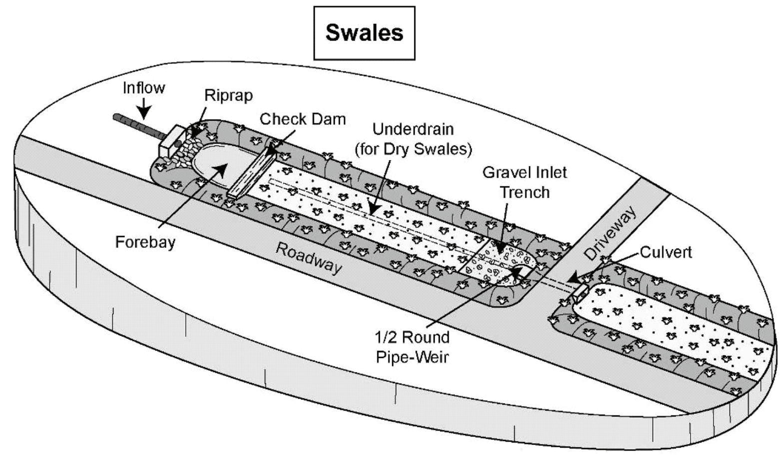
- DEPTH: Should be a minimum of 300 mm deep and sized to provide the required storage volume. Granular material should be 50 mm diameter clear stone.
- PEA GRAVEL CHOKING LAYER: A 100 mm deep layer of pea gravel (3 to 10 mm diameter clear stone) should be placed on top of the coarse gravel storage layer as a choking layer separating it from the overlying filter media bed.

FILTER MEDIA

- COMPOSITION: To ensure a consistent and homogeneous bed, filter media should come pre-mixed from an approved vendor.
- DEPTH: Recommended depth is between 1.0 and 1.25 m. However in constrained applications, pollutant removal benefits may be achieved in beds as shallow as 500 mm. If trees are to be included in the design, bed depth must be at least 1.0 m.
- MULCH: A 75 mm layer of mulch on the surface of the filter bed enhances plant survival, suppresses weed growth and pretreats runoff before it reaches the filter bed.

UNDERDRAIN

- Only needed where native soil infiltration rate is less than 15 mm/hr (hydraulic conductivity of less than 1x10-6 cm/s).
- Should consist of a perforated pipe embedded in the coarse gravel storage layer at least 100 mm above the bottom.
- A strip of geotextile filter fabric placed between the filter media and pea gravel choking layer over the perforated pipe is optional to help prevent fine soil particles from entering the underdrain.
- A vertical standpipe connected to the underdrain at the furthest downstream end of the swale can be used as a cleanout and monitoring well.



ABILITY TO MEET SWM OBJECTIVES

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Dry swale with no underdrain or full infiltration	Yes	Yes - size for water quality storage requirement	Partial - based on available storage volume and soil infiltration rate
Dry swale with underdrain or partial infiltration	Partial - based on available storage volume beneath the underdrain and soil infiltration rate	Yes - size for water quality storage requirement	Partial - based on available storage volume beneath the underdrain and soil infiltration rate
Dry swale with underdrain and impermeable liner or no infiltration	Partial - some volume reduction through evapotranspiration	Yes - size for water quality storage requirement	Partial - some volume reduction through evapotranspiration

OPERATION AND MAINTENANCE

Dry swales require routine inspection and maintenance of the landscaping as well as periodic inspection for less frequent maintenance needs or remedial maintenance. Generally, routine maintenance will be the same as for any other landscaped area; weeding, pruning, and litter removal. Regular watering may be required during the first two years until vegetation is established.

For the first two years following construction the facility should be inspected at least quarterly and after every major storm event (> 25 mm). Subsequently, inspections should be conducted in the spring and fall of each year and after major storm events. Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.

Trash and debris should be removed from pretreatment devices, the dry swale surface and inlet and outlets at least twice annually. Other maintenance activities include reapplying mulch, pruning, weeding replacing dead vegetation and repairing eroded areas as needed. Remove accumulated sediment on the dry swale surface when dry and exceeding 25 mm depth.

CONVEYANCE AND OVERFLOW

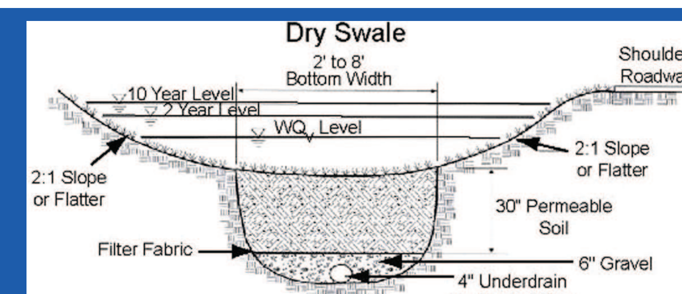
Should be designed for a maximum velocity of 0.5 m/s or less for a 4 hour 25 mm Chicago storm event. The swale should also convey the locally required design storm (usually the 10 year storm) at non-erosive velocities with freeboard provided above the required design storm water level.

MONITORING WELLS

A capped vertical standpipe consisting of an anchored 100 to 150 millimetre diameter perforated pipe with a lockable cap installed to the bottom of the facility at the furthest downgradient end is recommended for monitoring the length of time required to fully drain the facility between storms.

GENERAL SPECIFICATIONS

Material	Specification	Quantity
Filter Media Composition	Filter Media Soil Mixture to contain: • 85 to 88% sand • 8 to 12% soil fines • 3 to 5% organic matter (leaf compost) Other Criteria: • Phosphorus soil test index (P-Index) value between 10 to 30 ppm • Cationic exchange capacity (CEC) greater than 10 meq/100 g • Free of stones, stumps, roots and other large debris • pH between 5.5 to 7.5 • Infiltration rate greater than 25 mm/hr.	Volumetric computation based on surface area and depth used in design computations
Geotextile	Material specifications should conform to Ontario Provincial Standard Specification (OPSS) 1860 for Class II geotextile fabrics. Should be woven monofilament or non-woven needle punched fabrics. Woven slit film and non-woven heat bonded fabrics should not be used as they are prone to clogging. For further guidance see CVC/TRCA LID SWM Planning and Design Guide, Table 4.9.4.	Strip over the perforated pipe underdrain (if present) between the filter media bed and gravel storage layer (stone reservoir).
Gravel	Washed 50 mm diameter clear stone with void space ratio of 0.4 should be used to surround the underdrain.	Volumetric computation based on depth.
Underdrain (optional)	Perforated HDPE or equivalent material, minimum 100 mm dia., 200 mm dia. recommended. Set pipe invert at least 100 mm above bottom of the gravel layer.	• Perforated pipe for length of dry swale. • Non-perforated pipe to connect with storm drain system. • One or more caps. • T's for underdrain
Check Dams	• Should be constructed of a non-erosive material such as wood, gabions, riprap, or concrete and underlain with filter fabric. • Wood used should consist of pressure treated logs or timbers, or water-resistant tree species such as cedar, hemlock, swamp oak or locust.	Computation of check dam material needed based on surface area and depth used in design computations
Mulch or Matting	• Shredded hardwood bark mulch • Where flow velocities dictate, use erosion and sediment control matting - coconut fiber or equivalent.	Mulch - A 75 mm layer on the surface of the filter bed. Matting - based on filter bed area.



SITE CONSIDERATIONS

Available Space
Footprints are 5 to 15% of their contributing drainage area. Swale length between culverts should be 5m or greater.

Site Topography
Longitudinal slopes ranging from 0.5 to 4%. On slopes steeper than 3%, check dams should be used.

Drainage Area and Runoff Volume to Site
Typically treat drainage areas of two hectares or less. Typical ratios of impervious drainage area to treatment facility area range from 5:1 to 15:1.

Soil
Dry swales can be located over any soil type, but hydrologic soil group A and B soils are best for achieving water balance benefits. Facilities should be located in portions of the site with the highest native soil infiltration rates. Where infiltration rates are less than 15 mm/hr (hydraulic conductivity less than 1x10-6 cm/s) an underdrain is required. Native soil infiltration rate at the proposed facility location and depth should be confirmed through measurement of hydraulic conductivity under field saturated conditions.

Wellhead Protection
Facilities receiving road or parking lot runoff should not be located within two (2) year time-of-travel wellhead protection areas.

Water Table
The bottom of the swale should be separated from the seasonally high water table or top of bedrock elevation by at least one (1) metre to prevent groundwater contamination.

Pollution Hot Spot Runoff
To protect groundwater from possible contamination, runoff from pollution hot spots should not be treated dry swales designed for full or partial infiltration. Facilities designed with an impermeable liner (filtration only facilities) can be used to treat runoff from pollution hot spots.

Setback from Buildings
Should be set back four (4) metres from building foundations unless an impermeable liner and underdrain system is used.

Proximity to Underground Utilities
Designers should consult local utility design guidance for the horizontal and vertical clearance between storm drains, ditches, and surface water bodies.

CONSTRUCTION CONSIDERATIONS

Ideally, dry swale sites should remain outside the limit of disturbance until construction of the swale begins to prevent soil compaction by heavy equipment. Dry swale locations should never be used as the site of sediment basins during construction, as the concentration of fines will prevent post-construction infiltration. To prevent clogging, stormwater should be diverted away from the practice until the drainage area is fully stabilized.

TORONTO AND REGION Conservation for The Living City

CVC CREDIT VALLEY CONSERVATION

FOR FURTHER DETAILS SEE SECTION 4.9 OF THE CVC/TRCA LID SWM GUIDE

APPENDIX E

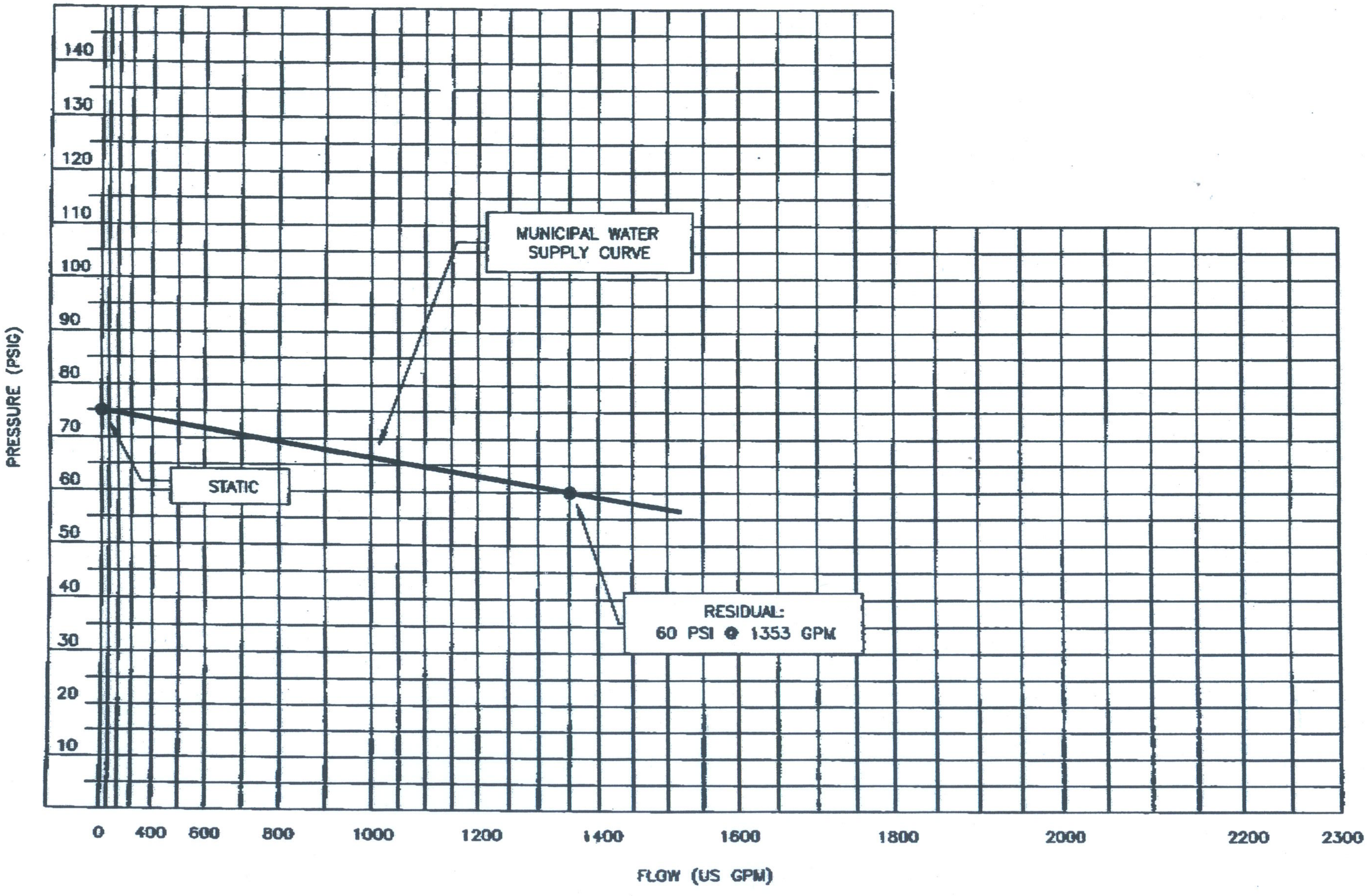
WATER SUPPLY PRESSURE TESTING

WATER SUPPLY GRAPH

STATIC PRESSURE 75 PSI
1353 GPM AT 60 PSI
GPM AT PSI

NAME: BRUNO RIDGE DRIVE TEST
LOCATION OF TEST: BRUNO RIDGE DR. & MT. WOLFE RD.
CITY: CALEDON, ONT.

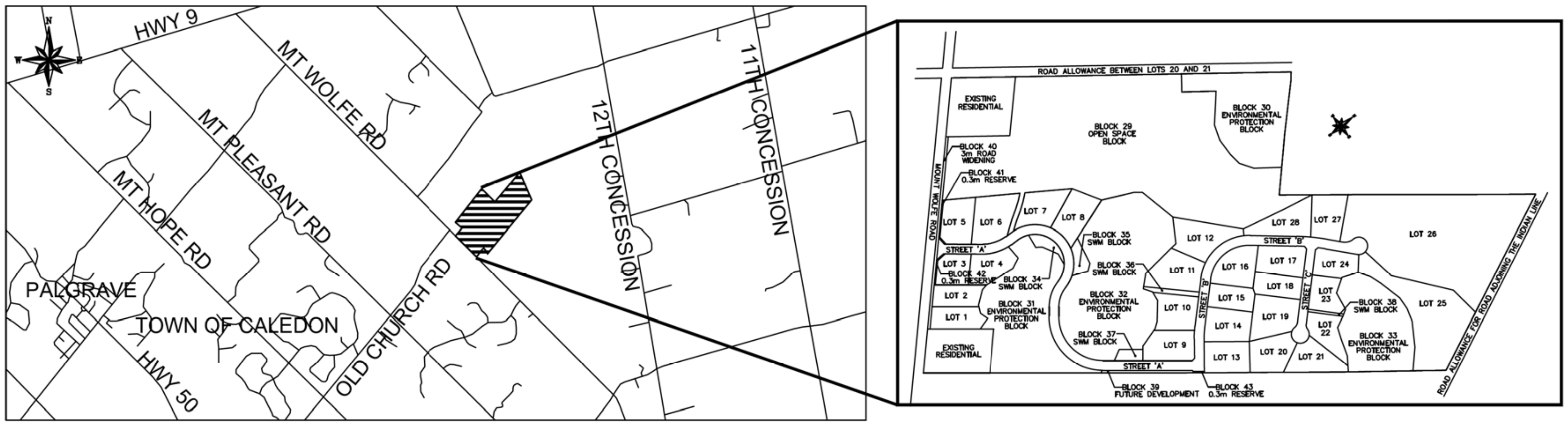
DATE : SEPTEMBER 7, 2011
TIME : 10:15 A.M.
BY : CESAN MECH. LTD.



APPENDIX F

PRELIMINARY ENGINEERING DRAWINGS

PRELIMINARY ENGINEERING DRAWINGS
HALL'S LAKE ESTATES
DRAFT PLAN 21T-98001C
PART OF LOT 20, CONCESSION 10 (ALBION)
TOWN OF CALEDON
REGION OF PEEL



LIST OF DRAWINGS

GENERAL PLANS

GENERAL PLAN (1 OF 2) 11-167-A-1
GENERAL PLAN (2 OF 2) 11-167-A-2

STORMWATER MANAGEMENT/GRADING PLANS

STORMWATER MANAGEMENT/GRADING PLAN (1 OF 2) 11-167-A-3
STORMWATERMANAGEMENT/GRADING PLAN (2 OF 2) 11-167-A-4

PLAN AND PROFILES

STREET 'A' (STA. 0+000 TO STA. 0+400) 11-167-A-5
STREET 'A' (STA. 0+400 TO STA. 0+800) 11-167-A-6
STREET 'B' (STA. 0+000 TO STA. 0+300) 11-167-A-7
STREET 'B' (STA. 0+300 TO STA. 0+565) 11-167-A-8
STREET 'C' (STA. 0+000 TO STA. 0+205) 11-167-A-9

PRELIMINARY LOT GRADING PLANS

LOT 6 - GRADING PLAN
LOT 9 - GRADING PLAN
LOT 11 - GRADING PLAN
LOT 25 - GRADING PLAN
LOT 28 - GRADING PLAN

THE CORPORATION OF THE TOWN OF CALEDON

REGION OF PEEL

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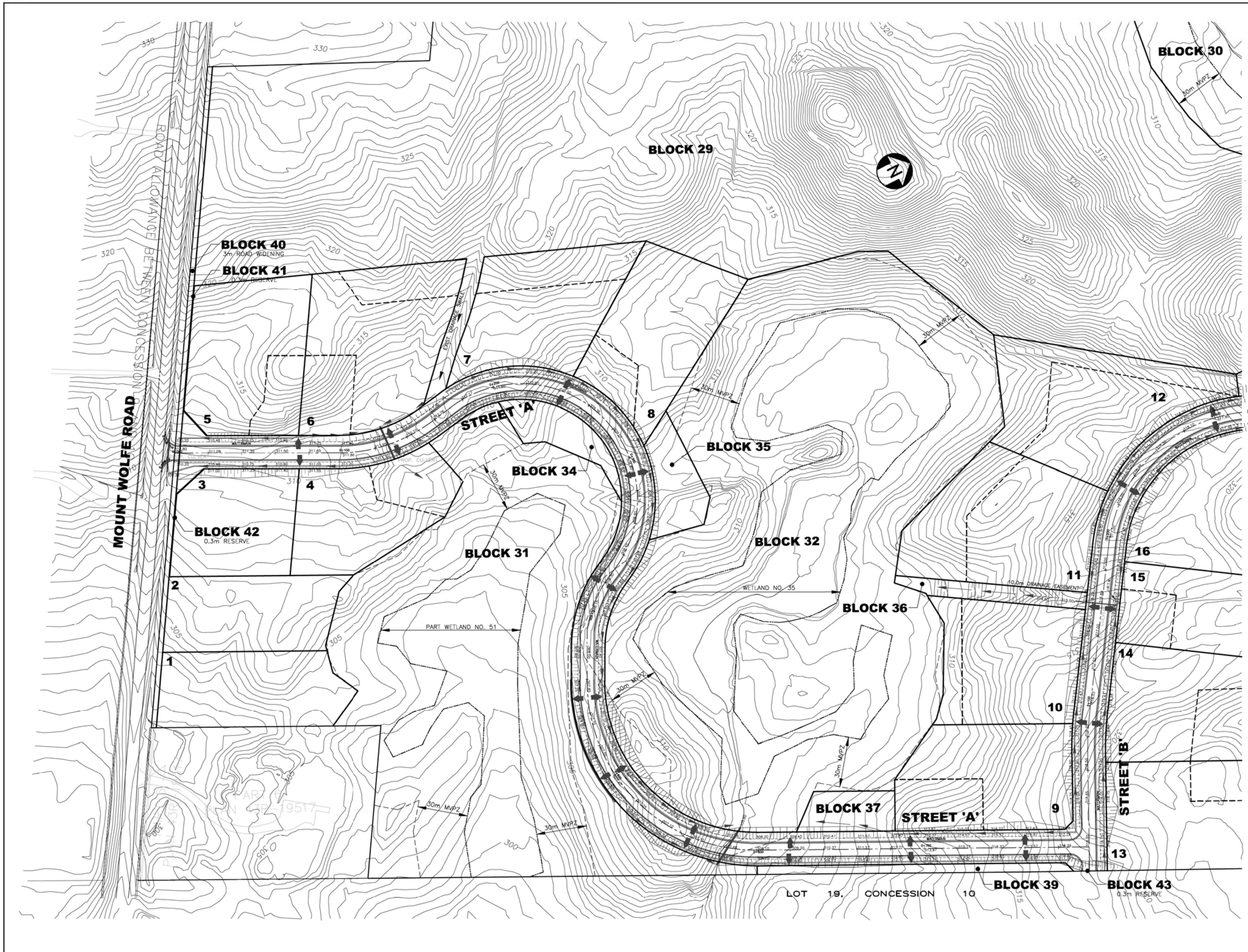
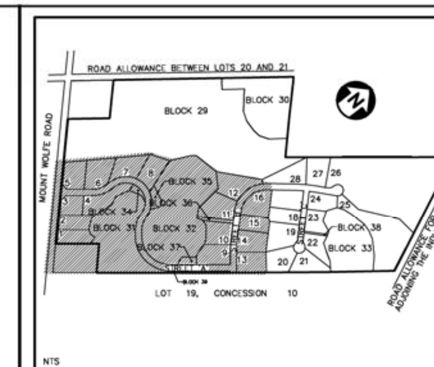
www.caldereng.com

RITELAND DEVELOPMENT CORPORATION
1862 ALBION ROAD
REXDALE, ON M9W 5T2





GENERAL NOTES:

1. THE INFORMATION SHOWN HEREIN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.

LEGEND:

- LOT LINES
- STRUCTURE ENVELOPE
- KEY NATURAL HERITAGE FEATURE
- 30m MVPZ
- PROPOSED WATERMAIN
- CURB OUTLETS
- PROPOSED SWALE

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY: APPROVED BY:

BENCH MARK:

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REGION OF PEEL

THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:
GENERAL PLAN
1 OF 2

Surveyed by:	Scale: Hor. 1:1000	File	
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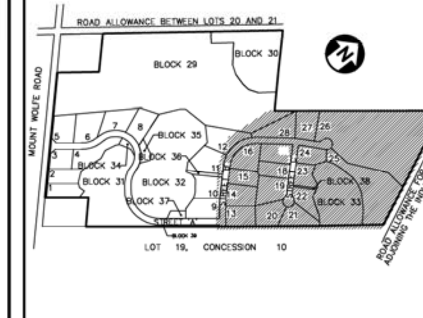
Drawn by: D. HAY		11-167-A-1	
Chk'd by: R.J. WHYTE	Date: 2013		



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DESIGNED BY: APPROVED BY:

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REGION OF PEEL

THE CORPORATION OF THE
TOWN OF CALEDON

CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES
(DP 21T-98001C)

TITLE:
GENERAL PLAN
2 OF 2

Surveyed by:	Scale: Hor. 1:1000	File	
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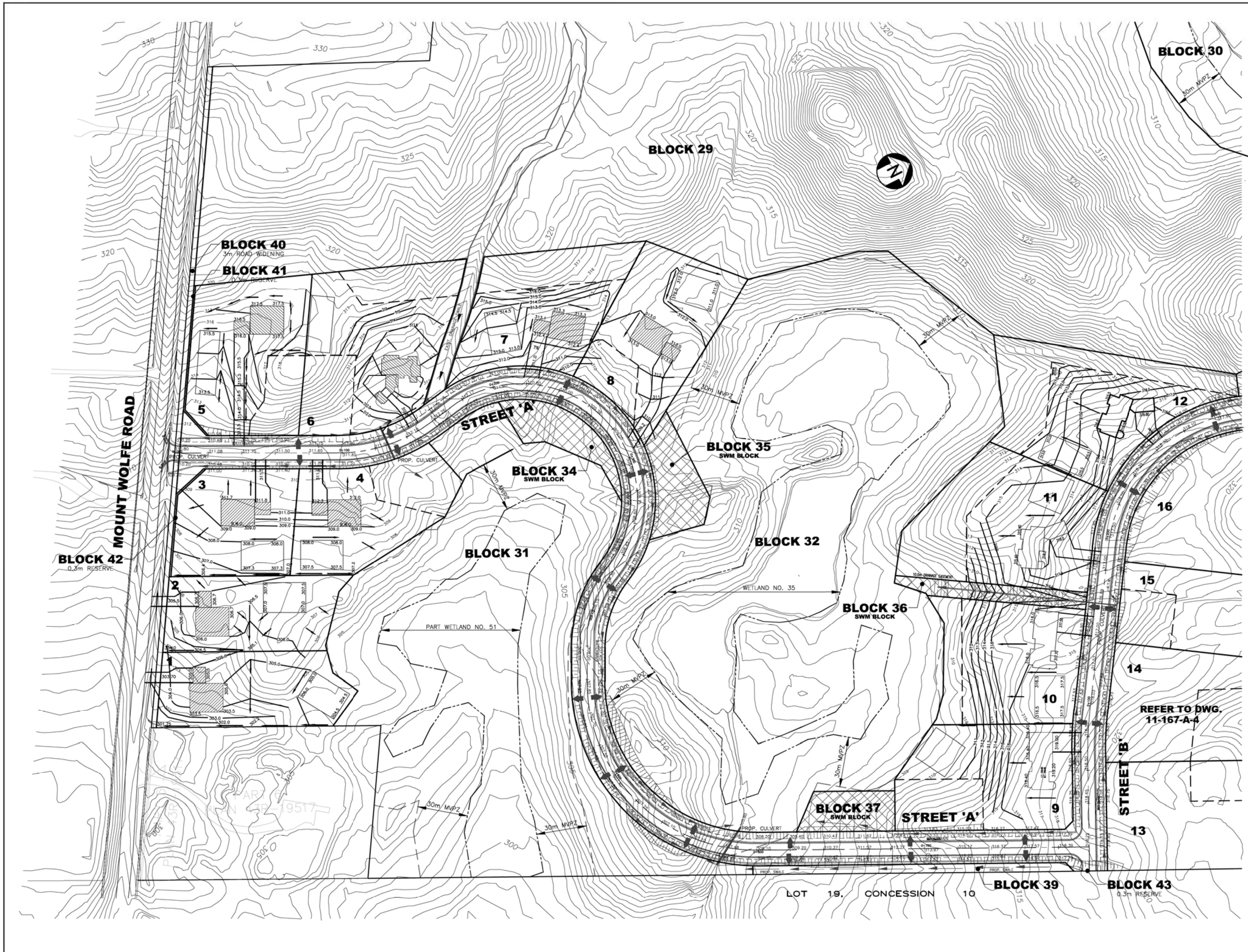
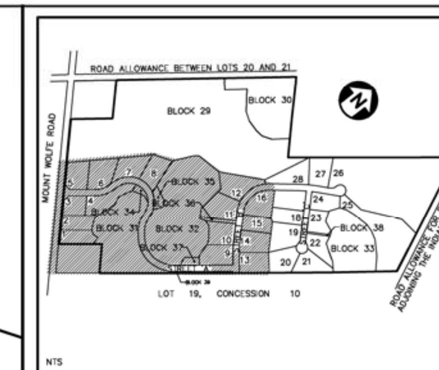
Chk'd by: R.J. WHYTE	Date: 2013		





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- PROPOSED DRY SWALE FILTRATION TRENCH
- PROPOSED SWM BLOCK

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY: APPROVED BY:

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REGION OF PEEL

THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:
STORMWATER MANAGEMENT/ GRADING PLAN
1 OF 2

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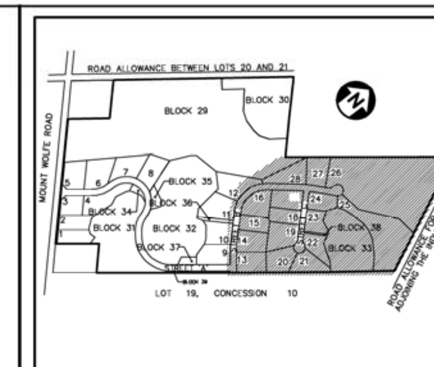

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2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY:

APPROVED BY:

BENCH MARK:

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REGION OF PEEL

THE CORPORATION OF THE
TOWN OF CALEDON

CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES
(DP 21T-98001C)

TITLE:
STORMWATER MANAGEMENT/ GRADING PLAN
2 OF 2

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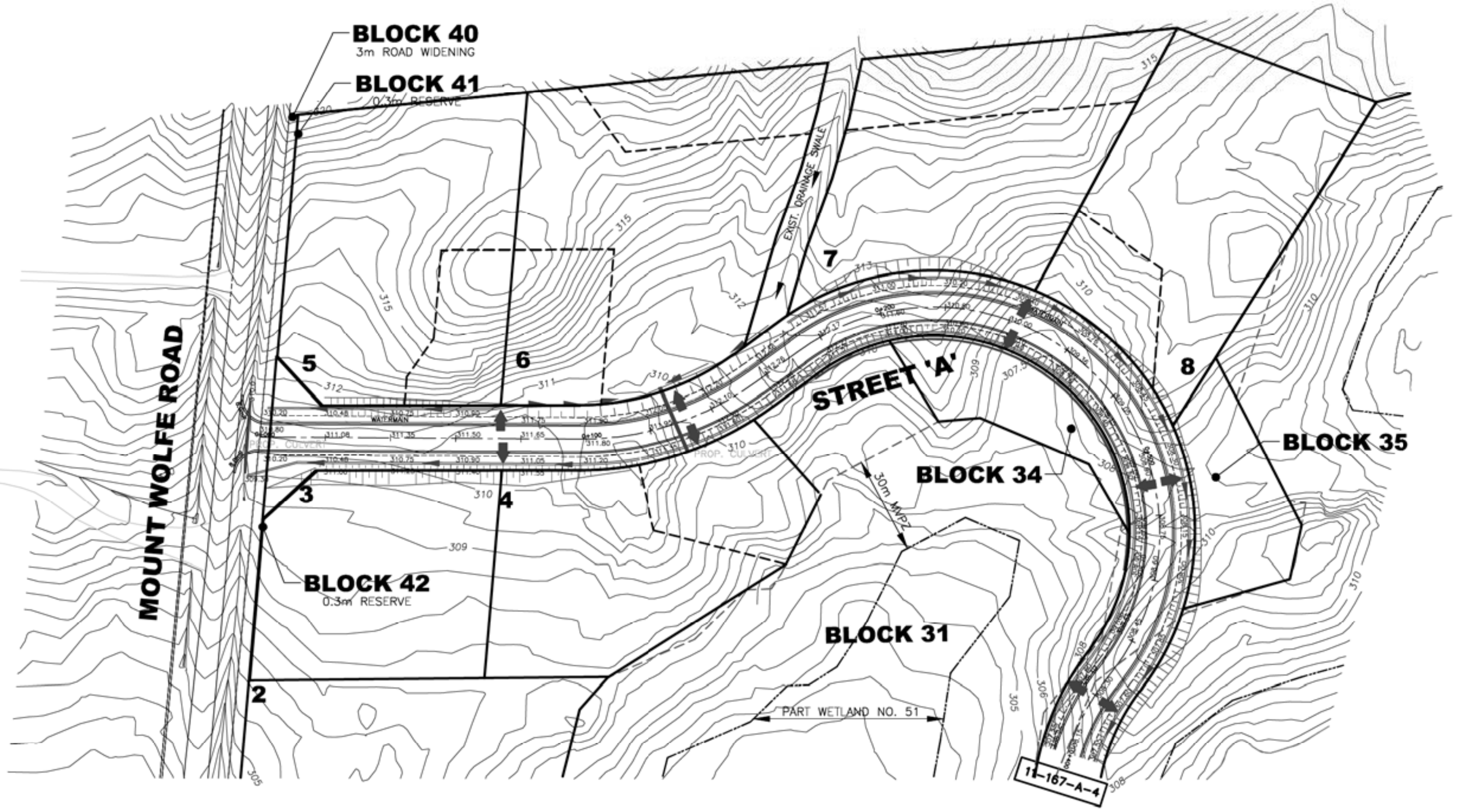
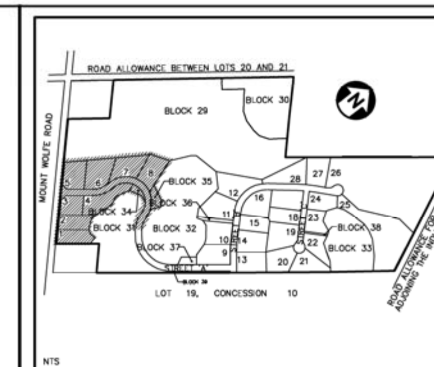
Drawn by: D. HAY		Sheet No.
Chk'd by: R.J. WHYTE	Date: 2013	





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DESIGNED BY:

APPROVED BY:

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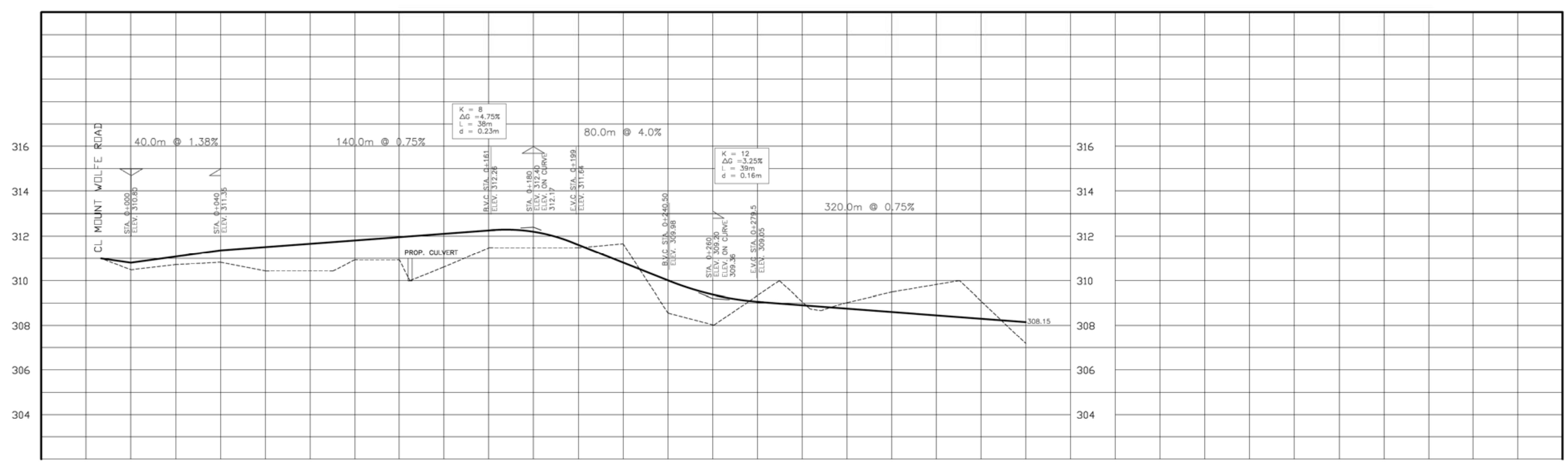

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PROPOSED RD. GRADE	310.80	311.08	311.35	311.50	311.65	311.80	311.95	312.10	312.26	312.17	311.60	310.80	310.00	309.36	309.05	308.90	308.75	308.60	308.45	308.30	308.15
℄ CHAINAGE	0+000					0+100					0+200					0+300					0+400

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REGION OF PEEL

THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:

RITELAND DEVELOPMENT CORPORATION

PROJECT:

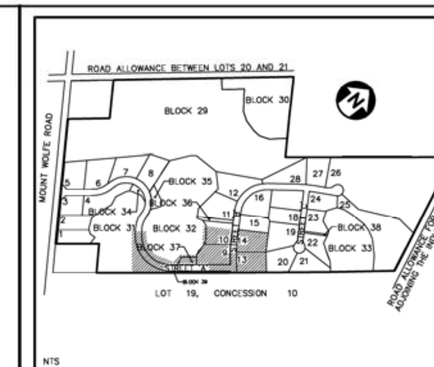
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:

STREET 'A'

STA. 0+000 TO STA. 0+400

Surveyed by: Designed by: D. HAY Drawn by: D. HAY Chk'd by: R.J. WHYTE	Scale: Hor. 1:1000 VERT. 1:100 Date: 2013	File Drawing No. 11-167-A-5	Sheet No.



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- 30m MVPZ
- PROPOSED WATERMAIN
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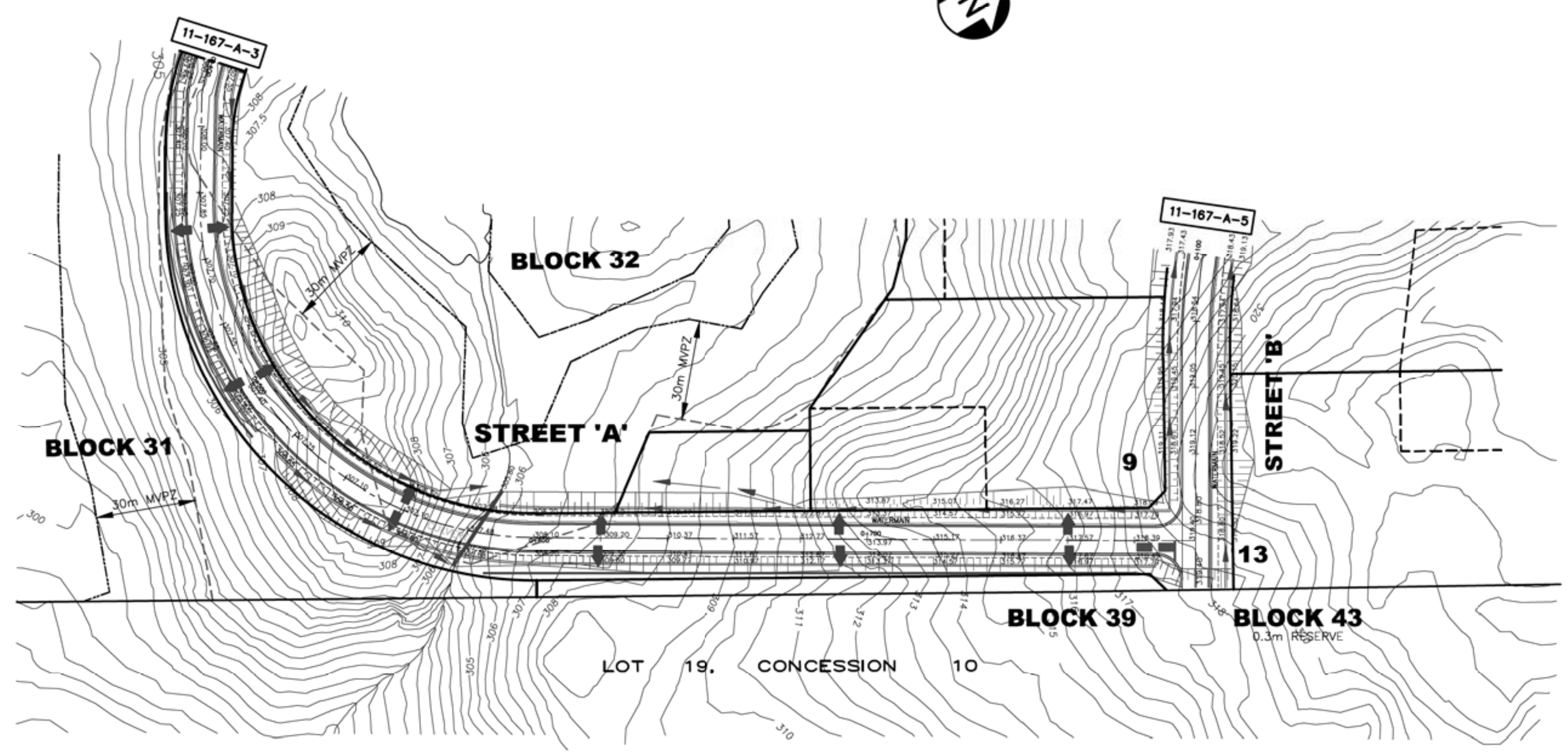

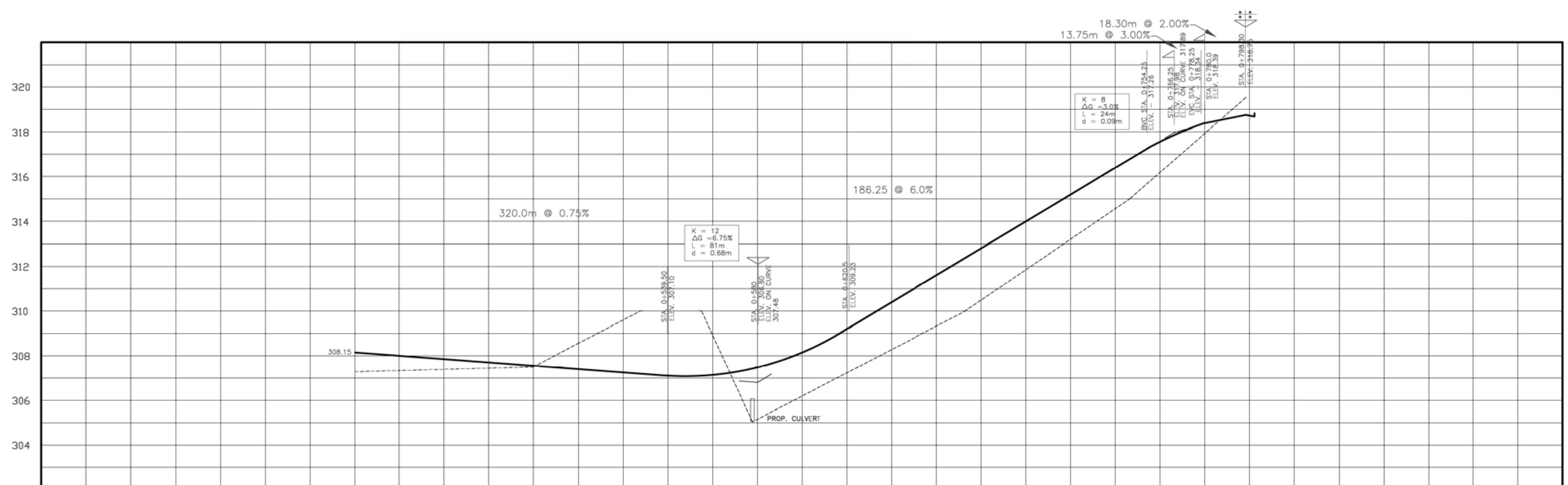

SWALE INVERT	307.55	307.40	307.25	307.10	306.95	306.80	306.65	306.50	306.50	306.88	307.50	308.60	309.77	310.97	312.17	313.37	314.57	315.77	316.97	317.79	318.15
PROPOSED RD. GRADE	308.15	308.00	307.85	307.70	307.55	307.40	307.25	307.10	307.10	307.48	308.10	309.20	310.37	311.57	312.77	313.97	315.17	316.37	317.57	318.39	318.75
℄ CHAINAGE	0+400					0+500					0+600					0+700					0+800

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

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REGION OF PEEL

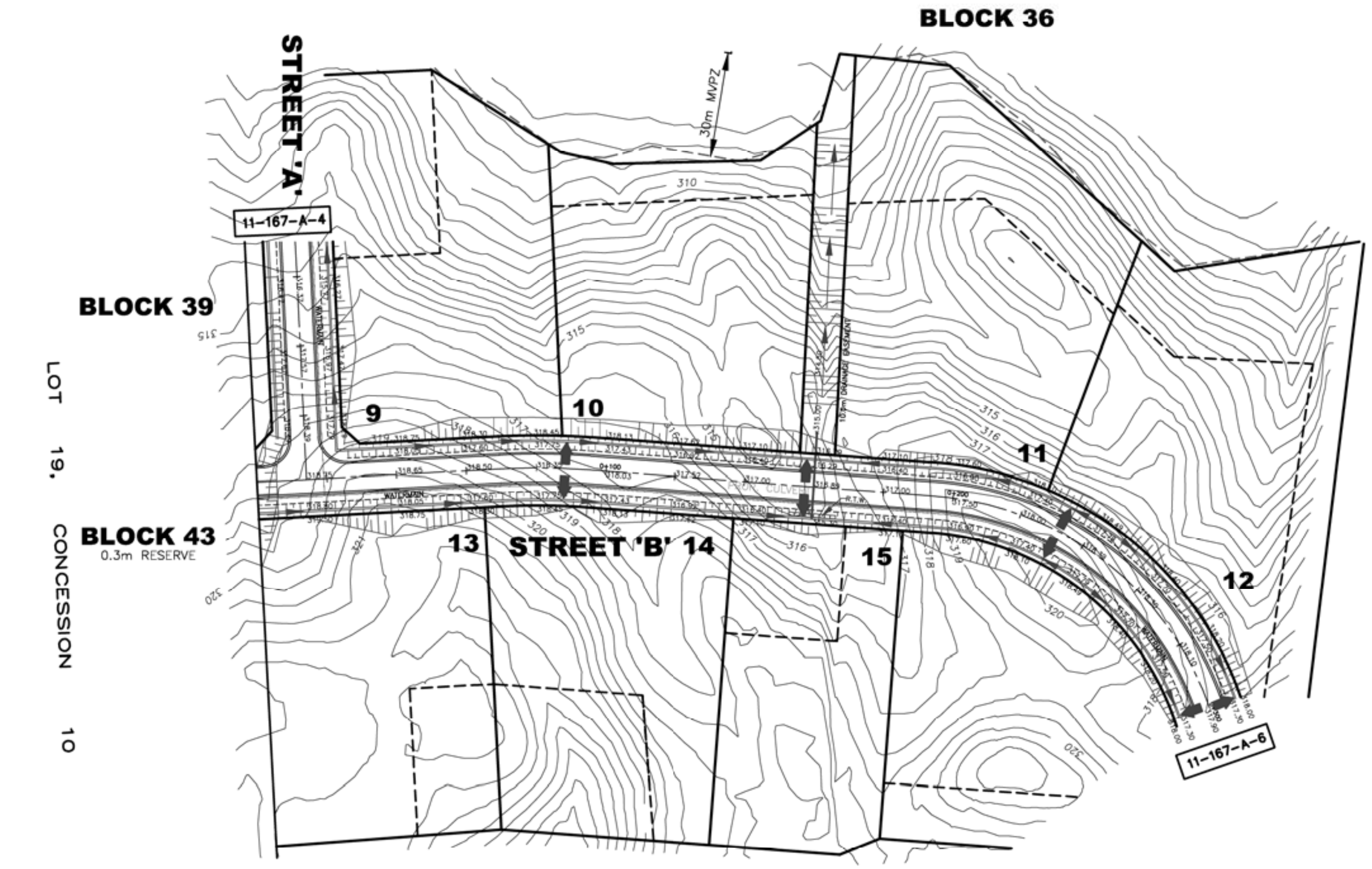
THE CORPORATION OF THE TOWN OF CALEDON

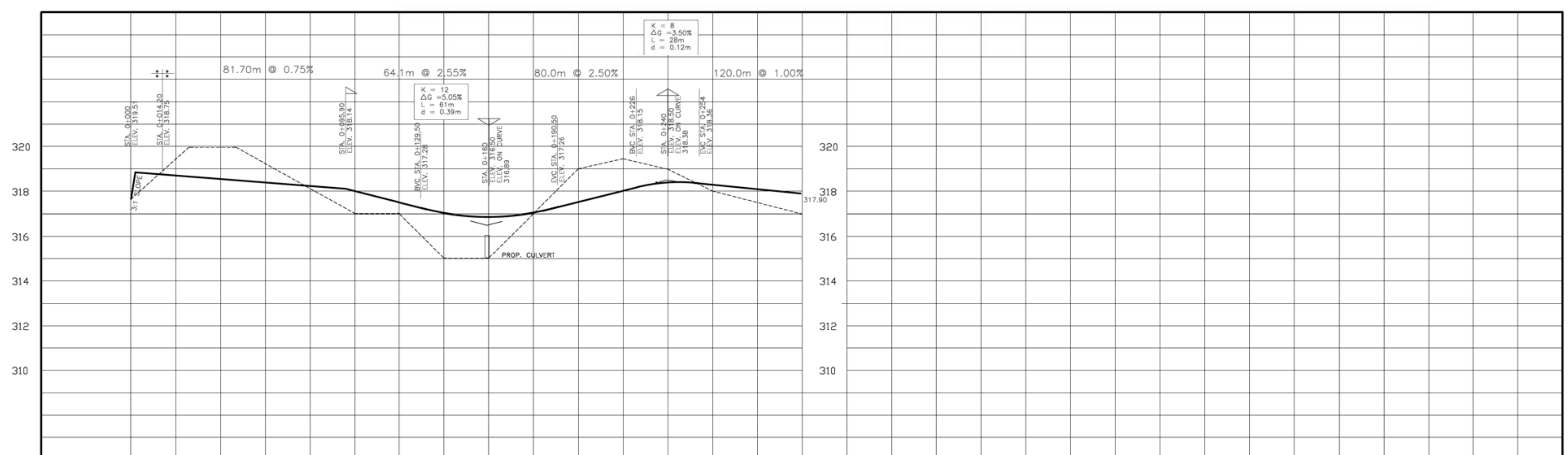
CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:
STREET 'A'
STA. 0+400 TO STA. 0+800

Surveyed by: Designed by: D. HAY Drawn by: D. HAY Chk'd by: R.J. WHYTE	Scale: Hor. 1:1000 VERT. 1:100 Date: 2013	File Drawing No. 11-167-A-6	Sheet No.





SWALE INVERT		318.15	318.05	317.90	317.75	318.43	316.92	316.40	316.29	316.40	316.90	317.40	317.79	317.70	317.50	317.30
PROPOSED RD. GRADE		318.75	318.65	318.50	318.35	318.03	317.52	317.00	316.89	317.00	317.50	318.00	318.39	318.30	318.10	317.90
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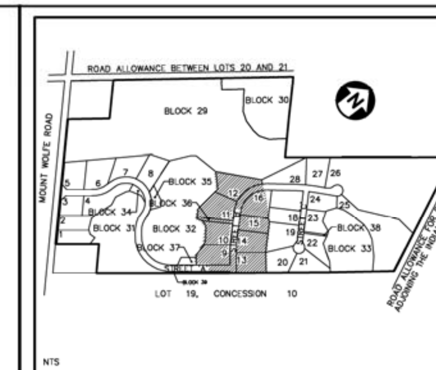

GENERAL NOTES:

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LEGEND:

- LOT LINES
- STRUCTURE ENVELOPE
- KEY NATURAL HERITAGE FEATURE
- 30m MVPZ
- PROPOSED WATERMAIN
- CURB OUTLETS
- PROPOSED SWALE

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY: APPROVED BY:

BENCH MARK:

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REGION OF PEEL

THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:

RITELAND DEVELOPMENT CORPORATION

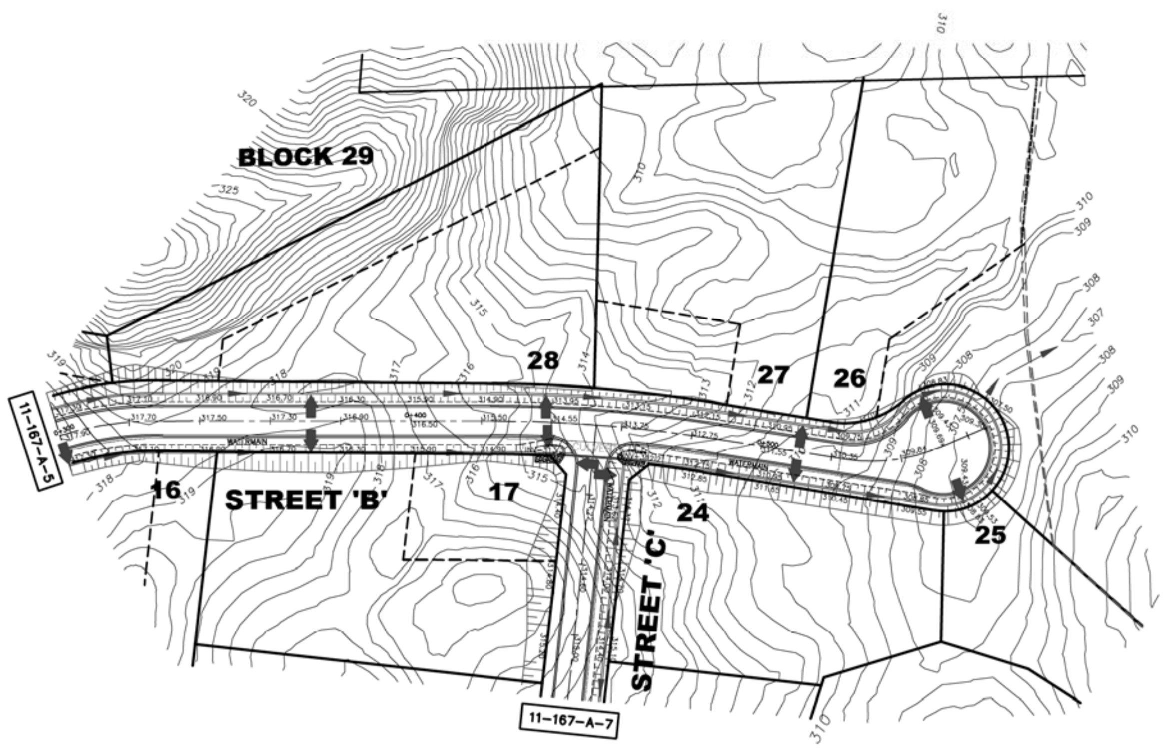
PROJECT:

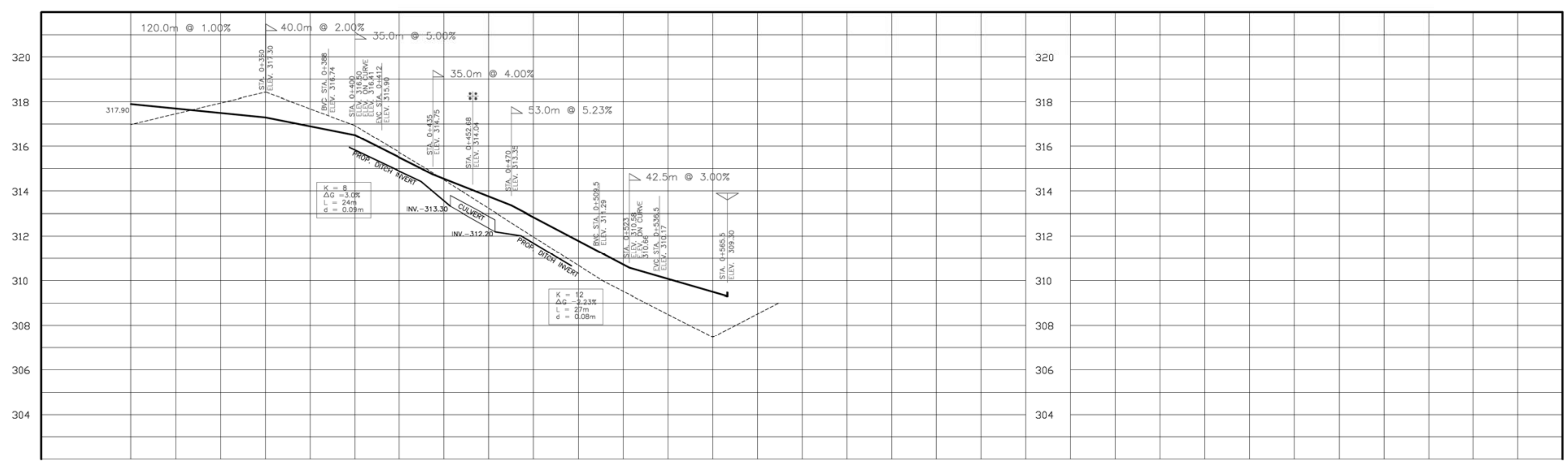
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:

STREET 'B'
STA. 0+000 TO STA. 0+300

Surveyed by:	Scale: Hor. 1:1000 VERT. 1:100	File
Designed by: D. HAY		Drawing No. 11-167-A-7
Drawn by: D. HAY		Sheet No.
Chk'd by: R.J. WHYTE	Date: 2013	



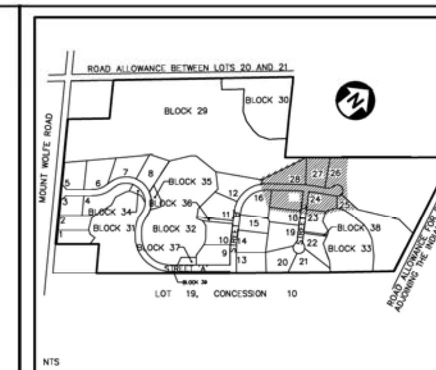


DITCH INVERT	317.30	317.10	316.90	316.70	316.30	315.90	314.90	313.95	313.15	312.15	310.95	309.75	309.24	308.64
PROPOSED RD. GRADE	317.90	317.70	317.50	317.30	316.90	316.50	315.50	314.55	313.75	312.75	311.55	310.35	309.84	309.24
℄ CHAINAGE	0+300					0+400					0+500			

STORM INVERT

PROPOSED RD. GRADE

℄ CHAINAGE



GENERAL NOTES:

1. THE INFORMATION SHOWN HEREIN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.

LEGEND:

- LOT LINES
- STRUCTURE ENVELOPE
- KEY NATURAL HERITAGE FEATURE
- 30m MVPZ
- PROPOSED WATERMAIN
- CURB OUTLETS
- PROPOSED SWALE

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY: APPROVED BY:

BENCH MARK:

Calder Engineering Ltd.
T 905-857-7600 E calder@caldereng.com W www.caldereng.com

REGION OF PEEL

THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:

RITELAND DEVELOPMENT CORPORATION

PROJECT:

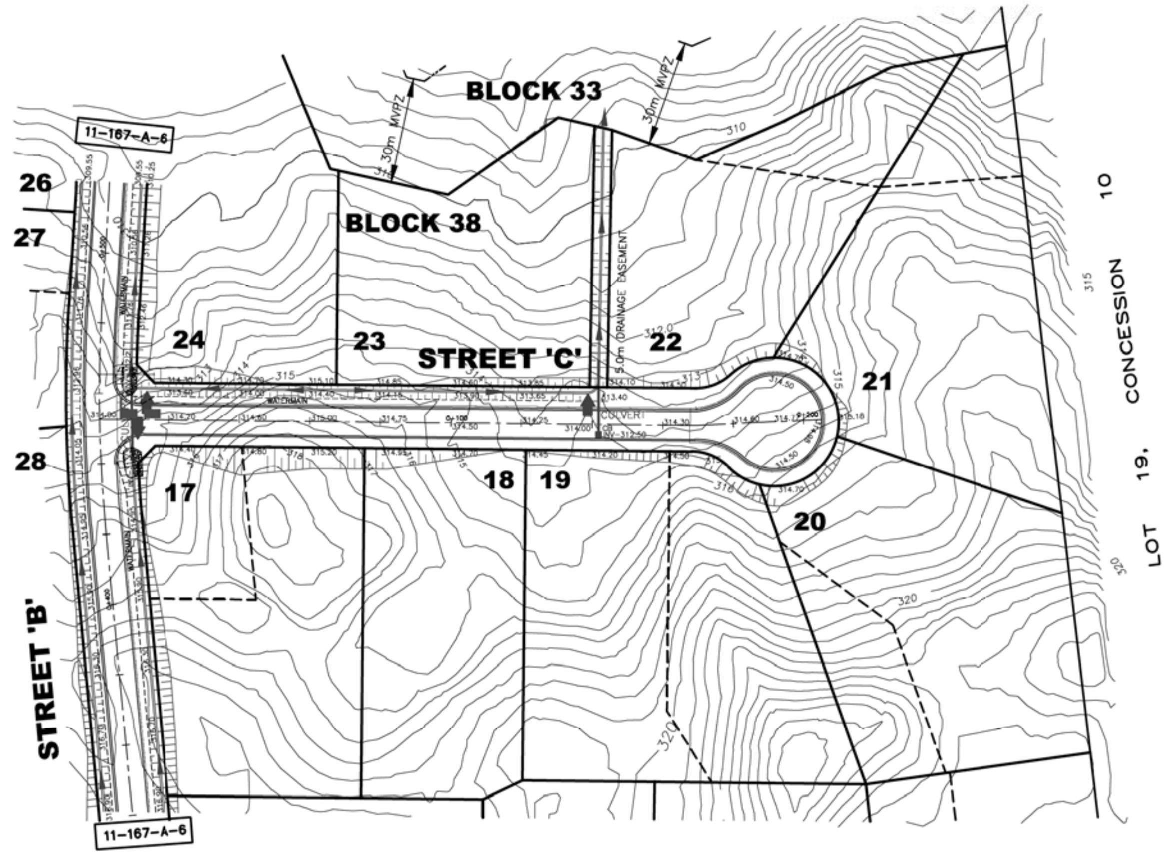
HALL'S LAKE ESTATES (DP 21T-98001C)

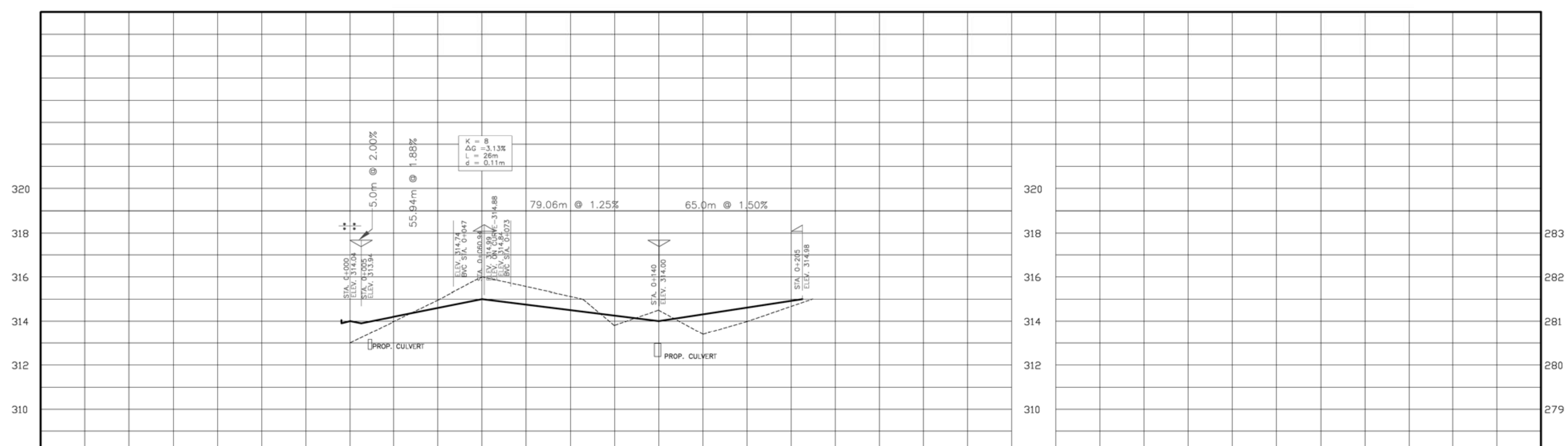
TITLE:

STREET 'B'

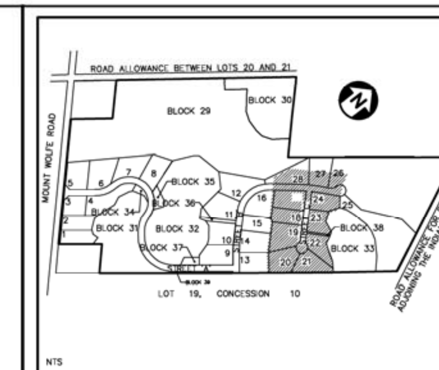
STA. 0+300 TO STA. 0+565

Surveyed by:	Scale: Hor. 1:1000 VERT. 1:100	File
Designed by: D. HAY		Drawing No. 11-167-A-8
Drawn by: D. HAY		Sheet No.
Chk'd by: R.J. WHYTE	Date: 2013	





STORM INVERT	313.40	313.60	314.00	314.40	314.15	319.90	313.65	313.40	313.70	314.00	314.30
PROPOSED RD. GRADE	314.00	314.20	314.60	315.00	314.75	314.50	314.25	314.00	314.30	314.60	314.90
℄ CHAINAGE	0+000					0+100					0+200



GENERAL NOTES:

1. THE INFORMATION SHOWN HEREIN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.

LEGEND:

- LOT LINES
- STRUCTURE ENVELOPE
- KEY NATURAL HERITAGE FEATURE
- 30m MVPZ
- PROPOSED WATERMAIN
- CURB OUTLETS
- PROPOSED SWALE

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	DH	2013/11/06	DRAFT PLAN APPLICATION	RJW	
2	DH	2015/02/11	DRAFT PLAN APPLICATION RESPONSE	RJW	

DESIGNED BY: APPROVED BY:

BENCH MARK:

Calder Engineering Ltd.
T 905-857-7600 E calder@caldereng.com W www.caldereng.com

REGION OF PEEL

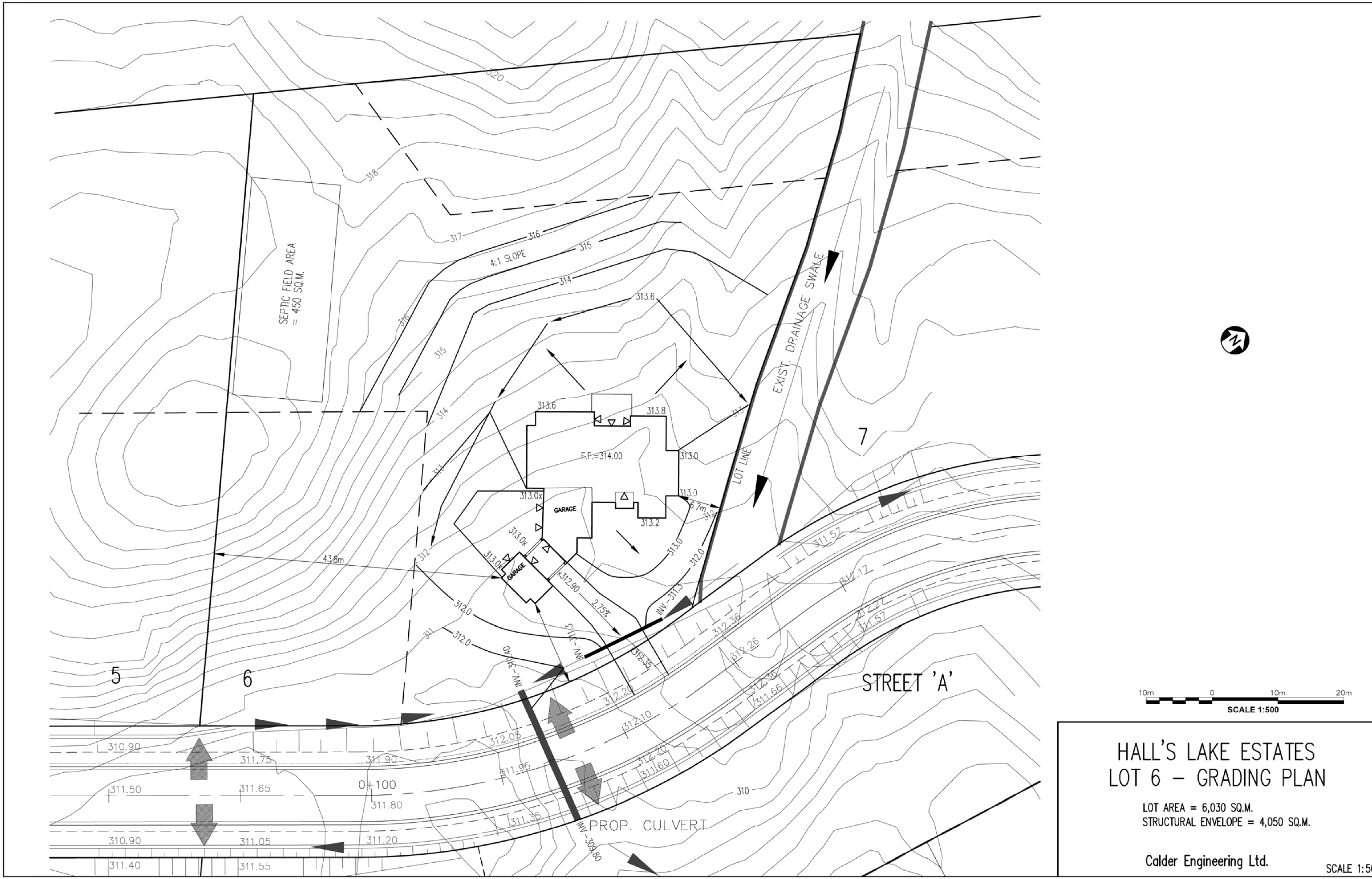
THE CORPORATION OF THE TOWN OF CALEDON

CLIENT:
RITELAND DEVELOPMENT CORPORATION

PROJECT:
HALL'S LAKE ESTATES (DP 21T-98001C)

TITLE:
STREET 'C'
STA. 0+000 TO STA. 0+205

Surveyed by:	Scale: Hor. 1:1000 VERT. 1:100	File	
Designed by: D. HAY		Drawing No. 11-167-A-9	Sheet No.
Drawn by: D. HAY			
Chk'd by: R.J. WHYTE	Date: 2013		



HALL'S LAKE ESTATES
LOT 6 – GRADING PLAN

LOT AREA = 6,030 SQ.M.
STRUCTURAL ENVELOPE = 4,050 SQ.M.

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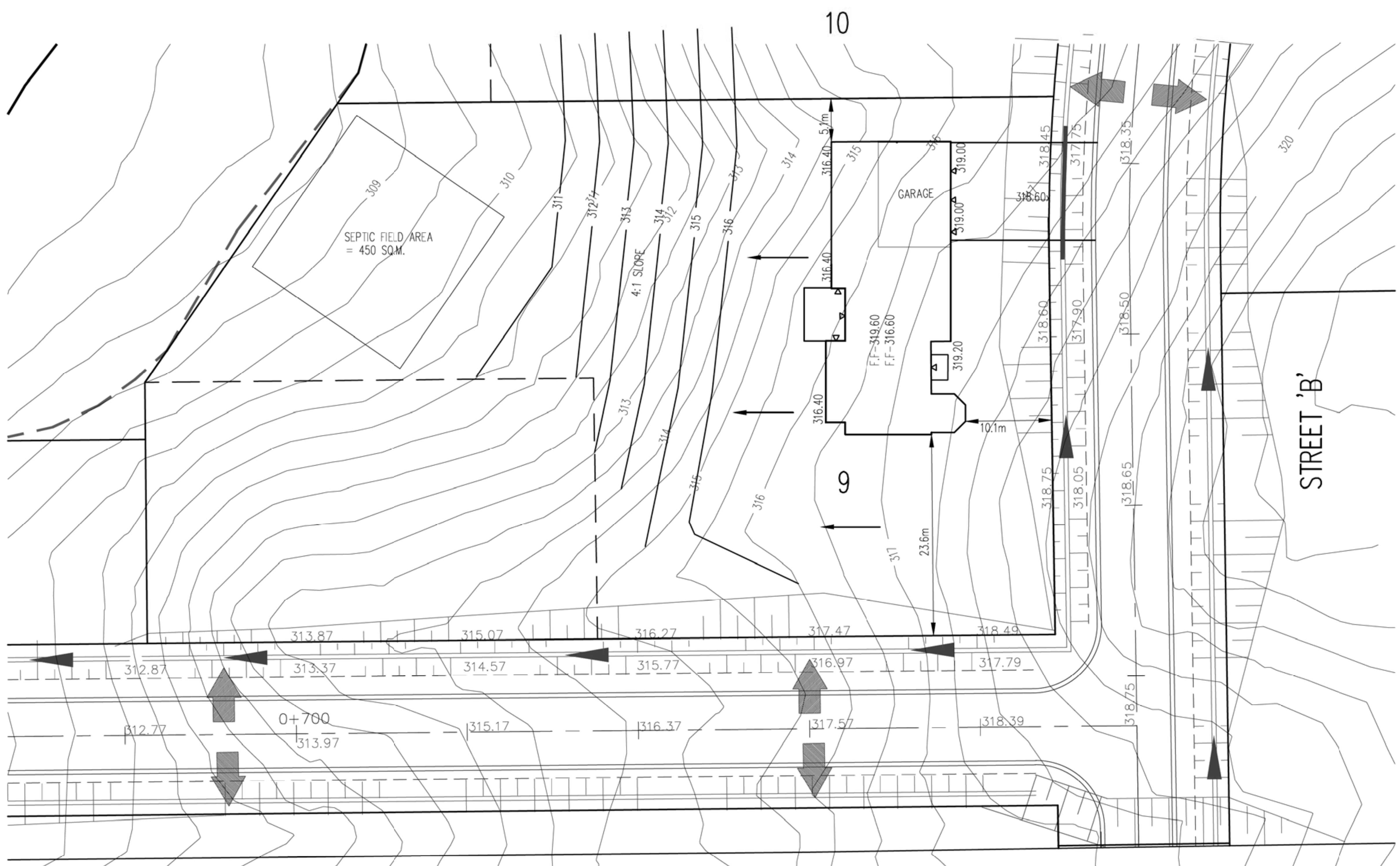
SCALE 1:500

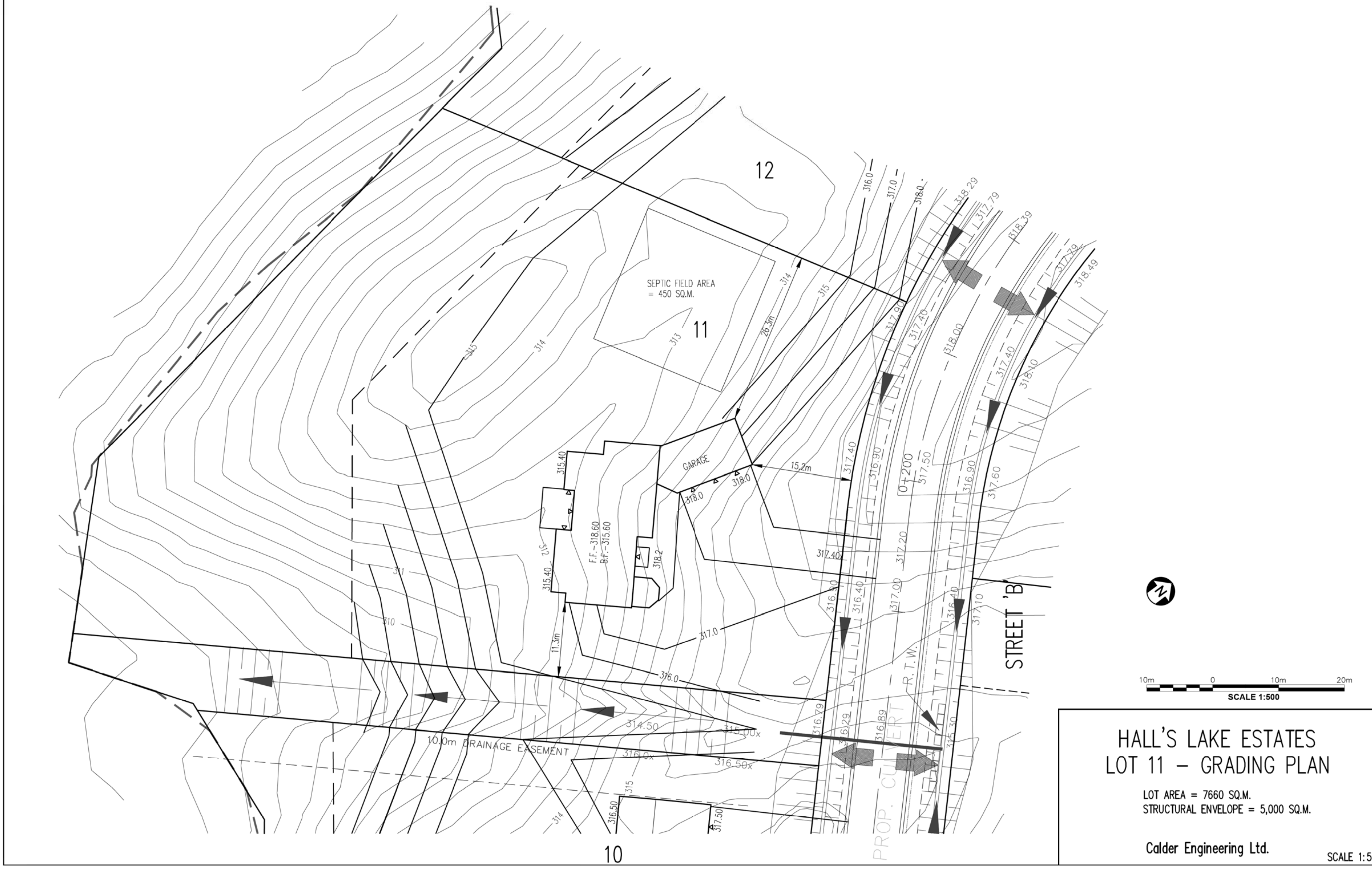


HALL'S LAKE ESTATES
LOT 9 – GRADING PLAN

LOT AREA = 6,320 SQ.M.
STRUCTURAL ENVELOPE = 4,720 SQ.M.

Calder Engineering Ltd.

SCALE 1:500

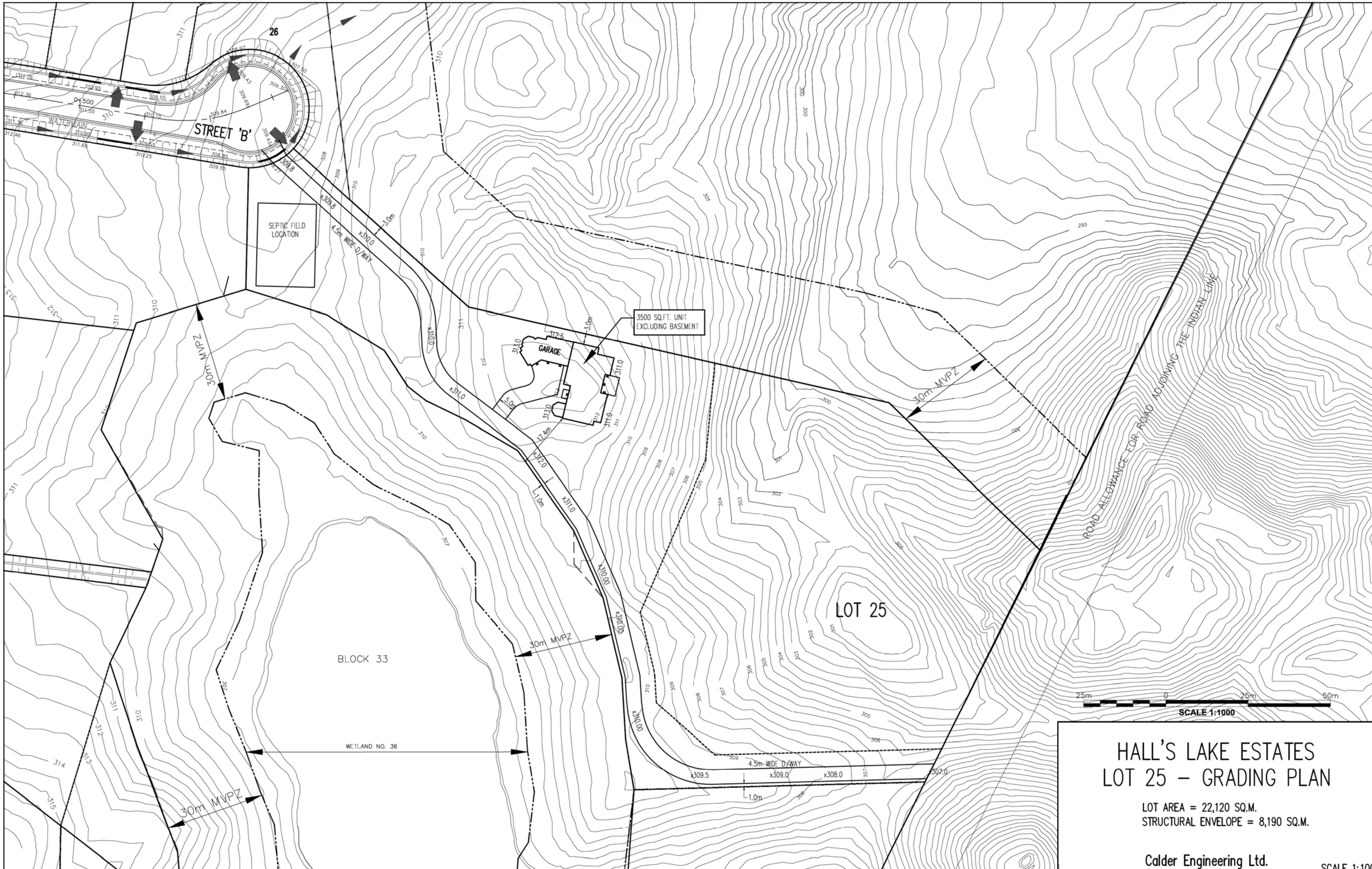


HALL'S LAKE ESTATES
LOT 11 – GRADING PLAN

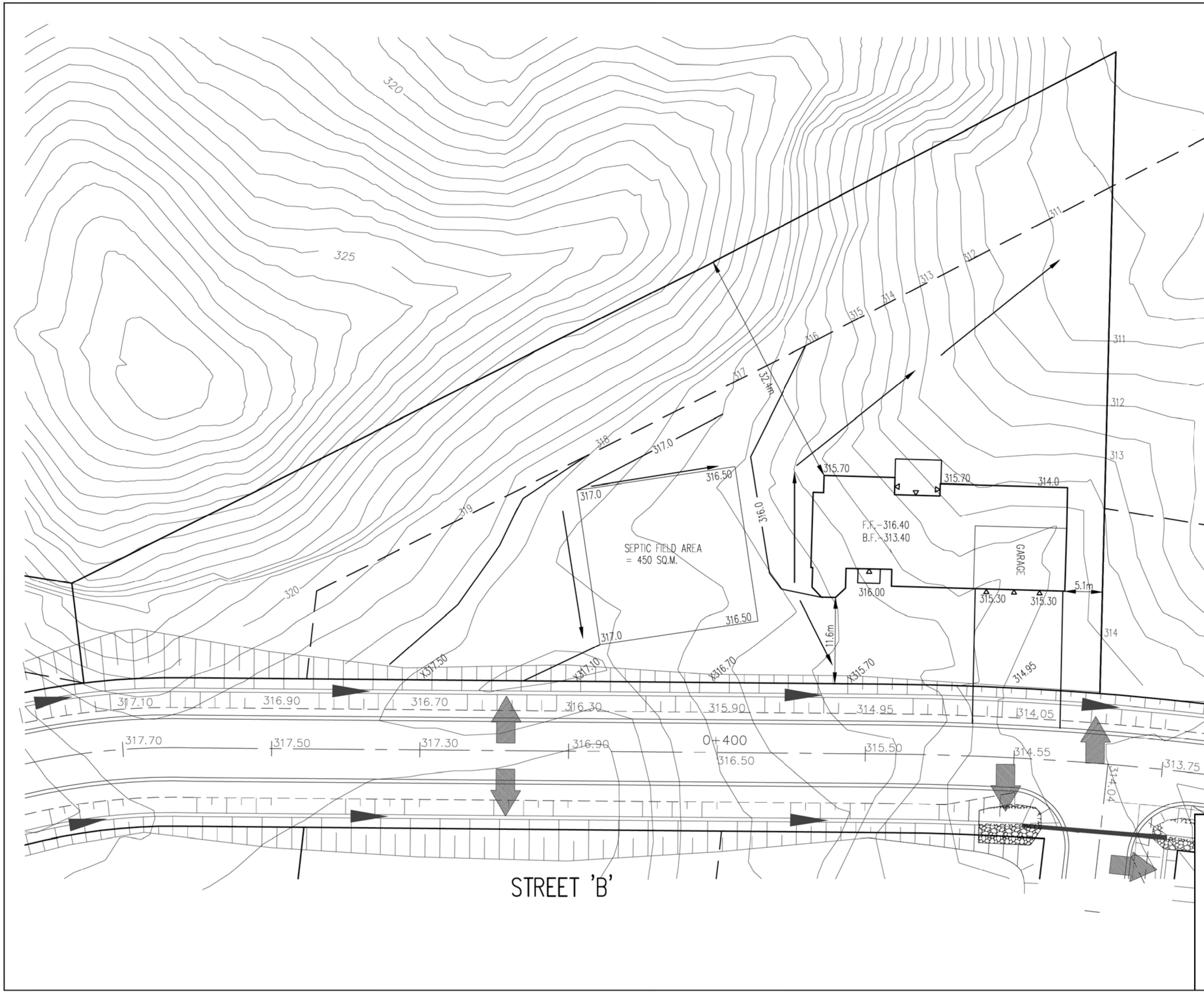
LOT AREA = 7660 SQ.M.
STRUCTURAL ENVELOPE = 5,000 SQ.M.

Calder Engineering Ltd.

SCALE 1:500



HALL'S LAKE ESTATES
LOT 25 – GRADING PLAN
LOT AREA = 22,120 SQ.M.
STRUCTURAL ENVELOPE = 8,190 SQ.M.
Calder Engineering Ltd.
SCALE 1:1000
SCALE 1:1000
25m
0
25m
50m
STREET 'B'
26
WATERMAIN
SEPTIC FIELD LOCATION
4.5m WIDE D/WAY
3500 SQ.FT. UNIT EXCLUDING BASEMENT
GARAGE
30m MVPZ
30m MVPZ
30m MVPZ
30m MVPZ
LOT 25
BLOCK 33
WETLAND NO. 36
4.5m WIDE D/WAY
ROAD ALLOWANCE FOR ROAD ADJOINING THE INDIAN LINE



HALL'S LAKE ESTATES
LOT 28 – GRADING PLAN

LOT AREA = 6,790 SQ.M.
STRUCTURAL ENVELOPE = 4,200 SQ.M.

Calder Engineering Ltd.

SCALE 1:500