



BURNSIDE

**Fergus Golf Club
Stormwater Management Report**

**883890 Ontario Limited
c/o Fergus Development Inc.
3190 Steeles Ave. E. Suite 300
Markham, ON L3R 1G9**



BURNSIDE

**Fergus Golf Club
Stormwater Management Report**

**883890 Ontario Limited c/o Fergus
Development Inc.
3190 Steeles Ave. E. Suite 300
Markham, ON L3R 1G9**

**R.J. Burnside & Associates Limited
6990 Creditview Road, Unit 2
Mississauga ON L5N 8R9 CANADA**

**January 2022
300052719.0000**

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
0	Yes	Yes	Fergus Development Inc.

Record of Revisions

Revision	Date	Description
0	January 2022	OPA, DP, and ZBA submission

R.J. Burnside & Associates Limited

Report Prepared By:



Laura Garner, P.Eng.
Project Engineer
LG:cv

Report Reviewed By:



Steve Roorda, P.Eng.
Vice President, Land Development
SR:cv

Table of Contents

1.0	Introduction	1
1.1	General.....	1
1.2	Site Description and Context	1
1.3	Background	3
2.0	Existing Site Characteristics	4
2.1	Land Uses	4
2.2	Soil Conditions.....	4
2.3	Groundwater Conditions	4
2.4	Environmental Features.....	4
3.0	Proposed Land Use	6
4.0	Grading and Storm Drainage	8
5.0	Storm Drainage	9
5.1	Existing Storm Drainage	9
5.1.1	External Drainage	10
5.2	Proposed Storm Drainage	12
5.2.1	Minor System	12
5.2.2	Major System	14
5.2.3	External Drainage Conveyance.....	14
6.0	Stormwater Management Plan	16
6.1	Existing Hydrologic Conditions.....	16
6.1.1	Curve Number.....	16
6.1.2	Existing Flows	17
6.2	Black Drain Conveyance Capacity.....	17
6.3	Proposed Hydrologic Conditions.....	18
6.4	Stormwater Management Design Criteria	21
6.4.1	Quantity Control	21
6.4.2	Quality Control	22
6.4.3	SWMF1	23
6.5	Water Balance / Infiltration.....	26
6.6	Low Impact Development	26
7.0	Erosion and Sediment Control	27
8.0	Conclusions & Recommendations	29

Tables

Table 1: Existing Catchments	9
Table 2: External Catchments	10
Table 3: External Drainage (EXT 1&2) Conveyance.....	14
Table 4: External Drainage (EXT3, EXT4, UNC1 & UNC5) Conveyance	15
Table 5: Curve Numbers.....	17
Table 6: Pre-Development Peak Flow Rates	17

Table 7: Black Drain Flows & Elevations	18
Table 8: Post-Development Impervious Values	19
Table 9: Proposed Catchments	21
Table 10: Post-Development Peak Flow Rates.....	22
Table 11: Flow Rate Summary	22
Table 12 Summary Table for SWM Pond 1	23

Figures

Figure 1: Site Location Plan.....	2
Figure 2: Existing Site Conditions	5
Figure 3: Proposed Draft Plan	7
Figure 4: Existing Drainage Areas	11
Figure 5: Post-Development Drainage Areas.....	13
Figure 6: Sample Lot Impervious Breakdown	20
Figure 7: Proposed SWMF1 Plan View.....	24
Figure 8: Proposed SWMF1 Sections.....	25

Drawing List

STM1

G1 – Grading Plan

G2 – Grading Plan

G3 – Grading Plan

Appendices

Appendix A Background Information

Appendix B SWMHYMO Modelling Parameters and Model Output

Appendix C Black Drain Analysis

Appendix D Stormwater Management Design Calculations

Drawings

Disclaimer

Other than by the addressee, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

1.0 Introduction

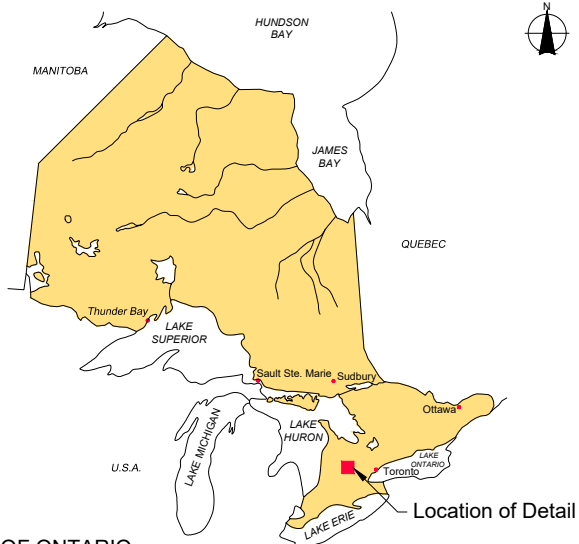
1.1 General

R.J. Burnside & Associates Limited (Burnside) has been retained by 883890 Ontario Limited c/o Fergus Development Inc. to prepare a Stormwater Management (SWM) Report for the proposed redevelopment of the Fergus Golf Club. This report has been prepared to accompany the application for Official Plan Amendment, Zoning By-law Amendment, Plan of Subdivision and Plan of Condominium applications and demonstrates that the subject lands can provide adequate stormwater management measures in accordance with applicable regulatory requirements and criteria. A Functional Servicing Report dated January 2022 has been prepared by Burnside, under a separate cover, and should be reviewed in conjunction with this report.

1.2 Site Description and Context

The Fergus Golf Club redevelopment is 82:20 ha in size and is located on the existing Fergus Golf Course in the Township of Centre Wellington, north of the Town of Fergus at Wellington Road 19 and Third Line. The existing golf course (the "Site") consists of two parcels; the northwest parcel, which is 42.35 ha, situated on the north side of Wellington Road 19, and the southeast parcel, which is 39.85 ha, situated on the south side of Wellington Road 19. The proposed residential redevelopment is located on the southeast parcel (the "SE Site") and the communal water and wastewater services are integrated into the existing Golf Course, which will remain, on the northwest parcel (the "NW Site").

The SE Site is surrounded by Wellington Road 19 to the north, Third Line and a combination of existing residential development and farmland to the east, towards Lake Belwood, existing farmland to the south, and existing residential to the west.



KEY MAP OF ONTARIO



Client

FERGUS DEVELOPMENT INC.

Figure Title

FERGUS GOLF COURSE

SITE LOCATION PLAN

Drawn

BF

Scale
N.T.S.

Checked

DN

Date

22/01/21

Project No.

300052719

Figure No.

1

1.3 Background

The development concepts contained in this report are an extension of and in accordance with the information contained in the following reports and engineering drawings:

- Functional Servicing Report – Fergus Golf Club, R.J. Burnside & Associates Limited, January 2022.

This report has been prepared in accordance with, and consideration of the information and recommendations provided in the following documents:

- Development Manual, Township Centre Wellington, March 2018.
- Stormwater Management Planning and Design Manual, previously Ministry of Environment (MOE), now Ministry of the Environment, Conservation and Parks (MECP), March 2003.
- Preliminary Geotechnical Investigation Report, Proposed Residential Development – Fergus Golf Club, Golder Associates Limited, January 2022.
- Hydrogeological Assessment, Proposed Residential Development – Fergus Golf Club, Golder Associates Limited, January 2022.
- Environmental Impact Study, Beacon Environmental, January 2022.

2.0 Existing Site Characteristics

2.1 Land Uses

The SE Site is currently occupied by the southeast parcel of the Fergus Golf Course – South Parcel. The Black Drain runs through the middle of the SE Site which is a drainage feature that conveys flows through the SE Site and connects to Irvine Creek southwest of the Site.

There are multiple wetlands located within the SE Site, some of which are proposed to be retained as part of the redevelopment plan per the Environmental Impact Study prepared by Beacon Environmental. The existing conditions are shown in Figure 2.

2.2 Soil Conditions

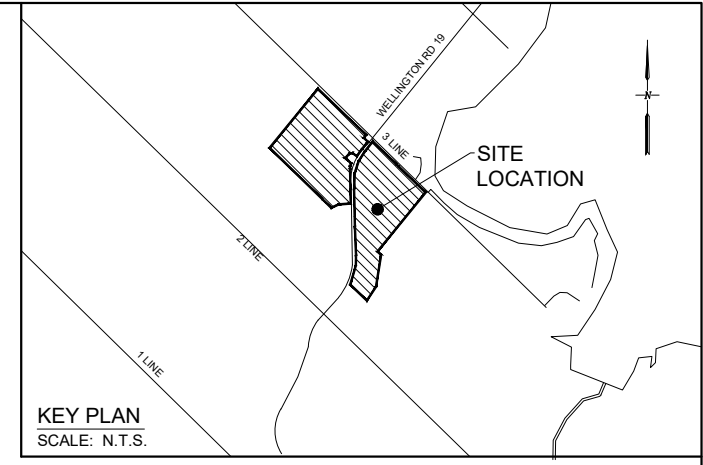
A geotechnical investigation for the Site was completed by Golder Associates Limited. Based upon the findings, the Site is covered by a topsoil layer, overlying silty sand to sand or clayey silt with sand containing varying amounts of gravel. These deposits are underlain by silty clay to clayey silt and silt and sand glacial till deposits.

2.3 Groundwater Conditions

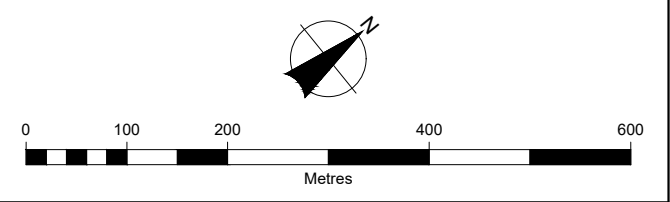
Groundwater conditions were monitored as part of the geotechnical and hydrogeological assessments completed by Golder Associates Limited. It was found that the average groundwater depth was approximately 0.6 m below grade. The overall direction of the groundwater flows primarily to the south / south-west.

2.4 Environmental Features

A detailed description of the natural features and functions of the SE Site is presented in the Environmental Impact Study by Beacon Environmental, December 2021.



- LEGEND**
- - - PROPERTY BOUNDARY
 - BH BOREHOLE

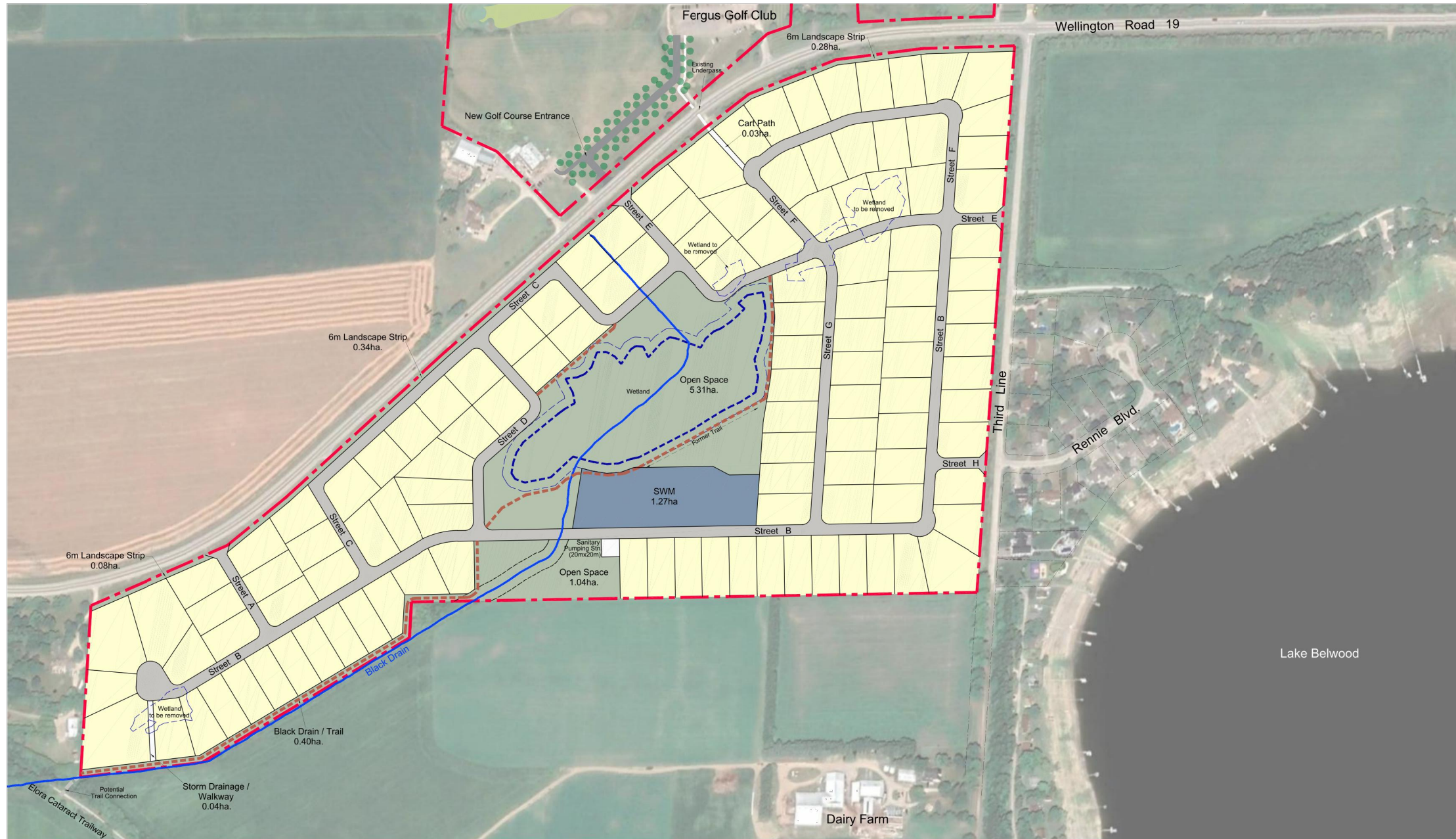


BURNSIDE			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE EXISTING CONDITIONS			
Drawn BF	Checked DN	Date 22/01/21	Figure No. 2
Scale 1:7500		Project No. 300052719	

3.0 Proposed Land Use

The proposed Draft Plan of Subdivision was completed by GSP Group Incorporated. The proposed development will be on the 39.85 ha development site to the south of Wellington Road and will include 118 single family dwelling lots, two Open Space blocks totaling 6.35 ha, and a Stormwater Management block that is 1.27 ha in size.

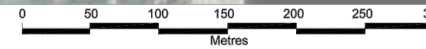
The Concept Plan for the SE Site is depicted on Figure 3.



DEVELOPMENT CONCEPT
The Village At Fairview Greens

- 1/2 Acre Residential Lots
- GRCA Wetland / OP Core Greenlands
- 10m Wetland Buffer
- Potential Trails

Site Area: 39.85ha. (98.5ac.)
No. of Lots: 118
Area of wetlands to be removed: 7,076sq.m.

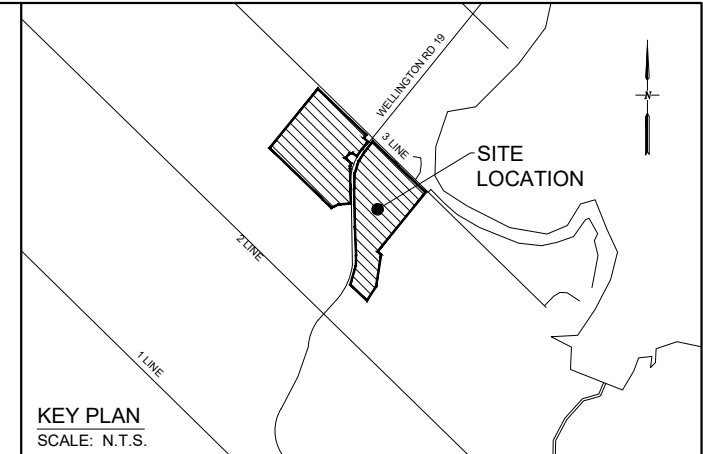



NOTE: This concept should be considered as a preliminary demonstration model that illustrates an 'order of magnitude' development scenario for the site. The number of lots are approximate and subject to more detailed design as well as municipal planning approvals.

Scale 1:4,000 | December 10, 2021 | Project No.: 21021 | Drawn By: SL



PROVIDED BY GSP GROUP
DATED: DECEMBER 10, 2021



			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE PROPOSED CONCEPT PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. 3
Scale N.T.S.	Project No. 300052719		

4.0 Grading and Storm Drainage

Refer to the Functional Servicing Report prepared by R.J. Burnside and Associates Limited dated January 2022 for details on the site grading. An overview of the storm drainage has been provided in this section.

5.0 Storm Drainage

5.1 Existing Storm Drainage

The existing topography for the SE Site generally drains to the existing drainage feature on the site, the Black Drain. The Black Drain is a municipal drainage channel that has a varying cross section that is generally flat bottomed with 3:1 side slope and a depth of approximately 1m.

Based on the Black Drainage Works Plan and Profile (Drawing D-GA-W-128) provided in Appendix A, the SE Site sits at the upstream end of the Black Drain drainage area. The entire SE Site drains to the Black Drain as shown on the drawing mentioned above and the Black Drain continues west eventually draining into Irvine Creek. Irvine Creek generally flows in a southwesterly direction connecting to the Grand River in Elora. Refer to Figure 4 for details on the existing storm drainage patterns.

To calculate runoff volumes and peak drainage flows in the existing condition, the site was divided into five drainage sub-catchments, ultimately all five sub-catchments drain to the Black Drain. Four nodes have been placed along the Black Drain to measure flows at selected locations along the Black Drain based on proposed post-development inlet locations to the Black Drain. The location of these nodes can be found on Figure 4. Catchment boundaries were delineated using topographic base mapping for the Site. The catchments are described in Table 1 and depicted in Figure 4.

Table 1: Existing Catchments

Catchment ID	Area (ha)	Time to Peak (hrs)	Outlet Location
101	1.58	0.31	Node 2
102	16.14	0.81	Node 3
103	7.09	0.26	
104	7.13	0.62	
105	7.91	0.31	Node 4
Total	39.85	-	

Catchment 101 slopes south and is the small area within the SE Site that drains to Node 2 along the Black Drain. Catchment 102 is the large area on the east side of the SE Site that drains to a series of ponds and wetlands, ultimately connecting to the Black Drain before Node 3. Catchment 103 is located north of the Black Drain and slopes south, generally sheet flowing towards the Black Drain before Node 3. Catchment 104 generally slopes west towards the Black Drain at Node 3 and is comprised of a large amount of wooded area. Catchment 105 is located at the west end of the SE Site and generally slopes south towards the Black Drain, connecting before Node 4.

5.1.1 External Drainage

There are six external drainage areas that flow through the SE Site and ultimately reach the existing Black Drain. Table 2 identifies the external catchments.

Table 2: External Catchments

Catchment ID	Area (ha)	Time to Peak (hrs)	TIMP (%)	XIMP (%)	Outlet Location
EXT1	7.93	0.44	N/A Nashyd		Node 1
EXT2	0.34	N/A Stanhyd	51%	36%	Node 3
EXT3	1.23		59%	44%	
EXT4	0.18		48%	33%	
EXT5	8.51	0.44	N/A Nashyd		Node 4
EXT6	15.73	0.55	N/A Nashyd		
Total	33.92	-			

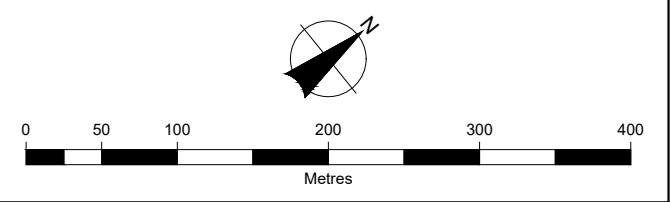
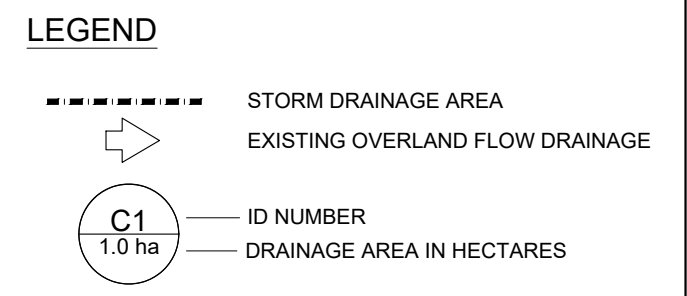
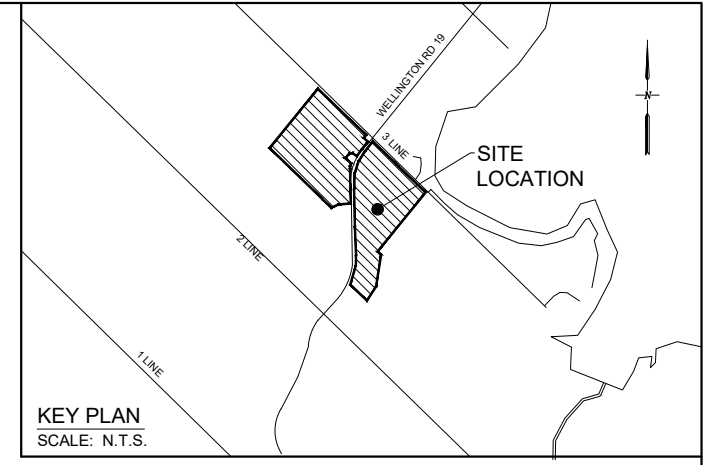
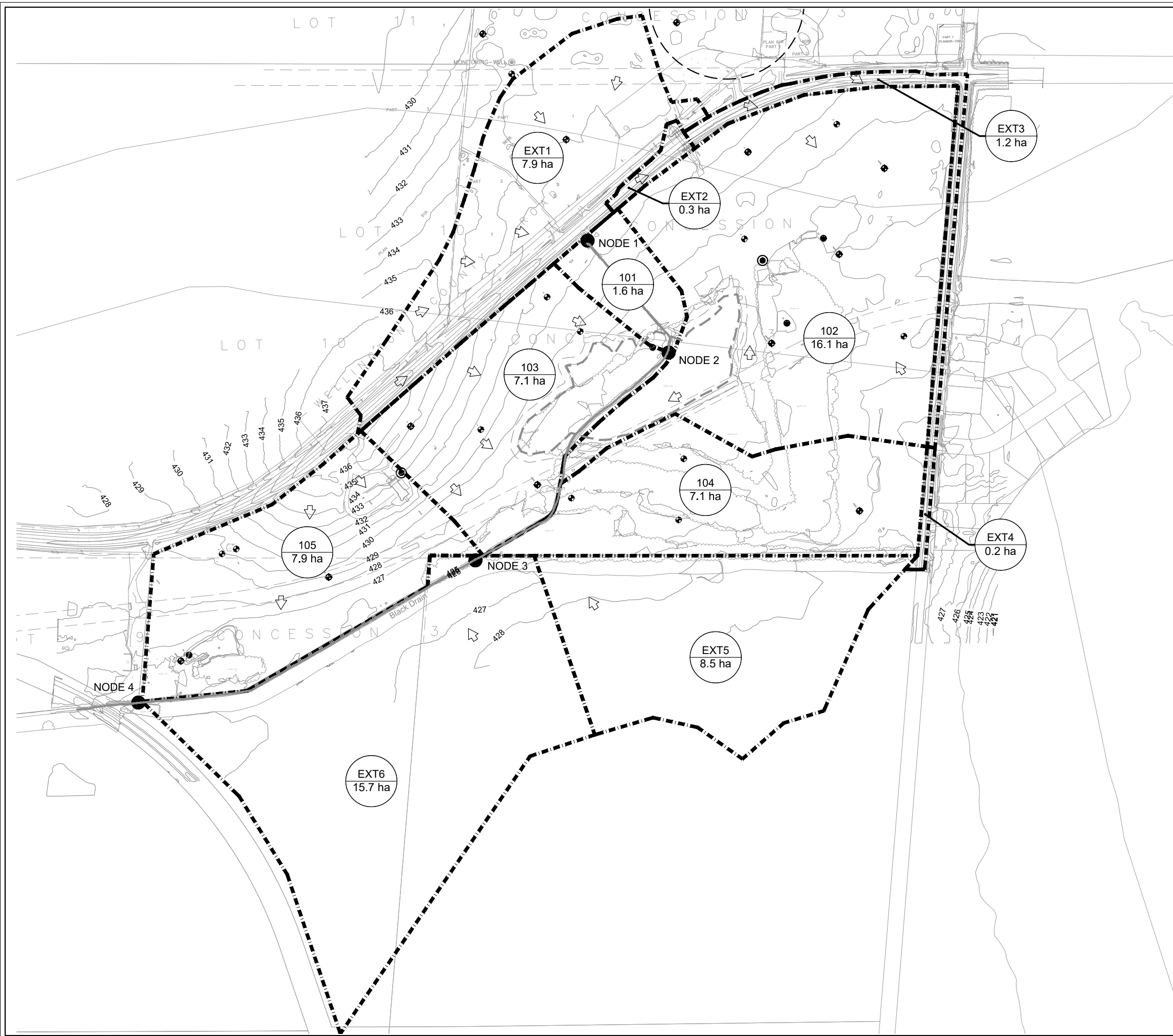
The first of these drainage areas (EXT1) is located on the north side of Wellington Road 19 and drains to the SE Site via roadside ditches and a culvert located under Wellington Road 19 that forms the start of the Black Drain. This drainage is indicated as the G-Drain shown on Drawing D-GA-W-128.

The second external drainage area (EXT2) is located on the south side of Wellington Road 19 and includes the South half of Wellington Road 19 and the roadside ditch. This area spills to the SE Site via a drainage ditch, east of the Black Drain.

The third of these drainage areas (EXT3) is located on the south side of Wellington Road 19 and includes the South half of Wellington Road 19 and the roadside ditch. It also includes the west side of 3rd Line and the roadside ditch. It currently appears that this drainage is captured in a ditch inlet catchbasin on the west side of 3rd Line and drains to the SE Site and ultimately the Black Drain via the D-Drain shown on Drawing D-GA-W-128.

The fourth of these drainage areas (EXT4) is located the west side of 3rd Line and the roadside ditch at the south end of the SE Site. It currently appears that this drainage is held in the ditch and ultimately spills into the SE Site via a low point on the east side of the SE Site.

The fifth and sixth external drainage areas (EXT5 and EXT6) sheet drains towards the existing golf course from the lands to the south of the SE Site.



			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE PRE-DEVELOPMENT DRAINAGE PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. 4
Scale 1:7500	Project No. 300052719		

5.2 Proposed Storm Drainage

The post-development drainage scheme generally follows the existing drainage patterns. One stormwater management facility is proposed for the SE Site which is detailed in the following sections. All drainage from the SE Site including the stormwater management facility will discharge to the Black Drain.

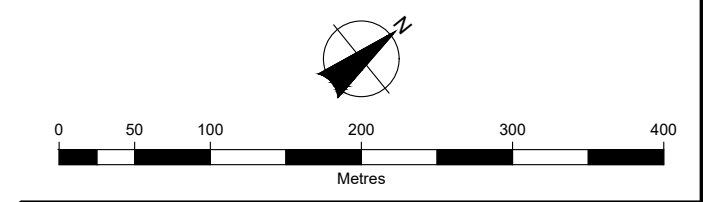
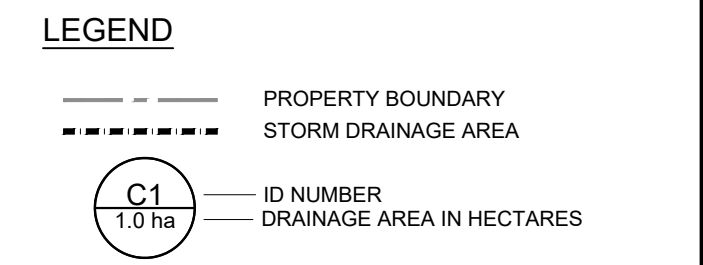
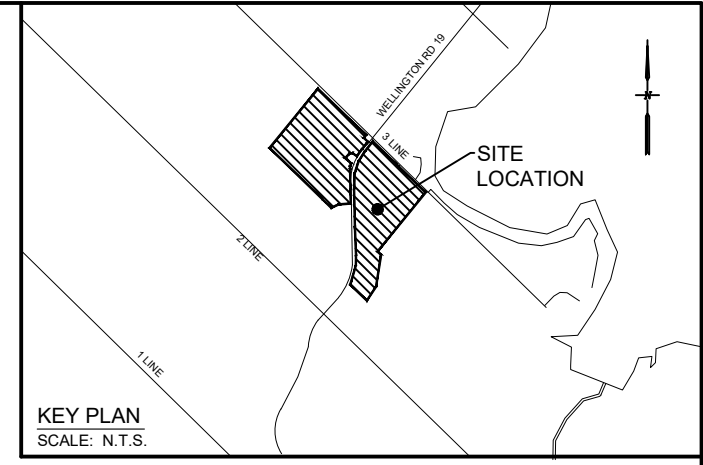
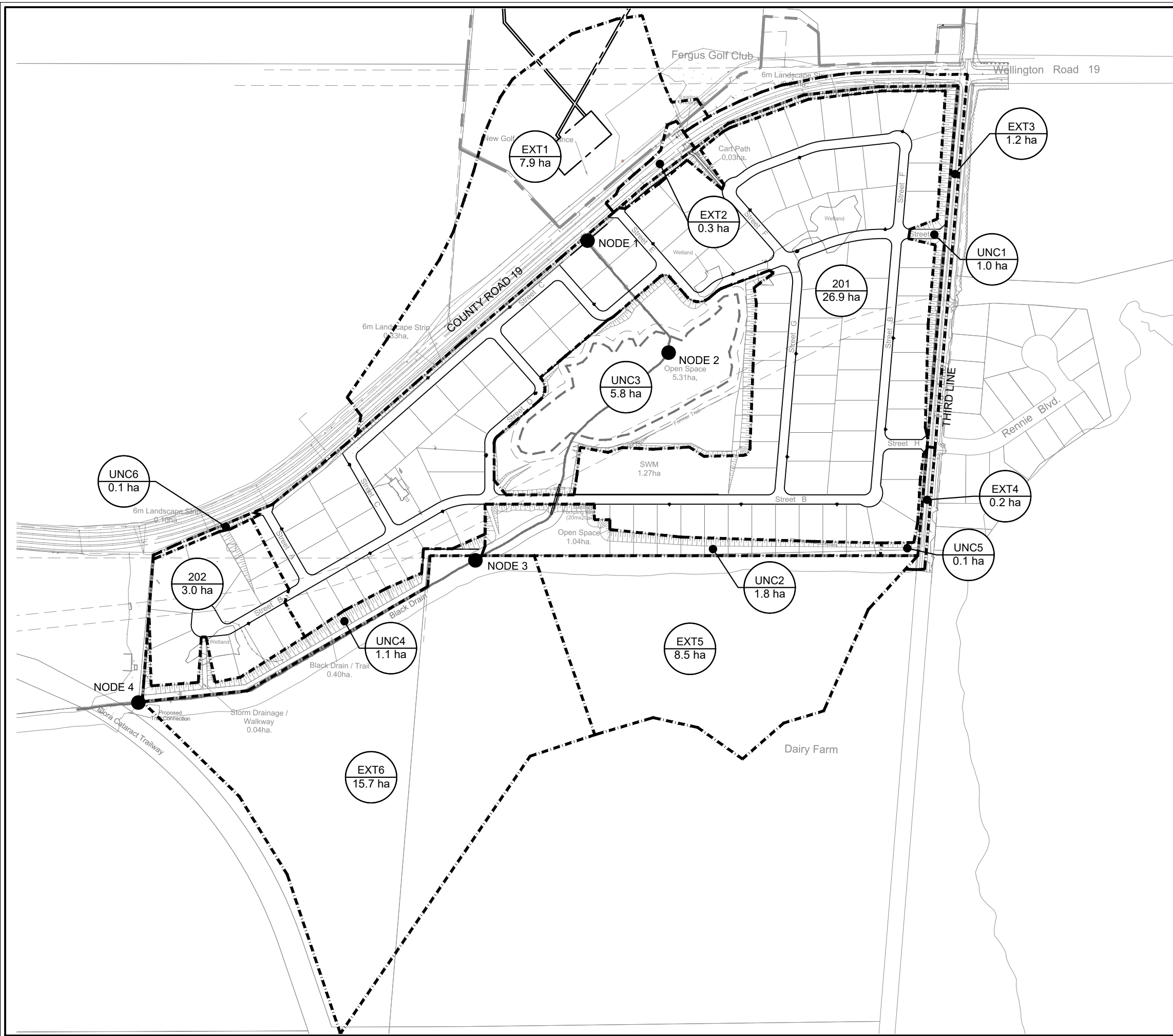
The minor system post-development flows for the SE Site will be directed to the stormwater management facility via a local storm sewer network. Major system flows will be routed to the stormwater management facility via roads and overland flow routes as required. The proposed stormwater treatment details for the SE Site are included in the sections following.

The roof drainage from the individual lots will be directed at the surface to pervious areas to promote infiltration and reduce surface runoff.

The storm drainage infrastructure for the development is highlighted on Drawing STM1, the proposed general drainage areas are highlighted on Figure 5.

5.2.1 Minor System

The minor storm system will be a series of storm sewers sized to convey the 5-year return period storm as per the Township of Centre Wellington standard. The storm sewers will follow the right-of-ways within the proposed development and ultimately outlet to the stormwater management pond. There will be one stormwater management facility, SWMF1, which is a wet pond located at the southern end, roughly in the middle of the SE Site. There will be another piped outlet to the Black Drain of uncontrolled flows at the southwest corner of the SE Site, this outlet will include an oil-grit separator and/or a surface LID measure to provide quality control prior to discharging to the Black Drain.



Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE POST-DEVELOPMENT DRAINAGE PLAN			
Drawn BF	Checked DN	Date 22/01/21	5
Scale 1:7500	Project No. 300052719		

5.2.2 Major System

The major system flow route will follow a combination of proposed right-of-ways and overland flow blocks to convey overland flows from major storm events, up to and including the 100-year storm event. The major system flows will be directed to the proposed stormwater management facility. The entire 100-year flow will be contained within the major system flow route. During detailed design, flow capacity calculations will be completed to ensure the overland flow route is sufficiently sized to accommodate the flow. As the grading becomes more refined during detailed design, if the major flow exceeds the capacity of the right-of-way, there may be some oversize piping required to ensure containment of the flow within the right-of-way limits.

5.2.3 External Drainage Conveyance

As noted previously, external drainage area EXT1 (7.93 ha) drains to the SE Site via roadside ditches and a culvert located under Wellington Road 19 which forms the start of the Black Drain. As identified on Drawing STM1, under post-development conditions it is proposed that this drainage will be captured and conveyed within a dedicated pipe to the existing Black Drain at the north-western limits of the existing woodlot / wetland feature. It is also proposed that this pipe network collect ditch flows from external drainage area EXT2 (0.34 ha). The ditch along Wellington Road 19 will require some minor re-grading as identified on the Grading Plan G3, and the flows will be directed to a ditch inlet catchbasin and connected to this bypass system. The proposed pipe is sized to accommodate the existing 100-year storm flow (calculated using the Rational Method) from the drainage area as identified in Table 3 below.

Table 3: External Drainage (EXT 1&2) Conveyance

Drainage Area (ha)	Calculated 100-Year Flow (m ³ /s)	Pipe Size	Pipe Slope
8.27	0.9	825 mm	0.50%

The preliminary alignment of the external drainage conveyance system is depicted along a rear lot line to the proposed discharge point as shown on Drawing STM1. During detailed design the final profile and alignment of the proposed conveyance system will be established.

The existing ditch inlet that currently captures external drainage area EXT3 (1.23 ha) is at an elevation too low to be captured within the proposed storm network. Therefore, it is proposed that this drainage will be captured and conveyed within a dedicated pipe to the existing Black Drain at the southern end of the site. This separate storm pipe network will also receive flow from external drainage area EXT4 (0.18 ha). The proposed system is sized to accommodate the existing 100-year storm flow (calculated using the Rational Method) from the drainage area as identified in Table 4.

Based on the proposed grading of the site there are two uncontrolled areas that drain out to 3rd Line, UNC1 (0.98 ha) and UNC 5 (0.13 ha). These areas will drain to the roadside ditch on the west side of 3rd Line and will ultimately be captured in the bypass storm network.

Table 4: External Drainage (EXT3, EXT4, UNC1 & UNC5) Conveyance

Drainage Area (ha)	Calculated 100-Year Flow (m³/s)	Pipe Size	Pipe Slope
2.52	0.55	825 mm	0.20%

The preliminary alignment of the external drainage conveyance system from the east side of the site is depicted along Streets B and H to the proposed discharge point. During detailed design the final profile and alignment of the proposed conveyance system will be established. The preliminary design is identified on Drawing STM1.

External Drainage Area EXT5 will be collected in a swale and directed to the Black Drain at Node 3. Since the proposed grade along the south end of the site will increase as part of the proposed development and will cut off the external drainage area, it is proposed that the external area be connected to the Black Drain via an interceptor swale to convey flows southwest, generally consistent with existing conditions.

External Drainage Area EXT6 will continue to sheet drain to the Black Drain, consistent with existing conditions.

6.0 Stormwater Management Plan

The stormwater management for the proposed redevelopment will be achieved through the use of one stormwater management facility. The facility is an off-line stormwater management wet pond, with an outlet to the Black Drain which receives most of the drainage from the site. There are multiple uncontrolled areas that drain from the SE Site which have been accommodated in the allowable release rate from the stormwater management facility.

6.1 Existing Hydrologic Conditions

The computer model SWMHYMO was used to simulate peak flow rates for different design storms based on the existing conditions of the SE Site. The Chicago 4-hour rainfall distribution from the Fergus Shand Dam IDF values was used to generate each storm event. Refer to Appendix A for IDF parameter details.

As the Black Drain bisects the SE Site, the simulation is split into four (4) nodes along the Black Drain, Node 1, where the Black Drain begins on the property, Node 2, where the Black Drain turns southwest, Node 3, where the Black Drain exits the SE Site, halfway through the site and Node 4, at the very southwest corner of the SE Site. The SE Site has been divided into a number of sub-catchments based on the localized drainage as described in Section 5.1 above. The existing drainage areas and flow directions are outlined on Figure 4.

6.1.1 Curve Number

The curve numbers used in the SWMHYMO modelling was determined using Tables 9-1 and 9-5 from the National Engineering Handbook. Based on existing soil mapping, the site soils are generally loam, comprised of Perth Loam/Parkhill Loam (soil group C), Listowel Loam/Harriston Loam (soil group B) and Hillsburgh Fine Sandy Loam (soil group A). The SE Site is comprised of existing golf course and woodlots. Some of the external drainage area is comprised of agricultural land and has been classified as Meadow. Table 5 outlines the curve number associated with the specific land covers and soil types.

Table 5: Curve Numbers

Land Cover	Soil Group	Curve Number
Golf Course	A	39
Woods		30
Meadow		30
Golf Course	B	61
Woods		60
Meadow		58
Golf Course	C	74
Woods		77
Meadow		71

For each of the catchments a composite curve number was calculated. Refer to Appendix B for details of the composite curve number calculations.

6.1.2 Existing Flows

Based on the modelling described above, Table 6 identifies the pre-development peak flows for each storm event at the Node locations shown on Figure 4.

Table 6: Pre-Development Peak Flow Rates

	Node 2 Total Flow (m ³ /s)	Node 3 (On-site) Flows (m ³ /s)	Node 3 Total Flow (m ³ /s)	Node 4 Total Flow (m ³ /s)
Drainage Area (ha)	9.51	31.94	50.13	73.77
2-Year	0.087	0.204	0.328	0.539
5-Year	0.168	0.391	0.625	1.026
10-Year	0.232	0.54	0.861	1.411
25-Year	0.324	0.755	1.201	1.967
50-Year	0.399	0.929	1.476	2.414
100-Year	0.479	1.114	1.771	2.893

The flows for Node 1 have not been included in the summary as the only flows entering the Black Drain at Node 1 are from external drainage area EXT1. In post-development these flows are being re-routed to enter the drain further along the drain and the initial section of the Black Drain is proposed to be removed and replaced by a piped storm system.

6.2 Black Drain Conveyance Capacity

In order to confirm the Black Drain conveyance capacity and anticipated water levels at the outlet locations, an analysis of the Black Drain cross-section was completed using Hydraflow Express. Using the pre-development SWMHYMO model that was prepared,

the anticipated flows at the proposed nodes was determined, as described above. The anticipated 100-year water level at SWMF1 outlet location, just upstream from Node 3 in the Black Drain, were used to set the outlet elevation of SWMF 1. The anticipated 100-year water level at the outlet location from the storm sewers from Catchment 202, just upstream of Node 4 in the Black Drain, were used to set the outlet elevation of the storm outlet. The following table summarizes the results of the modelling and cross-section analysis. Further detail on these calculations can be found in Appendix C.

Table 7: Black Drain Flows & Elevations

	SWMF1 Outlet (Node 3)	Storm Sewer Outlet (Node 4)
Pre-Development 100-year Flow (cms)	1.77	2.893
100-year Flow Depth (m)	0.50	0.70
Black Drain Invert (m)	425.50	424.50
Anticipated Existing Black Drain 100-Year Elevation (m)	426.00	425.20
Proposed SWM Pond Outlet Elevation (m)	426.00	425.50

As noted in Table 7 above, both proposed outlets have been set above the calculated existing 100-year flow elevation within the Black Drain. Based on the proposed quantity controls outlined in the sections below, the flows in post-development will be reduced at all nodes using stormwater management measures therefore it is anticipated that the flow depths in the Black Drain will be reduced from the elevations shown in the Table 7.

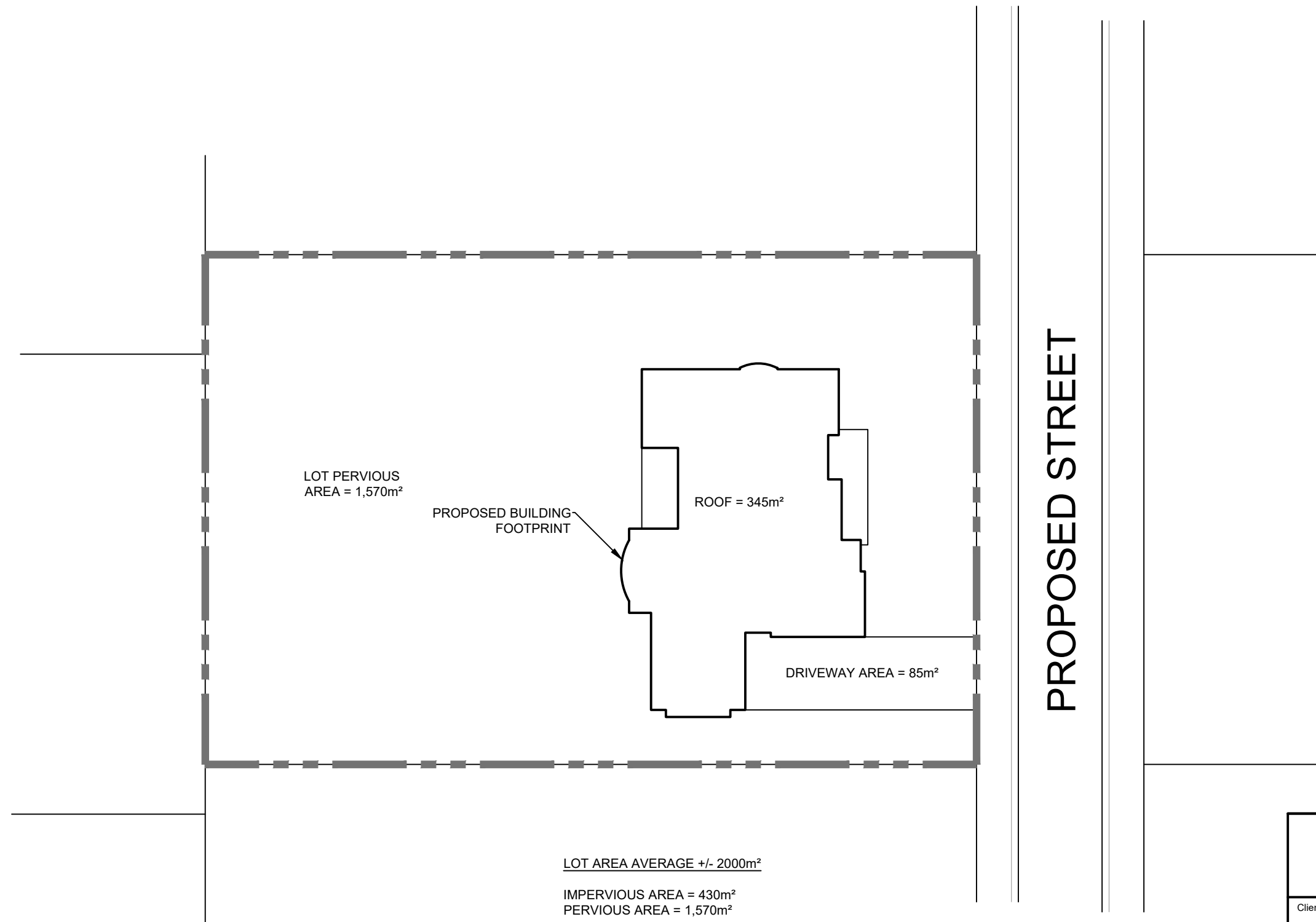
6.3 Proposed Hydrologic Conditions

The stormwater management for the proposed redevelopment will be achieved through the use of one stormwater management wet pond with an outlet to the Black Drain which receives most of the drainage from the site. There are multiple uncontrolled areas that drain from the site which have been accommodated in the allowable release rate from the stormwater management facility. The drainage from Catchment 202, which will drain uncontrolled, will require quality treatment as it is comprised of road runoff as well as landscape areas.

A hydrologic model has been created to simulate the anticipated post-development peak stormwater runoff rates for all design storm events. This model takes into account, development type for each sub-catchment. The assumed impervious values are shown in Table 8 below. Note, a composite impervious was calculated for the low-density residential for the proposed “estate lots” that will see a larger percentage of pervious area than a typical low-density residential lot. Refer to Figure 6 for a sample lot impervious area breakdown. This sample lot shows that the impervious percentage was calculated as 21.5%, a conservative impervious value of 25% has been used in the stormwater management design.

Table 8: Post-Development Impervious Values

Land Use	TIMP	XIMP
Roads	65%	50%
Open Space	7%	5%
SWM Block	50%	50%
Low-Density Residential	25%	15%



LOT AREA AVERAGE +/- 2000m²

IMPERVIOUS AREA = 430m²
 PERVIOUS AREA = 1,570m²

LOT % IMPERVIOUS = 21.5%

% IMPERVIOUS USED IN SWM
 MODELLING = 25%



Client

FERGUS DEVELOPMENT INC.

Figure Title

FERGUS GOLF COURSE

SAMPLE LOT IMPERVIOUS BREAKDOWN

Drawn LG	Checked BF	Date 22/01/21	Figure No. 6
Scale N.T.S.	Project No. 300052719		

Post-development sub-catchment areas and corresponding drainage areas are shown in Table 9 and on Figure 5.

Table 9: Proposed Catchments

Catchment ID	Area (ha)	Time to Peak (hrs)	TIMP (%)	XIMP (%)	Outlet Location
201	26.92	N/A Stanhyd	34%	23%	Node 3
202	2.99	N/A Stanhyd	28%	18%	Node 4
UNC1	0.98	0.04	N/A Nashyd		Node 3
UNC2	1.81	0.21	N/A Nashyd		Node 3
UNC3	5.82	0.83	N/A Nashyd		Node 3
UNC4	1.12	0.05	N/A Nashyd		Node 4
UNC5	0.13	0.07	N/A Nashyd		Node 3
UNC6	0.08	0.05	N/A Nashyd		Rd 19 Ditch
Total	39.85	-			

6.4 Stormwater Management Design Criteria

The following describes the stormwater management pond design criteria that was used in the design of the proposed stormwater management ponds in accordance with the Township of Centre Wellington, Grand River Conservation Authority Design Criteria, and the Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Guidelines:

- Quality Control: Level 1 (Enhanced)
- Erosion Control: 24-hour retention of 25 mm runoff event
- Quantity Control: Post- to Pre-Control for 2- through 100-year storm events

6.4.1 Quantity Control

The post-development peak flow rates for the 2- through 100-year events are summarized in Table 10. The flow rates have been calculated at specific nodes for comparison purposes to pre-development conditions. The nodes, as identified on Figure 5, represent the flows entering the Black Drain at specific locations. Node 3 is the approximate location where Pond 1 will outlet and Node 4 is located at the edge of the SE Site. The hydrologic flow charts and SWMHYMO runs for all storms are included as Appendix D.

Table 10: Post-Development Peak Flow Rates

	Node 2 Total Flow (m ³ /s)	Node 3 (On-site) Flows (m ³ /s)	Node 3 Total Flow (m ³ /s)	Node 4 Total Flow (m ³ /s)
Drainage Area (ha)	8.27	35.66	53.85	73.69
2-Year	0.076	0.162	0.306	0.52
5-Year	0.145	0.322	0.476	0.822
10-Year	0.199	0.450	0.601	1.052
25-Year	0.278	0.635	0.769	1.368
50-Year	0.341	0.771	0.905	1.612
100-Year	0.408	0.923	1.096	1.893

Table 11 summarizes the net storm flows leaving the SE Site under both pre and post-development conditions.

Table 11: Flow Rate Summary

Storm Event	Flow Rates (m ³ /s)	
	Node 4	
	Pre	Post
2-Year	0.539	0.52
5-Year	1.026	0.822
10-Year	1.411	1.052
25-Year	1.967	1.368
50-Year	2.414	1.612
100-Year	2.893	1.893

As shown in the tables above, the post-development flows will be below the pre-development flows for all storms from the 2-through 100-year storm events at all nodes.

6.4.2 Quality Control

The stormwater management facility will be sized in accordance with the MECP requirements for the provision of Level 1 Quantity Control.

Extended Detention volume for each facility will be provided to meet the greater of the 40 m³/ha noted in the MECP manual or the equivalent runoff from the 25 mm storm event. The extended detention will be released over a minimum 24-hour period.

The majority of the uncontrolled areas that do not reach the stormwater management ponds are rear yards which are considered “clean runoff” sources. The one uncontrolled catchment (Catchment 202) that includes driveways and roads, will require quality

control measures. It is proposed that an oil-grit separator and/or surface LID measures in the centre of the roundabout will be incorporated to ensure the provision of the 80% TSS removal associated with Level 1 quality control.

6.4.3 SWMF1

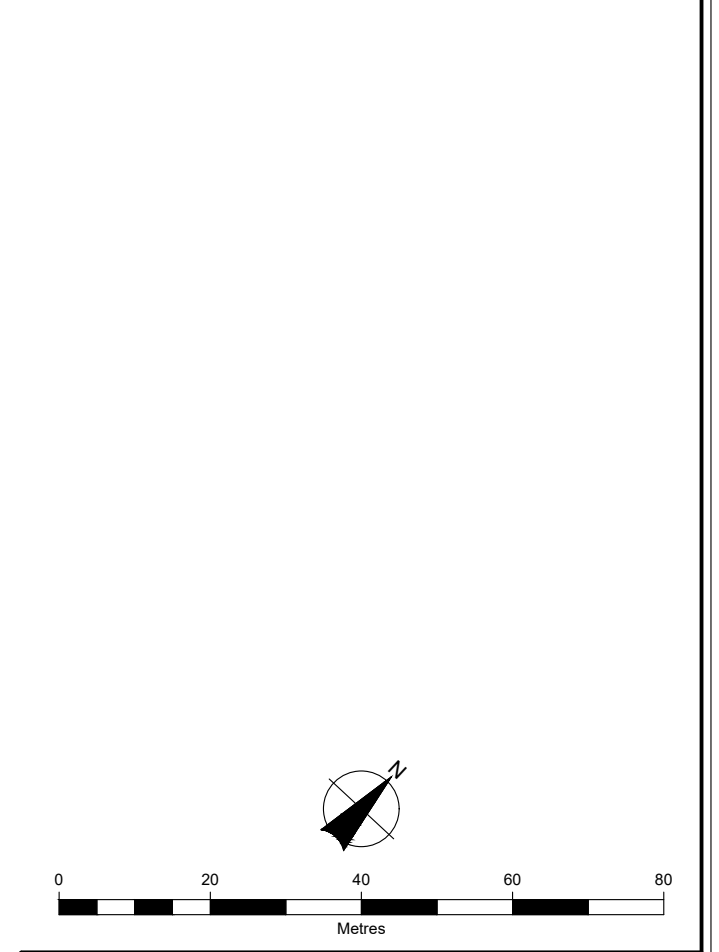
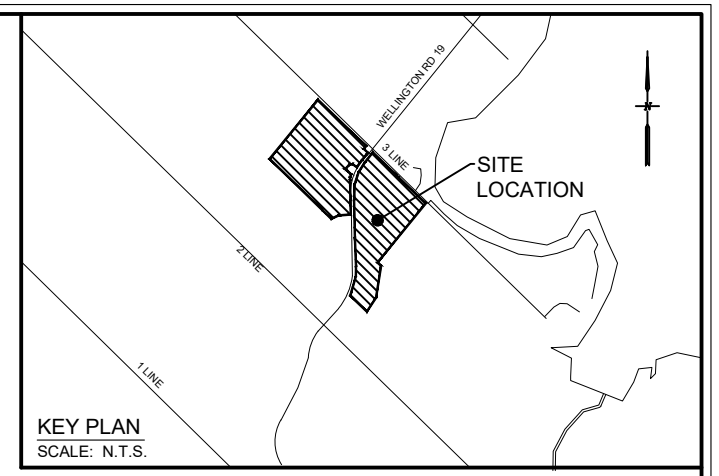
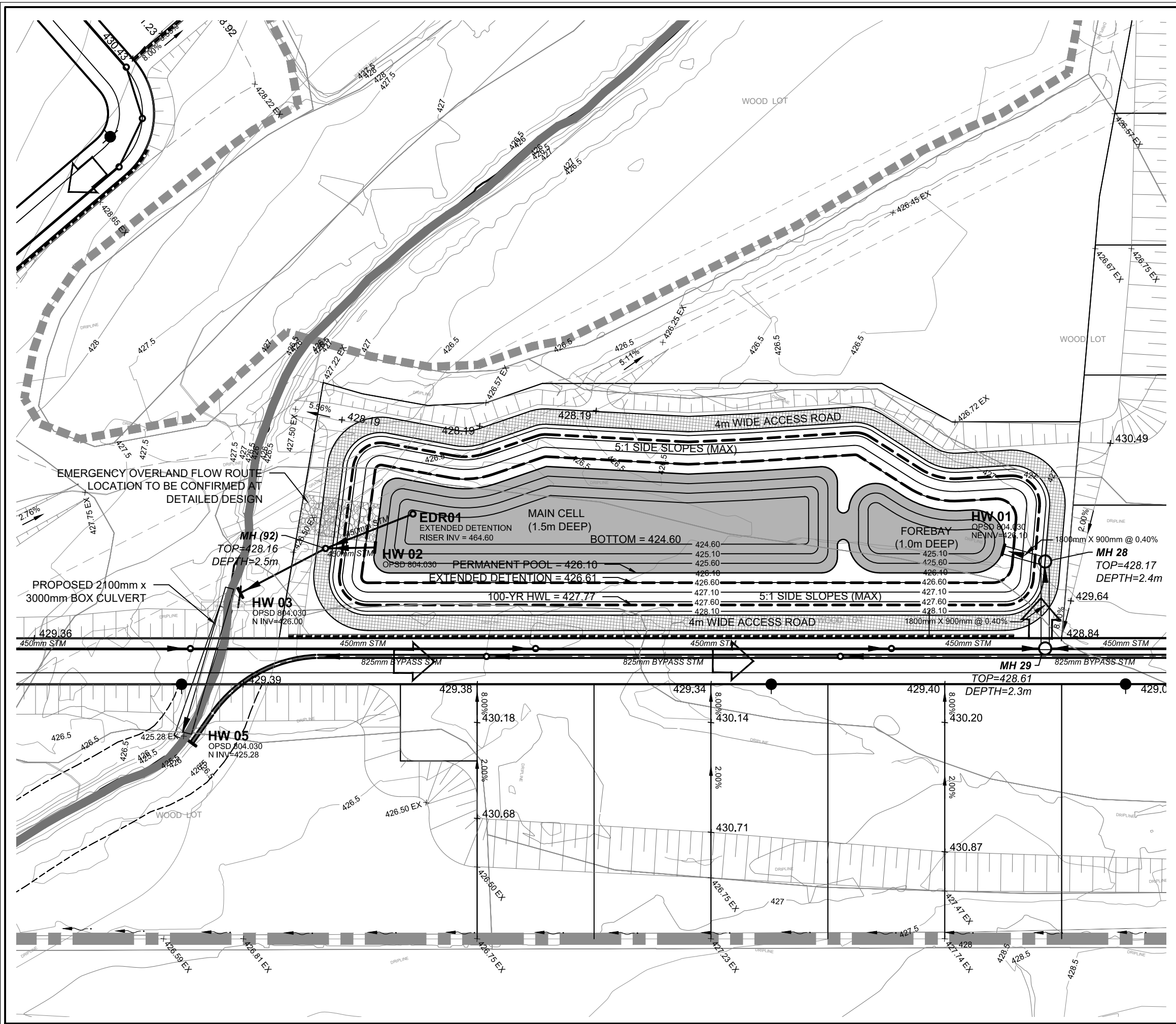
The stormwater management pond, SWMF1, is located at the south end of the SE Site roughly in the middle, adjacent to the Black Drain at a low point. The pond has been designed with 5:1 side slope and a 4 m wide access road to provide access to the forebay, pond inlet and outlet. The pond outlet will be directed to the Black Drain. The requirement for a pond liner will be confirmed at detailed design in order to maintain a permanent pool based on the groundwater levels observed.

Table 12 summarizes the operating characteristics for SWMF1, and the storage volumes required to meet the design criteria.

Table 12 Summary Table for SWM Pond 1

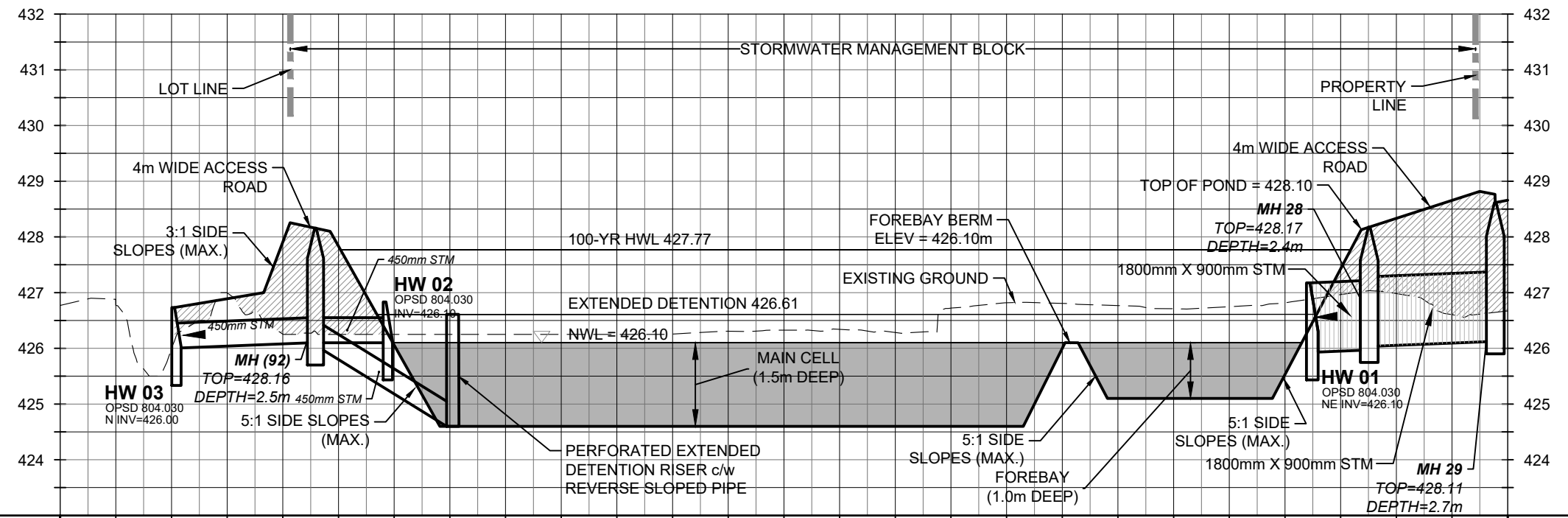
Drainage Area	=	26.92 ha	% IMP=	33.6
Pond Block Area	=	1.27 ha		
Permanent Pool Required	=	99.7 m ³ /ha	x	26.92 ha = 2,684 m ³
Permanent Pool Provided	=	3,546 m ³		
Max Depth	=	1.5 m		
Permanent Pool Elevation	=	426.10 m		
Erosion Control =	=	8.321mm x 26.92 ha x 10		2,240 m ³
Release Rate	=	39 L/s		
ED Active Storage Provided	=	2,249 m ³		
Depth	=	0.51 m	@	426.61m
Return Event	Pond Out-Flow (m ³ /s)	Storage Volume (m ³)	Water Elevation (m)	
2-year	0.049	2,845	426.72	
5-year	0.106	4,463	427.03	
10-year	0.152	5,550	427.21	
25-year	0.138	7,007	427.45	
50-year	0.262	8,132	427.60	
100-year	0.311	9,283	427.77	

Calculations associated with the stormwater management pond sizing are included in Appendix D. Figures 7 and 8 illustrate the proposed SWMF1 configuration and section including minor grading around the pond.




BURNSIDE			
Client			
FERGUS DEVELOPMENT INC.			
Figure Title			
FERGUS GOLF COURSE			
SWM POND PLAN			
Drawn	Checked	Date	7
BF	LG	22/01/21	
Scale	Project No.		
1:1000	300052719		

File: \\velmo\Shared Work Areas\052719_05 FSR07_Figures\FSR FIGURES\052719_05 SWM POND 1.dwg Date Plotted: January 21, 2022 - 12:20 PM



EXIST\PROP CENTERLINE ELEVATION	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180	0+190	0+200	0+210	0+220	0+230	0+240	0+250	0+260	EXIST\PROP CENTERLINE ELEVATION			
					427.69	427.69	425.79	425.79	424.60	424.60	424.60	424.60	424.60	424.60	424.60	424.60	424.60	424.60	424.60	426.02	426.02	425.10	425.10	425.10	425.10	425.10	425.37	425.37	427.28	427.28	
CHAINAGE	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180	0+190	0+200	0+210	0+220	0+230	0+240	0+250	0+260	CHAINAGE			

SWM POND - SECTION A-A
SCALE H1:1000 V1:100

			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE SWM POND SECTION			
Drawn BF	Checked LG	Date 22/01/21	8
Scale 1:500	Project No. 300052719		

6.5 Water Balance / Infiltration

A preliminary water balance was completed by Golder which reviewed the pre-development and unmitigated post-development water balance for the subdivision block. It is proposed, on a site wide basis, that the rooftop runoff can be directed to the surface to supplement the groundwater recharge. Based on the findings of the water balance, the site wide infiltration is expected to decrease by 14%, including the downspout disconnection.

In order to maintain pre-development infiltration, the report prepared by Golder recommends considering additional LID mitigation features. Refer to the section below for examples of LID options.

Based on the average depth to groundwater in the spring season being approximately 0.6 m below grade, there is limited feasibility to implement subsurface LID's (e.g., infiltration trenches or galleries). LID inverts and depth to groundwater of any proposed sub-surface LID features will be confirmed during detailed design.

6.6 Low Impact Development

Based on Golder's analysis of soil and groundwater conditions, the water balance, under post-development conditions, can be partially maintained through discharge of roof leaders to grade. The at grade discharge of roof leaders ensures that downspouts outlet to grassed swales within the rear yard or side yard, as opposed to outletting to the driveway and entering the storm sewer system.

To ensure the water balance is fully maintained under post-development conditions, LIDs measures will be implemented. LIDs such as linear bioswales implemented within the road right-of-way as well as potentially directing the cul-de-sac drainage to a centralized infiltration facility will be investigated at the detailed design stage.

The stormwater management block identified within the design currently does not reflect any reductions in runoff volume to the facility as a result of the use of LID techniques.

7.0 Erosion and Sediment Control.

The following general Erosion and Sediment Control (ESC) measures will be implemented as part of the construction works associated with the proposed redevelopment. A detailed Erosion Sediment Control Plan will be established during the detailed design approvals process. The ESC measures noted below are intended to mitigate the potential impacts associated with the construction activities on the surrounding environment. The ESC measures listed below are applicable to all construction activities within the subject property:

- a) Erosion and Sediment Control (ESC) measures will be implemented prior to, and maintained during the construction phases, to prevent entry of sediment into the water.
- b) Sediment control fence consisting of non-woven material shall be installed and maintained to prevent sediment from leaving the proposed construction areas. Location of fencing will be established based on the site staging and proposed construction work.
- c) The contractor shall maintain a supply of silt fence, clear stone, straw bales and filter fabric on-site for emergency use.
- d) All in-water and near water works will be conducted in the dry, with appropriate erosion and sediment controls.
- e) No equipment or vehicles are permitted to cross through the watercourse, unless approved by Grand River Conservation Authority.
- f) No sediment-laden water or deleterious substances will be released to the adjacent waterbody at any time. Dewatering discharge containing sediment laden water must be discharged to a sediment bag positioned in a vegetated area and allowed to discharge into existing established vegetation at least 30m from any watercourse or existing storm catchbasin.
- g) Removal of vegetative cover will be staged and restricted to a period immediately preceding the commencement of earth works in each stage.
- h) Disturbed areas will be temporarily or permanently stabilized or restored as the work progresses.
- i) If site construction activities are interrupted, and/or inactivity exceeds 30 days, all stripped and/or bare soil areas are to be stabilized using either erosion control matting (e.g., jute), sodding/seeding/mulching or other approved methods to the satisfaction of the site inspector.

- j) Equipment, stockpiled material or construction material will be stored outside watercourse and buffer areas and in a manner that prevents sediment or deleterious substances from entering the Black Drain.
- k) Vehicular refueling and maintenance will be conducted a minimum of 30 metres from the water.
- l) An ESC monitoring program will be used as detailed below in Section 9. Erosion and sediment control methods are to be continuously monitored, evaluated, and upgraded when necessary (see further details below in Section 9.0).
- m) All damaged erosion and sediment control measures should be repaired and/or replaced within 48 hours of the inspection.
- n) After hours contact numbers are to be posted on-site for emergencies.

8.0 Conclusions & Recommendations

The preceding report provides an investigation of existing drainage conditions and an assessment of the stormwater management plan for the Fergus Golf Club redevelopment in the Township of Centre Wellington.

As outlined in the report above, the stormwater management blocks provided in the Draft Plan of Subdivision are adequate to support the stormwater management measures required to meet the design criteria.



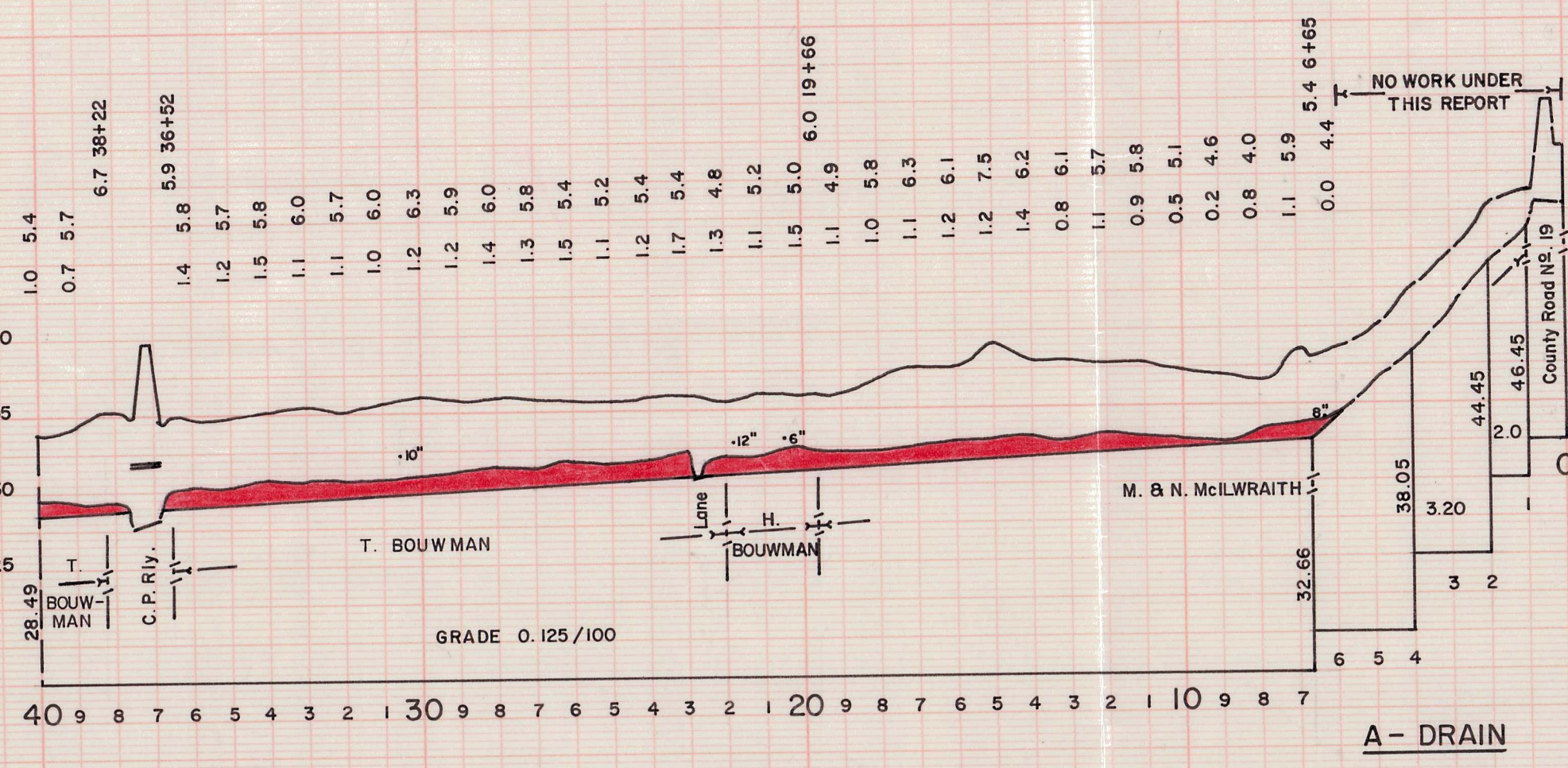
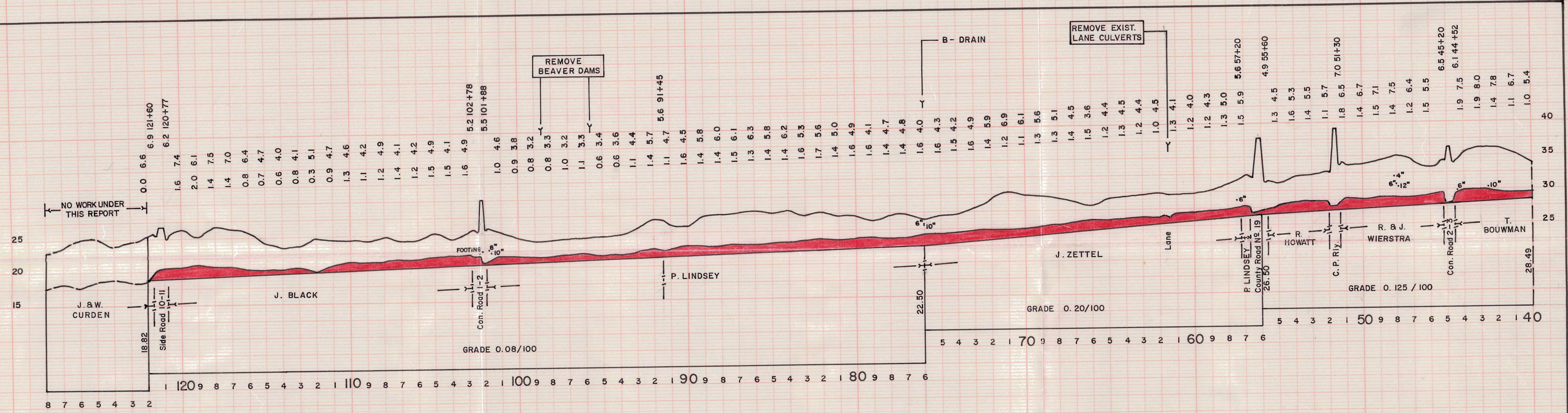
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]



Appendix A

Background Information



BENCH MARKS

A 0+82	TOP CENTRE DWST. 18" DIA. C.S.P.	49.50
A 1+00	SPIKE IN FENCE POST	40' S. 50.31
A 14+40	TOP CENTRE DWST. CONC. CULVERT	12' W. 40.12
A 36+90	TOP CENTRE UPST. CONC. HEADWALL	37.25
A 45+10	TOP CENTRE DWST. 5' DIA. C.S.P.	32.92
A 51+70	TOP WEST TRACK	39.19
A 56+55	TOP CENTRE DWST. 5.5' DIA. C.S.P.	32.26
A 91+50	TOP CENTRE DWST. 18" DIA. C.S.P.	20' N. 26.22
A 102+32	TOP CENTRE DWST. CONC. WHEELGUARD	30.87
A 121+26	TOP CENTRE DWST. CONC. WHEELGUARD	27.99
B 0+60	SPIKE IN 1' DIA. SPRUCE TREE	2' S. 41.21
B 14+45	SPIKE IN FENCE POST	30' N. 34.03
B 24+78	SPIKE IN FENCE POST	45' N. 28.34

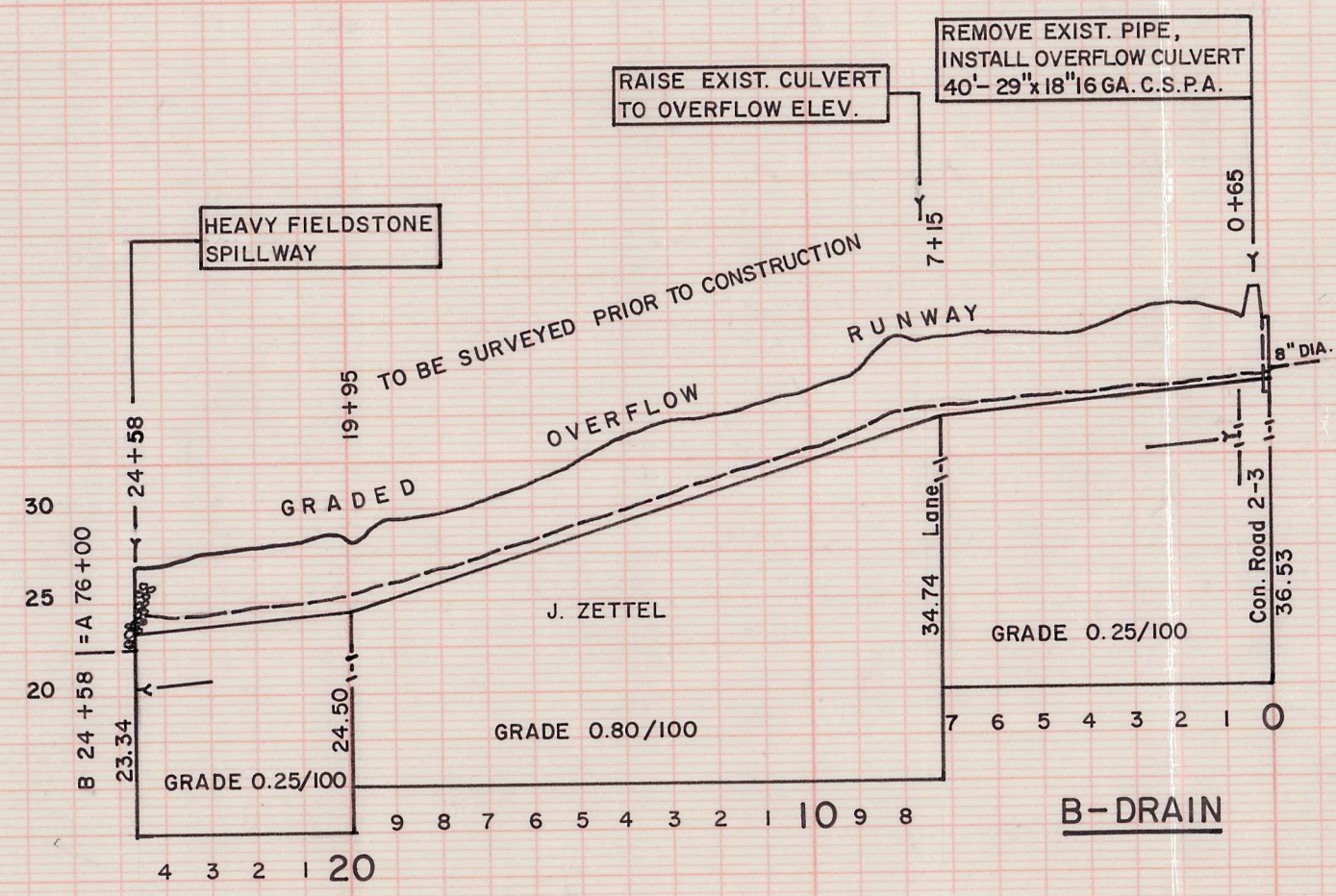
BOTTOM WIDTH: A 0+00-90+00 3 ft.
A 90+00-122+00 4 ft.

SIDE SLOPE: lft. vert. to lft. horz.

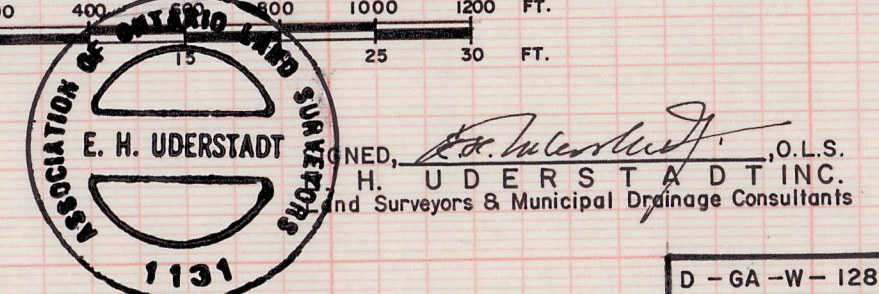
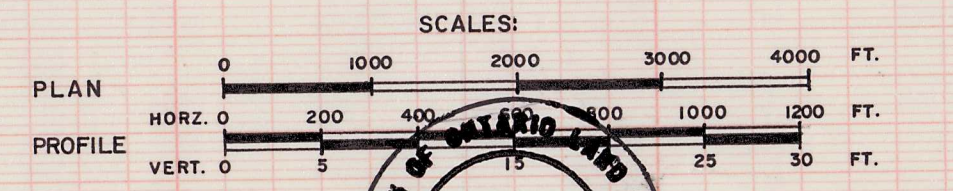
PLAN & PROFILES
OF THE
BLACK DRAINAGE WORKS
REPAIR & IMPROVEMENT, 1976
IN THE TOWNSHIPS OF
NICHOL AND WEST GARAFRAXA

B DRAIN TILE SIZES

24+58-24+44 14 LIN. FT. 15" DIA. 18 GA. M.P. WITH GRATE
24+44-19+95 449 LIN. FT. 12" DIA. FIELD TILE
19+95-0+00 1955 LIN. FT. 10" DIA. FIELD TILE
CON. ROAD 2-3 40 LIN. FT. 12" DIA. 16 GA. M.P.
CATCH BASIN: 0+00



DATED, MAR. 29, 1976
Orangeville, Ontario



Project: Fergus Golf Course
File: 300052719
Designed by: L.Garner
Date: 5-Apr-21



IDF Parameter Conversion

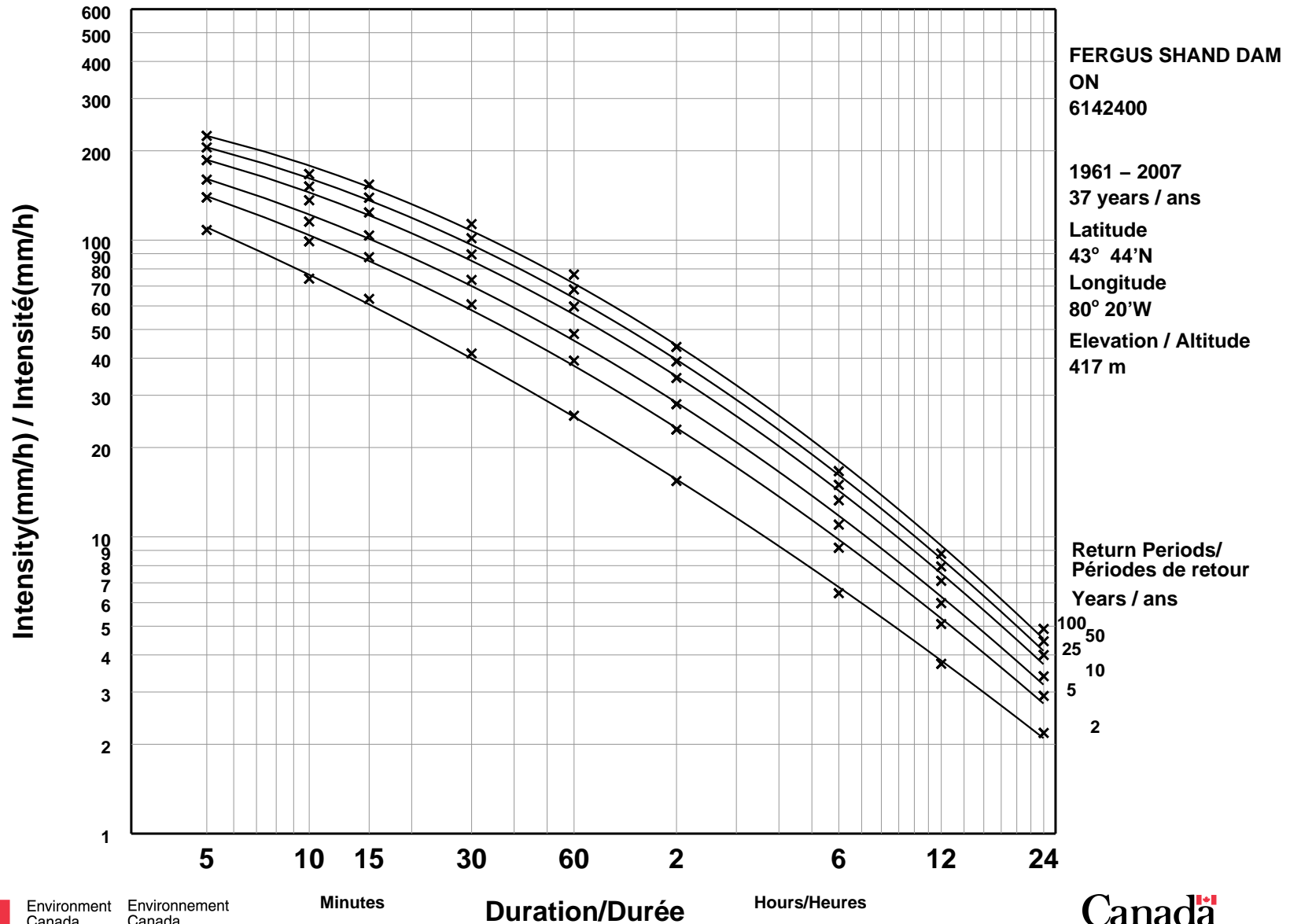
	A	B	C
2 Year	22.6	-0.702	
5 Year	31.6	-0.698	
10 Year	37.5	-0.696	
25 Year	45	-0.694	
50 Year	50.5	-0.693	
100 Year	56	-0.693	

	A	B	C
2 Year	400.2862	0	0.702
5 Year	550.6006	0	0.698
10 Year	648.0739	0	0.696
25 Year	771.3464	0	0.694
50 Year	862.0852	0	0.693
100 Year	955.9757	0	0.693

Short Duration Rainfall Intensity–Duration–Frequency Data

2019/02/27

Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



Environment and Climate Change Canada
 Environnement et Changement climatique Canada

Short Duration Rainfall Intensity-Duration-Frequency Data
 Données sur l'intensité, la durée et la fréquence des chutes
 de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2019/02/27

```

=====
FERGUS SHAND DAM                                ON            6142400
Latitude:  43 44'N   Longitude: 80 20'W   Elevation/Altitude: 417      m
Years/Années :  1961 - 2007           # Years/Années :    37
=====
    
```

Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

Year Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1961	11.7	19.8	25.4	27.9	36.8	41.9	45.2	46.6	48.9
1962	-99.9	-99.9	-99.9	-99.9	21.6	24.4	43.4	52.8	59.2
1963	-99.9	14.7	15.7	15.7	16.8	20.8	26.4	31.2	51.3
1964	-99.9	-99.9	19.6	25.7	26.2	26.7	31.2	34.8	53.3
1965	-99.9	7.9	11.2	19.0	19.3	29.0	33.5	43.9	61.0
1966	-99.9	7.6	7.9	8.9	10.9	17.5	20.1	30.2	37.1
1967	-99.9	-99.9	33.5	53.8	86.9	89.4	111.0	113.5	116.8
1968	10.4	15.7	21.3	29.0	38.4	52.8	64.5	65.0	117.6
1970	7.9	9.4	13.5	16.5	18.3	19.6	36.6	37.3	37.3
1972	9.1	16.0	23.1	37.1	58.4	65.8	67.3	78.2	78.2
1973	12.2	18.0	22.6	30.5	30.7	52.6	54.1	54.1	76.5
1974	6.6	9.1	12.2	18.0	23.9	34.8	46.5	63.8	65.5
1975	9.4	12.4	15.5	18.8	20.6	24.1	35.3	42.2	44.7
1976	13.5	13.5	16.8	24.1	29.2	38.1	59.2	59.2	59.2
1977	9.1	15.5	17.8	20.3	23.9	24.1	34.0	38.6	48.8
1978	11.7	12.8	12.8	17.6	23.4	34.1	40.6	43.4	50.0
1979	5.5	7.9	9.5	13.4	13.5	14.1	17.6	28.6	34.2
1980	11.6	13.0	17.1	23.7	42.0	54.5	62.8	63.0	63.2
1981	8.0	14.1	16.6	18.2	21.8	22.9	34.0	41.8	51.5
1982	8.1	11.2	12.7	18.0	23.2	24.2	29.2	31.2	34.0
1983	7.6	13.4	14.0	18.4	18.6	19.0	23.5	26.6	36.9

1984	13.5	13.7	13.9	15.1	17.4	18.2	23.4	35.8	43.8
1985	11.5	13.2	17.8	26.6	26.6	32.4	37.5	49.0	65.4
1987	8.0	10.3	12.2	13.0	14.4	-99.9	-99.9	81.2	81.2
1988	7.4	9.5	11.8	17.9	31.9	35.3	42.2	42.2	42.6
1989	11.0	14.5	14.7	16.4	19.5	26.0	37.3	49.6	50.6
1990	6.1	9.0	13.2	20.8	23.7	25.0	27.4	31.4	36.8
1991	17.3	18.9	20.3	24.6	35.9	40.1	55.4	67.3	73.4
1992	9.7	12.6	17.1	19.8	31.0	36.5	-99.9	-99.9	67.8
1993	6.3	7.3	10.5	15.6	16.2	18.6	25.3	28.6	45.1
1994	7.5	9.7	11.8	13.4	13.6	15.9	21.8	30.3	36.7
1996	9.7	12.6	15.6	19.3	26.9	29.8	35.8	45.0	49.7
1997	4.5	6.1	8.1	9.9	12.8	14.4	21.8	26.0	32.0
1998	4.7	5.8	7.2	9.0	15.2	24.5	40.1	52.6	70.2
1999	11.1	18.0	23.6	33.1	37.6	40.9	57.2	60.5	63.4
2000	7.1	11.9	16.8	20.3	26.2	28.4	48.9	51.3	53.0
2001	8.3	13.6	19.3	32.0	38.7	40.8	44.0	44.0	44.0
2002	10.6	17.3	20.8	21.7	22.1	23.7	25.0	29.0	29.6
2003	17.0	31.2	43.0	65.2	75.6	79.6	79.6	80.0	80.0
2004	9.1	12.5	13.9	16.7	22.1	30.6	43.0	43.0	58.9
2005	11.3	20.2	29.1	37.8	46.6	65.4	65.5	65.5	65.5
2006	7.8	12.5	17.3	23.3	24.7	31.0	39.2	39.6	42.0
2007	9.5	12.8	16.0	20.4	26.9	26.9	27.1	30.8	36.1

# Yrs.	37	40	42	42	43	42	41	42	43
Années									
Mean	9.5	13.1	17.0	22.5	28.1	33.7	41.8	47.8	55.7
Moyenne									
Std. Dev.	2.9	4.7	6.9	10.9	15.4	17.1	18.5	18.3	19.7
Écart-type									
Skew.	0.75	1.42	1.69	2.12	2.18	1.59	1.54	1.39	1.40
Dissymétrie									
Kurtosis	4.03	7.51	7.45	8.94	8.71	5.59	6.72	5.79	5.74

*-99.9 Indicates Missing Data/Données manquantes

Warning: annual maximum amount greater than 100-yr return period amount

Avertissement : la quantité maximale annuelle excède la quantité pour une période de retour de 100 ans

Year/Année	Duration/Durée	Data/Données	100-yr/ans
1967	1 h	86.9	76.6
1967	2 h	89.4	87.3
1967	6 h	111.0	99.9
1967	12 h	113.5	105.3
1968	24 h	117.6	117.5
2003	10 min	31.2	27.8
2003	15 min	43.0	38.5
2003	30 min	65.2	56.6

Table 2a : Return Period Rainfall Amounts (mm)
 Quantité de pluie (mm) par période de retour

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	9.0	11.6	13.3	15.5	17.1	18.7	37
10 min	12.4	16.5	19.2	22.7	25.3	27.8	40
15 min	15.8	21.9	25.9	31.0	34.7	38.5	42
30 min	20.8	30.4	36.7	44.8	50.7	56.6	42
1 h	25.6	39.2	48.3	59.7	68.2	76.6	43
2 h	30.9	46.0	56.0	68.6	78.0	87.3	42
6 h	38.8	55.1	66.0	79.6	89.8	99.9	41
12 h	44.8	61.0	71.7	85.3	95.3	105.3	42
24 h	52.4	69.8	81.4	95.9	106.7	117.5	43

Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits
 Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	108.2	139.3	159.9	186.0	205.3	224.5	37
	+/- 10.4	+/- 17.6	+/- 23.7	+/- 32.0	+/- 38.3	+/- 44.6	37
10 min	74.2	99.0	115.4	136.2	151.6	166.9	40
	+/- 8.0	+/- 13.5	+/- 18.2	+/- 24.5	+/- 29.3	+/- 34.2	40
15 min	63.4	87.6	103.7	124.0	139.0	153.9	42
	+/- 7.6	+/- 12.8	+/- 17.3	+/- 23.4	+/- 27.9	+/- 32.6	42
30 min	41.5	60.7	73.4	89.5	101.4	113.3	42
	+/- 6.0	+/- 10.2	+/- 13.7	+/- 18.5	+/- 22.1	+/- 25.8	42
1 h	25.6	39.2	48.3	59.7	68.2	76.6	43
	+/- 4.2	+/- 7.1	+/- 9.6	+/- 13.0	+/- 15.5	+/- 18.1	43
2 h	15.4	23.0	28.0	34.3	39.0	43.7	42
	+/- 2.4	+/- 4.0	+/- 5.4	+/- 7.3	+/- 8.7	+/- 10.2	42
6 h	6.5	9.2	11.0	13.3	15.0	16.6	41
	+/- 0.9	+/- 1.5	+/- 2.0	+/- 2.7	+/- 3.2	+/- 3.7	41
12 h	3.7	5.1	6.0	7.1	7.9	8.8	42
	+/- 0.4	+/- 0.7	+/- 1.0	+/- 1.3	+/- 1.6	+/- 1.8	42
24 h	2.2	2.9	3.4	4.0	4.4	4.9	43
	+/- 0.2	+/- 0.4	+/- 0.5	+/- 0.7	+/- 0.8	+/- 1.0	43

Table 3 : Interpolation Equation / Équation d'interpolation: $R = A \cdot T^B$

R = Interpolated Rainfall rate (mm/h)/Intensité interpolée de la pluie (mm/h)

RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)

T = Rainfall duration (h) / Durée de la pluie (h)

Statistics/Statistiques	2	5	10	25	50	100
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans
Mean of RR/Moyenne de RR	37.8	51.8	61.0	72.7	81.3	89.9
Std. Dev. /Écart-type (RR)	37.1	48.3	55.7	65.2	72.2	79.2
Std. Error/Erreur-type	8.6	16.4	21.4	27.8	32.5	37.1
Coefficient (A)	22.6	31.6	37.5	45.0	50.5	56.0
Exponent/Exposant (B)	-0.702	-0.698	-0.696	-0.694	-0.693	-0.693
Mean % Error/% erreur moyenne	9.2	13.9	15.7	17.4	18.3	19.1



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

SWMHYMO Modelling Parameters and Model Output

Table 9-5 Runoff curve numbers for urban areas ^{1/}

Cover description cover type and hydrologic condition	Average percent impervious area ^{2/}	-- CN for hydrologic soil group --			
		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/}					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94

Site Soil Groups:
Perth/Parkhill Loam = Soil Group C
Listowel/Harriston Loam = Soil Group B
Hillsburgh Fine Sandy Loam = Soil Group A

The golf course can be said to be in good condition, refer to composite CN calculation

1/ Average runoff condition, and $I_a = 0.2S$.

2/ The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

3/ CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space type.

4/ Composite CNs for natural desert landscaping should be computed using figures 9-3 or 9-4 based on the impervious area percentage (CN=98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

Table 9-1 Runoff curve numbers for agricultural lands ^{1/} — Continued

covertype	Cover description treatment ^{2/}	hydrologic condition ^{3/}	--CN for hydrologic soil group--			
			A	B	C	D
Pasture, grassland, or range- continuous forage for grazing ^{4/}		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		Good	30	58	71	78
Brush-brush-forbs-grass mixture with brush the major element ^{5/}		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 ^{6/}	48	65	73
Woods-grass combination (orchard or tree farm) ^{7/}		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods ^{8/}		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30	55	70	77
Farmstead—buildings, lanes, driveways, and surrounding lots		---	59	74	82	86
Roads (including right-of-way):						
Dirt		---	72	82	87	89
Gravel		---	76	85	89	91

1/ Average runoff condition, and $I_a = 0.2s$.

2/ Crop residue cover applies only if residue is on at least 5 percent of the surface throughout the year.

3/ Hydrologic condition is based on combinations of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface toughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

For conservation tillage poor hydrologic condition, 5 to 20 percent of the surface is covered with residue (less than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

For conservation tillage good hydrologic condition, more than 20 percent of the surface is covered with residue (greater than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

4/ Poor: < 50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: > 75% ground cover and lightly or only occasionally grazed.

5/ Poor: < 50% ground cover.

Fair: 50 to 75% ground cover.

Good: > 75% ground cover.

6/ If actual curve number is less than 30, use CN = 30 for runoff computation.

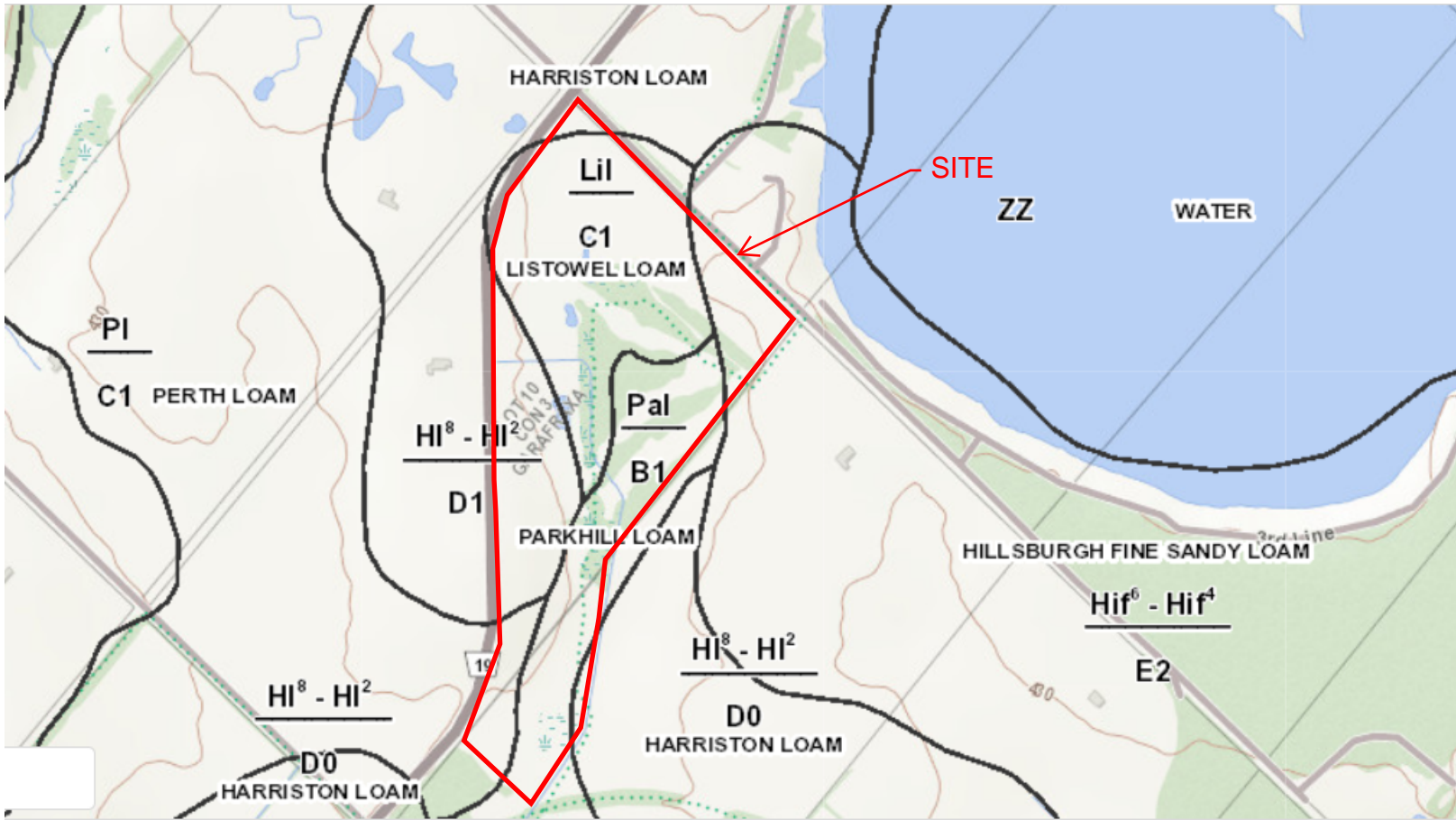
7/ CNs shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture.

8/ Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

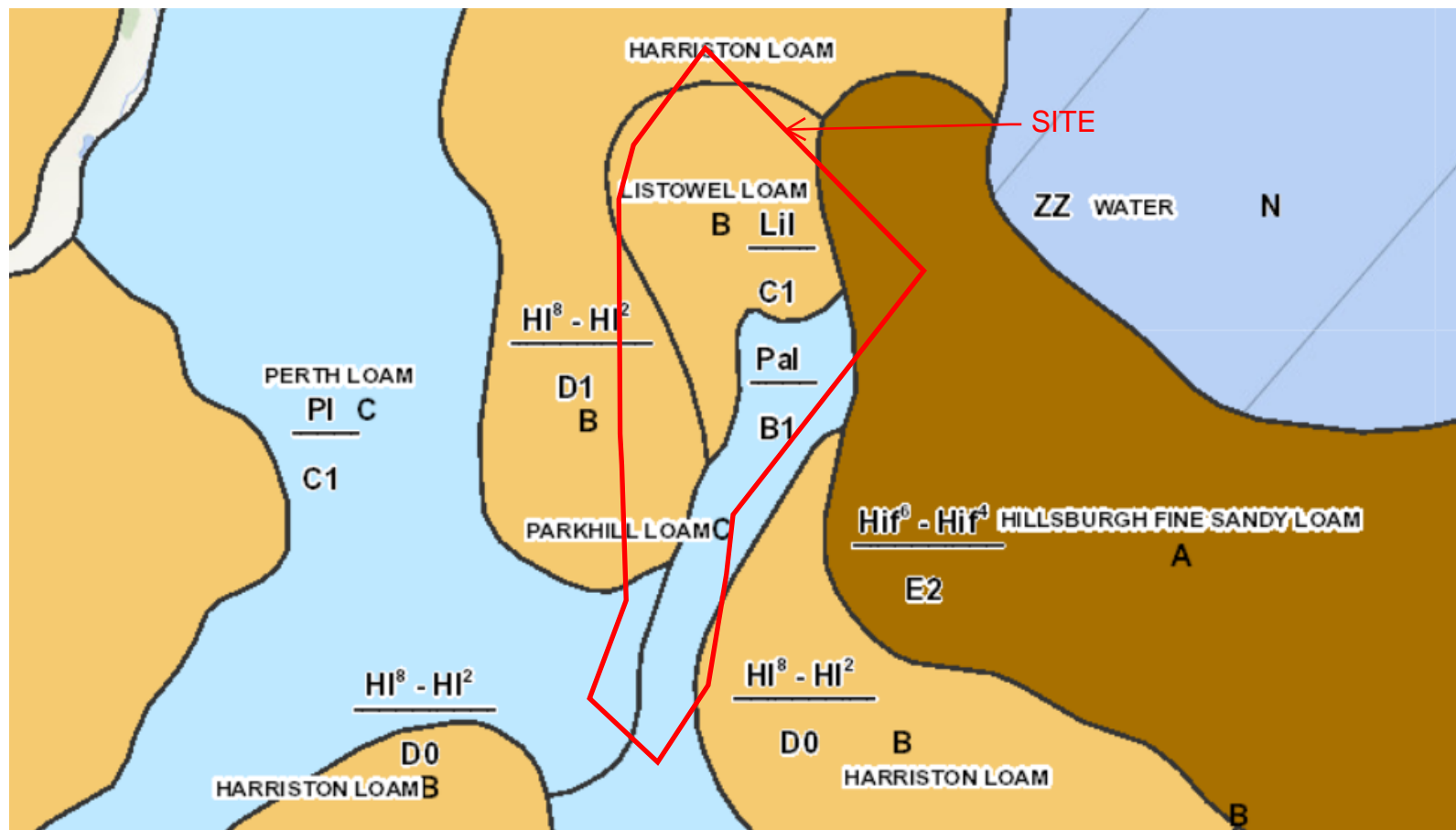
Fair: Woods are grazed, but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Hydrologic Soil Group Mapping - Ontario AgMaps



Mapping with Soil Group



 BURNSIDE	Project: Fergus Golf Club	Prepared by: L.Garner Project no.: 300052719
	Task: Curve Number Summary	
	Date: 20-Dec-21	

Pre-Development

	Perth Loam			Listowel Loam					
Soil Name	Parkhill Loam			Harriston Loam			Hillsburgh Fine Sandy Loam		
Land Cover	Golf Course/Lawn	Woods	Meadow	Golf Course/Lawn	Woods	Meadow	Golf Course/Lawn	Woods	Meadow
Soil Group	C	C	C	B	B	B	A	A	A
CN Number	74	77	71	61	60	58	39	30	30

Catchment	Total Area	Soil Group C			Soil Group B			Soil Group A			CN Number
		Golf Course	Woods	Meadow	Golf Course	Woods	Meadow	Golf Course	Woods	Meadow	
EXT1	7.93				7.93						61
EXT2*	0.34						0.34				58
EXT3*	1.23						1.15			0.08	56
EXT4*	0.18									0.18	30
EXT5	8.51			0.63			0.74			7.14	35
EXT6	15.73			0.74			12.93			2.06	55
101	1.58				1.46	0.12					61
102	16.14		0.78		10.62	3.68		1.06			60
103	7.09	0.88	0.27		5.18	0.75					63
104	7.13	1.53	2.86			0.15		1.79	0.80		61
105	7.91	5.97	0.18		1.64	0.12					71

*Note: For Stanhyd commands CN value is based solely on the pervious surfaces, in this case the road side ditch ground cover

Post-Development

Catchment	Total Area	Soil Group C		Soil Group B		Soil Group A		CN Number
		Lawns	Woods	Lawns	Woods	Lawns	Woods	
201	26.92	6.22		17.79		2.91		62
202	2.99	2.99						74
UNC1	0.98			0.98				61
UNC2	1.81	1.41				0.40		66
UNC3	5.82		0.59	3.18	2.05			62
UNC4	1.12	0.28		0.84				64
UNC5	0.13					0.13		39
UNC6	0.08	0.08						74

Note: For Stanhyd commands CN value is based solely on the pervious surfaces

Project: **Fergus Golf Club**
 Project #: 300052719
 Designed By: L.Garner
 Date: 22-Dec-2021



Airport Method for Time to Peak Calculations

Natural Area Watershed Information

WS	Area (ha)	Length (m)	RC	Slope (%)	Time of Concentration (min)	Time to Peak (hrs)
PRE-DEVELOPMENT						
101	1.58	207	0.2	2.46	31.35	0.31
102	16.14	618	0.2	0.73	80.75	0.81
103	7.09	234	0.2	5.19	26.06	0.26
104	7.13	446	0.2	1.00	62.01	0.62
105	7.91	269	0.2	3.94	30.61	0.31
EXTERNAL						
EXT1	7.93	361	0.25	1.74	43.88	0.44
EXT5	8.51	260	0.2	1.20	44.48	0.44
EXT6	15.73	510	0.2	1.79	54.67	0.55
POST-DEVELOPMENT						
UNC1	0.98	15	0.2	29.30	3.73	0.04
UNC2	1.81	131	0.2	4.34	20.69	0.21
UNC3	5.82	412	0.2	0.36	83.12	0.83
UNC4	1.12	27	0.2	23.40	5.39	0.05
UNC5	0.13	24	0.2	8.42	7.12	0.07
UNC6	0.08	6	0.2	3.83	4.61	0.05

NOTE: Time to Peak = 0.60T_c

NOTE: Airport method was selected to calculate the watershed time of concentration as per the MOE Drainage Management Manual (for RC less than 0.4) - see below

Airport Formula

For watersheds where the runoff coefficient, C, is less than 0.40, the Airport formula gives a better estimate of t_c. This method was developed for airfields and is expressed as follows:

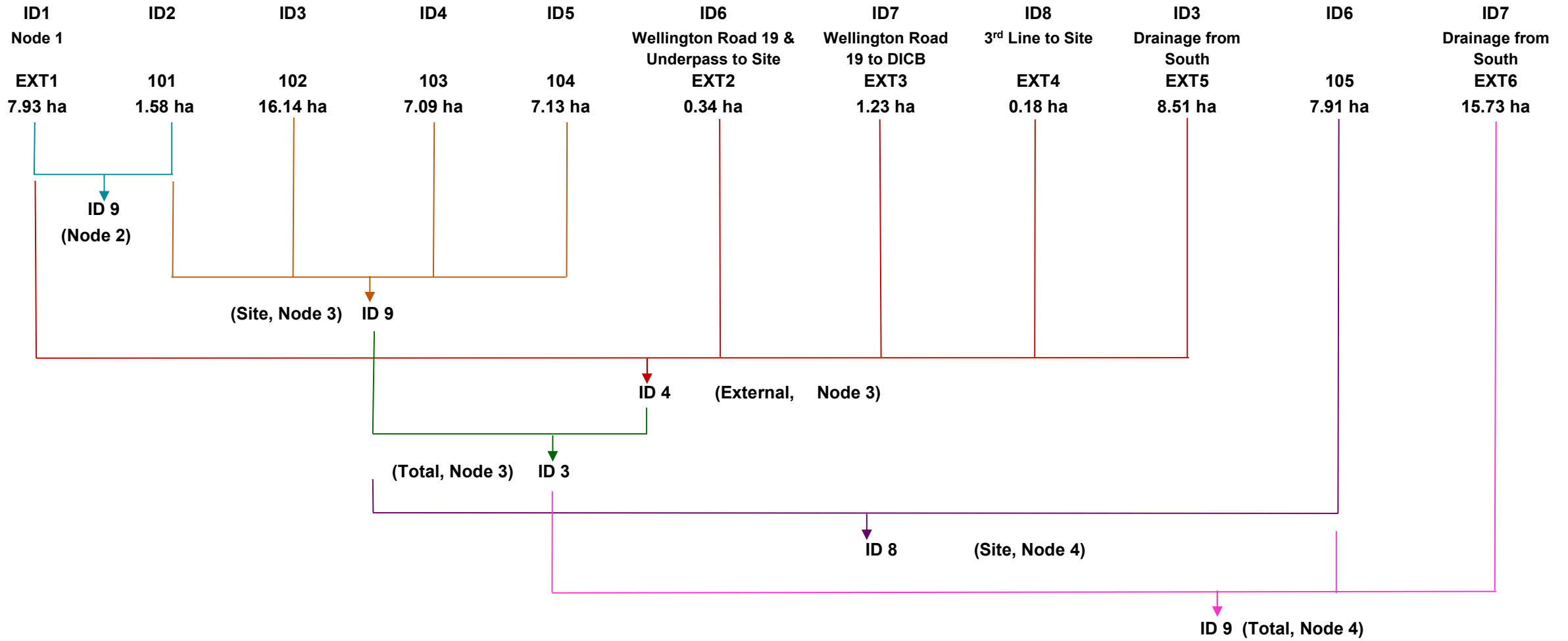
$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}} \quad (8.16)$$

where:

- t_c = time of concentration, min
- C = runoff coefficient
- S_w = watershed slope, %
- L = watershed length, m

When a watershed length is made up of widely differing surfaces (e.g. grass and concrete), t_c, can be calculated for each surface, and the individual values summed to give the overall value.

Pre-Development SWMHYMO Model Schematic



Project Name Fergus Golf Course
Project No. 300052719.0000
Date September 24, 2021




```

00271>
00272> ADD HYD          Idsum=[8], NHYD=["Node4"], Ids to add=[6,9]
00273> *%-----
00274> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00275> *103, 104, EXT5, 105, EXT6)
00276>
00277> ADD HYD          Idsum=[9], NHYD=["Node4Tot"], Ids to add=[3,6,7]
00278> *%-----
00279> *%-----
00280> *10-Year
00281> CHICAGO STORM    IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00282> ICASEcs=[1],
00283> A=[648.07], B=[0.0001], and C=[0.696],
00284> *%-----
00285> *%-----
00286> *Catchment EXT1
00287> *External area on the northwest of Wellington Road 19.
00288> *This catchment drains to the golf course via a culvert under Wellington Road 19
00289> *and forms the start of the Black Drain at NODE 1
00290>
00291> DESIGN NASHYD     ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00292> DWF=[0] (cms), CN/C=[61], TP=[0.44]hrs,
00293> RAINFALL=[ , , , ] (mm/hr), END=-1
00294> *%-----
00295> *Catchment 101
00296> *Drains to NODE 2
00297>
00298> DESIGN NASHYD     ID=[2], NHYD=["101"], DT=[2]min, AREA=[1.58] (ha),
00299> DWF=[0] (cms), CN/C=[61], TP=[0.31]hrs,
00300> RAINFALL=[ , , , ] (mm/hr), END=-1
00301> *%-----
00302> *Total Flow at Node 2 (Catchment EXT1 & 101)
00303>
00304> ADD HYD          Idsum=[9], NHYD=["Node2"], Ids to add=[1,2]
00305> *%-----
00306> *Catchment 102
00307> *This catchment refers to the north corner of the site
00308> *These lands ultimately enter the drain by Node 3
00309>
00310> DESIGN NASHYD     ID=[3], NHYD=["102"], DT=[2]min, AREA=[16.14] (ha),
00311> DWF=[0] (cms), CN/C=[60], TP=[0.81]hrs,
00312> RAINFALL=[ , , , ] (mm/hr), END=-1
00313> *%-----
00314> *Catchment 103
00315> *This catchment refers to the northwest side of the site, existing golf course
00316> *These land drain to Node 3 along the Black Drain
00317>
00318> DESIGN NASHYD     ID=[4], NHYD=["103"], DT=[2]min, AREA=[7.09] (ha),
00319> DWF=[0] (cms), CN/C=[63], TP=[0.26]hrs,
00320> RAINFALL=[ , , , ] (mm/hr), END=-1
00321> *%-----
00322> *Catchment 104
00323> *This catchment refers to the southeast corner of the site, existing golf course
00324> * and woods. These land drain to Node 3 along the Black Drain
00325>
00326> DESIGN NASHYD     ID=[5], NHYD=["104"], DT=[2]min, AREA=[7.13] (ha),
00327> DWF=[0] (cms), CN/C=[61], TP=[0.62]hrs,
00328> RAINFALL=[ , , , ] (mm/hr), END=-1
00329> *%-----
00330> *Total Flow at Node 3, no external (101, 102, 103, 104)
00331> *Pond 1 Allowable Release Rate
00332>
00333> ADD HYD          Idsum=[9], NHYD=["Node3SITE"], Ids to add=[2,3,4,5]
00334> *%-----
00335> *Catchment EXT2
00336> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00337> *This catchment drains to the golf course via a spill point and CB on south side
00338> *Wellington Road 19 and is directed to the Black Drain by Node 3
00339>
00340> DESIGN STANDHYD   ID=[6], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00341> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00342> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00343> *%-----
00344> *Catchment EXT3
00345> *External area - Wellington Road 19 and 3rd line and
00346> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00347> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00348> *and is directed to the Black Drain by Node 3
00349>
00350> DESIGN STANDHYD   ID=[7], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00351> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00352> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00353> *%-----
00354> *Catchment EXT4
00355> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00356> *This catchment spills to the golf course and is directed to the Black Drain by
00357>
00358> DESIGN STANDHYD   ID=[8], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00359> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00360> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00361> *%-----
00362> *Catchment EXT5
00363> *External area on the south of the site, existing agricultural
00364> *flows to the Black Drain at Node 3
00365>
00366> DESIGN NASHYD     ID=[3], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00367> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00368> RAINFALL=[ , , , ] (mm/hr), END=-1
00369> *%-----
00370> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00371> *Pond 1 Allowable Release Rate
00372>
00373> ADD HYD          Idsum=[4], NHYD=["Node3EXT"], Ids to add=[1,6,7,8,3]
00374> *%-----
00375>
00376> *Total Flow at Node 3, with external
00377> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00378>
00379> ADD HYD          Idsum=[3], NHYD=["Node3Tot"], Ids to add=[9,4]
00380> *%-----
00381> *Catchment 105
00382> *This catchment refers to the southeast corner of the site, existing golf course
00383> *These land drain to Node 4 along the Black Drain
00384> *Pond 2 Allowable Release Rate
00385>
00386> DESIGN NASHYD     ID=[6], NHYD=["105"], DT=[2]min, AREA=[7.91] (ha),
00387> DWF=[0] (cms), CN/C=[71], TP=[0.31]hrs,
00388> RAINFALL=[ , , , ] (mm/hr), END=-1
00389> *%-----
00390> *Catchment EXT6
00391> *External area on the south of the site, existing agricultural
00392> *flows to the Black Drain at Node 4
00393>
00394> DESIGN NASHYD     ID=[7], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00395> DWF=[0] (cms), CN/C=[55], TP=[.55]hrs,
00396> RAINFALL=[ , , , ] (mm/hr), END=-1
00397> *%-----
00398> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00399>
00400> ADD HYD          Idsum=[8], NHYD=["Node4"], Ids to add=[6,9]
00401> *%-----
00402> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00403> *103, 104, EXT5, 105, EXT6)
00404>
00405> ADD HYD          Idsum=[9], NHYD=["Node4Tot"], Ids to add=[3,6,7]

```

```

00406> *%-----
00407> *%-----
00408> *25-Year
00409> CHICAGO STORM    IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00410> ICASEcs=[1],
00411> A=[771.35], B=[0.0001], and C=[0.694],
00412> *%-----
00413> *Catchment EXT1
00414> *External area on the northwest of Wellington Road 19.
00415> *This catchment drains to the golf course via a culvert under Wellington Road 19
00416> *and forms the start of the Black Drain at NODE 1
00417>
00418> DESIGN NASHYD     ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00419> DWF=[0] (cms), CN/C=[61], TP=[0.44]hrs,
00420> RAINFALL=[ , , , ] (mm/hr), END=-1
00421>
00422> *%-----
00423> *Catchment 101
00424> *Drains to NODE 2
00425>
00426> DESIGN NASHYD     ID=[2], NHYD=["101"], DT=[2]min, AREA=[1.58] (ha),
00427> DWF=[0] (cms), CN/C=[61], TP=[0.31]hrs,
00428> RAINFALL=[ , , , ] (mm/hr), END=-1
00429> *%-----
00430> *Total Flow at Node 2 (Catchment EXT1 & 101)
00431>
00432> ADD HYD          Idsum=[9], NHYD=["Node2"], Ids to add=[1,2]
00433> *%-----
00434> *Catchment 102
00435> *This catchment refers to the north corner of the site
00436> *These lands ultimately enter the drain by Node 3
00437>
00438> DESIGN NASHYD     ID=[3], NHYD=["102"], DT=[2]min, AREA=[16.14] (ha),
00439> DWF=[0] (cms), CN/C=[60], TP=[0.81]hrs,
00440> RAINFALL=[ , , , ] (mm/hr), END=-1
00441> *%-----
00442> *Catchment 103
00443> *This catchment refers to the northwest side of the site, existing golf course,
00444> *These land drain to Node 3 along the Black Drain
00445>
00446> DESIGN NASHYD     ID=[4], NHYD=["103"], DT=[2]min, AREA=[7.09] (ha),
00447> DWF=[0] (cms), CN/C=[63], TP=[0.26]hrs,
00448> RAINFALL=[ , , , ] (mm/hr), END=-1
00449> *%-----
00450> *Catchment 104
00451> *This catchment refers to the southeast corner of the site, existing golf course
00452> * and woods. These land drain to Node 3 along the Black Drain
00453>
00454> DESIGN NASHYD     ID=[5], NHYD=["104"], DT=[2]min, AREA=[7.13] (ha),
00455> DWF=[0] (cms), CN/C=[61], TP=[0.62]hrs,
00456> RAINFALL=[ , , , ] (mm/hr), END=-1
00457> *%-----
00458> *Total Flow at Node 3, no external (101, 102, 103, 104)
00459> *Pond 1 Allowable Release Rate
00460>
00461> ADD HYD          Idsum=[9], NHYD=["Node3SITE"], Ids to add=[2,3,4,5]
00462> *%-----
00463> *Catchment EXT2
00464> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00465> *This catchment drains to the golf course via a spill point and CB on south side
00466> *Wellington Road 19 and is directed to the Black Drain by Node 3
00467>
00468> DESIGN STANDHYD   ID=[6], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00469> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00470> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00471> *%-----
00472> *Catchment EXT3
00473> *External area - Wellington Road 19 and 3rd line and
00474> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00475> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00476> *and is directed to the Black Drain by Node 3
00477>
00478> DESIGN STANDHYD   ID=[7], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00479> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00480> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00481> *%-----
00482> *Catchment EXT4
00483> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00484> *This catchment spills to the golf course and is directed to the Black Drain by
00485>
00486> DESIGN STANDHYD   ID=[8], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00487> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00488> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00489> *%-----
00490> *Catchment EXT5
00491> *External area on the south of the site, existing agricultural
00492> *flows to the Black Drain at Node 3
00493>
00494> DESIGN NASHYD     ID=[3], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00495> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00496> RAINFALL=[ , , , ] (mm/hr), END=-1
00497> *%-----
00498> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00499> *Pond 1 Allowable Release Rate
00500>
00501> ADD HYD          Idsum=[4], NHYD=["Node3EXT"], Ids to add=[1,6,7,8,3]
00502> *%-----
00503>
00504> *Total Flow at Node 3, with external
00505> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00506>
00507> ADD HYD          Idsum=[3], NHYD=["Node3Tot"], Ids to add=[9,4]
00508> *%-----
00509> *Catchment 105
00510> *This catchment refers to the southeast corner of the site, existing golf course
00511> *These land drain to Node 4 along the Black Drain
00512> *Pond 2 Allowable Release Rate
00513>
00514> DESIGN NASHYD     ID=[6], NHYD=["105"], DT=[2]min, AREA=[7.91] (ha),
00515> DWF=[0] (cms), CN/C=[71], TP=[0.31]hrs,
00516> RAINFALL=[ , , , ] (mm/hr), END=-1
00517> *%-----
00518>
00519> *External area on the south of the site, existing agricultural
00520> *flows to the Black Drain at Node 4
00521>
00522> DESIGN NASHYD     ID=[7], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00523> DWF=[0] (cms), CN/C=[55], TP=[.55]hrs,
00524> RAINFALL=[ , , , ] (mm/hr), END=-1
00525> *%-----
00526> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00527>
00528> ADD HYD          Idsum=[8], NHYD=["Node4"], Ids to add=[6,9]
00529> *%-----
00530> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00531> *103, 104, EXT5, 105, EXT6)
00532>
00533> ADD HYD          Idsum=[9], NHYD=["Node4Tot"], Ids to add=[3,6,7]
00534> *%-----
00535> *%-----
00536> *50-Year
00537> CHICAGO STORM    IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00538> ICASEcs=[1],
00539> A=[862.09], B=[0.0001], and C=[0.693],
00540> *%-----

```

```

00541> *%-----|
00542> *Catchment EXTI
00543> *External area on the northwest of Wellington Road 19.
00544> *This catchment drains to the golf course via a culvert under Wellington Road 19
00545> *and forms the start of the Black Drain at NODE 1
00546>
00547> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00548> DWF=[0] (cms), CN/C=[61], TP=[0.44]hrs,
00549> RAINFALL=[ , , , ](mm/hr), END=-1
00550> *%-----|
00551> *Catchment 101
00552> *Drains to NODE 2
00553>
00554> DESIGN NASHYD ID=[2], NHYD=["101"], DT=[2]min, AREA=[1.58] (ha),
00555> DWF=[0] (cms), CN/C=[61], TP=[0.31]hrs,
00556> RAINFALL=[ , , , ](mm/hr), END=-1
00557> *%-----|
00558> *Total Flow at Node 2 (Catchment EXTI & 101)
00559>
00560> ADD HYD Idsum=[9], NHYD=["Node2"], IDs to add=[1,2]
00561> *%-----|
00562> *Catchment 102
00563> *This catchment refers to the north corner of the site
00564> *These lands ultimately enter the drain by Node 3
00565>
00566> DESIGN NASHYD ID=[3], NHYD=["102"], DT=[2]min, AREA=[16.14] (ha),
00567> DWF=[0] (cms), CN/C=[60], TP=[0.81]hrs,
00568> RAINFALL=[ , , , ](mm/hr), END=-1
00569> *%-----|
00570> *Catchment 103
00571> *This catchment refers to the northwest side of the site, existing golf course,
00572> *These land drain to Node 3 along the Black Drain
00573>
00574> DESIGN NASHYD ID=[4], NHYD=["103"], DT=[2]min, AREA=[7.09] (ha),
00575> DWF=[0] (cms), CN/C=[63], TP=[0.26]hrs,
00576> RAINFALL=[ , , , ](mm/hr), END=-1
00577> *%-----|
00578> *Catchment 104
00579> *This catchment refers to the southeast corner of the site, existing golf course
00580> * and woods. These land drain to Node 3 along the Black Drain
00581>
00582> DESIGN NASHYD ID=[5], NHYD=["104"], DT=[2]min, AREA=[7.13] (ha),
00583> DWF=[0] (cms), CN/C=[61], TP=[0.62]hrs,
00584> RAINFALL=[ , , , ](mm/hr), END=-1
00585> *%-----|
00586> *Total Flow at Node 3, no external (101, 102, 103, 104)
00587> *Pond 1 Allowable Release Rate
00588>
00589> ADD HYD Idsum=[9], NHYD=["Node3SITE"], IDs to add=[2,3,4,5]
00590> *%-----|
00591> *Catchment EXT2
00592> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00593> *This catchment drains to the golf course via a spill point and CB on south side
00594> *Wellington Road 19 and is directed to the Black Drain by Node 3
00595>
00596> DESIGN STANDHYD ID=[6], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00597> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00598> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00599> *%-----|
00600> *Catchment EXT3
00601> *External area - Wellington Road 19 and 3rd line and
00602> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00603> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00604> *and is directed to the Black Drain by Node 3
00605>
00606> DESIGN STANDHYD ID=[7], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00607> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00608> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00609> *%-----|
00610> *Catchment EXT4
00611> *External area - 3rd line and Roadside ditch on west side of 3rd Line
00612> *This catchment spills to the golf course and is directed to the Black Drain by
00613>
00614> DESIGN STANDHYD ID=[8], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00615> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00616> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00617> *%-----|
00618> *Catchment EXT5
00619> *External area on the south of the site, existing agricultural
00620> *flows to the Black Drain at Node 3
00621>
00622> DESIGN NASHYD ID=[3], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00623> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00624> RAINFALL=[ , , , ](mm/hr), END=-1
00625> *%-----|
00626> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00627> *Pond 1 Allowable Release Rate
00628>
00629> ADD HYD Idsum=[4], NHYD=["Node3EXT"], IDs to add=[1,6,7,8,3]
00630> *%-----|
00631>
00632> *Total Flow at Node 3, with external
00633> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00634>
00635> ADD HYD Idsum=[3], NHYD=["Node3Tot"], IDs to add=[9,4]
00636> *%-----|
00637> *Catchment 105
00638> *This catchment refers to the southeast corner of the site, existing golf course
00639> *These land drain to Node 4 along the Black Drain
00640> *Pond 2 Allowable Release Rate
00641>
00642> DESIGN NASHYD ID=[6], NHYD=["105"], DT=[2]min, AREA=[7.91] (ha),
00643> DWF=[0] (cms), CN/C=[71], TP=[0.31]hrs,
00644> RAINFALL=[ , , , ](mm/hr), END=-1
00645> *%-----|
00646> *Catchment EXT6
00647> *External area on the south of the site, existing agricultural
00648> *flows to the Black Drain at Node 4
00649>
00650> DESIGN NASHYD ID=[7], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00651> DWF=[0] (cms), CN/C=[55], TP=[.55]hrs,
00652> RAINFALL=[ , , , ](mm/hr), END=-1
00653> *%-----|
00654> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00655>
00656> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[6,9]
00657> *%-----|
00658> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00659> *103, 104, EXT5, 105, EXT6)
00660>
00661> ADD HYD Idsum=[9], NHYD=["Node4Tot"], IDs to add=[3,6,7]
00662> *%-----|
00663>
00664> *100-Year
00665> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00666> ICASECS=[1],
00667> A=[955.98], B=[0.0001], and C=[0.693],
00668> *%-----|
00669>
00670> *Catchment EXTI
00671> *External area on the northwest of Wellington Road 19.
00672> *This catchment drains to the golf course via a culvert under Wellington Road 19
00673> *and forms the start of the Black Drain at NODE 1
00674>
00675> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),

```

```

00676> DWF=[0] (cms), CN/C=[61], TP=[0.44]hrs,
00677> RAINFALL=[ , , , ](mm/hr), END=-1
00678> *%-----|
00679> *Catchment 101
00680> *Drains to NODE 2
00681>
00682> DESIGN NASHYD ID=[2], NHYD=["101"], DT=[2]min, AREA=[1.58] (ha),
00683> DWF=[0] (cms), CN/C=[61], TP=[0.31]hrs,
00684> RAINFALL=[ , , , ](mm/hr), END=-1
00685> *%-----|
00686> *Total Flow at Node 2 (Catchment EXTI & 101)
00687>
00688> ADD HYD Idsum=[9], NHYD=["Node2"], IDs to add=[1,2]
00689> *%-----|
00690> *Catchment 102
00691> *This catchment refers to the north corner of the site
00692> *These lands ultimately enter the drain by Node 3
00693>
00694> DESIGN NASHYD ID=[3], NHYD=["102"], DT=[2]min, AREA=[16.14] (ha),
00695> DWF=[0] (cms), CN/C=[60], TP=[0.81]hrs,
00696> RAINFALL=[ , , , ](mm/hr), END=-1
00697> *%-----|
00698> *Catchment 103
00699> *This catchment refers to the northwest side of the site, existing golf course,
00700> *These land drain to Node 3 along the Black Drain
00701>
00702> DESIGN NASHYD ID=[4], NHYD=["103"], DT=[2]min, AREA=[7.09] (ha),
00703> DWF=[0] (cms), CN/C=[63], TP=[0.26]hrs,
00704> RAINFALL=[ , , , ](mm/hr), END=-1
00705> *%-----|
00706> *Catchment 104
00707> *This catchment refers to the southeast corner of the site, existing golf course
00708> * and woods. These land drain to Node 3 along the Black Drain
00709>
00710> DESIGN NASHYD ID=[5], NHYD=["104"], DT=[2]min, AREA=[7.13] (ha),
00711> DWF=[0] (cms), CN/C=[61], TP=[0.62]hrs,
00712> RAINFALL=[ , , , ](mm/hr), END=-1
00713> *%-----|
00714> *Total Flow at Node 3, no external (101, 102, 103, 104)
00715> *Pond 1 Allowable Release Rate
00716>
00717> ADD HYD Idsum=[9], NHYD=["Node3SITE"], IDs to add=[2,3,4,5]
00718> *%-----|
00719> *Catchment EXT2
00720> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00721> *This catchment drains to the golf course via a spill point and CB on south side
00722> *Wellington Road 19 and is directed to the Black Drain by Node 3
00723>
00724> DESIGN STANDHYD ID=[6], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00725> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00726> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00727> *%-----|
00728> *Catchment EXT3
00729> *External area - Wellington Road 19 and 3rd line and
00730> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00731> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00732> *and is directed to the Black Drain by Node 3
00733>
00734> DESIGN STANDHYD ID=[7], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00735> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00736> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00737> *%-----|
00738> *Catchment EXT4
00739> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00740> *This catchment spills to the golf course and is directed to the Black Drain by
00741>
00742> DESIGN STANDHYD ID=[8], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00743> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00744> SLOPE=[0.5] (%), RAINFALL=[ , , , ](mm/hr), END=-1
00745> *%-----|
00746> *Catchment EXT5
00747> *External area on the south of the site, existing agricultural
00748> *flows to the Black Drain at Node 3
00749>
00750> DESIGN NASHYD ID=[3], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00751> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00752> RAINFALL=[ , , , ](mm/hr), END=-1
00753> *%-----|
00754> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00755> *Pond 1 Allowable Release Rate
00756>
00757> ADD HYD Idsum=[4], NHYD=["Node3EXT"], IDs to add=[1,6,7,8,3]
00758> *%-----|
00759>
00760> *Total Flow at Node 3, with external
00761> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00762>
00763> ADD HYD Idsum=[3], NHYD=["Node3Tot"], IDs to add=[9,4]
00764> *%-----|
00765> *Catchment 105
00766> *This catchment refers to the southeast corner of the site, existing golf course
00767> *These land drain to Node 4 along the Black Drain
00768> *Pond 2 Allowable Release Rate
00769>
00770> DESIGN NASHYD ID=[6], NHYD=["105"], DT=[2]min, AREA=[7.91] (ha),
00771> DWF=[0] (cms), CN/C=[71], TP=[0.31]hrs,
00772> RAINFALL=[ , , , ](mm/hr), END=-1
00773> *%-----|
00774> *Catchment EXT6
00775> *External area on the south of the site, existing agricultural
00776> *flows to the Black Drain at Node 4
00777>
00778> DESIGN NASHYD ID=[7], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00779> DWF=[0] (cms), CN/C=[55], TP=[.55]hrs,
00780> RAINFALL=[ , , , ](mm/hr), END=-1
00781> *%-----|
00782> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00783>
00784> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[6,9]
00785> *%-----|
00786> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00787> *103, 104, EXT5, 105, EXT6)
00788>
00789> ADD HYD Idsum=[9], NHYD=["Node4Tot"], IDs to add=[3,6,7]
00790> *%-----|
00791> FINISH
00792>
00793>
00794>
00795>
00796>
00797>
00798>
00799>
00800>
00801>
00802>
00803>
00804>
00805>
00806>
00807>
00808>
00809>
00810>

```

00811>
00812>
00813>
00814>
00815>
00816>
00817>
00818>
00819>
00820>
00821>
00822>
00823>
00824>

Pre-Development SWMHYMO Output File

(C:\...PRE.out)

```
00001>-----
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999 -----
00004> S W W W M M M H H Y Y M M M O O 9 9 9 9
00005> SSSSS W W M M M H H H H Y Y M M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M M H H Y Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y Y M M O O 9 9 9 -----
00008> # 3877524
00009> StormWater Management Hydrologic Model 999 999 -----
00010>
00011> *****
00012> ***** SWMHYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3848 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhm@jfsa.Com *****
00021> *****
00022>-----
00023> *****
00024> ***** Licensed user: R.J. Burnside & Associates Ltd *****
00025> ***** Brampton SERIAL#:3877524 *****
00026> *****
00027>-----
00028> *****
00029> ***** PROGRAM ARRAY DIMENSIONS *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033>-----
00034>-----
00035>-----
00036> ***** D E T A I L E D O U T P U T *****
00037>-----
00038> ***** DATE: 2021-12-22 TIME: 13:08:22 RUN COUNTER: 002535 *****
00039>-----
00040> * Input filename: C:\SWMHYM-1\FERGUS-1\PRE.DAT *
00041> * Output filename: C:\SWMHYM-1\FERGUS-1\PRE.out *
00042> * Summary filename: C:\SWMHYM-1\FERGUS-1\PRE.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047>-----
00048>-----
00049>-----
00050> 001:0001-----
00051> * Project Name: [Fergus Golf Club] Project Number: [300052719]
00052> * Date : 09-20-21 TIME: 13:08:22 RUN COUNTER: 002535 *
00053> * Modeller : [L.Garner]
00054> * Company : R.J. Burnside & Associates
00055> * License # : 3245976
00056>-----
00057>-----
00058>-----
00059> | START | Project dir.: C:\SWMHYM-1\FERGUS-1\
00060> |-----| Rainfall dir.: C:\SWMHYM-1\FERGUS-1\
00061> | TZERO = .00 hrs on 0
00062> | METOUT= 2 (output = METRIC)
00063> | NRUN = 001
00064> | NSTORM= 0
00065>-----
00066> 001:0002-----
00067> *2-Year
00068>-----
00069> | CHICAGO STORM | IDF curve parameters: A= 400.290
00070> | Ptotal= 34.16 mm | B= .000
00071> | C= .702
00072> used in: INTENSITY = A / (t + B) ^ C
00073>-----
00074> Duration of storm = 4.00 hrs
00075> Storm time step = 5.00 min
00076> Time to peak ratio = .33
00077>-----
00078> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00079> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00080> .08 2.683 | 1.08 8.628 | 2.08 6.127 | 3.08 3.403
00081> .17 2.817 | 1.17 11.819 | 2.17 5.697 | 3.17 3.295
00082> .25 2.970 | 1.25 22.044 | 2.25 5.333 | 3.25 3.194
00083> .33 3.144 | 1.33 129.328 | 2.33 5.021 | 3.33 3.101
00084> .42 3.345 | 1.42 27.075 | 2.42 4.750 | 3.42 3.014
00085> .50 3.581 | 1.50 17.037 | 2.50 4.512 | 3.50 2.932
00086> .58 3.862 | 1.58 12.977 | 2.58 4.301 | 3.58 2.856
00087> .67 4.202 | 1.67 10.680 | 2.67 4.112 | 3.67 2.785
00088> .75 4.626 | 1.75 9.174 | 2.75 3.942 | 3.75 2.717
00089> .83 5.172 | 1.83 8.098 | 2.83 3.789 | 3.83 2.654
00090> .92 5.906 | 1.92 7.285 | 2.92 3.649 | 3.92 2.594
00091> 1.00 6.958 | 2.00 6.645 | 3.00 3.521 | 4.00 2.537
00092>-----
00093>-----
00094> 001:0003-----
00095> * Fergus Golf Club Pre Development
00096> *
00097> *
00098> *
00099> *Note: For Time-To-Peak calculations refer to Appendix.
01000> *The existing land use for the site varies between golf course & woods.
01001> *A Composite CN number was established based on Soils Mapping for each catchment
01002> *Catchment EXT1
01003> *External area on the northwest of Wellington Road 19.
01004> *This catchment drains to the golf course via a culvert under Wellington Road 19
01005> *and forms the start of the Black Drain at NODE 1
01006>-----
01007> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
01008> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01009> |-----| U.H. Tp(hrs)= .440
01010>-----
01011> Unit Hyd Qpeak (cms)= .688
01012>-----
01013> PEAK FLOW (cms)= .071 (i)
01014> TIME TO PEAK (hrs)= 1.875
01015> RUNOFF VOLUME (mm)= 5.468
01016> TOTAL RAINFALL (mm)= 34.158
01017> RUNOFF COEFFICIENT = .160
01018>-----
01019> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01020>-----
01021>-----
01022> 001:0004-----
01023> *Catchment 101
01024> *Drains to NODE 2
01025>-----
01026> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
01027> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01028> |-----| U.H. Tp(hrs)= .310
01029>-----
01030> Unit Hyd Qpeak (cms)= .195
01031>-----
01032> PEAK FLOW (cms)= .018 (i)
01033> TIME TO PEAK (hrs)= 1.708
01034> RUNOFF VOLUME (mm)= 5.468
01035> TOTAL RAINFALL (mm)= 34.158
```

```
00136> RUNOFF COEFFICIENT = .160
00137>
00138> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00139>-----
00140>-----
00141> 001:0005-----
00142> *Total Flow at Node 2 (Catchment EXT1 & 101)
00143>-----
00144> | ADD HYD (Node2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00145> |-----| (ha) (cms) (hrs) (mm) (cms)
00146> | ID1 01:EXT1 | 7.93 .071 1.88 5.47 .000
00147> | +ID2 02:101 | 1.58 .018 1.71 5.47 .000
00148> |-----|-----
00149> | SUM 09:Node2 | 9.51 .087 1.83 5.47 .000
00150>-----
00151> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00152>-----
00153>-----
00154> 001:0006-----
00155> *Catchment 102
00156> *This catchment refers to the north corner of the site
00157> *These lands ultimately enter the drain by Node 3
00158>-----
00159> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
00160> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00161> |-----| U.H. Tp(hrs)= .810
00162>-----
00163> Unit Hyd Qpeak (cms)= .761
00164>-----
00165> PEAK FLOW (cms)= .094 (i)
00166> TIME TO PEAK (hrs)= 2.417
00167> RUNOFF VOLUME (mm)= 5.280
00168> TOTAL RAINFALL (mm)= 34.158
00169> RUNOFF COEFFICIENT = .155
00170>-----
00171> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00172>-----
00173>-----
00174> 001:0007-----
00175> *Catchment 103
00176> *This catchment refers to the northwest side of the site, existing golf course,
00177> *These land drain to Node 3 along the Black Drain
00178>-----
00179> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
00180> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00181> |-----| U.H. Tp(hrs)= .260
00182>-----
00183> Unit Hyd Qpeak (cms)= 1.042
00184>-----
00185> PEAK FLOW (cms)= .097 (i)
00186> TIME TO PEAK (hrs)= 1.625
00187> RUNOFF VOLUME (mm)= 5.865
00188> TOTAL RAINFALL (mm)= 34.158
00189> RUNOFF COEFFICIENT = .172
00190>-----
00191> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00192>-----
00193>-----
00194> 001:0008-----
00195> *Catchment 104
00196> *This catchment refers to the southeast corner of the site, existing golf course
00197> *and woods. These land drain to Node 3 along the Black Drain
00198>-----
00199> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
00200> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00201> |-----| U.H. Tp(hrs)= .620
00202>-----
00203> Unit Hyd Qpeak (cms)= .439
00204>-----
00205> PEAK FLOW (cms)= .051 (i)
00206> TIME TO PEAK (hrs)= 2.167
00207> RUNOFF VOLUME (mm)= 5.468
00208> TOTAL RAINFALL (mm)= 34.158
00209> RUNOFF COEFFICIENT = .160
00210>-----
00211> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00212>-----
00213>-----
00214> 001:0009-----
00215> *Total Flow at Node 3, no external (101, 102, 103, 104)
00216> *Pond 1 Allowable Release Rate
00217>-----
00218> | ADD HYD (Node3SITE) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00219> |-----| (ha) (cms) (hrs) (mm) (cms)
00220> | ID1 02:101 | 1.58 .018 1.71 5.47 .000
00221> | +ID2 03:102 | 16.14 .094 2.42 5.28 .000
00222> | +ID3 04:103 | 7.09 .097 1.63 5.87 .000
00223> | +ID4 05:104 | 7.13 .051 2.17 5.47 .000
00224> |-----|-----
00225> | SUM 09:Node3SITE | 31.94 .204 1.92 5.46 .000
00226>-----
00227> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00228>-----
00229>-----
00230> 001:0010-----
00231> *Catchment EXT2
00232> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00233> *This catchment drains to the golf course via a spill point and CB on south side
00234> *Wellington Road 19 and is directed to the Black Drain by Node 3
00235>-----
00236> | DESIGN STANDHYD | Area (ha)= .34
00237> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
00238>-----
00239> IMPERVIOUS PERVIOUS (i)
00240> Surface Area (ha)= .17 .17
00241> Dep. Storage (mm)= .80 1.50
00242> Average Slope (%)= .50 .50
00243> Length (m)= 47.61 40.00
00244> Mannings n = .013 .250
00245>-----
00246> Max. eff. Inten. (mm/hr)= 129.33 7.75
00247> over (min) 2.50 32.50
00248> Storage Coeff. (min)= 1.82 (ii) 31.57 (ii)
00249> Unit Hyd. Tpeak (min)= 2.50 32.50
00250> Unit Hyd. peak (cms)= .51 .04
00251>-----
00252> *TOTALS*
00253> PEAK FLOW (cms)= .04 .00 .042 (iii)
00254> TIME TO PEAK (hrs)= 1.33 1.88 1.333
00255> RUNOFF VOLUME (mm)= 33.36 6.27 16.020
00256> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00257> RUNOFF COEFFICIENT = .98 .18 .469
00258>-----
00259> *** WARNING: Storage Coefficient is smaller than DT!
00260> Use a smaller DT or a larger area.
00261>-----
00262> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00263> CN* = 58.0 Ia = Dep. Storage (above)
00264> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00265> THAN THE STORAGE COEFFICIENT.
00266> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00267>-----
00268>-----
00269> 001:0011-----
00270> *Catchment EXT3
00271> *External area - Wellington Road 19 and 3rd line and
00272> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
```

```

00271> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00272> *and is directed to the Black Drain by Node 3
00273> -----
00274> | DESIGN STANDHYD | Area (ha)= 1.23
00275> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
00276> -----
00277>
00278> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)
00279> Dep. Storage (mm)= .80 1.50
00280> Average Slope (%)= .50 .50
00281> Length (m)= 90.55 40.00
00282> Mannings n = .013 .250
00283> -----
00284> Max.eff.Inten.(mm/hr)= 129.33 7.88
00285> over (min) 2.50 32.50
00286> Storage Coeff. (min)= 2.67 (ii) 32.23 (ii)
00287> Unit Hyd. Tpeak (min)= 2.50 32.50
00288> Unit Hyd. peak (cms)= .41 .04
00289> -----
00290> PEAK FLOW (cms)= .17 .01 .170 (iii)
00291> TIME TO PEAK (hrs)= 1.33 1.88 1.333
00292> RUNOFF VOLUME (mm)= 33.36 6.10 18.093
00293> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00294> RUNOFF COEFFICIENT = .98 .18 .530
00295> -----
00296> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00297> CN* = 56.0 Ia = Dep. Storage (Above)
00298> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00299> THAN THE STORAGE COEFFICIENT.
00300> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00301> -----
00302>
00303> 001:0012-----
00304> *Catchment EXT4
00305> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00306> *This catchment spills to the golf course and is directed to the Black Drain by
00307> -----
00308> | DESIGN STANDHYD | Area (ha)= .18
00309> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
00310> -----
00311>
00312> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)
00313> Dep. Storage (mm)= .09 .09
00314> Average Slope (%)= .50 .50
00315> Length (m)= 34.64 40.00
00316> Mannings n = .013 .250
00317> -----
00318> Max.eff.Inten.(mm/hr)= 129.33 8.26
00319> over (min) 2.50 30.00
00320> Storage Coeff. (min)= 1.50 (ii) 30.51 (ii)
00321> Unit Hyd. Tpeak (min)= 2.50 30.00
00322> Unit Hyd. peak (cms)= .55 .04
00323> -----
00324> PEAK FLOW (cms)= .02 .00 .021 (iii)
00325> TIME TO PEAK (hrs)= 1.33 1.83 1.333
00326> RUNOFF VOLUME (mm)= 33.36 2.21 12.487
00327> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00328> RUNOFF COEFFICIENT = .98 .06 .366
00329> *** WARNING: Storage Coefficient is smaller than DT!
00330> Use a smaller DT or a larger area.
00331> -----
00332> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00333> CN* = 30.0 Ia = Dep. Storage (Above)
00334> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00335> THAN THE STORAGE COEFFICIENT.
00336> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00337> -----
00338>
00339> 001:0013-----
00340> *Catchment EXT5
00341> *External area on the south of the site, existing agricultural
00342> *flows to the Black Drain at Node 3
00343> -----
00344> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
00345> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00346> | U.H. Tp(hrs)= .440
00347> -----
00348> Unit Hyd Qpeak (cms)= .739
00349> -----
00350> PEAK FLOW (cms)= .029 (i)
00351> TIME TO PEAK (hrs)= 1.875
00352> RUNOFF VOLUME (mm)= 2.115
00353> TOTAL RAINFALL (mm)= 34.158
00354> RUNOFF COEFFICIENT = .062
00355> -----
00356> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00357> -----
00358>
00359> 001:0014-----
00360> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00361> *Pond 1 Allowable Release Rate
00362> -----
00363> | ADD HYD (Node3EXT ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00364> (ha) (cms) (hrs) (mm) (cms)
00365> ID1 01:EXT1 7.93 .071 1.88 5.47 .000
00366> +ID2 06:EXT2 .34 .042 1.33 16.02 .000
00367> +ID3 07:EXT3 1.23 .170 1.33 18.09 .000
00368> +ID4 08:EXT4 .18 .021 1.33 12.49 .000
00369> +ID5 03:EXT5 8.51 .029 1.88 2.11 .000
00370> =====
00371> SUM 04:Node3EXT 18.19 .243 1.33 5.02 .000
00372> -----
00373> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00374> -----
00375>
00376> 001:0015-----
00377> *Total Flow at Node 3, with external
00378> *EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00379> -----
00380> | ADD HYD (Node3Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00381> (ha) (cms) (hrs) (mm) (cms)
00382> ID1 09:Node3SITE 31.94 .204 1.92 5.46 .000
00383> +ID2 04:Node3EXT 18.19 .243 1.33 5.02 .000
00384> =====
00385> SUM 03:Node3Tot 50.13 .328 1.88 5.30 .000
00386> -----
00387> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00388> -----
00389>
00390> 001:0016-----
00391> *Catchment 105
00392> *This catchment refers to the southeast corner of the site, existing golf course
00393> *These land drain to Node 4 along the Black Drain
00394> *Pond 2 Allowable Release Rate
00395> -----
00396> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
00397> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00398> | U.H. Tp(hrs)= .310
00399> -----
00400> Unit Hyd Qpeak (cms)= .975
00401> -----
00402> PEAK FLOW (cms)= .131 (i)
00403> TIME TO PEAK (hrs)= 1.708
00404> RUNOFF VOLUME (mm)= 7.819
00405> TOTAL RAINFALL (mm)= 34.158

```

```

00406> RUNOFF COEFFICIENT = .229
00407>
00408> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00409> -----
00410>
00411> 001:0017-----
00412> *Catchment EXT6
00413> *External area on the south of the site, existing agricultural
00414> *flows to the Black Drain at Node 4
00415> -----
00416> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
00417> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00418> | U.H. Tp(hrs)= .550
00419> -----
00420> Unit Hyd Qpeak (cms)= 1.092
00421> -----
00422> PEAK FLOW (cms)= .098 (i)
00423> TIME TO PEAK (hrs)= 2.042
00424> RUNOFF VOLUME (mm)= 4.435
00425> TOTAL RAINFALL (mm)= 34.158
00426> RUNOFF COEFFICIENT = .130
00427> -----
00428> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00429> -----
00430>
00431> 001:0018-----
00432> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00433> -----
00434> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00435> (ha) (cms) (hrs) (mm) (cms)
00436> ID1 06:105 7.91 .131 1.71 7.82 .000
00437> +ID2 09:Node3SITE 31.94 .204 1.92 5.46 .000
00438> =====
00439> SUM 08:Node4 39.85 .327 1.75 5.93 .000
00440> -----
00441> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00442> -----
00443>
00444> 001:0019-----
00445> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00446> *103, 104, EXT5, 105, EXT6)
00447> -----
00448> | ADD HYD (Node4Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00449> (ha) (cms) (hrs) (mm) (cms)
00450> ID1 03:Node3Tot 50.13 .328 1.88 5.30 .000
00451> +ID2 06:105 7.91 .131 1.71 7.82 .000
00452> +ID3 07:EXT6 15.73 .098 2.04 4.44 .000
00453> =====
00454> SUM 09:Node4Tot 73.77 .539 1.83 5.39 .000
00455> -----
00456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00457> -----
00458>
00459> 001:0020-----
00460> *5-Year
00461> -----
00462> | CHICAGO STORM | IDF curve parameters: A= 550.600
00463> | Ptotal= 48.03 mm | B= .000
00464> | C= .698
00465> used in: INTENSITY = A / (t + B)^C
00466> -----
00467> Duration of storm = 4.00 hrs
00468> Storm time step = 5.00 min
00469> Time to peak ratio = .33
00470> -----
00471>
00472> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00473> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00474> .17 4.012 | 1.17 16.693 | 2.08 8.686 | 3.08 4.841
00475> .25 4.228 | 1.25 31.019 | 2.25 7.567 | 3.25 4.545
00476> .33 4.475 | 1.33 179.040 | 2.33 7.127 | 3.33 4.413
00477> .42 4.759 | 1.42 38.058 | 2.42 6.744 | 3.42 4.290
00478> .50 5.093 | 1.50 24.013 | 2.50 6.408 | 3.50 4.175
00479> .58 5.489 | 1.58 18.319 | 2.58 6.110 | 3.58 4.067
00480> .67 5.971 | 1.67 15.094 | 2.67 5.843 | 3.67 3.966
00481> .75 6.569 | 1.75 12.977 | 2.75 5.603 | 3.75 3.870
00482> .83 7.340 | 1.83 11.463 | 2.83 5.386 | 3.83 3.780
00483> .92 8.375 | 1.92 10.318 | 2.92 5.188 | 3.92 3.695
00484> 1.00 9.858 | 2.00 9.417 | 3.00 5.007 | 4.00 3.615
00485> -----
00486>
00487> 001:0021-----
00488> *Catchment EXT1
00489> *External area on the northwest of Wellington Road 19.
00490> *This catchment drains to the golf course via a culvert under Wellington Road 19
00491> *and forms the start of the Black Drain at Node 1
00492> -----
00493> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
00494> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00495> | U.H. Tp(hrs)= .440
00496> -----
00497> Unit Hyd Qpeak (cms)= .688
00498> -----
00499> PEAK FLOW (cms)= .137 (i)
00500> TIME TO PEAK (hrs)= 1.875
00501> RUNOFF VOLUME (mm)= 10.361
00502> TOTAL RAINFALL (mm)= 48.025
00503> RUNOFF COEFFICIENT = .216
00504> -----
00505> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00506> -----
00507>
00508> 001:0022-----
00509> *Catchment 101
00510> *Drains to NODE 2
00511> -----
00512> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
00513> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00514> | U.H. Tp(hrs)= .310
00515> -----
00516> Unit Hyd Qpeak (cms)= .195
00517> -----
00518> PEAK FLOW (cms)= .034 (i)
00519> TIME TO PEAK (hrs)= 1.708
00520> RUNOFF VOLUME (mm)= 10.361
00521> TOTAL RAINFALL (mm)= 48.025
00522> RUNOFF COEFFICIENT = .216
00523> -----
00524> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00525> -----
00526>
00527> 001:0023-----
00528> *Total Flow at Node 2 (Catchment EXT1 & 101)
00529> -----
00530> | ADD HYD (Node2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00531> (ha) (cms) (hrs) (mm) (cms)
00532> ID1 01:EXT1 7.93 .137 1.88 10.36 .000
00533> +ID2 02:101 1.58 .034 1.71 10.36 .000
00534> =====
00535> SUM 09:Node2 9.51 .168 1.83 10.36 .000
00536> -----
00537> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00538> -----
00539>
00540> 001:0024-----

```



```

00541> *Catchment 102
00542> *This catchment refers to the north corner of the site
00543> *These lands ultimately enter the drain by Node 3
00544> -----
00545> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
00546> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00547> | U.H. Tp(hrs)= .810
00548> -----
00549> Unit Hyd Qpeak (cms)= .761
00550> -----
00551> PEAK FLOW (cms)= .181 (i)
00552> TIME TO PEAK (hrs)= 2.417
00553> RUNOFF VOLUME (mm)= 10.028
00554> TOTAL RAINFALL (mm)= 48.025
00555> RUNOFF COEFFICIENT = .209
00556> -----
00557> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00558> -----
00559> *Catchment 103
00560> *This catchment refers to the northwest side of the site, existing golf course,
00561> *These land drain to Node 3 along the Black Drain
00562> -----
00563> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
00564> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00565> | U.H. Tp(hrs)= .260
00566> -----
00567> Unit Hyd Qpeak (cms)= 1.042
00568> -----
00569> PEAK FLOW (cms)= .186 (i)
00570> TIME TO PEAK (hrs)= 1.625
00571> RUNOFF VOLUME (mm)= 10.761
00572> TOTAL RAINFALL (mm)= 48.025
00573> RUNOFF COEFFICIENT = .230
00574> -----
00575> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00576> -----
00577> *Catchment 104
00578> *This catchment refers to the southeast corner of the site, existing golf course
00579> * and woods. These land drain to Node 3 along the Black Drain
00580> -----
00581> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
00582> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00583> | U.H. Tp(hrs)= .620
00584> -----
00585> Unit Hyd Qpeak (cms)= .439
00586> -----
00587> PEAK FLOW (cms)= .098 (i)
00588> TIME TO PEAK (hrs)= 2.125
00589> RUNOFF VOLUME (mm)= 10.761
00590> TOTAL RAINFALL (mm)= 48.025
00591> RUNOFF COEFFICIENT = .216
00592> -----
00593> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00594> -----
00600> 001:0027-----
00601> *Total Flow at Node 3, no external (101, 102, 103, 104)
00602> *Pond 1 Allowable Release Rate
00603> -----
00604> | ADD HYD (Node3SITE ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00605> | (ha) (cms) (hrs) (mm) (cms)
00606> | ID1 02:101 1.58 .034 1.71 10.36 .000
00607> | +ID2 03:102 16.14 .181 2.42 10.03 .000
00608> | +ID3 04:103 7.09 .186 1.63 11.06 .000
00609> | +ID4 05:104 7.13 .098 2.13 10.36 .000
00610> | =====
00611> | SUM 09:Node3SITE 31.94 .391 1.92 10.35 .000
00612> -----
00613> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00614> -----
00615> -----
00616> 001:0028-----
00617> *Catchment EXT2
00618> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00619> *This catchment drains to the golf course via a spill point and CB on south side
00620> *Wellington Road 19 and is directed to the Black Drain by Node 3
00621> -----
00622> | DESIGN STANDHYD | Area (ha)= .34
00623> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
00624> -----
00625> IMPERVIOUS PERVIOUS (i)
00626> Surface Area (ha)= .17 .17
00627> Dep. Storage (mm)= .80 1.50
00628> Average Slope (%)= .50 .50
00629> Length (m)= 47.61 40.00
00630> Mannings n = .013 .250
00631> -----
00632> Max.eff.Inten.(mm/hr)= 179.04 18.38
00633> over (min) = 2.50 22.50
00634> Storage Coeff. (min)= 1.60 (ii) 22.66 (ii)
00635> Unit Hyd. Tpeak (min)= 2.50 22.50
00636> Unit Hyd. peak (cms)= .54 .05
00637> -----
00638> *TOTALS*
00639> PEAK FLOW (cms)= .06 .00 .060 (iii)
00640> TIME TO PEAK (hrs)= 1.33 1.67 1.333
00641> RUNOFF VOLUME (mm)= 47.23 11.71 24.494
00642> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
00643> RUNOFF COEFFICIENT = .98 .24 .510
00644> *** WARNING: Storage Coefficient is smaller than DT!
00645> Use a smaller DT or a larger area.
00646> -----
00647> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00648> CN* = 58.0 Ia = Dep. Storage (Above)
00649> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00650> THAN THE STORAGE COEFFICIENT.
00651> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00652> -----
00653> 001:0029-----
00654> *Catchment EXT3
00655> *External area - Wellington Road 19 and 3rd line and
00656> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00657> *This catchment drains to the golf course via a DICB on west side of 3rd Line
00658> *and is directed to the Black Drain by Node 3
00659> -----
00660> | DESIGN STANDHYD | Area (ha)= 1.23
00661> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
00662> -----
00663> IMPERVIOUS PERVIOUS (i)
00664> Surface Area (ha)= .73 .50
00665> Dep. Storage (mm)= .80 1.50
00666> Average Slope (%)= .50 .50
00667> Length (m)= 90.55 40.00
00668> Mannings n = .013 .250
00669> -----
00670> Max.eff.Inten.(mm/hr)= 179.04 18.70
00671> over (min) = 2.50 22.50
00672> Storage Coeff. (min)= 2.35 (ii) 23.27 (ii)
00673> Unit Hyd. Tpeak (min)= 2.50 22.50
00674> Unit Hyd. peak (cms)= .45 .05
00675> -----
00676> *TOTALS*

```

```

00676> PEAK FLOW (cms)= .24 .02 .245 (iii)
00677> TIME TO PEAK (hrs)= 1.33 1.67 1.333
00678> RUNOFF VOLUME (mm)= 47.23 11.41 27.167
00679> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
00680> RUNOFF COEFFICIENT = .98 .24 .566
00681> *** WARNING: Storage Coefficient is smaller than DT!
00682> Use a smaller DT or a larger area.
00683> -----
00684> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00685> CN* = 56.0 Ia = Dep. Storage (Above)
00686> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00687> THAN THE STORAGE COEFFICIENT.
00688> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00689> -----
00690> -----
00691> 001:0030-----
00692> *Catchment EXT4
00693> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00694> *This catchment spills to the golf course and is directed to the Black Drain by
00695> -----
00696> | DESIGN STANDHYD | Area (ha)= .18
00697> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
00698> -----
00699> IMPERVIOUS PERVIOUS (i)
00700> Surface Area (ha)= .09 .09
00701> Dep. Storage (mm)= .80 1.50
00702> Average Slope (%)= .50 .50
00703> Length (m)= 34.64 40.00
00704> Mannings n = .013 .250
00705> -----
00706> Max.eff.Inten.(mm/hr)= 179.04 4.69
00707> over (min) = 2.50 37.50
00708> Storage Coeff. (min)= 1.32 (ii) 37.68 (ii)
00709> Unit Hyd. Tpeak (min)= 2.50 37.50
00710> Unit Hyd. peak (cms)= .58 .03
00711> -----
00712> *TOTALS*
00713> PEAK FLOW (cms)= .03 .00 .029 (iii)
00714> TIME TO PEAK (hrs)= 1.33 2.00 1.333
00715> RUNOFF VOLUME (mm)= 47.23 4.33 18.487
00716> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
00717> RUNOFF COEFFICIENT = .98 .09 .385
00718> *** WARNING: Storage Coefficient is smaller than DT!
00719> Use a smaller DT or a larger area.
00720> -----
00721> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00722> CN* = 30.0 Ia = Dep. Storage (Above)
00723> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00724> THAN THE STORAGE COEFFICIENT.
00725> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00726> -----
00727> 001:0031-----
00728> *Catchment EXT5
00729> *External area on the south of the site, existing agricultural
00730> *flows to the Black Drain at Node 3
00731> -----
00732> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
00733> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00734> | U.H. Tp(hrs)= .440
00735> -----
00736> Unit Hyd Qpeak (cms)= .739
00737> -----
00738> PEAK FLOW (cms)= .057 (i)
00739> TIME TO PEAK (hrs)= 1.875
00740> RUNOFF VOLUME (mm)= 4.177
00741> TOTAL RAINFALL (mm)= 48.025
00742> RUNOFF COEFFICIENT = .087
00743> -----
00744> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00745> -----
00746> -----
00747> 001:0032-----
00748> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
00749> *Pond 1 Allowable Release Rate
00750> -----
00751> | ADD HYD (Node3EXT ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00752> | (ha) (cms) (hrs) (mm) (cms)
00753> | ID1 01:EXT1 7.93 .137 1.88 10.36 .000
00754> | +ID2 06:EXT2 .34 .060 1.33 24.49 .000
00755> | +ID3 07:EXT3 1.23 .245 1.33 27.17 .000
00756> | +ID4 08:EXT4 .18 .029 1.33 18.49 .000
00757> | +ID5 03:EXT5 8.51 .057 1.88 4.18 .000
00758> | =====
00759> | SUM 04:Node3EXT 18.19 .356 1.33 8.95 .000
00760> -----
00761> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00762> -----
00763> -----
00764> 001:0033-----
00765> *Total Flow at Node 3, with external
00766> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
00767> -----
00768> | ADD HYD (Node3Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00769> | (ha) (cms) (hrs) (mm) (cms)
00770> | ID1 09:Node3SITE 31.94 .391 1.92 10.35 .000
00771> | +ID2 04:Node3EXT 18.19 .356 1.33 8.95 .000
00772> | =====
00773> | SUM 03:Node3Tot 50.13 .625 1.83 9.84 .000
00774> -----
00775> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00776> -----
00777> -----
00778> *Catchment 105
00779> *This catchment refers to the southeast corner of the site, existing golf course
00780> *These land drain to Node 4 along the Black Drain
00781> *Pond 2 Allowable Release Rate
00782> -----
00783> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
00784> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00785> | U.H. Tp(hrs)= .310
00786> -----
00787> Unit Hyd Qpeak (cms)= .975
00788> -----
00789> PEAK FLOW (cms)= .245 (i)
00790> TIME TO PEAK (hrs)= 1.667
00791> RUNOFF VOLUME (mm)= 14.405
00792> TOTAL RAINFALL (mm)= 48.025
00793> RUNOFF COEFFICIENT = .300
00794> -----
00795> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00796> -----
00797> -----
00798> 001:0035-----
00799> *Catchment EXT6
00800> *External area on the south of the site, existing agricultural
00801> *flows to the Black Drain at Node 4
00802> -----
00803> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
00804> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00805> | U.H. Tp(hrs)= .550
00806> -----
00807> Unit Hyd Qpeak (cms)= 1.092
00808> -----
00809> PEAK FLOW (cms)= .191 (i)
00810> -----

```

```

00811> TIME TO PEAK (hrs)= 2.042
00812> RUNOFF VOLUME (mm)= 8.511
00813> TOTAL RAINFALL (mm)= 48.025
00814> RUNOFF COEFFICIENT = .177
00815>
00816> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00817>
-----
00819> 001:0036-----
00820> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
00821>
00822> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00823> (ha) (cms) (hrs) (mm) (cms)
00824> ID1 06:105 7.91 .625 1.67 14.40 .000
00825> +ID2 09:Node3SITE 31.94 .391 1.92 10.35 .000
00826>
00827> =====
00828> SUM 08:Node4 39.85 .622 1.75 11.15 .000
00829>
00830> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00831>
-----
00832> 001:0037-----
00833> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
00834> *103, 104, EXT5, 105, EXT6)
00835>
00836> | ADD HYD (Node4Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00837> (ha) (cms) (hrs) (mm) (cms)
00838> ID1 03:Node3Tot 7.91 .625 1.83 9.84 .000
00839> +ID2 06:105 7.91 .245 1.67 14.40 .000
00840> +ID3 07:EXT6 15.73 .191 2.04 8.51 .000
00841>
00842> =====
00843> SUM 09:Node4Tot 73.77 1.026 1.83 10.05 .000
00844>
00845> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00846>
-----
00847> 001:0038-----
00848> *10-Year
00849>
00850> | CHICAGO STORM | IDF curve parameters: A= 648.070
00851> | Ptotal= 57.15 mm | B= .000
00852> C= .696
00853>
00854> used in: INTENSITY = A / (t + B)^C
00855>
00856> Duration of storm = 4.00 hrs
00857> Storm time step = 5.00 min
00858> Time to peak ratio = .33
00859>
00860> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00861> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00862> .08 4.577 | 1.08 14.574 | 2.08 10.379 | 3.08 5.794
00863> .17 4.805 | 1.17 19.908 | 2.17 9.656 | 3.17 5.611
00864> .25 5.063 | 1.25 36.926 | 2.25 9.045 | 3.25 5.441
00865> .33 5.357 | 1.33 21.414 | 2.33 8.520 | 3.33 5.283
00866> .42 5.697 | 1.42 45.280 | 2.42 8.064 | 3.42 5.136
00867> .50 6.095 | 1.50 28.609 | 2.50 7.663 | 3.50 4.999
00868> .58 6.568 | 1.58 21.843 | 2.58 7.308 | 3.58 4.870
00869> .67 7.142 | 1.67 18.007 | 2.67 6.990 | 3.67 4.749
00870> .75 7.856 | 1.75 15.488 | 2.75 6.704 | 3.75 4.635
00871> .83 8.774 | 1.83 13.686 | 2.83 6.445 | 3.83 4.528
00872> .92 10.008 | 1.92 12.323 | 2.92 6.209 | 3.92 4.426
00873> 1.00 11.775 | 2.00 11.249 | 3.00 5.993 | 4.00 4.330
00874>
-----
00875> 001:0039-----
00876> *Catchment EXT1
00877> *External area on the northwest of Wellington Road 19.
00878> *This catchment drains to the golf course via a culvert under Wellington Road 19
00879> *and forms the start of the Black Drain at NODE 1
00880>
00881> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
00882> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00883> U.H. Tp(hrs)= .440
00884>
00885> Unit Hyd Qpeak (cms)= .688
00886>
00887> PEAK FLOW (cms)= .189 (i)
00888> TIME TO PEAK (hrs)= 1.875
00889> RUNOFF VOLUME (mm)= 14.203
00890> TOTAL RAINFALL (mm)= 57.150
00891> RUNOFF COEFFICIENT = .249
00892>
00893> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00894>
-----
00895>
00896> 001:0040-----
00897> *Catchment 101
00898> *Drains to NODE 2
00899>
00900> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
00901> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00902> U.H. Tp(hrs)= .310
00903>
00904> Unit Hyd Qpeak (cms)= .195
00905>
00906> PEAK FLOW (cms)= .047 (i)
00907> TIME TO PEAK (hrs)= 1.667
00908> RUNOFF VOLUME (mm)= 14.203
00909> TOTAL RAINFALL (mm)= 57.150
00910> RUNOFF COEFFICIENT = .249
00911>
00912> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00913>
-----
00914>
00915> 001:0041-----
00916> *Total Flow at Node 2 (Catchment EXT1 & 101)
00917>
00918> | ADD HYD (Node2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00919> (ha) (cms) (hrs) (mm) (cms)
00920> ID1 01:EXT1 7.93 .189 1.88 14.20 .000
00921> +ID2 02:101 1.58 .047 1.67 14.20 .000
00922>
00923> =====
00924> SUM 09:Node2 9.51 .232 1.83 14.20 .000
00925>
00926> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00927>
-----
00928> 001:0042-----
00929> *Catchment 102
00930> *This catchment refers to the north corner of the site
00931> *These lands ultimately enter the drain by Node 3
00932>
00933> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
00934> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00935> U.H. Tp(hrs)= .810
00936>
00937> Unit Hyd Qpeak (cms)= .761
00938>
00939> PEAK FLOW (cms)= .249 (i)
00940> TIME TO PEAK (hrs)= 2.417
00941> RUNOFF VOLUME (mm)= 13.765
00942> TOTAL RAINFALL (mm)= 57.150
00943> RUNOFF COEFFICIENT = .241
00944>
00945> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

00946>
00947> -----
00948> *Catchment 103
00949> *This catchment refers to the northwest side of the site, existing golf course,
00950> *These land drain to Node 3 along the Black Drain
00951>
00952> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
00953> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00954> U.H. Tp(hrs)= .260
00955>
00956> Unit Hyd Qpeak (cms)= 1.042
00957>
00958> PEAK FLOW (cms)= .256 (i)
00959> TIME TO PEAK (hrs)= 1.625
00960> RUNOFF VOLUME (mm)= 15.120
00961> TOTAL RAINFALL (mm)= 57.150
00962> RUNOFF COEFFICIENT = .265
00963>
00964> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00965>
00966> -----
00967>
00968> 001:0044-----
00969> *Catchment 104
00970> *This catchment refers to the southeast corner of the site, existing golf course
00971> * and woods. These land drain to Node 3 along the Black Drain
00972>
00973> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
00974> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00975> U.H. Tp(hrs)= .620
00976>
00977> Unit Hyd Qpeak (cms)= .439
00978>
00979> PEAK FLOW (cms)= .135 (i)
00980> TIME TO PEAK (hrs)= 2.125
00981> RUNOFF VOLUME (mm)= 14.203
00982> TOTAL RAINFALL (mm)= 57.150
00983> RUNOFF COEFFICIENT = .249
00984>
00985> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00986>
-----
00987>
00988> 001:0045-----
00989> *Total Flow at Node 3, no external (101, 102, 103, 104)
00990> *Pond 1 Allowable Release Rate
00991>
00992> | ADD HYD (Node3SITE ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00993> (ha) (cms) (hrs) (mm) (cms)
00994> ID1 02:101 1.58 .047 1.67 14.20 .000
00995> +ID2 03:102 16.14 .249 2.42 13.77 .000
00996> +ID3 04:103 7.09 .256 1.63 15.12 .000
00997> +ID4 05:104 7.13 .135 2.13 14.20 .000
00998> =====
00999> SUM 09:Node3SITE 31.94 .540 1.92 14.19 .000
01000>
01001> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01002>
-----
01003>
01004> 001:0046-----
01005> *Catchment EXT2
01006> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
01007> *This catchment drains to the golf course via a spill point and CB on south side
01008> *Wellington Road 19 and is directed to the Black Drain by Node 3
01009>
01010> | DESIGN STANDHYD | Area (ha)= .34
01011> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
01012>
01013> IMPERVIOUS PERVIOUS (i)
01014> Surface Area (ha)= .17 .17
01015> Dep. Storage (mm)= .80 1.50
01016> Average Slope (%)= .50 .50
01017> Length (m)= 47.61 40.00
01018> Mannings n = .013 .250
01019>
01020> Max.eff.Inten.(mm/hr)= 211.41 27.15
01021> over (min) 2.50 20.00
01022> Storage Coeff. (min)= 1.49 (ii) 19.51 (iii)
01023> Unit Hyd. Tpeak (min)= 2.50 20.00
01024> Unit Hyd. peak (cms)= .55 .06
01025>
01026> PEAK FLOW (cms)= .07 .01 *TOTALS*
01027> TIME TO PEAK (hrs)= 1.33 1.63 1.333
01028> RUNOFF VOLUME (mm)= 56.35 15.93 30.484
01029> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01030> RUNOFF COEFFICIENT = .99 .28 .533
01031> *** WARNING: Storage Coefficient is smaller than DT!
01032> Use a smaller DT or a larger area.
01033>
01034> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01035> CN = 58.0 Ia = Dep. Storage (Above)
01036> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01037> THAN THE STORAGE COEFFICIENT.
01038> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01039>
01040>
01041> 001:0047-----
01042> *Catchment EXT3
01043> *External area - Wellington Road 19 and 3rd line and
01044> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
01045> *This catchment drains to the golf course via a DICB on west side of 3rd Line
01046> *and is directed to the Black Drain by Node 3
01047>
01048> | DESIGN STANDHYD | Area (ha)= 1.23
01049> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
01050>
01051> IMPERVIOUS PERVIOUS (i)
01052> Surface Area (ha)= .73 .50
01053> Dep. Storage (mm)= .80 1.50
01054> Average Slope (%)= .50 .50
01055> Length (m)= 90.55 40.00
01056> Mannings n = .013 .250
01057>
01058> Max.eff.Inten.(mm/hr)= 211.41 27.64
01059> over (min) 2.50 20.00
01060> Storage Coeff. (min)= 2.20 (ii) 20.09 (ii)
01061> Unit Hyd. Tpeak (min)= 2.50 20.00
01062> Unit Hyd. peak (cms)= .46 .06
01063>
01064> PEAK FLOW (cms)= .29 .02 *TOTALS*
01065> TIME TO PEAK (hrs)= 1.33 1.63 1.333
01066> RUNOFF VOLUME (mm)= 56.35 15.54 33.497
01067> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01068> RUNOFF COEFFICIENT = .99 .27 .586
01069> *** WARNING: Storage Coefficient is smaller than DT!
01070> Use a smaller DT or a larger area.
01071>
01072> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01073> CN = 56.0 Ia = Dep. Storage (Above)
01074> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01075> THAN THE STORAGE COEFFICIENT.
01076> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01077>
01078>
01079> 001:0048-----
01080> *Catchment EXT4

```

```

01081> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
01082> *This catchment spills to the golf course and is directed to the Black Drain by
01083> -----
01084> | DESIGN STANDHYD | Area (ha)= .18
01085> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
01086> -----
01087>
01088> Surface Area (ha)= .09 IMPERVIOUS PERVIOUS (i)
01089> Dep. Storage (mm)= .80 1.50
01090> Average Slope (%)= .50 .50
01091> Length (m)= 34.64 40.00
01092> Mannings n = .013 .250
01093> -----
01094> Max. eff. Inten. (mm/hr)= 211.41 7.18
01095> over (min) 2.50 32.50
01096> Storage Coeff. (min)= 1.23 (ii) 31.91 (ii)
01097> Unit Hyd. Tpeak (min)= 2.50 32.50
01098> Unit Hyd. peak (cms)= .59 .04
01099> -----
01100> PEAK FLOW (cms)= .03 .00 *TOTALS*
01101> TIME TO PEAK (hrs)= 1.33 1.88 1.333
01102> RUNOFF VOLUME (mm)= 56.35 6.07 22.666
01103> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01104> RUNOFF COEFFICIENT = .99 .11 .397
01105> *** WARNING: Storage Coefficient is smaller than DT!
01106> Use a smaller DT or a larger area.
01107>
01108> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01109> CN* = 30.0 Ia = Dep. Storage (Above)
01110> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01111> THAN THE STORAGE COEFFICIENT.
01112> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01113> -----
01114>
01115> 001:0049-----
01116> *Catchment EXTS
01117> *External area on the south of the site, existing agricultural
01118> *flows to the Black Drain at Node 3
01119> -----
01120> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
01121> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01122> | U.H. Tp(hrs)= .440
01123> -----
01124> Unit Hyd Qpeak (cms)= .739
01125> -----
01126> PEAK FLOW (cms)= .080 (i)
01127> TIME TO PEAK (hrs)= 1.875
01128> RUNOFF VOLUME (mm)= 5.872
01129> TOTAL RAINFALL (mm)= 57.150
01130> RUNOFF COEFFICIENT = .103
01131> -----
01132> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01133> -----
01134>
01135> 001:0050-----
01136> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
01137> *Pond 1 Allowable Release Rate
01138> -----
01139> | ADD HYD (Node3EXT ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01140> | (ha) (cms) (hrs) (mm) (cms)
01141> | ID1 01:EXT1 7.93 .189 1.88 14.20 .000
01142> | +ID2 06:EXT2 .34 .071 1.33 30.48 .000
01143> | +ID3 07:EXT3 1.23 .295 1.33 33.50 .000
01144> | +ID4 08:EXT4 .18 .035 1.33 22.67 .000
01145> | +ID5 03:EXT5 8.51 .080 1.88 5.87 .000
01146> | =====
01147> | SUM 04:Node3EXT 18.19 .434 1.33 12.00 .000
01148> -----
01149> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01150> -----
01151>
01152> 001:0051-----
01153> *Total Flow at Node 3, with external
01154> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
01155> -----
01156> | ADD HYD (Node3Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01157> | (ha) (cms) (hrs) (mm) (cms)
01158> | ID1 09:Node3SITE 31.94 .540 1.92 14.19 .000
01159> | +ID2 04:Node3EXT 18.19 .434 1.33 12.00 .000
01160> | =====
01161> | SUM 03:Node3Tot 50.13 .861 1.83 13.39 .000
01162> -----
01163> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01164> -----
01165>
01166> 001:0052-----
01167> *Catchment 105
01168> *This catchment refers to the southeast corner of the site, existing golf course
01169> *These land drain to Node 4 along the Black Drain
01170> *Pond 2 Allowable Release Rate
01171> -----
01172> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
01173> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01174> | U.H. Tp(hrs)= .310
01175> -----
01176> Unit Hyd Qpeak (cms)= .975
01177> -----
01178> PEAK FLOW (cms)= .335 (i)
01179> TIME TO PEAK (hrs)= 1.667
01180> RUNOFF VOLUME (mm)= 19.429
01181> TOTAL RAINFALL (mm)= 57.150
01182> RUNOFF COEFFICIENT = .340
01183> -----
01184> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01185> -----
01186>
01187> 001:0053-----
01188> *Catchment EXT6
01189> *External area on the south of the site, existing agricultural
01190> *flows to the Black Drain at Node 4
01191> -----
01192> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
01193> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01194> | U.H. Tp(hrs)= .550
01195> -----
01196> Unit Hyd Qpeak (cms)= 1.092
01197> -----
01198> PEAK FLOW (cms)= .264 (i)
01199> TIME TO PEAK (hrs)= 2.042
01200> RUNOFF VOLUME (mm)= 11.754
01201> TOTAL RAINFALL (mm)= 57.150
01202> RUNOFF COEFFICIENT = .206
01203> -----
01204> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01205> -----
01206>
01207> 001:0054-----
01208> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
01209> -----
01210> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01211> | (ha) (cms) (hrs) (mm) (cms)
01212> | ID1 06:105 (mm)= 7.91 .335 1.67 19.43 .000
01213> | +ID2 09:Node3SITE 31.94 .540 1.92 14.19 .000
01214> | =====
01215> | SUM 08:Node4 39.85 .855 1.75 15.23 .000

```

```

01216>
01217> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01218> -----
01219>
01220> 001:0055-----
01221> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
01222> *103, 104, EXT5, 105, EXT6)
01223> -----
01224> | ADD HYD (Node4Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01225> | (ha) (cms) (hrs) (mm) (cms)
01226> | ID1 03:Node3Tot 50.13 .861 1.83 13.39 .000
01227> | +ID2 06:105 7.91 .335 1.67 19.43 .000
01228> | +ID3 07:EXT6 15.73 .264 2.04 11.75 .000
01229> | =====
01230> | SUM 09:Node4Tot 73.77 1.411 1.83 13.69 .000
01231> -----
01232> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01233> -----
01234>
01235> 001:0056-----
01236> *25-Year
01237> -----
01238> CHICAGO STORM | ID: CHICAGO STORM | A= 771.350
01239> | Ptotal= 68.77 mm | B= .000
01240> | C= .694
01241> used in: INTENSITY = A / (t + B)^C
01242> -----
01243> Duration of storm = 4.00 hrs
01244> Storm time step = 5.00 min
01245> Time to peak ratio = .33
01246> -----
01247> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01248> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01249> .08 5.543 | 1.08 17.591 | 2.08 12.540 | 3.08 7.012
01250> .17 5.818 | 1.17 24.008 | 2.17 11.669 | 3.17 6.791
01251> .25 6.129 | 1.25 44.448 | 2.25 10.933 | 3.25 6.586
01252> .33 6.485 | 1.33 252.441 | 2.33 10.300 | 3.33 6.396
01253> .42 6.895 | 1.42 54.475 | 2.42 9.751 | 3.42 6.219
01254> .50 7.375 | 1.50 34.465 | 2.50 9.267 | 3.50 6.053
01255> .58 7.946 | 1.58 26.335 | 2.58 8.839 | 3.58 5.897
01256> .67 8.638 | 1.67 21.722 | 2.67 8.455 | 3.67 5.751
01257> .75 9.500 | 1.75 18.692 | 2.75 8.110 | 3.75 5.613
01258> .83 10.606 | 1.83 16.523 | 2.83 7.797 | 3.83 5.484
01259> .92 12.093 | 1.92 14.881 | 2.92 7.513 | 3.92 5.361
01260> 1.00 14.222 | 2.00 13.589 | 3.00 7.252 | 4.00 5.245
01261> -----
01262>
01263> *Catchment EXT1
01264> *External area on the northwest of Wellington Road 19.
01265> *This catchment drains to the golf course via a culvert under Wellington Road 19
01266> *and forms the start of the Black Drain at NODE 1
01267> -----
01268>
01269> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
01270> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01271> | U.H. Tp(hrs)= .440
01272> -----
01273> Unit Hyd Qpeak (cms)= .688
01274> -----
01275> PEAK FLOW (cms)= .264 (i)
01276> TIME TO PEAK (hrs)= 1.875
01277> RUNOFF VOLUME (mm)= 19.704
01278> TOTAL RAINFALL (mm)= 68.771
01279> RUNOFF COEFFICIENT = .287
01280> -----
01281> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01282> -----
01283>
01284> 001:0058-----
01285> *Catchment 101
01286> *Drains to NODE 2
01287> -----
01288> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
01289> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01290> | U.H. Tp(hrs)= .310
01291> -----
01292> Unit Hyd Qpeak (cms)= .195
01293> -----
01294> PEAK FLOW (cms)= .066 (i)
01295> TIME TO PEAK (hrs)= 1.667
01296> RUNOFF VOLUME (mm)= 19.704
01297> TOTAL RAINFALL (mm)= 68.771
01298> RUNOFF COEFFICIENT = .287
01299> -----
01300> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01301> -----
01302>
01303> *Total Flow at Node 2 (Catchment EXT1 & 101)
01304> -----
01305>
01306> | ADD HYD (Node2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01307> | (ha) (cms) (hrs) (mm) (cms)
01308> | ID1 01:EXT1 1.58 .264 1.88 19.70 .000
01309> | +ID2 02:101 1.58 .066 1.67 19.70 .000
01310> | =====
01311> | SUM 09:Node2 9.51 .324 1.83 19.70 .000
01312> -----
01313> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01314> -----
01315>
01316> 001:0060-----
01317> *Catchment 102
01318> *This catchment refers to the north corner of the site
01319> *These lands ultimately enter the drain by Node 3
01320> -----
01321> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
01322> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01323> | U.H. Tp(hrs)= .810
01324> -----
01325> Unit Hyd Qpeak (cms)= .761
01326> -----
01327> PEAK FLOW (cms)= .348 (i)
01328> TIME TO PEAK (hrs)= 2.417
01329> RUNOFF VOLUME (mm)= 19.126
01330> TOTAL RAINFALL (mm)= 68.771
01331> RUNOFF COEFFICIENT = .278
01332> -----
01333> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01334> -----
01335>
01336> 001:0061-----
01337> *Catchment 103
01338> *This catchment refers to the northwest side of the site, existing golf course,
01339> *These land drain to Node 3 along the Black Drain
01340> -----
01341> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
01342> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01343> | U.H. Tp(hrs)= .260
01344> -----
01345> Unit Hyd Qpeak (cms)= 1.042
01346> -----
01347> PEAK FLOW (cms)= .357 (i)
01348> TIME TO PEAK (hrs)= 1.625
01349> RUNOFF VOLUME (mm)= 20.908
01350> TOTAL RAINFALL (mm)= 68.771

```

```

01351> RUNOFF COEFFICIENT = .304
01352>
01353> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01354>
01355>
01356> 001:0062-----
01357> *Catchment 104
01358> *This catchment refers to the southeast corner of the site, existing golf course
01359> * and woods. These land drain to Node 3 along the Black Drain
01360>
01361> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
01362> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01363> | U.H. Tp(hrs)= .620
01364>
01365> Unit Hyd Qpeak (cms)= .439
01366>
01367> PEAK FLOW (cms)= .189 (i)
01368> TIME TO PEAK (hrs)= 1.225
01369> RUNOFF VOLUME (mm)= 19.704
01370> TOTAL RAINFALL (mm)= 68.771
01371> RUNOFF COEFFICIENT = .287
01372>
01373> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01374>
01375>
01376> 001:0063-----
01377> *Total Flow at Node 3, no external (101, 102, 103, 104)
01378> *Pond 1 Allowable Release Rate
01379>
01380> | ADD HYD (Node3SITE ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01381> | (ha) (cms) (hrs) (mm) (cms)
01382> | ID1 02:101 1.58 .066 1.67 19.70 .000
01383> | +ID3 04:103 7.09 .357 1.63 20.91 .000
01384> | +ID4 05:104 7.13 .189 2.13 19.70 .000
01385> |
01386> |====|
01387> | SUM 09:Node3SITE 31.94 .755 1.88 19.68 .000
01388>
01389> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01390>
01391>
01392> 001:0064-----
01393> *Catchment EXT5
01394> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
01395> *This catchment drains to the golf course via a spill point and CB on south side
01396> *Wellington Road 19 and is directed to the Black Drain by Node 3
01397>
01398> | DESIGN STANDHYD | Area (ha)= .34
01399> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
01400>
01401> IMPERVIOUS PERVIOUS (i)
01402> Surface Area (ha)= .17 .17
01403> Dep. Storage (mm)= .80 1.50
01404> Average Slope (%)= .50 .50
01405> Length (m)= 47.61 40.00
01406> Mannings n = .013 .250
01407>
01408> Max.eff.Inten.(mm/hr)= 252.44 40.89
01409> over (min) 2.50 17.50
01410> Storage Coeff. (min)= 1.39 (ii) 16.69 (ii)
01411> Unit Hyd. Tpeak (min)= 2.50 17.50
01412> Unit Hyd. peak (cms)= .57 .07
01413>
01414> PEAK FLOW (cms)= .08 .01 *TOTALS*
01415> TIME TO PEAK (hrs)= 1.33 1.58 .087 (iii)
01416> RUNOFF VOLUME (mm)= 67.97 21.94 1.333
01417> TOTAL RAINFALL (mm)= 68.77 68.77 38.510
01418> RUNOFF COEFFICIENT = .99 .32 68.771
01419> *** WARNING: Storage Coefficient is smaller than DT!
01420> Use a smaller DT or a larger area.
01421>
01422> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01423> CN* = 58.0 Ia = Dep. Storage (Above)
01424> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01425> THAN THE STORAGE COEFFICIENT.
01426> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01427>
01428>
01429> 001:0065-----
01430> *Catchment EXT3
01431> *External area - Wellington Road 19 and 3rd line and
01432> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
01433> *This catchment drains to the golf course via a DICB on west side of 3rd Line
01434> *and is directed to the Black Drain by Node 3
01435>
01436> | DESIGN STANDHYD | Area (ha)= 1.23
01437> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
01438>
01439> IMPERVIOUS PERVIOUS (i)
01440> Surface Area (ha)= .73 .50
01441> Dep. Storage (mm)= .80 1.50
01442> Average Slope (%)= .50 .50
01443> Length (m)= 90.55 40.00
01444> Mannings n = .013 .250
01445>
01446> Max.eff.Inten.(mm/hr)= 252.44 41.66
01447> over (min) 2.50 17.50
01448> Storage Coeff. (min)= 2.05 (ii) 17.23 (ii)
01449> Unit Hyd. Tpeak (min)= 2.50 17.50
01450> Unit Hyd. peak (cms)= .48 .07
01451>
01452> PEAK FLOW (cms)= .35 .04 *TOTALS*
01453> TIME TO PEAK (hrs)= 1.33 1.58 .361 (iii)
01454> RUNOFF VOLUME (mm)= 67.97 21.42 41.903
01455> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
01456> RUNOFF COEFFICIENT = .99 .31 .609
01457>
01458> *** WARNING: Storage Coefficient is smaller than DT!
01459> Use a smaller DT or a larger area.
01460>
01461> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01462> CN* = 56.0 Ia = Dep. Storage (Above)
01463> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01464> THAN THE STORAGE COEFFICIENT.
01465> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01466>
01467> 001:0066-----
01468> *Catchment EXT4
01469> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
01470> *This catchment spills to the golf course and is directed to the Black Drain by
01471>
01472> | DESIGN STANDHYD | Area (ha)= .18
01473> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
01474>
01475> IMPERVIOUS PERVIOUS (i)
01476> Surface Area (ha)= .09 .09
01477> Dep. Storage (mm)= .80 1.50
01478> Average Slope (%)= .50 .50
01479> Length (m)= 34.64 40.00
01480> Mannings n = .013 .250
01481>
01482> Max.eff.Inten.(mm/hr)= 252.44 11.35
01483> over (min) 2.50 27.50
01484> Storage Coeff. (min)= 1.15 (ii) 26.69 (ii)
01485> Unit Hyd. Tpeak (min)= 2.50 27.50

```

```

01486> Unit Hyd. peak (cms)= .60 .04
01487>
01488> PEAK FLOW (cms)= .04 .00 *TOTALS*
01489> TIME TO PEAK (hrs)= 1.33 1.75 .041 (iii)
01490> RUNOFF VOLUME (mm)= 67.97 8.66 28.235
01491> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
01492> RUNOFF COEFFICIENT = .99 .13 .411
01493> *** WARNING: Storage Coefficient is smaller than DT!
01494> Use a smaller DT or a larger area.
01495>
01496> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01497> CN* = 30.0 Ia = Dep. Storage (Above)
01498> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01499> THAN THE STORAGE COEFFICIENT.
01500> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01501>
01502>
01503> 001:0067-----
01504> *Catchment EXT5
01505> *External area on the south of the site, existing agricultural
01506> *flows to the Black Drain at Node 3
01507>
01508> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
01509> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01510> | U.H. Tp(hrs)= 1.440
01511>
01512> Unit Hyd Qpeak (cms)= .739
01513>
01514> PEAK FLOW (cms)= .115 (i)
01515> TIME TO PEAK (hrs)= 1.875
01516> RUNOFF VOLUME (mm)= 8.396
01517> TOTAL RAINFALL (mm)= 68.771
01518> RUNOFF COEFFICIENT = .122
01519>
01520> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01521>
01522>
01523>
01524> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
01525> *Pond 1 Allowable Release Rate
01526>
01527> | ADD HYD (Node3EXT ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01528> | (ha) (cms) (hrs) (mm) (cms)
01529> | ID1 01:EXT1 7.93 .264 1.88 19.70 .000
01530> | +ID2 06:EXT2 1.34 .087 1.33 38.51 .000
01531> | +ID3 07:EXT3 1.23 .361 1.33 41.90 .000
01532> | +ID4 08:EXT4 .18 .041 1.33 28.23 .000
01533> | +ID5 03:EXT5 8.51 .115 1.88 8.40 .000
01534> |
01535> |====|
01536> | SUM 04:Node3EXT 18.19 .537 1.33 16.35 .000
01537>
01538> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01539>
01540> 001:0069-----
01541> *Total Flow at Node 3, with external
01542> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
01543>
01544> | ADD HYD (Node3Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01545> | (ha) (cms) (hrs) (mm) (cms)
01546> | ID1 09:Node3SITE 31.94 .755 1.88 19.68 .000
01547> | +ID2 04:Node3EXT 18.19 .537 1.33 16.35 .000
01548> |
01549> |====|
01550> | SUM 03:Node3Tot 50.13 1.201 1.83 18.47 .000
01551>
01552>
01553>
01554> 001:0070-----
01555> *Catchment 105
01556> *This catchment refers to the southeast corner of the site, existing golf course
01557> *These land drain to Node 4 along the Black Drain
01558> *Pond 2 Allowable Release Rate
01559>
01560> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
01561> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01562> | U.H. Tp(hrs)= .310
01563>
01564> Unit Hyd Qpeak (cms)= .975
01565>
01566> PEAK FLOW (cms)= .461 (i)
01567> TIME TO PEAK (hrs)= 1.667
01568> RUNOFF VOLUME (mm)= 26.462
01569> TOTAL RAINFALL (mm)= 68.771
01570> RUNOFF COEFFICIENT = .385
01571>
01572>
01573> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01574>
01575> 001:0071-----
01576> *Catchment EXT6
01577> *External area on the south of the site, existing agricultural
01578> *flows to the Black Drain at Node 4
01579>
01580> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
01581> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01582> | U.H. Tp(hrs)= 1.550
01583>
01584> Unit Hyd Qpeak (cms)= 1.092
01585>
01586> PEAK FLOW (cms)= .372 (i)
01587> TIME TO PEAK (hrs)= 2.042
01588> RUNOFF VOLUME (mm)= 16.451
01589> TOTAL RAINFALL (mm)= 68.771
01590> RUNOFF COEFFICIENT = .239
01591>
01592> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01593>
01594>
01595> 001:0072-----
01596> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
01597>
01598> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01599> | (ha) (cms) (hrs) (mm) (cms)
01600> | ID1 06:105 7.91 .461 1.67 26.46 .000
01601> | +ID2 09:Node3SITE 31.94 .755 1.88 19.68 .000
01602> |
01603> |====|
01604> | SUM 08:Node4 39.85 1.189 1.75 21.03 .000
01605>
01606> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01607>
01608> 001:0073-----
01609> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
01610> *103, 104, EXT5, 105, EXT6)
01611>
01612> | ADD HYD (Node4Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01613> | (ha) (cms) (hrs) (mm) (cms)
01614> | ID1 03:Node3Tot 50.13 1.201 1.83 18.47 .000
01615> | +ID2 06:105 7.91 .461 1.67 26.46 .000
01616> | +ID3 07:EXT6 15.73 .372 2.04 16.45 .000
01617> |
01618> |====|
01619> | SUM 09:Node4Tot 73.77 1.967 1.83 18.90 .000
01620>
01621> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

```

01621>
01622> -----
01623> 001:0074-----
01624> *50-Year
01625> -----
01626> | CHICAGO STORM | IDf curve parameters: A= 862.090
01627> | Ptotal= 77.28 mm | B= .000
01628> | C= .693
01629> used in: INTENSITY = A / (t + B)^C
01630> -----
01631> Duration of storm = 4.00 hrs
01632> Storm time step = 5.00 min
01633> Time to peak ratio = .33
01634> -----
01635>
01636> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01637> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01638> .08 6.249 | 1.08 19.799 | 2.08 14.121 | 3.08 7.903
01639> .17 6.559 | 1.17 27.009 | 2.17 13.142 | 3.17 7.654
01640> .25 6.909 | 1.25 49.956 | 2.25 12.313 | 3.25 7.423
01641> .33 7.309 | 1.33 282.592 | 2.33 11.602 | 3.33 7.209
01642> .42 7.771 | 1.42 61.210 | 2.42 10.984 | 3.42 7.009
01643> .50 8.311 | 1.50 38.752 | 2.50 10.440 | 3.50 6.823
01644> .58 8.953 | 1.58 29.622 | 2.58 9.958 | 3.58 6.648
01645> .67 9.732 | 1.67 24.441 | 2.67 9.526 | 3.67 6.483
01646> .75 10.701 | 1.75 21.035 | 2.75 9.138 | 3.75 6.328
01647> .83 11.946 | 1.83 18.598 | 2.83 8.786 | 3.83 6.182
01648> .92 13.618 | 1.92 16.753 | 2.92 8.466 | 3.92 6.044
01649> 1.00 16.011 | 2.00 15.300 | 3.00 8.173 | 4.00 5.913
01650> -----
01651> 001:0075-----
01652> *Catchment EXT1
01653> *External area on the northwest of Wellington Road 19.
01654> *This catchment drains to the golf course via a culvert under Wellington Road 19
01655> *and forms the start of the Black Drain at NODE 1
01656> -----
01657> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
01658> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01659> | U.H. Tp(hrs)= .440
01660> -----
01661> Unit Hyd Qpeak (cms)= .688
01662> -----
01663> PEAK FLOW (cms)= .325 (i)
01664> TIME TO PEAK (hrs)= 1.875
01665> RUNOFF VOLUME (mm)= 24.113
01666> TOTAL RAINFALL (mm)= 77.284
01667> RUNOFF COEFFICIENT = .312
01668> -----
01669> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01670> -----
01671> -----
01672> 001:0076-----
01673> *Catchment 101
01674> *Drains to NODE 2
01675> -----
01676> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
01677> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01678> | U.H. Tp(hrs)= .310
01679> -----
01680> Unit Hyd Qpeak (cms)= .195
01681> -----
01682> PEAK FLOW (cms)= .082 (i)
01683> TIME TO PEAK (hrs)= 1.667
01684> RUNOFF VOLUME (mm)= 24.113
01685> TOTAL RAINFALL (mm)= 77.284
01686> RUNOFF COEFFICIENT = .312
01687> -----
01688> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01689> -----
01690> -----
01691> 001:0077-----
01692> *Total Flow at Node 2 (Catchment EXT1 & 101)
01693> -----
01694> | ADD HYD (Node2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01695> | (ha) (cms) (hrs) (mm) (cms)
01696> | ID1 01:EXT1 7.93 .325 1.88 24.11 .000
01697> | +ID2 02:101 1.58 .082 1.67 24.11 .000
01698> | SUM 09:Node2 9.51 .399 1.83 24.11 .000
01699> -----
01700> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01701> -----
01702> -----
01703> -----
01704> 001:0078-----
01705> *Catchment 102
01706> *This catchment refers to the north corner of the site
01707> *These lands ultimately enter the drain by Node 3
01708> -----
01709> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
01710> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01711> | U.H. Tp(hrs)= .810
01712> -----
01713> Unit Hyd Qpeak (cms)= .761
01714> -----
01715> PEAK FLOW (cms)= .428 (i)
01716> TIME TO PEAK (hrs)= 2.417
01717> RUNOFF VOLUME (mm)= 23.430
01718> TOTAL RAINFALL (mm)= 77.284
01719> RUNOFF COEFFICIENT = .303
01720> -----
01721> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01722> -----
01723> -----
01724> 001:0079-----
01725> *Catchment 103
01726> *This catchment refers to the northwest side of the site, existing golf course,
01727> *These land drain to Node 3 along the Black Drain
01728> -----
01729> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
01730> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01731> | U.H. Tp(hrs)= .260
01732> -----
01733> Unit Hyd Qpeak (cms)= 1.042
01734> -----
01735> PEAK FLOW (cms)= .439 (i)
01736> TIME TO PEAK (hrs)= 1.625
01737> RUNOFF VOLUME (mm)= 25.530
01738> TOTAL RAINFALL (mm)= 77.284
01739> RUNOFF COEFFICIENT = .330
01740> -----
01741> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01742> -----
01743> -----
01744> 001:0080-----
01745> *Catchment 104
01746> *This catchment refers to the southeast corner of the site, existing golf course
01747> * and woods. These land drain to Node 3 along the Black Drain
01748> -----
01749> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
01750> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01751> | U.H. Tp(hrs)= .620
01752> -----
01753> Unit Hyd Qpeak (cms)= .439
01754> -----
01755> PEAK FLOW (cms)= .233 (i)

```

```

01756> TIME TO PEAK (hrs)= 2.125
01757> RUNOFF VOLUME (mm)= 24.113
01758> TOTAL RAINFALL (mm)= 77.284
01759> RUNOFF COEFFICIENT = .312
01760> -----
01761> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01762> -----
01763> -----
01764> 001:0081-----
01765> *Total Flow at Node 3, no external (101, 102, 103, 104)
01766> *Pond 1 Allowable Release Rate
01767> -----
01768> | ADD HYD (Node3SITE ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01769> | (ha) (cms) (hrs) (mm) (cms)
01770> | ID1 02:101 1.58 .082 1.67 24.11 .000
01771> | +ID2 03:102 16.14 .428 2.42 23.43 .000
01772> | +ID3 04:103 7.09 .439 1.63 25.53 .000
01773> | +ID4 05:104 7.13 .233 2.13 24.11 .000
01774> -----
01775> SUM 09:Node3SITE 31.94 .929 1.88 24.08 .000
01776> -----
01777> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01778> -----
01779> -----
01780> 001:0082-----
01781> *Catchment EXT2
01782> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
01783> *This catchment drains to the golf course via a spill point and CB on south side
01784> *Wellington Road 19 and is directed to the Black Drain by Node 3
01785> -----
01786> | DESIGN STANDHYD | Area (ha)= .34
01787> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
01788> -----
01789> IMPERVIOUS PERVIOUS (i)
01790> Surface Area (ha)= .17 .17
01791> Dep. Storage (mm)= .80 1.50
01792> Average Slope (%)= .50 .250
01793> Length (m)= 47.61 40.00
01794> Mannings n = .013 .250
01795> -----
01796> Max.eff.Inten.(mm/hr)= 282.59 55.49
01797> over (min) 2.50 15.00
01798> Storage Coeff. (min)= 1.33 (ii) 14.87 (ii)
01799> Unit Hyd. Tpeak (min)= 2.50 15.00
01800> Unit Hyd. peak (cms)= .58 .08
01801> -----
01802> PEAK FLOW (cms)= .09 .02 .099 (iii)
01803> TIME TO PEAK (hrs)= 1.33 1.54 1.333
01804> RUNOFF VOLUME (mm)= 76.48 26.72 44.633
01805> TOTAL RAINFALL (mm)= 77.28 77.28 77.284
01806> RUNOFF COEFFICIENT = .99 .35 .578
01807> -----
01808> *** WARNING: Storage Coefficient is smaller than DT!
01809> Use a smaller DT or a larger area.
01810> -----
01811> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01812> CN* = 58.0 Ia = Dep. Storage (Above)
01813> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01814> THAN THE STORAGE COEFFICIENT.
01815> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01816> -----
01817> 001:0083-----
01818> *Catchment EXT3
01819> *External area - Wellington Road 19 and 3rd line and
01820> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
01821> *This catchment drains to the golf course via a DICB on west side of 3rd Line.
01822> *and is directed to the Black Drain by Node 3
01823> -----
01824> | DESIGN STANDHYD | Area (ha)= 1.23
01825> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
01826> -----
01827> IMPERVIOUS PERVIOUS (i)
01828> Surface Area (ha)= .73 .50
01829> Dep. Storage (mm)= .80 1.50
01830> Average Slope (%)= .50 .50
01831> Length (m)= 90.55 40.00
01832> Mannings n = .013 .250
01833> -----
01834> Max.eff.Inten.(mm/hr)= 282.59 56.56
01835> over (min) 2.50 15.00
01836> Storage Coeff. (min)= 1.96 (ii) 15.39 (ii)
01837> Unit Hyd. Tpeak (min)= 2.50 15.00
01838> Unit Hyd. peak (cms)= .49 .07
01839> -----
01840> PEAK FLOW (cms)= .40 .05 .411 (iii)
01841> TIME TO PEAK (hrs)= 1.33 1.54 1.333
01842> RUNOFF VOLUME (mm)= 76.48 26.11 48.274
01843> TOTAL RAINFALL (mm)= 77.28 77.28 77.284
01844> RUNOFF COEFFICIENT = .99 .34 .625
01845> -----
01846> *** WARNING: Storage Coefficient is smaller than DT!
01847> Use a smaller DT or a larger area.
01848> -----
01849> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01850> CN* = 56.0 Ia = Dep. Storage (Above)
01851> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01852> THAN THE STORAGE COEFFICIENT.
01853> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01854> -----
01855> 001:0084-----
01856> *Catchment EXT4
01857> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
01858> *This catchment spills to the golf course and is directed to the Black Drain by
01859> -----
01860> | DESIGN STANDHYD | Area (ha)= .18
01861> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
01862> -----
01863> IMPERVIOUS PERVIOUS (i)
01864> Surface Area (ha)= .09 .09
01865> Dep. Storage (mm)= .80 1.50
01866> Average Slope (%)= .50 .50
01867> Length (m)= 34.64 40.00
01868> Mannings n = .013 .250
01869> -----
01870> Max.eff.Inten.(mm/hr)= 282.59 16.05
01871> over (min) 2.50 22.50
01872> Storage Coeff. (min)= 1.10 (ii) 23.33 (ii)
01873> Unit Hyd. Tpeak (min)= 2.50 22.50
01874> Unit Hyd. peak (cms)= .61 .05
01875> -----
01876> PEAK FLOW (cms)= .05 .00 .047 (iii)
01877> TIME TO PEAK (hrs)= 1.33 1.67 1.333
01878> RUNOFF VOLUME (mm)= 76.48 10.81 32.481
01879> TOTAL RAINFALL (mm)= 77.28 77.28 77.284
01880> RUNOFF COEFFICIENT = .99 .14 .420
01881> -----
01882> *** WARNING: Storage Coefficient is smaller than DT!
01883> Use a smaller DT or a larger area.
01884> -----
01884> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01885> CN* = 30.0 Ia = Dep. Storage (Above)
01886> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01887> THAN THE STORAGE COEFFICIENT.
01888> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01889> -----
01890> -----

```

```

01891> 001:0085-----
01892> *Catchment EXT5
01893> *External area on the south of the site, existing agricultural
01894> *flows to the Black Drain at Node 3
01895> -----
01896> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
01897> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01898> |-----| U.H. Tp(hrs)= .440
01899> -----
01900> Unit Hyd Qpeak (cms)= .739
01901> -----
01902> PEAK FLOW (cms)= .144 (i)
01903> TIME TO PEAK (hrs)= 1.875
01904> RUNOFF VOLUME (mm)= 10.490
01905> TOTAL RAINFALL (mm)= 77.284
01906> RUNOFF COEFFICIENT = .136
01907> -----
01908> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01909> -----
01910> -----
01911> 001:0086-----
01912> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
01913> *Pond 1 Allowable Release Rate
01914> -----
01915> | ADD HYD (Node3EXT ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01916> |-----| (ha) (cms) (hrs) (mm) (cms)
01917> | ID1 01:EXT1 | 7.93 .325 1.88 24.11 .000
01918> | +D2 06:EXT2 | .34 .099 1.33 44.63 .000
01919> | +D3 07:EXT3 | 1.23 .411 1.33 48.27 .000
01920> | +D4 08:EXT4 | .18 .047 1.33 32.48 .000
01921> | +D5 03:EXT5 | 8.51 .144 1.88 10.49 .000
01922> |-----|
01923> | SUM 04:Node3EXT | 18.19 .617 1.33 19.84 .000
01924> -----
01925> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01926> -----
01927> -----
01928> 001:0087-----
01929> *Total Flow at Node 3, with external
01930> *(EXT1, 101, 102, 103, 104, EXT2, EXT3, EXT4, EXT5)
01931> -----
01932> | ADD HYD (Node3Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01933> |-----| (ha) (cms) (hrs) (mm) (cms)
01934> | ID1 09:Node3SITE | 31.94 .929 1.88 24.08 .000
01935> | +D2 04:Node3EXT | 18.19 .617 1.33 19.84 .000
01936> |-----|
01937> | SUM 03:Node3Tot | 50.13 1.476 1.83 22.54 .000
01938> -----
01939> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01940> -----
01941> -----
01942> 001:0088-----
01943> *Catchment 105
01944> *This catchment refers to the southeast corner of the site, existing golf course
01945> *These land drain to Node 4 along the Black Drain
01946> *Pond 2 Allowable Release Rate
01947> -----
01948> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
01949> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01950> |-----| U.H. Tp(hrs)= .310
01951> -----
01952> Unit Hyd Qpeak (cms)= .975
01953> -----
01954> PEAK FLOW (cms)= .562 (i)
01955> TIME TO PEAK (hrs)= 1.667
01956> RUNOFF VOLUME (mm)= 31.990
01957> TOTAL RAINFALL (mm)= 77.284
01958> RUNOFF COEFFICIENT = .414
01959> -----
01960> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01961> -----
01962> -----
01963> 001:0089-----
01964> *Catchment EXT6
01965> *External area on the south of the site, existing agricultural
01966> *flows to the Black Drain at Node 4
01967> -----
01968> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
01969> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01970> |-----| U.H. Tp(hrs)= .550
01971> -----
01972> Unit Hyd Qpeak (cms)= 1.092
01973> -----
01974> PEAK FLOW (cms)= .461 (i)
01975> TIME TO PEAK (hrs)= 2.042
01976> RUNOFF VOLUME (mm)= 20.251
01977> TOTAL RAINFALL (mm)= 77.284
01978> RUNOFF COEFFICIENT = .262
01979> -----
01980> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01981> -----
01982> -----
01983> 001:0090-----
01984> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
01985> -----
01986> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01987> |-----| (ha) (cms) (hrs) (mm) (cms)
01988> | ID1 06:105 | 7.91 .562 1.67 31.99 .000
01989> | +D2 09:Node3SITE | 31.94 .929 1.88 24.08 .000
01990> |-----|
01991> | SUM 08:Node4 | 39.85 1.458 1.75 25.65 .000
01992> -----
01993> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01994> -----
01995> -----
01996> 001:0091-----
01997> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
01998> *103, 104, EXT5, 105, EXT6)
01999> -----
02000> | ADD HYD (Node4Tot ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02001> |-----| (ha) (cms) (hrs) (mm) (cms)
02002> | ID1 03:Node3Tot | 50.13 1.476 1.83 22.54 .000
02003> | +D2 06:105 | 7.91 .562 1.67 31.99 .000
02004> | +D3 07:EXT6 | 15.73 .461 2.04 20.25 .000
02005> |-----|
02006> | SUM 09:Node4Tot | 73.77 2.414 1.83 23.07 .000
02007> -----
02008> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02009> -----
02010> -----
02011> 001:0092-----
02012> *100-Year
02013> -----
02014> | CHICAGO STORM | IDF curve parameters: A= 955.980
02015> | Ptotal= 85.70 mm | B= .000
02016> |-----| C= .693
02017> -----
02018> used in: INTENSITY = A / (t + B) ^ C
02019> -----
02020> Duration of storm = 4.00 hrs
02021> Storm time step = 5.00 min
02022> Time to peak ratio = .33
02023> -----
02024> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02025> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02026> .08 6.929 | 1.08 21.955 | 2.08 15.659 | 3.08 8.764

```

```

02026> .17 7.273 | 1.17 29.950 | 2.17 14.573 | 3.17 8.488
02027> .25 7.661 | 1.25 55.397 | 2.25 13.654 | 3.25 8.232
02028> .33 8.103 | 1.33 313.369 | 2.33 12.866 | 3.33 7.994
02029> .42 8.617 | 1.42 67.877 | 2.42 12.180 | 3.42 7.773
02030> .50 9.216 | 1.50 42.973 | 2.50 11.577 | 3.50 7.566
02031> .58 9.928 | 1.58 32.848 | 2.58 11.042 | 3.58 7.372
02032> .67 10.792 | 1.67 27.103 | 2.67 10.564 | 3.67 7.189
02033> .75 11.867 | 1.75 23.326 | 2.75 10.133 | 3.75 7.017
02034> .83 13.247 | 1.83 20.623 | 2.83 9.743 | 3.83 6.855
02035> .92 15.101 | 1.92 18.577 | 2.92 9.388 | 3.92 6.702
02036> 1.00 17.755 | 2.00 16.966 | 3.00 9.063 | 4.00 6.557
02037> -----
02038> -----
02039> 001:0093-----
02040> *Catchment EXT1
02041> *External area on the northwest of Wellington Road 19.
02042> *This catchment drains to the golf course via a culvert under Wellington Road 19
02043> and forms the start of the Black Drain at NODE 1
02044> -----
02045> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
02046> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02047> |-----| U.H. Tp(hrs)= .440
02048> -----
02049> Unit Hyd Qpeak (cms)= .688
02050> -----
02051> PEAK FLOW (cms)= .390 (i)
02052> TIME TO PEAK (hrs)= 1.875
02053> RUNOFF VOLUME (mm)= 28.751
02054> TOTAL RAINFALL (mm)= 85.701
02055> RUNOFF COEFFICIENT = .335
02056> -----
02057> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02058> -----
02059> -----
02060> 001:0094-----
02061> *Catchment 101
02062> *Drains to NODE 2
02063> -----
02064> | DESIGN NASHYD | Area (ha)= 1.58 Curve Number (CN)=61.00
02065> | 02:101 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02066> |-----| U.H. Tp(hrs)= .310
02067> -----
02068> Unit Hyd Qpeak (cms)= .195
02069> -----
02070> PEAK FLOW (cms)= .098 (i)
02071> TIME TO PEAK (hrs)= 1.667
02072> RUNOFF VOLUME (mm)= 28.751
02073> TOTAL RAINFALL (mm)= 85.701
02074> RUNOFF COEFFICIENT = .335
02075> -----
02076> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02077> -----
02078> -----
02079> 001:0095-----
02080> *Total Flow at Node 2 (Catchment EXT1 & 101)
02081> -----
02082> | ADD HYD (Node2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02083> |-----| (ha) (cms) (hrs) (mm) (cms)
02084> | ID1 01:EXT1 | 7.93 .390 1.88 28.75 .000
02085> | +D2 02:101 | 1.58 .098 1.67 28.75 .000
02086> |-----|
02087> | SUM 09:Node2 | 9.51 .479 1.83 28.75 .000
02088> -----
02089> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02090> -----
02091> -----
02092> 001:0096-----
02093> *Catchment 102
02094> *This catchment refers to the north corner of the site
02095> *These lands ultimately enter the drain by Node 3
02096> -----
02097> | DESIGN NASHYD | Area (ha)= 16.14 Curve Number (CN)=60.00
02098> | 03:102 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02099> |-----| U.H. Tp(hrs)= .810
02100> -----
02101> Unit Hyd Qpeak (cms)= .761
02102> -----
02103> PEAK FLOW (cms)= .513 (i)
02104> TIME TO PEAK (hrs)= 2.375
02105> RUNOFF VOLUME (mm)= 27.964
02106> TOTAL RAINFALL (mm)= 85.701
02107> RUNOFF COEFFICIENT = .326
02108> -----
02109> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02110> -----
02111> -----
02112> 001:0097-----
02113> *Catchment 103
02114> *This catchment refers to the northwest side of the site, existing golf course,
02115> *These land drain to Node 3 along the Black Drain
02116> -----
02117> | DESIGN NASHYD | Area (ha)= 7.09 Curve Number (CN)=63.00
02118> | 04:103 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02119> |-----| U.H. Tp(hrs)= .260
02120> -----
02121> Unit Hyd Qpeak (cms)= 1.042
02122> -----
02123> PEAK FLOW (cms)= .527 (i)
02124> TIME TO PEAK (hrs)= 1.625
02125> RUNOFF VOLUME (mm)= 30.379
02126> TOTAL RAINFALL (mm)= 85.701
02127> RUNOFF COEFFICIENT = .354
02128> -----
02129> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02130> -----
02131> -----
02132> 001:0098-----
02133> *Catchment 104
02134> *This catchment refers to the southeast corner of the site, existing golf course
02135> * and woods. These land drain to Node 3 along the Black Drain
02136> -----
02137> | DESIGN NASHYD | Area (ha)= 7.13 Curve Number (CN)=61.00
02138> | 05:104 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02139> |-----| U.H. Tp(hrs)= .620
02140> -----
02141> Unit Hyd Qpeak (cms)= .439
02142> -----
02143> PEAK FLOW (cms)= .279 (i)
02144> TIME TO PEAK (hrs)= 2.125
02145> RUNOFF VOLUME (mm)= 28.751
02146> TOTAL RAINFALL (mm)= 85.701
02147> RUNOFF COEFFICIENT = .335
02148> -----
02149> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02150> -----
02151> -----
02152> 001:0099-----
02153> *Total Flow at Node 3, no external (101, 102, 103, 104)
02154> *Pond 1 Allowable Release Rate
02155> -----
02156> | ADD HYD (Node3SITE ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02157> |-----| (ha) (cms) (hrs) (mm) (cms)
02158> | ID1 02:101 | 1.58 .098 1.67 28.75 .000
02159> | +D2 03:102 | 16.14 .513 2.38 27.96 .000
02160> | +D3 04:103 | 7.09 .527 1.63 30.38 .000

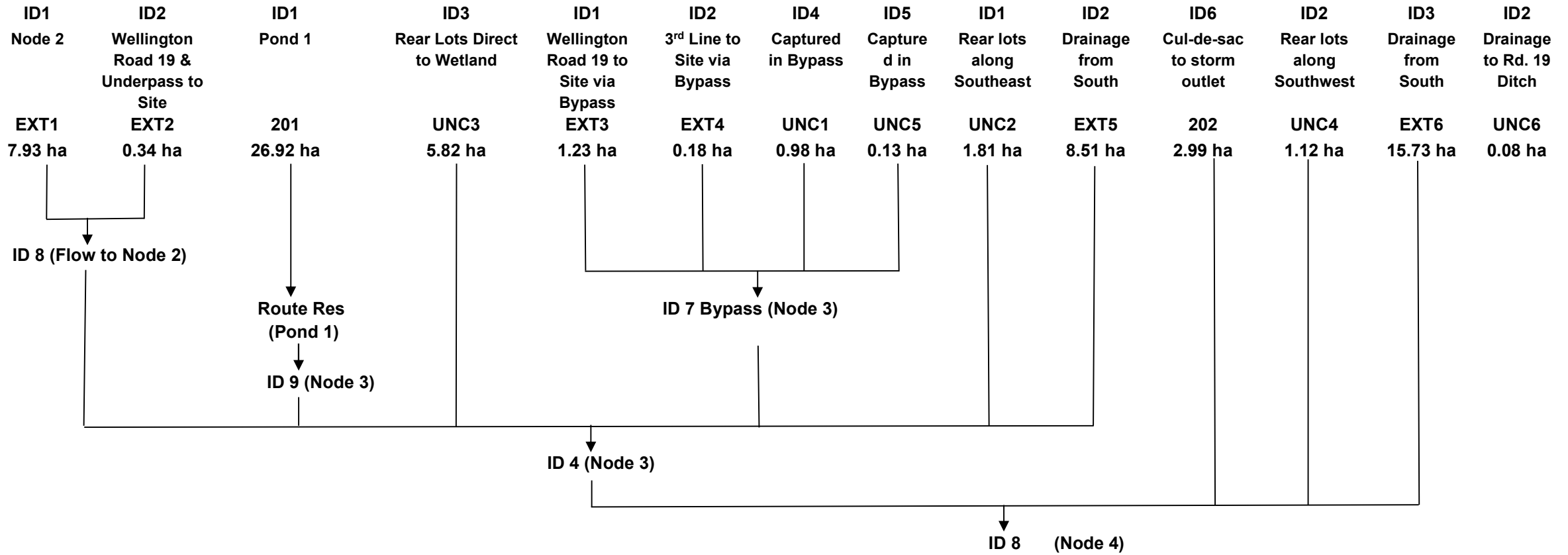
```

02161> +IDA 05:104 7.13 .279 2.13 28.75 .000
02162> =====
02163> SUM 09:Node3SITE 31.94 1.114 1.88 28.71 .000
02164>
02165> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02166> -----
02167> 001:0100-----
02168> *Catchment EXT2
02170> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
02171> *This catchment drains to the golf course via a spill point and CB on south side of
02172> *Wellington Road 19 and is directed to the Black Drain by Node 3
02173> -----
02174> | DESIGN STANDHYD | Area (ha)= .34
02175> | 06:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
02176> -----
02177> IMPERVIOUS PERVIOUS (i)
02178> Surface Area (ha)= .17 .17
02179> Dep. Storage (mm)= .80 1.50
02180> Average Slope (%)= .50 .50
02181> Length (m)= 47.61 40.00
02182> Mannings n = .013 .250
02183> -----
02184> Max.eff.Inten.(mm/hr)= 313.37 74.37
02185> over (min) 2.50 12.50
02186> Storage Coeff. (min)= 1.28 (ii) 13.32 (ii)
02187> Unit Hyd. Tpeak (min)= 2.50 12.50
02188> Unit Hyd. peak (cms)= .58 .09
02189> -----
02190> PEAK FLOW (cms)= .10 .02 *TOTALS*
02191> TIME TO PEAK (hrs)= 1.33 1.50 .112 (iii)
02192> RUNOFF VOLUME (mm)= 84.90 31.72 50.865
02193> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
02194> RUNOFF COEFFICIENT = .99 .37 .594
02195> *** WARNING: Storage Coefficient is smaller than DT!
02196> Use a smaller DT or a larger area.
02197> -----
02198> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02199> CN* = 58.0 Ia = Dep. Storage (Above)
02200> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02201> THAN THE STORAGE COEFFICIENT.
02202> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02203> -----
02204> 001:0101-----
02205> *Catchment EXT3
02207> *External area - Wellington Road 19 and 3rd line and
02208> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
02209> *This catchment drains to the golf course via a DICB on west side of 3rd Line
02210> *and is directed to the Black Drain by Node 3
02211> -----
02212> | DESIGN STANDHYD | Area (ha)= 1.23
02213> | 07:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
02214> -----
02215> IMPERVIOUS PERVIOUS (i)
02216> Surface Area (ha)= .73 .50
02217> Dep. Storage (mm)= .80 1.50
02218> Average Slope (%)= .50 .50
02219> Length (m)= 90.55 40.00
02220> Mannings n = .013 .250
02221> -----
02222> Max.eff.Inten.(mm/hr)= 313.37 67.71
02223> over (min) 2.50 15.00
02224> Storage Coeff. (min)= 1.88 (ii) 14.38 (ii)
02225> Unit Hyd. Tpeak (min)= 2.50 15.00
02226> Unit Hyd. peak (cms)= .50 .08
02227> -----
02228> PEAK FLOW (cms)= .44 .06 *TOTALS*
02229> TIME TO PEAK (hrs)= 1.33 1.54 1.333
02230> RUNOFF VOLUME (mm)= 84.90 31.02 54.729
02231> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
02232> RUNOFF COEFFICIENT = .99 .36 .639
02233> *** WARNING: Storage Coefficient is smaller than DT!
02234> Use a smaller DT or a larger area.
02235> -----
02236> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02237> CN* = 56.0 Ia = Dep. Storage (Above)
02238> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02239> THAN THE STORAGE COEFFICIENT.
02240> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02241> -----
02242> 001:0102-----
02243> *Catchment EXT4
02245> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
02246> *This catchment spills to the golf course and is directed to the Black Drain by
02247> -----
02248> | DESIGN STANDHYD | Area (ha)= .18
02249> | 08:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
02250> -----
02251> IMPERVIOUS PERVIOUS (i)
02252> Surface Area (ha)= .09 .09
02253> Dep. Storage (mm)= .80 1.50
02254> Average Slope (%)= .50 .50
02255> Length (m)= 34.64 40.00
02256> Mannings n = .013 .250
02257> -----
02258> Max.eff.Inten.(mm/hr)= 313.37 19.57
02259> over (min) 2.50 22.50
02260> Storage Coeff. (min)= 1.05 (ii) 21.60 (ii)
02261> Unit Hyd. Tpeak (min)= 2.50 22.50
02262> Unit Hyd. peak (cms)= .62 .05
02263> -----
02264> PEAK FLOW (cms)= .05 .00 *TOTALS*
02265> TIME TO PEAK (hrs)= 1.33 1.67 .052 (iii)
02266> RUNOFF VOLUME (mm)= 84.90 13.12 36.810
02267> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
02268> RUNOFF COEFFICIENT = .99 .15 .430
02269> *** WARNING: Storage Coefficient is smaller than DT!
02270> Use a smaller DT or a larger area.
02271> -----
02272> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02273> CN* = 30.0 Ia = Dep. Storage (Above)
02274> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02275> THAN THE STORAGE COEFFICIENT.
02276> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02277> -----
02278> 001:0103-----
02279> *Catchment EXT5
02281> *External area on the south of the site, existing agricultural
02282> *flows to the Black Drain at Node 3
02283> -----
02284> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
02285> | 03:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02286> | U.H. Tp(hrs)= .440
02287> -----
02288> Unit Hyd Qpeak (cms)= .739
02289> -----
02290> PEAK FLOW (cms)= .176 (i)
02291> TIME TO PEAK (hrs)= 1.875
02292> RUNOFF VOLUME (mm)= 12.753
02293> TOTAL RAINFALL (mm)= 85.701
02294> RUNOFF COEFFICIENT = .149
02295> -----

02296> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02297> -----
02298> 001:0104-----
02300> *Total External Flow at Node 3 (EXT1, EXT2, EXT3, EXT4, EXT5)
02301> *Pond 1 Allowable Release Rate
02302> -----
02303> | ADD HYD (Node3EXT) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02304> (ha) (cms) (hrs) (mm) (cms)
02305> ID1 01:EXT1 7.93 .390 1.88 28.75 .000
02306> +ID2 06:EXT2 .34 .112 1.33 50.87 .000
02307> +ID3 07:EXT3 1.23 .461 1.33 54.73 .000
02308> +ID4 08:EXT4 .18 .052 1.33 36.81 .000
02309> +ID5 03:EXT5 8.51 .176 1.88 12.75 .000
02310> =====
02311> SUM 04:Node3EXT 18.19 .700 1.33 23.52 .000
02312> -----
02313> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02314> -----
02315> 001:0105-----
02317> *Total Flow at Node 3, with external
02318> *These land drain to Node 4 along the Black Drain
02319> -----
02320> | ADD HYD (Node3Tot) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02321> (ha) (cms) (hrs) (mm) (cms)
02322> ID1 09:Node3SITE 31.94 1.114 1.88 28.71 .000
02323> +ID2 04:Node3EXT 18.19 .700 1.33 23.52 .000
02324> =====
02325> SUM 03:Node3Tot 50.13 1.771 1.83 26.83 .000
02326> -----
02327> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02328> -----
02329> 001:0106-----
02331> *Catchment 105
02332> *This catchment refers to the southeast corner of the site, existing golf course
02333> *Pond 2 Allowable Release Rate
02334> -----
02335> | DESIGN NASHYD | Area (ha)= 7.91 Curve Number (CN)=71.00
02337> | 06:105 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02338> | U.H. Tp(hrs)= .310
02339> -----
02340> Unit Hyd Qpeak (cms)= .975
02341> -----
02342> PEAK FLOW (cms)= .669 (i)
02343> TIME TO PEAK (hrs)= 1.667
02344> RINOFF VOLUME (mm)= 37.722
02345> TOTAL RAINFALL (mm)= 85.701
02346> RUNOFF COEFFICIENT = .440
02347> -----
02348> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02349> -----
02350> 001:0107-----
02352> *Catchment EXT6
02353> *External area on the south of the site, existing agricultural
02354> *flows to the Black Drain at Node 4
02355> -----
02356> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
02357> | 07:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02358> | U.H. Tp(hrs)= .550
02359> -----
02360> Unit Hyd Qpeak (cms)= 1.092
02361> -----
02362> PEAK FLOW (cms)= .555 (i)
02363> TIME TO PEAK (hrs)= 2.042
02364> RINOFF VOLUME (mm)= 24.278
02365> TOTAL RAINFALL (mm)= 85.701
02366> RUNOFF COEFFICIENT = .283
02367> -----
02368> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02369> -----
02370> 001:0108-----
02371> *Total Flow at Node 4, no external (101, 102, 103, 104, 105)
02372> -----
02373> | ADD HYD (Node4) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02375> (ha) (cms) (hrs) (mm) (cms)
02376> ID1 06:105 7.91 .669 1.67 37.72 .000
02377> +ID2 09:Node3SITE 31.94 1.114 1.88 28.71 .000
02378> =====
02379> SUM 08:Node4 39.85 1.745 1.75 30.50 .000
02380> -----
02381> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02382> -----
02383> 001:0109-----
02384> *Total Flow at Node 4, with external (EXT1, 101, EXT2, EXT3, EXT4, 102,
02385> 103, 104, EXT5, 105, EXT6)
02386> -----
02387> | ADD HYD (Node4Tot) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02389> (ha) (cms) (hrs) (mm) (cms)
02390> ID1 03:Node3Tot 50.13 1.771 1.83 26.83 .000
02391> +ID2 06:105 7.91 .669 1.67 37.72 .000
02392> +ID3 07:EXT6 15.73 .555 2.04 24.28 .000
02393> =====
02394> SUM 09:Node4Tot 73.77 2.893 1.83 27.45 .000
02395> -----
02396> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02397> -----
02398> 001:0110-----
02400> FINISH
02401> -----
02402> *****
02403> WARNINGS / ERRORS / NOTES
02404> -----
02405> 001:0010 DESIGN STANDHYD
02406> *** WARNING: Storage Coefficient is smaller than DT!
02407> Use a smaller DT or a larger area.
02408> 001:0012 DESIGN STANDHYD
02409> *** WARNING: Storage Coefficient is smaller than DT!
02410> Use a smaller DT or a larger area.
02411> 001:0028 DESIGN STANDHYD
02412> *** WARNING: Storage Coefficient is smaller than DT!
02413> Use a smaller DT or a larger area.
02414> 001:0029 DESIGN STANDHYD
02415> *** WARNING: Storage Coefficient is smaller than DT!
02416> Use a smaller DT or a larger area.
02417> 001:0030 DESIGN STANDHYD
02418> *** WARNING: Storage Coefficient is smaller than DT!
02419> Use a smaller DT or a larger area.
02420> 001:0046 DESIGN STANDHYD
02421> *** WARNING: Storage Coefficient is smaller than DT!
02422> Use a smaller DT or a larger area.
02423> 001:0047 DESIGN STANDHYD
02424> *** WARNING: Storage Coefficient is smaller than DT!
02425> Use a smaller DT or a larger area.
02426> 001:0048 DESIGN STANDHYD
02427> *** WARNING: Storage Coefficient is smaller than DT!
02428> Use a smaller DT or a larger area.
02429> 001:0064 DESIGN STANDHYD
02430> *** WARNING: Storage Coefficient is smaller than DT!

```
02431> Use a smaller DT or a larger area.
02432> 001:0065 DESIGN STANDHYD
02433> *** WARNING: Storage Coefficient is smaller than DT!
02434> Use a smaller DT or a larger area.
02435> 001:0066 DESIGN STANDHYD
02436> *** WARNING: Storage Coefficient is smaller than DT!
02437> Use a smaller DT or a larger area.
02438> 001:0082 DESIGN STANDHYD
02439> *** WARNING: Storage Coefficient is smaller than DT!
02440> Use a smaller DT or a larger area.
02441> 001:0083 DESIGN STANDHYD
02442> *** WARNING: Storage Coefficient is smaller than DT!
02443> Use a smaller DT or a larger area.
02444> 001:0084 DESIGN STANDHYD
02445> *** WARNING: Storage Coefficient is smaller than DT!
02446> Use a smaller DT or a larger area.
02447> 001:0100 DESIGN STANDHYD
02448> *** WARNING: Storage Coefficient is smaller than DT!
02449> Use a smaller DT or a larger area.
02450> 001:0101 DESIGN STANDHYD
02451> *** WARNING: Storage Coefficient is smaller than DT!
02452> Use a smaller DT or a larger area.
02453> 001:0102 DESIGN STANDHYD
02454> *** WARNING: Storage Coefficient is smaller than DT!
02455> Use a smaller DT or a larger area.
02456> Simulation ended on 2021-12-22 at 13:08:25
02457> =====
02458>
02459>
```


Post-Development SWMHYMO Model Schematic



Project Name Fergus Golf Course
Project No. 300052719.0000
Date September 24, 2021



Post-Development SWMHYMO Input File

(C:\...POST.DAT)

```
00001> 2 Metric units
00002> #*****
00003> # Project Name: [Fergus Golf Club] Project Number: [30005219]
00004> # Date : [9-28-2021]
00005> # Modeller : [L.Garner]
00006> # Company : R.J. Burnside & Associates
00007> # License # : 3245976
00008> #*****
00009> #
00010> # *****
00011> # Fergus Golf Club Post Development
00012> # *****
00013> #
00014> #-----
00015> #-----
00016> START TZERO=[0.0], METFOU=[2], NSTORM=[0], NRUN=[0]
00017> # [ ] <- storm filename
00018> #-----
00019> # 25mm 4-hr Chicago
00020> MASS STORM PTOTAL=[25] (mm), CSDT=[10] (min),
00021> CURVE_FILENAME=["4hr-chi.mst"]
00022> #-----
00023> *Catchment EXT1
00024> *External area on the northwest of Wellington Road 19.
00025> *This catchment drains to the golf course via a culvert which will be captured
00026> *and enter a bypass pipe, entering the Black Drain at Node 2
00027>
00028> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00029> DWF=[0] (cms), CN/C=[61], TP=[.44]hrs,
00030> RAINFALL=[ , , , ] (mm/hr), END=-1
00031> #-----
00032> *Catchment EXT2
00033> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00034> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00035>
00036> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00037> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00038> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00039> #-----
00040> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00041>
00042> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00043> #-----
00044> *Catchment 201
00045> *Drainage Area to SWM#1
00046>
00047> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha),
00048> XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62],
00049> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00050> #-----
00051> * Pond 1
00052> ROUTE RESERVOIR Idout=[9], NHYD=["Pond1"], Idin=[1],
00053> RDT=[2] (min),
00054> TABLE of ( OUTFLOW-STORAGE ) values
00055> (cms) - (ha-m)
00056> [ 0.0 , 0.0 ]
00057> [ 0.057 , 0.331 ]
00058> [ 0.32 , 0.950 ]
00059> [ -1 , -1 ] (max twenty pts)
00060> Idovf=[ ], NHYDovf=[overflow]
00061> #-----
00062> *Catchment UNC3
00063> *Existing wetland/open space area to remain
00064> *flows to the Black Drain at Node 3
00065>
00066> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha),
00067> DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs,
00068> RAINFALL=[ , , , ] (mm/hr), END=-1
00069> #-----
00070> *Catchment EXT3
00071> *External area - Wellington Road 19 and 3rd line and
00072> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00073> *This catchment is collected in a bypass and is directed to the Black Drain by N
00074>
00075> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00076> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00077> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00078> #-----
00079> *Catchment EXT4
00080> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00081> *This catchment is collected in a bypass and directed to the Black Drain by Node
00082>
00083> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00084> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00085> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00086> #-----
00087> *Catchment UNC1
00088> *This catchment drains east towards 3rd Line and is collected in a bypass that
00089> *is directed to the Black Drain by Node 3
00090>
00091> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha),
00092> DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs,
00093> RAINFALL=[ , , , ] (mm/hr), END=-1
00094> #-----
00095> *Catchment UNC5
00096> *This catchment drains east towards 3rd Line and is collected in a bypass that
00097> *is directed to the Black Drain by Node 3
00098>
00099> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
00100> DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
00101> RAINFALL=[ , , , ] (mm/hr), END=-1
00102> #-----
00103> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
00104>
00105> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00106> #-----
00107> *Catchment UNC2
00108> *Rear lots on South side of property, collected in swale
00109> *flows to the Black Drain at Node 3
00110>
00111> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),
00112> DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs,
00113> RAINFALL=[ , , , ] (mm/hr), END=-1
00114> #-----
00115> *Catchment EXT5
00116> *External area on the south of the site, existing agricultural
00117> *flows to the Black Drain at Node 3
00118>
00119> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00120> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00121> RAINFALL=[ , , , ] (mm/hr), END=-1
00122> #-----
00123> *Total Flow to Node 3 (Including External Areas)
00124>
00125> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00126> #-----
00127> *Catchment 202
00128> *This catchment is the area draining Node 4 Outlet
00129>
00130> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha),
00131> XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74],
00132> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00133> #-----
00134> *Catchment UNC4
00135> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00136>
00137> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha),
00138> DWF=[0] (cms), CN/C=[64], TP=[0.05]hrs,
00139> RAINFALL=[ , , , ] (mm/hr), END=-1
00140> #-----
00141> *Catchment EXT6
00142> *External area on the south of the site, existing agricultural
00143> *flows to the Black Drain at Node 4
00144>
00145> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00146> DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs,
00147> RAINFALL=[ , , , ] (mm/hr), END=-1
00148> #-----
00149> *Total Flow to Node 4 (Including External Areas)
00150>
00151> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00152> #-----
00153> *Catchment EXT5
00154> *Uncontrolled rear yards, flows to ditch along Road 19
00155>
00156> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha),
00157> DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs,
00158> RAINFALL=[ , , , ] (mm/hr), END=-1
00159> #-----
00160> *2-Year
00161> CHICAGO STORM UNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00162> ICASE=[1],
00163> A=[400.29], B=[0.0001], and C=[0.702],
00164> #-----
00165> *Catchment EXT1
00166> *External area on the northwest of Wellington Road 19.
00167> *This catchment drains to the golf course via a culvert which will be captured
00168> *and enter a bypass pipe, entering the Black Drain at Node 2
00169>
00170>
00171> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00172> DWF=[0] (cms), CN/C=[61], TP=[.44]hrs,
00173> RAINFALL=[ , , , ] (mm/hr), END=-1
00174> #-----
00175> *Catchment EXT2
00176> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00177> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00178>
00179> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00180> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00181> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00182> #-----
00183> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00184>
00185> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00186> #-----
00187> *Catchment 201
00188> *Drainage Area to SWM#1
00189>
00190> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha),
00191> XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62],
00192> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00193> #-----
00194> * Pond 1
00195> ROUTE RESERVOIR Idout=[9], NHYD=["Pond1"], Idin=[1],
00196> RDT=[2] (min),
00197> TABLE of ( OUTFLOW-STORAGE ) values
00198> (cms) - (ha-m)
00199> [ 0.0 , 0.0 ]
00200> [ 0.057 , 0.331 ]
00201> [ 0.32 , 0.950 ]
00202> [ -1 , -1 ] (max twenty pts)
00203> Idovf=[ ], NHYDovf=[overflow]
00204> #-----
00205> *Catchment UNC3
00206> *Existing wetland/open space area to remain
00207> *flows to the Black Drain at Node 3
00208>
00209> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha),
00210> DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs,
00211> RAINFALL=[ , , , ] (mm/hr), END=-1
00212> #-----
00213> *Catchment EXT3
00214> *External area - Wellington Road 19 and 3rd line and
00215> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00216> *This catchment is collected in a bypass and is directed to the Black Drain by N
00217>
00218> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00219> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00220> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00221> #-----
00222> *Catchment EXT4
00223> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00224> *This catchment is collected in a bypass and directed to the Black Drain by Node
00225>
00226> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00227> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00228> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00229> #-----
00230> *Catchment UNC1
00231> *This catchment drains east towards 3rd Line and is collected in a bypass that
00232> *is directed to the Black Drain by Node 3
00233>
00234> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha),
00235> DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs,
00236> RAINFALL=[ , , , ] (mm/hr), END=-1
00237> #-----
00238> *Catchment UNC5
00239> *This catchment drains east towards 3rd Line and is collected in a bypass that
00240> *is directed to the Black Drain by Node 3
00241>
00242> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
00243> DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
00244> RAINFALL=[ , , , ] (mm/hr), END=-1
00245> #-----
00246> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
00247>
00248> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00249> #-----
00250> *Catchment UNC2
00251> *Rear lots on South side of property, collected in swale
00252> *flows to the Black Drain at Node 3
00253>
00254> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),
00255> DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs,
00256> RAINFALL=[ , , , ] (mm/hr), END=-1
00257> #-----
00258> *Catchment EXT5
00259> *External area on the south of the site, existing agricultural
00260> *flows to the Black Drain at Node 3
00261>
00262> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
00263> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00264> RAINFALL=[ , , , ] (mm/hr), END=-1
00265> #-----
00266> *Total Flow to Node 3 (Including External Areas)
00267>
00268> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00269> #-----
00270> *Catchment 202
```

```

00271> *This catchment is the area draining Node 4 Outlet
00272>
00273> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha),
00274> XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74],
00275> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00276> *%-----|
00277> *Catchment UNC4
00278> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00279>
00280> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha),
00281> DWF=[0] (cms), CN/C=[64], TP=[0.05]hrs,
00282> RAINFALL=[ , , , ] (mm/hr), END=-1
00283> *%-----|
00284> *Catchment EXT6
00285> *External area on the south of the site, existing agricultural
00286> *flows to the Black Drain at Node 4
00287>
00288> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00289> DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs,
00290> RAINFALL=[ , , , ] (mm/hr), END=-1
00291> *%-----|
00292> *Total Flow to Node 4 (Including External Areas)
00293>
00294> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00295> *%-----|
00296> *Catchment UNC6
00297> *Uncontrolled rear yards, flows to ditch along Road 19
00298>
00299> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha),
00300> DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs,
00301> RAINFALL=[ , , , ] (mm/hr), END=-1
00302> *%-----|
00303> *%-----|
00304> *5-Year
00305> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00306> ICASEcs=[1],
00307> A=[550.60], B=[0.0001], and C=[0.698],
00308> *%-----|
00309> *Catchment EXT1
00310> *External area on the northwest of Wellington Road 19.
00311> *This catchment drains to the golf course via a culvert which will be captured
00312> *and enter a bypass pipe, entering the Black Drain at Node 2
00313>
00314> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00315> DWF=[0] (cms), CN/C=[61], TP=[.44]hrs,
00316> RAINFALL=[ , , , ] (mm/hr), END=-1
00317> *%-----|
00318> *Catchment UNC2
00319> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00320> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00321>
00322> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00323> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00324> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00325> *%-----|
00326> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00327>
00328> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00329> *%-----|
00330> *Catchment 201
00331> *Drainage Area to SWMF1
00332>
00333> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha),
00334> XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62],
00335> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00336> *%-----|
00337> * Pond 1
00338> ROUTE RESERVOIR IDout=[9], NHYD=["Pond1"], IDin=[1],
00339> RDT=[2] (min),
00340>
00341> TABLE of ( OUTFLOW-STORAGE ) values
00342> (cms) - (ha-m)
00343> [ 0.0 , 0.0 ]
00344> [ 0.057 , 0.331 ]
00345> [ 0.32 , 0.950 ]
00346> [ -1 , -1 ] (max twenty pts)
00347> IDovf=[ ], NHYDovf=[overflow]
00348> *%-----|
00349> *Catchment UNC3
00350> *Existing wetland/open space area to remain
00351> *flows to the Black Drain at Node 3
00352>
00353> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha),
00354> DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs,
00355> RAINFALL=[ , , , ] (mm/hr), END=-1
00356> *%-----|
00357> *Catchment EXT3
00358> *External area - Wellington Road 19 and 3rd line and
00359> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00360> *This catchment is collected in a bypass and is directed to the Black Drain by N
00361>
00362> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00363> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00364> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00365> *%-----|
00366> *Catchment EXT4
00367> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00368> *This catchment is collected in a bypass and directed to the Black Drain by Node
00369>
00370> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00371> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00372> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00373> *%-----|
00374> *Catchment UNC1
00375> *This catchment drains east towards 3rd Line and is collected in a bypass that
00376> *is directed to the Black Drain by Node 3
00377>
00378> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha),
00379> DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs,
00380> RAINFALL=[ , , , ] (mm/hr), END=-1
00381> *%-----|
00382> *Catchment UNC5
00383> *This catchment drains east towards 3rd Line and is collected in a bypass that
00384> *is directed to the Black Drain by Node 3
00385>
00386> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
00387> DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
00388> RAINFALL=[ , , , ] (mm/hr), END=-1
00389> *%-----|
00390> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
00391>
00392> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00393> *%-----|
00394> *Catchment UNC2
00395> *Rear lots on South side of property, collected in swale
00396> *flows to the Black Drain at Node 3
00397>
00398> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),
00399> DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs,
00400> RAINFALL=[ , , , ] (mm/hr), END=-1
00401> *%-----|
00402> *Catchment EXT5
00403> *External area on the south of the site, existing agricultural
00404> *flows to the Black Drain at Node 3
00405>
00406> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),

```

```

00406> DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
00407> RAINFALL=[ , , , ] (mm/hr), END=-1
00408> *%-----|
00409> *Total Flow to Node 3 (Including External Areas)
00410>
00411> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00412> *%-----|
00413> *Catchment 202
00414> *This catchment is the area draining Node 4 Outlet
00415>
00416> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha),
00417> XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74],
00418> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00419> *%-----|
00420> *Catchment UNC4
00421> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00422>
00423> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha),
00424> DWF=[0] (cms), CN/C=[64], TP=[0.05]hrs,
00425> RAINFALL=[ , , , ] (mm/hr), END=-1
00426> *%-----|
00427> *Catchment EXT6
00428> *External area on the south of the site, existing agricultural
00429> *flows to the Black Drain at Node 4
00430>
00431> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
00432> DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs,
00433> RAINFALL=[ , , , ] (mm/hr), END=-1
00434> *%-----|
00435> *Total Flow to Node 4 (Including External Areas)
00436>
00437> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00438> *%-----|
00439> *Catchment UNC6
00440> *Uncontrolled rear yards, flows to ditch along Road 19
00441>
00442> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha),
00443> DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs,
00444> RAINFALL=[ , , , ] (mm/hr), END=-1
00445> *%-----|
00446> *%-----|
00447> *10-Year
00448> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min),
00449> ICASEcs=[1],
00450> A=[648.07], B=[0.0001], and C=[0.696],
00451> *%-----|
00452> *Catchment EXT1
00453> *External area on the northwest of Wellington Road 19.
00454> *This catchment drains to the golf course via a culvert which will be captured
00455> *and enter a bypass pipe, entering the Black Drain at Node 2
00456>
00457> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
00458> DWF=[0] (cms), CN/C=[61], TP=[.44]hrs,
00459> RAINFALL=[ , , , ] (mm/hr), END=-1
00460> *%-----|
00461> *Catchment EXT2
00462> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00463> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00464>
00465> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
00466> XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
00467> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00468> *%-----|
00469> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00470>
00471> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00472> *%-----|
00473> *Catchment 201
00474> *Drainage Area to SWMF1
00475>
00476> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha),
00477> XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62],
00478> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00479> *%-----|
00480> * Pond 1
00481> ROUTE RESERVOIR IDout=[9], NHYD=["Pond1"], IDin=[1],
00482> RDT=[2] (min),
00483>
00484> TABLE of ( OUTFLOW-STORAGE ) values
00485> (cms) - (ha-m)
00486> [ 0.0 , 0.0 ]
00487> [ 0.057 , 0.331 ]
00488> [ 0.32 , 0.950 ]
00489> [ -1 , -1 ] (max twenty pts)
00490> IDovf=[ ], NHYDovf=[overflow]
00491> *%-----|
00492> *Catchment UNC3
00493> *Existing wetland/open space area to remain
00494> *flows to the Black Drain at Node 3
00495>
00496> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha),
00497> DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs,
00498> RAINFALL=[ , , , ] (mm/hr), END=-1
00499> *%-----|
00500> *Catchment EXT3
00501> *External area - Wellington Road 19 and 3rd line and
00502> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00503> *This catchment is collected in a bypass and is directed to the Black Drain by N
00504>
00505> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
00506> XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
00507> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00508> *%-----|
00509> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00510> *This catchment is collected in a bypass and directed to the Black Drain by Node
00511>
00512> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
00513> XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
00514> SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00515> *%-----|
00516> *Catchment UNC1
00517> *This catchment drains east towards 3rd Line and is collected in a bypass that
00518> *is directed to the Black Drain by Node 3
00519>
00520> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha),
00521> DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs,
00522> RAINFALL=[ , , , ] (mm/hr), END=-1
00523> *%-----|
00524> *Catchment UNC5
00525> *This catchment drains east towards 3rd Line and is collected in a bypass that
00526> *is directed to the Black Drain by Node 3
00527>
00528> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
00529> DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
00530> RAINFALL=[ , , , ] (mm/hr), END=-1
00531> *%-----|
00532> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
00533>
00534> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00535> *%-----|
00536> *Catchment UNC2
00537> *Rear lots on South side of property, collected in swale
00538> *flows to the Black Drain at Node 3
00539>
00540> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),

```

00541> DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00542> *%-----
00543> *Catchment EXT5
00544> *External area on the south of the site, existing agricultural
00545> *flows to the Black Drain at Node 3
00546> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha), DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00547> *%-----
00548> *Total Flow to Node 3 (Including External Areas)
00549> *%-----
00550> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00551> *%-----
00552> *Catchment 202
00553> *This catchment is the area draining Node 4 Outlet
00554> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha), XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00555> *%-----
00556> *Catchment UNC4
00557> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00558> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha), DWF=[0] (cms), CN/C=[64], TP=[0.05]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00559> *%-----
00560> *Catchment EXT6
00561> *External area on the south of the site, existing agricultural
00562> *flows to the Black Drain at Node 4
00563> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha), DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00564> *%-----
00565> *Total Flow to Node 4 (Including External Areas)
00566> *%-----
00567> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00568> *%-----
00569> *Catchment UNC6
00570> *Uncontrolled rear yards, flows to ditch along Road 19
00571> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha), DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00572> *%-----
00573> *25-Year
00574> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min), ICASECS=[1], A=[771.35], B=[0.0001], and C=[0.694]
00575> *%-----
00576> *Catchment EXT1
00577> *External area on the northwest of Wellington Road 19.
00578> *This catchment drains to the golf course via a culvert which will be captured
00579> *and enter a bypass pipe, entering the Black Drain at Node 2
00580> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha), DWF=[0] (cms), CN/C=[61], TP=[.44]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00581> *%-----
00582> *Catchment EXT2
00583> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00584> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00585> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha), XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00586> *%-----
00587> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00588> *%-----
00589> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00590> *%-----
00591> *Catchment 201
00592> *Drainage Area to SWMF1
00593> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha), XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00594> *%-----
00595> * Pond 1
00596> ROUTE RESERVOIR Idout=[9], NHYD=["Pond1"], Idin=[1], RDT=[2] (min),
TABLE of (OUTFLOW-STORAGE) values
(cms) - (ha-m)
[0.0, 0.0]
[0.057, 0.331]
[0.32, 0.950]
[-1, -1] (max twenty pts)
Idovf=[], NHYDovf=[overflow]
00597> *%-----
00598> *Catchment UNC3
00599> *Existing wetland/open space area to remain
00600> *flows to the Black Drain at Node 3
00601> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha), DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00602> *%-----
00603> *Catchment EXT4
00604> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00605> *This catchment is collected in a bypass and directed to the Black Drain by Node
00606> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha), XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00607> *%-----
00608> *Catchment UNC1
00609> *This catchment drains east towards 3rd Line and is collected in a bypass that
00610> *is directed to the Black Drain by Node 3
00611> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha), DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00612> *%-----
00613> *Catchment UNC5
00614> *This catchment drains east towards 3rd Line and is collected in a bypass that
00615> *is directed to the Black Drain by Node 3
00616> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha), DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00617> *%-----
00618> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi

00676>
00677> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00678> *%-----
00679> *Catchment UNC2
00680> *Rear lots on South side of property, collected in swale
00681> *flows to the Black Drain at Node 3
00682> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha), DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00683> *%-----
00684> *Catchment EXT5
00685> *External area on the south of the site, existing agricultural
00686> *flows to the Black Drain at Node 3
00687> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha), DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00688> *%-----
00689> *Total Flow to Node 3 (Including External Areas)
00690> *%-----
00691> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00692> *%-----
00693> *Catchment 202
00694> *This catchment is the area draining Node 4 Outlet
00695> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha), XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00696> *%-----
00697> *Catchment UNC4
00698> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00699> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha), DWF=[0] (cms), CN/C=[64], TP=[0.05]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00700> *%-----
00701> *External area on the south of the site, existing agricultural
00702> *flows to the Black Drain at Node 4
00703> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha), DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00704> *%-----
00705> *Total Flow to Node 4 (Including External Areas)
00706> *%-----
00707> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00708> *%-----
00709> *Catchment UNC6
00710> *Uncontrolled rear yards, flows to ditch along Road 19
00711> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha), DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00712> *%-----
00713> *25-Year
00714> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSDT=[5] (min), ICASECS=[1], A=[862.09], B=[0.0001], and C=[0.693]
00715> *%-----
00716> *External area on the northwest of Wellington Road 19.
00717> *This catchment drains to the golf course via a culvert which will be captured
00718> *and enter a bypass pipe, entering the Black Drain at Node 2
00719> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha), DWF=[0] (cms), CN/C=[61], TP=[.44]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00720> *%-----
00721> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00722> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00723> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha), XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00724> *%-----
00725> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00726> *%-----
00727> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00728> *%-----
00729> *Catchment 201
00730> *Drainage Area to SWMF1
00731> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha), XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00732> *%-----
00733> * Pond 1
00734> ROUTE RESERVOIR Idout=[9], NHYD=["Pond1"], Idin=[1], RDT=[2] (min),
TABLE of (OUTFLOW-STORAGE) values
(cms) - (ha-m)
[0.0, 0.0]
[0.057, 0.331]
[0.32, 0.950]
[-1, -1] (max twenty pts)
Idovf=[], NHYDovf=[overflow]
00735> *%-----
00736> *Catchment UNC3
00737> *Existing wetland/open space area to remain
00738> *flows to the Black Drain at Node 3
00739> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha), DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00740> *%-----
00741> *Catchment EXT3
00742> *External area - Wellington Road 19 and 3rd line and
00743> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00744> *This catchment is collected in a bypass and is directed to the Black Drain by N
00745> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha), XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00746> *%-----
00747> *Catchment EXT4
00748> *External area - Wellington Road 19 and 3rd Line and
00749> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00750> *This catchment is collected in a bypass and is directed to the Black Drain by Node
00751> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha), XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30], SLOPE=[0.5] (%), RAINFALL=[, , ,](mm/hr), END=-1
00752> *%-----
00753> *Catchment UNC1
00754> *This catchment drains east towards 3rd Line and is collected in a bypass that
00755> *is directed to the Black Drain by Node 3
00756> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha), DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00757> *%-----
00758> *Catchment UNC5
00759> *This catchment drains east towards 3rd Line and is collected in a bypass that
00760> *is directed to the Black Drain by Node 3
00761> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha), DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs, RAINFALL=[, , ,](mm/hr), END=-1
00762> *%-----
00763> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi

```

00811> *This catchment drains east towards 3rd Line and is collected in a bypass that
00812> *is directed to the Black Drain by Node 3
00813>
00814> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00815>
00816>
00817> *%-----|
00818> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL, UNC5) - Black Drain Bypass Pi
00819>
00820> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00821> *%-----|
00822> *Catchment UNC2
00823> *Rear lots on South side of property, collected in swale
00824> *flows to the Black Drain at Node 3
00825>
00826> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),
DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00827>
00828>
00829> *%-----|
00830> *Catchment EXT5
00831> *External area on the south of the site, existing agricultural
00832> *flows to the Black Drain at Node 3
00833>
00834> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00835>
00836>
00837> *%-----|
00838> *Total Flow to Node 3 (Including External Areas)
00839>
00840> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00841> *%-----|
00842> *Catchment 202
00843> *This catchment is the area draining Node 4 Outlet
00844>
00845> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha),
XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00846>
00847>
00848> *%-----|
00849> *Catchment UNC4
00850> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00851>
00852> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha),
DWF=[0] (cms), CN/C=[64], TP=[0.44]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00853>
00854>
00855> *%-----|
00856> *Catchment EXT6
00857> *External area on the south of the site, existing agricultural
00858> *flows to the Black Drain at Node 4
00859>
00860> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00861>
00862>
00863> *%-----|
00864> *Total Flow to Node 4 (Including External Areas)
00865>
00866> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
00867> *%-----|
00868> *Catchment UNC6
00869> *Uncontrolled rear yards, flows to ditch along Road 19
00870>
00871> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha),
DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00872>
00873>
00874> *%-----|
00875> *%-----|
00876> *100-Year
00877> CHICAGO STORM IUNITS=[2], TD=[4] (hrs), TPRAT=[0.333], CSPT=[5] (min),
ICASE=[1],
A=[955.98], B=[0.0001], and C=[0.693],
00878>
00879>
00880> *%-----|
00881> *Catchment EXT1
00882> *External area on the northwest of Wellington Road 19.
00883> *This catchment drains to the golf course via a culvert which will be captured
00884> *and enter a bypass pipe, entering the Black Drain at Node 2
00885>
00886> DESIGN NASHYD ID=[1], NHYD=["EXT1"], DT=[2]min, AREA=[7.93] (ha),
DWF=[0] (cms), CN/C=[61], TP=[.44]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00887>
00888>
00889> *%-----|
00890> *Catchment EXT2
00891> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00892> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00893>
00894> DESIGN STANDHYD ID=[2], NHYD=["EXT2"], DT=[2]min, AREA=[0.34] (ha),
XIMP=[0.36], TIMP=[0.51], DWF=[0] (cms), LOSS=[2], CN=[58],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00895>
00896>
00897> *%-----|
00898> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00899>
00900> ADD HYD Idsum=[8], NHYD=["Bypass1"], IDs to add=[1,2]
00901> *%-----|
00902> *Catchment 201
00903> *Drainage Area to SWMFI
00904>
00905> DESIGN STANDHYD ID=[1], NHYD=["201"], DT=[2]min, AREA=[26.92] (ha),
XIMP=[0.23], TIMP=[0.34], DWF=[0] (cms), LOSS=[2], CN=[62],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00906>
00907>
00908> *%-----|
00909> * Pond 1
00910> ROUTE RESERVOIR Idout=[9], NHYD=["Pond1"], Idin=[1],
RDT=[2] (min),
00911>
00912> TABLE of ( OUTFLOW-STORAGE ) values
(cms) - (ha-m)
00913> [ 0.0 , 0.0 ]
00914> [ 0.057 , 0.331 ]
00915> [ 0.32 , 0.950 ]
00916>
00917> Idovf=[ , , , ] (max twenty pts)
00918>
00919> *%-----|
00920> *Catchment UNC3
00921> *Existing wetland/open space area to remain
00922> *flows to the Black Drain at Node 3
00923>
00924> DESIGN NASHYD ID=[3], NHYD=["UNC3"], DT=[2]min, AREA=[5.82] (ha),
DWF=[0] (cms), CN/C=[62], TP=[0.83]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00925>
00926>
00927> *%-----|
00928> *Catchment EXT3
00929> *External area - Wellington Road 19 and 3rd line and
00930> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00931> *This catchment is collected in a bypass and is directed to the Black Drain by N
00932>
00933> DESIGN STANDHYD ID=[1], NHYD=["EXT3"], DT=[2]min, AREA=[1.23] (ha),
XIMP=[0.44], TIMP=[0.59], DWF=[0] (cms), LOSS=[2], CN=[56],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00934>
00935>
00936> *%-----|
00937> *Catchment EXT4
00938> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00939> *This catchment is collected in a bypass and directed to the Black Drain by Node
00940>
00941> DESIGN STANDHYD ID=[2], NHYD=["EXT4"], DT=[2]min, AREA=[0.18] (ha),
XIMP=[0.33], TIMP=[0.48], DWF=[0] (cms), LOSS=[2], CN=[30],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00942>
00943>
00944> *%-----|
00945> *Catchment UNCL

```

```

00946> *This catchment drains east towards 3rd Line and is collected in a bypass that
00947> *is directed to the Black Drain by Node 3
00948>
00949> DESIGN NASHYD ID=[4], NHYD=["UNC1"], DT=[2]min, AREA=[0.98] (ha),
DWF=[0] (cms), CN/C=[61], TP=[0.04]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00950>
00951>
00952> *%-----|
00953> *Catchment UNC5
00954> *This catchment drains east towards 3rd Line and is collected in a bypass that
00955> *is directed to the Black Drain by Node 3
00956>
00957> DESIGN NASHYD ID=[5], NHYD=["UNC5"], DT=[2]min, AREA=[0.13] (ha),
DWF=[0] (cms), CN/C=[39], TP=[0.07]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00958>
00959>
00960> *%-----|
00961> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL, UNC5) - Black Drain Bypass Pi
00962>
00963> ADD HYD Idsum=[7], NHYD=["Bypass2"], IDs to add=[1,2,4,5]
00964> *%-----|
00965> *Catchment UNC2
00966> *Rear lots on South side of property, collected in swale
00967> *flows to the Black Drain at Node 3
00968>
00969> DESIGN NASHYD ID=[1], NHYD=["UNC2"], DT=[2]min, AREA=[1.81] (ha),
DWF=[0] (cms), CN/C=[66], TP=[0.21]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00970>
00971>
00972> *%-----|
00973> *Catchment UNC5
00974> *External area on the south of the site, existing agricultural
00975> *flows to the Black Drain at Node 3
00976>
00977> DESIGN NASHYD ID=[2], NHYD=["EXT5"], DT=[2]min, AREA=[8.51] (ha),
DWF=[0] (cms), CN/C=[35], TP=[0.44]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00978>
00979>
00980> *%-----|
00981> *Total Flow to Node 3 (Including External Areas)
00982>
00983> ADD HYD Idsum=[4], NHYD=["Node3"], IDs to add=[8,9,3,7,1,2]
00984> *%-----|
00985> *Catchment 202
00986> *This catchment is the area draining Node 4 Outlet
00987>
00988> DESIGN STANDHYD ID=[6], NHYD=["202"], DT=[2]min, AREA=[2.99] (ha),
XIMP=[0.18], TIMP=[0.28], DWF=[0] (cms), LOSS=[2], CN=[74],
SLOPE=[0.5] (%), RAINFALL=[ , , , ] (mm/hr), END=-1
00989>
00990>
00991> *%-----|
00992> *Catchment UNC4
00993> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00994>
00995> DESIGN NASHYD ID=[2], NHYD=["UNC4"], DT=[2]min, AREA=[1.12] (ha),
DWF=[0] (cms), CN/C=[64], TP=[0.44]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00996>
00997>
00998> *%-----|
00999> *Catchment EXT6
01000> *External area on the south of the site, existing agricultural
01001> *flows to the Black Drain at Node 4
01002>
01003> DESIGN NASHYD ID=[3], NHYD=["EXT6"], DT=[2]min, AREA=[15.73] (ha),
DWF=[0] (cms), CN/C=[55], TP=[0.55]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
01004>
01005>
01006> *%-----|
01007> *Total Flow to Node 4 (Including External Areas)
01008>
01009> ADD HYD Idsum=[8], NHYD=["Node4"], IDs to add=[4,6,2,3]
01010> *%-----|
01011> *Catchment UNC6
01012> *Uncontrolled rear yards, flows to ditch along Road 19
01013>
01014> DESIGN NASHYD ID=[2], NHYD=["UNC6"], DT=[2]min, AREA=[0.08] (ha),
DWF=[0] (cms), CN/C=[74], TP=[0.05]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
01015>
01016>
01017> *%-----|
01018> FINISH
01019>
01020>
01021>
01022>
01023>
01024>
01025>
01026>
01027>
01028>
01029>
01030>
01031>
01032>
01033>

```

Post-Development SWMHYMO Output File

(C:\...\POST.out)

00001> =====
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999 =====
00004> S W W W M M M H H Y Y M M M O O 9 9 9 9 9
00005> SSSSS W W M M M H H H H Y Y M M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M H H Y Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y Y M M O O 9 9 9 9 =====
00008> *****
00009> StormWater Management Hydrologic Model 999 999 =====
00010>
00011> *****
00012> ***** SWMHYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhym@fsa.Com *****
00021> *****
00022> *****
00023> *****
00024> ***** Licensed user: R.J. Burnside & Associates Ltd *****
00025> ***** Brampton SERIAL#:3877524 *****
00026> *****
00027> *****
00028> *****
00029> ***** ***** PROGRAM ARRAY DIMENSIONS ***** *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034> *****
00035> *****
00036> ***** D E T A I L E D O U T P U T *****
00037> *****
00038> ***** DATE: 2021-12-22 TIME: 15:14:52 RUN COUNTER: 002540 *****
00039> *****
00040> * Input filename: C:\SWMHYM-1\FERGUS-1\POST.DAT *
00041> * Output filename: C:\SWMHYM-1\FERGUS-1\POST.out *
00042> * Summary filename: C:\SWMHYM-1\FERGUS-1\POST.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047> *****
00048> *****
00049> *****
00050> 001:0001-----
00051> *****
00052> *# Project Name: [Fergus Golf Club] Project Number: [300052719]
00053> *# Date: 09-12-22 TIME: 15:14:52 RUN COUNTER: 002540 *
00054> *# Modeller : [L.Garner]
00055> *# Company : R.J. Burnside & Associates
00056> *# License # : 3245976
00057> *****
00058> *# *****
00059> *# Fergus Golf Club Post Development *
00060> *# *****
00061> *# *****
00062> *****
00063> | START | Project dir.: C:\SWMHYM-1\FERGUS-1\
00064> | PFCAL= 25.00 mm | Rainfall dir.: C:\SWMHYM-1\FERGUS-1\
00065> | TZERO = .00 hrs on 0
00066> | METOUT= 2 (output = METRIC)
00067> | NRUN = 001
00068> | NSTORM= 0
00069> *****
00070> 001:0002-----
00071> *****
00072> | MASS STORM | Filename: C:\SWMHYM-1\FERGUS-1\4hr-chi.mst
00073> | PFCAL= 25.00 mm | Comments: 4 Hour, Chicago Distribution with 10 min
00074> *****
00075> | Duration of storm = 4.17 hrs
00076> | Mass curve time step = 10.00 min
00077> | Selected storm time step = 10.00 min
00078> | Volume of derived storm = 25.00 mm
00079> *****
00080> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00081> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00082> .17 1.500 | 1.33 36.300 | 2.50 2.850 | 3.67 1.500
00083> .33 2.100 | 1.50 23.500 | 2.67 2.400 | 3.93 1.050
00084> .50 2.250 | 1.67 9.900 | 2.83 2.250 | 4.00 .600
00085> .67 2.550 | 1.83 6.300 | 3.00 2.100 | 4.17 .300
00086> .83 4.050 | 2.00 4.800 | 3.17 1.800 |
00087> 1.00 7.500 | 2.17 3.900 | 3.33 1.650 |
00088> 1.17 24.000 | 2.33 3.150 | 3.50 1.650 |
00089> *****
00090> *****
00091> 001:0003-----
00092> *Catchment EXT1
00093> *External area on the northwest of Wellington Road 19.
00094> *This catchment drains to the golf course via a culvert which will be captured
00095> *and enter a bypass pipe, entering the Black Drain at Node 2
00096> *****
00097> | DESIGN NASHVD | Area (ha)= 7.93 Curve Number (CN)=61.00
00098> | 01:EXT1 DT= 2.00 | Ia (mm) = 1.500 # of Linear Res. (N)= 3.00
00099> | U.H. Tp(hrs)= .440
00100> *****
00101> | Unit Hyd Tpeak (cms) = .688
00102> *****
00103> *****
00104> | PEAK FLOW (cms) = .043 (i)
00105> | TIME TO PEAK (hrs) = 1.900
00106> | RUNOFF VOLUME (mm) = 2.971
00107> | TOTAL RAINFALL (mm) = 25.000
00108> | RUNOFF COEFFICIENT = .119
00109> *****
00110> *****
00111> *****
00112> 001:0004-----
00113> *Catchment EXT2
00114> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
00115> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00116> *****
00117> | DESIGN STANDHYD | Area (ha)= .34
00118> | 02:EXT2 DT= 2.00 | Total Imp(%) = 51.00 Dir. Conn.(%) = 36.00
00119> *****
00120> ***** IMPERVIOUS PERVIOUS (i)
00121> | Surface Area (ha)= .17 .17
00122> | Dep. Storage (mm)= .80 1.50
00123> | Average Slope (%)= .50 .50
00124> | Length (m)= 47.61 40.00
00125> | Mannings n = .013 .250
00126> *****
00127> | Max. eff. Inten. (mm/hr)= 36.30 3.80
00128> | over (min) = 4.00 42.00
00129> | Storage Coeff. (min)= 3.02 (ii) 42.60 (ii)
00130> | Unit Hyd. Tpeak (min)= 4.00 42.00
00131> | Unit Hyd. peak (cms) = .33 .03
00132> *****
00133> ***** *TOTALS*
00134> | PEAK FLOW (cms) = .01 .00
00135> | TIME TO PEAK (hrs) = 1.33 2.13
00136> | RUNOFF VOLUME (mm) = 24.20 3.45
00137> | TOTAL RAINFALL (mm) = 25.00 10.923

00136> TOTAL RAINFALL (mm)= 25.00 25.00 25.000
00137> RUNOFF COEFFICIENT = .97 .14 .437
00138> *****
00139> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00140> CN* = 58.0 Ia = Dep. Storage (Above)
00141> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00142> THAN THE STORAGE COEFFICIENT.
00143> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00144> *****
00145> *****
00146> 001:0005-----
00147> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00148> *****
00149> | ADD HYD (Bypass1) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00150> | (ha) (cms) (hrs) (mm) (cms)
00151> | ID1 01:EXT1 7.93 .043 1.90 2.97 .000
00152> | +ID2 02:EXT2 .34 .012 1.33 10.92 .000
00153> *****
00154> | SUM 08:Bypass1 8.27 .045 1.87 3.30 .000
00155> *****
00156> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00157> *****
00158> *****
00159> 001:0006-----
00160> *Catchment 201
00161> *Drainage Area to SWMF1
00162> *****
00163> | DESIGN STANDHYD | Area (ha)= 26.92
00164> | 01:201 DT= 2.00 | Total Imp(%) = 34.00 Dir. Conn.(%) = 23.00
00165> *****
00166> ***** IMPERVIOUS PERVIOUS (i)
00167> | Surface Area (ha)= 9.15 17.77
00168> | Dep. Storage (mm)= .80 1.50
00169> | Average Slope (%)= .50 .50
00170> | Length (m)= 423.64 40.00
00171> | Mannings n = .013 .250
00172> *****
00173> | Max. eff. Inten. (mm/hr)= 34.25 3.05
00174> | over (min) = 12.00 54.00
00175> | Storage Coeff. (min)= 11.48 (ii) 54.67 (ii)
00176> | Unit Hyd. Tpeak (min)= 12.00 54.00
00177> | Unit Hyd. peak (cms) = .10 .02
00178> *****
00179> | PEAK FLOW (cms) = .46 .09 *TOTALS*
00180> | TIME TO PEAK (hrs) = 1.47 2.33 1.500
00181> | RUNOFF VOLUME (mm) = 24.20 3.58 8.321
00182> | TOTAL RAINFALL (mm) = 25.00 25.00 25.000
00183> | RUNOFF COEFFICIENT = .97 .14 .333
00184> *****
00185> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00186> CN* = 62.0 Ia = Dep. Storage (Above)
00187> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00188> THAN THE STORAGE COEFFICIENT.
00189> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00190> *****
00191> *****
00192> 001:0007-----
00193> *Pond 1
00194> *****
00195> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
00196> | IN<01: (201) |
00197> | OUT<09: (Pond1) | ***** OUTFLOW STORAGE TABLE *****
00198> | (cms) (ha.m.) | (cms) (ha.m.)
00199> | .000 .0000E+00 | .320 .9500E+00
00200> | .057 .3310E+00 | .000 .0000E+00
00201> *****
00202> *****
00203> ***** ROUTING RESULTS *****
00204> | (ha) (cms) (hrs) (mm)
00205> | INFLOW >01: (201) 26.92 .477 1.500 8.321
00206> | OUTFLOW<09: (Pond1) 26.92 .032 4.533 8.321
00207> *****
00208> ***** PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.659
00209> | TIME SHIFT OF PEAK FLOW (min) = 182.00
00210> | MAXIMUM STORAGE USED (ha.m.) = 1843E+00
00211> *****
00212> *****
00213> *****
00214> *Catchment UNC3
00215> *Existing wetland/open space area to remain
00216> *flows to the Black Drain at Node 3
00217> *****
00218> | DESIGN NASHVD | Area (ha)= 5.82 Curve Number (CN)=62.00
00219> | 03:UNC3 DT= 2.00 | Ia (mm) = 1.500 # of Linear Res. (N)= 3.00
00220> | U.H. Tp(hrs)= .830
00221> *****
00222> *****
00223> *****
00224> | Unit Hyd Qpeak (cms) = .268
00225> *****
00226> *****
00227> *****
00228> *****
00229> *****
00230> *****
00231> *****
00232> *****
00233> 001:0008-----
00234> *Catchment EXT3
00235> *External area - Wellington Road 19 and 3rd line and
00236> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00237> *This catchment is collected in a bypass and is directed to the Black Drain by N
00238> *****
00239> | DESIGN STANDHYD | Area (ha)= 1.23
00240> | 01:EXT3 DT= 2.00 | Total Imp(%) = 59.00 Dir. Conn.(%) = 44.00
00241> *****
00242> ***** IMPERVIOUS PERVIOUS (i)
00243> | Surface Area (ha)= .73 .50
00244> | Dep. Storage (mm)= .80 1.50
00245> | Average Slope (%)= .50 .50
00246> | Length (m)= 90.55 40.00
00247> | Mannings n = .013 .250
00248> *****
00249> | Max. eff. Inten. (mm/hr)= 36.30 3.77
00250> | over (min) = 4.00 44.00
00251> | Storage Coeff. (min)= 4.44 (ii) 44.15 (ii)
00252> | Unit Hyd. Tpeak (min)= 4.00 44.00
00253> | Unit Hyd. peak (cms) = .26 .03
00254> *****
00255> ***** *TOTALS*
00256> | PEAK FLOW (cms) = .05 .00 .052 (iii)
00257> | TIME TO PEAK (hrs) = 1.33 2.17 1.333
00258> | RUNOFF VOLUME (mm) = 24.20 3.36 12.530
00259> | TOTAL RAINFALL (mm) = 25.00 25.00 25.000
00260> | RUNOFF COEFFICIENT = .97 .13 .501
00261> *****
00262> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00263> CN* = 56.0 Ia = Dep. Storage (Above)
00264> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00265> THAN THE STORAGE COEFFICIENT.
00266> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00267> *****
00268> *****
00269> *Catchment EXT4
00270> *External area - 3rd Line and Roadside ditch on west side of 3rd Line

```

00271> *This catchment is collected in a bypass and directed to the Black Drain by Node
00272> -----
00273> | DESIGN STANDHYD | Area (ha)= .18
00274> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
00275> -----
00276> IMPERVIOUS PERVIOUS (i)
00277> Surface Area (ha)= .09 .09
00278> Dep. Storage (mm)= .80 1.50
00279> Average Slope (%)= .50 .50
00280> Length (m)= 34.64 40.00
00281> Mannings n = .013 .250
00282> -----
00283> Max.eff.Inten.(mm/hr)= 36.30 .92
00284> over (min) 2.00 72.00
00285> Storage Coeff. (min)= 2.50 (ii) 72.33 (ii)
00286> Unit Hyd. Tpeak (min)= 2.00 72.00
00287> Unit Hyd. peak (cms)= .47 .02
00288> -----
00289> PEAK FLOW (cms)= .01 .00 *TOTALS*
00290> TIME TO PEAK (hrs)= 1.33 2.67 1.333
00291> RUNOFF VOLUME (mm)= 24.20 1.17 8.773
00292> TOTAL RAINFALL (mm)= 25.00 25.00 25.000
00293> RUNOFF COEFFICIENT = .97 .05 .351
00294> -----
00295> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00296> CN* = 30.0 Ia = Dep. Storage (Above)
00297> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00298> THAN THE STORAGE COEFFICIENT.
00299> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00300> -----
00301> -----
00302> 001:0011-----
00303> *Catchment UNCL
00304> *This catchment drains east towards 3rd Line and is collected in a bypass that
00305> *is directed to the Black Drain by Node 3
00306> -----
00307> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
00308> | 04:UNCL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00309> | U.H. Tp(hrs)= .040
00310> -----
00311> Unit Hyd Qpeak (cms)= .936
00312> -----
00313> PEAK FLOW (cms)= .011 (i)
00314> TIME TO PEAK (hrs)= 1.333
00315> RUNOFF VOLUME (mm)= 2.971
00316> TOTAL RAINFALL (mm)= 25.000
00317> RUNOFF COEFFICIENT = .119
00318> -----
00319> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00320> -----
00321> *** WARNING: Time step is too large for value of TP.
00322> R.V. may be ok. Peak flow could be off.
00323> -----
00324> 001:0012-----
00325> *Catchment UNC5
00326> *This catchment drains east towards 3rd Line and is collected in a bypass that
00327> *is directed to the Black Drain by Node 3
00328> -----
00329> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
00330> | 05:UNC5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00331> | U.H. Tp(hrs)= .070
00332> -----
00333> Unit Hyd Qpeak (cms)= .071
00334> -----
00335> PEAK FLOW (cms)= .001 (i)
00336> TIME TO PEAK (hrs)= 1.500
00337> RUNOFF VOLUME (mm)= 1.311
00338> TOTAL RAINFALL (mm)= 25.000
00339> RUNOFF COEFFICIENT = .052
00340> -----
00341> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00342> -----
00343> -----
00344> 001:0013-----
00345> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL1, UNC5) - Black Drain Bypass Pi
00346> -----
00347> | ADD HYD (Bypass2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00348> | (ha) (cms) (hrs) (mm) (cms)
00349> | ID1 01:EXT3 1.23 .052 1.33 12.53 .000
00350> | +ID2 02:EXT4 .18 .006 1.33 8.77 .000
00351> | +ID3 04:UNCL1 .98 .011 1.33 2.97 .000
00352> | +ID4 05:UNC5 .13 .001 1.50 1.31 .000
00353> -----
00354> | SUM 07:Bypass2 2.52 .070 1.33 7.97 .000
00355> -----
00356> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00357> -----
00358> -----
00359> 001:0014-----
00360> *Catchment UNCL2
00361> *Rear lots on South side of property, collected in swale
00362> *flows to the Black Drain at Node 3
00363> -----
00364> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
00365> | 01:UNCL2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00366> | U.H. Tp(hrs)= .210
00367> -----
00368> Unit Hyd Qpeak (cms)= .329
00369> -----
00370> PEAK FLOW (cms)= .018 (i)
00371> TIME TO PEAK (hrs)= 1.600
00372> RUNOFF VOLUME (mm)= 3.578
00373> TOTAL RAINFALL (mm)= 25.000
00374> RUNOFF COEFFICIENT = .143
00375> -----
00376> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00377> -----
00378> -----
00379> 001:0015-----
00380> *Catchment EXT5
00381> *External area on the south of the site, existing agricultural
00382> *flows to the Black Drain at Node 3
00383> -----
00384> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
00385> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00386> | U.H. Tp(hrs)= .440
00387> -----
00388> Unit Hyd Qpeak (cms)= .739
00389> -----
00390> PEAK FLOW (cms)= .017 (i)
00391> TIME TO PEAK (hrs)= 1.900
00392> RUNOFF VOLUME (mm)= 1.115
00393> TOTAL RAINFALL (mm)= 25.000
00394> RUNOFF COEFFICIENT = .045
00395> -----
00396> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00397> -----
00398> -----
00399> 001:0016-----
00400> *Total Flow to Node 3 (Including External Areas)
00401> -----
00402> | ADD HYD (Node3 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00403> | (ha) (cms) (hrs) (mm) (cms)
00404> | ID1 08:Bypass1 8.27 .045 1.87 3.30 .000
00405> | +ID2 09:Pond1 26.92 .032 4.53 8.32 .000

```

```

00406> +ID3 03:UNC3 5.82 .021 2.43 3.08 .000
00407> +ID4 07:Bypass2 2.52 .070 1.33 7.97 .000
00408> +ID5 01:UNCL2 1.81 .018 1.60 3.58 .000
00409> +ID6 02:EXT5 8.51 .017 1.90 1.12 .000
00410> =====
00411> SUM 04:Node3 53.85 .124 1.83 5.67 .000
00412> -----
00413> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00414> -----
00415> -----
00416> 001:0017-----
00417> *Catchment 202
00418> *This catchment is the area draining Node 4 Outlet
00419> -----
00420> | DESIGN STANDHYD | Area (ha)= 2.99
00421> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00
00422> -----
00423> IMPERVIOUS PERVIOUS (i)
00424> Surface Area (ha)= .84 2.15
00425> Dep. Storage (mm)= .80 1.50
00426> Average Slope (%)= .50 .50
00427> Length (m)= 141.19 40.00
00428> Mannings n = .013 .250
00429> -----
00430> Max.eff.Inten.(mm/hr)= 36.30 5.50
00431> over (min) 6.00 40.00
00432> Storage Coeff. (min)= 5.80 (ii) 39.92 (ii)
00433> Unit Hyd. Tpeak (min)= 6.00 40.00
00434> Unit Hyd. peak (cms)= .19 .03
00435> -----
00436> PEAK FLOW (cms)= .05 .02 *TOTALS*
00437> TIME TO PEAK (hrs)= 1.37 2.10 1.367
00438> RUNOFF VOLUME (mm)= 24.20 5.50 8.863
00439> TOTAL RAINFALL (mm)= 25.00 25.00 25.000
00440> RUNOFF COEFFICIENT = .97 .22 .355
00441> -----
00442> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00443> CN* = 74.0 Ia = Dep. Storage (Above)
00444> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00445> THAN THE STORAGE COEFFICIENT.
00446> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00447> -----
00448> -----
00449> 001:0018-----
00450> *Catchment UNCL4
00451> *Uncontrolled rear yards, flows to the Black Drain at Node 4
00452> -----
00453> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00
00454> | 02:UNCL4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00455> | U.H. Tp(hrs)= .050
00456> -----
00457> Unit Hyd Qpeak (cms)= .856
00458> -----
00459> PEAK FLOW (cms)= .014 (i)
00460> TIME TO PEAK (hrs)= 1.333
00461> RUNOFF VOLUME (mm)= 3.319
00462> TOTAL RAINFALL (mm)= 25.000
00463> RUNOFF COEFFICIENT = .133
00464> -----
00465> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00466> -----
00467> *** WARNING: Time step is too large for value of TP.
00468> R.V. may be ok. Peak flow could be off.
00469> -----
00470> 001:0019-----
00471> *Catchment EXT6
00472> *External area on the south of the site, existing agricultural
00473> *flows to the Black Drain at Node 4
00474> -----
00475> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
00476> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00477> | U.H. Tp(hrs)= .550
00478> -----
00479> Unit Hyd Qpeak (cms)= 1.092
00480> -----
00481> PEAK FLOW (cms)= .059 (i)
00482> TIME TO PEAK (hrs)= 2.067
00483> RUNOFF VOLUME (mm)= 2.387
00484> TOTAL RAINFALL (mm)= 25.000
00485> RUNOFF COEFFICIENT = .095
00486> -----
00487> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00488> -----
00489> -----
00490> 001:0020-----
00491> *Total Flow to to Node 4 (Including External Areas)
00492> -----
00493> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00494> | (ha) (cms) (hrs) (mm) (cms)
00495> | ID1 04:Node3 53.85 .124 1.83 5.67 .000
00496> | +ID2 06:202 2.99 .051 1.37 8.86 .000
00497> | +ID3 02:UNCL4 1.12 .014 1.33 3.32 .000
00498> | +ID4 03:EXT6 15.73 .059 2.07 2.39 .000
00499> -----
00500> SUM 08:Node4 73.69 .212 1.97 5.06 .000
00501> -----
00502> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00503> -----
00504> -----
00505> 001:0021-----
00506> *Catchment UNCL6
00507> *Uncontrolled rear yards, flows to ditch along Road 19
00508> -----
00509> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00
00510> | 02:UNCL6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00511> | U.H. Tp(hrs)= .050
00512> -----
00513> Unit Hyd Qpeak (cms)= .061
00514> -----
00515> PEAK FLOW (cms)= .001 (i)
00516> TIME TO PEAK (hrs)= 1.333
00517> RUNOFF VOLUME (mm)= 4.896
00518> TOTAL RAINFALL (mm)= 25.000
00519> RUNOFF COEFFICIENT = .196
00520> -----
00521> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00522> -----
00523> *** WARNING: Time step is too large for value of TP.
00524> R.V. may be ok. Peak flow could be off.
00525> -----
00526> 001:0022-----
00527> *2-Year
00528> -----
00529> | CHICAGO STORM | IDF curve parameters: A= 400.290
00530> | Ptotal= 34.16 mm | B= .000
00531> | C= .702
00532> used in: INTENSITY = A / (t + B)^C
00533> -----
00534> Duration of storm = 4.00 hrs
00535> Storm time step = 5.00 min
00536> Time to peak ratio = .33
00537> -----
00538> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00539> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00540> .08 2.683 | 1.08 8.628 | 2.08 6.127 | 3.08 3.403

```

```

00541> .17 2.817 | 1.17 11.819 | 2.17 5.697 | 3.17 3.295
00542> .25 2.970 | 1.25 22.044 | 2.25 5.333 | 3.25 3.194
00543> .33 3.144 | 1.33 29.328 | 2.33 5.021 | 3.33 3.101
00544> .42 3.345 | 1.42 27.075 | 2.42 4.750 | 3.42 3.014
00545> .50 3.581 | 1.50 17.037 | 2.50 4.512 | 3.50 2.932
00546> .58 3.862 | 1.58 12.977 | 2.58 4.301 | 3.58 2.856
00547> .67 4.202 | 1.67 10.680 | 2.67 4.112 | 3.67 2.785
00548> .75 4.626 | 1.75 9.174 | 2.75 3.942 | 3.75 2.717
00549> .83 5.172 | 1.83 8.098 | 2.83 3.789 | 3.83 2.654
00550> .92 5.906 | 1.92 7.285 | 2.92 3.649 | 3.92 2.594
00551> 1.00 6.958 | 2.00 6.645 | 3.00 3.521 | 4.00 2.537
00552>
00553>
00554> 001:0023-----
00555> *Catchment EXTL
00556> *External area on the northwest of Wellington Road 19.
00557> *This catchment drains to the golf course via a culvert which will be captured
00558> *and enter a bypass pipe, entering the Black Drain at Node 2
00559>
00560> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
00561> | 01:EXTL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00562> | U.H. Tp(hrs)= .440
00563>
00564> Unit Hyd Qpeak (cms)= .688
00565>
00566> PEAK FLOW (cms)= .071 (i)
00567> TIME TO PEAK (hrs)= 1.875
00568> RUNOFF VOLUME (mm)= 5.468
00569> TOTAL RAINFALL (mm)= 34.158
00570> RUNOFF COEFFICIENT = .160
00571>
00572> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00573>
00574>
00575> 001:0024-----
00576> *Catchment EXT2
00577> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
00578> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
00579>
00580> | DESIGN STANDHYD | Area (ha)= .34
00581> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
00582>
00583> IMPERVIOUS PERVIOUS (i)
00584> Surface Area (ha)= .17 .17
00585> Dep. Storage (mm)= .80 1.50
00586> Average Slope (%)= .50 .50
00587> Length (m)= 47.61 40.00
00588> Mannings n = .013 .250
00589>
00590> Max.eff.Inten.(mm/hr)= 129.33 7.75
00591> over (min) 2.50 32.50
00592> Storage Coeff. (min)= 1.82 (ii) 31.57 (ii)
00593> Unit Hyd. Tpeak (min)= 2.50 32.50
00594> Unit Hyd. peak (cms)= .51 .04
00595>
00596> PEAK FLOW (cms)= .04 .00 *TOTALS*
00597> TIME TO PEAK (hrs)= 1.33 1.88 1.333
00598> RUNOFF VOLUME (mm)= 33.36 6.27 16.020
00599> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00600> RUNOFF COEFFICIENT = .98 .18 .469
00601> *** WARNING: Storage Coefficient is smaller than DT!
00602> Use a smaller DT or a larger area.
00603>
00604> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00605> CN* = 58.0 Ia = Dep. Storage (Above)
00606> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00607> THAN THE STORAGE COEFFICIENT.
00608> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00609>
00610>
00611> 001:0025-----
00612> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
00613>
00614> | ADD HYD (Bypassl ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00615> | (ha) (cms) (hrs) (mm) (cms)
00616> | ID1 01:EXT1 7.93 .071 1.88 5.47 .000
00617> | +ID2 02:EXT2 .34 .042 1.33 16.02 .000
00618> =====
00619> | SUM 08:Bypassl 8.27 .076 1.88 5.90 .000
00620>
00621> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00622>
00623>
00624> 001:0026-----
00625> *Catchment 201
00626> *Drainage Area to SWMFL
00627>
00628> | DESIGN STANDHYD | Area (ha)= 26.92
00629> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00
00630>
00631> IMPERVIOUS PERVIOUS (i)
00632> Surface Area (ha)= 9.15 17.77
00633> Dep. Storage (mm)= .80 1.50
00634> Average Slope (%)= .50 .50
00635> Length (m)= 423.64 40.00
00636> Mannings n = .013 .250
00637>
00638> Max.eff.Inten.(mm/hr)= 95.24 6.31
00639> over (min) 7.50 40.00
00640> Storage Coeff. (min)= 7.63 (ii) 39.93 (ii)
00641> Unit Hyd. Tpeak (min)= 7.50 40.00
00642> Unit Hyd. peak (cms)= .15 .03
00643>
00644> PEAK FLOW (cms)= 1.05 .18 *TOTALS*
00645> TIME TO PEAK (hrs)= 1.42 2.04 1.417
00646> RUNOFF VOLUME (mm)= 33.36 6.50 12.675
00647> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00648> RUNOFF COEFFICIENT = .98 .19 .371
00649>
00650> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00651> CN* = 62.0 Ia = Dep. Storage (Above)
00652> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00653> THAN THE STORAGE COEFFICIENT.
00654> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00655>
00656>
00657> 001:0027-----
00658> * Pond 1
00659>
00660> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
00661> | IN>01: (201 ) |
00662> | OUT<09: (Pond1 ) |
00663> ===== OUTFLOW STORAGE TABLE =====
00664> (cms) (ha.m.) | OUTFLOW STORAGE (ha.m.)
00665> | .000 .0000E+00 | .320 .9500E+00
00666> | .057 .3310E+00 | .000 .0000E+00
00667>
00668> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00669> (ha) (cms) (hrs) (mm)
00670> | INFLOW >01: (201 ) | 26.92 1.077 1.417 12.675
00671> | OUTFLOW<09: (Pond1 ) | 26.92 .049 4.583 12.675
00672>
00673> PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.58
00674> TIME SHIFT OF PEAK FLOW (min) = 190.00
00675> MAXIMUM STORAGE USED (ha.m.) = .2845E+00

```

```

00676>
00677> -----
00678>
00679> *Catchment UNC3
00680> *Existing wetland/open space area to remain
00681> *flows to the Black Drain at Node 3
00682>
00683> | DESIGN NASHYD | Area (ha)= 5.92 Curve Number (CN)=62.00
00684> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00685> | U.H. Tp(hrs)= .830
00686>
00687> Unit Hyd Qpeak (cms)= .268
00688>
00689> PEAK FLOW (cms)= .036 (i)
00690> TIME TO PEAK (hrs)= 2.458
00691> RUNOFF VOLUME (mm)= 5.663
00692> TOTAL RAINFALL (mm)= 34.158
00693> RUNOFF COEFFICIENT = .166
00694>
00695> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00696>
00697>
00698> 001:0029-----
00699> *Catchment EXT3
00700> *External area - Wellington Road 19 and 3rd line and
00701> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
00702> *This catchment is collected in a bypass and is directed to the Black Drain by N
00703>
00704> | DESIGN STANDHYD | Area (ha)= 1.23
00705> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
00706>
00707> IMPERVIOUS PERVIOUS (i)
00708> Surface Area (ha)= .73 .50
00709> Dep. Storage (mm)= .80 1.50
00710> Average Slope (%)= .50 .50
00711> Length (m)= 90.55 40.00
00712> Mannings n = .013 .250
00713>
00714> Max.eff.Inten.(mm/hr)= 129.33 7.88
00715> over (min) 2.50 32.50
00716> Storage Coeff. (min)= 2.67 (ii) 32.23 (ii)
00717> Unit Hyd. Tpeak (min)= 2.50 32.50
00718> Unit Hyd. peak (cms)= .41 .04
00719>
00720> PEAK FLOW (cms)= .17 .01 *TOTALS*
00721> TIME TO PEAK (hrs)= 1.33 1.88 1.333
00722> RUNOFF VOLUME (mm)= 33.36 6.10 18.093
00723> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00724> RUNOFF COEFFICIENT = .98 .18 .530
00725>
00726> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00727> CN* = 56.0 Ia = Dep. Storage (Above)
00728> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00729> THAN THE STORAGE COEFFICIENT.
00730> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00731>
00732>
00733> 001:0030-----
00734> *Catchment EXT4
00735> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
00736> *This catchment is collected in a bypass and directed to the Black Drain by Node
00737>
00738> | DESIGN STANDHYD | Area (ha)= .18
00739> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
00740>
00741> IMPERVIOUS PERVIOUS (i)
00742> Surface Area (ha)= .09 .09
00743> Dep. Storage (mm)= .80 1.50
00744> Average Slope (%)= .50 .50
00745> Length (m)= 34.64 40.00
00746> Mannings n = .013 .250
00747>
00748> Max.eff.Inten.(mm/hr)= 129.33 8.26
00749> over (min) 2.50 30.00
00750> Storage Coeff. (min)= 1.50 (ii) 30.51 (ii)
00751> Unit Hyd. Tpeak (min)= 2.50 30.00
00752> Unit Hyd. peak (cms)= .55 .04
00753>
00754> PEAK FLOW (cms)= .02 .00 *TOTALS*
00755> TIME TO PEAK (hrs)= 1.33 1.83 1.333
00756> RUNOFF VOLUME (mm)= 33.36 2.21 12.487
00757> TOTAL RAINFALL (mm)= 34.16 34.16 34.158
00758> RUNOFF COEFFICIENT = .98 .06 .366
00759> *** WARNING: Storage Coefficient is smaller than DT!
00760> Use a smaller DT or a larger area.
00761>
00762> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00763> CN* = 30.0 Ia = Dep. Storage (Above)
00764> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00765> THAN THE STORAGE COEFFICIENT.
00766> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00767>
00768>
00769> 001:0031-----
00770> *Catchment UNC1
00771> *This catchment drains east towards 3rd Line and is collected in a bypass that
00772> *is directed to the Black Drain by Node 3
00773>
00774> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
00775> | 04:UNC1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00776> | U.H. Tp(hrs)= .040
00777>
00778> Unit Hyd Qpeak (cms)= .936
00779>
00780> PEAK FLOW (cms)= .043 (i)
00781> TIME TO PEAK (hrs)= 1.333
00782> RUNOFF VOLUME (mm)= 5.468
00783> TOTAL RAINFALL (mm)= 34.158
00784> RUNOFF COEFFICIENT = .160
00785>
00786> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00787>
00788> *** WARNING: Time step is too large for value of TP.
00789> R.V. may be ok. Peak flow could be off.
00790>
00791> 001:0032-----
00792> *Catchment UNC5
00793> *This catchment drains east towards 3rd Line and is collected in a bypass that
00794> *is directed to the Black Drain by Node 3
00795>
00796> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
00797> | 05:UNC5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00798> | U.H. Tp(hrs)= .070
00799>
00800> Unit Hyd Qpeak (cms)= .071
00801>
00802> PEAK FLOW (cms)= .002 (i)
00803> TIME TO PEAK (hrs)= 1.375
00804> RUNOFF VOLUME (mm)= 2.481
00805> TOTAL RAINFALL (mm)= 34.158
00806> RUNOFF COEFFICIENT = .073
00807>
00808> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00809>
00810> *** WARNING: Time step is too large for value of TP.

```


00811> R.V. may be ok. Peak flow could be off.

00812> -----

00813> 001:0034-----

00814> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL1, UNCL5) - Black Drain Bypass Pi

00815> -----

00816> | ADD HYD (Bypass2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

00817> | (ha) (cms) (hrs) (mm) (cms)

00818> | 01:EXT3 1.23 .170 1.33 18.09 .000

00819> | +D2 02:EXT4 .18 .021 1.33 12.49 .000

00820> | +D3 04:UNCL1 .98 .043 1.33 5.47 .000

00821> | +D4 05:UNCL5 .13 .002 1.38 2.48 .000

00822> -----

00823> SUM 07:Bypass2 2.52 .236 1.33 11.98 .000

00824> -----

00825> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00826> -----

00827> -----

00828> 001:0035-----

00829> *Catchment UNC2

00830> *Rear lots on South side of property, collected in swale

00831> *flows to the Black Drain at Node 3

00832> -----

00833> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00

00834> | 01:UNC2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

00835> -----

00836> U.H. Tp(hrs)= .210

00837> -----

00838> Unit Hyd Qpeak (cms)= .329

00839> PEAK FLOW (cms)= .032 (i)

00840> TIME TO PEAK (hrs)= 1.542

00841> RUNOFF VOLUME (mm)= 6.523

00842> TOTAL RAINFALL (mm)= 34.158

00843> RUNOFF COEFFICIENT = .191

00844> -----

00845> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00846> -----

00847> -----

00848> 001:0036-----

00849> *Catchment EXT5

00850> *External area on the south of the site, existing agricultural

00851> *flows to the Black Drain at Node 3

00852> -----

00853> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00

00854> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

00855> -----

00856> U.H. Tp(hrs)= .440

00857> -----

00858> Unit Hyd Qpeak (cms)= .729

00859> PEAK FLOW (cms)= .039 (i)

00860> TIME TO PEAK (hrs)= 1.875

00861> RUNOFF VOLUME (mm)= 2.115

00862> TOTAL RAINFALL (mm)= 34.158

00863> RUNOFF COEFFICIENT = .062

00864> -----

00865> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00866> -----

00867> -----

00868> 001:0036-----

00869> *Total Flow to Node 3 (Including External Areas)

00870> -----

00871> | ADD HYD (Node3) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

00872> | (ha) (cms) (hrs) (mm) (cms)

00873> | 08:Bypass1 8.27 .076 1.88 5.90 .000

00874> | +D2 09:Pond1 26.92 .049 4.58 12.68 .000

00875> | +D3 03:UNCL3 5.82 .036 2.46 5.66 .000

00876> | +D4 07:Bypass2 2.52 .236 1.33 11.98 .000

00877> | +D5 01:UNC2 1.81 .032 1.54 6.52 .000

00878> | +D6 02:EXT5 8.51 .029 1.88 2.11 .000

00879> -----

00880> SUM 04:Node3 53.85 .306 1.33 8.97 .000

00881> -----

00882> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00883> -----

00884> -----

00885> 001:0037-----

00886> *Catchment 202

00887> *This catchment is the area draining Node 4 Outlet

00888> -----

00889> | DESIGN STANDHYD | Area (ha)= 2.99

00890> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00

00891> -----

00892> IMPERVIOUS PERVIOUS (i)

00893> Surface Area (ha)= .84 2.15

00894> Dep. Storage (mm)= .80 1.50

00895> Average Slope (%)= .50 .50

00896> Length (m)= 141.19 40.00

00897> Mannings n = .013 .250

00898> -----

00899> Max. eff. Inten. (mm/hr)= 129.33 11.29

00900> over (min)= 2.50 30.00

00901> Storage Coeff. (min)= 3.49 (ii) 29.09 (ii)

00902> Unit Hyd. Tpeak (min)= 2.50 30.00

00903> Unit Hyd. peak (cms)= .35 .04

00904> -----

00905> PEAK FLOW (cms)= .15 .04 .159 (iii)

00906> TIME TO PEAK (hrs)= 1.33 1.79 1.333

00907> RUNOFF VOLUME (mm)= 33.36 9.70 13.957

00908> TOTAL RAINFALL (mm)= 34.16 34.16 34.158

00909> RUNOFF COEFFICIENT = .98 .28 .409

00910> -----

00911> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

00912> CN* = 74.0 Ia = Dep. Storage (Above)

00913> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

00914> THAN THE STORAGE COEFFICIENT.

00915> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00916> -----

00917> -----

00918> 001:0038-----

00919> *Catchment UNCL4

00920> *Uncontrolled rear yards, flows to the Black Drain at Node 4

00921> -----

00922> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00

00923> | 02:UNCL4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

00924> -----

00925> U.H. Tp(hrs)= .050

00926> -----

00927> Unit Hyd Qpeak (cms)= .856

00928> PEAK FLOW (cms)= .048 (i)

00929> TIME TO PEAK (hrs)= 1.333

00930> RUNOFF VOLUME (mm)= 6.076

00931> TOTAL RAINFALL (mm)= 34.158

00932> RUNOFF COEFFICIENT = .178

00933> -----

00934> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00935> -----

00936> *** WARNING: Time step is too large for value of TP.

00937> R.V. may be ok. Peak flow could be off.

00938> -----

00939> 001:0039-----

00940> *Catchment EXT6

00941> *External area on the south of the site, existing agricultural

00942> *flows to the Black Drain at Node 4

00943> -----

00944> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00

00945> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

00946> -----

00947> U.H. Tp(hrs)= .550

00948> -----

00949> Unit Hyd Qpeak (cms)= 1.092

00950> -----

00951> PEAK FLOW (cms)= .098 (i)

00952> TIME TO PEAK (hrs)= 2.042

00953> RUNOFF VOLUME (mm)= 4.435

00954> TOTAL RAINFALL (mm)= 34.158

00955> RUNOFF COEFFICIENT = .130

00956> -----

00957> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00958> -----

00959> 001:0040-----

00960> *Total Flow to to Node 4 (Including External Areas)

00961> -----

00962> | ADD HYD (Node4) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

00963> | (ha) (cms) (hrs) (mm) (cms)

00964> | 04:Node3 53.85 .306 1.33 8.97 .000

00965> | +D2 06:202 2.99 .159 1.33 13.96 .000

00966> | +D3 02:UNCL4 1.12 .048 1.33 6.08 .000

00967> | +D4 03:EXT6 15.73 .098 2.04 4.44 .000

00968> -----

00969> SUM 08:Node4 73.69 .520 1.33 8.16 .000

00970> -----

00971> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00972> -----

00973> -----

00974> 001:0041-----

00975> *Catchment UNC6

00976> *Uncontrolled rear yards, flows to ditch along Road 19

00977> -----

00978> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00

00979> | 02:UNC6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

00980> -----

00981> U.H. Tp(hrs)= .050

00982> -----

00983> Unit Hyd Qpeak (cms)= .061

00984> PEAK FLOW (cms)= .005 (i)

00985> TIME TO PEAK (hrs)= 1.333

00986> RUNOFF VOLUME (mm)= 8.749

00987> TOTAL RAINFALL (mm)= 34.158

00988> RUNOFF COEFFICIENT = .256

00989> -----

00990> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00991> -----

00992> *** WARNING: Time step is too large for value of TP.

00993> R.V. may be ok. Peak flow could be off.

00994> -----

00995> 001:0042-----

00996> *5-Year

00997> -----

00998> | CHICKA STORM | IDF curve parameters: A= 550.600

00999> | Ptotal= 48.03 mm | B= .000

01000> C= .698

01001> used in: INTENSITY = A / (t + B)^C

01002> -----

01003> Duration of storm = 4.00 hrs

01004> Storm time step = 5.00 min

01005> Time to peak ratio = .33

01006> -----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN	
01007>	0.8	3.821	1.08	12.209	2.08	8.686	3.08	4.841
01008>	.17	4.012	1.17	16.693	2.17	8.080	3.17	4.688
01009>	.25	4.228	1.25	31.019	2.25	7.567	3.25	4.545
01010>	.33	4.475	1.33	179.040	2.33	7.127	3.33	4.413
01011>	.42	4.759	1.42	38.058	2.42	6.744	3.42	4.290
01012>	.50	5.093	1.50	24.013	2.50	6.408	3.50	4.175
01013>	.58	5.489	1.58	18.319	2.58	6.110	3.58	4.067
01014>	.67	5.971	1.67	15.094	2.67	5.843	3.67	3.966
01015>	.75	6.569	1.75	12.977	2.75	5.603	3.75	3.870
01016>	.83	7.340	1.83	11.463	2.83	5.386	3.83	3.780
01017>	.92	8.375	1.92	10.318	2.92	5.188	3.92	3.695
01018>	1.00	9.858	2.00	9.417	3.00	5.007	4.00	3.615

01021> -----

01022> -----

01023> 001:0043-----

01024> *Catchment EXT1

01025> *External area on the northwest of Wellington Road 19.

01026> *This catchment drains to the golf course via a culvert which will be captured

01027> *and enter a bypass pipe, entering the Black Drain at Node 2

01028> -----

01029> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00

01030> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

01031> -----

01032> U.H. Tp(hrs)= .440

01033> -----

01034> Unit Hyd Qpeak (cms)= .688

01035> PEAK FLOW (cms)= .137 (i)

01036> TIME TO PEAK (hrs)= 1.875

01037> RUNOFF VOLUME (mm)= 10.361

01038> TOTAL RAINFALL (mm)= 48.025

01039> RUNOFF COEFFICIENT = .216

01040> -----

01041> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01042> -----

01043> -----

01044> 001:0044-----

01045> *Catchment EXT2

01046> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt

01047> *This will be captured via the Black Drain Bypass and enter the drain at Node 2

01048> -----

01049> | DESIGN STANDHYD | Area (ha)= .34

01050> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00

01051> -----

01052> IMPERVIOUS PERVIOUS (i)

01053> Surface Area (ha)= .17 .17

01054> Dep. Storage (mm)= .80 1.50

01055> Average Slope (%)= .50 .50

01056> Length (m)= 47.61 40.00

01057> Mannings n = .013 .250

01058> -----

01059> Max. eff. Inten. (mm/hr)= 179.04 18.38

01060> over (min)= 2.50 22.50

01061> Storage Coeff. (min)= 1.60 (ii) 22.66 (ii)

01062> Unit Hyd. Tpeak (min)= 2.50 22.50

01063> Unit Hyd. peak (cms)= .54 .05

01064> -----

01065> PEAK FLOW (cms)= .06 .00 .060 (iii)

01066> TIME TO PEAK (hrs)= 1.33 1.67 1.333

01067> RUNOFF VOLUME (mm)= 47.23 11.71 24.494

01068> TOTAL RAINFALL (mm)= 48.03 48.03 48.025

01069> RUNOFF COEFFICIENT = .98 .24 .510

01070> -----

01071> *** WARNING: Storage Coefficient is smaller than DT!

01072> Use a smaller DT or a larger area.

01073> -----

01074> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01075> CN* = 58.0 Ia = Dep. Storage (Above)

01076> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01077> THAN THE STORAGE COEFFICIENT.

01078> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01079> -----

01080> 001:0045-----

```

01081> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
01082> -----
01083> | ADD HYD (Bypass1 ) | ID: NHYD | AREA | QPEAK | TPEAK | R.V. | DWF
01084> | over (min) | | | | | | |
01085> | ID1 01:EXT1 | 7.93 | .137 | 1.88 | 10.36 | .000
01086> | +ID2 02:EXT2 | .34 | .060 | 1.33 | 24.49 | .000
01087> -----
01088> | SUM 08:Bypass1 | 8.27 | .145 | 1.88 | 10.94 | .000
01089>
01090> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01091> -----
01092>
01093> 001:0046-----
01094> *Catchment 201
01095> *Drainage Area to SWMP1
01096> -----
01097> | DESIGN STANDHYD | Area (ha)= 26.92
01098> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00
01099> -----
01100> IMPERVIOUS PERVIOUS (i)
01101> Surface Area (ha)= 9.15 17.77
01102> Dep. Storage (mm)= .80 1.50
01103> Average Slope (%)= .50 .50
01104> Length (m)= 423.64 40.00
01105> Mannings n = .013 .250
01106>
01107> Max.eff.Inten.(mm/hr)= 132.05 14.20
01108> over (min) = 30.00 30.00
01109> Storage Coeff. (min)= 6.69 (ii) 30.05 (ii)
01110> Unit Hyd. Tpeak (min)= 7.50 30.00
01111> Unit Hyd. peak (cms)= .16 .04
01112>
01113> PEAK FLOW (cms)= 1.53 .41 *TOTALS*
01114> TIME TO PEAK (hrs)= 1.42 1.79 1.640 (iii)
01115> RUNOFF VOLUME (mm)= 47.23 12.12 20.198
01116> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
01117> RUNOFF COEFFICIENT = .98 .25 .421
01118>
01119> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01120> CN* = 62.0 Ia = Dep. Storage (Above)
01121> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01122> THAN THE STORAGE COEFFICIENT.
01123> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01124> -----
01125>
01126> 001:0047-----
01127> * Pond 1
01128> -----
01129> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
01130> | IN>01: (201 ) |
01131> | OUT<09: (Pond1 ) | ===== OUTFLOW STORAGE TABLE =====
01132> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01133> | (ha.m.) | (ha.m.) |
01134> | .000 .0000E+00 | .320 .9500E+00
01135> | .057 .3310E+00 | .000 .0000E+00
01136>
01137> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01138> (ha) (cms) (hrs) (mm)
01139> INFLOW >01: (201 ) 26.92 1.640 1.417 20.198
01140> OUTFLOW<09: (Pond1 ) 26.92 .106 4.292 20.198
01141>
01142> PEAK FLOW REDUCTION (Qout/Qin) (%) = 6.462
01143> TIME SHIFT OF PEAK FLOW (min)= 172.50
01144> MAXIMUM STORAGE USED (ha.m.)=.4463E+00
01145> -----
01146>
01147> 001:0048-----
01148> *Catchment UNCL3
01149> *Existing wetland/open space area to remain
01150> *flows to the Black Drain at Node 3
01151> -----
01152> | DESIGN NASHYD | Area (ha)= 5.82 Curve Number (CN)=62.00
01153> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01154> | U.H. Tp(hrs)= .830
01155> -----
01156> Unit Hyd Qpeak (cms)= .268
01157>
01158> PEAK FLOW (cms)= .069 (i)
01159> TIME TO PEAK (hrs)= 2.458
01160> RUNOFF VOLUME (mm)= 10.705
01161> TOTAL RAINFALL (mm)= 48.025
01162> RUNOFF COEFFICIENT = .223
01163>
01164> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01165> -----
01166>
01167> 001:0049-----
01168> *Catchment EXT3
01169> *External area - Wellington Road 19 and 3rd line and
01170> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
01171> *This catchment is collected in a bypass and is directed to the Black Drain by N
01172> -----
01173> | DESIGN STANDHYD | Area (ha)= 1.23
01174> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
01175> -----
01176> IMPERVIOUS PERVIOUS (i)
01177> Surface Area (ha)= .73 .50
01178> Dep. Storage (mm)= .80 1.50
01179> Average Slope (%)= .50 .50
01180> Length (m)= 90.55 40.00
01181> Mannings n = .013 .250
01182>
01183> Max.eff.Inten.(mm/hr)= 179.04 18.70
01184> over (min) = 2.50 22.50
01185> Storage Coeff. (min)= 2.35 (ii) 23.27 (ii)
01186> Unit Hyd. Tpeak (min)= 2.50 22.50
01187> Unit Hyd. peak (cms)= .45 .05
01188>
01189> PEAK FLOW (cms)= .24 .02 *TOTALS*
01190> TIME TO PEAK (hrs)= 1.33 1.67 .245 (iii)
01191> RUNOFF VOLUME (mm)= 47.23 11.41 27.167
01192> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
01193> RUNOFF COEFFICIENT = .98 .24 .566
01194> *** WARNING: Storage Coefficient is smaller than DT!
01195> Use a smaller DT or a larger area.
01196>
01197> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01198> CN* = 56.0 Ia = Dep. Storage (Above)
01199> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01200> THAN THE STORAGE COEFFICIENT.
01201> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01202> -----
01203>
01204> 001:0050-----
01205> *Catchment EXT4
01206> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
01207> *This catchment is collected in a bypass and directed to the Black Drain by Node
01208> -----
01209> | DESIGN STANDHYD | Area (ha)= .18
01210> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
01211> -----
01212> IMPERVIOUS PERVIOUS (i)
01213> Surface Area (ha)= .09 .09
01214> Dep. Storage (mm)= .80 1.50
01215> Average Slope (%)= .50 .50

```

```

01216> Length (m)= 34.64 40.00
01217> Mannings n = .013 .250
01218>
01219> Max.eff.Inten.(mm/hr)= 179.04 4.69
01220> over (min) = 2.50 37.50
01221> Storage Coeff. (min)= 1.32 (ii) 37.68 (ii)
01222> Unit Hyd. Tpeak (min)= 2.50 37.50
01223> Unit Hyd. peak (cms)= .58 .03
01224>
01225> PEAK FLOW (cms)= .03 .00 *TOTALS*
01226> TIME TO PEAK (hrs)= 1.33 2.00 1.333
01227> RUNOFF VOLUME (mm)= 47.23 4.33 18.487
01228> TOTAL RAINFALL (mm)= 48.03 48.03 48.025
01229> RUNOFF COEFFICIENT = .98 .09 .385
01230>
01231> *** WARNING: Storage Coefficient is smaller than DT!
01232> Use a smaller DT or a larger area.
01233>
01234> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01235> CN* = 30.0 Ia = Dep. Storage (Above)
01236> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01237> THAN THE STORAGE COEFFICIENT.
01238> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01239> -----
01240> 001:0051-----
01241> *Catchment UNCL1
01242> *This catchment drains east towards 3rd Line and is collected in a bypass that
01243> *is directed to the Black Drain by Node 3
01244> -----
01245> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
01246> | 04:UNCL1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01247> | U.H. Tp(hrs)= .040
01248> -----
01249> Unit Hyd Qpeak (cms)= .936
01250>
01251> PEAK FLOW (cms)= .083 (i)
01252> TIME TO PEAK (hrs)= 1.333
01253> RUNOFF VOLUME (mm)= 10.361
01254> TOTAL RAINFALL (mm)= 48.025
01255> RUNOFF COEFFICIENT = .216
01256>
01257> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01258> -----
01259> *** WARNING: Time step is too large for value of TP.
01260> R.V. may be ok. Peak flow could be off.
01261> -----
01262> 001:0052-----
01263> *Catchment UNCL5
01264> *This catchment drains east towards 3rd Line and is collected in a bypass that
01265> *is directed to the Black Drain by Node 3
01266> -----
01267> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
01268> | 05:UNCL5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01269> | U.H. Tp(hrs)= .070
01270> -----
01271> Unit Hyd Qpeak (cms)= .071
01272>
01273> PEAK FLOW (cms)= .003 (i)
01274> TIME TO PEAK (hrs)= 1.375
01275> RUNOFF VOLUME (mm)= 4.877
01276> TOTAL RAINFALL (mm)= 48.025
01277> RUNOFF COEFFICIENT = .102
01278>
01279> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01280> -----
01281> *** WARNING: Time step is too large for value of TP.
01282> R.V. may be ok. Peak flow could be off.
01283> -----
01284> 001:0053-----
01285> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL1, UNCL5) - Black Drain Bypass Pi
01286> -----
01287> | ADD HYD (Bypass2 ) | ID: NHYD | AREA | QPEAK | TPEAK | R.V. | DWF
01288> | over (min) | | | | | | |
01289> | ID1 01:EXT3 | 1.23 | .245 | 1.33 | 27.17 | .000
01290> | +ID2 02:EXT4 | .18 | .029 | 1.33 | 18.49 | .000
01291> | +ID3 04:UNCL1 | .98 | .083 | 1.33 | 10.36 | .000
01292> | +ID4 05:UNCL5 | .13 | .003 | 1.38 | 4.88 | .000
01293> -----
01294> | SUM 07:Bypass2 | 2.52 | .360 | 1.33 | 18.86 | .000
01295>
01296> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01297> -----
01298>
01299> 001:0054-----
01300> *Catchment UNCL2
01301> *Rear lots on South side of property, collected in swale
01302> *flows to the Black Drain at Node 3
01303> -----
01304> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
01305> | 01:UNCL2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01306> | U.H. Tp(hrs)= .210
01307> -----
01308> Unit Hyd Qpeak (cms)= .329
01309>
01310> PEAK FLOW (cms)= .061 (i)
01311> TIME TO PEAK (hrs)= 1.542
01312> RUNOFF VOLUME (mm)= 12.203
01313> TOTAL RAINFALL (mm)= 48.025
01314> RUNOFF COEFFICIENT = .254
01315>
01316> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01317> -----
01318>
01319> 001:0055-----
01320> *Catchment EXT5
01321> *External area on the south of the site, existing agricultural
01322> *flows to the Black Drain at Node 3
01323> -----
01324> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
01325> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01326> | U.H. Tp(hrs)= .440
01327> -----
01328> Unit Hyd Qpeak (cms)= .739
01329>
01330> PEAK FLOW (cms)= .057 (i)
01331> TIME TO PEAK (hrs)= 1.875
01332> RUNOFF VOLUME (mm)= 4.177
01333> TOTAL RAINFALL (mm)= 48.025
01334> RUNOFF COEFFICIENT = .087
01335>
01336> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01337> -----
01338>
01339> 001:0056-----
01340> *Total Flow to Node 3 (Including External Areas)
01341> -----
01342> | ADD HYD (Node3 ) | ID: NHYD | AREA | QPEAK | TPEAK | R.V. | DWF
01343> | over (min) | | | | | | |
01344> | ID1 08:Bypass1 | 8.27 | .145 | 1.88 | 10.94 | .000
01345> | +ID2 09:Pond1 | 26.92 | .106 | 4.29 | 20.20 | .000
01346> | +ID3 03:UNCL3 | 5.82 | .069 | 2.46 | 10.71 | .000
01347> | +ID4 07:Bypass2 | 2.52 | .360 | 1.33 | 18.86 | .000
01348> | +ID5 01:UNCL2 | 1.81 | .061 | 1.54 | 12.20 | .000
01349> | +ID6 02:EXT5 | 8.51 | .057 | 1.88 | 4.18 | .000
01350> -----

```

01351> SUM 04:Node3 53.85 .476 1.33 14.89 .000

01352>

01353> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01354>

01355>

01356> 001:0057-----

01357> *Catchment 202

01358> *This catchment is the area draining Node 4 Outlet

01359>

01360> | DESIGN STANDHYD | Area (ha)= 2.99

01361> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00

01362>-----

01363> IMPERVIOUS PERVIOUS (i)

01364> Surface Area (ha)= .84 2.15

01365> Dep. Storage (mm)= .80 1.50

01366> Average Slope (%)= .50 .50

01367> Length (m)= 141.19 40.00

01368> Mannings n = .013 .250

01369>

01370> Max.eff.Inten.(mm/hr)= 179.04 24.69

01371> over (min) 2.50 22.50

01372> Storage Coeff. (min)= 3.06 (ii) 21.78 (ii)

01373> Unit Hyd. Tpeak (min)= 2.50 22.50

01374> Unit Hyd. peak (cms)= .38 .05

01375>

01376> PEAK FLOW (cms)= .22 .09 *TOTALS*

01377> TIME TO PEAK (hrs)= 1.33 1.67 1.333

01378> RUNOFF VOLUME (mm)= 47.23 17.44 22.804

01379> TOTAL RAINFALL (mm)= 48.03 48.03 48.025

01380> RUNOFF COEFFICIENT = .98 .36 .475

01381>

01382> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01383> CN* = 74.0 Ia = Dep. Storage (Above)

01384> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01385> THAN THE STORAGE COEFFICIENT.

01386> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01387>

01388>-----

01389> 001:0058-----

01390> *Catchment UNC4

01391> *Uncontrolled rear yards, flows to the Black Drain at Node 4

01392>

01393> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00

01394> | 02:UNC4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

01395> U.H. Tp(hrs)= .050

01396>

01397> Unit Hyd Qpeak (cms)= .856

01398>

01399> PEAK FLOW (cms)= .091 (i)

01400> TIME TO PEAK (hrs)= 1.333

01401> RUNOFF VOLUME (mm)= 11.429

01402> TOTAL RAINFALL (mm)= 48.025

01403> RUNOFF COEFFICIENT = .238

01404>

01405> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01406>

01407> *** WARNING: Time step is too large for value of TP.

01408> R.V. may be ok. Peak flow could be off.

01409>

01410> 001:0059-----

01411> *Catchment EXT6

01412> *External area on the south of the site, existing agricultural

01413> *flows to the Black Drain at Node 4

01414>-----

01415> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00

01416> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

01417> U.H. Tp(hrs)= .550

01418>

01419> Unit Hyd Qpeak (cms)= 1.092

01420>

01421> PEAK FLOW (cms)= .191 (i)

01422> TIME TO PEAK (hrs)= 2.042

01423> RUNOFF VOLUME (mm)= 8.511

01424> TOTAL RAINFALL (mm)= 48.025

01425> RUNOFF COEFFICIENT = .177

01426>

01427> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01428>

01429>-----

01430> 001:0060-----

01431> *Total Flow to to Node 4 (Including External Areas)

01432>

01433> | ADD HYD (Node4) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

01434> (ha) (cms) (hrs) (mm) (cms)

01435> ID1 04:Node3 53.85 .476 1.33 14.89 .000

01436> +ID2 06:202 2.99 .240 1.33 22.80 .000

01437> +ID3 02:UNC4 1.12 .091 1.33 11.43 .000

01438> +ID4 03:EXT6 15.73 .191 2.04 8.51 .000

01439>-----

01440> SUM 08:Node4 73.69 .822 1.33 13.79 .000

01441>

01442> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01443>

01444>-----

01445> 001:0061-----

01446> *Catchment UNC6

01447> *Uncontrolled rear yards, flows to ditch along Road 19

01448>

01449> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00

01450> | 02:UNC6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

01451> U.H. Tp(hrs)= .050

01452>

01453> Unit Hyd Qpeak (cms)= .061

01454>

01455> PEAK FLOW (cms)= .009 (i)

01456> TIME TO PEAK (hrs)= 1.333

01457> RUNOFF VOLUME (mm)= 15.943

01458> TOTAL RAINFALL (mm)= 48.025

01459> RUNOFF COEFFICIENT = .332

01460>

01461> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01462>

01463> *** WARNING: Time step is too large for value of TP.

01464> R.V. may be ok. Peak flow could be off.

01465>

01466> 001:0062-----

01467> *10-Year

01468>-----

01469> | CHICAGO STORM | IDF curve parameters: A= 648.070

01470> | Ptotal= 57.15 mm | B= .000

01471> C= .696

01472>-----

01473> used in: INTENSITY = A / (t + B) ^ C

01474>

01475> Duration of storm = 4.00 hrs

01476> Storm time step = 5.00 min

01477> Time to peak ratio = .33

01478>

01479> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

01480> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr

01481> .08 4.577 | 1.08 14.574 | 2.08 10.379 | 3.08 5.794

01482> .17 4.805 | 1.17 19.908 | 2.17 9.656 | 3.17 5.611

01483> .25 5.063 | 1.25 36.926 | 2.25 9.045 | 3.25 5.441

01484> .33 5.357 | 1.33 211.414 | 2.33 8.520 | 3.33 5.283

01485> .42 5.697 | 1.42 45.280 | 2.42 8.064 | 3.42 5.136

01486> .50 6.095 | 1.50 28.609 | 2.50 7.663 | 3.50 4.999

01486> .58 6.568 | 1.58 21.843 | 2.58 7.308 | 3.58 4.870

01487> .67 7.142 | 1.67 18.007 | 2.67 6.990 | 3.67 4.749

01488> .75 7.856 | 1.75 15.488 | 2.75 6.704 | 3.75 4.635

01489> .83 8.774 | 1.83 13.686 | 2.83 6.445 | 3.83 4.528

01490> .92 10.008 | 1.92 12.323 | 2.92 6.209 | 3.92 4.426

01491> 1.00 11.775 | 2.00 11.249 | 3.00 5.993 | 4.00 4.330

01492>

01493>-----

01494> 001:0063-----

01495> *Catchment EXT1

01496> *External area on the northwest of Wellington Road 19.

01497> *This catchment drains to the golf course via a culvert which will be captured

01498> and enter a bypass pipe, entering the Black Drain at Node 2

01499>

01500> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00

01501> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00

01502> U.H. Tp(hrs)= .440

01503>

01504> Unit Hyd Qpeak (cms)= .688

01505>

01506> PEAK FLOW (cms)= .189 (i)

01507> TIME TO PEAK (hrs)= 1.875

01508> RUNOFF VOLUME (mm)= 14.203

01509> TOTAL RAINFALL (mm)= 57.150

01510> RUNOFF COEFFICIENT = .249

01511>

01512> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01513>

01514>-----

01515> 001:0064-----

01516> *Catchment EXT2

01517> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt

01518> *This will be captured via the Black Drain Bypass and enter the drain at Node 2

01519>

01520> | DESIGN STANDHYD | Area (ha)= .34

01521> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00

01522>-----

01523> IMPERVIOUS PERVIOUS (i)

01524> Surface Area (ha)= .17 .17

01525> Dep. Storage (mm)= .80 1.50

01526> Average Slope (%)= .50 .50

01527> Length (m)= 47.61 40.00

01528> Mannings n = .013 .250

01529>

01530> Max.eff.Inten.(mm/hr)= 211.41 27.15

01531> over (min) 2.50 20.00

01532> Storage Coeff. (min)= 1.49 (ii) 19.51 (ii)

01533> Unit Hyd. Tpeak (min)= 2.50 20.00

01534> Unit Hyd. peak (cms)= .55 .06

01535>

01536> PEAK FLOW (cms)= .07 .01 *TOTALS*

01537> TIME TO PEAK (hrs)= 1.33 1.63 1.333

01538> RUNOFF VOLUME (mm)= 56.35 15.93 30.484

01539> TOTAL RAINFALL (mm)= 57.15 57.15 57.150

01540> RUNOFF COEFFICIENT = .99 .28 .533

01541> *** WARNING: Storage Coefficient is smaller than DT!

01542> Use a smaller DT or a larger area.

01543>

01544> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01545> CN* = 58.0 Ia = Dep. Storage (Above)

01546> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01547> THAN THE STORAGE COEFFICIENT.

01548> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01549>

01550>-----

01551> 001:0065-----

01552> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe

01553>

01554> | ADD HYD (Bypass1) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

01555> (ha) (cms) (hrs) (mm) (cms)

01556> ID1 01:EXT1 7.93 .189 1.88 14.20 .000

01557> +ID2 02:EXT2 .34 .071 1.33 30.48 .000

01558>-----

01559> SUM 08:Bypass1 8.27 .199 1.83 14.87 .000

01560>

01561> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01562>

01563>-----

01564> 001:0066-----

01565> *Catchment 201

01566> *Drainage Area to SWMF1

01567>

01568> | DESIGN STANDHYD | Area (ha)= 26.92

01569> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00

01570>-----

01571> IMPERVIOUS PERVIOUS (i)

01572> Surface Area (ha)= 9.15 17.77

01573> Dep. Storage (mm)= .80 1.50

01574> Average Slope (%)= .50 .50

01575> Length (m)= 423.64 40.00

01576> Mannings n = .013 .250

01577>

01578> Max.eff.Inten.(mm/hr)= 211.41 21.79

01579> over (min) 5.00 25.00

01580> Storage Coeff. (min)= 5.54 (ii) 25.22 (ii)

01581> Unit Hyd. Tpeak (min)= 5.00 25.00

01582> Unit Hyd. peak (cms)= .21 .05

01583>

01584> PEAK FLOW (cms)= 2.12 .63 *TOTALS*

01585> TIME TO PEAK (hrs)= 1.38 1.71 1.375

01586> RUNOFF VOLUME (mm)= 56.35 16.49 25.655

01587> TOTAL RAINFALL (mm)= 57.15 57.15 57.150

01588> RUNOFF COEFFICIENT = .99 .29 .449

01589>

01590> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01591> CN* = 62.0 Ia = Dep. Storage (Above)

01592> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01593> THAN THE STORAGE COEFFICIENT.

01594> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01595>

01596>-----

01597> 001:0067-----

01598> *Pond 1

01599>

01600> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.

01601> | IN>01: (201) |

01602> | OUT<09: (Pond1) | ===== OUTFLOW STORAGE TABLE =====

01603> OUTFLOW STORAGE | OUTFLOW STORAGE

01604> (cms) (ha.m.) | (cms) (ha.m.)

01605> .000 .0000E+00 | .320 .9500E+00

01606> .057 .3310E+00 | .000 .0000E+00

01607>

01608> ROUTING RESULTS AREA QPEAK TPEAK R.V.

01609> (ha) (cms) (hrs) (mm)

01610> INFLOW >01: (201) 26.92 2.271 1.375 25.655

01611> OUTFLOW<09: (Pond1) 26.92 .152 4.167 25.654

01612>

01613> PEAK FLOW REDUCTION [Qout/Qin] (%)= 6.699

01614> TIME SHIFT OF PEAK FLOW (min)= 167.50

01615> MAXIMUM STORAGE USED (ha.m.)= 5550E+00

01616>

01617>-----

01618> 001:0068-----

01619> *Catchment UNC3

01620> *Existing wetland/open space area to remain

```

01621> *flows to the Black Drain at Node 3
01622>
01623> | DESIGN NASHYD | Area (ha)= 5.82 Curve Number (CN)=62.00
01624> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01625> -----
01626> U.H. Tp(hrs)= .830
01627>
01628> Unit Hyd Qpeak (cms)= .268
01629> PEAK FLOW (cms)= .094 (i)
01630> TIME TO PEAK (hrs)= 2.458
01631> RUNOFF VOLUME (mm)= 14.655
01632> TOTAL RAINFALL (mm)= 57.150
01633> RUNOFF COEFFICIENT = .256
01634>
01635> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01636>
-----
01637>
01638> 001:0069-----
01639> *Catchment EXT3
01640> *External area - Wellington Road 19 and 3rd line and
01641> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
01642> *This catchment is collected in a bypass and is directed to the Black Drain by N
01643> -----
01644> | DESIGN STANDHYD | Area (ha)= 1.23
01645> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
01646> -----
01647> IMPERVIOUS PERVIOUS (i)
01648> Surface Area (ha)= .73 .50
01649> Dep. Storage (mm)= .80 1.50
01650> Average Slope (%)= .50 .50
01651> Length (m)= 90.55 40.00
01652> Mannings n = .013 .250
01653>
01654> Max.eff.Inten.(mm/hr)= 211.41 27.64
01655> over (min) 2.50 20.00
01656> Storage Coeff. (min)= 2.20 (ii) 20.09 (ii)
01657> Unit Hyd. Tpeak (min)= 2.50 20.00
01658> Unit Hyd. peak (cms)= .46 .06
01659>
01660> PEAK FLOW (cms)= .29 .02 *TOTALS*
01661> TIME TO PEAK (hrs)= 1.33 1.63 1.333
01662> RUNOFF VOLUME (mm)= 56.35 15.54 33.497
01663> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01664> RUNOFF COEFFICIENT = .99 .27 .586
01665> *** WARNING: Storage Coefficient is smaller than DT!
01666> Use a smaller DT or a larger area.
01667>
01668> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01669> CN* = 56.0 Ia = Dep. Storage (Above)
01670> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01671> THAN THE STORAGE COEFFICIENT.
01672> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01673>
01674>
-----
01675> 001:0070-----
01676> *Catchment EXT4
01677> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
01678> *This catchment is collected in a bypass and directed to the Black Drain by Node
01679> -----
01680> | DESIGN STANDHYD | Area (ha)= .18
01681> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
01682> -----
01683> IMPERVIOUS PERVIOUS (i)
01684> Surface Area (ha)= .09 .09
01685> Dep. Storage (mm)= .80 1.50
01686> Average Slope (%)= .50 .50
01687> Length (m)= 34.64 40.00
01688> Mannings n = .013 .250
01689>
01690> Max.eff.Inten.(mm/hr)= 211.41 7.18
01691> over (min) 2.50 32.50
01692> Storage Coeff. (min)= 1.23 (ii) 31.91 (ii)
01693> Unit Hyd. Tpeak (min)= 2.50 32.50
01694> Unit Hyd. peak (cms)= .59 .04
01695>
01696> PEAK FLOW (cms)= .03 .00 *TOTALS*
01697> TIME TO PEAK (hrs)= 1.33 1.88 1.333
01698> RUNOFF VOLUME (mm)= 56.35 6.07 22.666
01699> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01700> RUNOFF COEFFICIENT = .99 .11 .397
01701> *** WARNING: Storage Coefficient is smaller than DT!
01702> Use a smaller DT or a larger area.
01703>
01704> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01705> CN* = 30.0 Ia = Dep. Storage (Above)
01706> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01707> THAN THE STORAGE COEFFICIENT.
01708> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01709>
01710>
-----
01711> 001:0071-----
01712> *Catchment UNC1
01713> *This catchment drains east towards 3rd Line and is collected in a bypass that
01714> *is directed to the Black Drain by Node 3
01715> -----
01716> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
01717> | 04:UNC1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01718> U.H. Tp(hrs)= .040
01719>
01720> Unit Hyd Qpeak (cms)= .936
01721>
01722> PEAK FLOW (cms)= .115 (i)
01723> TIME TO PEAK (hrs)= 1.333
01724> RUNOFF VOLUME (mm)= 14.203
01725> TOTAL RAINFALL (mm)= 57.150
01726> RUNOFF COEFFICIENT = .249
01727>
01728> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01729>
01730> *** WARNING: Time step is too large for value of TP.
01731> R.V. may be ok. Peak flow could be off.
01732>
01733>
-----
01734> 001:0072-----
01735> *Catchment UNC5
01736> *This catchment drains east towards 3rd Line and is collected in a bypass that
01737> *is directed to the Black Drain by Node 3
01738> -----
01739> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
01740> | 05:UNC5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01741> U.H. Tp(hrs)= .070
01742>
01743> Unit Hyd Qpeak (cms)= .071
01744> PEAK FLOW (cms)= .005 (i)
01745> TIME TO PEAK (hrs)= 1.375
01746> RUNOFF VOLUME (mm)= 6.838
01747> TOTAL RAINFALL (mm)= 57.150
01748> RUNOFF COEFFICIENT = .120
01749>
01750> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01751>
01752> *** WARNING: Time step is too large for value of TP.
01753> R.V. may be ok. Peak flow could be off.
01754>
01755> 001:0073-----

```

```

01756> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
01757>
01758> | ADD HDR (Bypass2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01759> (ha) (cms) (hrs) (mm) (cms)
01760> ID1 01:EXT3 1.23 .295 1.33 33.50 .000
01761> ID2 02:EXT4 .18 .035 1.33 22.67 .000
01762> ID3 04:UNC1 .98 .115 1.33 14.20 .000
01763> ID4 05:UNC5 1.13 .005 1.38 6.84 .000
01764> -----
01765> SUM 07:Bypass2 2.52 .449 1.33 23.84 .000
01766>
01767> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01768>
01769>
-----
01770> 001:0074-----
01771> *Catchment UNC2
01772> *Rear lots on South side of property, collected in swale
01773> *flows to the Black Drain at Node 3
01774> -----
01775> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
01776> | 01:UNC2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01777> U.H. Tp(hrs)= .210
01778>
01779> Unit Hyd Qpeak (cms)= .329
01780>
01781> PEAK FLOW (cms)= .084 (i)
01782> TIME TO PEAK (hrs)= 1.542
01783> RUNOFF VOLUME (mm)= 16.606
01784> TOTAL RAINFALL (mm)= 57.150
01785> RUNOFF COEFFICIENT = .291
01786>
01787> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01788>
01789>
-----
01790> 001:0075-----
01791> *Catchment EXT5
01792> *External area on the south of the site, existing agricultural
01793> *flows to the Black Drain at Node 3
01794> -----
01795> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
01796> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01797> U.H. Tp(hrs)= .440
01798>
01799> Unit Hyd Qpeak (cms)= .739
01800>
01801> PEAK FLOW (cms)= .080 (i)
01802> TIME TO PEAK (hrs)= 1.875
01803> RUNOFF VOLUME (mm)= 5.872
01804> TOTAL RAINFALL (mm)= 57.150
01805> RUNOFF COEFFICIENT = .103
01806>
01807> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01808>
01809>
-----
01810> 001:0076-----
01811> *Total Flow to Node 3 (Including External Areas)
01812>
01813> | ADD HDR (Node3) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01814> (ha) (cms) (hrs) (mm) (cms)
01815> ID1 08:Bypass1 8.27 .199 1.83 14.87 .000
01816> ID2 09:Pond1 26.92 .152 4.17 25.65 .000
01817> ID3 03:UNC3 5.82 .094 2.46 14.65 .000
01818> ID4 07:Bypass2 2.52 .449 1.33 23.84 .000
01819> ID5 01:UNC2 1.81 .084 1.54 16.61 .000
01820> ID6 02:EXT5 8.51 .080 1.88 5.87 .000
01821> -----
01822> SUM 04:Node3 53.85 .601 1.33 19.29 .000
01823>
01824> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01825>
01826>
-----
01827> 001:0077-----
01828> *Catchment 202
01829> *This catchment is the area draining Node 4 Outlet
01830> -----
01831> | DESIGN STANDHYD | Area (ha)= 2.99
01832> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00
01833> -----
01834> IMPERVIOUS PERVIOUS (i)
01835> Surface Area (ha)= .84 2.15
01836> Dep. Storage (mm)= .80 1.50
01837> Average Slope (%)= .50 .50
01838> Length (m)= 141.19 40.00
01839> Mannings n = .013 .250
01840>
01841> Max.eff.Inten.(mm/hr)= 211.41 39.01
01842> over (min) 2.50 17.50
01843> Storage Coeff. (min)= 2.87 (ii) 18.46 (ii)
01844> Unit Hyd. Tpeak (min)= 2.50 17.50
01845> Unit Hyd. peak (cms)= .40 .06
01846>
01847> PEAK FLOW (cms)= .27 .14 *TOTALS*
01848> TIME TO PEAK (hrs)= 1.33 1.58 1.333
01849> RUNOFF VOLUME (mm)= 56.35 23.23 29.192
01850> TOTAL RAINFALL (mm)= 57.15 57.15 57.150
01851> RUNOFF COEFFICIENT = .99 .41 .511
01852>
01853> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01854> CN* = 74.0 Ia = Dep. Storage (Above)
01855> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01856> THAN THE STORAGE COEFFICIENT.
01857> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01858>
01859>
-----
01860> 001:0078-----
01861> *Catchment UNC4
01862> *Uncontrolled rear yards, flows to the Black Drain at Node 4
01863> -----
01864> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00
01865> | 02:UNC4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01866> U.H. Tp(hrs)= .050
01867>
01868> Unit Hyd Qpeak (cms)= .856
01869>
01870> PEAK FLOW (cms)= .125 (i)
01871> TIME TO PEAK (hrs)= 1.333
01872> RUNOFF VOLUME (mm)= 15.600
01873> TOTAL RAINFALL (mm)= 57.150
01874> RUNOFF COEFFICIENT = .273
01875>
01876> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01877>
01878> *** WARNING: Time step is too large for value of TP.
01879> R.V. may be ok. Peak flow could be off.
01880>
01881> 001:0079-----
01882> *Catchment EXT6
01883> *External area on the south of the site, existing agricultural
01884> *flows to the Black Drain at Node 4
01885> -----
01886> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
01887> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
01888> U.H. Tp(hrs)= .550
01889>
01890> Unit Hyd Qpeak (cms)= 1.092

```

```

01891>
01892> PEAK FLOW (cms)= .264 (i)
01893> TIME TO PEAK (hrs)= 2.042
01894> RUNOFF VOLUME (mm)= 11.754
01895> TOTAL RAINFALL (mm)= 57.150
01896> RUNOFF COEFFICIENT = .206
01897>
01898> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01899>
01900>
01901> 001:0080-----
01902> *Total Flow to Node 4 (Including External Areas)
01903>
01904> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01905> | (ha) (cms) (hrs) (mm) (cms)
01906> | ID1 04:Node3 53.85 .601 1.33 19.29 .000
01907> | +ID2 06:202 2.99 .303 1.33 29.19 .000
01908> | +ID3 02:UNC4 1.12 .125 1.33 15.60 .000
01909> | +ID4 03:EXT6 15.73 .264 2.04 11.75 .000
01910> | =====
01911> | SUM 08:Node4 73.69 1.052 1.33 18.03 .000
01912>
01913> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01914>
01915>
01916> 001:0081-----
01917> *Catchment UNC6
01918> *Uncontrolled rear yards, flows to ditch along Road 19
01919>
01920> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00
01921> | 02:UNC6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01922> | U.H. Tp(hrs)= .050
01923>
01924> Unit Hyd Qpeak (cms)= .061
01925>
01926> PEAK FLOW (cms)= .013 (i)
01927> TIME TO PEAK (hrs)= 1.333
01928> RUNOFF VOLUME (mm)= 21.374
01929> TOTAL RAINFALL (mm)= 57.150
01930> RUNOFF COEFFICIENT = .374
01931>
01932> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01933>
01934> *** WARNING: Time step is too large for value of TP.
01935> R.V. may be ok. Peak flow could be off.
01936>
01937> 001:0082-----
01938> *25-Year
01939>
01940> | CHICAGO STORM | IDF curve parameters: A= 771.350
01941> | Total= 68.77 mm | B= .000
01942> | C= / .694
01943> | used in: INTENSITY = A / (t + B)^C
01944>
01945> Duration of storm = 4.00 hrs
01946> Storm time step = 5.00 min
01947> Time to peak ratio = .33
01948>
01949>
01950> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01951> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01952> .08 5.543 | 1.08 17.591 | 2.08 12.540 | 3.08 7.012
01953> .17 5.818 | 1.17 24.008 | 2.17 11.669 | 3.17 6.791
01954> .25 6.129 | 1.25 44.448 | 2.25 10.933 | 3.25 6.586
01955> .33 6.485 | 1.33 252.441 | 2.33 10.300 | 3.33 6.396
01956> .42 6.895 | 1.42 54.475 | 2.42 9.751 | 3.42 6.219
01957> .50 7.375 | 1.50 34.465 | 2.50 9.267 | 3.50 6.053
01958> .58 7.946 | 1.58 26.335 | 2.58 8.839 | 3.58 5.897
01959> .67 8.638 | 1.67 21.722 | 2.67 8.455 | 3.67 5.751
01960> .75 9.461 | 1.75 18.692 | 2.75 8.110 | 3.75 5.613
01961> .83 10.606 | 1.83 16.523 | 2.83 7.797 | 3.83 5.484
01962> .92 12.093 | 1.92 14.881 | 2.92 7.513 | 3.92 5.361
01963> 1.00 14.222 | 2.00 13.589 | 3.00 7.252 | 4.00 5.245
01964>
01965> 001:0083-----
01966> *Catchment EXT1
01967> *External area on the northwest of Wellington Road 19.
01968> *This catchment drains to the golf course via a culvert which will be captured
01969> *and enter a bypass pipe, entering the Black Drain at Node 2
01970>
01971> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
01972> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01973> | U.H. Tp(hrs)= .440
01974>
01975> Unit Hyd Qpeak (cms)= .688
01976>
01977> PEAK FLOW (cms)= .264 (i)
01978> TIME TO PEAK (hrs)= 1.875
01979> RUNOFF VOLUME (mm)= 19.704
01980> TOTAL RAINFALL (mm)= 68.771
01981> RUNOFF COEFFICIENT = .287
01982>
01983> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01984>
01985>
01986> 001:0084-----
01987> *Catchment EXT2
01988> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
01989> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
01990>
01991> | DESIGN STANDHYD | Area (ha)= .34
01992> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
01993>
01994> IMPERVIOUS PERVIOUS (i)
01995> Surface Area (ha)= .17 .17
01996> Dep. Storage (mm)= .80 1.50
01997> Average Slope (%)= .50 .50
01998> Length (m)= 47.61 40.00
01999> Mannings n = .013 .250
02000>
02001> Max.eff.Inten.(mm/hr)= 252.44 40.89
02002> over (min) 2.50 17.50
02003> Storage Coeff. (min)= 1.39 (ii) 16.69 (ii)
02004> Unit Hyd. Tpeak (min)= 2.50 17.50
02005> Unit Hyd. peak (cms)= .57 .07
02006>
02007> PEAK FLOW (cms)= .08 .01 .087 (iii)
02008> TIME TO PEAK (hrs)= 1.33 1.58 1.333
02009> RUNOFF VOLUME (mm)= 67.97 21.94 38.510
02010> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
02011> RUNOFF COEFFICIENT = .99 .32 .560
02012>
02013> *** WARNING: Storage Coefficient is smaller than DT!
02014> Use a smaller DT or a larger area.
02015>
02016> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02017> CN* = 58.0 Ia = Dep. Storage (Above)
02018> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02019> THAN THE STORAGE COEFFICIENT.
02020> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02021>
02022> 001:0085-----
02023> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
02024>
02025> | ADD HYD (Bypass1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

```

```

02026>-----
02027> (ha) (cms) (hrs) (mm) (cms)
02028> ID1 01:EXT1 7.93 .264 1.88 19.70 .000
02029> +ID2 02:EXT2 1.34 .087 1.33 38.51 .000
02030> =====
02031> SUM 08:Bypass1 8.27 .278 1.83 20.48 .000
02032>
02033> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02034>
02035> 001:0086-----
02036> *Catchment 201
02037> *Drainage Area to SWMF1
02038>
02039> | DESIGN STANDHYD | Area (ha)= 26.92
02040> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00
02041>
02042> IMPERVIOUS PERVIOUS (i)
02043> Surface Area (ha)= 9.15 17.77
02044> Dep. Storage (mm)= .80 1.50
02045> Average Slope (%)= .50 .50
02046> Length (m)= 423.64 40.00
02047> Mannings n = .013 .250
02048>
02049> Max.eff.Inten.(mm/hr)= 252.44 32.19
02050> over (min) 5.00 22.50
02051> Storage Coeff. (min)= 5.16 (ii) 22.00 (ii)
02052> Unit Hyd. Tpeak (min)= 5.00 22.50
02053> Unit Hyd. peak (cms)= .22 .05
02054>
02055> PEAK FLOW (cms)= 2.60 .96
02056> TIME TO PEAK (hrs)= 1.38 1.67
02057> RUNOFF VOLUME (mm)= 67.97 22.67 33.087
02058> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
02059> RUNOFF COEFFICIENT = .99 .33 .481
02060>
02061> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02062> CN* = 62.0 Ia = Dep. Storage (Above)
02063> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02064> THAN THE STORAGE COEFFICIENT.
02065> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02066>
02067>
02068> 001:0087-----
02069> * Pond 1
02070>
02071> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
02072> | IN>01: (201 ) |
02073> | OUT>03: (Pond1 ) | ===== OUTFLOW STORAGE TABLE =====
02074> OUTFLOW STORAGE OUTFLOW STORAGE
02075> (cms) (ha.m.) | (cms) (ha.m.)
02076> .000 .9000E+00 | .320 .9500E+00
02077> .057 .3310E+00 | .000 .0000E+00
02078>
02079> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02080> (ha) (cms) (hrs) (mm)
02081> INFLOW >01: (201 ) 26.92 2.871 1.375 33.087
02082> OUTFLOW<09: (Pond1 ) 26.92 .214 4.125 33.086
02083>
02084> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.456
02085> TIME SHIFT OF PEAK FLOW (min) = 165.00
02086> MAXIMUM STORAGE USED (ha.m.) = 7007E+00
02087>
02088>
02089> 001:0088-----
02090> *Catchment UNC3
02091> *Existing wetland/open space area to remain
02092> *flows to the Black Drain at Node 3
02093>
02094> | DESIGN NASHYD | Area (ha)= 5.82 Curve Number (CN)=62.00
02095> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02096> | U.H. Tp(hrs)= .830
02097>
02098> Unit Hyd Qpeak (cms)= .268
02099>
02100> PEAK FLOW (cms)= .131 (i)
02101> TIME TO PEAK (hrs)= 2.417
02102> RUNOFF VOLUME (mm)= 20.298
02103> TOTAL RAINFALL (mm)= 68.771
02104> RUNOFF COEFFICIENT = .295
02105>
02106> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02107>
02108>
02109> 001:0089-----
02110> *Catchment EXT3
02111> *External area - Wellington Road 19 and 3rd line and
02112> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
02113> *This catchment is collected in a bypass and is directed to the Black Drain by N
02114>
02115> | DESIGN STANDHYD | Area (ha)= 1.23
02116> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
02117>
02118> IMPERVIOUS PERVIOUS (i)
02119> Surface Area (ha)= .73 .50
02120> Dep. Storage (mm)= .80 1.50
02121> Average Slope (%)= .50 .50
02122> Length (m)= 90.55 40.00
02123> Mannings n = .013 .250
02124>
02125> Max.eff.Inten.(mm/hr)= 252.44 41.66
02126> over (min) 2.50 17.50
02127> Storage Coeff. (min)= 2.05 (ii) 17.23 (ii)
02128> Unit Hyd. Tpeak (min)= 2.50 17.50
02129> Unit Hyd. peak (cms)= .48 .07
02130>
02131> PEAK FLOW (cms)= .35 .04
02132> TIME TO PEAK (hrs)= 1.33 1.58 1.333
02133> RUNOFF VOLUME (mm)= 67.97 21.42 41.903
02134> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
02135> RUNOFF COEFFICIENT = .99 .31 .609
02136>
02137> *** WARNING: Storage Coefficient is smaller than DT!
02138> Use a smaller DT or a larger area.
02139>
02140> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02141> CN* = 56.0 Ia = Dep. Storage (Above)
02142> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02143> THAN THE STORAGE COEFFICIENT.
02144> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02145>
02146> 001:0090-----
02147> *Catchment EXT4
02148> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
02149> *This catchment is collected in a bypass and directed to the Black Drain by Node
02150>
02151> | DESIGN STANDHYD | Area (ha)= .18
02152> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
02153>
02154> IMPERVIOUS PERVIOUS (i)
02155> Surface Area (ha)= .09 .09
02156> Dep. Storage (mm)= .80 1.50
02157> Average Slope (%)= .50 .50
02158> Length (m)= 34.64 40.00
02159> Mannings n = .013 .250
02160>

```

```

02161> Max.eff.Inten.(mm/hr)= 252.44 11.35
02162> over (min) 2.50 27.50
02163> Storage Coeff. (min)= 1.15 (ii) 26.69 (ii)
02164> Unit Hyd. Tpeak (min)= 2.50 27.50
02165> Unit Hyd. peak (cms)= .60 .04
02166>
02167> PEAK FLOW (cms)= .04 .00 .041 (iii)
02168> TIME TO PEAK (hrs)= 1.33 1.75 1.333
02169> RUNOFF VOLUME (mm)= 67.97 8.66 28.235
02170> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
02171> RUNOFF COEFFICIENT = .99 .13 .411
02172> *** WARNING: Storage Coefficient is smaller than DT!
02173> Use a smaller DT or a larger area.
02174>
02175> (i) CN PROCEDURE SELECTED FOR PEROUS LOSSES:
02176> CN* = 30.0 Ia = Dep. Storage (Above)
02177> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02178> THAN THE STORAGE COEFFICIENT.
02179> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02180>
02181> -----
02182> 001:0091-----
02183> *Catchment UNCL
02184> *This catchment drains east towards 3rd Line and is collected in a bypass that
02185> *is directed to the Black Drain by Node 3
02186>
02187> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
02188> | 04:UNCL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02189> | U.H. Tp(hrs)= .040
02190>
02191> Unit Hyd Qpeak (cms)= .936
02192>
02193> PEAK FLOW (cms)= .160 (i)
02194> TIME TO PEAK (hrs)= 1.333
02195> RUNOFF VOLUME (mm)= 19.704
02196> TOTAL RAINFALL (mm)= 68.771
02197> RUNOFF COEFFICIENT = .287
02198>
02199> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02200>
02201> *** WARNING: Time step is too large for value of TP.
02202> R.V. may be ok. Peak flow could be off.
02203>
02204> 001:0092-----
02205> *Catchment UNCS
02206> *This catchment drains east towards 3rd Line and is collected in a bypass that
02207> *is directed to the Black Drain by Node 3
02208>
02209> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
02210> | 05:UNCS DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02211> | U.H. Tp(hrs)= .070
02212>
02213> Unit Hyd Qpeak (cms)= .071
02214>
02215> PEAK FLOW (cms)= .007 (i)
02216> TIME TO PEAK (hrs)= 1.375
02217> RUNOFF VOLUME (mm)= 9.741
02218> TOTAL RAINFALL (mm)= 68.771
02219> RUNOFF COEFFICIENT = .142
02220>
02221> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02222>
02223> *** WARNING: Time step is too large for value of TP.
02224> R.V. may be ok. Peak flow could be off.
02225>
02226> 001:0093-----
02227> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNCL, UNCS) - Black Drain Bypass Pi
02228>
02229> | ADD HYD (Bypass2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02230> | (ha) (cms) (hrs) (mm) (cms)
02231> | ID1 01:EXT3 1.23 .361 1.33 41.90 .000
02232> | +ID2 02:EXT4 .18 .041 1.33 28.23 .000
02233> | +ID3 04:UNCL .98 .160 1.33 19.70 .000
02234> | +ID4 05:UNCS .13 .007 1.38 9.74 .000
02235> | =====
02236> | SUM 07:Bypass2 2.52 .568 1.33 30.63 .000
02237>
02238> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02239>
02240>
02241> 001:0094-----
02242> *Catchment UNCL
02243> *Rear lots on South side of property, collected in swale
02244> *flows to the Black Drain at Node 3
02245>
02246> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
02247> | 01:UNCL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02248> | U.H. Tp(hrs)= .210
02249>
02250> Unit Hyd Qpeak (cms)= .329
02251>
02252> PEAK FLOW (cms)= .116 (i)
02253> TIME TO PEAK (hrs)= 1.542
02254> RUNOFF VOLUME (mm)= 22.842
02255> TOTAL RAINFALL (mm)= 68.771
02256> RUNOFF COEFFICIENT = .332
02257>
02258> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02259>
02260>
02261> 001:0095-----
02262> *Catchment EXTS
02263> *External area on the south of the site, existing agricultural
02264> *flows to the Black Drain at Node 3
02265>
02266> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
02267> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02268> | U.H. Tp(hrs)= .440
02269>
02270> Unit Hyd Qpeak (cms)= .739
02271>
02272> PEAK FLOW (cms)= .115 (i)
02273> TIME TO PEAK (hrs)= 1.875
02274> RUNOFF VOLUME (mm)= 8.396
02275> TOTAL RAINFALL (mm)= 68.771
02276> RUNOFF COEFFICIENT = .122
02277>
02278> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02279>
02280>
02281> 001:0096-----
02282> *Total Flow to Node 3 (Including External Areas)
02283>
02284> | ADD HYD (Node3 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02285> | (ha) (cms) (hrs) (mm) (cms)
02286> | ID1 08:Bypass1 8.27 .278 1.83 20.48 .000
02287> | +ID2 09:Pond1 26.92 .214 4.13 33.09 .000
02288> | +ID3 03:UNCL 5.82 .131 2.42 20.30 .000
02289> | +ID4 07:Bypass2 2.52 .568 1.33 30.63 .000
02290> | +ID5 01:UNCL 1.81 .116 1.54 22.84 .000
02291> | +ID6 02:EXT5 8.51 .115 1.88 8.40 .000
02292> | =====
02293> | SUM 04:Node3 53.85 .769 1.33 25.41 .000
02294>
02295> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

```

02296>
02297> -----
02298> 001:0097-----
02299> *Catchment 202
02300> *This catchment is the area draining Node 4 Outlet
02301>
02302> | DESIGN STANDHYD | Area (ha)= 2.99
02303> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00
02304>
02305> IMPERVIOUS PEROUS (i)
02306> Surface Area (ha)= .84 2.15
02307> Dep. Storage (mm)= .80 1.50
02308> Average Slope (%)= .50 .50
02309> Length (m)= 141.19 40.00
02310> Mannings n = .013 .250
02311>
02312> Max.eff.Inten.(mm/hr)= 252.44 58.67
02313> over (min) 2.50 15.00
02314> Storage Coeff. (min)= 2.67 (ii) 15.91 (ii)
02315> Unit Hyd. Tpeak (min)= 2.50 15.00
02316> Unit Hyd. peak (cms)= .41 .07
02317>
02318> PEAK FLOW (cms)= .33 .21 *TOTALS*
02319> TIME TO PEAK (hrs)= 1.33 1.54 1.333 (iii)
02320> RUNOFF VOLUME (mm)= 67.97 31.20 37.822
02321> TOTAL RAINFALL (mm)= 68.77 68.77 68.771
02322> RUNOFF COEFFICIENT = .99 .45 .550
02323>
02324> (i) CN PROCEDURE SELECTED FOR PEROUS LOSSES:
02325> CN* = 74.0 Ia = Dep. Storage (Above)
02326> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02327> THAN THE STORAGE COEFFICIENT.
02328> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02329>
02330>
02331> 001:0098-----
02332> *Catchment UNCL
02333> *Uncontrolled rear yards, flows to the Black Drain at Node 4
02334>
02335> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00
02336> | 02:UNCL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02337> | U.H. Tp(hrs)= .050
02338>
02339> Unit Hyd Qpeak (cms)= .856
02340>
02341> PEAK FLOW (cms)= .175 (i)
02342> TIME TO PEAK (hrs)= 1.333
02343> RUNOFF VOLUME (mm)= 21.535
02344> TOTAL RAINFALL (mm)= 68.771
02345> RUNOFF COEFFICIENT = .313
02346>
02347> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02348>
02349> *** WARNING: Time step is too large for value of TP.
02350> R.V. may be ok. Peak flow could be off.
02351>
02352> 001:0099-----
02353> *Catchment EXTB6
02354> *External area on the south of the site, existing agricultural
02355> *flows to the Black Drain at Node 4
02356>
02357> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
02358> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02359> | U.H. Tp(hrs)= .550
02360>
02361> Unit Hyd Qpeak (cms)= 1.092
02362>
02363> PEAK FLOW (cms)= .372 (i)
02364> TIME TO PEAK (hrs)= 2.042
02365> RUNOFF VOLUME (mm)= 16.451
02366> TOTAL RAINFALL (mm)= 68.771
02367> RUNOFF COEFFICIENT = .239
02368>
02369> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02370>
02371>
02372> 001:0100-----
02373> *Total Flow to Node 4 (Including External Areas)
02374>
02375> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02376> | (ha) (cms) (hrs) (mm) (cms)
02377> | ID1 04:Node3 53.85 .769 1.33 25.41 .000
02378> | +ID2 06:202 2.99 .389 1.33 37.82 .000
02379> | +ID3 02:UNCL 1.12 .175 1.33 21.53 .000
02380> | +ID4 03:EXT6 15.73 .372 2.04 16.45 .000
02381> | =====
02382> | SUM 08:Node4 73.69 1.368 1.33 23.94 .000
02383>
02384> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02385>
02386>
02387> 001:0101-----
02388> *Catchment UNCL
02389> *Uncontrolled rear yards, flows to ditch along Road 19
02390>
02391> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00
02392> | 02:UNCL DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02393> | U.H. Tp(hrs)= .050
02394>
02395> Unit Hyd Qpeak (cms)= .061
02396>
02397> PEAK FLOW (cms)= .018 (i)
02398> TIME TO PEAK (hrs)= 1.333
02399> RUNOFF VOLUME (mm)= 28.914
02400> TOTAL RAINFALL (mm)= 68.771
02401> RUNOFF COEFFICIENT = .420
02402>
02403> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02404>
02405> *** WARNING: Time step is too large for value of TP.
02406> R.V. may be ok. Peak flow could be off.
02407>
02408>
02409> *50-Year
02410>
02411> | CHICAGO STORM | IDF curve parameters: A= 862.090
02412> | Ptotal= 77.28 mm | B= .000
02413> | C= .693
02414> used in: INTENSITY = A / (t + B)^C
02415>
02416> Duration of storm = 4.00 hrs
02417> Storm time step = 5.00 min
02418> Time to peak ratio = .33
02419>
02420>
02421> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02422> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02423> .08 6.249 | 1.08 19.799 | 2.08 14.121 | 3.08 7.903
02424> .17 6.559 | 1.37 27.009 | 2.17 13.142 | 3.17 7.654
02425> .25 6.909 | 1.25 49.956 | 2.25 12.313 | 3.25 7.423
02426> .33 7.309 | 1.33 282.592 | 2.33 11.602 | 3.33 7.209
02427> .42 7.771 | 1.42 61.210 | 2.42 10.984 | 3.42 7.009
02428> .50 8.311 | 1.50 38.752 | 2.50 10.440 | 3.50 6.823
02429> .58 8.953 | 1.58 29.622 | 2.58 9.958 | 3.58 6.648
02430> .67 9.732 | 1.67 24.441 | 2.67 9.526 | 3.67 6.483
02431> .75 10.701 | 1.75 21.035 | 2.75 9.138 | 3.75 6.328

```

02431> .83 11.946 | 1.83 18.598 | 2.83 8.786 | 3.83 6.182
02432> .92 13.618 | 1.92 16.753 | 2.92 8.466 | 3.92 6.044
02433> 1.00 16.011 | 2.00 15.300 | 3.00 8.173 | 4.00 5.913
02434>
02435>-----
02436> 001:0103-----
02437> *Catchment EXT1
02438> *External area on the northwest of Wellington Road 19.
02439> *This catchment drains to the golf course via a culvert which will be captured
02440> *and enter a bypass pipe, entering the Black Drain at Node 2
02441>-----
02442> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
02443> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02444> | U.H. Tp(hrs)= .440
02445>-----
02446> Unit Hyd Qpeak (cms) = .688
02447>-----
02448> PEAK FLOW (cms) = .325 (i)
02449> TIME TO PEAK (hrs) = 1.875
02450> RUNOFF VOLUME (mm) = 24.113
02451> TOTAL RAINFALL (mm) = 77.284
02452> RUNOFF COEFFICIENT = .312
02453>-----
02454> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02455>-----
02456> 001:0104-----
02457> *Catchment EXT2
02458> *External area - Wellington Road 19 and Roadside ditch on south side of Wellington
02459> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
02460>-----
02461> | DESIGN STANDHYD | Area (ha)= .34
02462> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
02463>-----
02464> IMPERVIOUS PERVIOUS (i)
02465> Surface Area (ha)= .17 .17
02466> Dep. Storage (mm)= .80 1.50
02467> Average Slope (%) = .50 .50
02468> Length (m) = 47.61 40.00
02469> Mannings n = .013 .250
02470>-----
02471> Max.eff.Inten.(mm/hr)= 282.59 55.49
02472> over (min) = 2.50 15.00
02473> Storage Coeff. (min)= 1.33 (ii) 14.87 (ii)
02474> Unit Hyd. Tpeak (min)= 2.50 15.00
02475> Unit Hyd. peak (cms) = .58 .08
02476>-----
02477> PEAK FLOW (cms) = .09 .02 *TOTALS*
02478> TIME TO PEAK (hrs) = 1.33 1.54 .099 (iii)
02479> RUNOFF VOLUME (mm) = 76.48 26.72 44.633
02480> TOTAL RAINFALL (mm) = 77.28 77.28 77.284
02481> RUNOFF COEFFICIENT = .99 .35 .578
02482>-----
02483> *** WARNING: Storage Coefficient is smaller than DT!
02484> Use a smaller DT or a larger area.
02485>-----
02486> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02487> CN* = 58.0 Ia = Dep. Storage (Above)
02488> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02489> THAN THE STORAGE COEFFICIENT.
02490> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02491>-----
02492> 001:0105-----
02493> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
02494>-----
02495> | ADD HYD (Bypass1) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02496> | (ha) (cms) (hrs) (mm) (cms)
02497> | 01:EXT1 7.93 .325 1.88 24.11 .000
02498> +ID2 02:EXT2 .34 .099 1.33 44.63 .000
02499>-----
02500> SUM 08:Bypass1 8.27 .341 1.83 24.96 .000
02501>-----
02502> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02503>-----
02504> 001:0106-----
02505> *Catchment 201
02506> *Drainage Area to SWMFI
02507>-----
02508> | DESIGN STANDHYD | Area (ha)= 26.92
02509> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00
02510>-----
02511> IMPERVIOUS PERVIOUS (i)
02512> Surface Area (ha)= 9.15 17.77
02513> Dep. Storage (mm)= .80 1.50
02514> Average Slope (%) = .50 .50
02515> Length (m) = 423.64 40.00
02516> Mannings n = .013 .250
02517>-----
02518> Max.eff.Inten.(mm/hr)= 282.59 42.55
02519> over (min) = 5.00 20.00
02520> Storage Coeff. (min)= 4.94 (ii) 19.99 (ii)
02521> Unit Hyd. Tpeak (min)= 5.00 20.00
02522> Unit Hyd. peak (cms) = .23 .06
02523>-----
02524> PEAK FLOW (cms) = 2.97 1.26 *TOTALS*
02525> TIME TO PEAK (hrs) = 1.38 1.63 3.368 (iii)
02526> RUNOFF VOLUME (mm) = 76.48 27.58 38.826
02527> TOTAL RAINFALL (mm) = 77.28 77.28 77.284
02528> RUNOFF COEFFICIENT = .99 .36 .502
02529>-----
02530> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02531> CN* = 62.0 Ia = Dep. Storage (Above)
02532> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02533> THAN THE STORAGE COEFFICIENT.
02534> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02535>-----
02536> 001:0107-----
02537> * Pond 1
02538>-----
02539> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
02540> | INP:01 (201) |
02541> | OUT:09 (Pond1) |
02542>-----
02543> OUTFLOW STORAGE | OUTFLOW STORAGE
02544> (cms) (ha.m.) | (cms) (ha.m.)
02545> .000 .0000E+00 | .320 .9500E+00
02546> .057 .3310E+00 | .000 .0000E+00
02547>-----
02548> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02549> (ha) (cms) (hrs) (mm)
02550> INFLOW >01: (201) 26.92 3.368 1.375 38.826
02551> OUTFLOW<09: (Pond1) 26.92 .262 4.083 38.825
02552>-----
02553> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.773
02554> TIME SHIFT OF PEAK FLOW (min) = 162.50
02555> MAXIMUM STORAGE USED (ha.m.) = .8132E+00
02556>-----
02557> 001:0108-----
02558> *Catchment UNC3
02559> *Existing wetland/open space area to remain
02560> *flows to the Black Drain at Node 3
02561>-----
02562> | DESIGN NASHYD | Area (ha)= 5.82 Curve Number (CN)=62.00

02566> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02567> | U.H. Tp(hrs)= .830
02568>-----
02569> Unit Hyd Qpeak (cms) = .268
02570>-----
02571> PEAK FLOW (cms) = .161 (i)
02572> TIME TO PEAK (hrs) = 2.417
02573> RUNOFF VOLUME (mm) = 24.813
02574> TOTAL RAINFALL (mm) = 77.284
02575> RUNOFF COEFFICIENT = .321
02576>-----
02577> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02578>-----
02579> 001:0109-----
02580> *Catchment EXT3
02581> *External area - Wellington Road 19 and 3rd line and
02582> *Roadside ditch on south side of Wellington Road 19 and west side of 3rd Line.
02583> *This catchment is collected in a bypass and is directed to the Black Drain by N
02584>-----
02585> | DESIGN STANDHYD | Area (ha)= 1.23
02586> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
02587>-----
02588> IMPERVIOUS PERVIOUS (i)
02589> Surface Area (ha)= .73 .50
02590> Dep. Storage (mm)= .80 1.50
02591> Average Slope (%) = .50 .50
02592> Length (m) = 90.55 40.00
02593> Mannings n = .013 .250
02594>-----
02595> Max.eff.Inten.(mm/hr)= 282.59 56.56
02596> over (min) = 2.50 15.00
02597> Storage Coeff. (min)= 1.96 (ii) 15.39 (ii)
02598> Unit Hyd. Tpeak (min)= 2.50 15.00
02599> Unit Hyd. peak (cms) = .49 .07
02600>-----
02601> *TOTALS*
02602> PEAK FLOW (cms) = .40 .05 .411 (iii)
02603> TIME TO PEAK (hrs) = 1.33 1.54 1.333
02604> RUNOFF VOLUME (mm) = 76.48 26.11 48.274
02605> TOTAL RAINFALL (mm) = 77.28 77.28 77.284
02606> RUNOFF COEFFICIENT = .99 .34 .625
02607>-----
02608> *** WARNING: Storage Coefficient is smaller than DT!
02609> Use a smaller DT or a larger area.
02610>-----
02611> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02612> CN* = 56.0 Ia = Dep. Storage (Above)
02613> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02614> THAN THE STORAGE COEFFICIENT.
02615> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02616>-----
02617> 001:0110-----
02618> *Catchment UNC4
02619> *External area - 3rd Line and Roadside ditch on west side of 3rd Line
02620> *This catchment is collected in a bypass and directed to the Black Drain by Node
02621>-----
02622> | DESIGN STANDHYD | Area (ha)= .18
02623> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
02624>-----
02625> IMPERVIOUS PERVIOUS (i)
02626> Surface Area (ha)= .09 .09
02627> Dep. Storage (mm)= .80 1.50
02628> Average Slope (%) = .50 .50
02629> Length (m) = 34.64 40.00
02630> Mannings n = .013 .250
02631>-----
02632> Max.eff.Inten.(mm/hr)= 282.59 16.05
02633> over (min) = 2.50 22.50
02634> Storage Coeff. (min)= 1.10 (ii) 23.33 (ii)
02635> Unit Hyd. Tpeak (min)= 2.50 22.50
02636> Unit Hyd. peak (cms) = .61 .05
02637>-----
02638> *TOTALS*
02639> PEAK FLOW (cms) = .05 .00 .047 (iii)
02640> TIME TO PEAK (hrs) = 1.33 1.67 1.333
02641> RUNOFF VOLUME (mm) = 76.48 10.81 32.481
02642> TOTAL RAINFALL (mm) = 77.28 77.28 77.284
02643> RUNOFF COEFFICIENT = .99 .14 .420
02644>-----
02645> *** WARNING: Storage Coefficient is smaller than DT!
02646> Use a smaller DT or a larger area.
02647>-----
02648> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02649> CN* = 30.0 Ia = Dep. Storage (Above)
02650> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02651> THAN THE STORAGE COEFFICIENT.
02652> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02653>-----
02654> 001:0111-----
02655> *Catchment UNC1
02656> *This catchment drains east towards 3rd Line and is collected in a bypass that
02657> *is directed to the Black Drain by Node 3
02658>-----
02659> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
02660> | 04:UNC1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02661> | U.H. Tp(hrs)= .040
02662>-----
02663> Unit Hyd Qpeak (cms) = .936
02664>-----
02665> PEAK FLOW (cms) = .197 (i)
02666> TIME TO PEAK (hrs) = 1.333
02667> RUNOFF VOLUME (mm) = 24.113
02668> TOTAL RAINFALL (mm) = 77.284
02669> RUNOFF COEFFICIENT = .312
02670>-----
02671> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02672>-----
02673> *** WARNING: Time step is too large for value of TP.
02674> R.V. may be ok. Peak flow could be off.
02675>-----
02676> 001:0112-----
02677> *Catchment UNC5
02678> *This catchment drains east towards 3rd Line and is collected in a bypass that
02679> *is directed to the Black Drain by Node 3
02680>-----
02681> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
02682> | 05:UNC5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02683> | U.H. Tp(hrs)= .070
02684>-----
02685> Unit Hyd Qpeak (cms) = .071
02686>-----
02687> PEAK FLOW (cms) = .008 (i)
02688> TIME TO PEAK (hrs) = 1.375
02689> RUNOFF VOLUME (mm) = 12.140
02690> TOTAL RAINFALL (mm) = 77.284
02691> RUNOFF COEFFICIENT = .157
02692>-----
02693> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02694>-----
02695> *** WARNING: Time step is too large for value of TP.
02696> R.V. may be ok. Peak flow could be off.
02697>-----
02698> 001:0113-----
02699> *Total Flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
02700> | ADD HYD (Bypass2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF

```

02701> -----
02702> ID1 01:EXT3 (ha) (cms) (hrs) (mm) (cms)
02703> +ID2 02:EXT4 .18 .047 1.33 32.48 .000
02704> +ID3 04:UNC1 .98 .197 1.33 24.11 .000
02705> +ID4 05:UNC5 .13 .008 1.38 12.14 .000
02706> -----
02707> SUM 07:Bypass2 2.52 .662 1.33 35.89 .000
02708> -----
02709> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02710> -----
02711> -----
02712> 001:0114-----
02713> *Catchment UNC2
02714> *Rear lots on South side of property, collected in swale
02715> *flows to the Black Drain at Node 3
02716> -----
02717> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
02718> | 01:UNC2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02719> | U.H. Tp(hrs)= .210
02720> -----
02721> Unit Hyd Qpeak (cms)= .329
02722> -----
02723> PEAK FLOW (cms)= .143 (i)
02724> TIME TO PEAK (hrs)= 1.542
02725> RUNOFF VOLUME (mm)= 27.794
02726> TOTAL RAINFALL (mm)= 77.284
02727> RUNOFF COEFFICIENT = .360
02728> -----
02729> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02730> -----
02731> -----
02732> 001:0115-----
02733> *Catchment EXT5
02734> *External area on the south of the site, existing agricultural
02735> *flows to the Black Drain at Node 3
02736> -----
02737> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
02738> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02739> | U.H. Tp(hrs)= .440
02740> -----
02741> Unit Hyd Qpeak (cms)= .739
02742> -----
02743> PEAK FLOW (cms)= .144 (i)
02744> TIME TO PEAK (hrs)= 1.875
02745> RUNOFF VOLUME (mm)= 10.490
02746> TOTAL RAINFALL (mm)= 77.284
02747> RUNOFF COEFFICIENT = .136
02748> -----
02749> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02750> -----
02751> -----
02752> 001:0116-----
02753> *Total Flow to Node 3 (Including External Areas)
02754> -----
02755> | ADD HYD (Node3 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02756> (ha) (cms) (hrs) (mm) (cms)
02757> | ID1 08:Bypass1 8.27 .341 1.83 24.96 .000
02758> +ID2 09:Fondl 26.92 .262 4.08 38.93 .000
02759> +ID3 03:UNC3 5.82 .161 2.42 24.81 .000
02760> +ID4 07:Bypass2 2.52 .662 1.33 35.89 .000
02761> +ID5 01:UNC2 1.81 .143 1.54 27.79 .000
02762> +ID6 02:EXT5 8.51 .144 1.88 10.49 .000
02763> -----
02764> SUM 04:Node3 53.85 .905 1.92 30.19 .000
02765> -----
02766> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02767> -----
02768> -----
02769> 001:0117-----
02770> *Catchment 202
02771> *This catchment is the area draining Node 4 Outlet
02772> -----
02773> | DESIGN STANDARD | Area (ha)= 2.99
02774> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00
02775> -----
02776> IMPERVIOUS PERVIOUS (i)
02777> Surface Area (ha)= .84 2.15
02778> Dep. Storage (mm)= .80 1.50
02779> Average Slope (%)= .50 .50
02780> Length (m)= 141.19 40.00
02781> Mannings n = .013 .250
02782> -----
02783> Max.eff.Inten.(mm/hr)= 282.59 70.72
02784> over (min) 2.50 15.00
02785> Storage Coeff. (min)= 2.55 (ii) 14.84 (ii)
02786> Unit Hyd. Tpeak (min)= 2.50 15.00
02787> Unit Hyd. peak (cms)= .42 .08
02788> -----
02789> PEAK FLOW (cms)= .37 .26 *TOTALS*
02790> TIME TO PEAK (hrs)= 1.33 1.54 .449 (iii)
02791> RUNOFF VOLUME (mm)= 76.48 37.39 44.430
02792> TOTAL RAINFALL (mm)= 77.28 77.28 77.284
02793> RUNOFF COEFFICIENT = .99 .48 .575
02794> -----
02795> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02796> CN* = 74.0 Ia = Dep. Storage (Above)
02797> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02798> THAN THE STORAGE COEFFICIENT.
02799> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02800> -----
02801> -----
02802> 001:0118-----
02803> *Catchment UNC4
02804> *Uncontrolled rear yards, flows to the Black Drain at Node 4
02805> -----
02806> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00
02807> | 02:UNC4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02808> | U.H. Tp(hrs)= .050
02809> -----
02810> Unit Hyd Qpeak (cms)= .856
02811> -----
02812> PEAK FLOW (cms)= .215 (i)
02813> TIME TO PEAK (hrs)= 1.333
02814> RUNOFF VOLUME (mm)= 26.265
02815> TOTAL RAINFALL (mm)= 77.284
02816> RUNOFF COEFFICIENT = .340
02817> -----
02818> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02819> -----
02820> *** WARNING: Time step is too large for value of TP.
02821> R.V. may be ok. Peak flow could be off.
02822> -----
02823> 001:0119-----
02824> *Catchment EXT6
02825> *External area on the south of the site, existing agricultural
02826> *flows to the Black Drain at Node 4
02827> -----
02828> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
02829> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02830> | U.H. Tp(hrs)= .550
02831> -----
02832> Unit Hyd Qpeak (cms)= 1.092
02833> -----
02834> PEAK FLOW (cms)= .461 (i)
02835> TIME TO PEAK (hrs)= 2.042

```

```

02836> RUNOFF VOLUME (mm)= 20.251
02837> TOTAL RAINFALL (mm)= 77.284
02838> RUNOFF COEFFICIENT = .262
02839> -----
02840> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02841> -----
02842> -----
02843> -----
02844> *Total Flow to to Node 4 (Including External Areas)
02845> -----
02846> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02847> (ha) (cms) (hrs) (mm) (cms)
02848> | ID1 04:Node3 53.85 .905 1.92 30.19 .000
02849> +ID2 06:202 2.99 .449 1.33 44.43 .000
02850> +ID3 02:UNC4 1.12 .215 1.33 26.27 .000
02851> +ID4 03:EXT6 15.73 .461 2.04 20.25 .000
02852> -----
02853> SUM 08:Node4 73.69 1.612 1.33 28.59 .000
02854> -----
02855> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02856> -----
02857> -----
02858> -----
02859> *Catchment UNC6
02860> *Uncontrolled rear yards, flows to ditch along Road 19
02861> -----
02862> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00
02863> | 02:UNC6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02864> | U.H. Tp(hrs)= .050
02865> -----
02866> Unit Hyd Qpeak (cms)= .061
02867> -----
02868> PEAK FLOW (cms)= .021 (i)
02869> TIME TO PEAK (hrs)= 1.333
02870> RUNOFF VOLUME (mm)= 34.801
02871> TOTAL RAINFALL (mm)= 77.284
02872> RUNOFF COEFFICIENT = .450
02873> -----
02874> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02875> -----
02876> *** WARNING: Time step is too large for value of TP.
02877> R.V. may be ok. Peak flow could be off.
02878> -----
02879> 001:0122-----
02880> *100-Year
02881> -----
02882> | CHICAGO STORM | IDF curve parameters: A= 955.980
02883> | Ftotal= 85.70 mm | B= .000
02884> | C= .693
02885> used in: INTENSITY = A / (t + B)^C
02886> -----
02887> Duration of storm = 4.00 hrs
02888> Storm time step = 5.00 min
02889> Time to peak ratio = .33
02890> -----
02891> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02892> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02893> .08 6.929 | 1.08 21.955 | 2.08 15.659 | 3.08 8.764
02894> .17 7.273 | 1.17 29.950 | 2.17 14.573 | 3.17 8.488
02895> .25 7.661 | 1.25 55.397 | 2.25 13.654 | 3.25 8.232
02896> .33 8.105 | 1.33 313.369 | 2.33 12.866 | 3.33 7.994
02897> .42 8.617 | 1.42 67.877 | 2.42 12.180 | 3.42 7.773
02898> .50 9.216 | 1.50 42.973 | 2.50 11.577 | 3.50 7.566
02899> .58 9.928 | 1.58 32.848 | 2.58 11.042 | 3.58 7.372
02900> .67 10.792 | 1.67 27.103 | 2.67 10.564 | 3.67 7.189
02901> .75 11.867 | 1.75 23.326 | 2.75 10.133 | 3.75 7.017
02902> .83 13.247 | 1.83 20.623 | 2.83 9.743 | 3.83 6.855
02903> .92 15.101 | 1.92 18.577 | 2.92 9.388 | 3.92 6.702
02904> 1.00 17.755 | 2.00 16.966 | 3.00 9.063 | 4.00 6.557
02905> -----
02906> -----
02907> 001:0123-----
02908> *Catchment EXT1
02909> *External area on the northwest of Wellington Road 19.
02910> *This catchment drains to the golf course via a culvert which will be captured
02911> *and enter a bypass pipe, entering the Black Drain at Node 2
02912> -----
02913> | DESIGN NASHYD | Area (ha)= 7.93 Curve Number (CN)=61.00
02914> | 01:EXT1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
02915> | U.H. Tp(hrs)= .440
02916> -----
02917> Unit Hyd Qpeak (cms)= .688
02918> -----
02919> PEAK FLOW (cms)= .390 (i)
02920> TIME TO PEAK (hrs)= 1.875
02921> RUNOFF VOLUME (mm)= 28.751
02922> TOTAL RAINFALL (mm)= 85.701
02923> RUNOFF COEFFICIENT = .335
02924> -----
02925> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02926> -----
02927> -----
02928> -----
02929> *Catchment EXT2
02930> *External area - Wellington Road 19 and Roadside ditch on south side of Wellingt
02931> *This will be captured via the Black Drain Bypass and enter the drain at Node 2
02932> -----
02933> | DESIGN STANDARD | Area (ha)= .34
02934> | 02:EXT2 DT= 2.00 | Total Imp(%)= 51.00 Dir. Conn.(%)= 36.00
02935> -----
02936> IMPERVIOUS PERVIOUS (i)
02937> Surface Area (ha)= .17 .17
02938> Dep. Storage (mm)= .80 1.50
02939> Average Slope (%)= .50 .50
02940> Length (m)= 47.61 40.00
02941> Mannings n = .013 .250
02942> -----
02943> Max.eff.Inten.(mm/hr)= 313.37 74.37
02944> over (min) 2.50 12.50
02945> Storage Coeff. (min)= 1.28 (ii) 13.32 (ii)
02946> Unit Hyd. Tpeak (min)= 2.50 12.50
02947> Unit Hyd. peak (cms)= .58 .09
02948> -----
02949> PEAK FLOW (cms)= .10 .02 *TOTALS*
02950> TIME TO PEAK (hrs)= 1.33 1.50 1.333
02951> RUNOFF VOLUME (mm)= 84.90 31.72 50.865
02952> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
02953> RUNOFF COEFFICIENT = .99 .37 .594
02954> *** WARNING: Storage Coefficient is smaller than DT!
02955> Use a smaller DT or a larger area.
02956> -----
02957> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02958> CN* = 58.0 Ia = Dep. Storage (Above)
02959> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02960> THAN THE STORAGE COEFFICIENT.
02961> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02962> -----
02963> -----
02964> 001:0125-----
02965> *Total Flow to Node 2 (EXT1 & EXT2) - Black Drain Bypass Pipe
02966> -----
02967> | ADD HYD (Bypass1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02968> (ha) (cms) (hrs) (mm) (cms)
02969> | ID1 01:EXT1 7.93 .390 1.88 28.75 .000
02970> +ID2 02:EXT2 7.34 .112 1.33 50.87 .000

```



```

02971>
02972>
02973>
02974> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02975>
02976>
02977> 001:0126-----
02978> *Catchment 201
02979> *Drainage Area to SWMP1
02980>
02981> | DESIGN STANDHYD | Area (ha)= 26.92
02982> | 01:201 DT= 2.00 | Total Imp(%)= 34.00 Dir. Conn.(%)= 23.00
02983>
02984> -----
02985> IMPERVIOUS PERVIOUS (i)
02986> Surface Area (ha)= 9.15 17.77
02987> Dep. Storage (mm)= .80 1.50
02988> Average Slope (%)= .50 .50
02989> Length (m)= 423.64 40.00
02990> Mannings n = .013 .250
02991>
02992> Max.eff.Inten.(mm/hr)= 313.37 55.31
02993> over (min)= 5.00 17.50
02994> Storage Coeff. (min)= 4.74 (ii) 18.29 (ii)
02995> Unit Hyd. Tpeak (min)= 5.00 17.50
02996> Unit Hyd. peak (cms)= .23 .06
02997>
02998> PEAK FLOW (cms)= 3.34 1.62 3.935 (iii)
02999> TIME TO PEAK (hrs)= 1.38 1.58 1.375
03000> RUNOFF VOLUME (mm)= 84.90 32.71 44.713
03001> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
03002> RUNOFF COEFFICIENT = .99 .38 .522
03003>
03004> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
03005> CN* = 62.0 Ia = Dep. Storage (Above)
03006> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03007> THAN THE STORAGE COEFFICIENT.
03008> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03009>
03010> 001:0127-----
03011> * Pond 1
03012>
03013> | ROUTE RESERVOIR | Requested routing time step = 2.0 min.
03014> | IN:01:(201 ) |
03015> | OUT<09:(Pond1 ) | ===== OUTFLOW STORAGE TABLE =====
03016> OUTFLOW STORAGE | OUTFLOW STORAGE
03017> (cms) (ha.m.) | (cms) (ha.m.)
03018> 0.00 .0000E+00 | .320 .9500E+00
03019> .057 .3310E+00 | .000 .0000E+00
03020>
03021> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03022> (ha) (cms) (hrs) (mm)
03023> INFLOW<01: (201 ) 26.92 3.935 1.375 44.713
03024> OUTFLOW<09: (Pond1 ) 26.92 .311 4.083 44.713
03025>
03026> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.898
03027> TIME SHIFT OF PEAK FLOW (min)= 162.50
03028> MAXIMUM STORAGE USED (ha.m.)=.9283E+00
03029>
03030>
03031> 001:0128-----
03032> *Catchment UNC3
03033> *Existing wetland/open space area to remain
03034> *flows to the Black Drain at Node 3
03035>
03036> | DESIGN NASHYD | Area (ha)= 5.82 Curve Number (CN)=62.00
03037> | 03:UNC3 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
03038> U.H. Tp (hrs)= .830
03039>
03040> Unit Hyd Qpeak (cms)= .268
03041>
03042> PEAK FLOW (cms)= .193 (i)
03043> TIME TO PEAK (hrs)= 2.417
03044> RUNOFF VOLUME (mm)= 29.556
03045> TOTAL RAINFALL (mm)= 85.701
03046> RUNOFF COEFFICIENT = .345
03047>
03048> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03049>
03050>
03051> 001:0129-----
03052> *Catchment EXT3
03053> *External area = Wellington Road 19 and 3rd line and
03054> *Roadside ditch on south side of Wellington Road and west side of 3rd Line.
03055> *This catchment is collected in a bypass and is directed to the Black Drain by N
03056>
03057> | DESIGN STANDHYD | Area (ha)= 1.23
03058> | 01:EXT3 DT= 2.00 | Total Imp(%)= 59.00 Dir. Conn.(%)= 44.00
03059>
03060> -----
03061> IMPERVIOUS PERVIOUS (i)
03062> Surface Area (ha)= .73 .50
03063> Dep. Storage (mm)= .80 1.50
03064> Average Slope (%)= .50 .50
03065> Length (m)= 90.55 40.00
03066> Mannings n = .013 .250
03067>
03068> Max.eff.Inten.(mm/hr)= 313.37 67.71
03069> over (min)= 2.50 15.00
03070> Storage Coeff. (min)= 1.88 (ii) 14.38 (ii)
03071> Unit Hyd. Tpeak (min)= 2.50 15.00
03072> Unit Hyd. peak (cms)= .50 .08
03073>
03074> PEAK FLOW (cms)= .44 .06
03075> TIME TO PEAK (hrs)= 1.33 1.54
03076> RUNOFF VOLUME (mm)= 84.90 31.02 54.729
03077> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
03078> RUNOFF COEFFICIENT = .99 .36 .639
03079>
03080> *** WARNING: Storage Coefficient is smaller than DT!
03081> Use a smaller DT or a larger area.
03082>
03083> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
03084> CN* = 56.0 Ia = Dep. Storage (Above)
03085> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03086> THAN THE STORAGE COEFFICIENT.
03087> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03088>
03089> 001:0130-----
03090> *Catchment EXT4
03091> *External area = 3rd Line and Roadside ditch on west side of 3rd Line
03092> *This catchment is collected in a bypass and directed to the Black Drain by Node
03093>
03094> | DESIGN STANDHYD | Area (ha)= .18
03095> | 02:EXT4 DT= 2.00 | Total Imp(%)= 48.00 Dir. Conn.(%)= 33.00
03096>
03097> -----
03098> IMPERVIOUS PERVIOUS (i)
03099> Surface Area (ha)= .09 .09
03100> Dep. Storage (mm)= .80 1.50
03101> Average Slope (%)= .50 .50
03102> Length (m)= 34.64 40.00
03103> Mannings n = .013 .250
03104>
03105> Max.eff.Inten.(mm/hr)= 313.37 19.57
03106> over (min)= 2.50 22.50
03107> Storage Coeff. (min)= 1.05 (ii) 21.60 (ii)

```

```

03106> Unit Hyd. Tpeak (min)= 2.50 22.50
03107> Unit Hyd. peak (cms)= .62 .05
03108>
03109> PEAK FLOW (cms)= .05 .00
03110> TIME TO PEAK (hrs)= 1.33 1.67
03111> RUNOFF VOLUME (mm)= 84.90 13.12 36.810
03112> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
03113> RUNOFF COEFFICIENT = .99 .15 .430
03114>
03115> *** WARNING: Storage Coefficient is smaller than DT!
03116> Use a smaller DT or a larger area.
03117>
03118> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
03119> CN* = 30.0 Ia = Dep. Storage (Above)
03120> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03121> THAN THE STORAGE COEFFICIENT.
03122> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03123>
03124> 001:0131-----
03125> *Catchment UNC1
03126> *This catchment drains east towards 3rd Line and is collected in a bypass that
03127> *is directed to the Black Drain by Node 3
03128>
03129> | DESIGN NASHYD | Area (ha)= .98 Curve Number (CN)=61.00
03130> | 04:UNC1 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
03131> U.H. Tp (hrs)= .040
03132>
03133> Unit Hyd Qpeak (cms)= .936
03134>
03135> PEAK FLOW (cms)= .238 (i)
03136> TIME TO PEAK (hrs)= 1.333
03137> RUNOFF VOLUME (mm)= 28.751
03138> TOTAL RAINFALL (mm)= 85.701
03139> RUNOFF COEFFICIENT = .335
03140>
03141> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03142>
03143>
03144> *** WARNING: Time step is too large for value of TP.
03145> R.V. may be ok. Peak flow could be off.
03146>
03147> 001:0132-----
03148> *Catchment UNC5
03149> *This catchment drains east towards 3rd Line and is collected in a bypass that
03150> *is directed to the Black Drain by Node 3
03151>
03152> | DESIGN NASHYD | Area (ha)= .13 Curve Number (CN)=39.00
03153> | 05:UNC5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
03154> U.H. Tp (hrs)= .070
03155>
03156> Unit Hyd Qpeak (cms)= .071
03157>
03158> PEAK FLOW (cms)= .010 (i)
03159> TIME TO PEAK (hrs)= 1.233
03160> RUNOFF VOLUME (mm)= 14.725
03161> TOTAL RAINFALL (mm)= 85.701
03162> RUNOFF COEFFICIENT = .172
03163>
03164> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03165>
03166>
03167> *** WARNING: Time step is too large for value of TP.
03168> R.V. may be ok. Peak flow could be off.
03169>
03170> 001:0133-----
03171> *Total flow to bypass to Node 3 (EXT3, EXT4, UNC1, UNC5) - Black Drain Bypass Pi
03172>
03173> | ADD HYD (Bypass2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03174> (ha) (cms) (hrs) (mm) (cms)
03175> +ID1 01:EXT3 1.23 .461 1.33 54.73 .000
03176> +ID2 02:EXT4 .18 .052 1.33 36.81 .000
03177> +ID3 04:UNC1 .98 .238 1.33 28.75 .000
03178> +ID4 05:UNC5 .13 .010 1.38 14.72 .000
03179>
03180> SUM 07:Bypass2 2.52 .759 1.33 41.28 .000
03181>
03182> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03183>
03184> 001:0134-----
03185> *Catchment UNC2
03186> *Rear lots on South side of property, collected in swale
03187> *flows to the Black Drain at Node 3
03188>
03189> | DESIGN NASHYD | Area (ha)= 1.81 Curve Number (CN)=66.00
03190> | 01:UNC2 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
03191> U.H. Tp (hrs)= .210
03192>
03193> Unit Hyd Qpeak (cms)= .329
03194>
03195> PEAK FLOW (cms)= .171 (i)
03196> TIME TO PEAK (hrs)= 1.542
03197> RUNOFF VOLUME (mm)= 32.968
03198> TOTAL RAINFALL (mm)= 85.701
03199> RUNOFF COEFFICIENT = .385
03200>
03201> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03202>
03203> 001:0135-----
03204> *Catchment EXT5
03205> *External area on the south of the site, existing agricultural
03206> *flows to the Black Drain at Node 3
03207>
03208> | DESIGN NASHYD | Area (ha)= 8.51 Curve Number (CN)=35.00
03209> | 02:EXT5 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
03210> U.H. Tp (hrs)= .440
03211>
03212> Unit Hyd Qpeak (cms)= .739
03213>
03214> PEAK FLOW (cms)= .176 (i)
03215> TIME TO PEAK (hrs)= 1.875
03216> RUNOFF VOLUME (mm)= 12.753
03217> TOTAL RAINFALL (mm)= 85.701
03218> RUNOFF COEFFICIENT = .149
03219>
03220> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03221>
03222> 001:0136-----
03223> *Total flow to Node 3 (Including External Areas)
03224>
03225> | ADD HYD (Node3 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03226> (ha) (cms) (hrs) (mm) (cms)
03227> +ID1 08:Bypass1 8.27 .408 1.83 29.66 .000
03228> +ID2 09:Pond1 26.92 .311 4.08 44.71 .000
03229> +ID3 03:UNC3 5.82 .193 2.42 29.56 .000
03230> +ID4 07:Bypass2 2.52 .759 1.33 41.28 .000
03231> +ID5 01:UNC2 1.81 .171 1.54 32.97 .000
03232> +ID6 02:EXT5 8.51 .176 1.88 12.75 .000
03233>
03234> SUM 04:Node3 53.85 1.096 1.92 35.16 .000
03235>
03236> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03237>
03238>
03239>
03240> 001:0137-----

```

```

03241> *Catchment 202
03242> *This catchment is the area draining Node 4 Outlet
03243> -----
03244> | DESIGN STANDHYD | Area (ha)= 2.99
03245> | 06:202 DT= 2.00 | Total Imp(%)= 28.00 Dir. Conn.(%)= 18.00
03246> -----
03247>
03248> Surface Area (ha)= .84 IMPERVIOUS PERVIOUS (i)
03249> Dep. Storage (mm)= .80 2.15 1.50
03250> Average Slope (%)= .50 .50
03251> Length (m)= 141.19 40.00
03252> Mannings n = .013 .250
03253>
03254> Max. eff. Inten. (mm/hr)= 313.37 93.75
03255> over (min) 2.50 12.50
03256> Storage Coeff. (min)= 2.45 (ii) 13.43 (iii)
03257> Unit Hyd. Tpeak (min)= 2.50 12.50
03258> Unit Hyd. peak (cms)= .43 .09
03259>
03260> PEAK FLOW (cms)= .42 .33 .535 (iii)
03261> TIME TO PEAK (hrs)= 1.33 1.50 1.333
03262> RUNOFF VOLUME (mm)= 84.90 43.75 51.160
03263> TOTAL RAINFALL (mm)= 85.70 85.70 85.701
03264> RUNOFF COEFFICIENT = .99 .51 .597
03265> *** WARNING: Storage Coefficient is smaller than DT!
03266> Use a smaller DT or a larger area.
03267>
03268> (i) CN PROCEDURE SELECTED FOR PEROUS LOSSES:
03269> CN* = 74.0 Ia = Dep. Storage (Above)
03270> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03271> THAN THE STORAGE COEFFICIENT.
03272> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03273> -----
03274>
03275> 001:0138-----
03276> *Catchment UNCL4
03277> *Uncontrolled rear yards, flows to the Black Drain at Node 4
03278> -----
03279> | DESIGN NASHYD | Area (ha)= 1.12 Curve Number (CN)=64.00
03280> | 02:UNCL4 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03281> | U.H. Tp(hrs)= .050
03282>
03283> Unit Hyd Qpeak (cms)= .856
03284>
03285> PEAK FLOW (cms)= .259 (i)
03286> TIME TO PEAK (hrs)= 1.333
03287> RUNOFF VOLUME (mm)= 31.222
03288> TOTAL RAINFALL (mm)= 85.701
03289> RUNOFF COEFFICIENT = .364
03290>
03291> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03292>
03293> *** WARNING: Time step is too large for value of TP.
03294> R.V. may be ok. Peak flow could be off.
03295> -----
03296> 001:0139-----
03297> *Catchment EXT6
03298> *External area on the south of the site, existing agricultural
03299> *flows to the Black Drain at Node 4
03300> -----
03301> | DESIGN NASHYD | Area (ha)= 15.73 Curve Number (CN)=55.00
03302> | 03:EXT6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03303> | U.H. Tp(hrs)= .550
03304>
03305> Unit Hyd Qpeak (cms)= 1.092
03306>
03307> PEAK FLOW (cms)= .555 (i)
03308> TIME TO PEAK (hrs)= 2.042
03309> RUNOFF VOLUME (mm)= 24.278
03310> TOTAL RAINFALL (mm)= 85.701
03311> RUNOFF COEFFICIENT = .283
03312>
03313> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03314>
03315> -----
03316> 001:0140-----
03317> *Total Flow to Node 4 (Including External Areas)
03318> -----
03319> | ADD HYD (Node4 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03320> | (ha) (cms) (hrs) (mm) (cms)
03321> | ID1 04:Node3 53.85 1.096 1.92 35.16 .000
03322> | +ID2 06:202 2.99 .535 1.33 51.16 .000
03323> | +ID3 02:UNCL4 1.12 .259 1.33 31.22 .000
03324> | +ID4 03:EXT6 15.73 .555 2.04 24.28 .000
03325> | =====
03326> | SUM 08:Node4 73.69 1.893 1.33 33.42 .000
03327>
03328> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03329>
03330> -----
03331> 001:0141-----
03332> *Catchment UNCL6
03333> *Uncontrolled rear yards, flows to ditch along Road 19
03334> -----
03335> | DESIGN NASHYD | Area (ha)= .08 Curve Number (CN)=74.00
03336> | 02:UNCL6 DT= 2.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03337> | U.H. Tp(hrs)= .050
03338>
03339> Unit Hyd Qpeak (cms)= .061
03340>
03341> PEAK FLOW (cms)= .025 (i)
03342> TIME TO PEAK (hrs)= 1.333
03343> RUNOFF VOLUME (mm)= 40.876
03344> TOTAL RAINFALL (mm)= 85.701
03345> RUNOFF COEFFICIENT = .477
03346>
03347> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03348>
03349> *** WARNING: Time step is too large for value of TP.
03350> R.V. may be ok. Peak flow could be off.
03351> -----
03352> 001:0142-----
03353> FINISH
03354> -----
03355> *****
03356> WARNINGS / ERRORS / NOTES
03357> -----
03358> 001:0018 DESIGN NASHYD
03359> *** WARNING: Time step is too large for value of TP.
03360> R.V. may be ok. Peak flow could be off.
03361> 001:0018 DESIGN NASHYD
03362> *** WARNING: Time step is too large for value of TP.
03363> R.V. may be ok. Peak flow could be off.
03364> 001:0021 DESIGN NASHYD
03365> *** WARNING: Time step is too large for value of TP.
03366> R.V. may be ok. Peak flow could be off.
03367> 001:0024 DESIGN STANDHYD
03368> *** WARNING: Storage Coefficient is smaller than DT!
03369> Use a smaller DT or a larger area.
03370> 001:0030 DESIGN STANDHYD
03371> *** WARNING: Storage Coefficient is smaller than DT!
03372> Use a smaller DT or a larger area.
03373> 001:0031 DESIGN NASHYD
03374> *** WARNING: Time step is too large for value of TP.
03375> R.V. may be ok. Peak flow could be off.

```

```

03376> 001:0032 DESIGN NASHYD
03377> *** WARNING: Time step is too large for value of TP.
03378> R.V. may be ok. Peak flow could be off.
03379> 001:0038 DESIGN NASHYD
03380> *** WARNING: Time step is too large for value of TP.
03381> R.V. may be ok. Peak flow could be off.
03382> 001:0041 DESIGN NASHYD
03383> *** WARNING: Time step is too large for value of TP.
03384> R.V. may be ok. Peak flow could be off.
03385> 001:0044 DESIGN STANDHYD
03386> *** WARNING: Storage Coefficient is smaller than DT!
03387> Use a smaller DT or a larger area.
03388> 001:0049 DESIGN STANDHYD
03389> *** WARNING: Storage Coefficient is smaller than DT!
03390> Use a smaller DT or a larger area.
03391> 001:0050 DESIGN STANDHYD
03392> *** WARNING: Storage Coefficient is smaller than DT!
03393> Use a smaller DT or a larger area.
03394> 001:0051 DESIGN NASHYD
03395> *** WARNING: Time step is too large for value of TP.
03396> R.V. may be ok. Peak flow could be off.
03397> 001:0052 DESIGN NASHYD
03398> *** WARNING: Time step is too large for value of TP.
03399> R.V. may be ok. Peak flow could be off.
03400> 001:0058 DESIGN NASHYD
03401> *** WARNING: Time step is too large for value of TP.
03402> R.V. may be ok. Peak flow could be off.
03403> 001:0061 DESIGN STANDHYD
03404> *** WARNING: Time step is too large for value of TP.
03405> R.V. may be ok. Peak flow could be off.
03406> 001:0064 DESIGN STANDHYD
03407> *** WARNING: Storage Coefficient is smaller than DT!
03408> Use a smaller DT or a larger area.
03409> 001:0069 DESIGN STANDHYD
03410> *** WARNING: Storage Coefficient is smaller than DT!
03411> Use a smaller DT or a larger area.
03412> 001:0070 DESIGN STANDHYD
03413> *** WARNING: Storage Coefficient is smaller than DT!
03414> Use a smaller DT or a larger area.
03415> 001:0071 DESIGN NASHYD
03416> *** WARNING: Time step is too large for value of TP.
03417> R.V. may be ok. Peak flow could be off.
03418> 001:0072 DESIGN STANDHYD
03419> *** WARNING: Time step is too large for value of TP.
03420> R.V. may be ok. Peak flow could be off.
03421> 001:0078 DESIGN NASHYD
03422> *** WARNING: Time step is too large for value of TP.
03423> R.V. may be ok. Peak flow could be off.
03424> 001:0081 DESIGN NASHYD
03425> *** WARNING: Time step is too large for value of TP.
03426> R.V. may be ok. Peak flow could be off.
03427> 001:0084 DESIGN STANDHYD
03428> *** WARNING: Storage Coefficient is smaller than DT!
03429> Use a smaller DT or a larger area.
03430> 001:0089 DESIGN STANDHYD
03431> *** WARNING: Storage Coefficient is smaller than DT!
03432> Use a smaller DT or a larger area.
03433> 001:0090 DESIGN STANDHYD
03434> *** WARNING: Storage Coefficient is smaller than DT!
03435> Use a smaller DT or a larger area.
03436> 001:0091 DESIGN NASHYD
03437> *** WARNING: Time step is too large for value of TP.
03438> R.V. may be ok. Peak flow could be off.
03439> 001:0092 DESIGN NASHYD
03440> *** WARNING: Time step is too large for value of TP.
03441> R.V. may be ok. Peak flow could be off.
03442> 001:0098 DESIGN NASHYD
03443> *** WARNING: Time step is too large for value of TP.
03444> R.V. may be ok. Peak flow could be off.
03445> 001:0101 DESIGN NASHYD
03446> *** WARNING: Time step is too large for value of TP.
03447> R.V. may be ok. Peak flow could be off.
03448> 001:0104 DESIGN STANDHYD
03449> *** WARNING: Storage Coefficient is smaller than DT!
03450> Use a smaller DT or a larger area.
03451> 001:0109 DESIGN STANDHYD
03452> *** WARNING: Storage Coefficient is smaller than DT!
03453> Use a smaller DT or a larger area.
03454> 001:0110 DESIGN STANDHYD
03455> *** WARNING: Storage Coefficient is smaller than DT!
03456> Use a smaller DT or a larger area.
03457> 001:0111 DESIGN NASHYD
03458> *** WARNING: Time step is too large for value of TP.
03459> R.V. may be ok. Peak flow could be off.
03460> 001:0112 DESIGN NASHYD
03461> *** WARNING: Time step is too large for value of TP.
03462> R.V. may be ok. Peak flow could be off.
03463> 001:0118 DESIGN NASHYD
03464> *** WARNING: Time step is too large for value of TP.
03465> R.V. may be ok. Peak flow could be off.
03466> 001:0121 DESIGN NASHYD
03467> *** WARNING: Time step is too large for value of TP.
03468> R.V. may be ok. Peak flow could be off.
03469> 001:0124 DESIGN STANDHYD
03470> *** WARNING: Storage Coefficient is smaller than DT!
03471> Use a smaller DT or a larger area.
03472> 001:0129 DESIGN STANDHYD
03473> *** WARNING: Storage Coefficient is smaller than DT!
03474> Use a smaller DT or a larger area.
03475> 001:0130 DESIGN STANDHYD
03476> *** WARNING: Storage Coefficient is smaller than DT!
03477> Use a smaller DT or a larger area.
03478> 001:0131 DESIGN NASHYD
03479> *** WARNING: Time step is too large for value of TP.
03480> R.V. may be ok. Peak flow could be off.
03481> 001:0132 DESIGN NASHYD
03482> *** WARNING: Time step is too large for value of TP.
03483> R.V. may be ok. Peak flow could be off.
03484> 001:0137 DESIGN STANDHYD
03485> *** WARNING: Storage Coefficient is smaller than DT!
03486> Use a smaller DT or a larger area.
03487> 001:0138 DESIGN NASHYD
03488> *** WARNING: Time step is too large for value of TP.
03489> R.V. may be ok. Peak flow could be off.
03490> 001:0141 DESIGN NASHYD
03491> *** WARNING: Time step is too large for value of TP.
03492> R.V. may be ok. Peak flow could be off.
03493> Simulation ended on 2021-12-22 at 15:14:57
03494> -----
03495>
03496>

```



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Black Drain Analysis

Channel Report

Pond 1 Outlet - NODE 3 - Black Drain Cross Section

User-defined

Invert Elev (m) = 425.5000
Slope (%) = 0.3900
N-Value = Composite

Highlighted

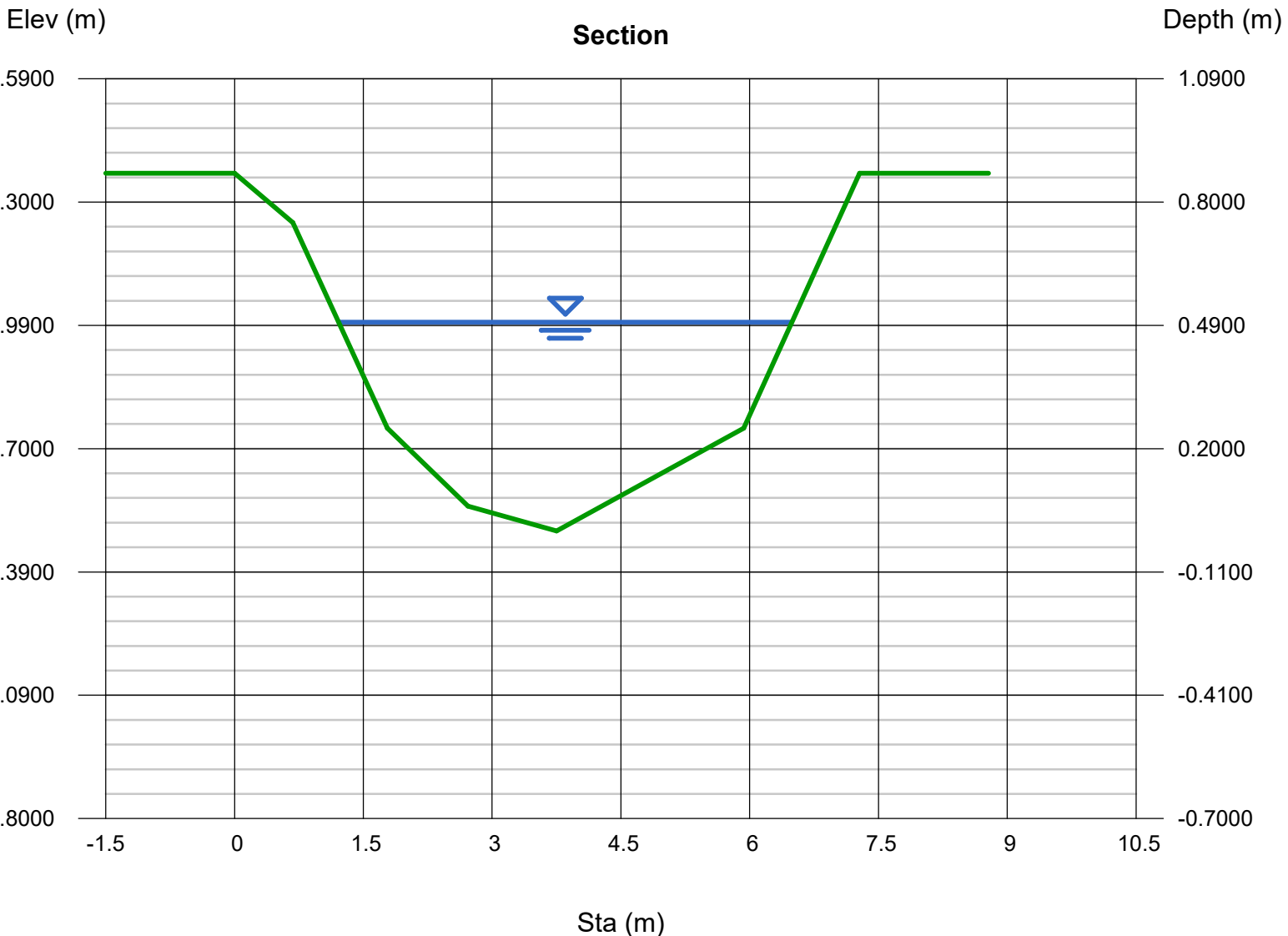
Depth (m) = 0.5075
Q (cms) = 1.8028
Area (sqm) = 1.8021
Velocity (m/s) = 1.0004
Wetted Perim (m) = 5.4242
Crit Depth, Yc (m) = 0.3810
Top Width (m) = 5.2771
EGL (m) = 0.5586

Calculations

Compute by: Q vs Depth
No. Increments = 48

(Sta, El, n)-(Sta, El, n)...

(0.0000, 426.3700)-(0.6800, 426.2500, 0.030)-(1.7800, 425.7500, 0.030)-(2.7200, 425.5600, 0.030)-(3.7500, 425.5000, 0.030)-(5.9300, 425.7500, 0.030)-(7.2800, 426.3700)



Channel Report

Storm Outlet - NODE 4 - Black Drain Cross Section

User-defined

Invert Elev (m) = 424.5000
Slope (%) = 0.3900
N-Value = Composite

Highlighted

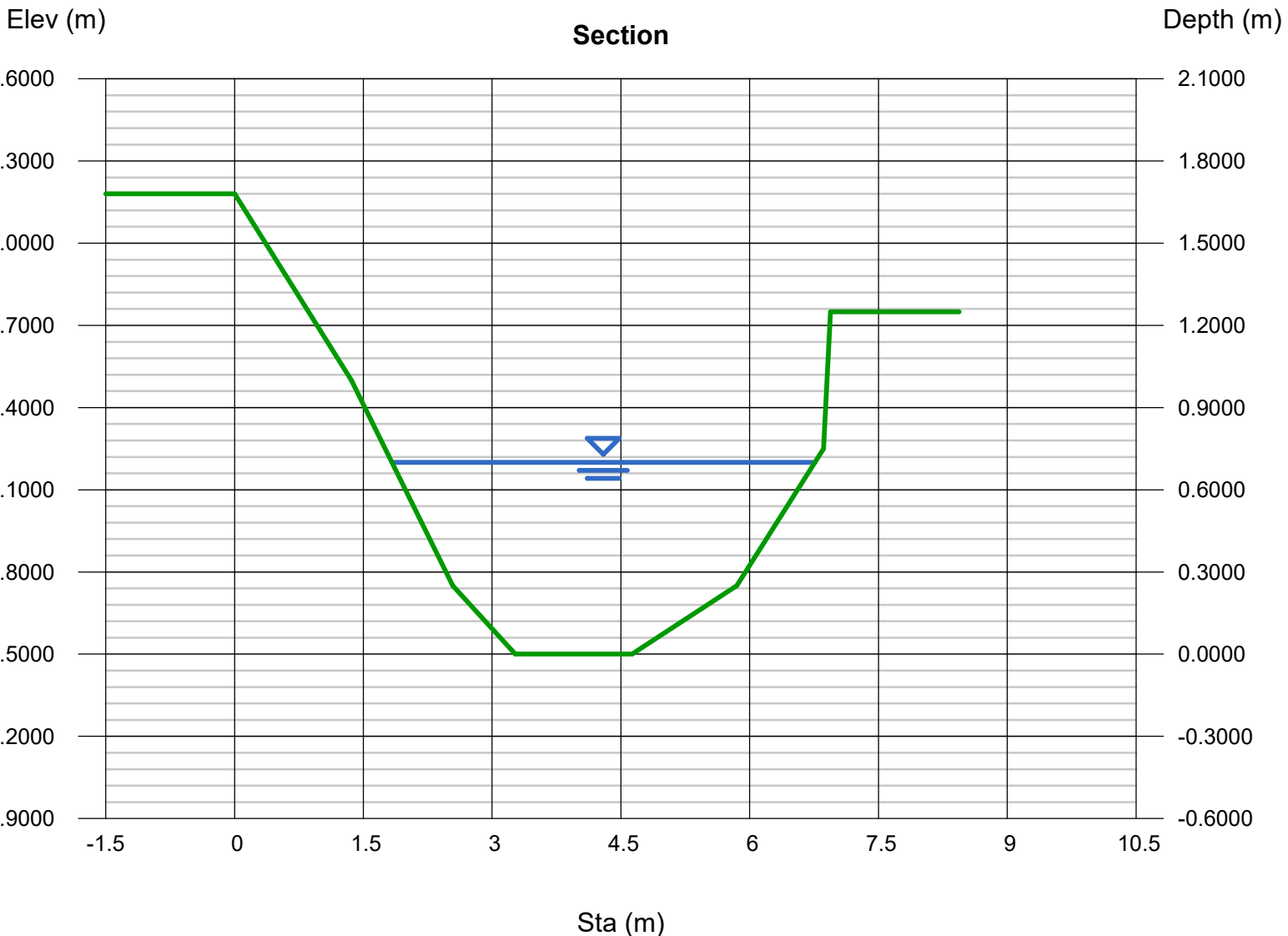
Depth (m) = 0.7000
Q (cms) = 3.0550
Area (sqm) = 2.4370
Velocity (m/s) = 1.2536
Wetted Perim (m) = 5.2301
Crit Depth, Yc (m) = 0.5182
Top Width (m) = 4.9270
EGL (m) = 0.7801

Calculations

Compute by: Q vs Depth
No. Increments = 48

(Sta, El, n)-(Sta, El, n)...

(0.0000, 426.1800)-(1.3600, 425.5000, 0.030)-(2.5400, 424.7500, 0.030)-(3.2700, 424.5000, 0.030)-(4.6300, 424.5000, 0.030)-(5.8500, 424.7500, 0.030)-(6.8600, 425.7000, 0.030)-(6.9400, 425.7500, 0.030)





BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix D

Stormwater Management Design Calculations

Project: Fergus Golf Course
 File: 300052719
 Designed by: L.Garner
 Date: 20-Dec-21



Catchment 201 - SWMF1

Total Drainage Area= **269200** m2 or **26.92** ha

Roads (m2)

41805.4	Right-of-Ways

Total Area= 4.18054 ha

TIMP	65%	Area	2.72 ha
XIMP	50%	Area	2.09 ha

High Density Residential (m2)

Total Area 0 ha

TIMP	80%	Area	0.00
XIMP	80%	Area	0.00

Medium Density Residential (m2)

Total Area 0.00 ha

TIMP	70%	Area	0.00 ha
XIMP	55%	Area	0.00 ha

SWM Block (m2)

12700	SWMF1

Total Area 1.27 ha

TIMP	50%	Area	0.64 ha
XIMP	50%	Area	0.64 ha

Low Density Residential (m2)

227394.6	Lots

Total Area 22.74 ha

TIMP	25%	Area	5.68 ha
XIMP	15%	Area	3.41 ha

Park (m2)

Total Area 0.00 ha

TIMP	7%	Area	0.00 ha
XIMP	5%	Area	0.00 ha

Total Area (less Residential)= 5.45 ha
 Total Residential Area(if not able to directly measure)= 21.47 ha

Total Area (uncontrolled to pond) 28.19 ha

TOTAL OVERALL DRAINAGE AREA
 Total TIMP= 9.04 ha Overall TIMP= 33.6 %
 Total XIMP= 6.14 ha Overall XIMP= 22.8 %

Project: Fergus Golf Course
File: 300052719
Designed by: L.Garner
Date: 20-Dec-21



Catchment 202

Total Drainage Area= **29900** m² or **2.99** ha

Roads (m²)

2575	

Total Area= 0.2575 ha

TIMP	65%	Area	0.17 ha
XIMP	50%	Area	0.13 ha

High Density Residential (m²)

Total Area 0 ha

TIMP	80%	Area	0.00
XIMP	80%	Area	0.00

Medium Density Residential (m²)

Total Area 0.00 ha

TIMP	70%	Area	0.00 ha
XIMP	55%	Area	0.00 ha

SWM Block (m²)

Total Area 0.00 ha

TIMP	50%	Area	0.00 ha
XIMP	50%	Area	0.00 ha

Low Density Residential (m²)

27325 remainder	

Total Area 2.73 ha

TIMP	25%	Area	0.68 ha
XIMP	15%	Area	0.41 ha

Parkland/Open Space Areas(m²)

Total Area 0.00 ha

TIMP	7%	Area	0.00 ha
XIMP	5%	Area	0.00 ha

TOTAL OVERALL DRAINAGE AREA
Total TIMP= 0.85 ha
Total XIMP= 0.54 ha

Overall TIMP= 28.4 %
Overall XIMP= 18.0 %

Project: Fergus Golf Course

File: 300052719

Designed L.Garner

Date: 28-Sep-21



External Catchments

Area EXT2

	Area (ha)	% Imp	A x imp	Composite % Imp
Ditch (Landscape) =	0.177 ha	7%	0.0124	
Asphalt/Hardscape Area =	0.163 ha	100%	0.1626	
Total Area (EXT2) =	0.340 ha		0.1750	51%

Area EXT3

	Area (ha)	% Imp	A x imp	Composite % Imp
Landscape Area =	0.552 ha	7%	0.0386	
Hardscape Area =	0.679 ha	100%	0.6785	
Total Area (EXT3) =	1.230 ha		0.7171	59%

Area EXT4

	Area (ha)	% Imp	A x imp	Composite % Imp
Landscape Area =	0.102 ha	7%	0.0071	
Hardscape Area =	0.078 ha	100%	0.0780	
Total Area (EXT4) =	0.180 ha		0.0851	48%

Project: Fergus Golf Course
File: 300052719
Designed by: L.Garner
Date: 20-Dec-21



SWMF1 - Wet Pond Permanent Pool Requirement

MOE Table 3.2 Water Quality Storage Requirements Based on Receiving Waters.

IMPERVIOUSNESS

Protection Level (1, 2, or 3)

33.57	%
1	

NOTE - 40 cu.m/ha has been removed from MOE table values for Ex. Detention Portion

Enhanced (Level 1) Protection

x	y	Known (x)	Calc (y)	Total Permanent Pool Required
Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	(cu.m)
35	100	33.57	99.71	2684.22
55	150			
70	185			
85	210			
95.0	236	Extrapolated		

Normal (Level 2) Protection

x	y	Known (x)	Calc (y)	Total Permanent Pool Required
Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	(cu.m)
35	50	33.57	#N/A	#N/A
55	70			
70	90			
85	110			
95.0	121	Extrapolated		

Basic (Level 3) Protection

x	y	Known (x)	Calc (y)	Total Permanent Pool Required
Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	Imperviousness (%)	Permanent Pool StorageVolume (cu.m./ha)	(cu.m)
35	20	33.57	#N/A	#N/A
55	35			
70	45			
85	55			
95.0	62	Extrapolated		



BURNSIDE

Location: Fergus Golf Course
Project #: 300052719
Date: L.Garner
Updated: 20-Dec-21

Extended Detention

25mm over 24 hours

SWMF1

Drainage Area: 26.92

$$8.321\text{mm}^* \times 26.92 \text{ ha} \times 10 = 2240.01 \text{ m}^3$$

$$2240 \text{ m}^3/24/3600 \times 1.5 = 0.039 \text{ m}^3/\text{s}$$

*8.321mm is the runoff volume from SWMHYMO based on the total and directly connected impervious



BURNSIDE

Location: Fergus Golf Course
 Project #: 300052719
 Date: L.Garner
 Updated: 20-Dec-21

SWMF1 Storage Calculations

INPUT AREA

Drainage Area: 26.92
 Percent Impervious: 34%
 Base of Pond: 424.60
 N.W.L.: 426.10
 Required Permanent Pool Volume: 2684
 Permanent Pool Volume Provided: 3546

ELEVATION / STORAGE INFORMATION

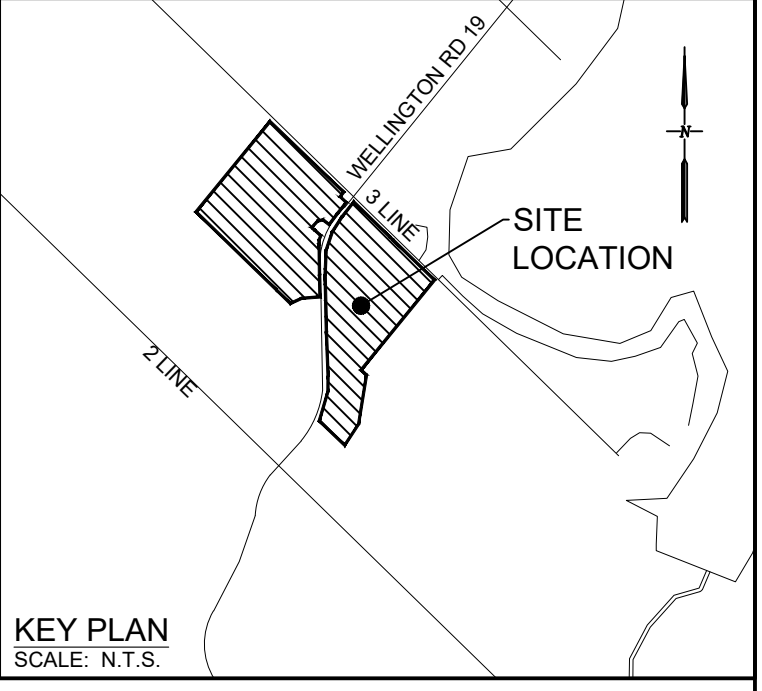
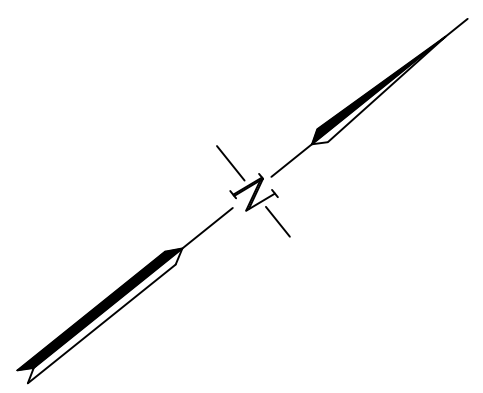
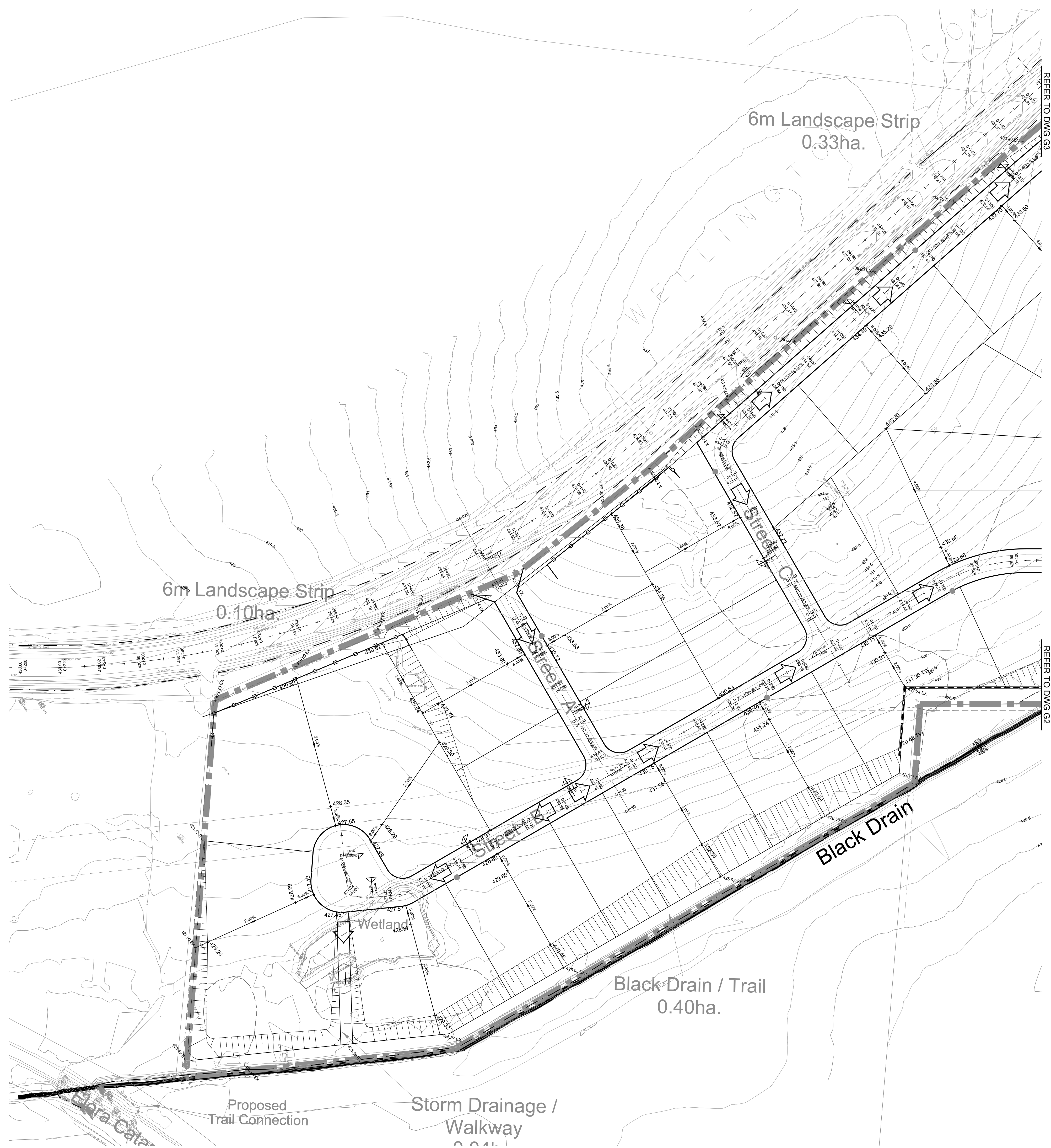
	Elevation	Stage	Cumulative Storage	Cumulative Storage above Permanent Pool
	(m)	(m)	(m3)	(m3)
Base of Pond :	424.60	0.00	0.00	0.00
	425.10	0.50	706.36	0.00
	425.60	1.00	1898.91	0.00
NWL :	426.10	1.50	3545.56	0.00
	426.60	2.00	5744.95	2199.39
	427.10	2.50	8451.97	4906.41
	427.60	3.00	11667.24	8121.68
HWL:	427.80	3.20	13098.77	9553.21
Top of Pond:	428.10	3.50	15405.50	11859.94
	2.00	Active Storage Depth		



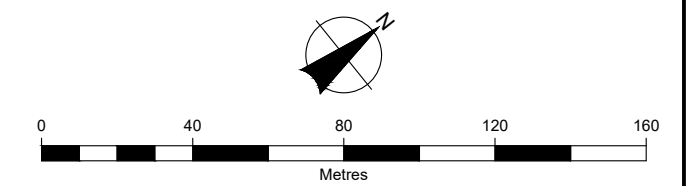
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Drawings

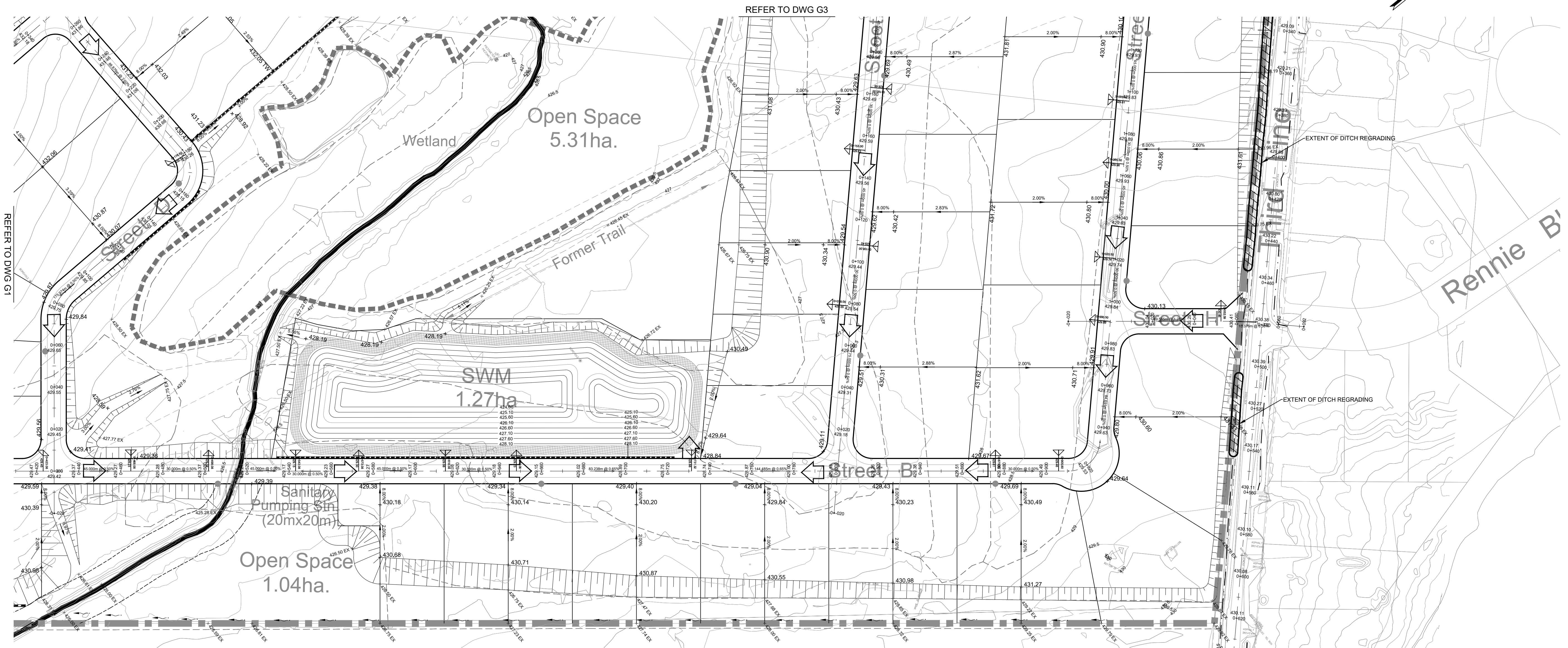
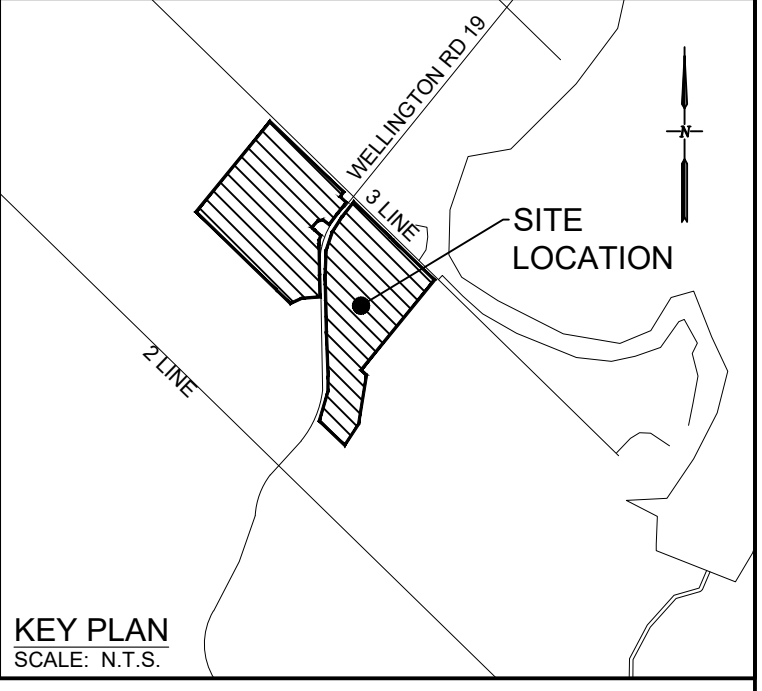


- LEGEND**
- PROPERTY BOUNDARY
 - EASEMENT
 - EXISTING CONTOUR
 - EXISTING ELEVATION
 - PROPOSED ELEVATION
 - PROPOSED SLOPE
 - PROPOSED OVERLAND FLOW DIRECTION
 - MAX. 3:1 SIDE SLOPES
 - PROPOSED RETAINING WALL
 - PROPOSED NOISE WALL (BY OTHERS)
 - PROPOSED SWALE
- LOT TYPES:**
- FRONT DRAINAGE
 - SPLIT DRAINAGE
 - WALK OUT LOT
 - LOOK OUT LOT

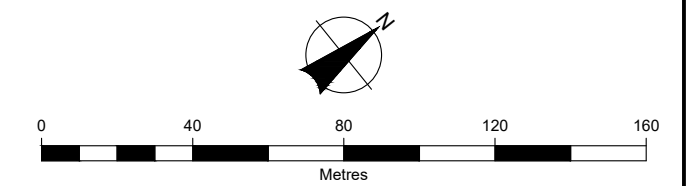


BURNSIDE			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE			
GRADING PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. G1
Scale 1:1000	Project No. 300052719		

File: \\hms\shared\work\Aurora\2021\Ferguson\GIS\Drawings\G1_Grading\G1_Grading.dwg, Date: 22/01/21, 1:54 PM

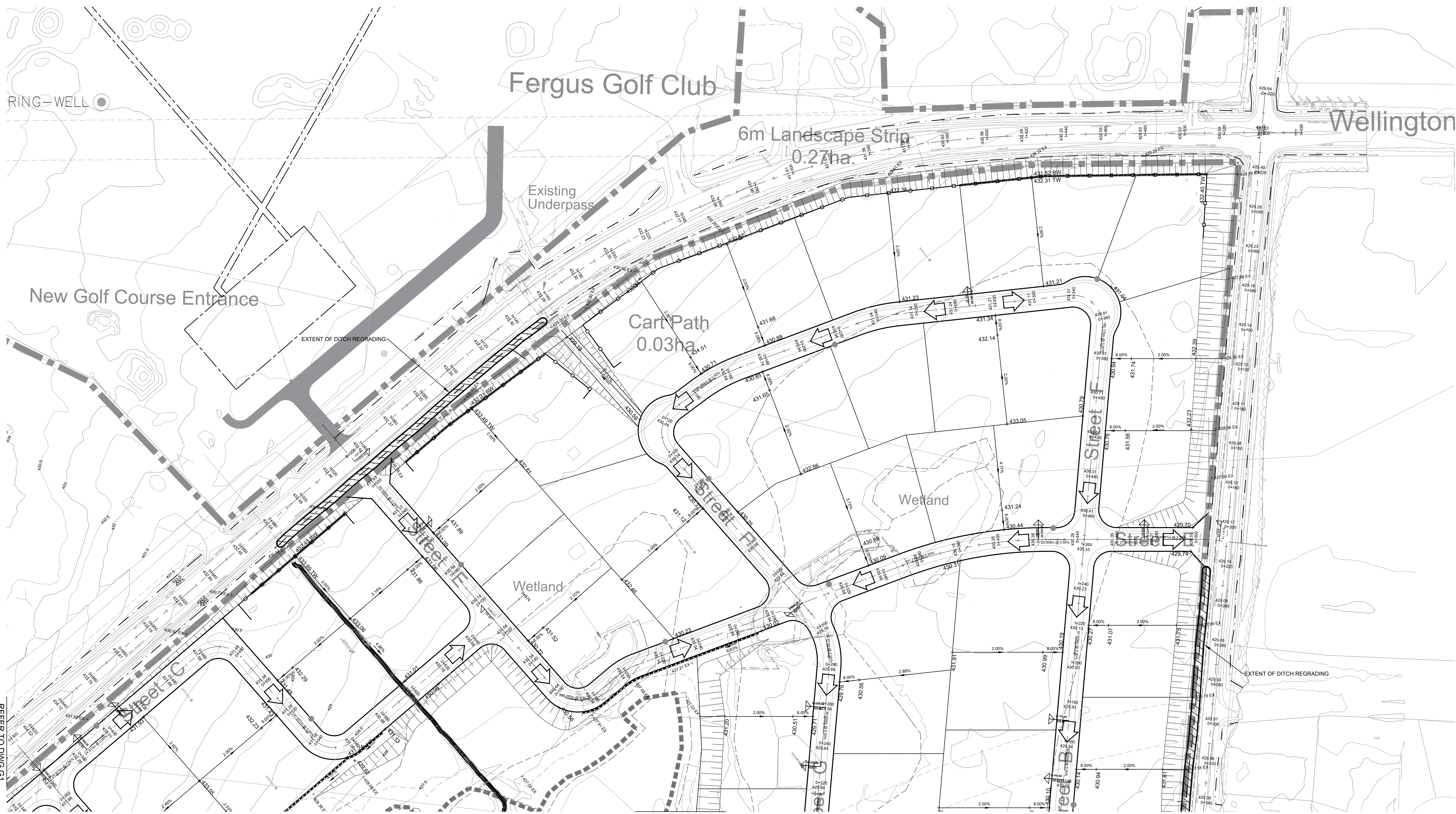


- LEGEND**
- PROPERTY BOUNDARY
 - EASEMENT
 - EXISTING CONTOUR
 - EXISTING ELEVATION
 - PROPOSED ELEVATION
 - PROPOSED SLOPE
 - PROPOSED OVERLAND FLOW DIRECTION
 - MAX. 3:1 SIDE SLOPES
 - PROPOSED RETAINING WALL
 - PROPOSED NOISE WALL (BY OTHERS)
 - PROPOSED SWALE
- LOT TYPES:**
- FRONT DRAINAGE
 - SPLIT DRAINAGE
 - WALK OUT LOT
 - LOOK OUT LOT



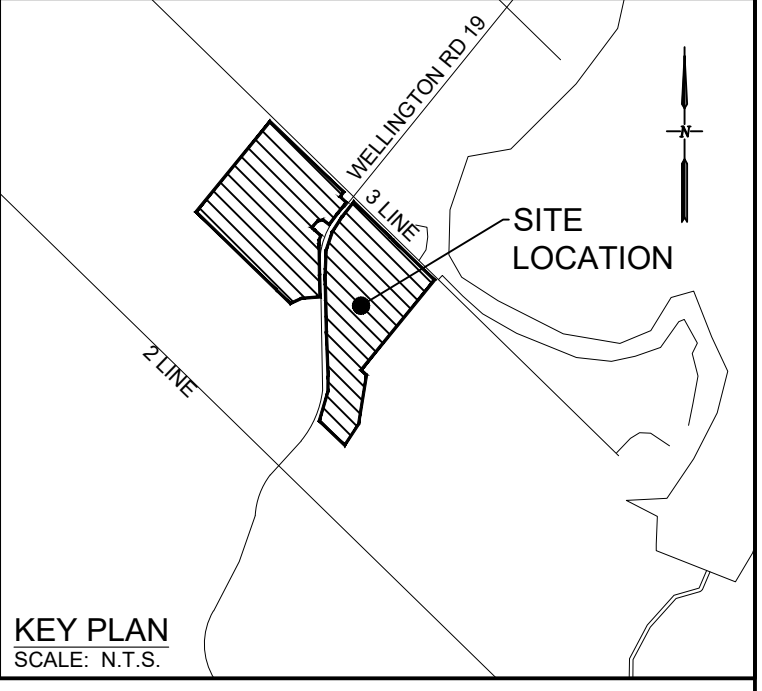
BURNSIDE			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE GRADING PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. G2
Scale 1:1000	Project No. 300052719		

File: \\burnside\shared\work\Aurora\2021\Ferguson_Golf_Course\2021\Ferguson_Golf_Course_Grading_Plan_G2.dwg, Date Plotted: January 21, 2022, 1:05 PM

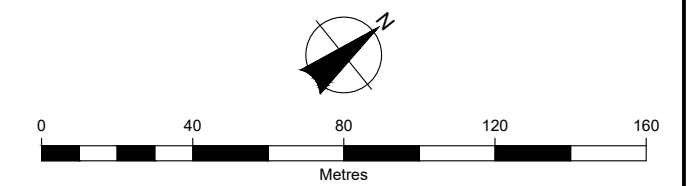


REFER TO DWG G1

REFER TO DWG G2

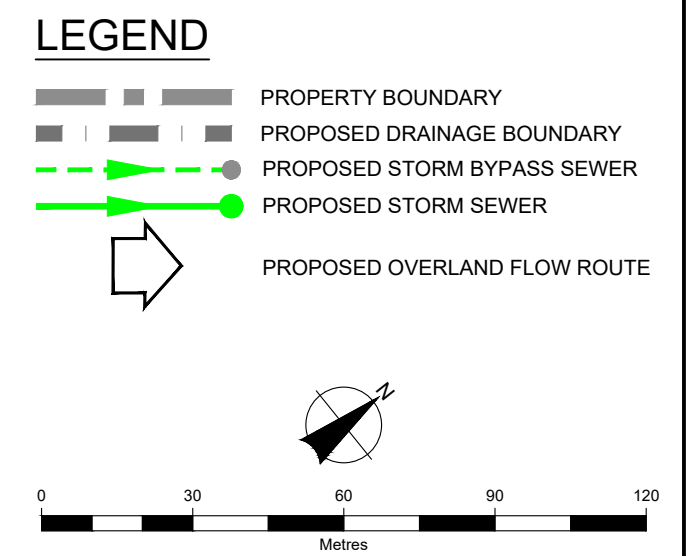
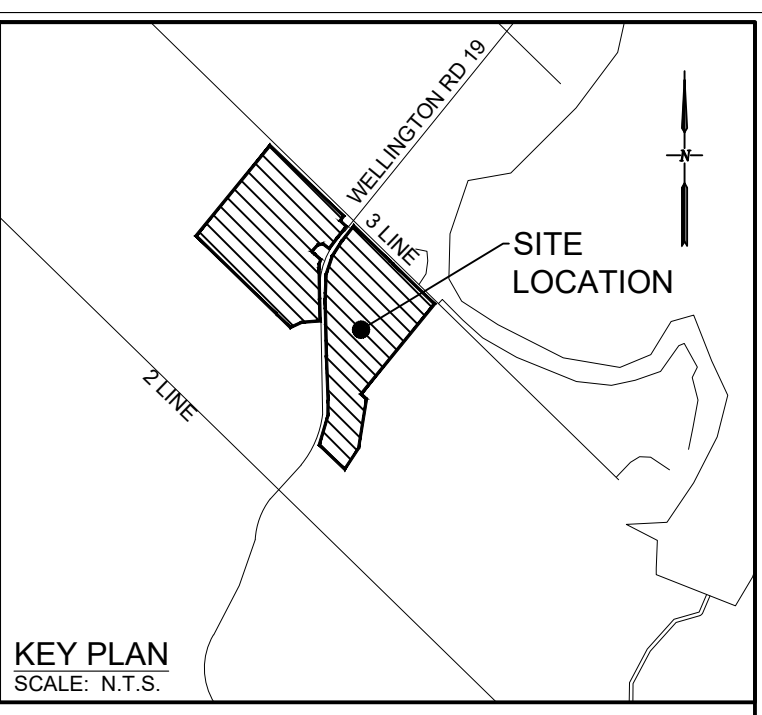
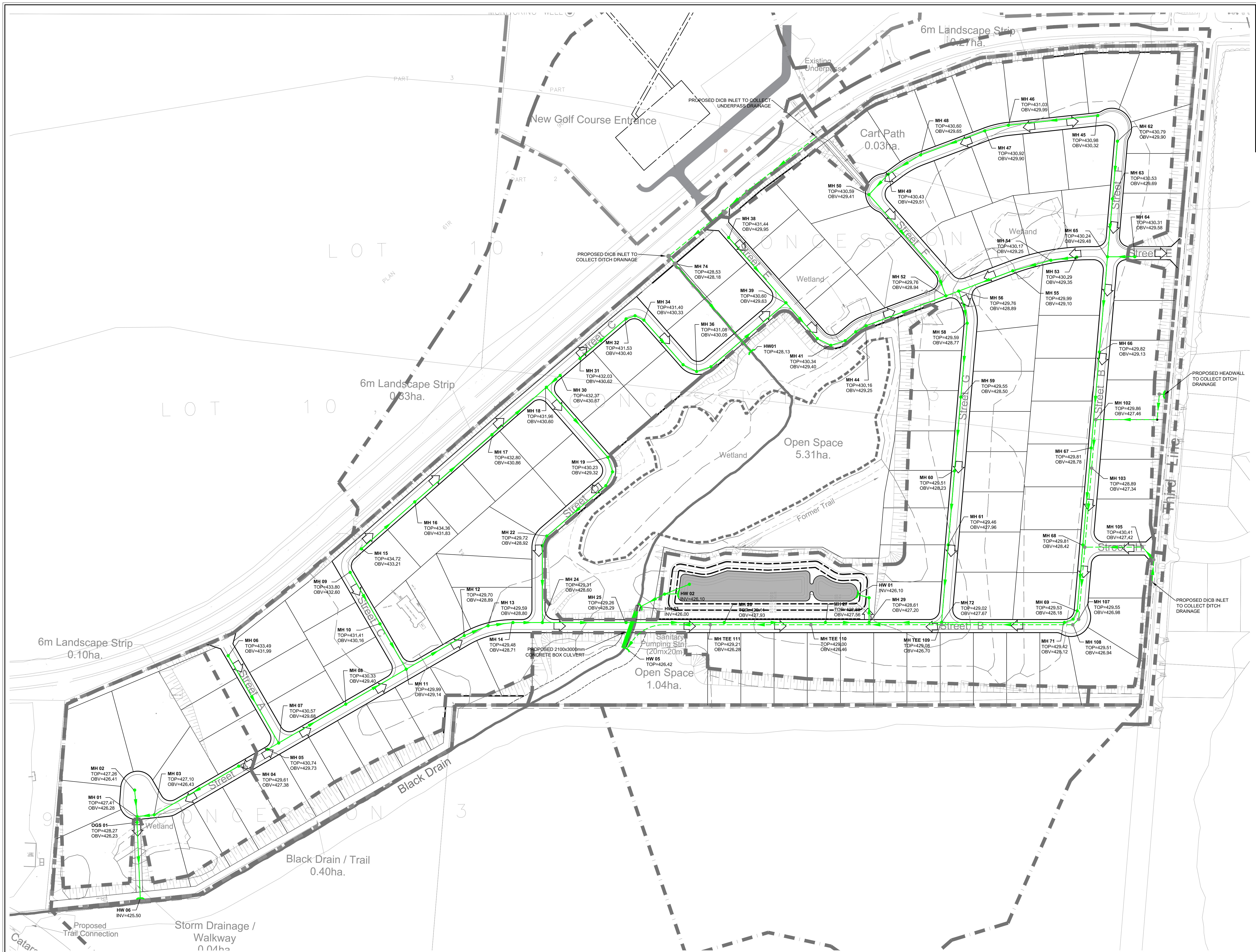


- LEGEND**
- PROPERTY BOUNDARY
 - EASEMENT
 - EXISTING CONTOUR
 - EXISTING ELEVATION
 - PROPOSED ELEVATION
 - PROPOSED SLOPE
 - PROPOSED OVERLAND FLOW DIRECTION
 - MAX. 3:1 SIDE SLOPES
 - PROPOSED RETAINING WALL
 - PROPOSED NOISE WALL (BY OTHERS)
 - PROPOSED SWALE
- LOT TYPES:**
- FRONT DRAINAGE
 - SPLIT DRAINAGE
 - WALK OUT LOT
 - LOOK OUT LOT



BURNSIDE			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE GRADING PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. G3
Scale 1:1000	Project No. 300052719		

File: \Informs\Shared\Work\Aurora\2021\11_Fergus_Golf_Course\2021\11_01_G3_G3-03.dwg User: P30004 January 21, 2022 1:03 PM



BURNSIDE			
Client FERGUS DEVELOPMENT INC.			
Figure Title FERGUS GOLF COURSE PRELIMINARY STORM SERVICING PLAN			
Drawn BF	Checked DN	Date 22/01/21	Figure No. STM1
Scale 1:1500		Project No. 300052719	

File: \\burnside\shared\work\A\2020\21\Fergus_Golf_Course\21_01_21\STM1.dwg, User: P\mohr, January 21, 2022, 1:10 PM

