



Functional Servicing Report

Marsville North & Marsville South Subdivisions Township of East Garafraxa (Marsville)

GMBP File: 2401738 / 418153 & 420004

Revised November 2024



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AND

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MARSVILLE NORTH & MARSVILLE SOUTH SUBDIVISIONS

TOWNSHIP OF EAST GARAFRAXA (MARSVILLE)

FUNCTIONAL SERVICING REPORT

REVISED NOVEMBER 2024

GMBP FILE: 2401738 / 418153 & 420004

1. INTRODUCTION

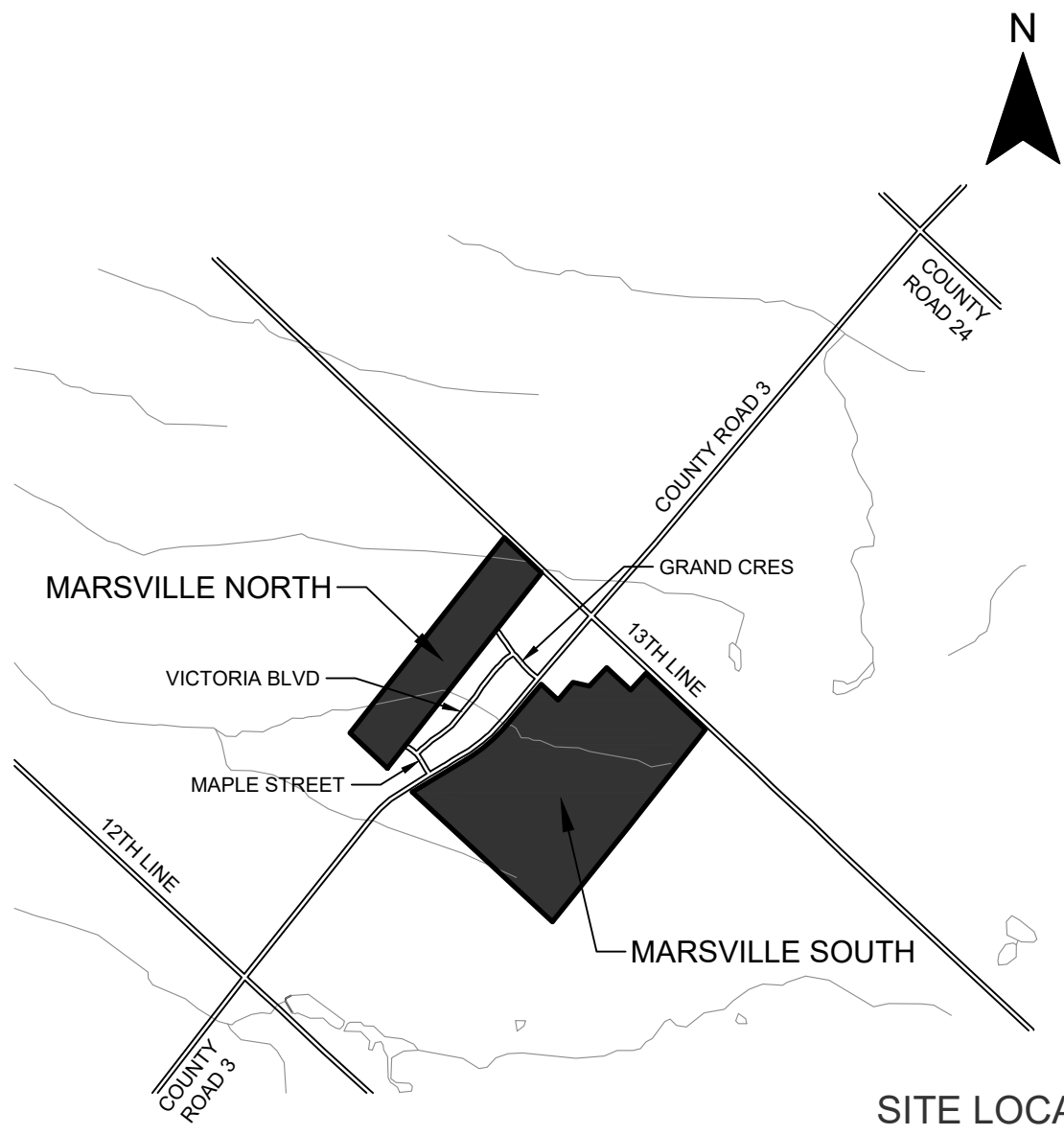
This revised Functional Servicing Report has been prepared by GM BluePlan Engineering Limited in support of the Draft Plans of Subdivision and Zoning By-Law Amendments for the proposed residential developments referred to as the Marsville North Subdivision (the east half of Lot 6, Concession 13 within the Township of East Garafraxa, in the County of Dufferin) and the Marsville South Subdivision (the east half of Lot 5, Concession 13 within the Township of East Garafraxa, in the County of Dufferin).

This report documents the proposed site grading, site servicing, stormwater management system and outlet design for the Marsville North Subdivision and Marsville South Subdivision within the Study Area as shown on Figure 1.

The site grading, site servicing and stormwater management techniques for the Study Area Including the Marsville North and South Subdivisions were derived from the recommendations presented in the following plans and reports:

- Draft Plan of Subdivision for Marsville North Subdivision prepared by GSP Group (dated August 12, 2024)
- Draft Plan of Subdivision for Marsville South Subdivision prepared by GSP Group (dated June 7, 2024)
- Topographic Survey completed by GM BluePlan Engineering Limited (dated December 2019 and February 2021)
- Geotechnical Investigation Report (WSP Canada Inc., dated May 2014)
- Geotechnical Investigation Marsville North (Marsville Thunderbird) Subdivision, Township of East Garafraxa (Marsville) Ontario (V.A. Wood (Guelph) Incorporated, dated February 2020)
- Foundation Recommendations Marsville North Subdivision (JLP Services Inc., dated April 4, 2022)
- Geotechnical Investigation, Blackwell Subdivision, Part of Lot 5, Concession 13, Township of East Garafraxa (Marsville) (V.A. Wood (Guelph) Inc., dated February 2020)
- Foundation Recommendations Marsville South Subdivision (JLP Services Inc., dated April 4, 2022)
- Marsville Well #2 Well Performance Assessment prepared by Geo Kamp Limited (dated May 2020)

MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



SITE LOCATION

Figure No. 1



418153 - 420004
FEBRUARY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N

- Marsville Water Supply System Small Municipal Residential Drinking Water System Schedule 22 Summary Report (Dufferin Water Co. Ltd., dated January 1, 2019 to December 31, 2019)
- Thunderbird Drainage Works (Uderstadt Burnside Ltd., dated April 28, 1981)
- Brouwer Drainage Works (E.H Uderstadt Inc. dated August 10, 1979)
- Township of East Garafraxa Official Plan (dated October 26, 2005)
- Technical Memo - Hydrogeology Executive Summary of Past Reports (GM BluePlan Engineering Limited, dated August 2020)
- Proposed Marsville Heritage Estate Development Hydrogeological Assessment – WSP Canada Inc. (2014)
- Additional Shallow Groundwater Investigation Proposed Marsville Estate Development – WSP Canada Inc. (2016)
- Marsville Heritage Estate – Nitrate Isotope Testing BH3, BH5, and BH9 Memo #1 – GEO KAMP Limited (2018)
- Marsville Heritage Estates Development MEMO #3 – Water Table Slope & Deep BH Performance Testing (BH1D, BH8, and BH12) - GEO KAMP Limited (2018)
- Marsville Heritage Estates Development Regarding Additional Hand Auger Holes MEMO #4 – GEO KAMP Limited (2018)
- Groundwater Impacts Considerations proposed Subdivision Design Marsville, Ontario – Rural Developments Consultants Limited (2018)
- Servicing Options Report, Marsville North, South & Estates Subdivisions, Township of East Garafraxa (Marsville), - GM BluePlan Engineering Limited (Revised November 12, 2021)
- Marsville Servicing Options Report Memo to Council – R.J. Burnside & Associates Limited (November 18, 2021)
- Hydrogeological Study for the Marsville South Subdivision – Part Lot 5, Concession 13, Geographic Township of East Garafraxa (GM BluePlan Engineering Limited, dated May 2022)
- Marsville Water System Expansion Municipal Class Environmental Assessment (Schedule B) Project File Report (R.J. Burnside & Associates Limited, dated September 2023)
- Groundwater Level Monitoring Report (GEI Consultants Canada Ltd., dated August 2024)

2. STUDY AREA INFORMATION

The 135.8-hectare Study Area, as shown on Figure 1, consists of the following components:

- Marsville North Subdivision: a proposed 9.73-hectare development bounded by existing agricultural lands to the north, 13th Line to the east, existing residential development (commonly referred to as the Thunderbird Subdivision) to the south, and existing agricultural lands to the west. The site is currently zoned for Agricultural (A) use. The site is grass covered with a portion of the site being cultivated for agricultural use.

- Marsville South Subdivision: a proposed 27.9-hectare development bounded by existing agricultural lands to the south and west, Dufferin County Road 3 to the north and existing residential lands and the 13th Line to the east. The site is currently zoned for Rural (RU) use. The site is actively cultivated for agricultural use.
- Thunderbird Subdivision: an existing 7.92-hectare development bounded by the existing residential lands to the east, Dufferin County Road 3 to the south, existing agricultural lands to the west and the proposed Marsville North Subdivision to the north. The Thunderbird Subdivision is currently zoned Residential. The site consists of 33 existing single family lots.
- Existing Residential Lands: 12.46-hectares of residential/commercial lands exists clustered around the Dufferin County Road 3 and the 13th Line intersection. These lands are currently zoned Residential/Commercial.
- Agricultural Lands: approximately 77.07-hectares of actively farmed agricultural lands surround the Marsville North, Marsville South and Thunderbird Subdivisions. These lands are currently zoned for Agricultural use.

Topography

The topography of the Study Area generally slopes from south to north. The average gradient across the proposed Marsville North and Marsville South developments is approximately 1.5%, with elevations ranging from 494.50 mASL along the south boundary of the Marsville South Subdivision to 485.0 mASL along the north boundary of the Marsville North Subdivision.

Under existing conditions, storm drainage through the Study Area is generally by overland sheetflow in a south to north direction to the Thunderbird and Brouwer Municipal Drains located along the northern boundary of the proposed Marsville North Subdivision.

Soils

The native on-site soils in the Study Area and throughout the proposed Marsville North and Marsville South Subdivisions are described as follows:

- From the Soil Survey of Dufferin County Ontario Report No. 38 of the Ontario Soil Survey (dated 1964), the native on-site soils are described as Harriston Loam (loam and silt loam till) with good drainage characteristics and Listowel Loam (loam and silt loam till) with imperfect drainage characteristics. Both Harriston Loam and Listowel Loam belong to the hydrologic soil group BC.

Geotechnical Investigations

The following Geotechnical Investigations have been completed in the Study Area for the proposed development properties:

- Marsville North Subdivision: In May of 2014, WSP Canada Inc. advanced eight (8) boreholes identifying a thin layer of topsoil underlain by intermittent layers of sandy silt, sand and silt, and clayey silt and sand deposits. The groundwater elevations across the site were found to range from 0.2m to 5.3m below original ground surface.

In February of 2020 a supplementary investigation was completed. V.A. Wood (Guelph) Inc. advanced six (6) boreholes, identifying a topsoil layer underlain by intermittent layers of sand silt till, sand and silt, silt clay and sand deposits. The supplementary groundwater elevations across the site were found to range from 0.6m to 5.9m below original ground surface.

- Marsville South Subdivision: In January of 2020, V.A. Wood (Guelph) Inc. advanced eighteen (18) boreholes and identified a thin layer of topsoil underlain by intermittent layers of silt and sand, and sandy clayey silt till and sand deposits. The groundwater elevations across the site were found to range from 0.3m to 10.5m below original ground surface.

For the Study Area, the reports for the Geotechnical Investigations are attached in the Appendices as follows:

- Appendix A: Marsville North Subdivision - Geotechnical Investigation Report (WSP Canada Inc., dated May 2014).
- Appendix B: Marsville North Subdivision - Geotechnical Investigation Marsville North (Marsville Thunderbird) Subdivision, Township of East Garafraxa (Marsville) Ontario (V.A. Wood (Guelph) Incorporated, dated February 2020) and the Foundation Recommendations Marsville North Subdivision (JLP Services Inc., dated April 4, 2022)
- Appendix C: Marsville South Subdivision - Geotechnical Investigation Report (V.A. Wood (Guelph) Inc. dated January 2020) and the Foundation Recommendations Marsville South Subdivision (JLP Services Inc., dated April 4, 2022)

Groundwater

As part of the February 2020 Geotechnical Investigations, monitoring wells with data loggers were installed by GM Blueplan Engineering Limited across the proposed development sites to establish the seasonal groundwater trends. Groundwater elevations across the proposed development sites recorded to date were as follows:

- Marsville North Subdivision: Groundwater elevations recorded to date have ranged from 0m to 8.7m below original ground surface and have been summarized in Appendix D.
- Marsville South Subdivision: Groundwater elevations recorded to date have ranged from 0m to 6.5m below original ground surface and have been summarized in Appendix D.

Existing Site Access and Right-of-Way Cross-Section

Within the Study Area, the existing site access to the proposed development sites and the existing right-of-way cross-section is as follows:

- Marsville North Subdivision: Access is provided via 13th Line, as well as from Grand Crescent and Maple Street located within the existing Thunderbird Subdivision.
- Marsville South Subdivision: Access is provided via Dufferin County Road 3 and 13th Line.
- Existing Development: A 20m wide rural right-of-way cross-section provides site access (Grand Crescent and Maple Street) and elsewhere in Marsville. The existing right-of-way cross-section generally consists of two asphalt lanes for vehicular travel, gravel shoulders along each side of the asphalt lanes and vegetated roadside ditches for the conveyance of storm drainage. Driveway culverts have also been installed within the rural right-of-way to provide driveway access to each of the existing lots.

Sanitary Servicing

Sanitary servicing for all existing residential, commercial and institutional lots within the Marsville Urban Boundary is currently provided by individual private on-site septic systems.

Water Servicing

Water servicing for all existing residential, commercial and institutional lots in Marsville is provided by individual private on-site wells, with the exception of the Thunderbird Subdivision.

Water supply for the existing Thunderbird Subdivision (Grand Crescent, Maple Street and Victoria Boulevard) is provided from a municipal well (Well No. 1) and pumping station located within the existing park on Grand Crescent (north of Dufferin County Road 3). The Permit to Take Water issued for Well No. 1 has an approved daily volume of 182m³ and an approved flow rate of 364 L/minute (Dufferin Water Co. Ltd., December 2019).

Well No. 1, which was installed in 1971 to a depth of 91.7m below ground level in bedrock, currently services the 33 existing residential lots within the Thunderbird Subdivision (Geo Kamp, May 2020). Well No. 1 provides adequate water supply to the Thunderbird Subdivision for domestic / potable use. Well No. 1 does not provide adequate volume or pressure for fire flow protection within the Thunderbird Subdivision.

The water distribution system for the existing Thunderbird Subdivision consists of a 150mm diameter watermain extended from the well house and then along Grand Crescent, Victoria Boulevard and Maple Street. Fire hydrants have also been provided on the existing water distribution system for flushing of the water distribution system.

Storm Drainage

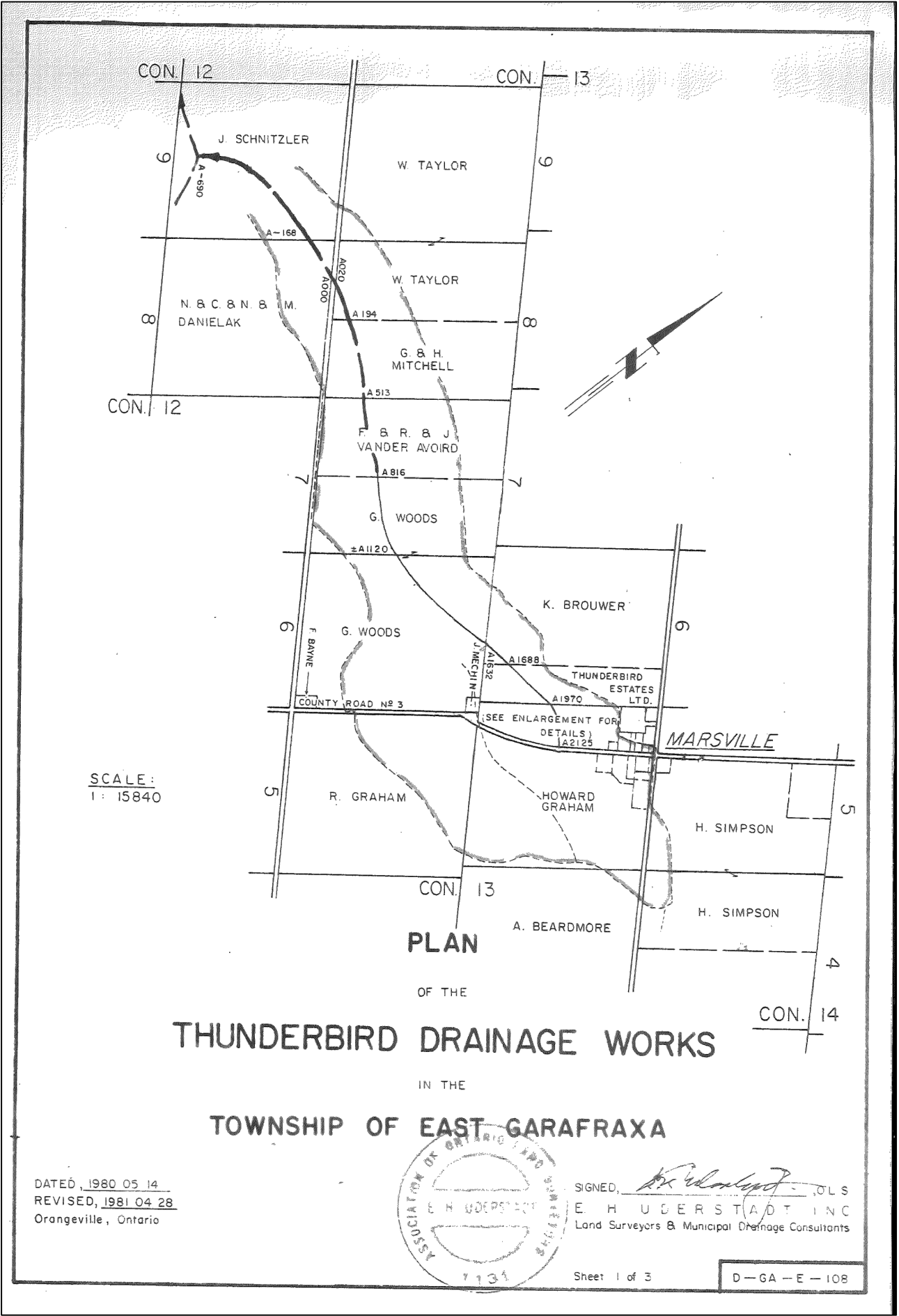
Storm drainage for all residential, commercial, and institutional lots in Marsville, with the exception of the existing Thunderbird Subdivision, is provided by overland sheetflow or surface flow to the existing roadside ditches and swales.

For the 33 existing lots within the Thunderbird Subdivision, storm drainage is conveyed via side yard and rear yard swales to roadside ditches, ultimately existing Thunderbird drainage works. Following the development and construction of the existing Thunderbird Subdivision, improvements to the overland drainage system and outlet were identified as being required.

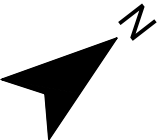
In the early 1980's, a petition for drainage improvements under The Drainage Act was filed with the Township of East Garafraxa. The drainage improvement petition resulted in the creation of the Thunderbird Drainage Works (Uderstadt Burnside Ltd., dated April 28, 1981), which provided storm drainage for approximately 153.36-hectares of contributing drainage area (see Figure No. 2).

The Thunderbird Drainage Works included the extension of a tile drain from the south limit of Dufferin County Road 3 downstream to the center of southwest half of Lot 7, Concession 13, Township of East Garafraxa. The tile drain is approximately 1336m in length, with tile sizes ranging from 300mm diameter at the north limit of Dufferin County Road 3 to 450mm diameter at the open drain outlet in the center of southwest half of Lot 7,

FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tinto Prop)\Drawings\418153 - FSR FIGURES 1-4.dwg LAYOUT:FIGURE 2 - THUNDERBIRD DRAIN
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



PLAN OF THE THUNDERBIRD DRAINAGE
WORKS TAKEN FROM THUNDERBIRD
DRAINAGE WORKS REPORT BY UDERSTADT
BURNSIDE LTD. DATED MAY 14, 1980, REVISED
APRIL 28, 1981.

THUNDERBIRD
DRAINAGE WORKS

Figure No. 2



418153 - 420004
FEBRUARY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N


Concession 13, Township of East Garafraxa. A surface overflow system above the buried tile drain also conveys flows exceeding capacity of the closed drain to the open drain outlet. An open drain (i.e. drainage ditch) then conveys discharge from the tile drain and surface overflow system at the center of southwest half of Lot 7, Concession 13 to the ultimate outlet on Lot 6, Concession 12.

Under existing conditions, approximately 5.5 hectares of the proposed Marsville North Subdivision is captured and conveyed via the Thunderbird Drainage Works. The remainder of the proposed Marsville North Subdivision lands (approximately 4.2 hectares) sheetflows overland to Branch C of the Brouwer Drainage Works (E.H Uderstadt Inc. dated August 10, 1979), which provides a storm drainage outlet for approximately 781.29-hectares of contributing drainage area (see Figure No. 3).

Under existing conditions, approximately 10.38ha of the proposed Marsville South Subdivision flows are conveyed to the West Watershed Catchment Area which discharges into the Thunderbird Drainage Works downstream of the Marsville North Subdivision lands and approximately 18.24 ha of the proposed Marsville South Subdivision flows through the existing Thunderbird Subdivision and eventually discharges into the Thunderbird Drainage Works.

A copy of both the Thunderbird Drainage Works (Uderstadt Burnside Ltd., dated April 28, 1981) and the Brouwer Drainage Works (E.H Uderstadt Inc. dated August 10, 1979) has been appended (see Appendix E).

BROUWER
DRAINAGE WORKS



BluePlan
ENGINEERING

3. SERVICING OPTIONS REPORT

Through discussion with R.J. Burnside & Associates (Township Engineers), The Sunray Group (Marsville Estates Subdivision) and Thomasfield Homes (Marsville North and Marsville South Subdivisions) retained GM Blueplan Engineering Limited to prepare a Servicing Options Report to address the requirements of Section 8.7 b) of the Township of East Garafraxa Official Plan (dated October 26, 2005). The purpose of the Servicing Options Report was to investigate, review and confirm the water and sanitary sewage servicing approach for the lands within the Marsville Urban Boundary in the Township of East Garafraxa.

The Servicing Options Report considers the following servicing options:

- Full Municipal Services
- Communal Services
- Individual Private Services
- Partial Services

Full Municipal Services is not a viable servicing option due to the lack of available receiving outlet for sanitary services and the prohibitive cost based on the achievable lot density within the Marsville Urban Boundary.

Communal Services are not a viable due to the regular refusal by municipalities to enter into responsibility/liability agreements which is the expected position of the Township of East Garafraxa. The prohibitive cost based on available lot density make individual communal services on the Marsville North, Marsville South and Marsville Estates Subdivisions an unviable option.

Individual Private Services are not viable due to the potential impacts on the municipal supply aquifer by the installation of 200 or more additional individual private wells. There is consensus with the Township Engineer that individual private septic systems are the only means available to provide sanitary servicing within the Marsville Urban Boundary.

Partial Services consisting of individual private septic systems and an expanded municipal potable water system with fire protection is a viable and achievable servicing option. The investigation and review of a Partial Services approach concluded the following:

- a) Using Partial Services consisting of individual private septic systems with tertiary treatment and an expanded municipal potable water system with fire reservoirs is an economical and achievable servicing option for full buildout within the Marsville urban boundary.
- b) Under either the Full Construction or Phased Construction of an expanded municipal potable water system with fire reservoirs, the fire protection provided meets the Ministry of Environment, Conservation and Parks and Ontario Building Code criteria. For the Marsville North, Marsville South and Marsville Estates Subdivisions, the Phased Construction of an expanded municipal potable water system with fire reservoirs is the most economical and achievable servicing option for the buildout of the Marsville Urban Boundary.

- c) Using Partial Services consisting of individual private septic systems with tertiary treatment and an expanded municipal potable water system with fire hydrants **is not** considered an economical or achievable servicing option for the buildout within the Marsville Urban Boundary from an economic and fire protection perspective.
- d) Under either the Full Construction or Phased Construction of an expanded municipal potable water system with fire hydrants, the fire protection provided **does not** meet the Ministry of Environment, Conservation and Parks criteria.

For the Marsville North, Marsville South and Marsville Estates Subdivisions, the Phased Construction of an expanded municipal potable water system with fire hydrants **is not** an economical or achievable servicing option. The investigation and review of the Partial Services approach recommends the following:

- a) The recommended servicing approach for the Marsville Urban Boundary is the use of Partial Services consisting of individual private wells with tertiary treatment and an expanded municipal potable water system with fire reservoirs.
- b) For the Marsville North, Marsville South and Marsville Estates Subdivisions, the use of Partial Services consisting of individual private septic systems and the **partial construction** of an expanded municipal potable water system with fire reservoirs is the preferred servicing option, as it is the only economical viable servicing approach.
- c) It is recommended that the Township of East Garafraxa develop a guaranteed cost recovery mechanism for the construction of the balance of an expanded municipal water system with fire reservoirs for the full buildout of the Marsville Urban Boundary and for future operation and maintenance of the expanded municipal water supply system.

At the Special Electronic Meeting of Council held on November 23, 2021, Council for the Township of East Garafraxa passed the following resolution with respect to the Servicing Options Report:

Be it resolved that council hereby receives the GM Blue Plan Engineering Servicing Options Report dated November 12, 2021 (revised);

AND FURTHER THAT Council hereby receives the R.J. Burnside & Associates Report dated November 18, 2021 in response to the above noted GM Blue Plan Engineering Servicing Options Report, and concur with the recommendations contained within the Burnside's Report;

AND THAT the Township Development Review Team be authorized to proceed accordingly.
CARRIED

Detailed review and confirmation of the preferred servicing approach for the Marsville North and Marsville South Subdivision requires the commencement of a Municipal Class Environmental Assessment (EA) by the Township of East Garafraxa. Commencement of the Municipal Class EA is currently under review with the Township of East Garafraxa and the developers for the Marsville North and Marsville South Subdivisions.

4. PROPOSED DEVELOPMENT CONDITIONS

Draft Plans of Subdivision

The Draft Plan of Subdivision prepared by GSP Group (see Figure No. 4) illustrates the proposed lot layout for the Marsville North Subdivision. The Draft Plan of Subdivision consists of 30 single detached residential lots, one (1) park block, two (2) blocks for stormwater management and a 20m wide right-of-way.

The Draft Plan of Subdivision prepared by GSP Group (see Figure No. 5) illustrates the proposed lot layout for the Marsville South Subdivision. The Draft Plan of Subdivision consists of 91 single detached residential lots, one (1) park block, two (2) blocks for stormwater management and a 20m wide right-of-way.

Proposed Right-of-Way Alignment

The Marsville North Subdivision includes the extension of Maple Street, from the northern limit of the existing Thunderbird Subdivision to 13th Line, and the extension of Grand Crescent, from the north limit of the existing Thunderbird Subdivision to the extension of Maple Street. Maple Street and Grand Crescent will be constructed with a minimum grade of 0.5% to a maximum grade of 5.0%.

The Marsville South Subdivision includes accesses to 13th Line and Dufferin County Road 3. The right-of-way will be constructed with a minimum grade of 0.5% to a maximum grade of 5.0%. The 20m right-of-way to be used for the internal roadways.

Proposed Right-of-Way Cross-Section

The 20m urban right-of-way cross-section is proposed for the Marsville North Subdivision (see Figure No. 6A) consisting of the following:

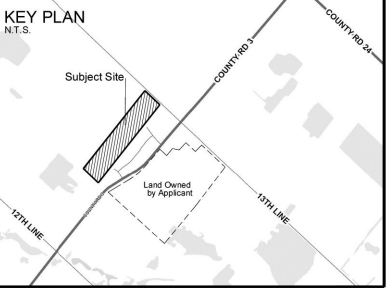
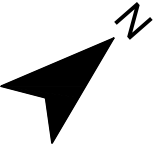
- Two (2) 4.0m wide asphalt lanes for vehicular travel,
- Concrete curb and gutter along both sides of the roadway,
- Municipal storm sewer 1.5m off the centreline of the roadway,
- 150mm diameter subdrains, wrapped in filter cloth with a clearstone jacket, beneath the curbs on both sides of the roadway, and,
- The required streetlighting and utilities.

The 20m rural right-of-way cross-section is proposed for the Marsville South Subdivision (see Figure No. 6B) consisting of the following:

- Two (2) 3.35m wide asphalt lanes for vehicular travel,
- 1.5m asphalt pathway along one side of the roadway and 1.5m gravel shoulder along the other side,
- Roadside ditches with 3.5:1 side slopes, 1.1m depth, swale subdrain with 150mm perforated pipe, wrapped in filter cloth with a clearstone jacket,
- 450mm diameter (minimum) driveway culverts
- The required streetlighting and utilities.

FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES 1-4.dwg LAYOUT:FIGURE 4 - ASTRID DRAFT PLAN
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



DRAFT PLAN
OF SUBDIVISION

EAST HALF OF LOT 6
CONCESSION 13
TOWNSHIP OF EAST GARAFRAXA
COUNTY OF DUFFERIN

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Single Detached Residential	1-30	30	6.58
Park / Municipal Water System	31		0.63
Stormwater Management	32-33		0.99
0.3m Reserve	34-35		0.00
Roads			1.52
TOTAL		30	9.72

ADDITIONAL INFORMATION
(UNDER SECTION 51(17) OF THE PLANNING ACT)
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and l ARE AS SHOWN ON
THE DRAFT PLAN.
h) Municipal water supply
i) Sand and gravel
k) Individual services

OWNER'S CERTIFICATE
I AUTHORIZE THE GSP GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN
OF SUBDIVISION TO

TOM KRZISAN
THOMASFIELD HOMES LIMITED
DATE

SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR
RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

JOHN SCOTT, O.L.S.
VAN HARTEN SURVEYING INC.
DATE

REVISIONS

PLANNING | URBAN DESIGN | LANDSCAPE ARCHITECTURE
gspgroup.ca
Date: August 12, 2024 Drawn By: MN Dwg. File Name: 230716.dwg
Scale: 1:1250 metric Project No.: 23079



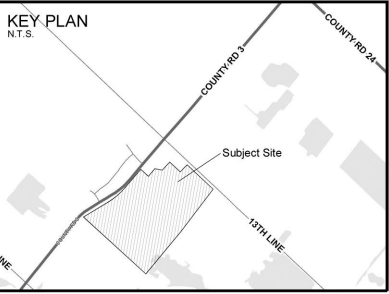
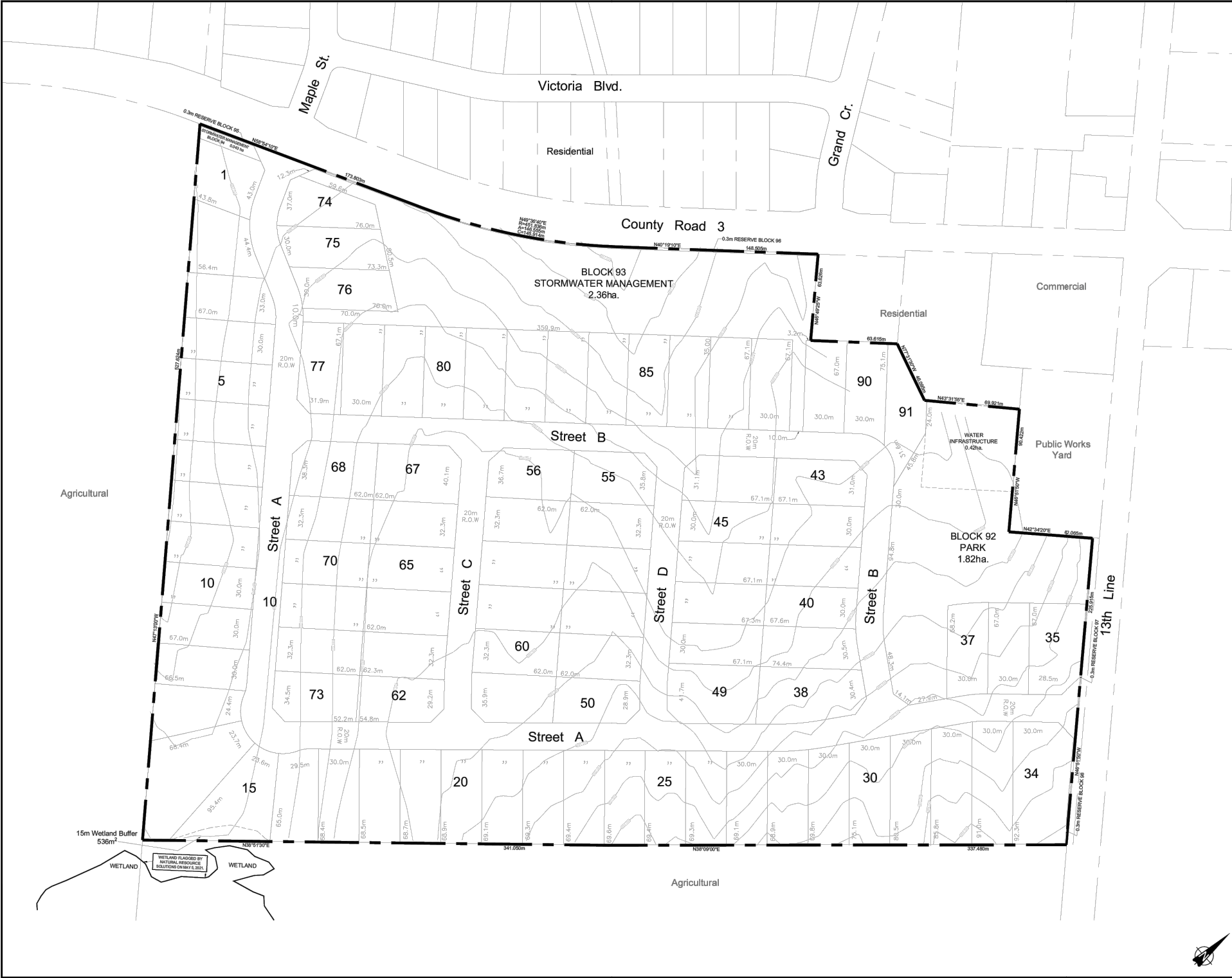
MARSVILLE NORTH
DRAFT PLAN OF
SUBDIVISION

Figure No. 4



418153 - 420004
FEBRUARY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N

FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tinto Prop)\Drawings\418153 - FSR FIGURES 1-4.dwg LAYOUT:FIGURE 5 - ASTRID DRAFT PLAN SOUTH
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DRAFT PLAN OF SUBDIVISION

PART OF EAST HALF LOT 5, CONCESSION 13
TOWNSHIP OF EAST GARAFRAXA,
COUNTY OF DUFFERIN

LAND USE SCHEDULE			
DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential	1- 91	91	19.53
Park	92		1.82
Stormwater Management	93-95		2.36
0.3m Reserve	95-98		
Roads			4.23
TOTAL		91	27.94

ADDITIONAL INFORMATION
(UNDER SECTION 51(17) OF THE PLANNING ACT)
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and l ARE AS SHOWN ON
THE DRAFT PLAN.
h) Municipal water supply
i) Sand and gravel
k) All sanitary and storm sewers as required

OWNER'S CERTIFICATE
I AUTHORIZE THE GSP GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN
OF SUBDIVISION TO

KATHERINE MCLAUGHLIN
THOMASFIELD HOMES LIMITED

DATE

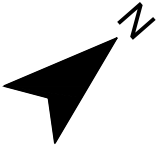
SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR
RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

JAMES M. LAWS, O.L.S.
VAN HARTEN SURVEYING INC.

DATE

GSP group		REVISIONS
PLANNING URBAN DESIGN LANDSCAPE ARCHITECTURE	gspgroup.ca	
Date: June 7, 2024	Drawn By: ML	Draw: File Name: d23980c.dwg
Scale: 1:1250	Project No.: 23080	

MARSVILLE NORTH AND SOUTH SUBDIVISION FUNCTIONAL SERVICING REPORT TOWNSHIP OF EAST GARAFRAXA



MARSVILLE SOUTH DRAFT PLAN OF
SUBDIVISION PROVIDED BY ASTRID J.
CLOS PLANNING CONSULTANTS DATED
FEBRUARY 5, 2020.

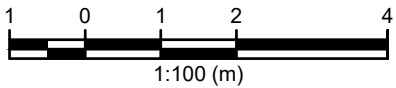
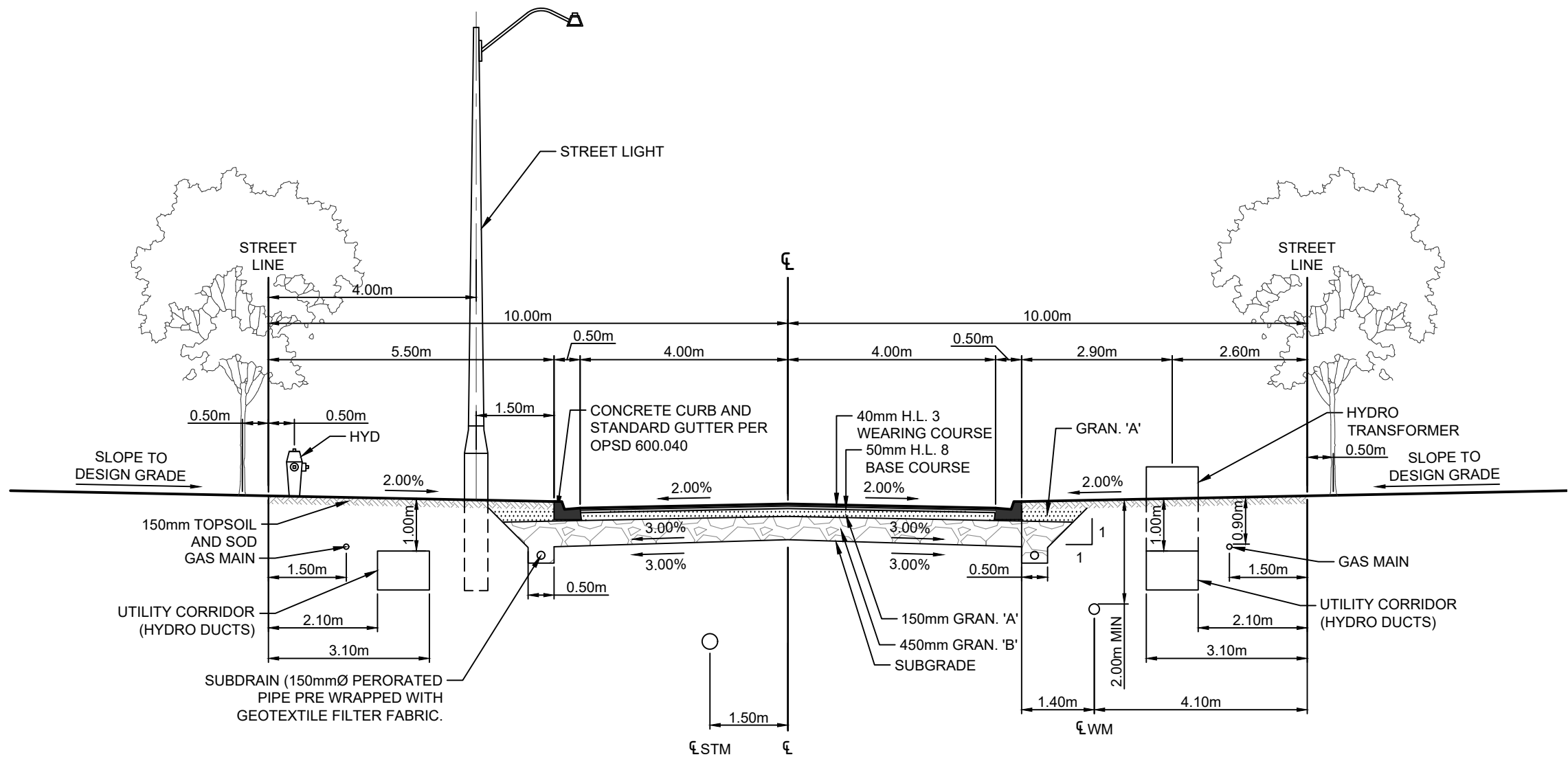
MARSVILLE SOUTH DRAFT PLAN OF SUBDIVISION

Figure No. 5



418153 - 420004
FEBRUARY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N

MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA

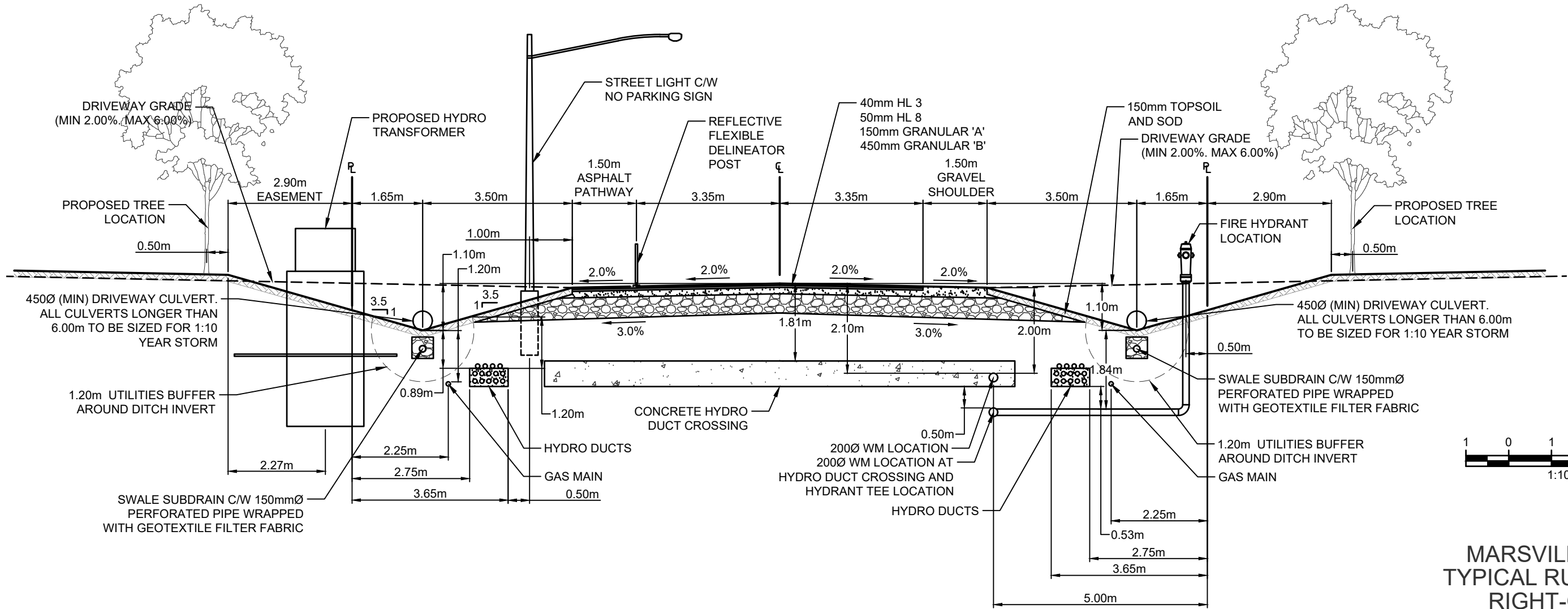


MARSVILLE NORTH
TYPICAL URBAN 20.00m
RIGHT-OF-WAY
CROSS SECTION

Figure No. 6 A



MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



MARSVILLE SOUTH
TYPICAL RURAL 20.00m
RIGHT-OF-WAY
CROSS SECTION

Figure No. 6 B



Proposed Sanitary Servicing

The Marsville North and Marsville South Subdivisions will be serviced with individual private onsite septic systems to provide sewage treatment and disposal. The private onsite septic systems will provide tertiary treatment prior to discharge to the disposal bed. See Figures No. 7 to 13 for conceptual lot layouts with septic bed locations.

Proposed Water Servicing

Water supply and services for both the Marsville North and Marsville South Subdivisions will be provided by the expansion of the existing municipal water system as per the Marsville Water System Expansion Municipal Class Environmental Assessment.

The domestic water demand for the expansion of the existing municipal water distribution system has been calculated based on the following criteria:

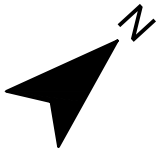
Table No. 1: Proposed Water Demand

Criteria	Marsville North Subdivision	Marsville South Subdivision	Reference
Residential Dwellings	30	91	Per Draft Plan of Subdivision
Population	96 people	291 people	Using 3.2 people/dwelling
Average Daily Demand	43,200 L/day	130,950 L/day	450 L/capita/day
Maximum Day Demand	155,520 L/day	471,420 L/day	3.6 per MECP Design Guidelines for Drinking Water Systems
Peak Day Demand	233,280 L/day	707,130 L/day	5.4 per MECP Design Guidelines for Drinking Water Systems

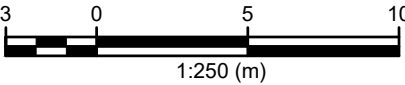
The water distribution system for the Marsville North Subdivision will include a 150mm diameter watermain extended along the internal roadway with individual service laterals to each lot. This will include the extension of a 150mm diameter watermain along Maple Street to 13th Line, to the existing watermain on Grand Crescent and to the existing watermain on Maple Street within the Thunderbird Subdivision for looping of the watermain system. Fire hydrants will be provided along the 150mm diameter watermain for flushing of the looped water distribution system in the Marsville North and Thunderbird Subdivisions.

The water distribution system for the Marsville South Subdivision will include a 150mm diameter watermain along the internal roadway with individual service laterals to each lot. This will include the extension of a 150mm diameter watermain to the 13th Line and Dufferin County Road 3 for future looping and connection to the expanded municipal water supply system as per the preferred alternative from the Municipal Class Environmental Assessment process. Fire hydrants will be provided along the 150mm diameter watermain for flushing of the water distribution system in the Marsville South Subdivisions.

MARSVILLE NORTH AND SOUTH SUBDIVISION
FUNCTIONAL
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TOWNSHIP OF EAST GARAFRAXA



- NOTES
- 1. NO SHEDS OR OUTDOOR STORAGE (BOAT/RV) IS PERMITTED PER A RESTRICTIVE COVENANT IN THE SUBDIVISION AGREEMENT.



CONCEPTUAL LOT LAYOUT WITH TERTIARY SEPTIC BEDS - LOT 1 MARSVILLE NORTH

Figure No. 7

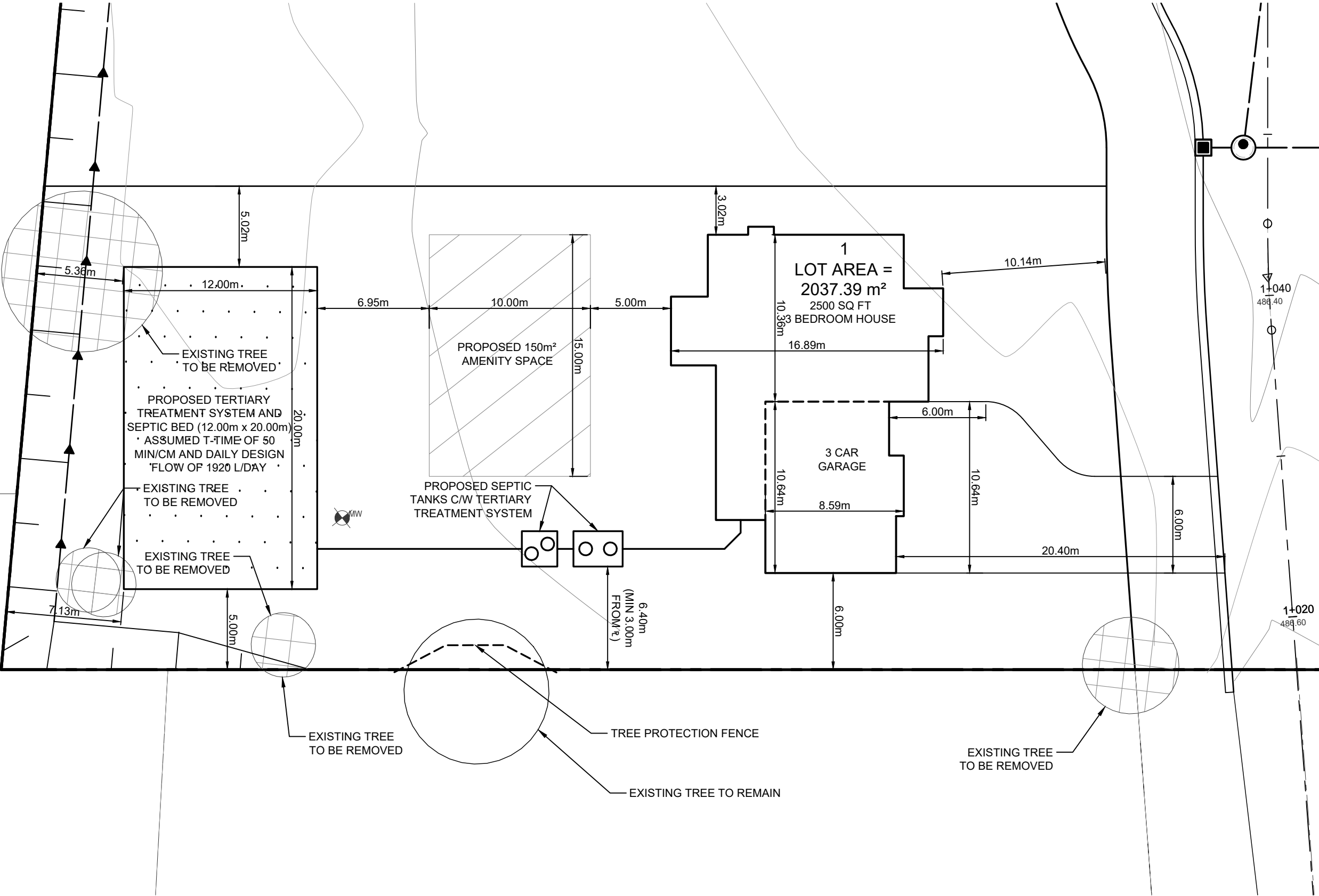
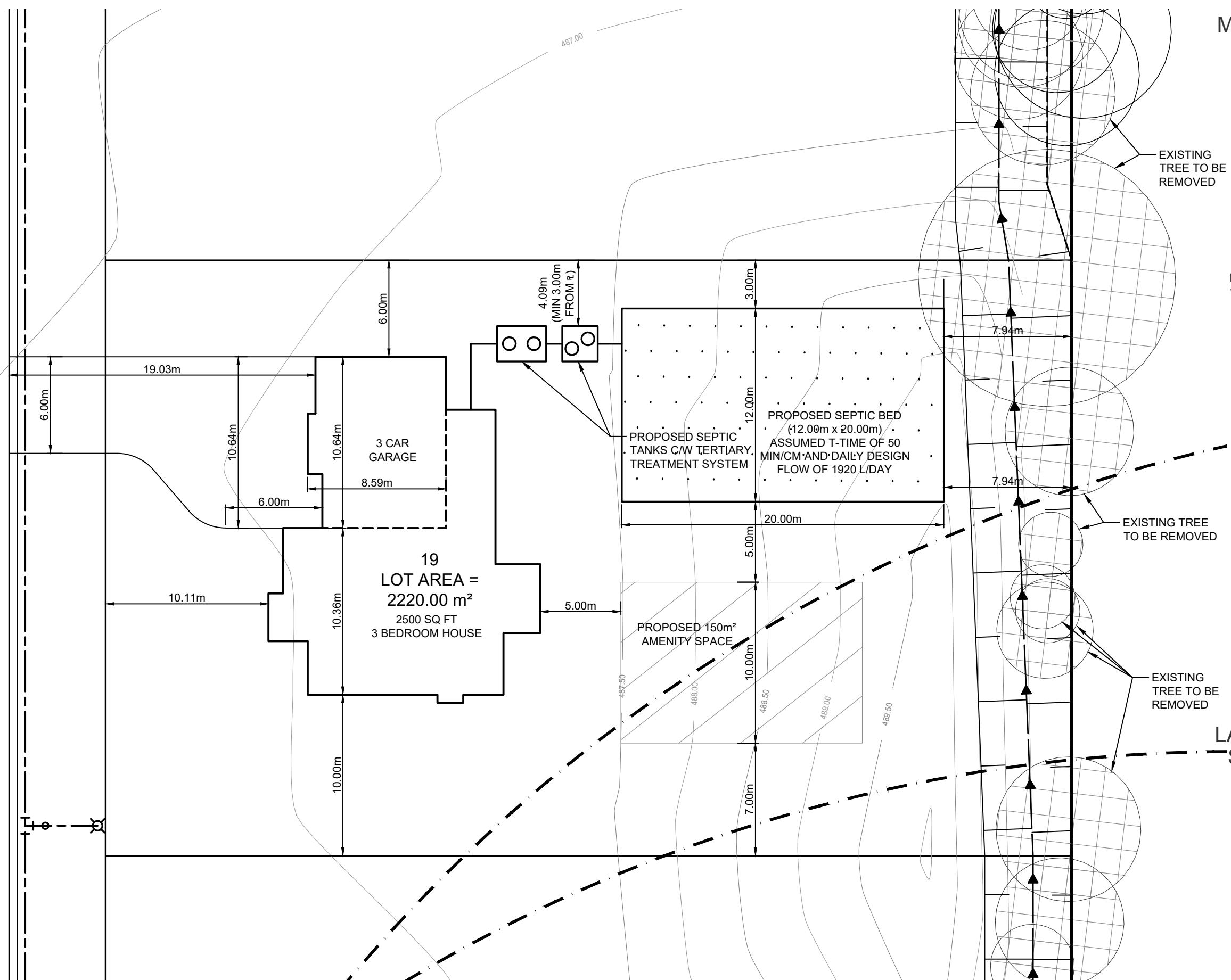
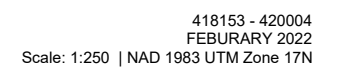


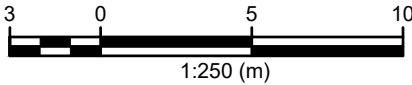
Figure No. 8



MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA

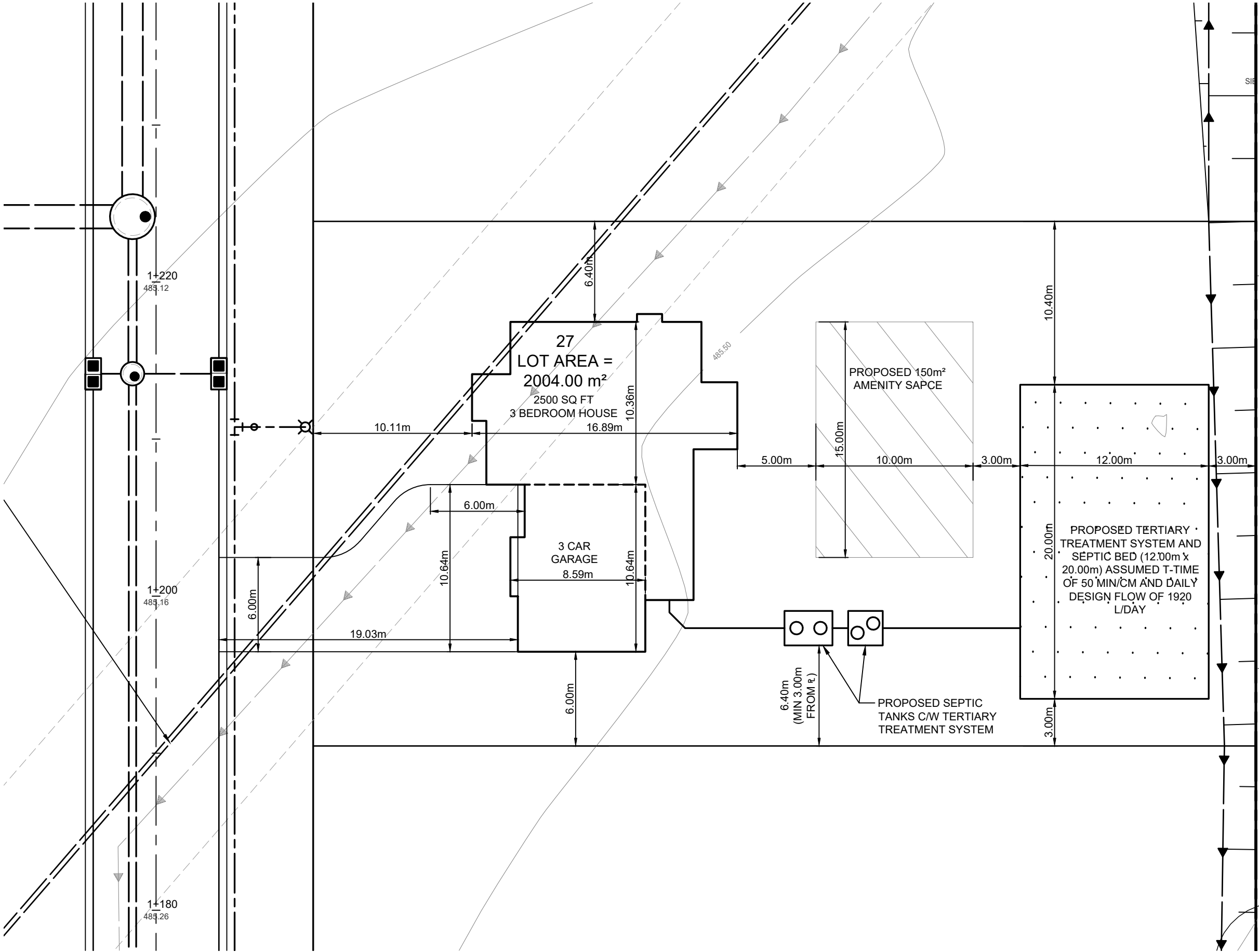


- NOTES
1. NO SHEDS OR OUTDOOR STORAGE (BOAT/RV) IS PERMITTED PER A RESTRICTIVE COVENANT IN THE SUBDIVISION AGREEMENT.

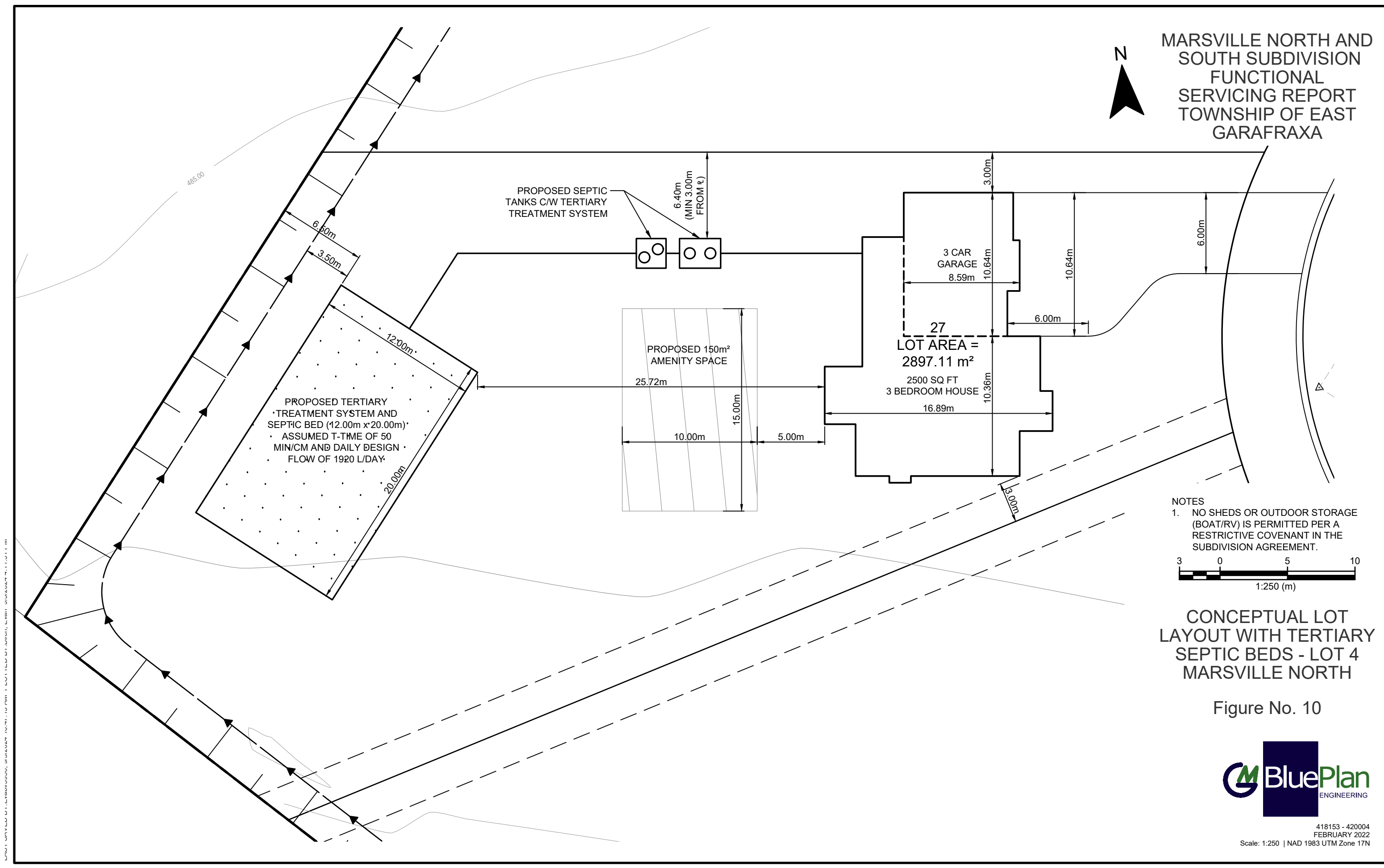


CONCEPTUAL LOT
LAYOUT WITH TERTIARY
SEPTIC BEDS - LOT 27
MARSVILLE NORTH

Figure No. 9



MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



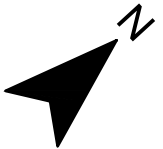
CONCEPTUAL LOT
LAYOUT WITH TERTIARY
SEPTIC BEDS - LOT 4
MARSVILLE NORTH

Figure No. 10

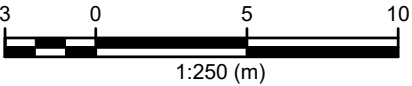


FILE:Working\THOMASFIELD HOMES LIMITED\4201754 - 420004 Marsville South (Graham Property)\Drawings\420004 - Conceptual Lot Layout Figures.dwg LAYOUT-FIGURE 11 - LOT 2 LAYOUT FIGURE
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



- NOTES
1. NO SHEDS OR OUTDOOR STORAGE (BOAT/RV) IS PERMITTED PER A RESTRICTIVE COVENANT IN THE SUBDIVISION AGREEMENT.

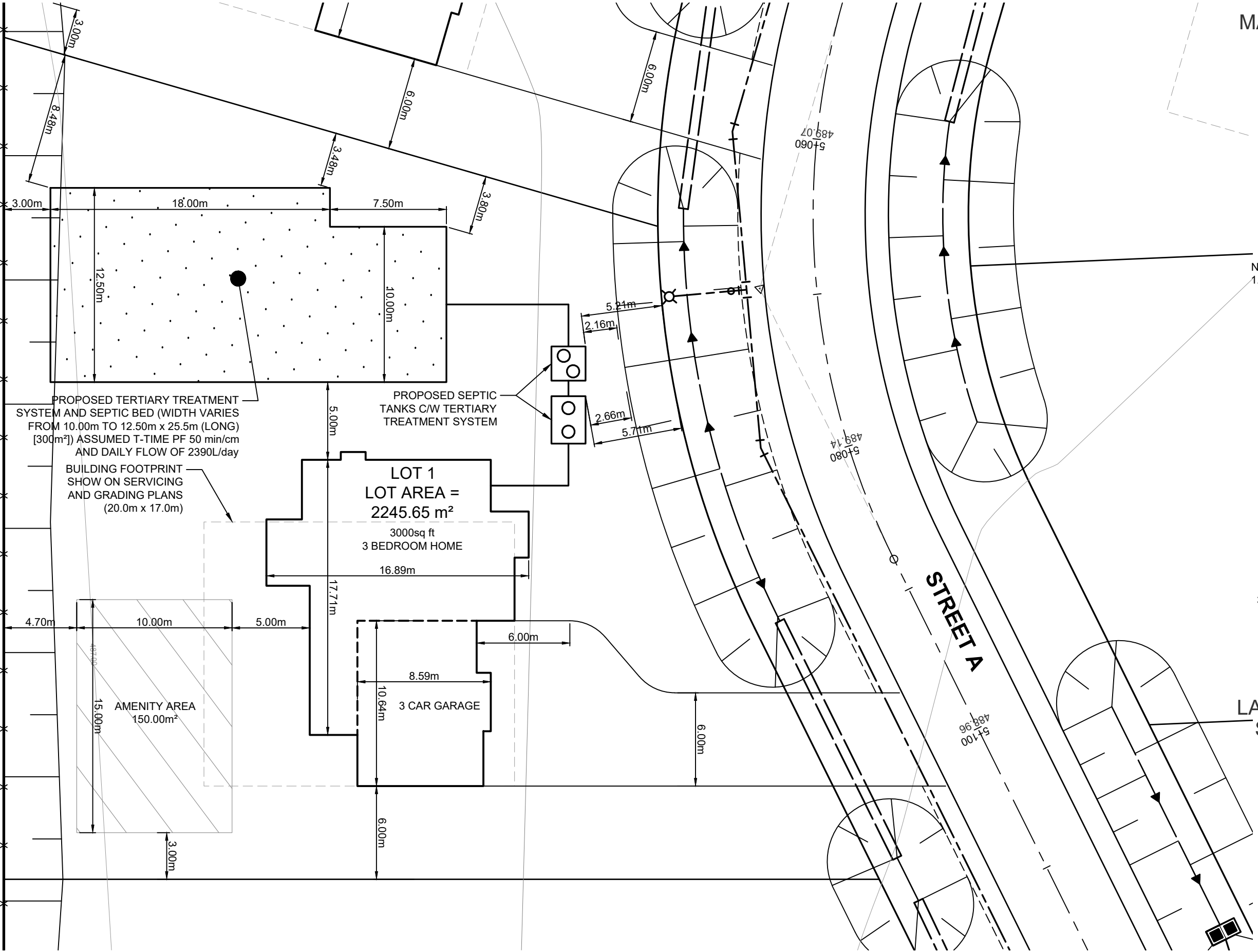


CONCEPTUAL LOT
LAYOUT WITH TERTIARY
SEPTIC BEDS - LOT 2
MARSVILLE SOUTH

Figure No. 11

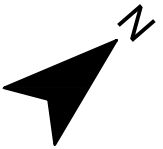


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JULY 2024
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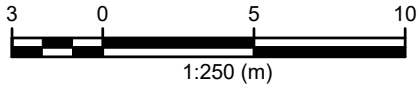


FILE: B:\Working\THOMASFIELD HOMES LIMITED\2401754 - 420004 Marsville South (Graham Property)\Drawings\420004 - Conceptual Lot Layout Figures.dwg LAYOUT: FIGURE 12 - LOT 57 LAYOUT FIGURE
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



- NOTES
1. NO SHEDS OR OUTDOOR STORAGE (BOAT/RV) IS PERMITTED PER A RESTRICTIVE COVENANT IN THE SUBDIVISION AGREEMENT.

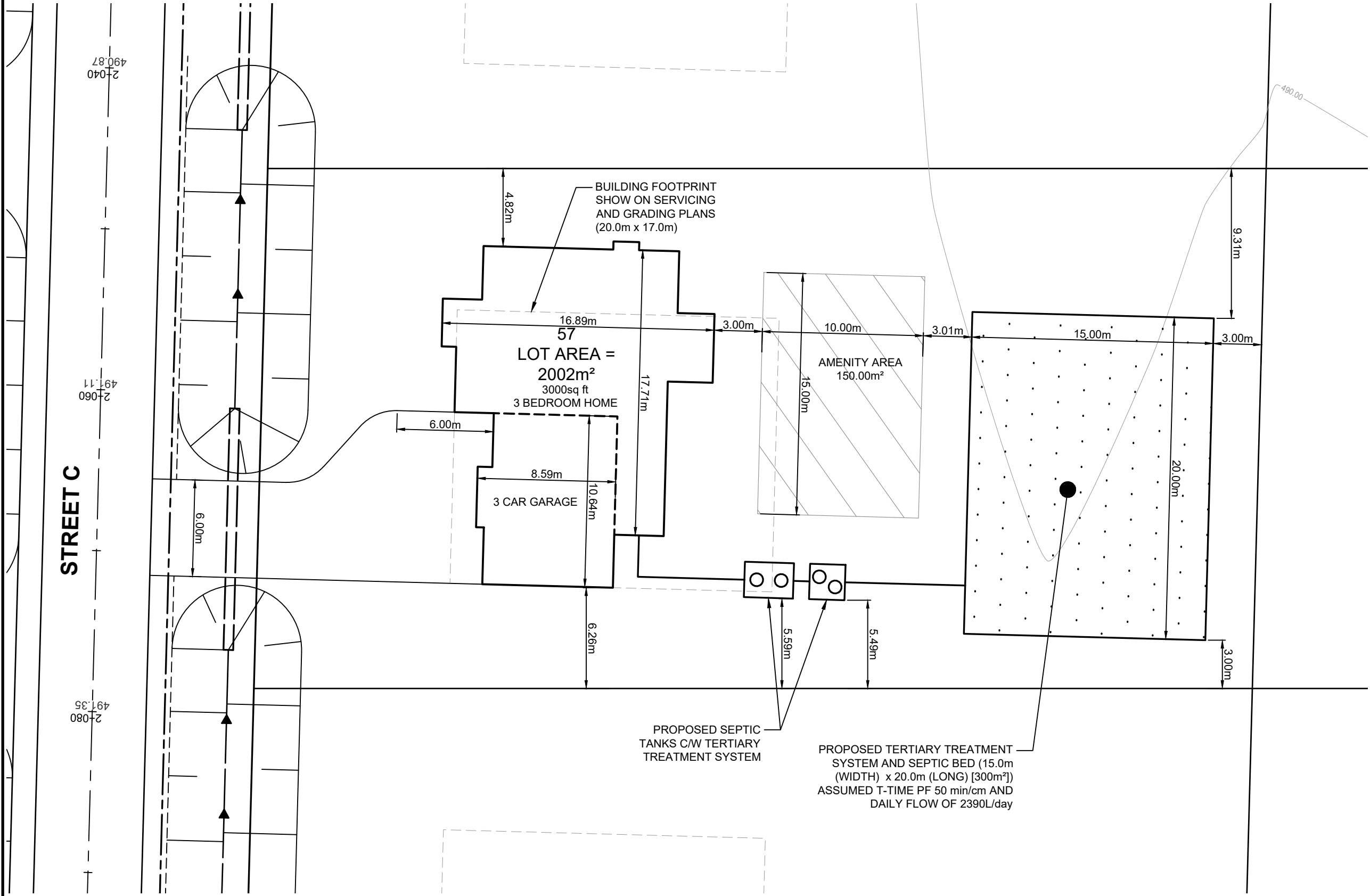


CONCEPTUAL LOT
LAYOUT WITH TERTIARY
SEPTIC BEDS - LOT 57
MARSVILLE SOUTH

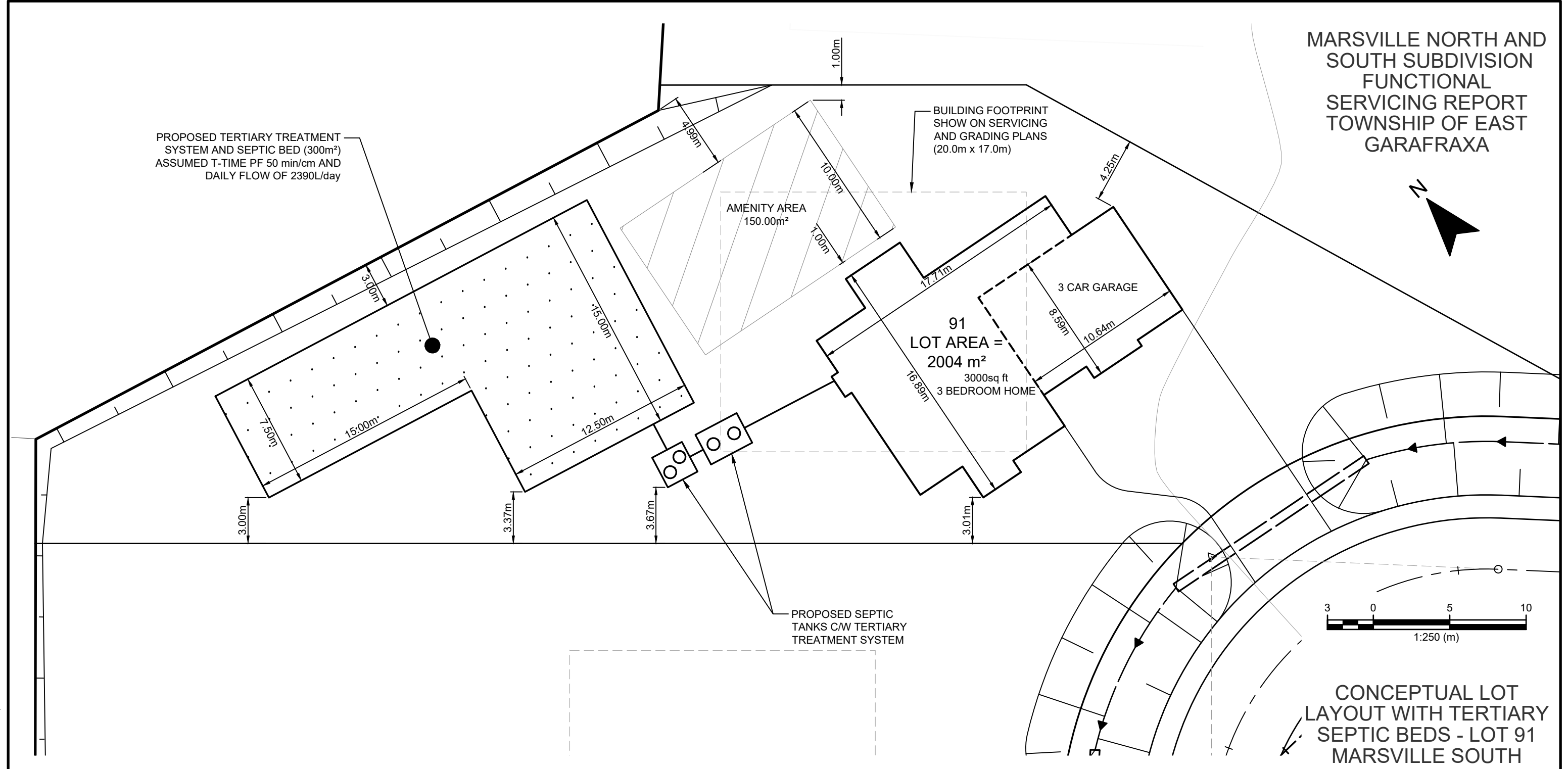
Figure No. 12



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FILE:Working\THOMASFIELD HOMES LIMITED\2401754 - 420004 Marsville South (Graham Property)\Drawings\420004 - Conceptual Lot Layout Figures.dwg LAYOUT:FIGURE 13 - LOT 91 LAYOUT FIGURE
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The Municipal Class Environmental Assessment process determined the sizing of the municipal well system and external piping system required on the 13th Line and Dufferin County Road 3 to provide the domestic water supply volume and pressure to interconnect and loop the internal water supply systems for the Marsville North and Marsville South Subdivisions to the expanded Marsville water supply system.

The water system is intended to be financially secured by the landowners developing lands within Marsville. The Township does not own the land required for the preferred solution and the water system cannot be constructed until those lands have been dedicated to the Township or other arrangements have been made to the satisfaction of the Township and Township Engineer.

Fire Flow Protection

As noted in the Municipal Class Environmental Assessment, the preferred alternative will provide fire protection via fire hydrants in the water distribution system which will be sized to provide 69-74 L/s once the water system is fully constructed and looped.

Foundation Drainage

Foundation drainage within the Marsville North Subdivision will be provided by a sump pump connection to the proposed municipal storm sewer in the right-of-way. Flow from the proposed storm sewer will then be conveyed to the stormwater management facility, ultimately discharging to the expanded Thunderbird Drainage Works system.

Foundation drainage within the Marsville South Subdivision will be provide by sump pumps discharging to grade and ultimately being conveyed overland via the roadside ditches to the stormwater management facility and the expanded Thunderbird Drainage Works system.

Stormwater Management

Through the pre-consultation process with the Township of East Garafraxa and the review of comments received by the Township of East Garafraxa during the public consultation process for the previous development applications, the following drainage concerns have been identified:

- The need to provide quality and quantity treatment control for stormwater runoff generated from the development lands prior to discharge from the site to the receiving outlet.
- The need to attenuate the rate of stormwater runoff discharging from the development lands to the receiving outlet to maintain the existing flow regime and to account for the available capacity in the receiving outlet to adequately convey the flows.
- The need to attenuate the volume of stormwater runoff discharging from the development lands to the receiving outlet to maintain the existing flow regime and to account for the available capacity in the receiving outlet to adequately convey the volume.
- The need to maintain the conveyance of existing stormwater flows and volumes generated from the Thunderbird Subdivision through the Marsville North Subdivision to the receiving outlet.

- The need to consider alternate drainage paths and outlets for stormwater runoff generated from the lands to the south of Dufferin County Road 3 to reduce the stormwater flow rates and volumes being directed and conveyed through the existing Thunderbird Subdivision.

To address the above concerns and needs, the Draft Plan of Subdivision for the Marsville North Subdivision has provided a 0.91-hectare block for use as a stormwater management facility, along with a 0.06-hectare block for a stormwater management conveyance channel to convey and route the stormwater flows from the existing Thunderbird Subdivision and other upstream lands to the stormwater management facility for the full range of design storm events (25 mm to 100 year design storm event) and the Regional Storm.

The Draft Plan of Subdivision for the Marsville South Subdivision has provided a 2.36-hectare block for use as a stormwater management facility for the full range of design storm events (25 mm to 100 year design storm event) and the Regional Storm. The proposed stormwater management facility is proposed to collect, attenuate and divert the storm runoff from the lands to the south of Dufferin County Road 3 to the west away from the existing Thunderbird Subdivision to the proposed extension of the new branch of the Thunderbird Drainage Works. A petition under the Drainage Act has been filed for improvements and new branch of the Thunderbird Drainage Works.

The stormwater management facilities will be designed to provide the required quality and quantity controls to meet the current standards for the Township of East Garafraxa, the Province of Ontario and the Grand River Conservation Authority.

Further details and discussion related to the stormwater management facility have been provided in Section 5.

Drainage Outlet Improvements

The Thunderbird Drainage Works is the legal drainage outlet for the proposed Marsville North Subdivision, the proposed Marsville South Subdivision, the existing Thunderbird Subdivision and surrounding existing agricultural lands located to the south of Dufferin County Road 3.

Development of the Marsville North and the Marsville South Subdivisions will increase stormwater flowrates and runoff volumes to the receiving outlet.

The existing Thunderbird Drainage Works, which consists of both tile drain and open drain (i.e. drainage ditch), was designed as an agricultural drain and does not have capacity to accommodate the additional stormwater runoff generated from the development of the Marsville North and Marsville South Subdivisions.

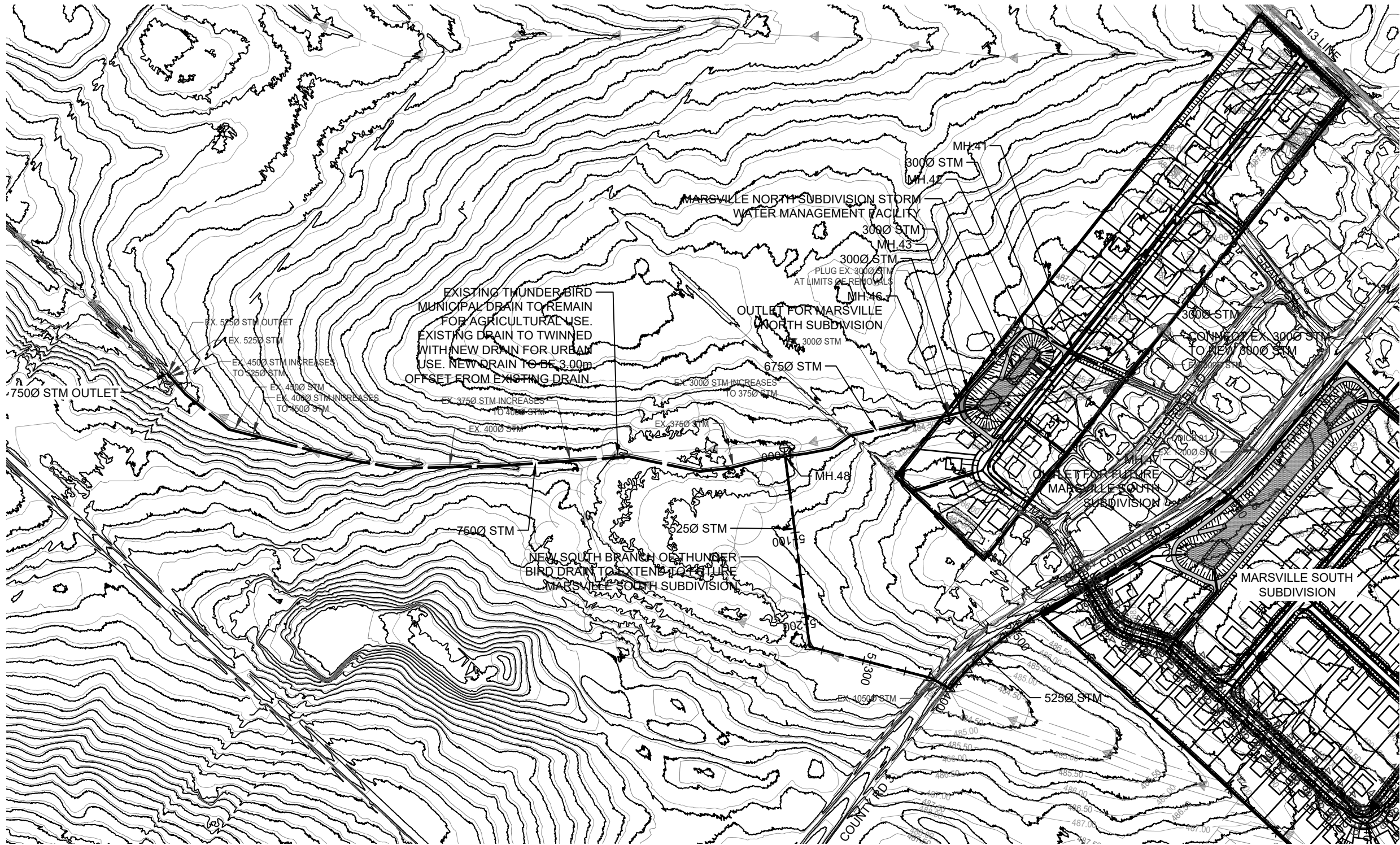
A petition has been filed under The Drainage Act for drainage improvements which may consist of a dedicated storm sewer system routed parallel to the existing Thunderbird Drainage Works (closed tile drain). The Township has retained a Drainage Engineer per the Drainage Act to review the proposed works and determine a final design. To provide sufficient capacity to accommodate and convey the stormwater generated from the Marsville North and Marsville South Subdivisions to the receiving outlet, the following drainage outlet improvements are may be considered, however the final design of the improvements is the responsibility of the Drainage Engineer:

- A dedicated storm sewer to be designed to provide sufficient capacity to convey the attenuated stormwater flowrates and volumes from the Marsville North and Marsville South Subdivision stormwater management facilities to a sufficient outlet.
- A dedicated storm sewer system to be installed parallel to the existing tile drain and extended from the centre of southwest half of Lot 7, Concession 13, Township of East Garafraxa to the outlet of the proposed Marsville North Subdivision stormwater management facility (approximately 1,010m in length).
- A dedicated storm sewer branch drain to the west to capture, convey and re-direct flows generated from the Marsville South Subdivision stormwater management facility to the south of Dufferin County Road 3 around the existing Thunderbird Subdivision (approximately 555m in length).
- The existing tile drain will be maintained from the centre of southwest half of Lot 7, Concession 13, Township of East Garafraxa to the south limit of Dufferin County Road 3 to maintain existing drainage conveyance from the Thunderbird Subdivision and to service the agricultural lands including the existing farm field tile drain systems.
- A portion of the existing tile drain from the Thunderbird Subdivision, which currently extends through the limits of the Marsville North Subdivision, will be re-routed through the development based on the internal right-of-way and lot layout for the subdivision. This will be maintained for routing and drainage.
- The open drain (i.e. drainage ditch) portion of the Thunderbird Drainage Works will be assessed to ensure the conveyance capacity and to ensure that flows from the upstream lands (both agricultural and urban development) are conveyed to a sufficient outlet.

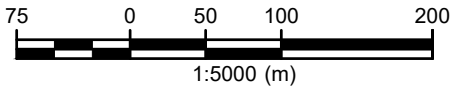
A conceptual layout for the proposed drainage outlet improvements have been illustrated on Figure No. 14 and Figure No. 15. The design will be finalized by the Drainage Engineer per the Drainage Act process.

Further details and discussion related to the drainage outlet improvements have been provided in Section 5.4.

FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES 5-7.dwg LAYOUT:FIGURE 14 - MARSVILLE NORTH DRAIN IMPROVEMENTS
LAST SAVED BY:E:\vabr3950, 9/3/2024 3:48:42 PM PLOTTED BY:Brch, Evan, 9/3/2024 4:14:17 PM



MARSVILLE NORTH AND
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SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



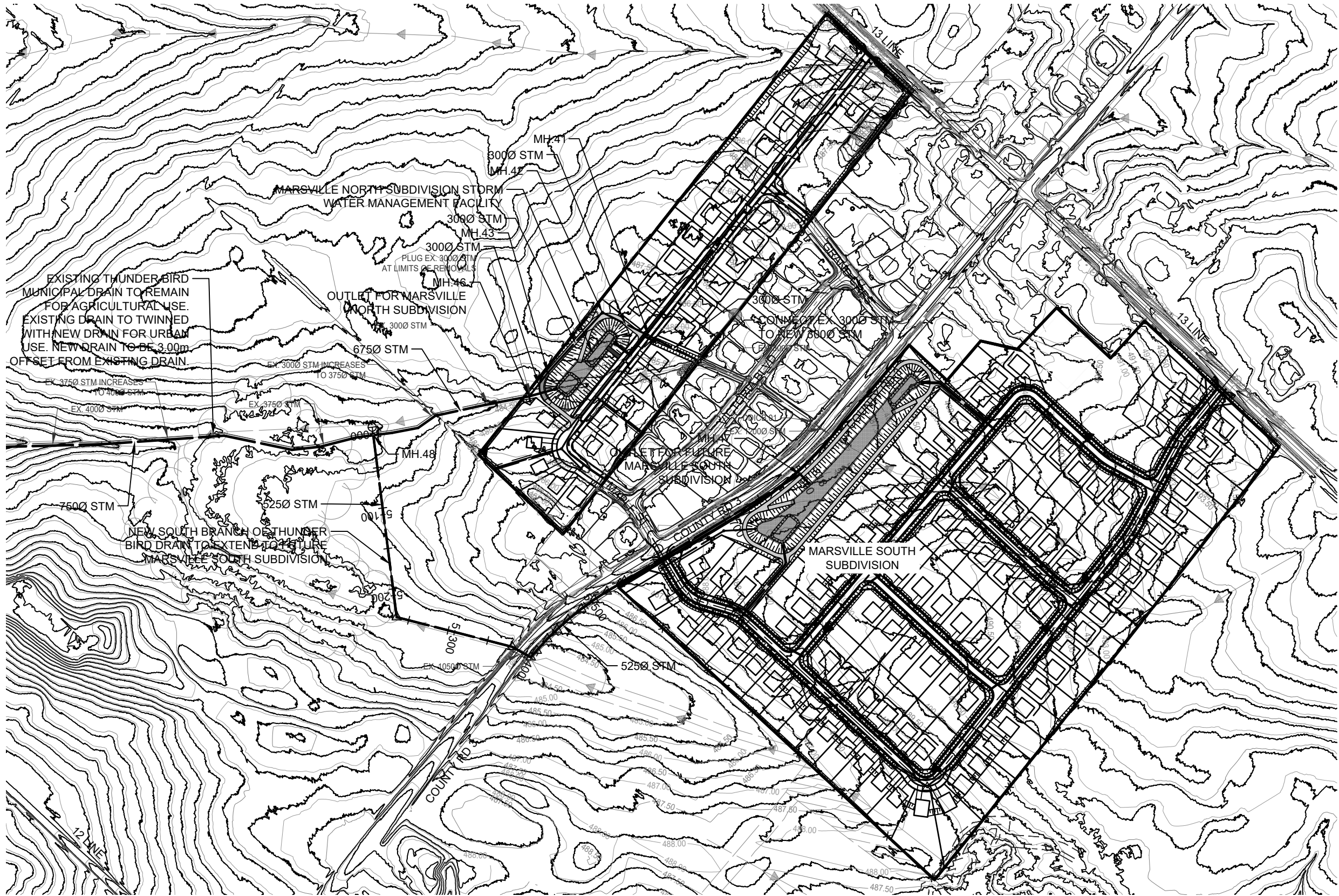
DRAINAGE OUTLET
IMPROVEMENTS
CONCEPTUAL
LAYOUT FOR MARSVILLE
NORTH SUBDIVISION

Figure No. 14

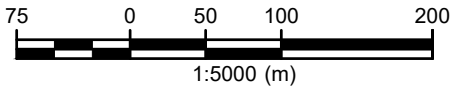


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FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES 5-7.dwg LAYOUT:FIGURE 15 - MARSVILLE SOUTH DRAIN IMPROVEMENTS
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



DRAINAGE OUTLET
IMPROVEMENTS
CONCEPTUAL LAYOUT
FOR LANDS SOUTH
OF COUNTY ROAD 3

Figure No. 15



418153 - 420004
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5. STORMWATER MANAGEMENT AND DRAINAGE OUTLET IMPROVEMENTS

5.1 Stormwater Management Design Criteria

The studies, policies and guidelines used to develop the stormwater management plan for the Marsville North and South Subdivisions are as follows:

1. The Stormwater Management Practices Planning and Design Manual, 1994
2. Stormwater Management Planning and Design Manual, 2003
3. The Interim Stormwater Quality Control Guidelines, 1991
4. The Stormwater Quality Best Management Practices Manual, 1991
5. The MTO Drainage Management Technical Guidelines, 1989
6. The Ontario Urban Drainage Design Guidelines, 1987

The stormwater management design criteria for Marsville North and Marsville South Subdivisions, are as follows:

1. Post-development runoff generated from the Marsville North Subdivision is to be attenuated in the on-site stormwater management facility, for the full range of design storm events (25mm to 100-year design storm event) to the capacity of the dedicated storm sewer system proposed as part of the drainage outlet improvements for the Thunderbird Drainage Works (closed tile drain). The allowable release rate from the Marsville North Subdivision stormwater management facility to the 675 mm diameter storm sewer is 0.750 m³/s for the full range of design storm events.
2. Post-development runoff generated from the Marsville South Subdivision is to be attenuated in the on-site stormwater management facility, for the full range of design storm events (25mm to 100-year design storm event), to the capacity of the storm sewer proposed as the drainage outlet for the pond. The storm sewer will drain into the West Watershed catchment area and eventually into the Thunderbird Drainage Works (closed tile drain). The allowable release rate from the Marsville South Subdivision stormwater management facility to the 525 mm diameter storm sewer is 0.390 m³/s for the full range of design storm events.
3. Ensure that sufficient major systems will convey the anticipated flow rates and runoff volumes generated during the Regional Storm.
4. Provide Enhanced (80% TSS) quality control treatment for runoff generated from the Marsville North and Marsville South Subdivisions, prior to discharge from the site.
5. Major storm flows exceeding the capacity of the proposed dedicated storm sewer are to be routed overland to a sufficient outlet.
6. Ensure the flow conveyance capacity of the open drain portion of the Thunderbird Drainage Works to provide sufficient capacity to convey the flowrate and volume generated from the upstream lands (agricultural and urban) to a sufficient outlet.

The Fergus Shand Dam rainfall parameters presented in the Stormwater Management Master Plan for Centre Wellington (Elora, Salem and Fergus) (wsp Group, dated April 9, 2024) were used to generate the mass rainfall data for a 4-hour duration rainfall event for the full range of design storms (2 to 100-year). The 25mm storm for

a 2-hour duration is also included within the table below. The Chicago storm parameters and the total depth of rainfall for each storm are as follows:

Table No. 2: Fergus Shand Dam - Chicago Storm Parameters

Parameter	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
a =	367.000	414.876	544.711	627.308	746.059	820.361	901.088
b =	5.000	0.0268	0.0206	0.0136	0.0851	0.0100	0.0426
c =	0.700	0.682	0.686	0.687	0.692	0.691	0.692
r =	0.394	0.375	0.375	0.375	0.375	0.375	0.375
td =	120.00	240.00	240.00	240.00	240.00	240.00	240.00
Rainfall depth (mm)	24.995	39.504	50.743	58.119	67.239	74.358	81.221

The Horton infiltration method was used in the MIDUSS model. The following parameters summarized in the following Table No. 3 were used according to the MTO Drainage Management Manual for a Type 'BC' Soil Classification (Design Chart 1.13) as it was interpolated between the Type 'B' and 'C' soils.

Table No. 3: MIDUSS – Horton Infiltration Parameters

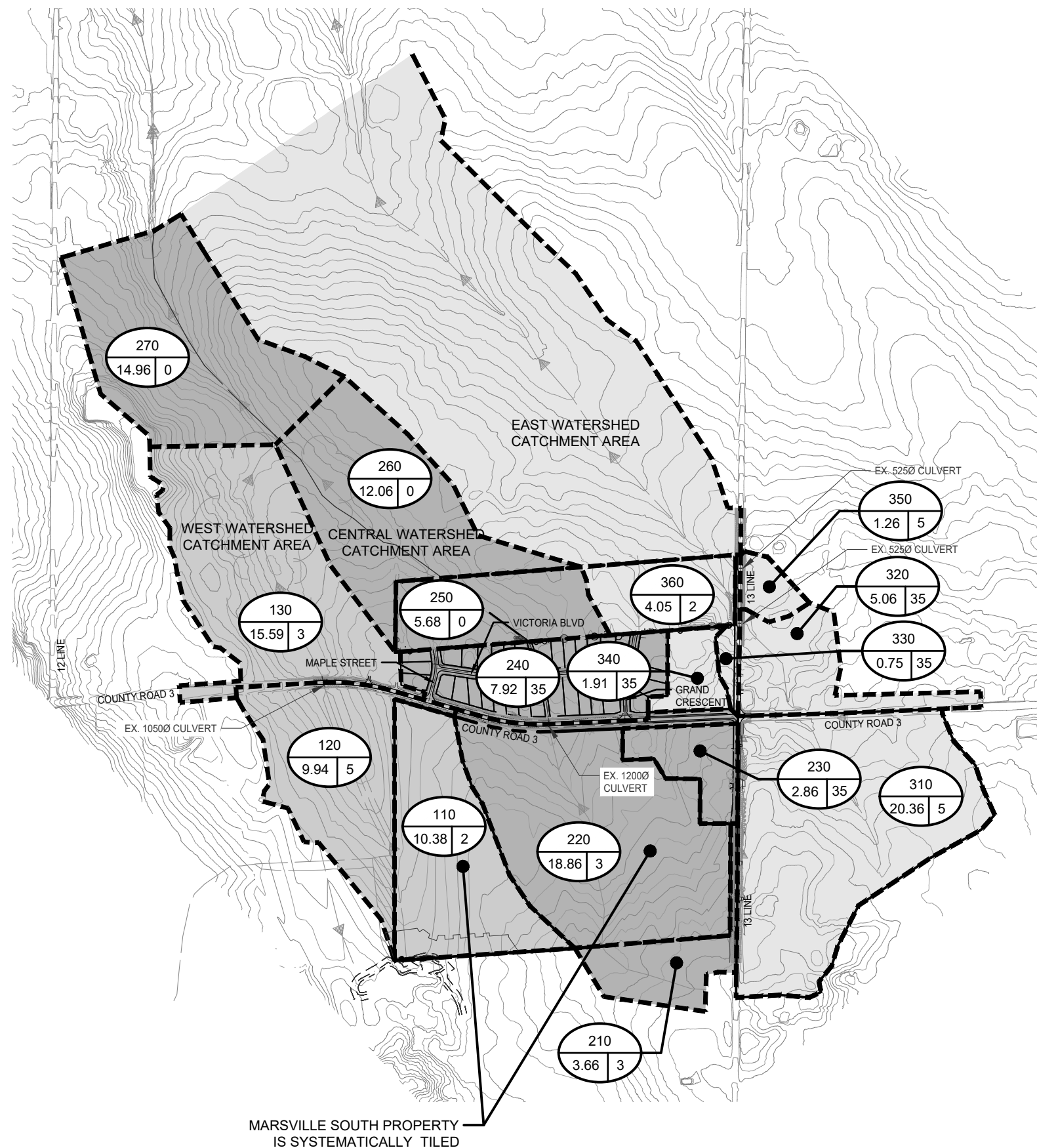
Parameter	Impervious Areas	Pervious Areas
Maximum Infiltration (mm/hr)	0.0	125.0
Minimum Infiltration (mm/hr)	0.0	5.0
Lag Constant (hr)	0.0	0.25
Depression Storage (mm)	1.5	5.0

The Hurricane Hazel (Regional Storm) and a 100-year design storm event with a 24-hour SCS distribution were also utilized to model the function of the stormwater management system under extreme conditions. The Regional Storm rainfall distribution is presented in Table No. 4 below:

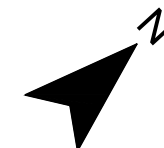
Table No. 4: Regional Storm Rainfall Distribution (O.Reg 160/06, Schedule 1, Table 1)

Time (min)	60	120	180	240	300	360	420	480	540	600
	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028
600	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028
1200	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028	2.028
1800	2.028	2.026	2.026	2.026	2.028	2.026	6.000	4.000	6.000	13.000
2400	17.000	13.000	23.000	13.000	13.000	53.000	38.000	13.000	Depth = 285.0mm	

FILE:Working\THOMASFIELD HOMES LIMITED\2401754 - 420004 Marsville South (Graham Property)\Drawings\420004 - 418153 - Combined SWM Figures.dwg LAYOUT:FIGURE 16 - PRE DEVELOPMENT
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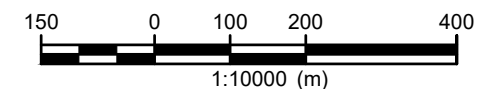


MARSVILLE NORTH AND SOUTH SUBDIVISION FUNCTIONAL SERVICING REPORT TOWNSHIP OF EAST GARAFRAXA



LEGEND

- PROP. STORM SEWER
- - - DRAINAGE AREA BOUNDARY
- 201
0.110 | 80
CATCHMENT NUMBER
% IMPERVIOUS
CATCHMENT AREA IN HECTARES



PRE-DEVELOPMENT
CONDITION DRAINAGE
CATCHMENT AREAS

Figure No. 16



418153 - 420004
FEBRUARY 2022
Scale: 1:10000 | NAD 1983 UTM Zone 17N

5.2 Pre-Development Conditions

The 135.8-hectare Study Area is comprised of three (3) pre-development condition watershed areas split into sixteen (16) pre-development condition drainage catchment areas as shown on Figure No. 16 and described below:

West Watershed Catchment Area

Catchment 110 (10.38 hectares, 2% impervious) represents a portion of the existing lands located to the south of Dufferin County Road 3. Runoff generated from Catchment 110 is currently conveyed via the existing 1050mm diameter culvert on Dufferin County Road 3 to the Thunderbird Drainage Works.

Catchment 120 (9.94 hectares, 5% impervious) represents the existing agricultural lands located to the south of Dufferin County Road 3. Runoff generated from Catchment 120 is conveyed via the existing 1050mm diameter culvert on Dufferin County Road 3 to the Thunderbird Drainage Works.

Catchment 130 (15.59 hectares, 3% impervious) represents the existing agricultural lands located on the north side of Dufferin County Road 3. Runoff generated from Catchment 130 is conveyed overland to the Thunderbird Drainage Works.

Central Watershed Catchment Area

Catchment 210 (3.66 hectares, 3% impervious) represents the existing agricultural lands located to the south of Dufferin County Road 3. Runoff generated from Catchment 210 sheetflows overland to the existing 1200mm diameter culvert on Dufferin Country Road 3, ultimately discharging through the existing Thunderbird Subdivision to the Thunderbird Drainage Works.

Catchment 220 (18.86 hectares, 3% impervious) represents a portion of the existing lands located to the south of Dufferin Country Road 3. Runoff generated from Catchment 220 sheetflows overland to the existing 1200mm diameter culvert on Dufferin Country Road 3, ultimately discharging through the existing Thunderbird Subdivision to the Thunderbird Drainage Works.

Catchment 230 (2.86 hectares, 35% impervious) represents the existing residential, commercial and municipal lands located at the southwest corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 230 sheetflows overland to the existing 1200mm diameter culvert on Dufferin Country Road 3, ultimately discharging through the existing Thunderbird Subdivision to the Thunderbird Drainage Works.

Catchment 240 (7.92 hectares, 35% impervious) represents the existing Thunderbird Subdivision. Runoff generated from Catchment 240 is conveyed via roadside ditches, subdrains and surface swales through the Marsville North Subdivision lands, ultimately discharging to the Thunderbird Drainage Works.

Catchment 250 (5.68 hectares, 0% impervious) represents the westerly portion of the Marsville North Subdivision. Runoff generated from Catchment 250 sheetflows overland and is captured and conveyed by the Thunderbird Drainage Works to the existing outlet.

Catchment 260 (12.06 hectares, 0% impervious) represents the existing agricultural lands located to the north of the Marsville North Subdivision. Runoff generated from Catchment 260 sheetflows overland and is captured and conveyed by the Thunderbird Drainage Works to the existing outlet.

Catchment 270 (14.96 hectares, 0% impervious) represents the existing agricultural lands immediately upstream of the open drain (i.e. drainage ditch) portion of the Thunderbird Drainage Works. Runoff generated from Catchment 270 sheetflows overland and is captured and conveyed by the Thunderbird Drainage Works to the existing outlet.

East Watershed Catchment Area

Catchment 310 (20.36 hectares, 5% impervious) represents the existing commercial and agricultural lands located at the southeast corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 310 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 320 (5.06 hectares, 35% impervious) represents the existing residential and agricultural lands located at the northeast corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 320 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 330 (0.75 hectares, 35% impervious) represents the existing residential lands fronting on to 13th Line. Runoff generated from Catchment 330 is conveyed via roadside ditches and overland sheetflow to Branch C of the Brouwer Drainage Works.

Catchment 340 (1.91 hectares, 35% impervious) represents the land located the east of the Thunderbird Subdivision. Runoff generated from Catchment 340 sheetflows overland to the Marsville North Subdivision, ultimately sheetflowing overland to the Branch C of the Brouwer Drainage Works.

Catchment 350 (1.26 hectares, 5% impervious) represents the existing agricultural lands located on the east side of the 13th Line. Runoff generated from Catchment 350 is conveyed via roadside ditches and overland sheetflow to Branch C of the Brouwer Drainage Works.

Catchment 360 (4.05 hectares, 2% impervious) represents the easterly portion of the Marsville North Subdivision. Runoff generated from Catchment 360 sheetflows overland to Branch C of the Brouwer Drainage Works.

A summary of the MIDUSS parameters used to model these catchments are as follows:

Table No. 5: MIDUSS Catchment Parameters – Pre-Development Conditions

Catchment	Area	Percent Imperviousness	Slope (%)	Flow Length (m)
West Watershed				

Catchment	Area	Percent Imperviousness	Slope (%)	Flow Length (m)
110	10.38	2	1.40	275
120	9.94	5	1.75	174
130	15.59	3	1.60	198
Central Watershed				
210	3.66	3	0.75	135
220	18.86	3	1.50	351
230	2.86	35	1.50	45
240	7.92	35	1.00	76
250	5.68	0	1.00	140
260	12.06	0	1.00	287
270	14.96	0	1.00	307
East Watershed				
310	20.36	5	1.00	323
320	5.06	35	1.00	89
330	0.75	35	0.50	50
340	1.91	35	0.50	100
350	1.26	5	1.25	93
360	4.05	2	1.50	296

5.3 Routing

The hydrologic model MIDUSS was used to create the design storm hydrographs and to route the flows.

Table No. 6 summarizes the peak flow rates and volumes generated from the sixteen (16) pre-development condition drainage catchment areas.

Table No. 6: PRE-DEVELOPMENT CONDITIONS – Peak Flow Rates and Volumes

Catchment ID	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)
West Watershed Catchment Areas																		
110	0.025	48.6	0.042	78.6	0.098	475.4	0.248	1,101.9	0.463	2,020.4	0.615	2,746.9	0.794	3,445.6	1.043	15,498	0.544	2,082.9
120	0.078	116.2	0.113	187.2	0.171	589.5	0.326	1,193.3	0.626	2,073.0	0.788	2,771.3	0.976	3,436.6	1.074	15,076	0.679	2,171.8
1050 Dia. Culvert at County Road 3	0.103	164.8	0.156	265.8	0.244	1,064.9	0.532	2,295.2	1.004	4,093.3	1.306	5,518.2	1.659	6,882.2	2.117	30,574	1.162	4,254.7
130	0.066	109.7	0.108	177.0	0.187	783.6	0.463	1,726.8	0.856	3,105.4	1.136	4,198.5	1.465	5,243.2	1.666	23,444	0.999	3,223.5
West Watershed Catchment Areas	0.169	274.5	0.263	442.8	0.418	1,848.5	0.995	4,022.0	1.859	7,198.8	2.442	9,716.7	3.112	12,125.4	3.783	54,018.3	2.162	7,478.2
Central Watershed Catchment Areas																		
210	0.017	25.8	0.025	41.6	0.044	183.9	0.109	405.4	0.202	729.0	0.268	985.7	0.344	1,231.1	0.391	5,503.6	0.235	756.7
220	0.066	132.6	0.109	214.5	0.170	949.1	0.402	2,090.4	0.770	3,759.4	1.017	5,079.9	1.256	6,352.1	1.806	28,294.0	0.884	3,900.7
230	0.147	230.4	0.247	372.6	0.333	544.1	0.401	739.8	0.495	995.9	0.567	1,197.1	0.641	1,388.7	0.305	5,186.6	0.378	1,138.4
1200mm dia. Culvert at County Road 3	0.224	388.8	0.334	628.7	0.471	1,687.1	0.608	3,235.7	0.998	5,484.3	1.318	7,262.6	1.640	8,971.8	2.480	38,984.7	1.118	5,795.9
240	0.427	648.3	0.606	1,049.4	0.830	1,543.9	0.990	2,049.6	1.209	2,742.7	1.376	3,288.0	1.546	3,821.7	0.804	14,580.0	0.927	3,175.6
North End of Existing Thunderbird Subdivision (via Stormwater Block)	0.651	1,037.1	0.941	1,678.1	1.300	3,230.9	1.580	5,285.3	1.972	8,226.9	2.326	10,550.6	2.706	12,793.5	3.283	53,564.5	1.655	8,971.5
250	0.000	0.00	0.00	0.00	0.066	208.5	0.180	549.8	0.352	1,052.4	0.445	1,448.9	0.554	1,832.0	0.615	8,304.7	0.388	1,071.6
Outlet Location for Future Marsville North Subdivision	0.651	1,037.1	0.941	1,678.1	1.305	3,439.4	1.597	5,835.1	2.076	9,279.3	2.488	11,999.5	2.923	14,625.5	3.899	61,869.2	1.888	10,043.0
260	0.000	0.00	0.00	0.00	0.097	442.8	0.251	1,167.6	0.488	2,234.0	0.649	3,077.9	0.805	3,891.0	1.151	17,619.0	0.572	2,274.9
270	0.000	0.00	0.00	0.00	0.114	549.3	0.307	1,448.4	0.576	2,770.4	0.766	3,817.5	0.978	4,824.0	1.406	21,837.0	0.679	2,821.4
Central Watershed Catchment Areas	0.651	1,037.1	0.941	1,678.1	1.316	4,431.5	1.633	8,451.0	2.640	14,283.7	3.467	18,894.8	4.383	23,340.5	6.455	101,324.3	2.965	15,139.3
Total Combined Flow to Thunderbird Drain (West and Central Watershed)	0.820	1,311.5	1.136	2,120.9	1.623	6,279.9	2.371	12,473.0	4.415	21,482.5	5.768	28,611.5	7.359	35,465.9	10.238	155,342.6	5.031	22,617.5
East Watershed Catchments Areas																		
310	0.118	238.2	0.188	385.8	0.278	1,210.0	0.431	2,445.8	0.783	4,250.6	1.012	5,676.1	1.308	7,049.2	1.918	31,139	0.886	4,460.0
320	0.272	414.0	0.381	670.4	0.511	989.3	0.611	1,315.6	0.746	1,761.6	0.849	2,114.0	0.952	2,448.5	0.516	9,325.1	0.584	2,029.5
525 dia. Culvert at 13 Line	0.371	652.2	0.569	1,056.2	0.758	2,199.3	0.945	3,761.4	1.223	6,012.2	1.421	7,790.1	1.635	9,497.7	2.434	40,464.1	1.073	6,489.5
330	0.040	61.3	0.058	99.3	0.080	145.8	0.095	193.5	0.116	258.8	0.132	311.5	0.149	361.6	0.076	1,379.9	0.088	300.3
340	0.104	156.6	0.153	252.2	0.200	372.2	0.234	495.4	0.282	666.9	0.315	801.6	0.349	931.5	0.198	3,608.0	0.209	762.1

Catchment ID	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)
Northeast of Existing Thunderbird Subdivision	0.516	870.1	0.774	1,407.7	1.024	2,717.3	1.260	4,450.2	1.605	6,937.9	1.851	8,903.2	2.112	10,790.8	2.709	45,451.8	1.255	7,551.8
350	0.010	14.7	0.013	23.9	0.022	74.8	0.051	151.2	0.101	262.6	0.128	350.3	0.158	435.1	0.137	1,887.1	0.108	275.5
Downstream of 525 dia. Culvert at 13 Line	0.525	884.8	0.778	1,431.5	1.046	2,792.1	1.297	4,601.4	1.668	7,200.5	1.932	9,253.5	2.214	11,225.9	2.846	47,338.9	1.327	7,827.3
360	0.010	19.0	0.016	30.65	0.038	185.5	0.096	430.0	0.180	788.4	0.233	1,071.7	0.306	1,343.7	0.404	6,037.1	0.207	813.0
Total to Brouwer Municipal Drain	0.535	903.8	0.804	1462.2	1.074	2,977.6	1.345	5,031.4	1.746	7,988.9	2.030	10,325.2	2.337	12,569.6	3.249	53,376.0	1.441	8,640.3

5.4 Stormwater Management Approach

The stormwater management approach for the Marsville North and Marsville South Subdivisions is a “treatment train” using lot level, conveyance and end-of-pipe management practices, along with the proposed drainage outlet improvements to the Thunderbird Drainage Works, to provide the required quality and quantity control treatment for runoff generated from the development. The stormwater management system for the Marsville North and Marsville South Subdivisions is designed to convey and attenuate the complete range of design storm events, up to and including the 100-year design storm.

Lot Level Controls

Stormwater management practices recommended for providing lot level controls are as follows:

a) Rear Yard Swales

The grading of the residential lots will be to current Township of East Garafraxa standards. The length of the rear lot swales will be maximized to utilize the contact time with the grassed surfaces to promote settling and filtration of runoff. To promote infiltration on the lots and in the swales, it is recommended that the average depth of graded topsoil be 300mm.

b) Foundation Drainage

Foundation drainage will be provided by sump pump discharging to the proposed storm sewers along the roadways for conveyance to the onsite stormwater management facilities in the Marsville North and South Subdivisions, ultimately discharging directly to the improved Thunderbird Drainage Works.

Conveyance Controls

Conveyance controls for the Marsville North and Marsville South Subdivisions are as follows:

- Municipal storm sewers within the rights-of-way of the subdivision lands to collect and convey stormwater to the respective stormwater management facilities in the Marsville North and Marsville South Subdivisions.
- Stormwater management conveyance channel to convey stormwater runoff from the Thunderbird Subdivision to the Marsville North Subdivision stormwater management facility.

End-of-Pipe Controls

The end-of-pipe controls for the Marsville North and Marsville South Subdivisions will consist of a stormwater management facility within each development. The stormwater management facilities are designed to attenuate the peak flow rated generated from the development area for the full range of design storm events (25mm to 100-year design storm event) prior to discharge to the dedicated storm sewer outlet proposed as part of the drainage outlet improvements for the Thunderbird Drainage Works (closed tile drain). Enhanced (80% TSS) water quality control treatment will also be provided within each of the stormwater management facility.

Thunderbird Drainage Work Improvements and Allowable Release Rates

The Thunderbird Drainage Works is the legal drainage outlet for proposed Marsville North and Marsville South Subdivisions, the existing Thunderbird Subdivision and existing agricultural lands located to the south of Dufferin County Road 3.

Development of the Marsville North and Marsville South Subdivisions will increase stormwater flowrates and volumes to the receiving outlet.

The existing Thunderbird Drainage Works, which consists of both tile drain and open drain (i.e. drainage ditch), was designed as an agricultural drain and does not have capacity to accommodate the additional stormwater runoff generated from the development of the Marsville North and Marsville South Subdivisions.

Based on the criteria used to design the Thunderbird Drainage Works, the allowable release rate to the closed tile drain from the Marsville North Subdivision lands is $0.01 \text{ m}^3/\text{s}$. With an allowable release rate of $0.01 \text{ m}^3/\text{s}$, the standard 24 to 48 hour drawdown time for the stormwater management facility cannot be achieved. Also, the concerns identified through the pre-consultation process related to increased volumes of runoff cannot be mitigated through the use of the existing Thunderbird Drainage Works.

To provide sufficient capacity to accommodate and convey the stormwater flows generated from the Marsville North and Marsville South Subdivisions to the receiving outlet, the following drainage outlet improvements are proposed (Figure No. 14 and Figure No. 15):

- Construct a parallel dedicated storm sewer with sufficient capacity to convey the attenuated stormwater flowrates and volumes from the Marsville North and Marsville South Subdivision stormwater management ponds to a sufficient outlet.
- The parallel dedicated storm sewer will consist of a 750 mm diameter storm sewer extending approximately 759 m from the open channel and a 675 mm diameter storm sewer extending approximately 191 m to the Marsville North Subdivision stormwater management pond to service Marsville North Subdivision.
- At the junction point of the 750 mm diameter storm sewer and the 675 mm diameter storm sewer to the Marsville North Subdivision, a 525 mm diameter storm sewer will be extended approximately 546 m in a westerly direction to re-direct flows from the Marsville South Subdivision stormwater management pond, routing the lands south of Dufferin County Road 3 away from the existing Thunderbird Subdivision.
- The allowable release rate from the Marsville North Subdivision stormwater management facility to the 675 mm diameter storm sewer is $0.750 \text{ m}^3/\text{s}$ for the full range of design storm events.
- The allowable release rate from the Marsville South Subdivision stormwater management facility to the 525 mm diameter storm sewer extended to the re-direct flows away from the existing Thunderbird Subdivision is $0.390 \text{ m}^3/\text{s}$ for the full range of design storm events.
- Upgrade the flow conveyance capacity of the open drain portion of the Thunderbird Drainage Works to provide sufficient capacity to convey the flowrate and volume generated from the upstream lands (agricultural and urban) to a sufficient outlet.

5.5 Post-Development Conditions

The post-development conditions of the proposed subdivisions were assumed to be 35% imperviousness, based on our preliminary imperviousness calculations as detailed in Table No. 7.

Table No. 7: Post-Development Imperviousness

Proposed Land Use	Marsville North Subdivision	Marsville South Subdivision	Assumptions
	Impervious Area (ha)	Impervious Area (ha)	
Residential Lots	1.33	3.91	Assumed 20% lot coverage
Roads	0.89	2.61	9m of asphalt road, 1.5m of sidewalk and 6m driveway aprons
Park	0.00	0.00	Assumed as all pervious.
SWM Block	0.42	1.22	Assumed as 50% impervious.
Total Impervious Area	2.64	7.74	
Total Site Area	9.729	28.10	
Total Percent Imperviousness	27%	27.5%	Use 35% to be conservative and to account for any additional residential imperviousness – patios, walkways, etc.

The 135.8-hectare Study Area is comprised of three (3) pre-development condition watershed catchment areas and seventeen (17) post-development condition drainage catchment areas as shown on Figure No. 17. The catchments are further described below:

West Watershed Catchment Areas

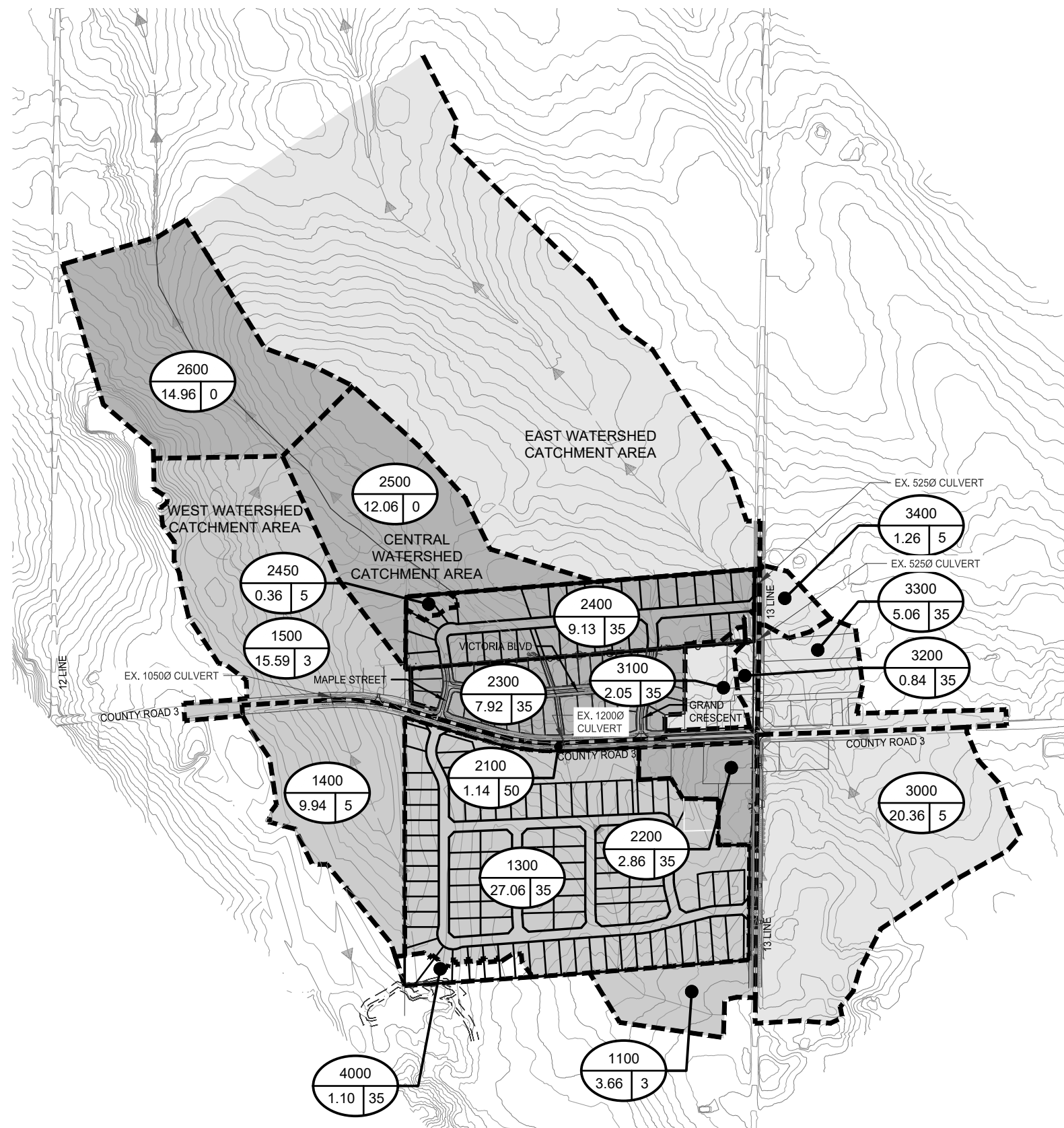
Catchment 1100 (3.66 hectares, 3% impervious) represents the existing agricultural lands located to the south of the proposed Marsville South Subdivision. Runoff generated from Catchment 1100 sheetflows overland through the proposed development to the Marsville South stormwater management facility located to the south of Dufferin County Road 3, prior to discharging to the 525mm diameter storm sewer extended west to re-direct flows away from the existing Thunderbird Subdivision.

Catchment 1300 (27.06 hectares, 35% impervious) represents the lands located to the south of Dufferin County Road 3 which will be developed as the Marsville South Subdivision. Runoff generated from Catchment 1300 will be conveyed via roadside ditches and culverts to the proposed Marsville South stormwater management facility located to the south of Dufferin County Road 3, prior to discharging to the 525mm diameter storm sewer extended west to re-direct flows away from the existing Thunderbird Subdivision.

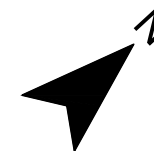
Catchment 1400 (9.94 hectares, 5% impervious) represents the existing agricultural lands located to the south of Dufferin County Road 3 and west of the proposed Marsville South Subdivision. Runoff generated from Catchment 1400 will continue to be conveyed via the existing 1050mm diameter culvert on Dufferin County Road 3 to the Thunderbird Drainage Works.

Catchment 1500 (15.59 hectares, 3% impervious) represents the existing agricultural lands located on the north side of Dufferin County Road 3 and west of the proposed Marsville North Subdivision. Runoff generated from Catchment 1500 will continue to be conveyed overland to the Thunderbird Drainage Works.

FILE: B:\Working\THOMASFIELD HOMES LIMITED\2401754 - 420004 Marsville South (Graham Property)\Drawings\420004 - 418153 - Combined SWM Figures.dwg LAYOUT: FIGURE 17 - POST DEVELOPMENT
LAST SAVED BY: Evabir3950, 9/4/2024 11:12:52 AM PLOTTED BY: Birch, Evan 10/28/2024 5:13:20 PM



MARSVILLE NORTH AND SOUTH SUBDIVISION FUNCTIONAL SERVICING REPORT TOWNSHIP OF EAST GARAFRAXA

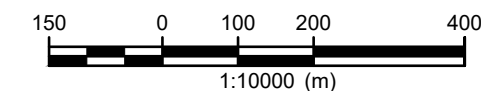


LEGEND

- PROP. STORM SEWER
- - - DRAINAGE AREA BOUNDARY
- | |
|------------|
| 201 |
| 0.110 80 |

 CATCHMENT NUMBER
% IMPERVIOUS
CATCHMENT AREA IN HECTARES

NOTE: MARSVILLE SOUTH
IS SYSTEMATICALLY TILED



POST-DEVELOPMENT CONDITION DRAINAGE CATCHMENT AREAS

Figure No. 17



418153 - 420004
FEBRUARY 2022
Scale: 1:10000 | NAD 1983 UTM Zone 17N

Catchment 4000 (1.10 hectares, 35% impervious) represents the rear yards of proposed walkout lots in the southwest corner of the Marsville South Subdivision lands. Runoff generated from Catchment 4000 will sheetflow uncontrolled towards the wetland south of the subdivision.

Central Watershed Catchment Areas

Catchment 2100 (1.14 hectares, 50% impervious) represents the southern portion of Dufferin County Road 3 right-of-way. Runoff generated from Catchment 2100 is directed to the existing 1200 mm diameter culvert on Dufferin County Road 3, discharging through the existing Thunderbird Subdivision to the stormwater management facility for the Marsville North Subdivision.

Catchment 2200 (2.86 hectares, 35% impervious) represents the existing residential, commercial and municipal lands located at the southwest corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 2200 sheetflows overland through the proposed development to the Marsville South stormwater management facility located to the south of Dufferin County Road 3, prior to discharging to the 525mm diameter storm sewer extended to re-direct flows away from the existing Thunderbird Subdivision.

Catchment 2300 (7.92 hectares, 35% impervious) represents the existing Thunderbird Subdivision. Runoff generated from Catchment 2300 sheetflows overland to the Marsville North Subdivision stormwater management facility.

Catchment 2400 (9.13 hectares, 35% impervious) represents the majority of the Marsville North Subdivision. Runoff generated from Catchment 2400 will be conveyed via on-site storm sewers and swales to the Marsville North Subdivision stormwater management facility.

Catchment 2450 (0.36 hectares, 15% impervious) represents the Marsville North Subdivision lots after the pond outlet. Minor runoff generated from Catchment 2450 will be collected and conveyed to the proposed 675mm diameter storm sewer bypassing the Marsville North Subdivision stormwater management facility. Major runoff generated from Catchment 2450 will sheetflow overland and contribute to the existing Thunderbird Drain and bypassing the Marsville North Subdivision stormwater management facility.

Catchment 2500 (12.06 hectares, 0% impervious) represents the existing agricultural lands located to the northwest of the Marsville North Subdivision. Runoff generated from Catchment 2500 sheetflows overland and is captured and conveyed by the existing Thunderbird Drainage Works to the existing outlet.

Catchment 2600 (14.96 hectares, 0% impervious) represents the existing agricultural lands immediately upstream of the open drain (i.e. drainage ditch) portion of the existing Thunderbird Drainage Works. Runoff generated from Catchment 2600 sheetflows overland and is captured and conveyed by the Thunderbird Drainage Works to the existing outlet.

East Watershed Catchment Areas

Catchment 3000 (20.36 hectares, 5% impervious) represents the existing commercial and agricultural lands located at the southeast corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 3000 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 3100 (2.05 hectares, 35% impervious) represents the land located the east of the Thunderbird Subdivision. Runoff generated from Catchment 3100 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 3200 (0.84 hectares, 35% impervious) represents the existing residential lands fronting on to 13th Line. Runoff generated from Catchment 3200 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 3300 (5.06 hectares, 35% impervious) represents the existing residential and agricultural lands located at the northeast corner of Dufferin County Road 3 and 13th Line. Runoff generated from Catchment 3300 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

Catchment 3400 (1.26 hectares, 5% impervious) represents the existing agricultural lands located on the east side of the 13th Line. Runoff generated from Catchment 3400 sheetflows overland to the existing roadside ditches on 13th Line, ultimately sheetflowing overland to Branch C of the Brouwer Drainage Works.

A summary of the MIDUSS parameters used to model these catchments are as follows:

Table No. 8: MIDUSS Catchment Parameters – Post-Development Conditions

Catchment	Area	Percent Imperviousness	Slope (%)	Flow Length (m)
West Watershed				
1100	3.66	3	0.75	135
1300	27.06	35	1.50	600
1400	9.94	5	0.75	174
1500	15.59	3	1.60	198
4000	1.10	35	7	50
Central Watershed				
2100	1.14	50	0.50	51
2200	2.86	35	1.00	45
2300	7.92	35	1.00	76
2400	9.13	35	1.00	65
2450	0.36	15	1.00	40
2500	12.06	0	1.00	287
2600	14.96	0	1.00	307
East Watershed				
3000	20.36	5	1.00	323
3100	2.05	35	0.50	100

Catchment	Area	Percent Imperviousness	Slope (%)	Flow Length (m)
3200	0.84	35	0.50	50
3300	5.06	35	1.00	89
3400	1.26	5	1.25	93

5.6 Routing

The hydrologic model MIDUSS was used to create the design storm hydrographs and to route the flows.

Table No. 9 summarizes the uncontrolled post-development peak flow rates and volumes generated from the seventeen (17) post-development condition drainage catchment areas.

Table No. 9: POST-DEVELOPMENT CONDITIONS – Uncontrolled Peak Flow Rates and Volumes

Catchment ID	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)
West Watershed Catchment Areas																		
1100	0.017	25.8	0.025	41.6	0.044	183.9	0.109	405.4	0.202	729.0	0.268	985.7	0.344	1,231.1	0.391	5,503.6	0.235	756.7
1300 (Marsville South Subdivision)	0.996	2,219.5	1.561	3,595.4	2.062	5,295.1	2.482	7,054.5	3.079	9,475.2	3.522	11,370.0	3.963	13,203.0	2.589	52,464.0	2.446	10,865.0
1400	0.064	116.0	0.104	188.2	0.166	590.8	0.272	1,194.0	0.509	2,072.1	0.640	2,769.0	0.790	3,439.3	1.026	15,259.0	0.557	2,177.5
1500	0.066	109.7	0.108	177.0	0.187	783.6	0.463	1,726.8	0.856	3,105.4	1.136	4,198.5	1.465	5,243.2	1.666	23,444.0	0.999	3,223.5
4000	0.061	88.9	0.099	144.7	0.133	213.2	0.164	284.1	0.207	380.6	0.241	457.8	0.277	532.0	0.124	1,980.7	0.185	439.0
Total - West Watershed	1.154	2,559.8	1.731	4,146.8	2.504	7,066.5	3.181	10,664.8	4.159	15,762.3	4.867	19,781.4	5.613	23,648.9	5.776	98,650.7	3.525	17,461.7
Central Watershed Catchment Areas																		
2100	0.088	133.2	0.126	215.7	0.172	298.9	0.203	373.3	0.245	472.1	0.277	551.6	0.308	628.0	0.121	2,288.0	0.177	560.2
2200	0.157	363.5	0.271	656.7	0.393	943.7	0.484	1,139.4	0.607	1,393.3	0.709	1,590.7	0.824	1,780.6	0.300	5,216.0	0.475	1,310.9
2300	0.427	648.3	0.606	1,049.4	0.830	1,543.9	0.990	2,049.6	1.209	2,742.7	1.376	3,288.0	1.546	3,821.7	0.804	14,580.0	0.927	3,175.6
2400 (Marsville North Subdivision)	0.493	745.1	0.725	1,206.1	0.985	1,767.5	1.177	2,344.7	1.440	3,153.6	1.639	3,787.3	1.842	4,401.5	0.927	16,776.0	1.079	3,646.3
2450	0.008	12.4	0.013	20.1	0.019	37.4	0.024	59.7	0.039	91.6	0.049	117.0	0.061	141.3	0.037	580.6	0.040	100.0
2500	0.000	0.0	0.000	0.0	0.097	442.9	0.251	1,167.6	0.488	2,234.0	0.649	3,077.9	0.805	3,891.0	1.151	17,619.0	0.572	2,274.9
2600	0.000	0.0	0.000	0.0	0.114	549.5	0.307	1,448.4	0.576	2,770.4	0.766	3,817.5	0.978	4,824.0	1.406	21,837.0	0.679	2,821.4
Total – Central Watershed Area	1.173	1,902.5	1.741	3,148.0	2.408	5,583.7	2.913	8,582.6	3.609	12,857.8	4.139	16,230.0	4.670	19,488.0	4.722	78,895.9	2.860	13,889.3
Total – Central and West Watershed Areas	1.960	4,462.3	3.211	7,294.8	4.584	12,650.2	5.773	19,247.5	7.521	28,620.1	8.768	36,011.3	10.114	43,136.9	10.498	177,546.5	6.239	31,351.0
East Watershed Catchment Areas																		
3000	0.118	238.2	0.188	385.8	0.278	1,209.9	0.431	2,445.7	0.783	4,250.6	1.012	5,676.1	1.308	7,049.2	1.918	31,139.0	0.886	4,460.0
3100	0.112	168.1	0.164	270.7	0.214	399.4	0.251	531.7	0.302	715.7	0.338	860.3	0.375	999.8	0.212	3,872.5	0.225	818.0
3200	0.045	68.6	0.065	111.2	0.089	163.3	0.106	216.7	0.130	289.9	0.148	348.8	0.167	405.0	0.085	1,545.4	0.099	336.3
3300	0.272	414.0	0.381	670.4	0.511	989.3	0.611	1,315.6	0.746	1,761.6	0.849	2,114.0	0.952	2,448.5	0.516	9,325.1	0.584	2,029.5
3400	0.010	14.7	0.013	23.9	0.022	74.8	0.051	151.2	0.101	262.6	0.128	350.3	0.158	435.1	0.137	1,887.1	0.108	275.5
Total – East Watershed Areas	0.538	903.6	0.805	1,461.9	1.069	2,836.8	1.324	4,660.9	1.701	7,280.4	1.968	9,349.6	2.255	11,337.5	2.869	47,768.9	1.350	7,919.2

5.7 Post-Development Quantity and Quality Control Analysis

Marsville North Subdivision

Runoff generated from Catchments 2100, 2200, 2300, and 2400 will be captured and conveyed by on-site storm sewers to the proposed Marsville North Subdivision stormwater management facility. The stormwater management facility is a wetland type facility which will provide both quantity control to attenuate flows to the allowable release rate and enhanced quality control treatment prior to discharge.

From Table 3.2 of the Stormwater Management Design Manual (MOE, 2003) a wetland facility with a contributing area that is 36% impervious requires $81.5 \text{ m}^3/\text{ha}$ of storage volume to provide enhanced water quality control treatment (80% TSS removal). $40 \text{ m}^3/\text{ha}$ of the required volume is extended detention, the remaining $41.5 \text{ m}^3/\text{ha}$ is required as permanent pool. Based on the contributing drainage area of 21.05 ha, approximately 842 m^3 is required in extended detention, and 873.6 m^3 is required in the permanent pool volume. The proposed facility has been designed to provide approximately $1,056.5 \text{ m}^3$ of extended detention and $1,581.2 \text{ m}^3$ of permanent pool, forebay, and outlet pool.

The stormwater management pond forebay has been designed to provide quality treatment of runoff prior to entering the main cell of the facility. The forebay (47m Top Length x 10m Top Width x 1.3m Depth) will receive runoff from the road storm sewer system and provide settling and dispersion. The cleanout frequency for the proposed forebay and outlet pool for this pond has been calculated to be 12 years based on the sediment loading and volume of the forebay and outlet pool.

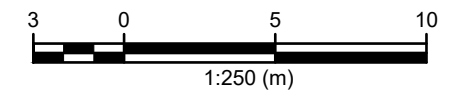
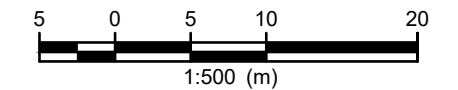
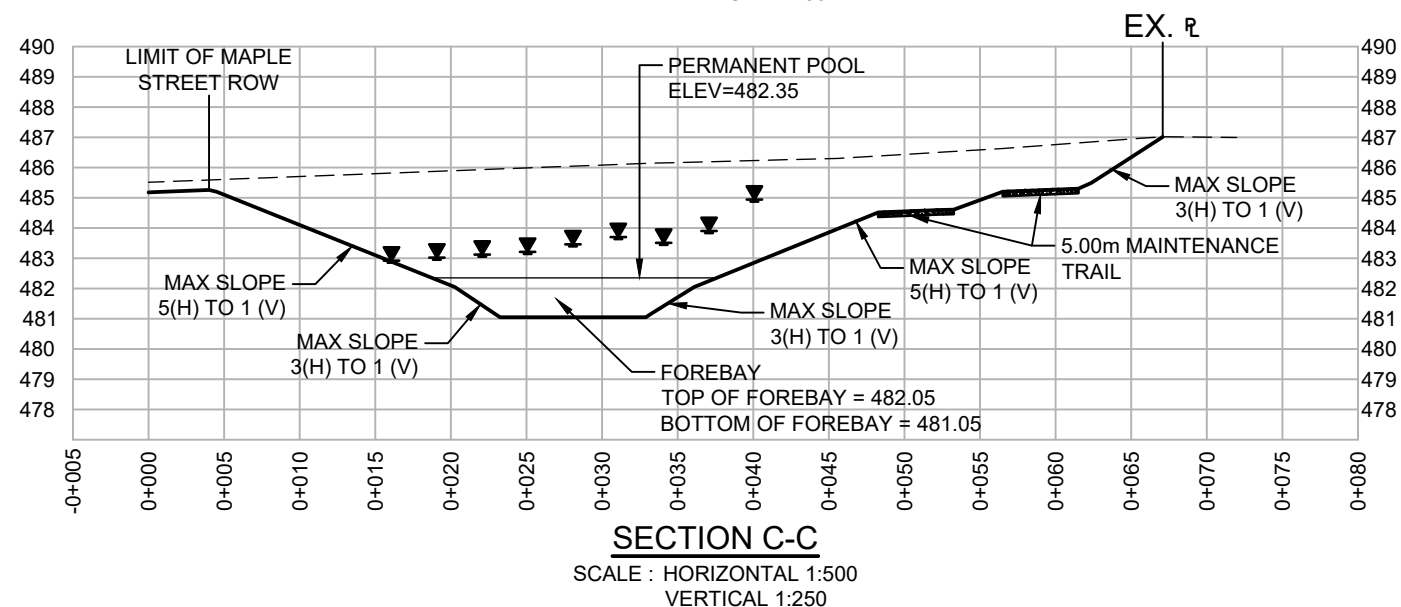
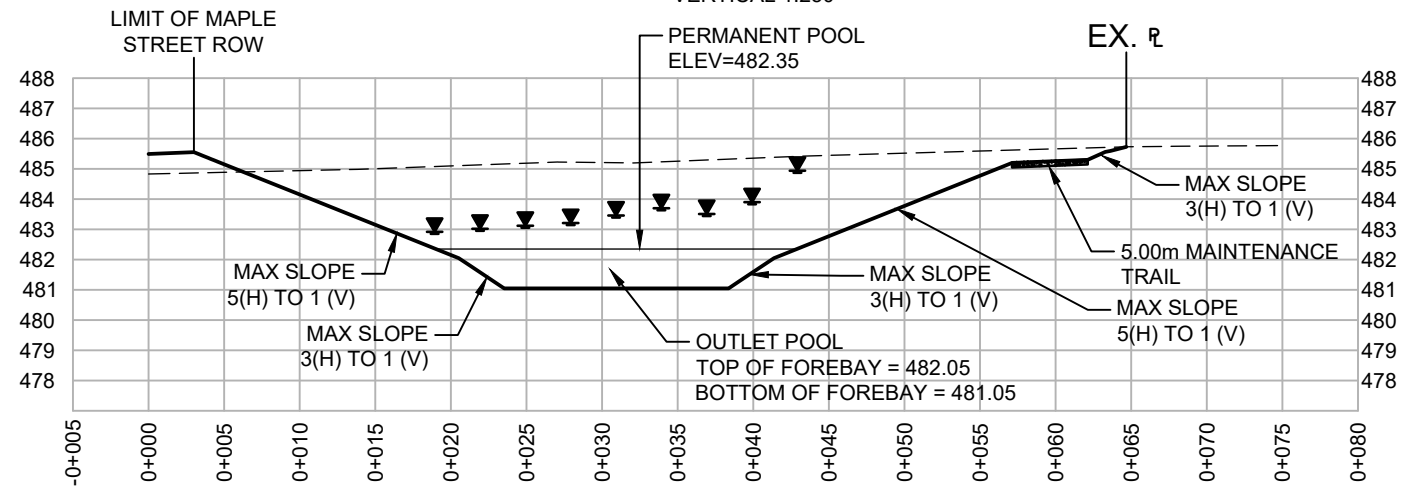
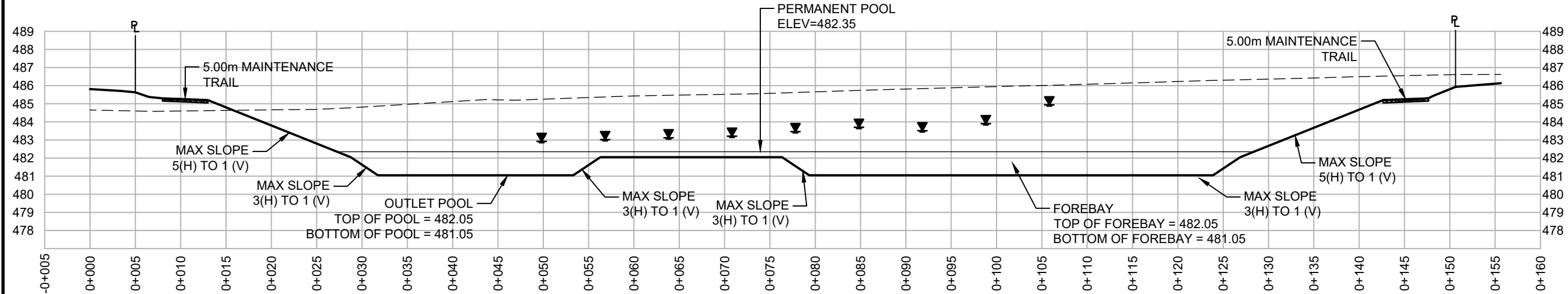
Thermal impacts of the stormwater management facility will be mitigated with tree planting to shade and cool the open water.

Details of the quantity and quality control components for the Marsville North Subdivision stormwater management facility are shown on Figure No. 18 and Figure No. 19.



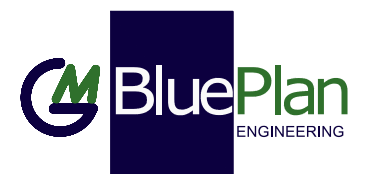
Figure No. 18

MARSVILLE NORTH AND SOUTH SUBDIVISION FUNCTIONAL SERVICING REPORT TOWNSHIP OF EAST GARAFRAXA



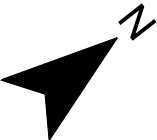
MARSVILLE NORTH SUBDIVISION STORMWATER MANAGEMENT FACILITY (SECTION VIEW)

Figure No. 19



418153 - 420004
FEBRUARY 2022
Scale: H 1:500 V 1:250 | NAD 1983 UTM Zone 17N

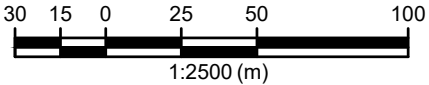
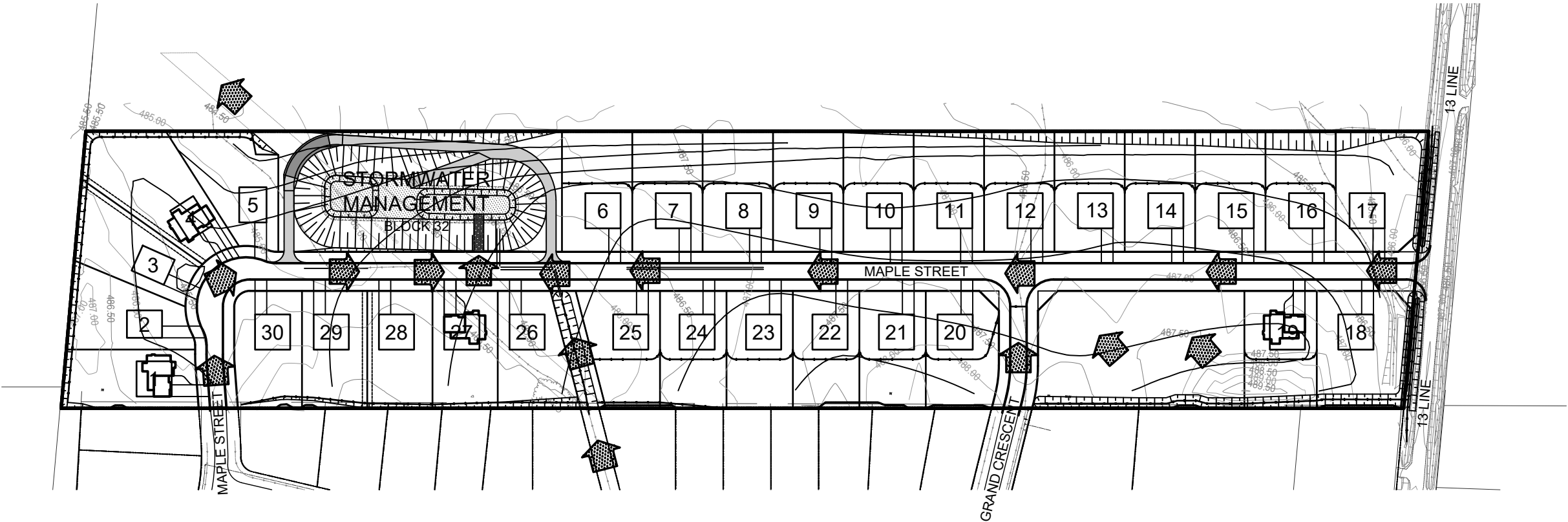
MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA



LEGEND



MAJOR OVERLAND
FLOW ROUTE



MARSVILLE NORTH
MAJOR OVERLAND
FLOW ROUTE

Figure No. 20



Table No. 10 summarizes the stage/storage/discharge capacities for the Marsville North Subdivision stormwater management facility.

Table No. 10: MARSVILLE NORTH SUBDIVISION – Stormwater Management Facility Stage / Storage / Discharge Capacity

Storage and Control	Available Capacity			Actual Capacity Used		
	Peak Flow m ³ /s	Storage Volume m ³	Storage Elevation m	Peak Flow m ³ /s	Storage Volume m ³	Storage Elevation m
Knockout Invert	0.000	0	482.35	---	---	---
CB Lip	0.040	1,056.5	482.80	---	---	---
25mm	---	---	---	0.129	1,420.8	482.93
2-Year	---	---	---	0.352	1,745.9	483.05
5-Year	---	---	---	0.655	2,209.4	483.20
10-Year	---	---	---	0.669	2,926.6	483.42
25-Year	---	---	---	0.691	3,977.7	483.71
24-Hour SCS Type II (100-Year)	---	---	---	0.695	4,228.8	483.77
50-Year	---	---	---	0.703	4,803.2	483.91
100-Year	---	---	---	0.713	5,694.5	484.12
Weir	0.749	9,625.1	484.90	---	---	---
Regional Storm	---	---	---	3.785	10,794.9	485.10
Top of Pond	6.484	11,390.1	485.20	---	---	---

Marsville South Subdivision

Runoff generated from Catchments 1100 and 1300 will be captured and conveyed by on-site storm sewers to the Marsville South Subdivision stormwater management facility prior to discharge to the 525mm diameter storm sewer. The stormwater management facility is a wetland which will provide both quantity control to attenuate flows to the allowable release rate and enhanced quality control treatment prior to discharge.

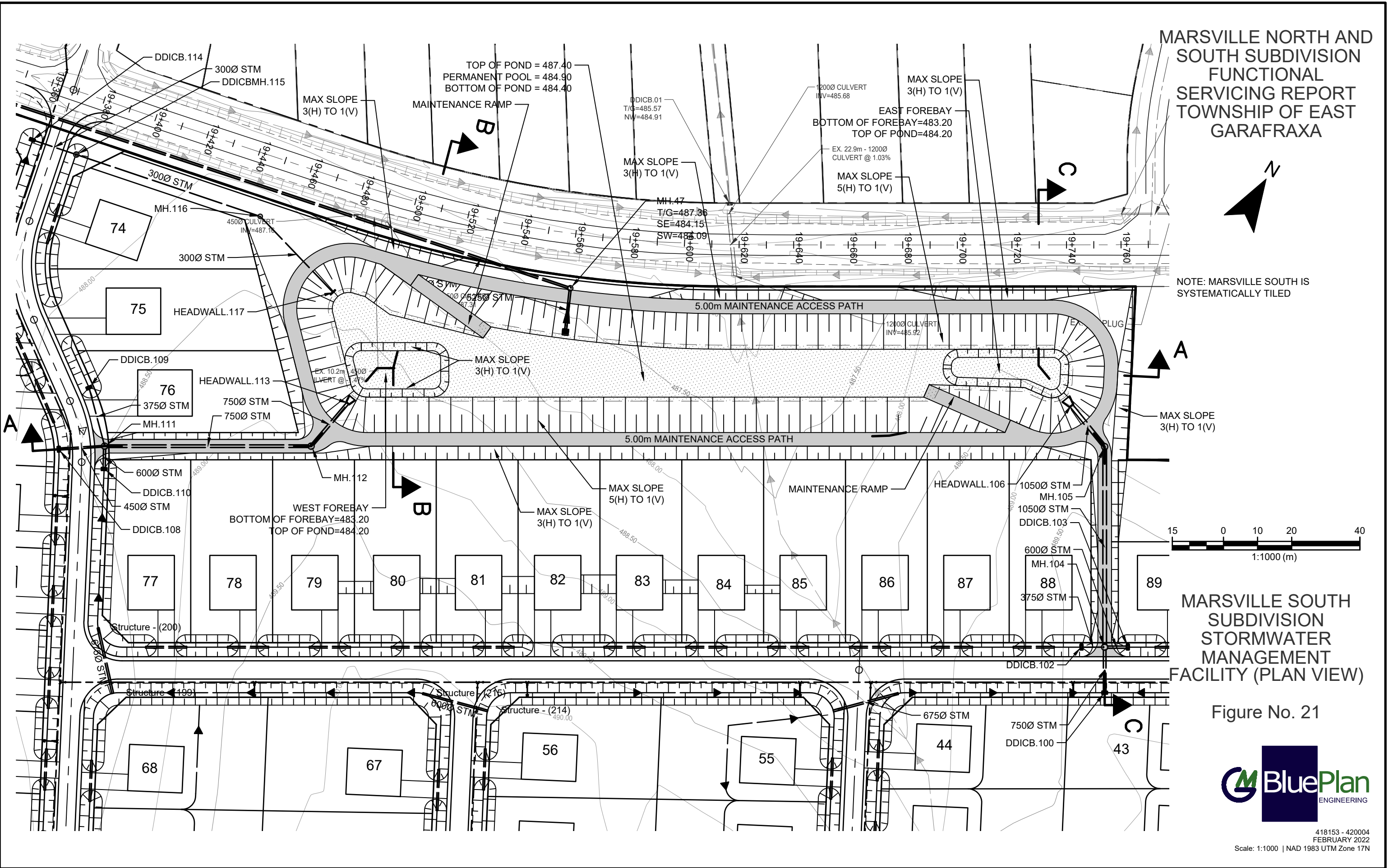
From Table 3.2 of the Stormwater Management Design Manual (MOE, 2003) a wetland type facility with a contributing area that is 31% impervious requires 80 m³/ha of storage volume to provide enhanced water quality control treatment (80% TSS removal). 40m³/ha of the required volume is extended detention, the remaining 40 m³/ha is required as permanent pool. Based on the contributing drainage area of 30.72 ha to the pond, approximately 1,229 m³ is required in extended detention, and 1,229 m³ is required in the permanent pool volume. The proposed facility has been designed to provide approximately 1,316.6 m³ of extended detention and 2,795.2 m³ of permanent pool and forebay.

The west forebay (25m Top Length x 14.4m Top Width x 1.0m Depth) and east forebay (38m Top Length x 8m Top Width x 1.0m Depth) will receive runoff from the road storm sewer system and provide settling and dispersion. The cleanout frequency for the proposed forebays for this pond has been calculated to be 6 years based on the sediment loading and volume of the forebay.

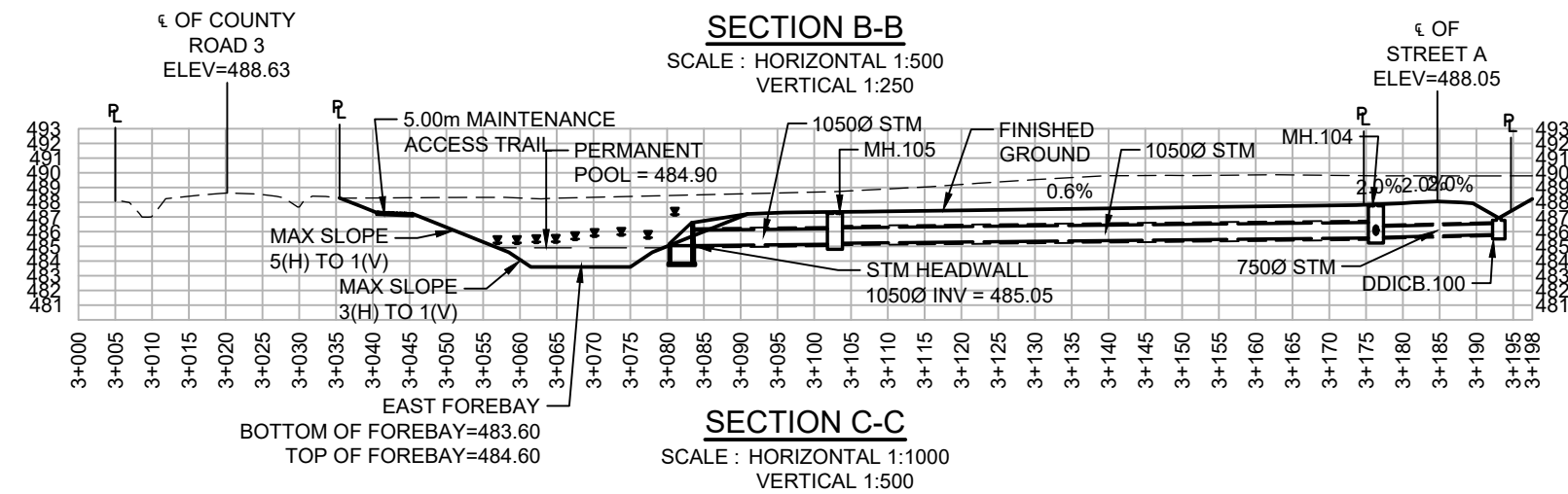
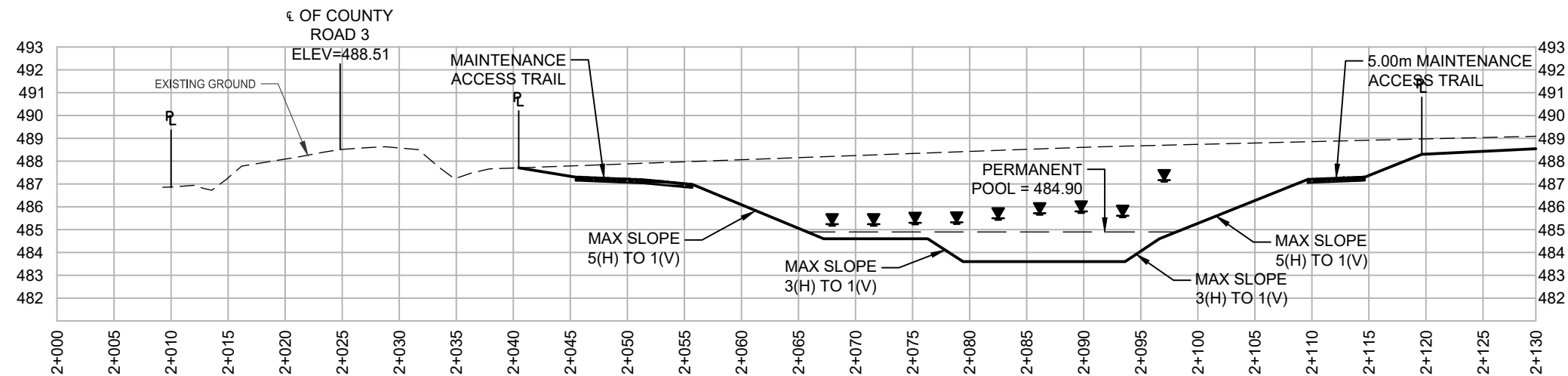
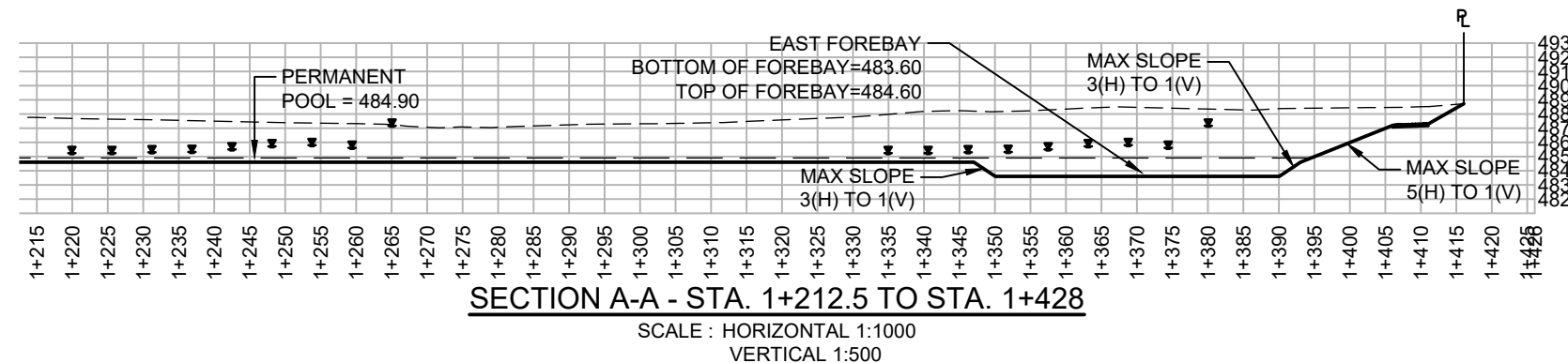
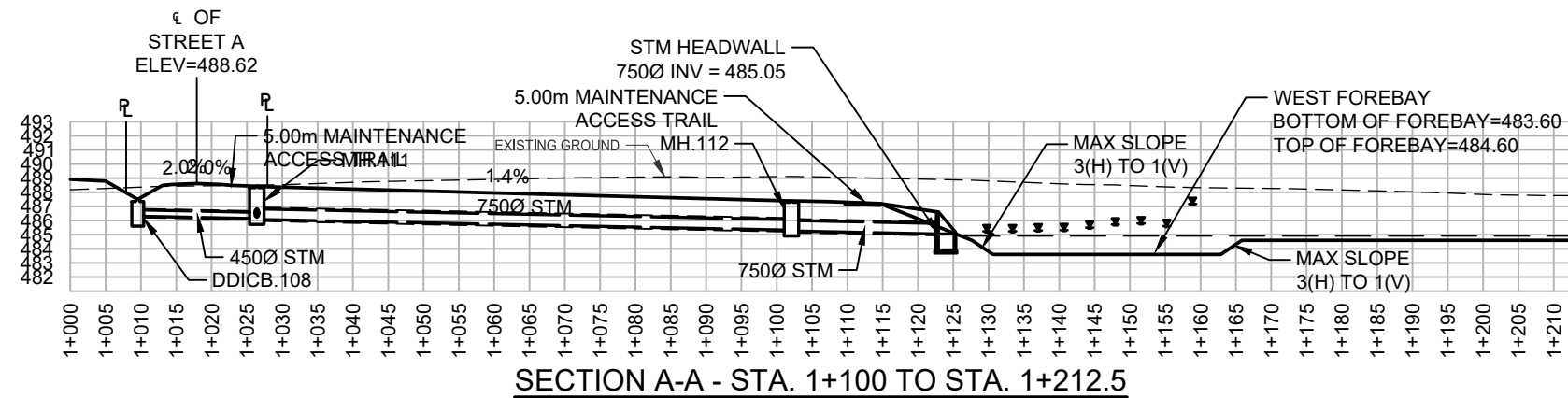
Thermal impacts of the stormwater management facility will be mitigated with tree planting to shade and cool the open water.

Details of the quantity and quality control components for the Marsville South Subdivision stormwater management facility are shown on Figure No. 21 and Figure No. 22.

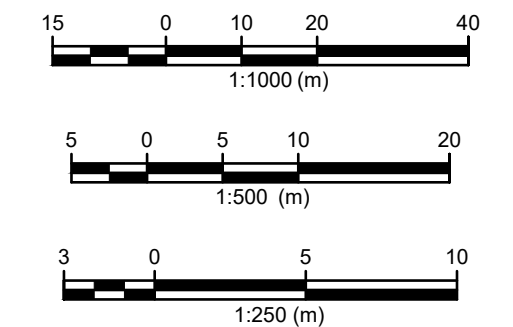
FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES 10-13.dwg LAYOUT:FIGURE 21 - MS SWM PLAN
LAST SAVED BY:E.vabir3950, 8/2/2024 2:52:39 PM PLOTTED BY: Birch, Evan 9/3/2024 4:19:01 PM



FILE: B:\Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Drawings\418153 - FSR FIGURES 10-13.dwg LAYOUT: FIGURE 22 - MS SWM SECTIONS
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MARVILLE NORTH AND SOUTH SUBDIVISION FUNCTIONAL SERVICING REPORT TOWNSHIP OF EAST GARAFRAXA



MARVILLE SOUTH SUBDIVISION STORMWATER MANAGEMENT FACILITY (SECTION VIEW)

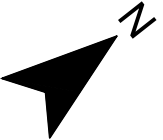
Figure No. 22



FILE:Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES 15-16.dwg LAYOUT:FIGURE 23 - MS MOFR
LAST SAVED BY:E.vabir3950, 7/8/2024 5:24:24 PM PLOTTED BY:Brch, Evan 9/3/2024 4:20:33 PM



MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA

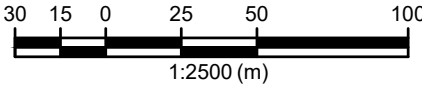


LEGEND



MAJOR OVERLAND
FLOW ROUTE

NOTE: MARSVILLE SOUTH
IS SYSTEMATICALLY TILED



MARSVILLE SOUTH
MAJOR OVERLAND
FLOW ROUTE

Figure No. 23



418153 - 420004
JULY 2024
Scale: 1:2500 | NAD 1983 UTM Zone 17N

Table No. 11 summarizes the stage/storage/discharge capacities for the future stormwater management facility to be designed, approved and constructed on the south side of Dufferin County Road to service the Marsville South Subdivision.

Table No. 11: MARSVILLE SOUTH SUBDIVISION – Stormwater Management Facility Stage / Storage / Discharge Capacity

Storage and Control	Available Capacity			Actual Capacity Used		
	Peak Flow m ³ /s	Storage Volume m ³	Storage Elevation m	Peak Flow m ³ /s	Storage Volume m ³	Storage Elevation m
Knockout Invert	0.000	0.00	484.90	---	---	---
DICB Lip	0.023	1,314.3	485.10	---	---	---
25mm	---	---	---	0.091	1,814.8	485.17
2-Year	---	---	---	0.189	2,286.6	485.24
5-Year	---	---	---	0.314	2,779.6	485.30
10-Year	---	---	---	0.317	4,287.8	485.50
25-Year	---	---	---	0.321	6,123.0	485.71
24-Hour SCS (100-Year)	---	---	---	0.323	6,699.7	485.78
50-Year	---	---	---	0.324	6,915.2	485.80
100-Year	---	---	---	0.329	9,416.3	486.06
Weir	0.345	20,076.7	487.00	---	---	---
Regional Storm	---	---	---	2.415	22,493.9	487.17
Top of Pond	3.328	22,738.1	487.20	---	---	---

Table No. 12 summarizes the peak flow rates and volumes at various key discharge locations under the pre-development and post-development conditions while illustrating the percent change between each condition.

Table No. 12: POST-DEVELOPMENT CONDITIONS – Controlled Peak Flow Rates and Volumes

Catchment ID	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)
To Proposed Thunderbird Drain Improvements																		
1100, 1300 (Controlled, Marsville South Subdivision SWMF)	0.091	2,245.3	0.189	3,636.9	0.314	5,479.0	0.317	7,459.9	0.321	10,204.2	0.324	12,356.1	0.329	14,434.4	2.415	57,967.6	0.323	11,621.8
Thunderbird Drain Improvements – Marsville South	0.091	2,245.3	0.189	3,636.9	0.314	5,479.0	0.317	7,459.9	0.321	10,204.2	0.324	12,356.1	0.329	14,434.4	2.415	57,967.6	0.323	11,621.8
Overflow from Marsville South Subdivision SWMF (1300)	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	2.070	19,451.7	0.000	0.0
2100	0.088	133.2	0.126	215.7	0.172	298.9	0.203	373.3	0.245	472.1	0.277	551.6	0.308	628.0	0.121	2,288.0	0.177	560.2
2200	0.157	363.5	0.271	656.7	0.393	943.7	0.484	1,139.4	0.607	1,393.3	0.709	1,590.7	0.824	1,780.6	0.300	5,216.0	0.475	1,310.9
<i>To 1200mm dia. Culvert crossing County Road 3 (Overflow from Marsville South, 2100, 2200)</i>	<i>0.245</i>	<i>496.6</i>	<i>0.397</i>	<i>872.4</i>	<i>0.565</i>	<i>1,242.6</i>	<i>0.687</i>	<i>1,512.6</i>	<i>0.848</i>	<i>1,865.4</i>	<i>0.970</i>	<i>2,142.3</i>	<i>1.074</i>	<i>2,408.6</i>	<i>2.289</i>	<i>26,955.7</i>	<i>0.651</i>	<i>1,871.1</i>
2300	0.427	648.3	0.606	1,049.4	0.830	1,543.9	0.990	2,049.6	1.209	2,742.7	1.376	3,288.0	1.546	3,821.7	0.804	14,580.0	0.927	3,175.6
<i>North End of Thunderbird Subdivision (2100, 2200, 2300 via Stormwater Block)</i>	<i>0.672</i>	<i>1,144.9</i>	<i>1.004</i>	<i>1,921.8</i>	<i>1.394</i>	<i>2,786.4</i>	<i>1.677</i>	<i>3,562.2</i>	<i>2.056</i>	<i>4,608.1</i>	<i>2.346</i>	<i>5,430.3</i>	<i>2.621</i>	<i>6,230.3</i>	<i>3.092</i>	<i>41,535.5</i>	<i>1.579</i>	<i>5,046.8</i>
2100, 2200, 2300, 2400 (Controlled, Marsville North Subdivision SWMF)	0.129	1,890.0	0.352	3,127.9	0.655	4,554.0	0.669	5,906.9	0.691	7,761.8	0.703	9,217.6	0.713	10,631.8	3.791	58,312.1	0.695	8,693.0
2450 (minor) (to Marsville North Thunderbird Drain Improvements)	0.008	12.4	0.013	20.1	0.018	37.1	0.018	55.3	0.018	71.6	0.018	85.0	0.018	96.4	0.018	448.0	0.018	75.9
Thunderbird Drain Improvements – Marsville North	0.130	1,902.3	0.354	3,149.0	0.662	4,584.4	0.681	5,968.7	0.699	7,826.0	0.715	9,294.7	0.726	10,740.5	0.747	39,142.0	0.695	8,698.5
Junction Between Marsville North and South Thunderbird Drain Improvements (MIDUSS – 5000)	0.211	4,144.8	0.489	6,782.5	0.972	10,060.9	0.995	13,424.7	1.016	18,028.6	1.032	21,641.4	1.046	25,166.6	1.110	79,476.3	1.025	20,393.7
To Existing Thunderbird Municipal Drain																		
1400	0.064	116.0	0.104	188.2	0.166	590.8	0.272	1,194.1	0.509	2,072.1	0.640	2,769.0	0.790	3,439.3	1.026	15,259.0	0.557	2,177.5
<i>To 1050 dia. culvert at County Rd 3</i>	<i>0.064</i>	<i>116.0</i>	<i>0.104</i>	<i>188.2</i>	<i>0.166</i>	<i>590.8</i>	<i>0.272</i>	<i>1,194.1</i>	<i>0.509</i>	<i>2,072.1</i>	<i>0.640</i>	<i>2,769.0</i>	<i>0.790</i>	<i>3,439.3</i>	<i>1.026</i>	<i>15,259.0</i>	<i>0.557</i>	<i>2,177.5</i>
1500	0.066	109.7	0.108	177.0	0.187	783.6	0.463	1,726.8	0.856	3,105.4	1.136	4,198.5	1.465	5,243.2	1.666	23,444.0	0.999	3,223.5
West Watershed Catchment Areas to Existing Thunderbird Municipal Drain	0.130	225.7	0.212	365.2	0.340	1,374.3	0.711	2,920.8	1.342	5,177.5	1.717	6,967.5	2.228	8,682.5	2.692	38,702.4	1.537	5,401.0
2500	0.000	0.0	0.000	0.0	0.097	442.9	0.251	1,167.6	0.488	2,234.0	0.649	3,077.9	0.805	3,891.0	1.151	17,619.0	0.572	2,274.9

Catchment ID	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)	Peak Flow (m³/s)	Volume (m³)
2600	0.000	0.0	0.000	0.0	0.114	549.5	0.307	1,448.4	0.576	2,770.4	0.766	3,817.5	0.978	4,824.0	1.406	21,837.0	0.679	2,821.4
2450 (major) (to Existing Thunderbird Drain)	0.000	0.0	0.000	0.0	0.001	0.2	0.006	4.4	0.021	20.0	0.031	32.0	0.043	44.9	0.019	132.6	0.022	24.1
Overflow from Marsville North Subdivision SWMF (2400)	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	3.132	22,535.9	0.000	0.0
Central Watershed Catchment Areas to Existing Thunderbird Municipal Drain	0.000	0.0	0.000	0.0	0.211	992.5	0.559	2,620.4	1.057	5,024.4	1.415	6,927.3	1.783	8,759.9	5.584	61,448.6	1.251	5,120.4
Total – Existing Thunderbird Municipal Drain (Central + West)	0.130	225.7	0.212	365.2	0.454	2,366.9	1.175	5,541.3	2.242	10,201.9	2.932	13,894.8	3.751	17,442.4	8.305	100,428.0	2.632	10,521.4
Junction – Existing Thunderbird Municipal Drain and Marsville North and South Drain Improvements																		
Open Channel Portion of Thunderbird Municipal Drain	0.222	4,370.4	0.512	7,147.7	1.383	12,427.7	2.164	18,966.0	3.257	28,230.5	3.964	35,536.2	4.794	42,608.9	9.421	179,935.7	3.651	30,915.1
To Wetland South of Site																		
4000	0.061	88.9	0.099	144.7	0.133	213.2	0.164	284.1	0.207	380.6	0.241	457.8	0.277	532.0	0.124	1,980.7	0.185	439.0
Total – to Wetland South of Marsville South Subdivision	0.061	88.9	0.099	144.7	0.133	213.2	0.164	284.1	0.207	380.6	0.241	457.8	0.277	532.0	0.124	1,980.7	0.185	439.0
To Brouwer Municipal Drain																		
3000	0.118	238.2	0.188	385.8	0.278	1,210.0	0.431	2,445.8	0.783	4,250.6	1.012	5,676.1	1.308	7,049.2	1.918	31,139.0	0.886	4,460.0
3100	0.112	168.1	0.164	270.7	0.214	399.4	0.251	531.7	0.302	715.7	0.338	860.3	0.375	999.8	0.212	3,872.5	0.225	818.0
3200	0.045	68.6	0.065	111.2	0.089	163.3	0.106	216.7	0.130	289.9	0.148	348.8	0.167	405.0	0.085	1,545.4	0.099	336.3
3300	0.272	414.0	0.381	970.4	0.511	989.3	0.611	1,315.6	0.746	1,761.6	0.849	2,114.0	0.952	2,448.5	0.516	9,325.1	0.584	2,029.5
3400	0.010	14.7	0.013	23.9	0.022	74.8	0.051	151.2	0.101	262.6	0.128	350.3	0.158	435.1	0.137	1,887.1	0.108	275.5
Total – to Brouwer Municipal Drain	0.538	903.6	0.805	1,762.0	1.069	2,836.8	1.324	4,661.0	1.701	7,280.4	1.968	9,349.5	2.255	11,337.6	2.869	47,769.1	1.350	7,919.3

Table No. 13: PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS – Peak Flow Rates and Volumes at Various Key Discharge Locations Comparison

Condition	25 mm		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		Regional		100-Year SCS (24-hr)	
	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume	Peak Flow	Volume
	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)
West Watershed Catchment Areas																		
Pre-Dev Flow to 1050 dia. Culvert at County Road 3	0.103	164.8	0.156	265.8	0.244	1,064.9	0.532	2,295.2	1.004	4,093.3	1.306	5,518.2	1.659	6,882.2	2.117	30,574	1.162	4,254.7
Post-Dev Flow to 1050 dia. Culvert at County Road 3	0.064	116.0	0.104	188.2	0.166	590.8	0.272	1,194.1	0.509	2,072.1	0.640	2,769.0	0.790	3,439.3	1.026	15,259.0	0.557	2,177.5
% Change	-37.9%	-29.6%	-33.3%	-29.2%	-32.0%	-44.5%	-48.9%	-48.0%	-49.3%	-49.4%	-51.0%	-49.8%	-52.4%	-50.0%	-51.5%	-50.1%	-52.1%	-48.8%
Pre-Dev Flows to Wetland from Marsville Subdivision	N/A																	
Post-Dev Flow to Wetland south of Marsville South Subdivision (Catchment 4000)	0.061	88.9	0.099	144.7	0.133	213.2	0.164	284.1	0.207	380.6	0.241	457.8	0.277	532.0	0.124	1,980.7	0.185	439.0
Pre-Dev Flows to Thunderbird Drain Improvements - South Branch	N/A																	
Post-Dev Piped Flow to Thunderbird Drain – Marsville South Branch	0.091	2,245.3	0.189	3,636.9	0.314	5,479.0	0.317	7,459.9	0.321	10,204.2	0.324	12,356.1	0.329	14,434.4	2.415	57,967.6	0.323	11,619.4
Central Watershed Catchment Areas																		
Pre-Dev 1200 dia. Culvert at County Road 3	0.224	388.8	0.334	628.7	0.471	1,687.1	0.608	3,235.7	0.998	5,484.3	1.318	7,262.6	1.640	8,971.8	2.480	38,984.7	1.118	5,795.9
Post-Dev 1200 dia. Culvert at County Road 3	0.245	496.6	0.397	872.4	0.565	1,242.6	0.687	1,512.6	0.848	1,865.4	0.970	2,142.3	1.074	2,408.6	2.282	26,922.4	0.651	1,871.1
% Change	9.4%	27.7%	18.9%	38.8%	20.0%	-26.3%	13.0%	-53.3%	-15.0%	-66.0%	-26.4%	-70.5%	-34.5%	-73.2%	-8.0%	-30.9%	-41.8%	-67.7%
Pre-Dev North of Thunderbird Subdivision via Stormwater Block	0.651	1,037.1	0.941	1,678.1	1.300	3,230.9	1.580	5,285.3	1.972	8,226.9	2.326	10,550.6	2.706	12,793.5	3.283	53,564.5	1.655	8,971.5
Post-Dev North of Thunderbird Subdivision via Stormwater Block	0.672	1,144.9	1.004	1,921.8	1.394	2,786.4	1.677	3,562.2	2.056	4,608.1	2.346	5,430.3	2.621	6,230.3	3.092	41,535.5	1.579	5,046.8
% Change	3.2%	10.4%	6.7%	14.5%	7.2%	-13.8%	6.1%	-32.6%	4.3%	-44.0%	0.9%	-48.5%	-3.1%	-51.3%	-5.8%	-22.5%	-4.6%	-43.7%
Pre-Dev Marsville North – North Boundary	0.651	1,037.1	0.941	1,678.1	1.305	3,439.4	1.597	5,835.1	2.076	9,279.3	2.488	11,999.5	2.923	14,625.5	3.899	61,869.2	1.888	10,043.0
Post- Dev Marsville North – North Boundary	0.000	0.0	0.000	0.0	0.001	0.2	0.006	4.4	0.021	20.0	0.031	32.0	0.043	44.9	3.044	22,169.3	0.022	24.1
% Change	-100.0%	-100.0%	-100.0%	-100.0%	-99.9%	-100.0%	-99.6%	-99.9%	-99.0%	-99.8%	-98.8%	-99.7%	-98.5%	-99.7%	-21.9%	-64.2%	-98.8%	-99.8%
Pre-Dev	0.820	1,311.5	1.136	2,120.9	1.623	6,279.9	2.371	12,473.0	4.415	21,482.5	5.768	28,611.5	7.359	35,465.9	10.238	155,342.6	5.031	22,617.5

Existing Agricultural Thunderbird Municipal Drain																		
Post-Dev Existing Agricultural Thunderbird Municipal Drain (MIDUSS – 5005)	0.130	225.7	0.212	365.2	0.454	2,366.9	1.175	5,541.3	2.242	10,201.9	2.932	13,894.8	3.751	17,442.4	8.305	100,428.0	2.632	10,521.4
% Change	-84.1%	-82.8%	-81.3%	-82.8%	-72.0%	-62.3%	-50.4%	-55.6%	-49.2%	-52.5%	-49.2%	-51.4%	-49.0%	-50.8%	-18.9%	-35.4%	-47.7%	-53.5%
Junction of Marsville North and South (MIDUSS – 5000)	0.211	4,144.8	0.489	6,782.5	0.972	10,060.9	0.995	13,424.7	1.016	18,028.6	1.032	21,641.4	1.046	25,166.6	1.110	79,476.3	1.025	20,393.7
Pre-Development Thunderbird Drain Overland Channel (MIDUSS – 6000)	0.820	1,311.5	1.136	2,120.9	1.623	6,279.9	2.371	12,473.0	4.415	21,482.5	5.768	28,611.5	7.359	35,465.9	10.238	155,342.6	5.031	22,617.5
Post-Dev Junction of Thunderbird Drain – Existing and Proposed Improvements at Overland Channel (MIDUSS – 5002)	0.222	4,370.4	0.512	7,147.7	1.383	12,427.7	2.164	18,966.0	3.257	28,230.5	3.964	35,536.2	4.794	42,608.9	9.421	179,935.7	3.651	30,915.1
% Change	-72.9%	233.2%	-54.9%	237.0%	-14.8%	97.9%	-8.7%	52.1%	-26.2%	31.4%	-31.3%	24.2%	-34.9%	20.1%	-8.0%	15.8%	-27.4%	36.7%
East Watershed Catchment Areas																		
Pre-Dev Total to Brouwer Municipal Drain	0.535	903.8	0.804	1,462.2	1.074	2,977.6	1.345	5,031.4	1.746	7,988.9	2.030	10,325.2	2.337	12,569.6	3.249	53,376.0	1.441	8,640.3
Post-Dev Total to Brouwer Municipal Drain	0.538	903.6	0.805	1,762.0	1.069	2,836.8	1.324	4,661.0	1.701	7,280.4	1.968	9,349.5	2.255	11,337.6	2.869	47,769.1	1.350	7,919.3
% Change	0.6%	0.0%	0.1%	20.5%	-0.5%	-4.7%	-1.6%	-7.4%	-2.6%	-8.9%	-3.1%	-9.4%	-3.5%	-9.8%	-11.7%	-10.5%	-6.3%	-8.3%

The Pre-Development and Post-Development Conditions Analysis, including MIDUSS modeling files are included within Appendix F and Appendix G, respectively.

6. CONVEYANCE ANALYSIS

6.1 Marsville South Right-of-Way

The 20-metre right-of-way in Marsville South can convey the proposed runoff into the stormwater management facility. The proposed roadside ditches (1.1m depth, 7m width, 1-2%) in the rural right-of-way cross-section can convey 9.232 m³/s. The anticipated major storm flow (100-year design storm) along the right-of-way to the pond from Catchment 1100 and 1300 is 4.134 m³/s. Therefore, the 20-metre right-of-way can convey the flows along the right-of-way to the stormwater management pond. The major overland flow routes in Marsville South Subdivision are shown in Figure No. 23.

6.2 Marsville South – Street A overflow to Stormwater Management Facility

The maintenance access path to the stormwater management facility (minimum channel depth of 0.3m, 1.4% slope, 5m base width) can convey approximately 5.286 m³/s and the underlying 750mm diameter storm sewer has a capacity of approximately 1.161 m³/s (at a grade of 1%). Therefore, the channel and storm sewer have sufficient capacity for the major storm flow (100-year design storm) of 4.134 m³/s.

6.3 Block 33 Stormwater Management Block Channel

The conveyance capacity of the Block 33 channel upstream of the stormwater management facility has been reviewed to ensure it can convey the anticipated major storm flows. Based on the shallowest section of the swale (0.85 m deep with 3:1 side slopes at a slope of 1.5%), the Block 33 channel has a conveyance capacity of 3.622 m³/s. The anticipated flow into the Block 33 channel from Catchments 2100, 2200 and 7.01 ha of Catchment 2300 under the 100-year design storm is 2.295 m³/s. Therefore, the channel in Block 33 has capacity to convey the 100-year storm without any overtopping.

6.4 Marsville North Right-of-Way

Additionally, the 20-metre urban right-of-way cross-section can convey the major overland flow into the stormwater management facility. The proposed right-of-way can convey 3.452 m³/s if using the entire 20m width. The 5-year design storm flows of 2.105 m³/s will be conveyed in the road storm sewer. Therefore, the 20-metre right-of-way can convey the difference of 1.347 m³/s. The major overland flow routes in Marsville North Subdivision are shown in Figure No. 20.

6.5 Overland Channel (Existing Thunderbird Municipal Drain)

The results at the overland channel after the Thunderbird Municipal Drain sewer outlet was compared between pre-development and post-development conditions during all design storm events in the following table. The overland channel is estimated to have a 1m base width, 1.5:1 side slopes, 2m depth, and a 1% grade. As the peak flow rate directed to the overland channel is proposed to decrease during all design storm events, the velocity and depth of flow are also less than the pre-development conditions. The channel capacity and proposed and existing flow rates will all be reviewed/verified/confirmed as part of the Drainage Act works.

Table No. 14: PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS - Comparison of Overland Channel Flow Rates

Storm Event	Pre-Development Conditions			Post-Development Conditions		
	Flow Rate (m ³ /s)	Velocity (m/s)	Depth of Flow (m)	Flow Rate (m ³ /s)	Velocity (m/s)	Depth of Flow (m)
25mm	0.820	0.771	0.191	0.222	0.750	0.222
2-Year	1.136	1.188	0.532	0.511	0.955	0.351
5-Year	1.620	1.305	0.636	1.383	1.252	0.587
10-Year	2.371	1.441	0.766	2.164	1.407	0.733
25-Year	4.415	1.689	1.028	3.257	1.563	0.891
24-Hour SCS (100-Year)	5.031	1.746	1.092	3.651	1.609	0.941
50-Year	5.768	1.807	1.163	3.964	1.643	0.978
100-Year	7.359	1.922	1.299	4.794	1.725	1.068
Regional Storm	9.887	2.069	1.482	9.415	2.044	1.450

6.6 Overland Channel (13th Line Roadside Ditch)

The roadside ditch on 13th Line, east of Marsville North Subdivision, is proposed to be reconstructed to have a 2m base width, 3:1 side slopes, 1m depth, and a 0.3% grade and a 675mm diameter driveway culvert at a 0.3% grade. The conveyance capacity of the proposed roadside ditch was assessed for all design storm events. The capacity of the entrance culvert is 0.480 m³/s and runoff exceeding the 5-year design storm event will overtop into the right-of-way, ultimately being conveyed by the roadside ditch north of the entrance.

Table No. 15: PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS - Comparison of 13th Line Roadside Ditch Flow Rates

Storm Event	Pre-Development Conditions (Catchments 310 – 360)	Post-Development Conditions (Catchments 3000 – 3400)		
	Flow Rate (m ³ /s)	Flow Rate (m ³ /s)	Velocity (m/s)	Depth of Flow (m)
25mm	0.535	0.538	0.535	0.335
2-Year	0.804	0.805	0.600	0.414
5-Year	1.074	1.069	0.650	0.479
10-Year	1.345	1.324	0.690	0.533
24-Hour SCS (100-Year)	1.441	1.350	0.693	0.539
25-Year	1.746	1.701	0.738	0.604
50-Year	2.030	1.968	0.768	0.649
100-Year	2.337	2.255	0.796	0.694
Regional Storm	3.249	2.869	0.849	0.779

8. FEATURE-BASED WATER BALANCE ANALYSIS TO OFF-SITE WETLAND

A monthly water balance analysis was completed for the offsite wetland to the south of the proposed Marsville South Subdivision. Details of the water balance have been included in Appendix H. The existing contributing drainage area to the wetland is approximately 15.32 ha at 2% imperviousness and does not include the site. Under post-development conditions, an additional 1.10 ha of the site at 35% imperviousness is directed to the offsite wetland for a total contributing area of 16.42 ha at 4% imperviousness.

Based on the Canadian Climate Normals for the Fergus Shand Dam Station from 1981 to 2010, the average annual precipitation for the area in which the site is located is estimated to be 945.9 mm.

It has been estimated that the potential annual evapotranspiration for this area is 539.5 mm. Therefore, 404 mm remains available for infiltration and runoff.

Based on the clayey silt till soils throughout the site, the potential infiltration across the site has been estimated as 87.1 mm annually, with the remaining 316.8 mm being runoff.

Groundwater patterns appear to flow parallel to the site boundary or slightly in from the boundary, and those contour patterns are not proposed to be changed (i.e. via cutting into the existing grade). Therefore, the recharge rates to the offsite wetland will not be changed under post-development conditions by the additional 1.10 ha sloped towards the wetland.

Therefore, under existing conditions the annual average groundwater recharge to the wetland is estimated to be 13,340 m³. Under post-development conditions, the annual natural groundwater recharge will remain the same.

Under existing conditions, the annual average runoff to the wetland is estimated to be 48,535 m³. As a result of the proposed development the additional area increases the runoff volume to 53,499 m³ per year.

The comparison between existing conditions and post-development recharge and runoff volumes to the offsite wetland are summarized in Table 16 below.

Table No. 16: Summary of Recharge and Runoff Volume – to Offsite Wetland

	Total Estimated Recharge	Total Estimate Runoff
Existing Conditions	13,340 m ³	48,535 m ³
Post-Development Conditions	13,340 m ³	53,499 m ³
Change from Existing Conditions	0%	10.2%

9. EROSION AND SEDIMENT CONTROL PLAN

Based on the Erosion and Sediment Control Guideline for Urban Construction (December 2006), the following sediment and erosion control plan has been prepared for the Marsville North and Marsville South Subdivisions.

Heavy duty (i.e. Type II) silt fence will be installed in all other locations where the potential for runoff to transport sediment off site exists. The silt fence will serve two (2) purposes. The first will be to prevent water borne sediments from being washed onto the adjacent properties. The second will be to delineate the limits of construction.

Heavy duty (i.e. Type II) silt fence will also be installed around any temporary topsoil stockpile located on-site.

The proposed stormwater management facility will be rough graded and used as a temporary sediment pond during the servicing and building construction.

Temporary rock check dams will be installed in rear-yard swales after the initial grading has been completed to slow the flow rates and promote the settlement of water borne sediments before discharging to the stormwater management facility.

Upon completion of the grading, any area not subject to active construction within 30 days will be top soiled and seeded as per OPSS 572.

Inspection and maintenance of all silt fencing and rock check dams will start after installation is complete. These features will be inspected on a weekly basis during active construction or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the facility found to need repair.

Once construction and landscaping within the limits of the subdivision has been substantially completed, the silt fence and rock check dams will be removed and any accumulated sediment will be collected.

After construction of the complete development, erosion will not occur and the sediment transport will be minimal.

10. CONCLUSIONS

In summary, the features of the design for the Marsville North and Marsville South Subdivisions are as follows:

1. As outlined in Section 3.3 of this Functional Servicing Report, the Marsville North and Marsville South Subdivision will be serviced with individual private onsite septic systems with tertiary treatment to provide sewage treatment and disposal.
2. Based on the recommendations presented in the Technical Memo - Hydrogeology Executive Summary of Past Reports (GM BluePlan Engineering Limited, dated August 2020), the use of tertiary treatment systems for all 30 lots within the Marsville North Subdivision is recommended to mitigate any potential impacts related to septic system effluent and to provide a cleaner effluent for discharge to the shallow groundwater system.
3. It is recommended that the Marsville South Subdivision also be serviced by private on-site septic systems with tertiary treatment for the 91 lots to provide a cleaner effluent for discharge to the shallow groundwater system.
4. Water supply for the Marsville North and the Marsville South Subdivision will be provided by the upgrades and expansions of the existing municipal water system, as per the Municipal Class Environmental Assessment process.
5. Water services for each lot in the Marsville North and Marsville South Subdivisions, will be provided by the expansion of the existing municipal water distribution system via the extension of a 150mm diameter watermain along the subdivision roads.
6. Foundation drainage within the Marsville North and Marsville South Subdivisions will be provided by a sump pumps discharging to either the storm sewer system or grade and ultimately the stormwater management facilities for conveyance to the improved Thunderbird Drainage Works.
7. Quantity and quality control treatment for runoff generated from the Marsville North Subdivision has been provided by the stormwater management facility, prior to discharge to the improved Thunderbird Drainage Works.
8. Quantity and quality control treatment for runoff generated from the Marsville South Subdivision has been provided by the stormwater management facility, prior to discharge to the improved Thunderbird Drainage Works.
9. To provide sufficient capacity to accommodate and convey the stormwater generated from the Marsville North and Marsville South Subdivisions to the receiving outlet, a petition has been filed under the Drainage Act for improvements to the existing Thunderbird Drainage Works. The final design of the improvements will be the responsibility of the Drainage Engineer.
10. The stormwater management design for the Marsville North Subdivision and Marsville South Subdivision provide a reduction of flow when comparing pre-development and post-development conditions for all key locations and storm events.

11. The proposed stormwater management facility will be rough graded and used as a temporary sediment pond during the servicing and building construction.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

Per:

A handwritten signature in blue ink, appearing to read 'AKroetsch', written over a horizontal line.

Angela Kroetsch, P.Eng.



APPENDIX A:
GEOTECHNICAL INVESTIGATION REPORT (WSP CANADA INC., DATED MAY
2014)

PROPOSED MARSVILLE HERITAGE ESTATE DEVELOPMENT GEOTECHNICAL INVESTIGATION

project n° 131-24174-00

Prepared for:
Marsville Heritage Estate Development

May 2014

WSP Canada Inc.
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May-21-2014

Khurram Tunio
Marsville Heritage Estate Development
2089 Osbond Road
Innisfil, ON L9S 0A9

**Subject: Geotechnical Investigation
Proposed Marsville Heritage Estate Development
Our file: 131-24174-00**

Dear Mr. Tunio:

WSP Canada Inc. (WSP) is pleased to submit our report of the Geotechnical Investigation for the Proposed Marsville Heritage Estate Development located in the Town of East Garafraxa, Ontario.

Thank you for selecting WSP Canada Inc. for this undertaking. We trust that this report is satisfactory for your current needs. If you have any questions or require further information, please contact our office at your convenience.

Yours truly,
WSP Canada Inc.

A handwritten signature in blue ink, appearing to read "D. MacGillivray", with a long vertical line extending downwards from the end of the signature.

David A. MacGillivray, M.A.Sc., P.Eng., P.Geo.
Senior Engineer, Environment

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1 INTRODUCTION

WSP Canada Inc. (WSP) prepared this report on behalf of Mr. Khurram Tunio to document the findings of the Geotechnical Investigation that was conducted for the Proposed Marsville Heritage Estate Development located in the Town of East Garafraxa, Ontario (the Site). The approximate location of the Site is shown on Figure 1.

It is understood that a residential subdivision with 46 lots is proposed for the Site. The purpose of the investigation was to obtain information about the subsurface conditions at the Site by means of drilling boreholes, to make recommendations pertaining to the geotechnical design of house foundations and basements, groundwater control and pavement design for the proposed roadways.

This report contains the findings of the investigation, together with our recommendations and comments. The anticipated construction conditions are also discussed but only to the extent that they may affect the geotechnical design. The construction methods discussed express our opinion only and are not intended to direct contractors on how to carry out the construction. Contractors should also be aware that the data and their interpretation presented in this report may not be sufficient to assess all factors that may have an effect upon construction.

This report is provided on the basis of the terms of reference presented above and in the text and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon. This report has been prepared for Mr. Khurram Tunio and his designers. Third party use of this report without WSP's consent is prohibited.

2 INVESTIGATION METHODOLOGY

2.1 BOREHOLE INVESTIGATION

On November 25, 2013, eight (8) boreholes (BH1-D/S to BH7) were drilled on-Site using a track-mounted Diedrich D-50 drill rig provided by London Soil Testing. One deep borehole (BH1-D) was advanced to a depth of 12.2 mBGS while the remaining shallow boreholes

(BH1-S to BH7) were advanced to a maximum depth of approximately 6.0 mBGS. Borehole locations are shown on the Site Plan in Figure 2.

The boreholes were drilled with hollow stem and solid stem continuous flight auger equipment by the drilling subcontractor under the direction and supervision of WSP personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 63.5 kg and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method (ASTM D1586 procedure). The results of standard penetration tests in terms of N values are referred to in this report as consistency for cohesive soils and relative density for non-cohesive materials. The samples were logged in the field and returned to WSP's laboratory for detailed examination by the project engineer and for laboratory testing. Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations.

Upon completion of the soil sampling activities, groundwater monitoring wells were installed in all of the borehole locations by London Soil Testing. Nitrile gloves were used to handle the well risers and screens during installation to minimize the potential for cross-contamination during installation. The monitoring wells were screened to intersect the local groundwater table, based on observed conditions in the soil horizon during the drilling and soil sampling activities. The wells were constructed using 51-millimeter (mm) Schedule 40 PVC riser and included a 1.5-m well screen (slot 10). A sand pack was placed in the borehole annulus around the well screen from the bottom of the well to approximately 1.0 m above the well screen. A bentonite seal was placed above the sand pack to 0.3 mBGS. The monitoring well construction details are shown on the attached borehole logs.

3 SITE AND SUBSURFACE CONDITIONS

A Site Location Map is shown on Figure 1 and a Site Plan is shown on Figure 2. Detailed subsurface conditions are presented on the Borehole Logs in Appendix A.

The Site generally consists of a gently rolling topography and generally slopes to the southeast. The Site ground surface elevation is approximately 485 to 490 m above mean sea level with the highest elevation situated near the northwest end of the property.

The ground elevations at the borehole locations ranged from 96.7 mARD at borehole BH2 to 99.1 mARD at borehole BH1-S. The site is currently agricultural land that has recently been cultivated for field crops. Ground surface elevations were determined using a fixed temporary benchmark with an assumed elevation of 100.00 mARD.

3.1 SOIL STRATIGRAPHY

In general, the site is covered with a thin layer of topsoil. The topsoil is underlain by intermittent layers of sandy silt to sand and silt which are in turn underlain by clayey silt and/or sand deposits. Auger refusal was not encountered in any of the boreholes. The following sub-sections of this report describe in some detail the description of the material observed from the boreholes.

3.1.1 TOPSOIL

A topsoil layer consisting of sandy silt with some organic material was encountered across the Site. The thickness of the topsoil ranged from 0.5 to 0.8 m at the surface.

3.1.2 SANDY SILT TO SILT AND SAND

Sandy silt to silt and sand was encountered below the topsoil in all eight boreholes. The thickness of these deposits ranged from approximately 1.7 to 7.9 m from below the topsoil.

The particle size distribution analysis for five samples of this material was determined in the laboratory and the results are summarized below and presented in Appendix B.

- Gravel (>2 mm size): 1 – 5 %
- Sand (0.06 mm to 2 mm size): 36 – 49 %
- Silt (0.002 mm to 0.06 mm size): 40 – 49 %
- Clay (<0.002 mm size): 8 – 10 %

From the recorded N-values, which ranged from 3 to 24 blows per 305 mm of penetration, the silt and sand deposits are considered to be soft/very loose to very stiff/compact, and are generally stiff/compact.

Laboratory moisture content of the tested samples for this layer ranged from 11.0 to 18.8 percent indicating moist to wet conditions.

3.1.3 CLAYEY SILT TILL

Underlying the sandy silt to silt and sand, a layer of clayey silt till was encountered at BH1-D, BH2, BH4 and BH7. The thickness of the clayey silt ranged from 1.1 to 2.4 m.

The particle size distribution analysis for a sample of the clayey silt till was determined in the laboratory and the results are summarized below and presented in Appendix B.

- Gravel (>2 mm size): 1 %
- Sand (0.06 mm to 2 mm size): 3 %

- Silt (0.002 mm to 0.06 mm size): 62 %
- Clay (<0.002 mm size): 34 %

From the recorded N-values, which ranged from 25 to 40 blows per 305 mm of penetration, the clayey silt till is considered to have a very stiff to hard consistency, and is generally hard.

Laboratory moisture content of the tested samples for this layer ranged from 13.0 to 25.1 percent indicating at plastic limit (APL) to wetter than plastic limit (WTPL) conditions.

3.1.4 SAND

A layer of fine to medium grained sand which underlies the clayey silt till was encountered at BH1-D, BH2 and BH4. At BH6, the sand layer was encountered below the sandy silt.

The particle size distribution analysis for a sample of sand was determined in the laboratory and the results are summarized below and presented in Appendix B.

- Gravel (>2 mm size): 1 %
- Sand (0.06 mm to 2 mm size): 84 %
- Silt and Clay (<0.002 mm to 0.06 mm size): 15 %

From the recorded N-values, which ranged from 17 to 38 blows per 305 mm of penetration, the sand layer is considered to be compact to dense, and is generally dense.

Laboratory moisture content of the tested samples for this layer ranged from 10.4 to 18.9 percent indicating dry to moist conditions.

3.2 GROUNDWATER LEVELS

Water was observed in some of the open boreholes during the drilling and upon completion. It is presumed that water may have entered from the surface or topsoil layer and may not be indicative of existing groundwater conditions. Static groundwater levels were taken on April 1, 2014.

Shallow groundwater (BH1-S, BH2 to BH7) at the Site is found within the sandy silt to silt and sand layer. Based on the water levels in the monitoring wells, it is inferred that shallow groundwater in the sandy silt to silt and sand layer would be encountered at approximately 0.2 m to 5.3 m below the prevailing ground surface level and at approximate elevations ranging between 91.01 mARD to 98.75 mARD. Ground surface elevations were determined using a fixed temporary benchmark with an assumed elevation of 100.00 mARD.

The inferred groundwater flow direction in the sandy silt to silt and sand layer is to the southwest across the Site. It should be noted that the groundwater table is subject to seasonal fluctuations and responds to major weather events.

3.3 OFF-SITE SOIL DISPOSAL

A composite sample of near surface soils was submitted for Toxicity Characteristic Leaching Procedure (TCLP) analyses of Ontario Regulation 558 metals and inorganics, and OC pesticides and PCBs to determine the appropriate off-site disposal alternatives. Results of the TCLP analyses indicate that the sample did not exceed the Ontario Regulation 558 standards and, as such, near surface soils are appropriate for disposal as non-hazardous, non-registerable waste. The laboratory Certificates of Analysis are attached in Appendix C.

4 DISCUSSIONS AND RECOMMENDATIONS

The proposed site is currently agricultural in use. It is understood that a residential subdivision with 46 lots and associated roadways is proposed for the Site.

Based on the results of this investigation, the subsurface stratigraphy at the site is characterized by sandy silt to silt and sand with intermittent deposits of clayey silt till and sand. Seven shallow boreholes were terminated in this layer (at approximately 6 m below ground surface). One deep borehole was terminated in a sand land layer approximately 12 m below ground surface. The groundwater levels in the shallow boreholes varied greatly across the site, ranging from 0.2 m to 5.3 m below ground surface.

Contractors bidding on this project or conducting work associated with this project should make their own interpretation of the factual data and / or carry out their own investigations.

The following discussions and recommendations are based on the factual data obtained from this investigation and are intended for use by the client's design engineers only.

4.1 EXCAVATION, BACKFILL AND GROUNDWATER CONTROL

Based on the borehole findings, excavation for building foundation and service connections at this site can be carried out with heavy hydraulic backhoes.

All excavations must be carried out in accordance with Occupational Health and Safety Act (OHSA). With respect to OHSA, the sandy silt to silt and sand layer and the sand deposits can be classified as Type C soil, while the clayey silt deposits are classified as Type B soil.

OHSA states that “where a layered geologic structure exists, the soil must be classified on the basis of the soil classification of the weakest soil layer”. In other words, for excavations through multiple soil types, the side slope geometry is governed by the soil with the highest letter designation. Excavations in Type C soil may be cut with vertical side-walls within the lower 1.2 m height of excavation and 1.5 horizontal to 1.0 vertical above this height. Locally, where loose or soft soil is encountered at shallow depths or within zones of persistent seepage, it may be necessary to flatten the side slopes as necessary to achieve stable conditions. Excavation side-slopes should not be unduly left exposed to inclement weather.

Where workers must enter excavations extending deeper than 1.2 m below grade, the excavation side-walls must be suitably sloped and / or braced in accordance with the Occupational Health and Safety Act and Regulation for Construction Projects.

The groundwater levels in the monitoring wells suggest that for the anticipated excavation depths there may be groundwater seepage into excavations. It is anticipated that adequate control of any groundwater seepage can likely be achieved by pumping from properly filtered sumps in the base of the excavation. Surface water should be directed away from the open excavations.

On-site excavated native soils are considered suitable for reuse as backfill or engineered fill material, provided their moisture content is controlled to within 2% of its optimum water content as determined by Standard Proctor test, and the materials are effectively compacted with heavy vibratory rollers. The compactors must be of sufficient size and energy to break down the lumps and to knead the soil into a homogeneous mass as water and compactive effort is applied. If the equipment does not have sufficient energy to break down the lumps, there is a tendency to bridging and post construction settlements. In situ testing may fail to identify this type of deficiency adequately because the zones of influence of testing equipment is small enough that the density of the lumps can be erroneously measured instead of the fill mass density. In areas of narrow trenches or confined spaces such as around foundations, foundation walls, etc., the use of aggregate fill such as Granular ‘B’ (OPSS 1010) is required if there is to be post-construction grade integrity.

The optimum moisture content of the sandy silt to silt and sand is approximately 12.5%. Measured in-situ moisture contents within the native soils ranged from 11.0 to 18.8 percent and averaged approximately 13.8%, which is on the dry side of the material’s optimum moisture content. Spreading the material in a wide area and air drying may be required to achieve the specified compaction of the native material. However, thorough vertical mixing of the excavated native soils will be required to provide a material that can be adequately compacted throughout. During warm weather, drying of the silty soils may become acute; therefore, the lift thickness for compaction and the moisture content of the soils must be properly controlled during the backfilling.

4.2 FOUNDATION DESIGN

The underlying undisturbed, native sandy silt to silt and sand soil (approximately 0.5 m below the existing surface) throughout the site is considered suitable for the support of the building foundation on conventional spread and strip footings. For preliminary design purposes, conventional strip and spread footing foundations placed on native soils having a compact relative density may be designed with a geotechnical resistance at Ultimate Limit States (U.L.S.) and geotechnical reaction at Serviceability Limit States (S.L.S.) of 150 kPa and 100 kPa, respectively. The geotechnical resistance at U.L.S. includes a resistance factor of 0.5. The geotechnical reaction at S.L.S. is based on a total settlement of approximately 25 mm.

For the case of conventional strip and spread footing foundations placed on approved engineered fill as described herein, a geotechnical resistance of 150 kPa at ULS and a geotechnical reaction of 100 kPa at SLS can be considered for the design.

The geotechnical bearing resistance values stated above are for vertical loads (no inclination) and no eccentricity. The minimum footing widths to be used in conjunction with the above recommended soil bearing pressure should be 0.5 m for continuous footings and 0.9 m for individual footings. The total and differential settlements of spread footing foundations designed in accordance with the above recommendations should not exceed tolerable limits of 25 mm and 19 mm, respectively.

All exterior footings and footings in unheated areas should be provided by at least 1.2 metres of soil cover or equivalent artificial thermal insulation for frost protection purposes. Exposed soil foundation subgrades should be protected against freezing and surface water should be kept away from the foundation subgrade areas to prevent softening. If unstable subgrade conditions develop, the Geotechnical Consultant should be contacted in order to assess the conditions and make appropriate recommendations.

Prior to pouring concrete for footings, the footing bases should be cleaned of all, deleterious materials such as topsoil, fill, softened or disturbed materials as well as any standing water. It is recommended that the foundations be inspected by Geotechnical Engineer in order to confirm the exposed soil conditions and recommended bearing capacities.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

The native soils are susceptible to disturbance when wet, so construction scheduling should consider the amount of excavation left exposed to the elements, during foundation preparation.

4.3 CONCRETE SLAB-ON-GRADE

It is understood that the new houses may require slab-on-grade construction for part of the structure (e.g., garages). The subgrade below the proposed slab-on-grade should consist of undisturbed, native soil which is adequate to support a slab-on-grade construction. Subgrade preparation should include the removal of all demolished building debris, any unsuitable earth fill, weak and disturbed soils. After removal of all unsuitable materials, the subgrade should be proof-rolled with heavy rubber tired equipment. The proof-rolling operation shall be witnessed by the Geotechnical Engineer. Any soft or wet subgrade areas which deflect significantly should be sub-excavated and replaced with suitable approved earth fill material compacted to at least 98% of Standard Proctor Maximum Dry Density (SPMDD).

Where new fill is required to raise the grade, excavated native material from the Site or similar clean imported fill material may be used, free from topsoil, organic or deleterious matter, provided the material is placed in large areas where it can be compacted with a heavy compactors. Oversize particles (cobbles, boulders) larger than 100 mm should be discarded from the fill material. The fill material should not be frozen and should not be too wet for efficient compaction (moisture content within 2 percent of the optimum). The fill placement should not be performed during winter months when freezing temperatures occur persistently or intermittently. All fill placed below the slab-on-grade areas of the building must be placed in thin lifts of 150 mm thickness or less.

Conventional lightly loaded concrete floor slab should be placed on a minimum 200 mm layer of 19 mm clear stone (OPSS 1004) compacted by vibration to a dense state.

Provided the subgrade, underfloor fill and granular base are prepared in accordance with the above recommendations, the modulus of subgrade reaction for slab design on the native soils will be 30,000 kPa/m.

The soils at this site are susceptible to frost effects which would have the potential to deform hard landscaping adjacent to the building. At locations where the building is expected to have flush entrances, care must be taken in detailing the exterior slabs / sidewalks, providing insulation / drainage / non-frost susceptible backfill to maintain the flush threshold during freezing weather conditions.

4.4 EARTHQUAKE DESIGN PARAMETERS

The Ontario Building Code (Ontario Regulation 332/12) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.18.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

The parameters for determination of the Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the Ontario Building Code. The classification is based on the

determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. In the absence of such measurements, the classification is estimated on the basis of empirical analysis of undrained shear strength or penetration resistance. The applicable penetration resistance is that which has been corrected to a rod energy efficiency of 60% of the theoretical maximum or the (N60) value.

Based on the borehole information, the overburden stratigraphy consists of a thin surface layer of topsoil by sandy silt to silt and sand with clayey silt deposits. The silty soils have an undrained shear strength that is typically 75 kPa and it is known that the deeper soils in the area are of comparable strength or stronger (clayey till; >100 kPa). On this basis, the site designation for seismic analysis is Class D according to Table 4.1.8.4.A from the quoted code.

The site specific 5% damped spectral acceleration coefficients, and the peak ground acceleration factors are provided in the 2006 Ontario Building Code - Supplementary Standard SB-1 (August 15, 2006), Table 1.2.

4.5 SOIL CORROSIVITY

A composite sample of near surface soils were submitted for pH, Sulphide, Redox Potential and Resistivity tests in order to determine their corrosive characteristics of the soils. The test results are tabulated below and the Certificate of Analysis provided by AGAT Laboratories is contained in Appendix C:

Table 1 Soil Corrosivity Results

SOIL CHARACTERISTICS	SAMPLE SS1
pH	8.23
Resistivity (ohm-cm)	8930
Redox Potential (mV)	162
Sulphide (%)	<0.01
Moisture Content (%)	-

The above tests are considered in evaluating the corrosivity of the soil. For each of these tests, the results are categorized and points are assigned according to their contribution to corrosivity as tabulated below:

Table 2 ANSI - AWWA Rating for Corrosivity

SOIL CHARACTERISTICS	SAMPLE SS1
pH	0
Resistivity (ohm-cm)	0
Redox Potential (mV)	0
Sulphide (%)	0
Moisture Content (%)	2
TOTAL POINTS	2*

*Note: A value less than 10 is considered non-corrosive.

Based on the ANSI – AWWA rating system, it is concluded that the soils would be considered non-corrosive for the subject site. The criteria for the soils test evaluation is presented in Appendix D. This data should be reviewed by the pipe manufacturer to ensure proper construction methodology and appropriate protection. All watermain construction and material specifications should follow the standards and regulations as per OPSS and Township specifications.

4.6 PAVEMENT DESIGN

Based on the existing topography of the subject site, assumed proposed grades and the data collected during the field investigation, it is anticipated that the sub-grade material for the pavement will generally consist of native silty soils. The pavement designs presented in Table 3 below are recommended. These pavements will provide service for 12 to 15 years before any significant restoration or reconstruction will be required.

Table 3 Asphaltic Concrete Pavement Structure Designs (Minimum Component Thicknesses)

PAVEMENT LAYER	COMPACTION REQUIREMENTS	CAR PARKING	MEDIUM DUTY DELIVERY/GARBAGE TRUCK TRAFFIC
Surface Course Asphaltic Concrete	As per OPS 310	40 mm Hot-Laid HL3	40 mm Hot-Laid HL3
Binder Course Asphaltic Concrete	As per OPS 310	50 mm Hot-Laid HL8	80 mm Hot-Laid HL8
Granular Base	100% SPMDD*	150 mm Granular 'A'	150 mm Granular 'A'
Granular Sub-base	100% SPMDD*	150 mm Granular 'B' Type II	300 mm Granular 'B' Type II

*Note: SPMDD - Standard Proctor Maximum Dry Density (ASTM-D698).

The granular pavement structure materials should be placed in lifts not exceeding 150 mm thick and be compacted to a minimum of 100% SPMDD. Asphaltic concrete materials should be rolled and compacted as per OPSS 310. The granular and asphaltic concrete pavement materials and their placement should conform to OPSS 310, 501, 1010 and 1150, and the pertinent Municipality specifications.

The long-term performance of the proposed pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible if fill is placed and that the subgrade is not disturbed and weakened after it is exposed.

Control of surface water is a significant factor in achieving good pavement life. Grading adjacent to the pavement areas must be designed so that water is not allowed to pond adjacent to the outside edges of the pavement or curb. In addition, the need for adequate drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum gradient of three percent) to provide effective drainage toward subgrade drains. Sub-drains consisted of at least 100 mm in diameter wrapped with filter cloth are recommended to intercept excess subsurface moisture at the curb lines and catch basins. The invert of sub-drains should be maintained at least 0.3 m below subgrade level.

Additional comments on the construction of pavement areas are as follows:

- As part of the subgrade preparation, remnants of former buildings (if any) must be excavated, and the proposed pavement areas should be stripped of vegetation, topsoil, unsuitable earth fill and other obvious objectionable material. The subgrade should be properly shaped and sloped as required, and then proof-rolled. Loose/soft or spongy subgrade areas should be sub-excavated and replaced with suitable approved material compacted to at least 98% of Standard Proctor Maximum Dry Density (SPMDD).
- Where new fill is needed to increase the grade or replace disturbed portions of the subgrade, excavated inorganic soils or similar clean imported fill materials may be used, provided their moisture content is maintained within 2 percent of the soil's optimum moisture content. All fill must be placed and compacted to not less than 98% of SPMDD.
- The most severe loading conditions on pavement areas and the subgrade may occur during construction during wet and un-drained conditions. Consequently, special provisions such as restricted lanes, half-loads during paving etc., may be required, especially if construction is carried out during unfavorable weather.
- For fine-grained soils, as encountered at the site, the degree of compaction specification alone cannot ensure distress free subgrade. Proof-rolling must be carried out and witnessed by geotechnical personnel for final recommendations of sub-base thicknesses.

5 GENERAL COMMENTS

During construction, inspections by geotechnical personnel from WSP should be carried out, to examine and approve founding soil, fill material, granular and to verify the placement of fill, compaction of subgrade by in situ density testing.

Finally, it is essential that construction be regarded as an extension of the design phase in the sense that design assumptions are confirmed or revised to conform to actual field conditions as revealed by excavation. This report is based on borehole information from a few locations only at the site. If, during construction, excavations reveal different subsoil conditions, it should be brought to our attention so that we can assess their effects on the construction.

6 STATEMENT OF LIMITATIONS

The comments and recommendations of this report are based on geotechnical data gathered from the boreholes at the locations indicated on the plot plan and are intended for the guidance of the project design engineers. Soil and groundwater conditions between and beyond the borehole locations may differ from those encountered at the time of our soil investigation and may become apparent during construction. Our responsibility is limited to accurate interpretation of the soil and groundwater conditions prevailing at the locations and date(s) investigated.

7 CLOSURE

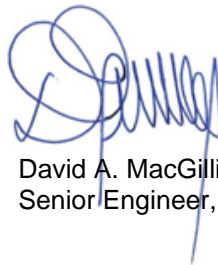
We trust this information is sufficient for your current needs. Please call if we can be of further assistance.

Prepared by:
WSP Canada Inc.



Craig Leger, M.Sc., C.E.T.
Environmental Scientist


Reviewed by



David A. MacGillivray, M.A.Sc. P.Eng., P.Geo.
Senior Engineer, Environment



LEGEND

 SITE BOUNDARY

50 25 0 50 metres



ORTHOGRAPHY SOURCE:
2012 DIGITALGLOBE IMAGERY (USGS EARTHSTAR GEOGRAPHICS)

LOCATION MAP

GEOTECHNICAL INVESTIGATION
PROPOSED MARSVILLE HERITAGE ESTATE
DEVELOPMENT
Town of East, Garafraxa, Ontario
For Khurram Tunio

DATE: APRIL 2014

SCALE: 1:5000

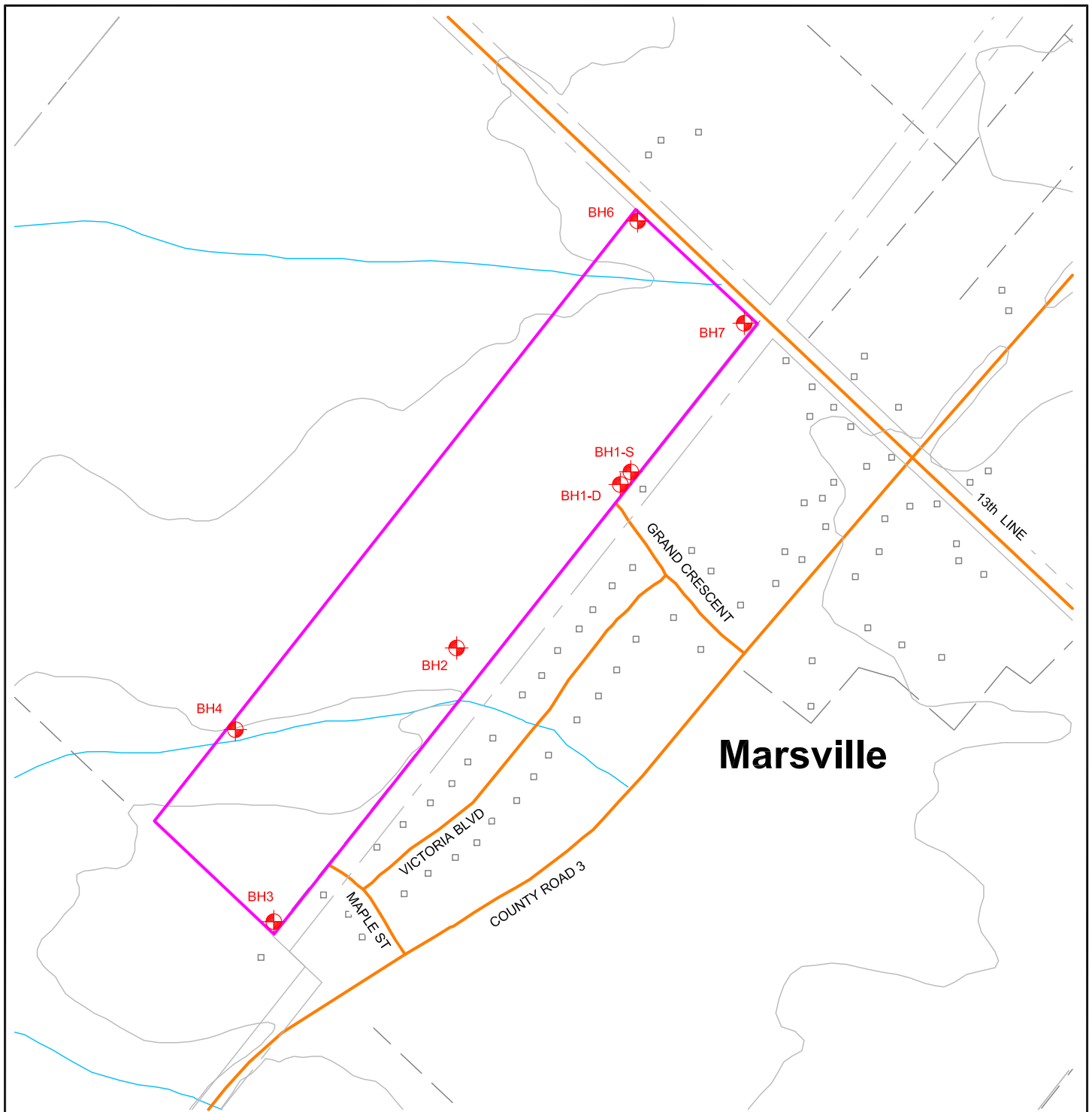
PROJECT: 131-24174-00 105

REF. NO.: 131-24174-00 105-0 F1-LM



FIGURE

1



LEGEND

- SITE BOUNDARY
- ⊕ BH4 MONITORING WELL LOCATION AND DESIGNATION



50 25 0 50 metres

MAP SOURCE:
OBM 1:10000 MAPPING, NAD 83, ZONE 17 DATUM.

SITE PLAN

GEOTECHNICAL INVESTIGATION
PROPOSED MARSVILLE HERITAGE ESTATE
DEVELOPMENT
Town of East, Garafraxa, Ontario
For Khurram Tunio

DATE: APRIL 2014

SCALE: 1:5000

PROJECT: 131-24174-00 105

REF. NO.: 131-24174-00 105-0 F2-SP



FIGURE

2

Appendix A

BOREHOLE LOGS

LOG OF BOREHOLE BH1D



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

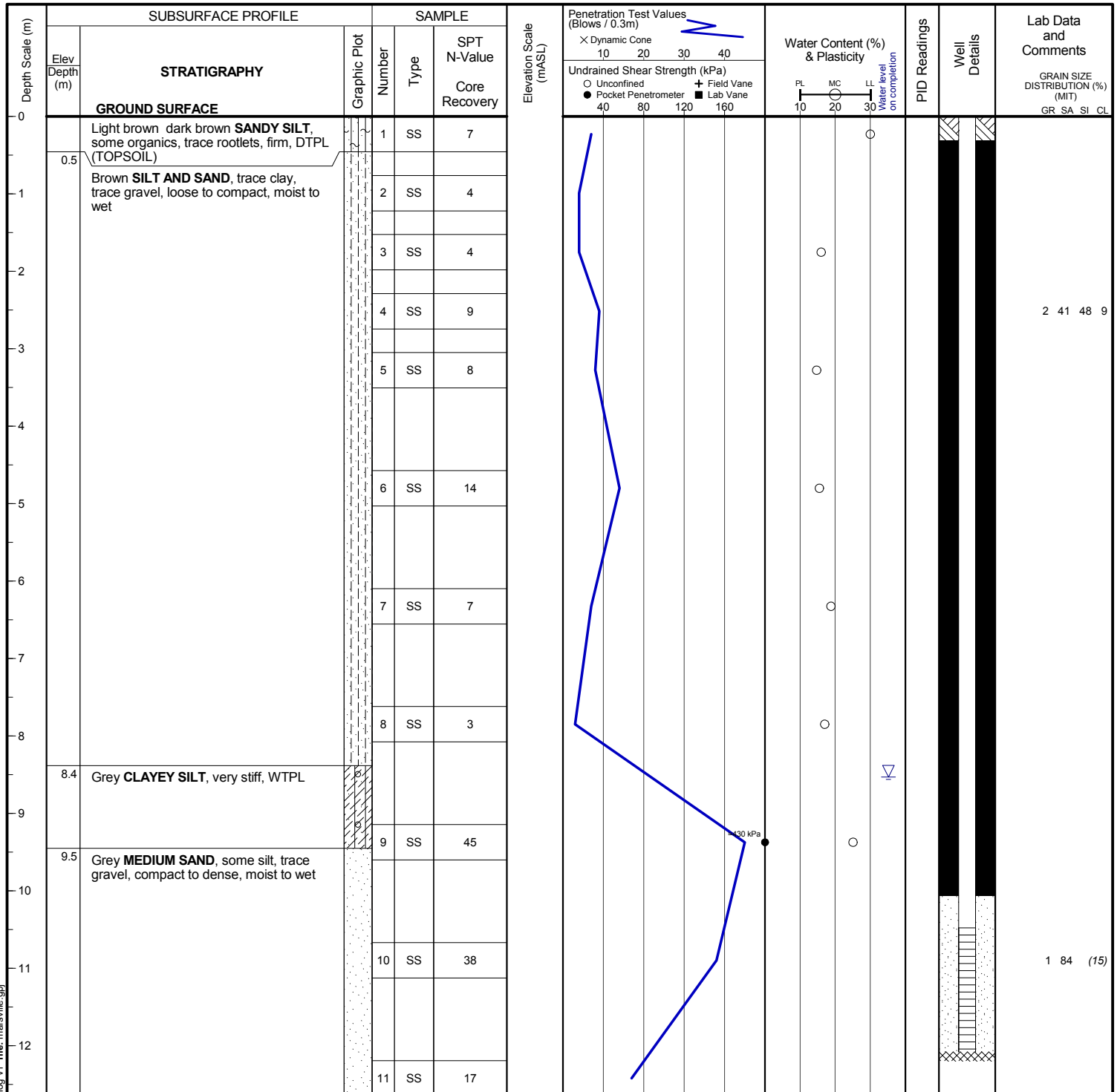
method | Hollow stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Unstabilized water level at 8.5 m below ground surface; borehole was open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH1S



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville


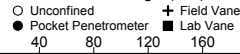
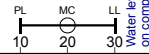
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)					Water Content (%) & Plasticity			PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value Core Recovery		Dynamic Cone		Undrained Shear Strength (kPa)			PL MC LL					
																		
0	GROUND SURFACE							10	20	30	40	10	20	30				
1																		
2																		
3																		
4																		
5																		
6																		

library: genivar - library.gib report: gen log v1 filter: marsville.gpj

LOG OF BOREHOLE BH2



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

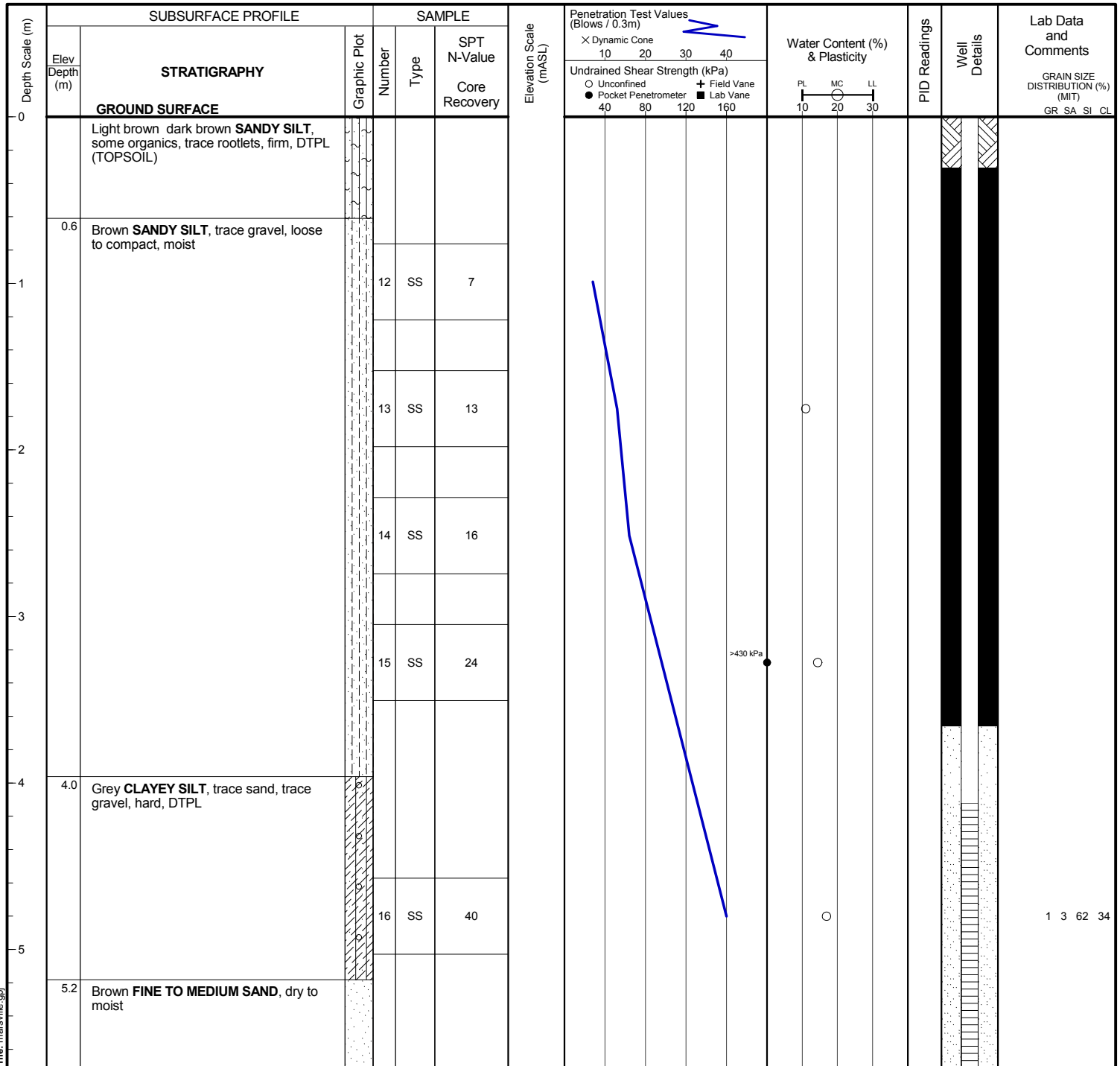
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Borehole was dry and open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH3



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

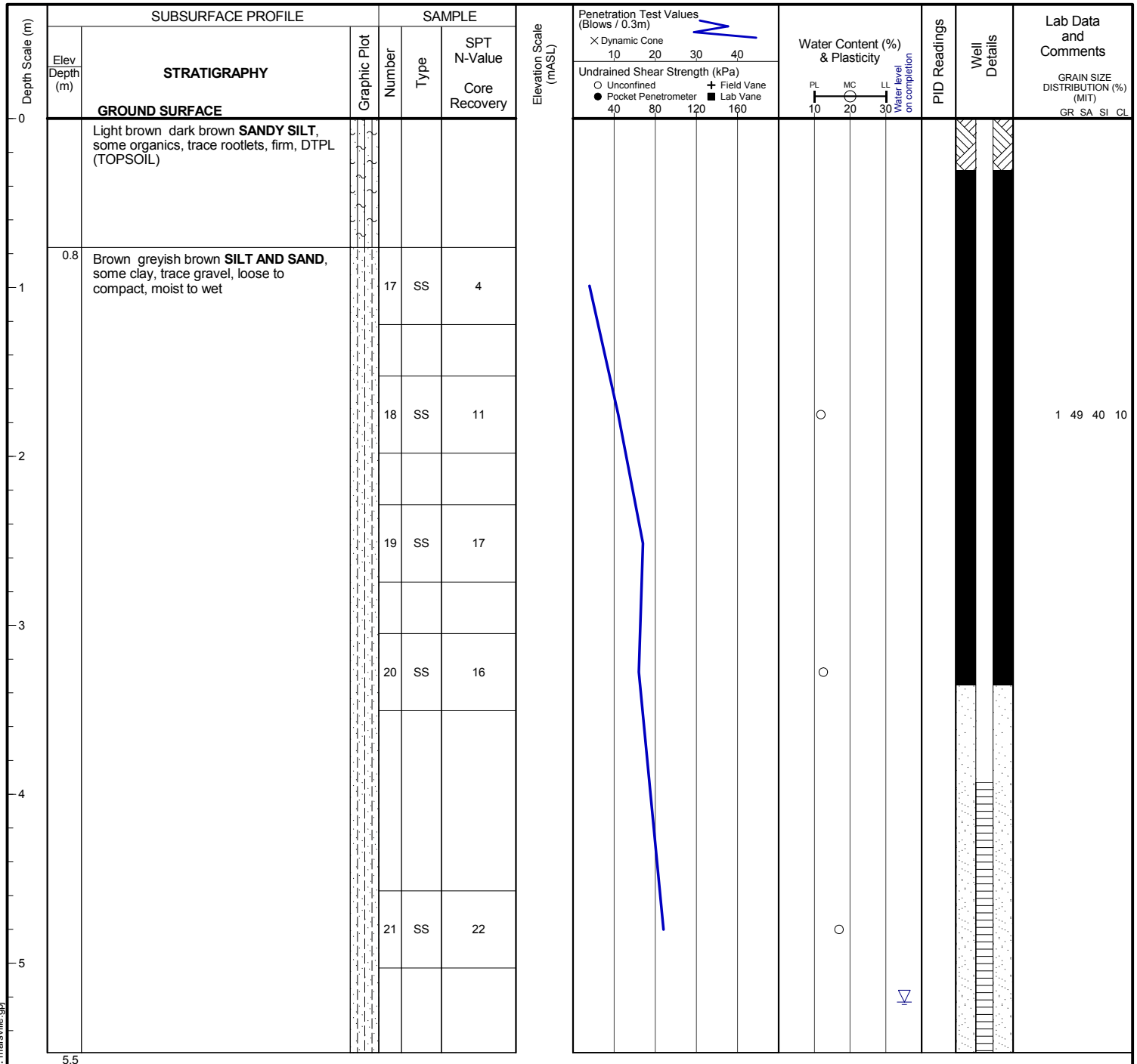
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Unstabilized water level at 5.2 m below ground surface; borehole was open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH4



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

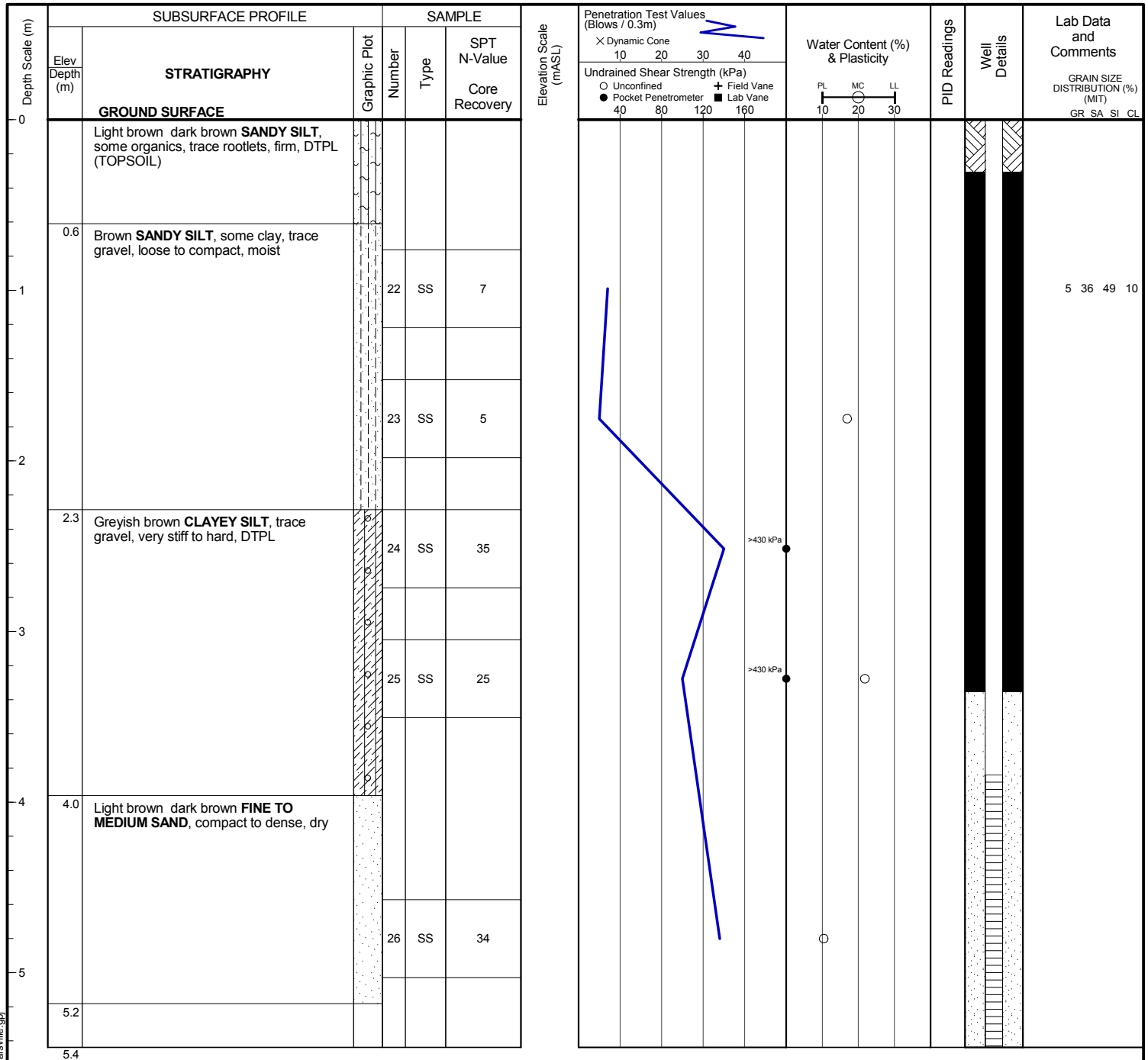
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Borehole was dry and open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH5



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

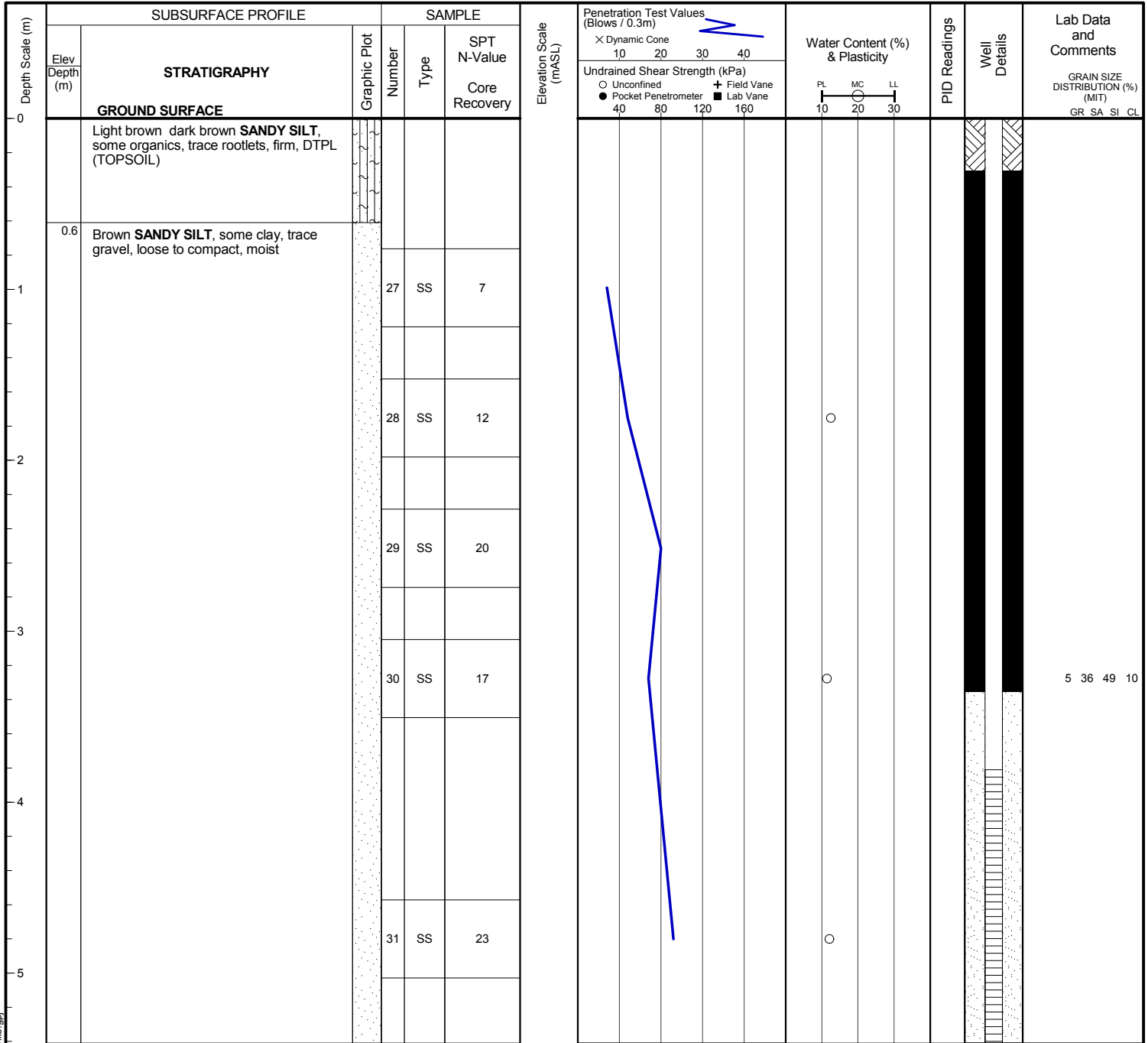
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Borehole was dry and open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH6



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

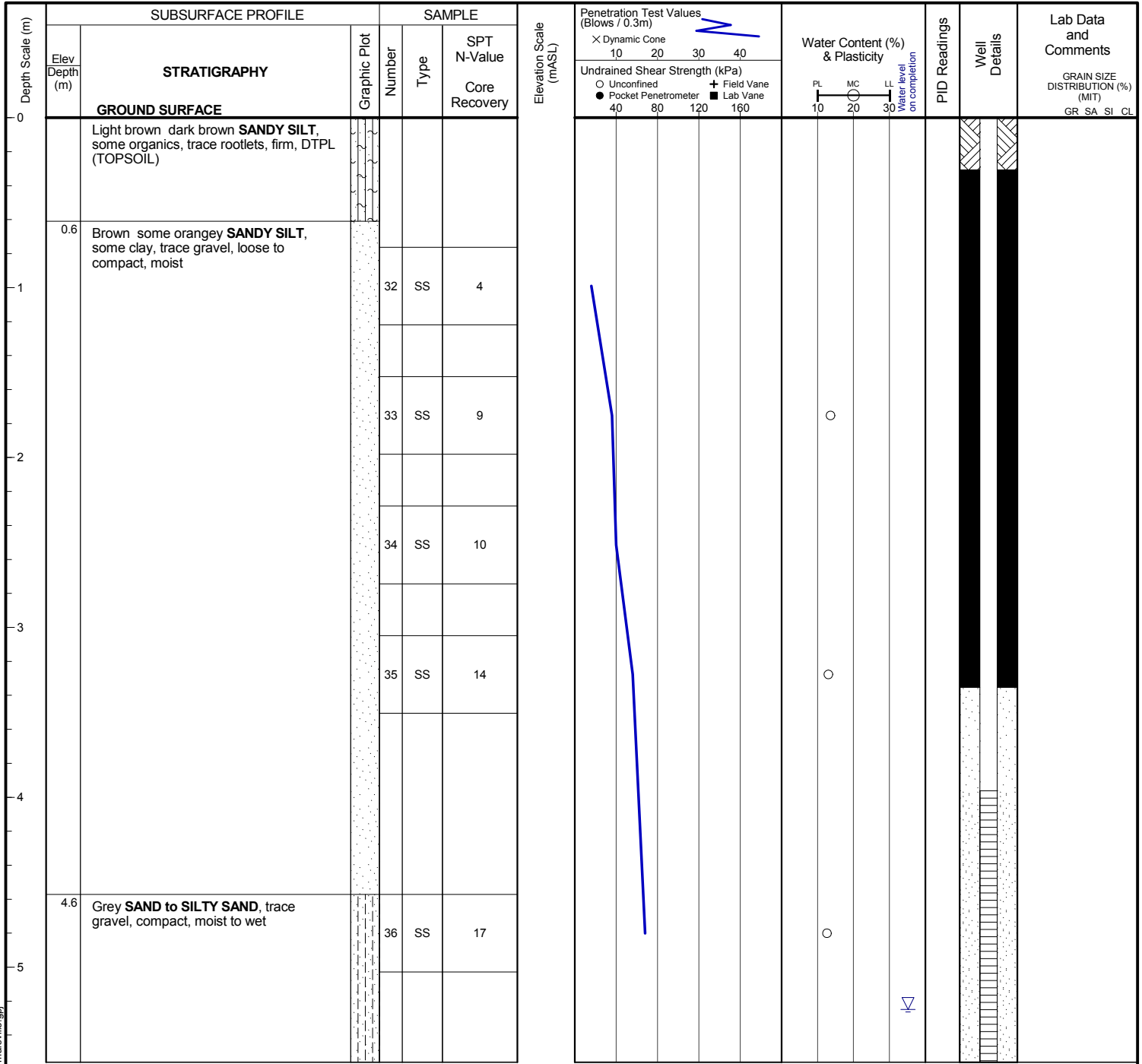
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Unstabilized water level at 5.2 m below ground surface; borehole was open upon completion.

50 mm monitoring well installed.
No. 10 screen installed.

LOG OF BOREHOLE BH7



project | Marsville Heritage Estate Development

project no. | 131-24174-00

client | Khurram Tunio

rig type | D50, track-mounted

date started | 2013/11/25

location | Marsville

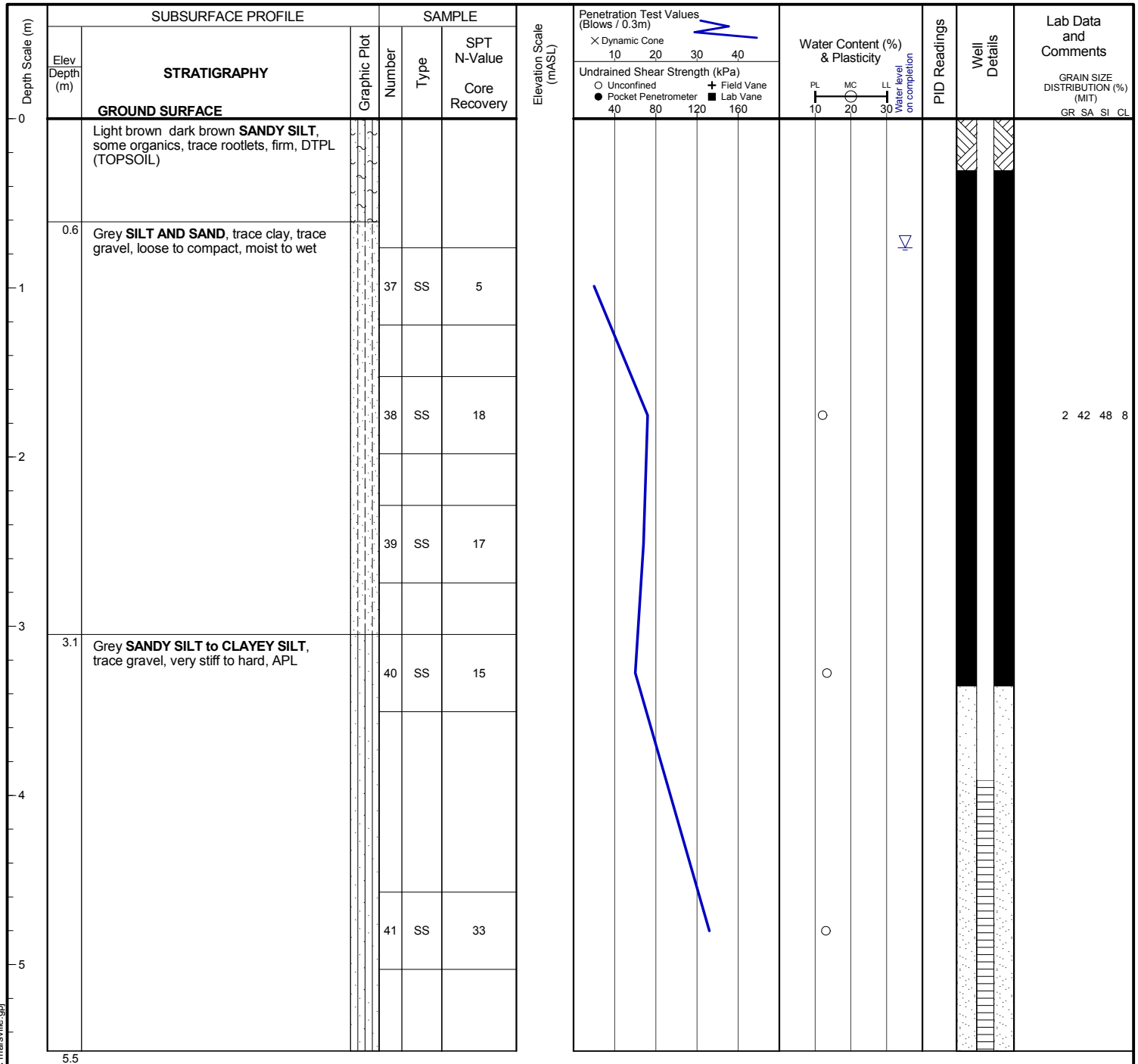
method | Solid stem augers

supervisor | SCL

position |

inclination | -90 deg.

reviewer | DM



END OF BOREHOLE

Unstabilized water level at 0.8 m below ground surface; borehole was open upon completion.

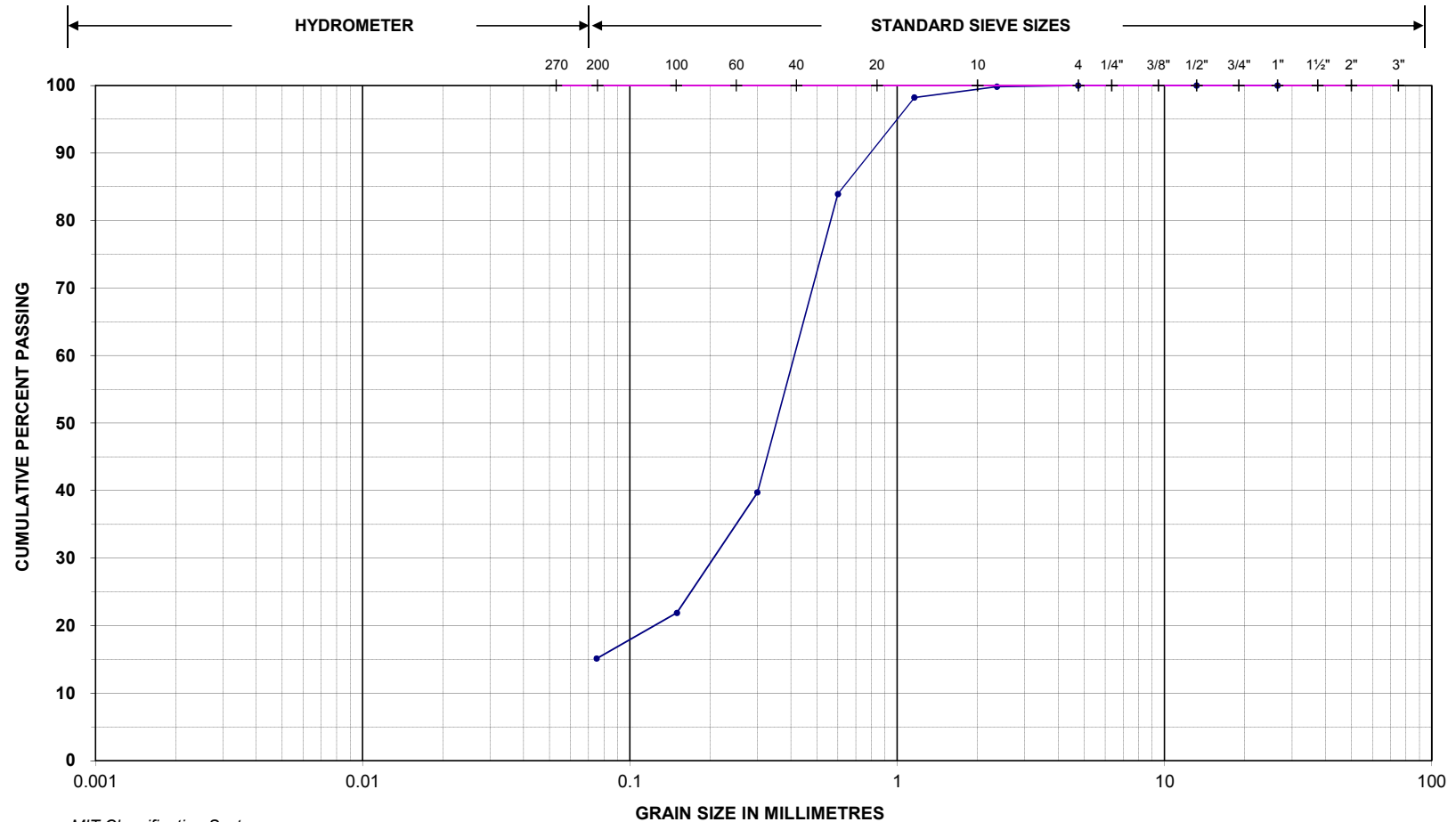
50 mm monitoring well installed.
No. 10 screen installed.

Appendix B

PARTICLE SIZE DISTRIBUTION ANALYSES



PARTICLE SIZE DISTRIBUTION



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Marsville Heritage Estate Development

Project No.: 131-24174-00

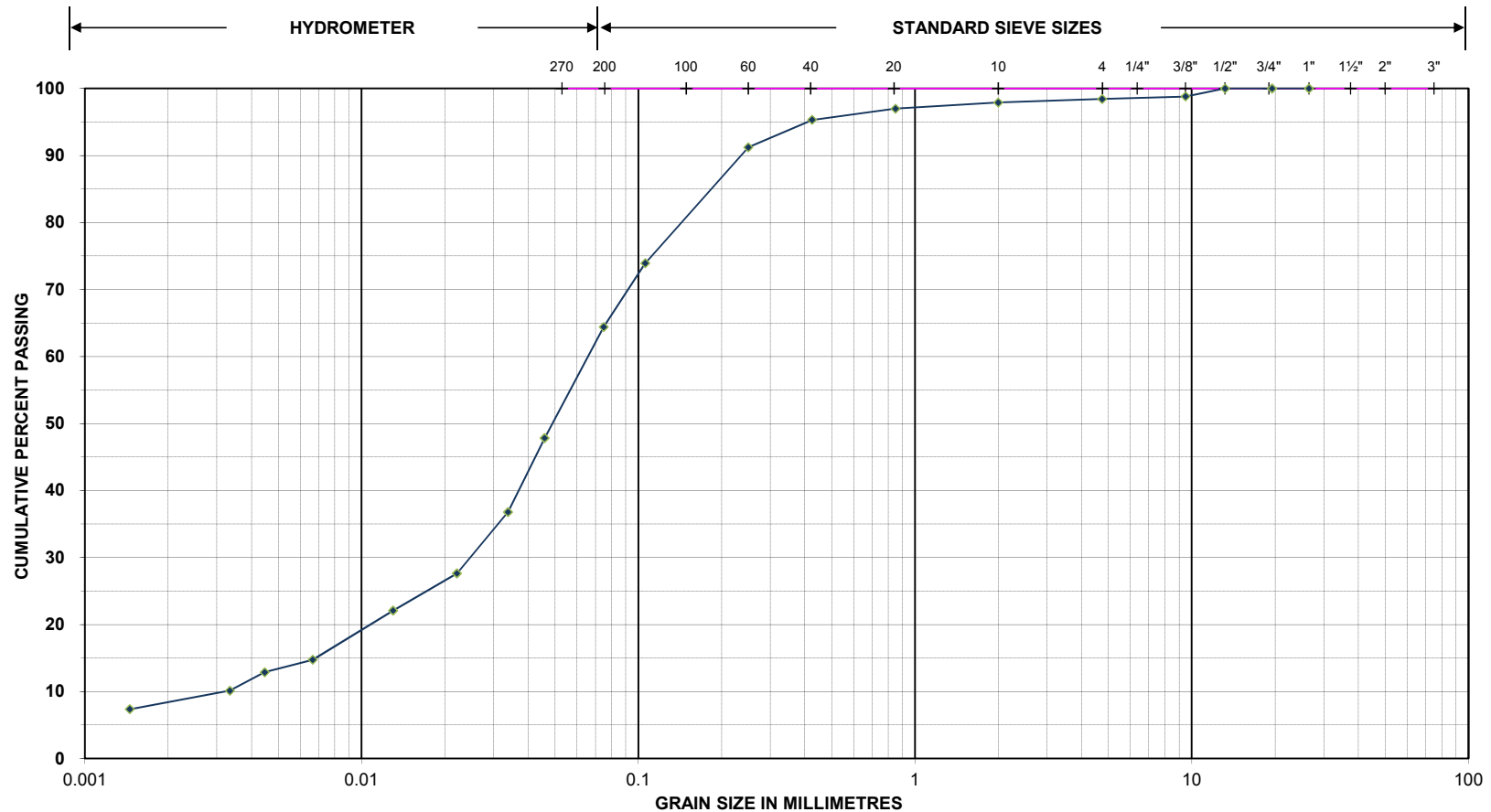
Location ID.: BH1-D

Sample No./Depth: 10 / 10.7-11.1m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	1.16 mm	98.2
26.5 mm	100.0	0.60 mm	83.9
13.2 mm	100.0	0.30 mm	39.7
4.75 mm	100.0	0.15 mm	21.9
2.36 mm	99.8	0.075 mm	15.1



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Marsville Heritage Estate Development

Project No.: 131-24174-00

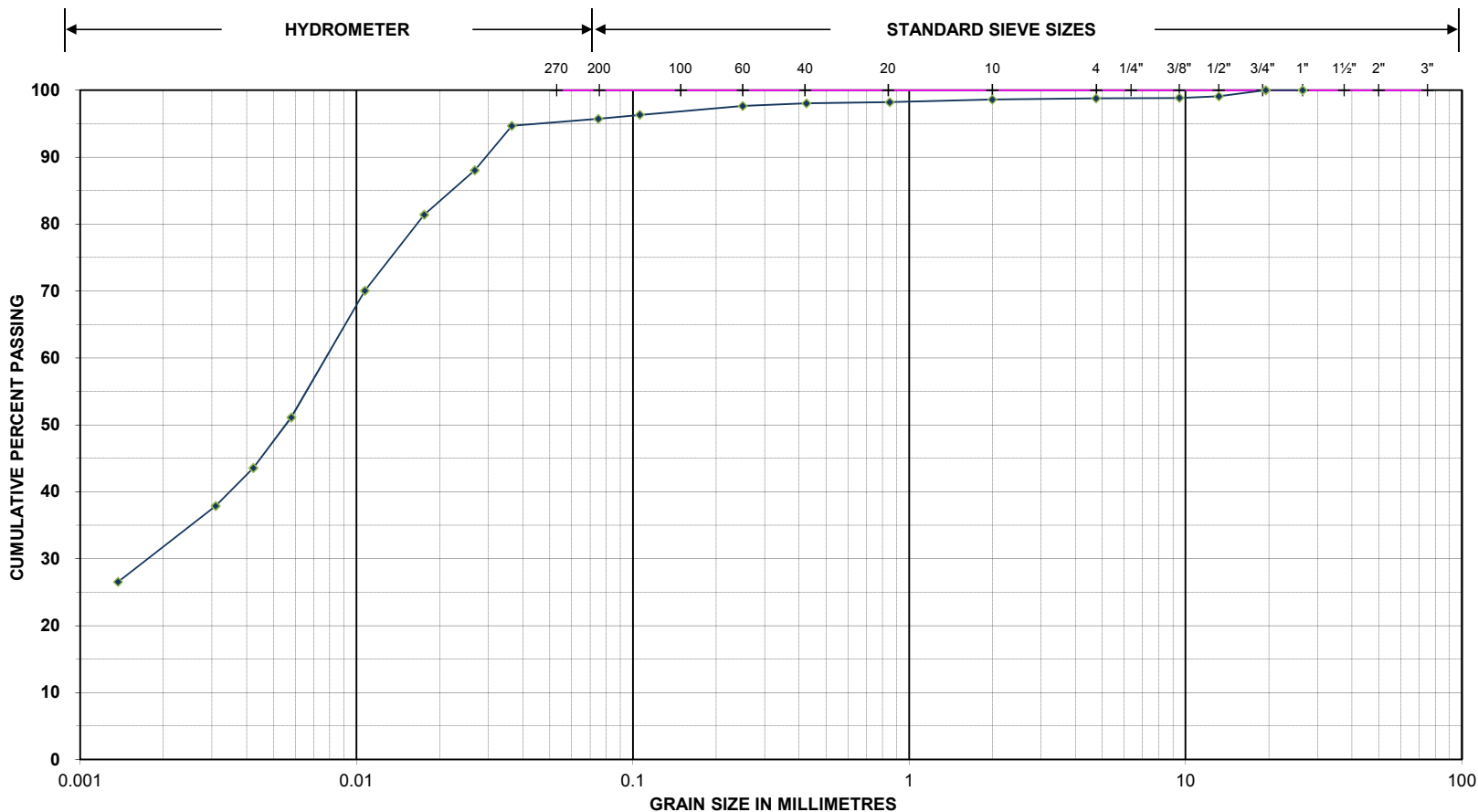
Location ID.: BH1-D

Sample No./Depth: 4 / 2.3-2.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	97.0	0.046	47.8
13.2 mm	100.0	0.425 mm	95.3	0.022	27.6
9.50 mm	98.8	0.250 mm	91.2	0.007	14.7
4.75 mm	98.4	0.106 mm	73.9	0.003	10.1
2.00 mm	97.9	0.075 mm	64.4	0.001	7.4



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Marsville Heritage Estate Development

Project No.: 131-24174-00

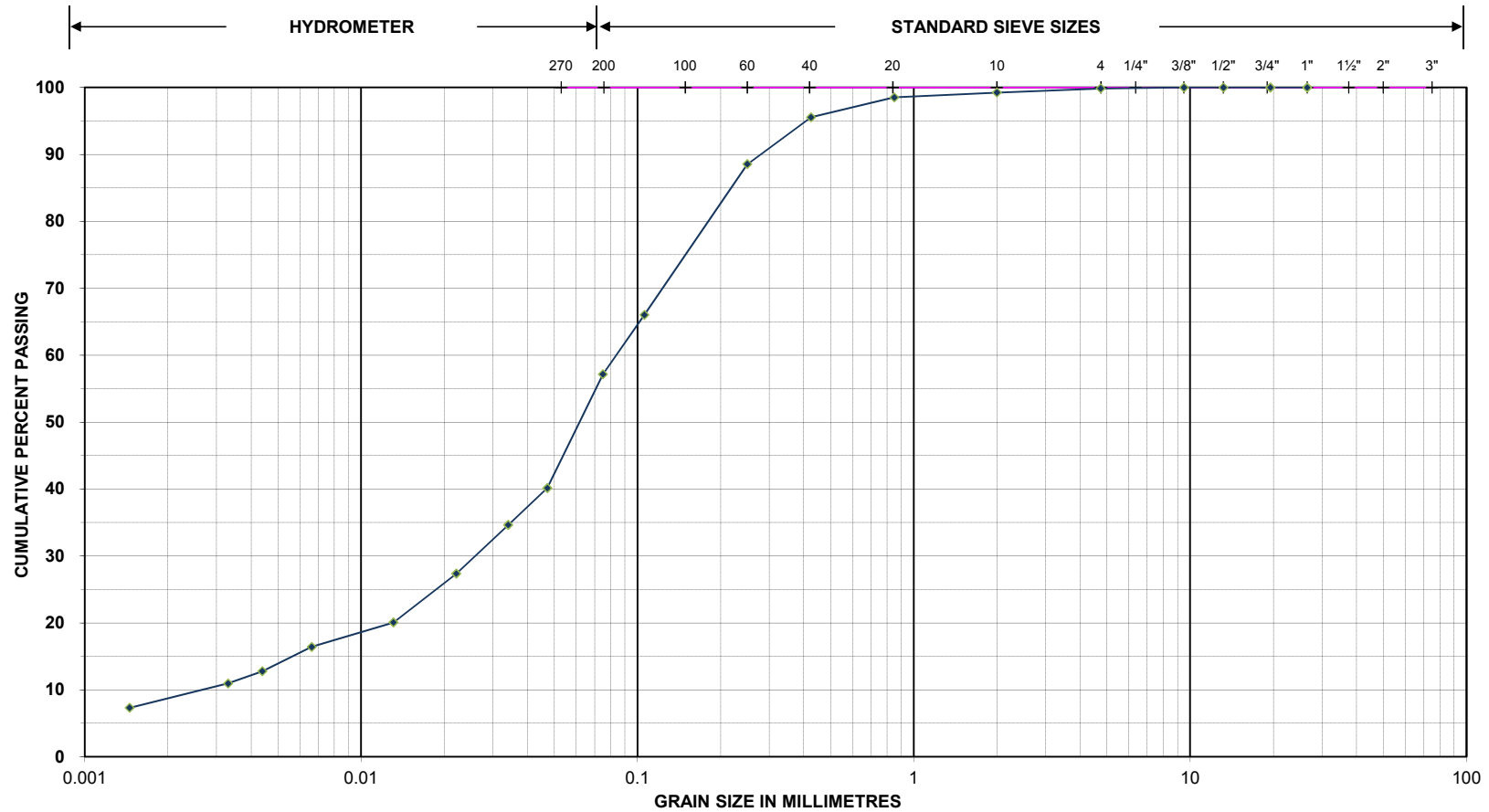
Location ID.: BH2

Sample No./Depth: 16 / 4.6-5.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	98.2	0.036	94.7
13.2 mm	99.1	0.425 mm	98.0	0.018	81.4
9.50 mm	98.8	0.250 mm	97.7	0.006	51.1
4.75 mm	98.8	0.106 mm	96.3	0.003	37.9
2.00 mm	98.6	0.075 mm	95.7	0.001	26.5



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

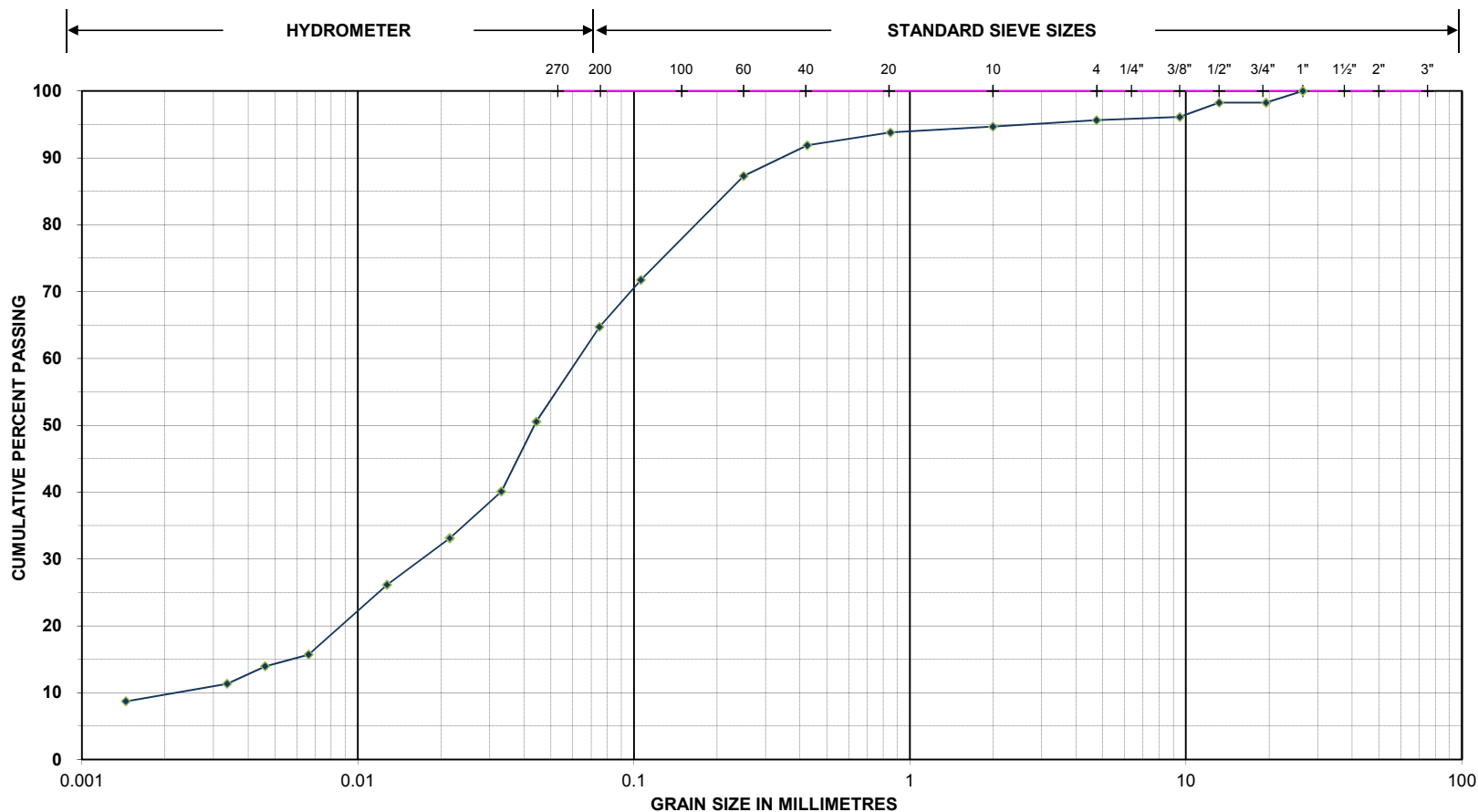
Project Name: Marsville Heritage Estate Development
Location ID.: BH3

Project No.: 131-24174-00
Sample No./Depth: 18 / 1.5-2.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	98.5	0.047	40.1
13.2 mm	100.0	0.425 mm	95.6	0.022	27.4
9.50 mm	100.0	0.250 mm	88.5	0.007	16.4
4.75 mm	99.9	0.106 mm	66.0	0.003	10.9
2.00 mm	99.2	0.075 mm	57.2	0.001	7.3



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

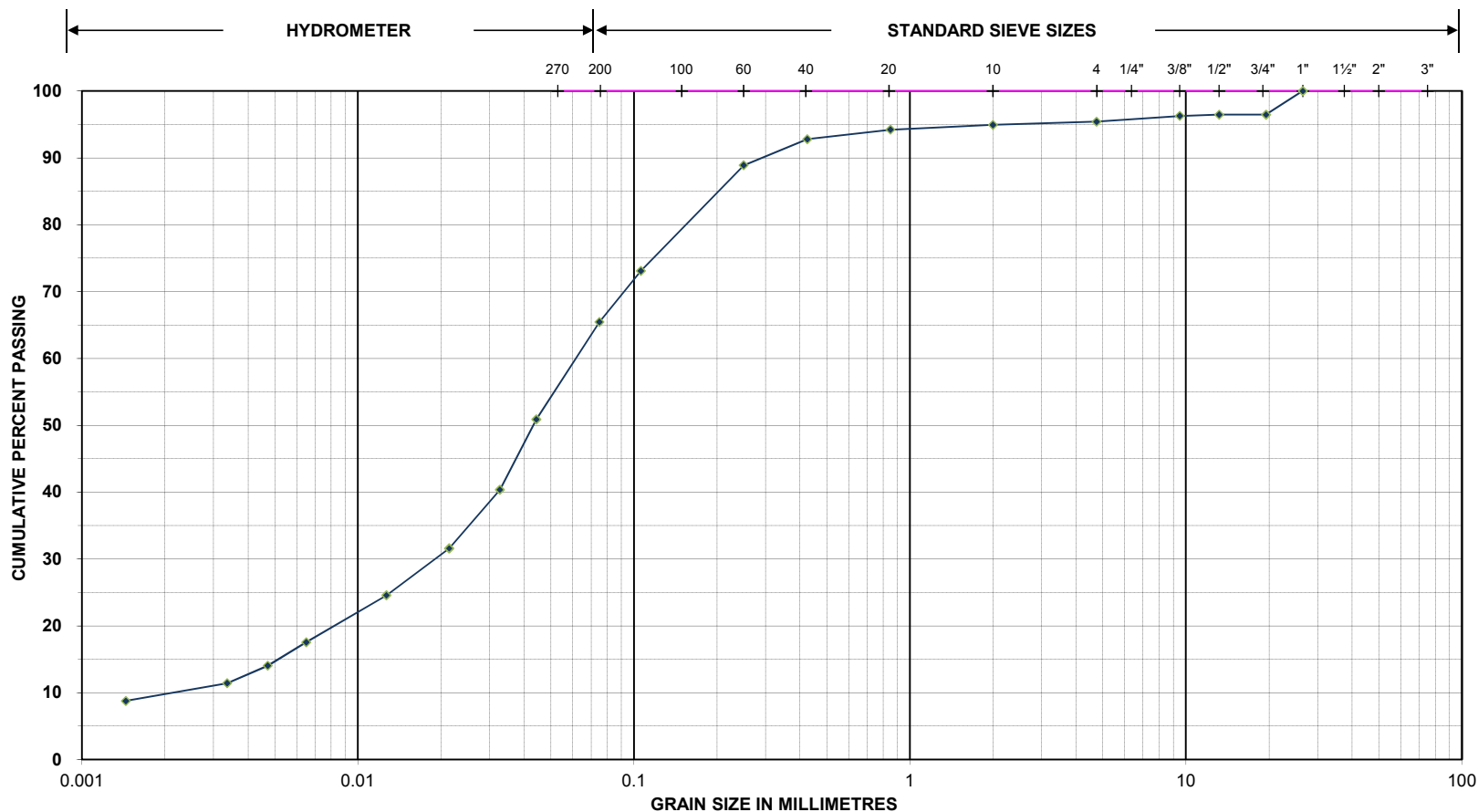
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Marsville Heritage Estate Development	Project No.:	131-24174-00
Location ID.:	BH4	Sample No./Depth:	22 / 0.8-1.2m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	93.8	0.044	50.6
13.2 mm	98.3	0.425 mm	91.9	0.022	33.1
9.50 mm	96.1	0.250 mm	87.3	0.007	15.7
4.75 mm	95.7	0.106 mm	71.8	0.003	11.3
2.00 mm	94.7	0.075 mm	64.7	0.001	8.7



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Marsville Heritage Estate Development

Project No.: 131-24174-00

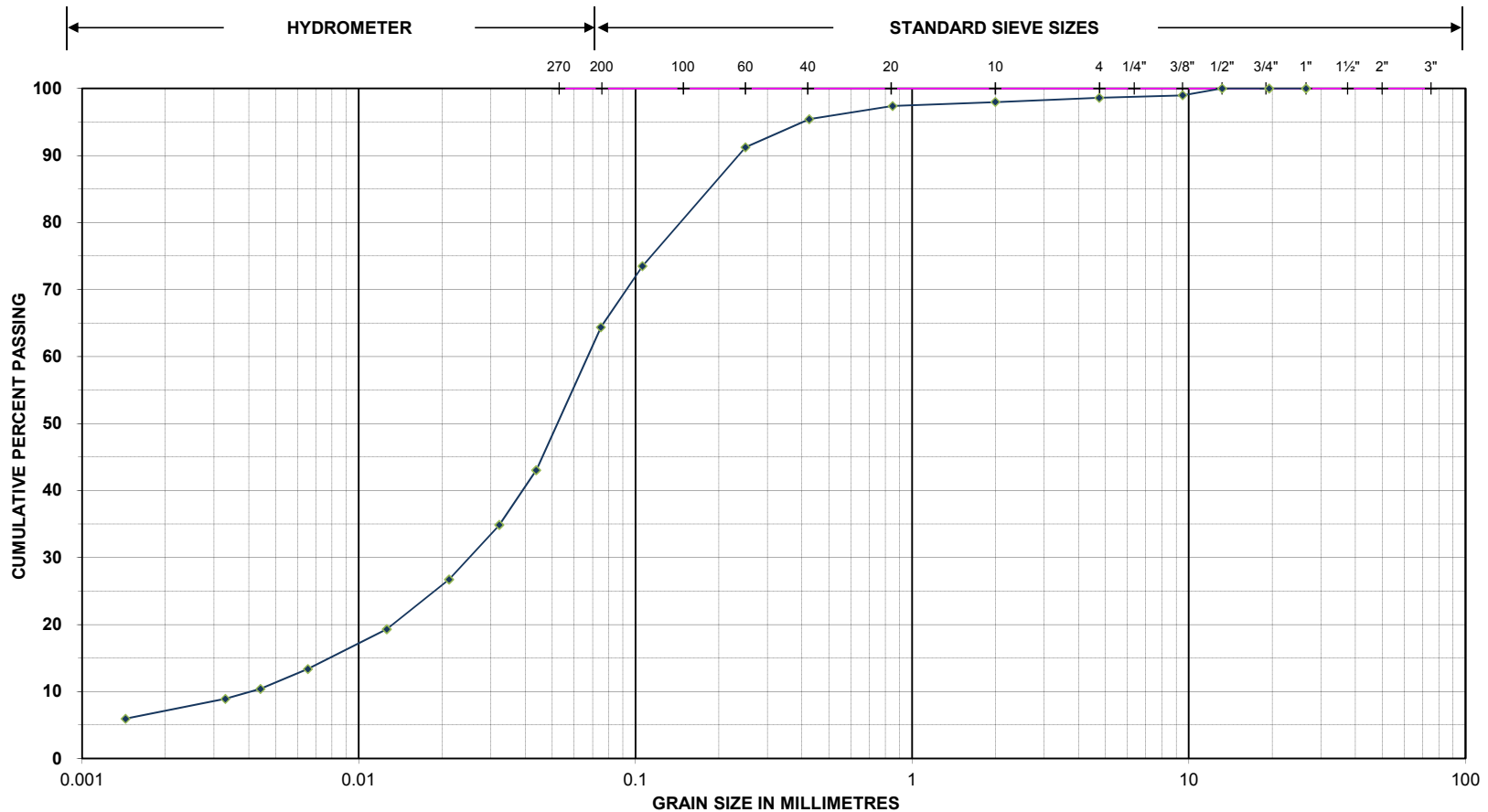
Location ID.: BH5

Sample No./Depth: 30 / 3.0-3.5m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	94.2	0.044	50.9
13.2 mm	96.5	0.425 mm	92.8	0.021	31.6
9.50 mm	96.3	0.250 mm	88.9	0.007	17.5
4.75 mm	95.4	0.106 mm	73.1	0.003	11.4
2.00 mm	94.9	0.075 mm	65.5	0.001	8.8



PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Marsville Heritage Estate Development

Project No.: 131-24174-00

Location ID.: BH7

Sample No./Depth: 38 / 1.5-2.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	0.850 mm	97.4	0.044	43.0
13.2 mm	100.0	0.425 mm	95.4	0.021	26.7
9.50 mm	99.0	0.250 mm	91.2	0.007	13.4
4.75 mm	98.6	0.106 mm	73.5	0.003	8.9
2.00 mm	98.0	0.075 mm	64.4	0.001	5.9

Appendix C

LABORATORY CERTIFICATES OF ANALYSIS

CLIENT NAME: WSP CANADA INC.
55 KING STREET, 7TH FLOOR
ST CATHARINES, ON L2R3H5
(905) 687-1771

ATTENTION TO: Craig Leger

PROJECT: 131-24174-00

AGAT WORK ORDER: 14T836498

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: May 14, 2014

PAGES (INCLUDING COVER): 7

VERSION*: 1

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

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

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

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Craig Leger

Corrosivity Package

DATE RECEIVED: 2014-05-06

DATE REPORTED: 2014-05-14

		SAMPLE DESCRIPTION:		SS1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		5/5/2014
Parameter	Unit	G / S	RDL	5339027
Sulfide	%		0.01	<0.01
Chloride (2:1)	µg/g		2	7
Sulphate (2:1)	µg/g		2	8
pH (2:1)	pH Units		NA	8.23
Electrical Conductivity (2:1)	mS/cm		0.005	0.112
Resistivity (2:1)	ohm.cm		1	8930
Redox Potential (2:1)	mV		5	162

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
5339027 * Analysis was performed at AGAT's Mining Division.

EC/Resistivity, pH, Chloride, Sulphate and Redox Potential were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

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

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Craig Leger

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2014-05-06

DATE REPORTED: 2014-05-14

		SAMPLE DESCRIPTION:		SS1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		5/5/2014
Parameter	Unit	G / S	RDL	5339027
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.100	0.166
Boron Leachate	mg/L	500	0.050	<0.050
Cadmium Leachate	mg/L	0.5	0.010	<0.010
Chromium Leachate	mg/L	5.0	0.010	<0.010
Lead Leachate	mg/L	5.0	0.010	<0.010
Mercury Leachate	mg/L	0.1	0.01	<0.01
Selenium Leachate	mg/L	1.0	0.010	<0.010
Silver Leachate	mg/L	5.0	0.010	<0.010
Uranium Leachate	mg/L	10.0	0.050	<0.050
Fluoride Leachate	mg/L	150	0.05	0.16
Cyanide Leachate	mg/L	20.0	0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Regulation 558

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

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

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Craig Leger

ON Regulation 558 - OC Pesticides & PCBs

DATE RECEIVED: 2014-05-06

DATE REPORTED: 2014-05-14

		SAMPLE DESCRIPTION:		SS1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		5/5/2014
Parameter	Unit	G / S	RDL	5339027
Heptachlor + Heptachlor Epoxide	mg/L	0.3	0.0003	<0.0003
Aldrin + Dieldrin	mg/L	0.07	0.0007	<0.0007
DDT + Metabolites	mg/L	3.0	0.003	<0.003
Methoxychlor	mg/L	90.0	0.09	<0.09
Chlordane (Total)	mg/L	0.7	0.0007	<0.0007
Aldrin	mg/L		0.0002	<0.0002
alpha - chlordane	mg/L		0.0001	<0.0001
gamma-Chlordane	mg/L		0.0002	<0.0002
Oxychlordane	mg/L		0.0004	<0.0004
pp'-DDE	mg/L		0.0005	<0.0005
pp'-DDD	mg/L		0.0015	<0.0015
op'-DDT	mg/L		0.0015	<0.0015
pp'-DDT	mg/L		0.0005	<0.0005
Dieldrin	mg/L		0.0005	<0.0005
Heptachlor	mg/L		0.0001	<0.0001
Heptachlor Epoxide	mg/L		0.0002	<0.0002
Lindane	mg/L		0.0004	<0.0004
PCB's	mg/L	0.3	0.0002	<0.0002
Endrin	mg/L	0.02	0.0004	<0.0004
Toxaphene	mg/L	0.5	0.0005	<0.0005
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130	102	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Reg. 558
5339027 The sample was leached according to Regulation 558 protocol. Analysis was performed after extraction of the leachate.

Certified By:

Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

ATTENTION TO: Craig Leger

Soil Analysis															
RPT Date: May 14, 2014			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 558 Metals and Inorganics

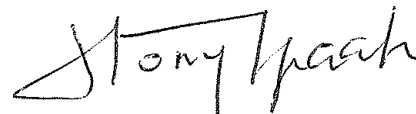
Arsenic Leachate	1		0.014	0.014	0.0%	< 0.010	98%	90%	110%	96%	80%	120%	99%	70%	130%
Barium Leachate	1		0.694	0.695	0.1%	< 0.100	96%	90%	110%	93%	80%	120%	102%	70%	130%
Boron Leachate	1		0.048	0.052	8.0%	< 0.050	106%	90%	110%	92%	80%	120%	107%	70%	130%
Cadmium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	97%	90%	110%	93%	80%	120%	97%	70%	130%
Chromium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	99%	90%	110%	104%	80%	120%	109%	70%	130%
Lead Leachate	1		0.025	0.025	0.0%	< 0.010	95%	90%	110%	88%	80%	120%	92%	70%	130%
Mercury Leachate	1		< 0.01	< 0.01	0.0%	< 0.01	99%	90%	110%	104%	80%	120%	94%	70%	130%
Selenium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	95%	90%	110%	89%	80%	120%	90%	70%	130%
Silver Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	95%	90%	110%	93%	80%	120%	98%	70%	130%
Uranium Leachate	1		< 0.050	< 0.050	0.0%	< 0.050	101%	90%	110%	81%	80%	120%	85%	70%	130%
Fluoride Leachate	1		0.14	0.14	0.0%	< 0.05	97%	90%	110%	100%	90%	110%	91%	70%	130%
Cyanide Leachate	1		< 0.05	< 0.05	0.0%	< 0.05	104%	90%	110%	107%	90%	110%	103%	70%	130%
(Nitrate + Nitrite) as N Leachate	5338918		< 0.70	< 0.70	0.0%	< 0.70	97%	80%	120%	108%	80%	120%	103%	70%	130%

Corrosivity Package

Sulfide	5339027		< 0.01	< 0.01	0.0%	< 0.01	83%	80%	120%						
Chloride (2:1)	5339027	5339027	7	7	0.0%	< 2	96%	80%	120%	97%	80%	120%	94%	70%	130%
Sulphate (2:1)	5339027	5339027	8	8	0.0%	< 2	97%	80%	120%	100%	80%	120%	98%	70%	130%
pH (2:1)	1	5339027	8.23	8.22	0.1%	NA	100%	90%	110%	NA			NA		
Electrical Conductivity (2:1)	1	5339027	0.112	0.114	1.8%	< 0.005	103%	90%	110%	NA			NA		
Redox Potential (2:1)	1	5339027	162	163	0.6%	< 5	98%	70%	130%	NA			NA		

Comments: NA signifies Not Applicable.

Certified By:



Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

ATTENTION TO: Craig Leger

Trace Organics Analysis

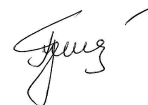
RPT Date: May 14, 2014

RPT Date: May 14, 2014			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

ON Regulation 558 - OC Pesticides & PCBs

Heptachlor + Heptachlor Epoxide	1	NA	NA	NA	0.0%	< 0.0003	80%	60%	140%	91%	60%	140%	NA	60%	140%
Aldrin + Dieldrin	1	NA	NA	NA	0.0%	< 0.0007	93%	60%	140%	91%	60%	140%	NA	60%	140%
DDT + Metabolites	1	NA	NA	NA	0.0%	< 0.003	80%	60%	140%	82%	60%	140%	NA	60%	140%
Methoxychlor	1	NA	NA	NA	0.0%	< 0.09	81%	60%	140%	95%	60%	140%	NA	60%	140%
Chlordane (Total)	1	NA	NA	NA	0.0%	< 0.0007	83%	60%	140%	91%	60%	140%	NA	60%	140%
Aldrin	1	NA	NA	NA	0.0%	< 0.0002	86%	60%	140%	92%	60%	140%	NA	60%	140%
alpha - chlordane	1	NA	NA	NA	0.0%	< 0.0001	82%	60%	140%	89%	60%	140%	NA	60%	140%
gamma-Chlordane	1	NA	NA	NA	0.0%	< 0.0002	84%	60%	140%	92%	60%	140%	NA	60%	140%
Oxychlordane	1	NA	NA	NA	0.0%	< 0.0004	72%	60%	140%	74%	60%	140%	NA	60%	140%
pp'-DDE	1	NA	NA	NA	0.0%	< 0.0005	86%	60%	140%	98%	60%	140%	NA	60%	140%
pp'-DDD	1	NA	NA	NA	0.0%	< 0.0015	74%	60%	140%	89%	60%	140%	NA	60%	140%
op'-DDT	1	NA	NA	NA	0.0%	< 0.0015	60%	60%	140%	60%	60%	140%	NA	60%	140%
pp'-DDT	1	NA	NA	NA	0.0%	< 0.0005	80%	60%	140%	82%	60%	140%	NA	60%	140%
Dieldrin	1	NA	NA	NA	0.0%	< 0.0005	100%	60%	140%	95%	60%	140%	NA	60%	140%
Heptachlor	1	NA	NA	NA	0.0%	< 0.0001	88%	60%	140%	95%	60%	140%	NA	60%	140%
Heptachlor Epoxide	1	NA	NA	NA	0.0%	< 0.0002	72%	60%	140%	86%	60%	140%	NA	60%	140%
Lindane	1	NA	NA	NA	0.0%	< 0.0004	80%	60%	140%	64%	60%	140%	NA	60%	140%
PCB's	1	NA	NA	NA	0.0%	< 0.0002	101%	60%	140%	105%	60%	140%	NA	60%	140%
Endrin	1	NA	NA	NA	0.0%	< 0.0004	84%	60%	140%	99%	60%	140%	NA	60%	140%
Toxaphene	1	NA	NA	NA	0.0%	< 0.0005	NA	60%	140%	NA	60%	140%	NA	60%	140%

Certified By:



Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 14T836498

PROJECT: 131-24174-00

ATTENTION TO: Craig Leger

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Sulfide			GRAVIMETRIC
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Resistivity (2:1)	INOR-93-6036		CALCULATION
Redox Potential (2:1)		McKeague 4.12 & SM 2510 B	REDOX POTENTIAL ELECTRODE
Arsenic Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Barium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Boron Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Cadmium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Chromium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Lead Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Mercury Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Selenium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Silver Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Uranium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Fluoride Leachate	INOR-93-6018	EPA SW-846-1311 & SM4500-F- C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA SW-846-1311 & MOE 3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA SW 846-1311 & SM 4500 - NO3- I	LACHAT FIA
Trace Organics Analysis			
Heptachlor + Heptachlor Epoxide	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Aldrin + Dieldrin	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
DDT + Metabolites	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Methoxychlor	ORG-91-5112	EPA SW-846 8081A & 8082	GC/MS & GC/ECD
Chlordane (Total)	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Aldrin	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
alpha - chlordane	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
gamma-Chlordane	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Oxychlordane	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
pp'-DDE	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
pp'-DDD	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
op'-DDT	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
pp'-DDT	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Dieldrin	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Heptachlor	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Heptachlor Epoxide	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Lindane	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
PCB's	ORG-91-5112	EPA SW-846 3550 & 8082	GC/ECD
Endrin	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Toxaphene	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3550 & 8081	GC/ECD



AGAT

Laboratories

Real Coder

5835 Coopers Avenue

Mississauga, ON

L4Z 1Y2

www.agatlabs.com • webearth.agatlabs.com

Chain of Custody Record

P: 905.712.5100 • F: 905.712.5122 • TF: 800.856.6261

Client Information

Company: WSP Canada
Contact: Craig Leber
Address: 1425 Cornmount Rd
Ancaster, ON
Phone: 289 239 0100 Fax: 289 239 0109
Project: 131-24174-00 PO: _____
AGAT Quotation #: _____
Please note, if quotation number is not provided,
client will be billed full price for analysis.

Regulatory Requirements

☐ Regulation 153/04
(reg. 511 Amend.)
Table _____ Indicate one
☐ Ind./Com
☐ Res./Park
☐ Agriculture
☐ Soil Texture (check one)
☐ Coarse ☒ Fine
☐ Sewer Use
Region _____ Indicate one
☒ Regulation 558
☐ CCME
☐ Other (specify) _____
☐ Sanitary
☐ Storm
☐ Prov. Water Quality
Objectives (PWQO)
☐ None

Invoice To

Company: _____ Same: Yes ☒ No ☐
Contact: _____
Address: _____

Report Information – reports to be sent to:

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil
1. Name: Craig Leber
Email: craig.leber@wspgroup.com
2. Name: _____
Email: _____

Is this a drinking water sample?
(potable water intended for human consumption)
☐ Yes ☒ No
If "Yes", please use the
Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition?
☐ Yes ☒ No

*TAT is exclusive of weekends and statutory holidays

Laboratory Use Only

Arrival Temperature: 11.2, 11.6, 12.3
AGAT WO #: _____
Lab Temperature: 9.4, 9.6, 9.8
Notes: 112 147836498

Turnaround Time Required (TAT) Required*

Regular TAT
☒ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): _____

Sample Identification Date Sampled Time Sampled Sample Matrix # of Containers Site/Sample Information Comments

SS1 5 May 2014 Soil 6

Metals and Inorganics
Metal Scan
Hydride Forming Metals
Client Custom Metals
ORPs: ☐ B-HWS ☐ Cl- ☐ CN- ☐ EC
☐ FOC ☐ Cr+6 ☐ SAR
☐ NO₃/NO₂ ☐ N- Total ☐ Hg ☐ pH
Nutrients: ☐ TP ☐ NH₃ ☐ TKN
☐ NO₃ ☐ NO₂ ☐ NO₃/NO₂
VOC: ☐ VOC ☐ THM ☐ BTEX
CCME Fractions 1 to 4
ABNs
PAHs
Chlorophenols
PCBs
Organochlorine Pesticides
TCLP Metals/Inorganics
Sewer Use

TCLP & Pesticides
Soil Corrosivity Package

Samples Reinstated By (Print Name and Sign):

C. Leber [Signature]

Date/Time

5 May 3:15

Samples Received By (Print Name and Sign):

Christine [Signature]

Date/Time

5 May 4:45

Print Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page 1 of 1

Nº: 196251

Appendix D

NUMERICAL CORROSIVITY SCALE

Numerical Corrosivity Scale

The American Water Works Association (AWWA) developed a numerical soil corrosivity scale, applicable to cast iron [alloys](#). The severity ranking by assigning points for different variables. When the points total of a soil in the AWWA scale equals ten (or higher), corrosion protective measures (such as [cathodic protection](#)) have been recommended for cast iron alloys. The point system for predicting soil corrosivity according the AWWA C-105 Standard.

Soil Parameter	Assigned Points
Resistivity (ohm cm)	
<700	10
700 - 1000	8
1000 - 1200	5
1200 - 1500	2
1500 - 2000	1
> 2000	0
pH	
0-2	5
2-4	3
4-6.5	0
6.5-7.5	0
7.5-8.5	0
>8.5	3
Redox Potential (mV)	
>100	0
50-100	3.5
0-50	4
<0	5
Sulfides	
Positive	3.5
Trace	2
Negative	0
Moisture	
Poor drainage continuously wet	2
Fair drainage generally moist	1
Good drainage generally dry	0

APPENDIX B:

**GEOTECHNICAL INVESTIGATION MARSVILLE NORTH (MARSVILLE
THUNDERBIRD) SUBDIVISION, TOWNSHIP OF EAST GARAFRAXA
(MARSVILLE) ONTARIO (V.A. WOOD (GUELPH) INCORPORATED, DATED
FEBRUARY 2020)**

AND

**FOUNDATION RECOMMENDATIONS MARSVILLE NORTH SUBDIVISION (JLP
SERVICES INC., DATED APRIL 4, 2022)**



V.A. WOOD (GUELPH) INCORPORATED
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
TELEPHONE: 519-763-3101

GEOTECHNICAL INVESTIGATION
MARSVILLE NORTH (MARSVILLE THUNDERBIRD) SUBDIVISION
MAPLE STREET
TOWNSHIP OF EAST GARAFRAXA (MARSVILLE), ONTARIO

Ref. No. G4223-20-2
February, 2020

Prepared for:

Thomasfield Homes Ltd.
295 Southgate Drive
Guelph, Ontario
N1H 6N3

Attention: Tom Krizsan, President

Distribution:

- (1) Copy – Thomasfield Homes Ltd.*
- (1) Copy – GM BluePlan Engineering Ltd.*
- (2) Copies – V.A. Wood (Guelph) Inc.*



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3.0 SUBSURFACE CONDITIONS	3
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5.0 DISCUSSION AND RECOMMENDATIONS	6
6.0 STATEMENT OF LIMITATIONS	14

APPENDIX

APPENDIX 'A'	Statement of Limitations
APPENDIX 'B'	Chemical Analysis Results - Soils

ENCLOSURES

	<u>No.</u>
BOREHOLE LOCATION PLAN	1
BOREHOLE LOGS	2 - 7
GRAIN SIZE DISTRIBUTION CURVES	8 - 11

1.0 INTRODUCTION:

V.A. Wood (Guelph) Inc. was retained by Thomasfield Homes Ltd. to carry out a geotechnical investigation for the proposed Marsville North/Marsville Thunderbird residential subdivision located in the Township of East Garafraxa (Marsville), Ontario.

It is noted that the past/present use of the subject property is cultivated farmland and at the time of the investigation the crop had been removed from the site.

The purpose of the investigation was to reveal the subsurface conditions and to determine the relevant soil properties for recommendations for the design and construction of building foundations, roads, sewers and storm water management design.

2.0 FIELD WORK:

The fieldwork was carried on January 10, 2020 and consisted of six (6) boreholes installed with monitoring wells at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a track-mounted, power auger machine, equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Logs as N-values. The boreholes were laid out in the field by GM BluePlan Engineering Ltd. and the subsurface soils were visually inspected, logged and sampled at the borehole locations by personnel from V.A. Wood (Guelph) Inc.

V.A. Wood (Guelph) Inc. engineering staff supervised the fieldwork and the ground elevations at each borehole were provided by GM BluePlan Engineering Ltd.

3.0 SUBSURFACE CONDITIONS:

Full details of the soils encountered in each borehole are given on the Borehole/Monitoring Well Logs, Enclosures 2 to 7, inclusive and the following notes are intended to summarize this data. It is noted that at the time of the fieldwork program the surface of the site was frozen.

*The boreholes encountered a surficial deposit of **topsoil** ranging between 300 and 500mm in thickness.*

*The topsoil at Boreholes 3 and 4 was underlain by a deposit of brown, re-worked **silt and sand** with trace organics to depths of about 1.2 metres below grade. Standard Penetration tests in this deposit gave N-values ranging between 6 and 19 blows/300mm and the natural moisture content was found to range from 12 to 14%. A typical grain size distribution curve for this material can be found on Enclosure 8.*

Based on a visual and tactile examination, this deposit of silt and sand is considered to be in a generally loose to compact condition.

*The topsoil at Boreholes 1, 2, 5 and 6, and re-worked silt and sand at Boreholes 3 and 4 was underlain by a deposit of brown **silt and sand** to depths ranging between 2.3 and 6.1 metres below grade. Standard Penetration tests in this deposit gave N-values ranging between 3 and 20 blows/300mm and the natural moisture content was found to range from 12 to 18%.*

Based on a visual and tactile examination, the deposit of silt and sand is considered to have a generally very loose to compact relative density.

*The silt and sand at Boreholes 2, 3, 5 and 6 was underlain by a deposit of brown **silt and sand till** to depths ranging between 6.1 metres below grade and the full depth of the investigation (i.e. 6.6 metres below grade). Standard Penetration tests in this deposit gave N-values ranging between 6 and greater than 100 blows/300mm and the natural moisture content was found to range from 12 to 14%. A typical grain size distribution curve for this material can be found on Enclosure 9.*

Based on a visual and tactile examination, the deposit of silt and sand till is considered to have a generally loose to very dense relative density, although it is noted that the presence of gravel, cobbles and/or boulders in this deposit may have resulted in high N-values and these may not accurately represent the relative density of the soil.

*The silt and sand at Boreholes 1 and 4 was underlain by a deposit of grey **silt and clay till** to a depth of 6.1 metres below grade. Standard Penetration tests in this deposit gave N-values ranging between 23 and 42 blows/300mm and the natural moisture content was found to range from 17 to 18%. A typical grain size distribution curve for this material can be found on Enclosure 10.*

Based on a visual and tactile examination, the deposit of silt and clay till is considered to have a generally very stiff to hard consistency.

*The silt and clay till at Boreholes 1 and 4 was underlain by a deposit of brown **sand** to the full depth of the investigation (i.e. 6.6 metres below grade). Standard Penetration tests in this deposit gave N-values ranging between 30 and 35 blows/300mm and the natural moisture content was found to be about 11%. A typical grain size distribution curve for this material can be found on Enclosure 11.*

Based on a visual and tactile examination, the deposit of sand is considered to have a generally dense relative density.

*The silt and sand till at Borehole 5 was underlain by a deposit of grey **silt and clay** to the full depth of the investigation (i.e. 6.6 metres below grade). A Standard Penetration test in this deposit gave an N-value of 22 blows/300mm.*

Based on a visual and tactile examination, the deposit of silt and clay is considered to have a generally very stiff consistency.

4.0 GROUNDWATER CONDITIONS:

All the boreholes, except Borehole 1, were dry and open to the full depth of the investigation on completion of the boring. Borehole 1 encountered a free water surface at El. 428.0m \pm (i.e. 3.3 \pm metres below grade) on completion of the boring.

It is noted that the water levels at boreholes were recorded immediately after completion of the fieldwork program. Monitoring Wells were installed and sealed with bentonite in all boreholes for future groundwater table monitoring and their construction can be found on the borehole logs, Enclosures 2 to 7, inclusive.

Water levels were measured in the monitoring wells at the elevations noted in the following chart.

BH/MW	Ground El. (m \pm)	14-Jan-2020		12-Feb-2020	
		Depth Below Existing Grade (m \pm)	Water Level Elev. (m \pm)	Depth Below Existing Grade (m \pm)	Water Level Elev. (m \pm)
1	485.3	1.35	484.0	2.15	483.2
2	487.0	0.55	486.5	1.15	485.9
3	486.1	0.0	486.1	Frozen	Frozen
4	486.1	5.8	480.3	5.93	480.2
5	487.8	0.33	487.5	0.77	487.0
6	487.3	0.0	487.3	0.59	486.7

An examination of the soil samples indicated that they were generally moist to saturated

It is noted that no sub-artesian water pressures were encountered in the boreholes.

Based on the foregoing, groundwater table is considered to be located at elevations ranging between 480.2m \pm and 487.5m \pm , although a perched water condition can be expected in the looser upper zones underlain by the less permeable tills.

5.0 DISCUSSION AND RECOMMENDATIONS:

5.1 General:

The boreholes generally encountered a surficial deposit of topsoil on loose, re-worked silt and sand on very loose to compact silt and sand underlain by deposits of loose to dense silt and sand till and/or very stiff to hard silt and clay till on dense sand.

The groundwater table is considered to be located at elevations ranging between 480.2m± and 487.5m±, although a perched water condition can be expected in the upper zones underlain by the less permeable tills.

5.2 Site Grading:

Considering the shallow groundwater table, we recommend that consideration be given to raise the grade of the site to have services and building foundations founded above the measured high groundwater table (see ramifications of the shallow groundwater table in Sections below).

5.3 Sewers:

It is anticipated that the sewer inverts will be located at typical depths ranging between 3 and 4 metres below grade.

Reference to the Borehole Logs indicates that the subgrade will generally consist of very compact to dense silt and sand and/or very stiff to hard silt and clay till. These deposits will generally provide adequate support for the pipes and allow the use of normal Class 'B' bedding using Granular 'A' material. Clear crushed stone should not be used as bedding unless it is wrapped with geotextile to prevent undesirable settlements caused from fines migrating into the voids of the stone. Where the exposed subgrade is less competent, the bedding thickness may have to be increased and it may be necessary to protect the excavation with a skim coat of concrete immediately after it has been exposed.

Where sewer trench grades are below the groundwater table, provisions will be required to lower the groundwater table through pumping from local sumps as and where required or through the use of well points. The sides of the excavation to a depth of more than 1.2 metres (and above the water table) should either be cut back at a side slope of 1 to 1 or supported using adequately braced closed sheeting.

The excavated materials in their present saturated condition are generally not considered suitable for re-use as trench backfill unless allowed to air dry prior to placement. Therefore the trench backfill should consist of materials complying with OPS Specifications for Granular 'B'. All trench backfill should be placed in 150 to 200mm thick layers and uniformly compacted to at least 95% of its Standard Proctor maximum dry density. The backfill around manholes should consist of well-graded and well-compacted granular material.

To minimize potential problems and wetting of the subgrade material, backfilling operations should follow closely after excavations, so that only a minimal length of trench is exposed at a time. Should construction be carried out in the winter season, particular attention should be given to make sure no frozen material is used for backfill.

5.4 Foundations:

The topsoil and loose, re-worked silt and sand are not considered suitable bearing strata. The foundations for the proposed structures should therefore be extended into the underlying deposits of native subsoils designed to allowable bearing pressures of up to 75 kPa under dry condition.

If due to grading considerations the site is to be raised, then "engineered fill" should be utilized.

The procedure for the "engineered fill" would consist of the following:

- 1. The total removal of topsoil from beneath the proposed development envelopes.*
- 2. Geotechnical personnel from V.A. Wood (Guelph) Inc., prior to placement of engineered fill should inspect the exposed subgrade. Any loose zones which are encountered should be removed and replaced with approved imported granular material complying with OPS Specifications for Granular 'B', compacted to at least 98% Standard Proctor maximum dry density.*
- 3. The area should then be brought up to the final subgrade level with approved imported granular material complying with OPS Specifications for Granular 'B', placed in maximum 200mm thick lifts and compacted to at least 98% Standard Proctor maximum dry density.*
- 4. The "engineered fill" under the footings should extend to at least 0.6 metres laterally beyond the edge of their perimeter at the foundation level and at least a distance equal to the depths of the fill pad, at the level of the approved subgrade.*
- 5. The "engineered fill" should be in place at least one month prior to foundation construction to minimize settlement.*

The “engineered fill” could be brought up to the underside of the granular floor bases and footings could then be trenched into the “engineered fill” and designed using an allowable bearing capacity of 100 kPa.

This “engineered fill” will satisfy the raising of the foundation level to the proposed grades and provide a suitable subgrade for the proposed floor slabs.

The placement of “engineered fill” should be supervised on a full-time basis by personnel from V.A. Wood (Guelph) Inc. to ensure approved materials are used and that suitable compaction of the fill is obtained.

All exterior footings or footings in unheated areas should be located at least 1.2 metres below finished grade for adequate frost protection.

Elevation differences between adjacent footings should not be more than a half of the horizontal distance between them.

It is estimated that the total and differential settlements of footings designed to these bearing pressures will be less than 25 and 20mm respectively, which are normally considered acceptable for the proposed structures.

It is recommended that all foundation excavations be inspected by geotechnical personnel from V.A. Wood (Guelph) Inc. to ensure the founding soils are similar to those identified in the Borehole Logs and that they are capable of supporting the design loads.

5.4.1 Slab-on-grade

If a thickened slab-on-grade foundation is considered an option for the proposed residential buildings, an allowable bearing capacity of 75 kPa can be used for design after removal of surficial topsoil and loose native subsoils. The thickened or stiffened slab should consist of reinforced concrete with thickened edges and intermediate thickened sections to provide the necessary rigidity. Reinforced thickened slab-on-grades will be limited by its maximum length; therefore, consideration must be given to the proposed length and width of the slab.

In order to have well compacted material under the foundation slab, it is recommended that a minimum 1.0 metre thick base layer be constructed. This base would consist of approved imported Granular ‘A’ material placed in 150 to 200mm thick lifts and compacted to at least 100% Standard Proctor maximum dry density. The granular base will provide a uniform bearing surface and act as a vapour barrier. It is recommended the base fill be placed at least one month prior to slab construction in order to minimize settlement.

The unheated floor slab should have adequate frost protection using either a non-frost susceptible fill of sufficient thickness or insulation or a combination of both.

5.4.2 Helical Piles:

Another alternative foundation type would be helical piles. Helical piles are comprised of helical shaped, circular steel plates welded onto a steel shaft, which are screwed through the substrata into the competent founding stratum. The load is transferred from the shaft to the founding stratum through the steel plates. The load capacity is a function of the torque developed to install the pile. The construction does not require heavy equipment and has less site disturbance compared to other types of deep foundations.

The design and specifications of helical piles are carried out by the supplier or contractor. Helical piles must be able to resist corrosive environment.

5.5 Basements:

Basement walls should be designed to resist lateral earth pressures, the magnitude of which can be determined from:

$$p = K(\gamma d + q)$$

<i>where;</i>	p	=	earth pressure, kN/m ²
	K	=	earth pressure co-efficient = 0.33, if retaining structure is permitted to move, otherwise $K = 0.5$
	γ	=	unit weight of backfill, 20 kN/m ³ for sand
	d	=	depth below finished grade, metres
	q	=	all adjacent surcharge kN/m ²

Water will tend to collect around and under the basement which, therefore, should be designed to resist hydrostatic pressures unless a perimeter drainage system is installed. Water collected in this system should be connected to the local storm drainage system either by gravity or by a permanent sump pump. Surface drainage around the building should be directed away from the building.

If basements are constructed, the basement floors should be located at least 0.5 metres above the observed high groundwater level otherwise sub-floor drainage systems together with continual pumping from the drainage systems will be required.

As well, some consideration should be given to waterproofing the basement walls if located within 0.5m of the groundwater table.

5.6 Excavation and Groundwater Control:

Construction problems due to water are anticipated with excavations below El. 487.5m±. Therefore, provision should be made for control of any surface water run-off and minor seepage from any wet sand seams by pumping from local sumps on an as and where required basis. If excavations are extended to at or below the groundwater table, a well-pointing system will likely be required to lower the water table sufficiently to allow excavation and removal of unsuitable soils within the excavations and permit construction in a dry environment.

Excavations to a depth of more than 1.2 metres below grade should be cut back to a side slope of 1 to 1 or, supported using adequately braced sheeting.

5.7 Floor Slabs:

All topsoil and any deleterious materials encountered should be stripped from the building areas and the proposed subgrade should be re-compacted from the surface to at least 95% of its Standard Proctor maximum dry density. Any loose/wet material encountered should be sub-excavated and replaced with approved fill.

The fill may consist of approved on-site materials free of cobbles/boulders or approved imported granular material. All fill should be placed in 150 to 200mm thick lifts and compacted to at least 95% Standard Proctor maximum dry density. It is recommended the underfloor fill be placed at least one month prior to floor construction in order to minimize settlement.

A layer of well-graded, free-draining material, at least 150mm thick and compacted to at least 98% Standard Proctor maximum density, should be placed under the floor slabs to provide a uniform bearing surface and act as a vapour barrier.

Frequent inspections by geotechnical personnel from V.A. Wood (Guelph) Inc. should be carried out during construction to verify compaction of the subgrade and base courses by in-situ density testing using nuclear gauges.

5.8 Pavement Designs:

All topsoil and any deleterious materials encountered should be stripped from the proposed pavement area(s) to depths to accommodate the following pavement designs. The underlying subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor maximum dry density prior to construction of the pavement. Any soft areas which are detected should be sub-excavated and backfilled with suitable on-site material or approved imported fill. All fill materials should be placed in 150 to 200mm thick lifts and compacted to at least 98% Standard Proctor maximum dry density.

Considering the probable traffic requirements and subsoil conditions, the following pavement designs are recommended as a minimum:

	Passenger Car Parking (Light Duty) (mm)	Access Road (Medium Duty) (mm)
Asphaltic Concrete	50	90
Granular 'A' Base Course	200	200
Granular 'B' Sub-base Course	500	500

The base and sub-base granular materials should be compacted to 100% Standard Proctor maximum dry density. The asphalt should be compacted to OPS Specifications.

Frequent inspections by geotechnical personnel from V.A. Wood (Guelph) Inc. should be carried out during construction to verify the compaction of the subgrade, base courses and asphaltic concrete by in-situ density testing using nuclear gauges.

5.9 Storm Water Management:

The grain size distribution curves prepared for the representative soil samples obtained at the boreholes were compared to the family of curves presented in the Supplementary Standard SB-6 of the 2012 Building Code Compendium. Based on the Unified Soils Classification System, the soils are considered to have the following properties:

<u>Material</u>	Unified Soils Classification <u>Group</u>	Estimated Co-efficient of Permeability (k) <u>(cm/sec)</u>
Silt and Sand	(ML)	10^{-5} to 10^{-6}

5.10 Chemical Analysis Results:

Representative samples of the subsoils from the boreholes were submitted to the Environmental Division of ALS Laboratory Group for chemical analyses. The analyses included:

- i) BTEX (benzene, toluene, ethylbenzene, xylenes);
- ii) TPH (total petroleum hydrocarbons: F1(C6-C10), F2(C10-C16), F3(C16-C34), F4(C34-C50);
- iii) Metals and Inorganics, SAR, EC and Chloride

The soil samples obtained from the boreholes were submitted as follows.

Sample Description	Submission Date	Material Type	Depth (m±)	Chemical Testing
L2404552-1 MW4 SAM 1	10-Jan-20	Silt and Sand	0.8 – 1.2	BTEX, F1-F4
L2404552-2 MW5 SAM 1	10-Jan-20	Silt and Sand	0.8 – 1.2	BTEX, F1-F4
L2404552-3 MW6 SAM 1	10-Jan-20	Silt and Sand	0.8 – 1.2	BTEX, F1-F4
L2409682-1 MW 1 SAM 1	24-Jan-20	Silt and Sand	0.8 – 1.2	Metals and Inorganics, SAR, EC, Chloride
L2409682-2 MW 2 SAM 2	24-Jan-20	Silt and Sand	1.5 – 2.0	Metals and Inorganics, SAR, EC, Chloride
L2409682-3 MW 3 SAM 2	24-Jan-20	Silt and Sand	1.5 – 2.0	Metals and Inorganics, SAR, EC, Chloride
L2409682-4 MW 4 SAM 1	24-Jan-20	Silt and Sand	0.8 – 1.2	Metals and Inorganics, SAR, EC, Chloride
L2409682-5 MW 5 SAM 1	24-Jan-20	Silt and Sand	0.8 – 1.2	Metals and Inorganics, SAR, EC, Chloride
L2409682-6 MW 6 SAM 2	24-Jan-20	Silt and Sand	1.5 – 2.0	Metals and Inorganics, SAR, EC, Chloride

The results of the chemical analyses are shown in Appendix 'B'.

The results indicate that the soils are within the allowable limits of the applicable MOE Tables 1 and 2 Site Condition Standards as outlined in Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, O.Reg. 153/04 as amended by O.Reg. 511 (July 2011) for all parameters analyzed for residential, parkland, institutional, industrial, commercial, community, agricultural or other property use.

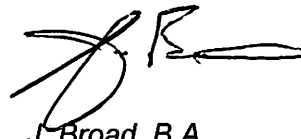
6.0 STATEMENT OF LIMITATION:

The Statement of Limitation presented on Appendix 'A' is an integral part of this report.

V.A. WOOD (GUELPH) INC.



S.Parajuli, MSc., P.Eng.
Geotechnical Engineer



J. Broad, B.A.
President & General Manager

JB:sm

Encls.



APPENDIX 'A'

STATEMENT OF LIMITATIONS:

The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature, which may be available, for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction, which would not be detected or anticipated at the time of the soil investigation.

*We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. **In cases where this recommendation is not followed, the company's responsibility is limited to interpreting accurately the information encountered at the boreholes.***

This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.

V.A. Wood (Guelph) Inc. prepared this report for Thomasfield Homes Ltd. and GM BluePlan Engineering Ltd. The material in it reflects V.A. Wood (Guelph) Inc. judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Parties. V.A. Wood (Guelph) Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

APPENDIX 'B'



V.A. WOOD (GUELPH)
ATTN: JOHN BROAD
405 YORK ROAD
GUELPH ON N1E 3H3

Date Received: 10-JAN-20
Report Date: 13-JAN-20 14:48 (MT)
Version: FINAL

Client Phone: 519-763-3101

Certificate of Analysis

Lab Work Order #: L2404552
Project P.O. #: NOT SUBMITTED
Job Reference: G4223-20-1
C of C Numbers: 17-819350
Legal Site Desc:

Emily Hansen
Account Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047
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ANALYTICAL GUIDELINE REPORT

L2404552 CONTD....

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G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2404552-1 MW4 SAM1										
Sampled By: CLIENT on 10-JAN-20										
Matrix: SOIL										
Physical Tests										
% Moisture		13.7		0.25	%	11-JAN-20				
Volatile Organic Compounds										
Benzene		<0.0068		0.0068	ug/g	13-JAN-20	0.02	0.02	0.21	0.32
Ethylbenzene		<0.018		0.018	ug/g	13-JAN-20	0.05	0.05	1.1	1.1
Toluene		<0.080		0.080	ug/g	13-JAN-20	0.2	0.2	2.3	6.4
o-Xylene		<0.020		0.020	ug/g	13-JAN-20				
m+p-Xylenes		<0.030		0.030	ug/g	13-JAN-20				
Xylenes (Total)		<0.050		0.050	ug/g	13-JAN-20	0.05	0.05	3.1	26
Surrogate: 4-Bromofluorobenzene		106.0		50-140	%	13-JAN-20				
Surrogate: 1,4-Difluorobenzene		107.5		50-140	%	13-JAN-20				
Hydrocarbons										
F1 (C6-C10)		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F1-BTEX		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F2 (C10-C16)		<10		10	ug/g	13-JAN-20	10	10	98	230
F3 (C16-C34)		<50		50	ug/g	13-JAN-20	240	240	300	1700
F4 (C34-C50)		<50		50	ug/g	13-JAN-20	120	120	2800	3300
Total Hydrocarbons (C6-C50)		<72		72	ug/g	13-JAN-20				
Chrom. to baseline at nC50		YES			No Unit	13-JAN-20				
Surrogate: 2-Bromobenzotrifluoride		92.3		60-140	%	13-JAN-20				
Surrogate: 3,4-Dichlorotoluene		91.1		60-140	%	13-JAN-20				
L2404552-2 MW5 SAM1										
Sampled By: CLIENT on 10-JAN-20										
Matrix: SOIL										
Physical Tests										
% Moisture		12.2		0.25	%	11-JAN-20				
Volatile Organic Compounds										
Benzene		<0.0068		0.0068	ug/g	13-JAN-20	0.02	0.02	0.21	0.32
Ethylbenzene		<0.018		0.018	ug/g	13-JAN-20	0.05	0.05	1.1	1.1
Toluene		<0.080		0.080	ug/g	13-JAN-20	0.2	0.2	2.3	6.4
o-Xylene		<0.020		0.020	ug/g	13-JAN-20				
m+p-Xylenes		<0.030		0.030	ug/g	13-JAN-20				
Xylenes (Total)		<0.050		0.050	ug/g	13-JAN-20	0.05	0.05	3.1	26
Surrogate: 4-Bromofluorobenzene		114.6		50-140	%	13-JAN-20				
Surrogate: 1,4-Difluorobenzene		116.3		50-140	%	13-JAN-20				
Hydrocarbons										
F1 (C6-C10)		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F1-BTEX		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F2 (C10-C16)		<10		10	ug/g	13-JAN-20	10	10	98	230
F3 (C16-C34)		<50		50	ug/g	13-JAN-20	240	240	300	1700
F4 (C34-C50)		<50		50	ug/g	13-JAN-20	120	120	2800	3300
Total Hydrocarbons (C6-C50)		<72		72	ug/g	13-JAN-20				
Chrom. to baseline at nC50		YES			No Unit	13-JAN-20				
Surrogate: 2-Bromobenzotrifluoride		94.5		60-140	%	13-JAN-20				
Surrogate: 3,4-Dichlorotoluene		100.6		60-140	%	13-JAN-20				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Comm Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Comm Property Use (Coarse)



Environmental

ANALYTICAL GUIDELINE REPORT

L2404552 CONTD....

Page 3 of 5

13-JAN-20 14:48 (MT)

G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2404552-3	MW6 SAM1									
Sampled By:	CLIENT on 10-JAN-20									
Matrix:	SOIL									
Physical Tests										
% Moisture		11.8		0.25	%	11-JAN-20				
Volatile Organic Compounds										
Benzene		<0.0068		0.0068	ug/g	13-JAN-20	0.02	0.02	0.21	0.32
Ethylbenzene		<0.018		0.018	ug/g	13-JAN-20	0.05	0.05	1.1	1.1
Toluene		<0.080		0.080	ug/g	13-JAN-20	0.2	0.2	2.3	6.4
o-Xylene		<0.020		0.020	ug/g	13-JAN-20				
m+p-Xylenes		<0.030		0.030	ug/g	13-JAN-20				
Xylenes (Total)		<0.050		0.050	ug/g	13-JAN-20	0.05	0.05	3.1	26
Surrogate: 4-Bromofluorobenzene		119.8		50-140	%	13-JAN-20				
Surrogate: 1,4-Difluorobenzene		119.8		50-140	%	13-JAN-20				
Hydrocarbons										
F1 (C6-C10)		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F1-BTEX		<5.0		5.0	ug/g	13-JAN-20	17	25	55	55
F2 (C10-C16)		<10		10	ug/g	13-JAN-20	10	10	98	230
F3 (C16-C34)		<50		50	ug/g	13-JAN-20	240	240	300	1700
F4 (C34-C50)		<50		50	ug/g	13-JAN-20	120	120	2800	3300
Total Hydrocarbons (C6-C50)		<72		72	ug/g	13-JAN-20				
Chrom. to baseline at nC50		YES			No Unit	13-JAN-20				
Surrogate: 2-Bromobenzotrifluoride		97.9		60-140	%	13-JAN-20				
Surrogate: 3,4-Dichlorotoluene		108.9		60-140	%	13-JAN-20				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260
BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS
--------------	------	-----------------------------	----------------------

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1
--------------	------	--------------------------------	-------------

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:

1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

Reference Information

17-819350

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Quality Control Report

Workorder: L2404552

Report Date: 13-JAN-20

Page 1 of 3

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT Soil								
Batch	R4967268							
WG3255929-4	DUP	WG3255929-3						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	13-JAN-20
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	13-JAN-20
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	13-JAN-20
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	13-JAN-20
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	13-JAN-20
WG3255929-2	LCS							
Benzene			104.2		%		70-130	13-JAN-20
Ethylbenzene			100.4		%		70-130	13-JAN-20
m+p-Xylenes			97.7		%		70-130	13-JAN-20
o-Xylene			102.6		%		70-130	13-JAN-20
Toluene			99.97		%		70-130	13-JAN-20
WG3255929-1	MB							
Benzene			<0.0068		ug/g		0.0068	13-JAN-20
Ethylbenzene			<0.018		ug/g		0.018	13-JAN-20
m+p-Xylenes			<0.030		ug/g		0.03	13-JAN-20
o-Xylene			<0.020		ug/g		0.02	13-JAN-20
Toluene			<0.080		ug/g		0.08	13-JAN-20
Surrogate: 1,4-Difluorobenzene			117.1		%		50-140	13-JAN-20
Surrogate: 4-Bromofluorobenzene			113.7		%		50-140	13-JAN-20
WG3255929-5	MS	L2404393-1						
Benzene			108.0		%		60-140	13-JAN-20
Ethylbenzene			101.9		%		60-140	13-JAN-20
m+p-Xylenes			98.7		%		60-140	13-JAN-20
o-Xylene			104.0		%		60-140	13-JAN-20
Toluene			102.1		%		60-140	13-JAN-20
F1-HS-511-WT Soil								
Batch	R4967268							
WG3255929-4	DUP	WG3255929-3						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	13-JAN-20
WG3255929-2	LCS							
F1 (C6-C10)			106.9		%		80-120	13-JAN-20
WG3255929-1	MB							
F1 (C6-C10)			<5.0		ug/g		5	13-JAN-20
Surrogate: 3,4-Dichlorotoluene			103.4		%		60-140	13-JAN-20
WG3255929-6	MS	L2404166-1						



Quality Control Report

Workorder: L2404552

Report Date: 13-JAN-20

Page 2 of 3

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	Soil							
Batch	R4967268							
WG3255929-6 MS		L2404166-1						
F1 (C6-C10)			103.4		%		60-140	13-JAN-20
F2-F4-511-WT	Soil							
Batch	R4967259							
WG3256236-3 DUP		WG3256236-5						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	13-JAN-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	13-JAN-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	13-JAN-20
WG3256236-2 LCS								
F2 (C10-C16)			103.9		%		80-120	13-JAN-20
F3 (C16-C34)			101.6		%		80-120	13-JAN-20
F4 (C34-C50)			101.2		%		80-120	13-JAN-20
WG3256236-1 MB								
F2 (C10-C16)			<10		ug/g		10	13-JAN-20
F3 (C16-C34)			<50		ug/g		50	13-JAN-20
F4 (C34-C50)			<50		ug/g		50	13-JAN-20
Surrogate: 2-Bromobenzotrifluoride			100.2		%		60-140	13-JAN-20
WG3256236-4 MS		WG3256236-5						
F2 (C10-C16)			102.6		%		60-140	13-JAN-20
F3 (C16-C34)			105.5		%		60-140	13-JAN-20
F4 (C34-C50)			107.6		%		60-140	13-JAN-20
MOISTURE-WT	Soil							
Batch	R4966760							
WG3255970-3 DUP		L2404313-18						
% Moisture		15.5	15.4		%	0.6	20	11-JAN-20
WG3255970-2 LCS								
% Moisture			100.0		%		90-110	11-JAN-20
WG3255970-1 MB								
% Moisture			<0.25		%		0.25	11-JAN-20

Quality Control Report

Workorder: L2404552

Report Date: 13-JAN-20

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

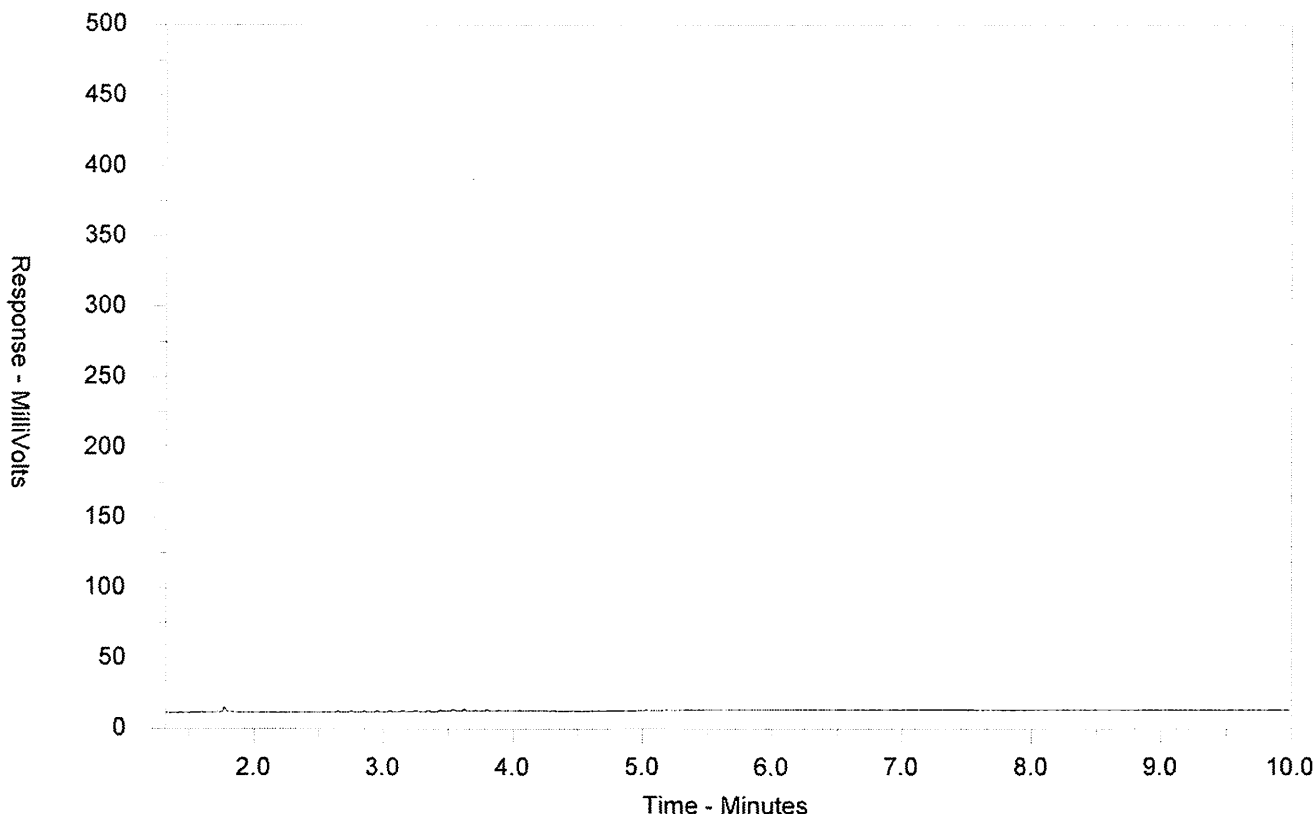
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2404552-1

Client Sample ID: MW4 SAM1



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34		nC50	
174°C	287°C	481°C		575°C	
346°F	549°F	898°F		1067°F	
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

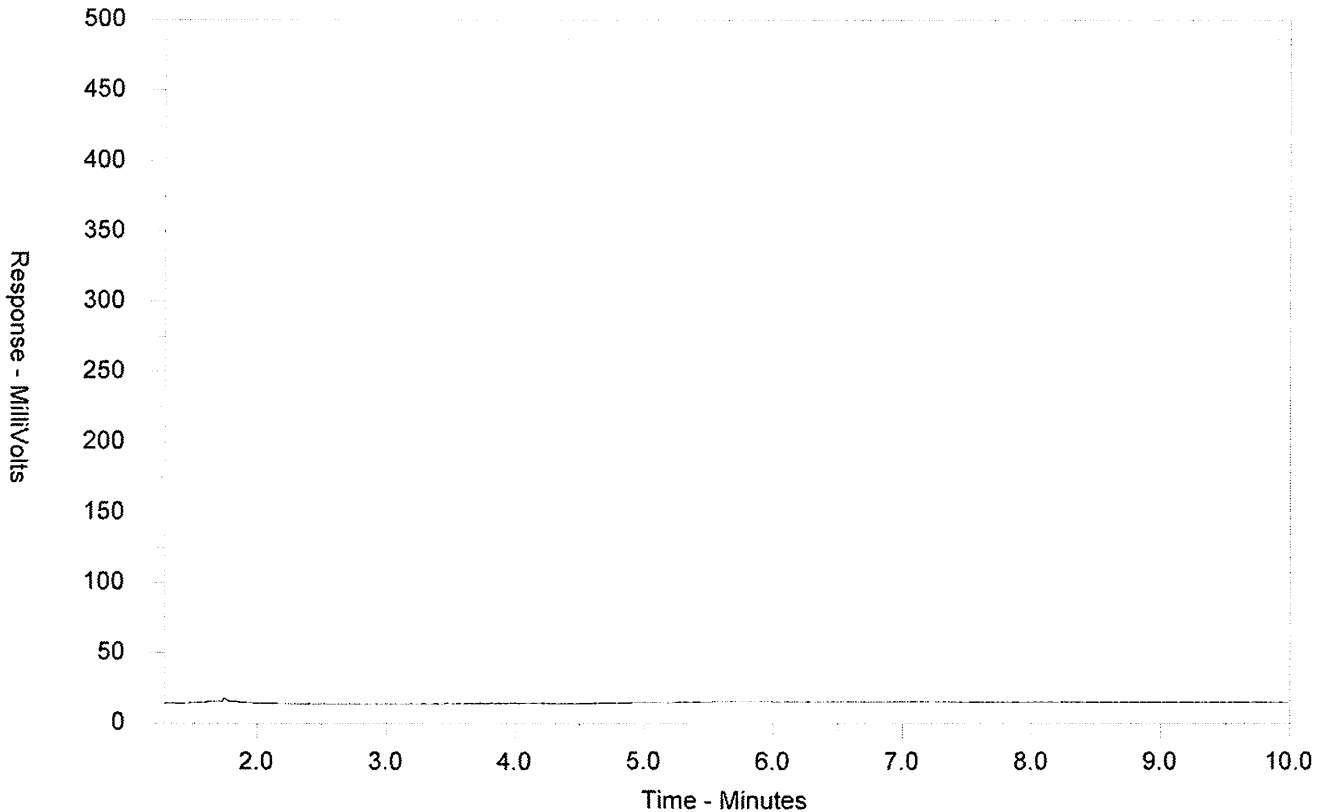
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2404552-2
Client Sample ID: MW5 SAM1



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

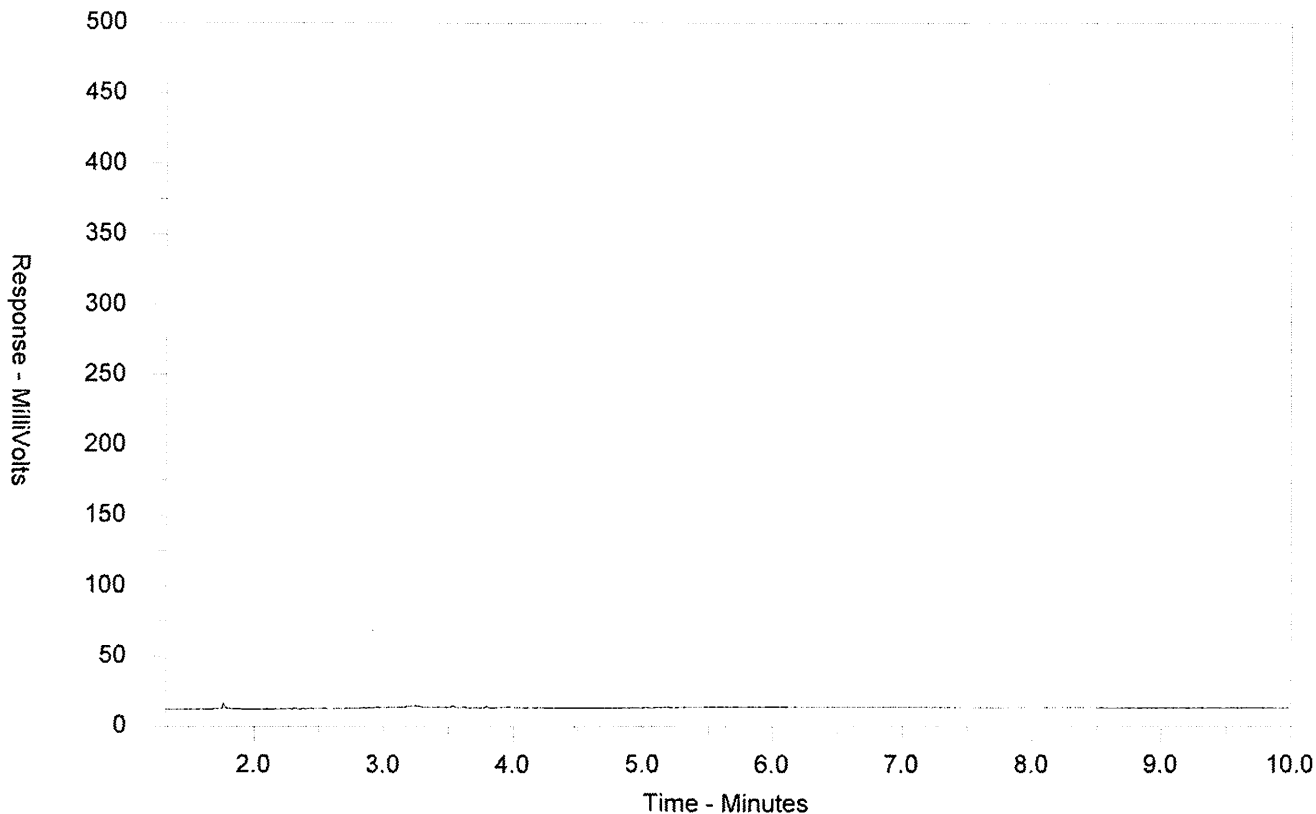
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2404552-3
Client Sample ID: MW6 SAM1



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2404552-COFC

COC Number: 17 - 819350

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www.alsglobal.com

Report To Contact and company name below will appear on the final report		Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Complete Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Select Service Level Below - Contact your AML to confirm all E&P TATs (surcharges may apply) Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply 4 day [P4-20%] <input type="checkbox"/> 1 Business day [E - 100%] 3 day [P3-25%] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E2 - 200%] 2 day [P2-50%] <input type="checkbox"/> (Laboratory opening fees may apply) Emergency <input type="checkbox"/> Date and Time Required for all E&P TATs: dd-mm-yy hh:mm	
Company: N. A. Wood (Buckley) Inc. Contact: John Buckley Phone: 519 863-3101 Company address below will appear on the final report 405 York Rd Guelph, ON N1E 3H3		Email 1 or Fax Email 2 Email 3		Date and Time Required for all E&P TATs: dd-mm-yy hh:mm	
City/Province: Guelph, ON Postal Code: N1E 3H3		Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below	
Company: ALS Environmental Contact: ALS Environmental		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below	
Project Information ALS Account # / Quote #: 64223-20-1 Job #: 64223-20-1 PO / A/E: 64223-20-1 LSD: 64223-20-1		Oil and Gas Required Fields (client use) AFECost Center: 64223-20-1 Major/Minor Code: 64223-20-1 Requisitioner: 64223-20-1 Location: 64223-20-1		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below	
ALS Lab Work Order # (lab use only): 64223-20-1		ALS Contact: 64223-20-1		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below	
Sample Identification and/or Coordinates (This description will appear on the report) MW 4, Sam 1 MW 5, Sam 1 MW 6, Sam 1		Date (dd-mm-yy) 10-01-20		Time (hh:mm) 10:15	
Sample Type Soil		Time (hh:mm) 10:15		Sample Type Soil	
Drinking Water (DW) Samples (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO		Special Instructions / Specify criteria to add on report by clicking on the drop-down list below (electronic COC only) 153/04 Tables 1+2		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input checked="" type="checkbox"/> Ice Cubes <input checked="" type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C 8.9 FINAL COOLER TEMPERATURES °C	
SHIPMENT RELEASE (client use) Released by: D. Buckley Date: 10/01/2020		INITIAL SHIPMENT RECEPTION (lab use only) Received by: W. H. Date: 1-10-2020		FINAL SHIPMENT RECEPTION (lab use only) Received by: W. H. Date: 1-10-2020	
Time: 10:15		Time: 10:15		Time: 10:15	



V.A. WOOD (GUELPH)
ATTN: JOHN BROAD
405 YORK ROAD
GUELPH ON N1E 3H3

Date Received: 24-JAN-20
Report Date: 30-JAN-20 14:23 (MT)
Version: FINAL

Client Phone: 519-763-3101

Certificate of Analysis

Lab Work Order #: L2409682

Project P.O. #: NOT SUBMITTED

Job Reference: G4223-20-1

C of C Numbers: 17-641590

Legal Site Desc:

Emily Hansen
Account Manager

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ANALYTICAL GUIDELINE REPORT

L2409682 CONTD....

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G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2409682-1 MW1 SAM1										
Sampled By: CLIENT on 10-JAN-20 @ 11:15										
Matrix: SOIL										
Physical Tests										
Conductivity		0.0829		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
% Moisture		11.7		0.25	%	27-JAN-20				
pH		7.78		0.10	pH units	27-JAN-20				
Cyanides										
Cyanide, Weak Acid Diss		<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
SAR		<0.10		0.10	SAR	28-JAN-20	1	2.4	5	12
Calcium (Ca)		10.6		0.50	mg/L	28-JAN-20				
Magnesium (Mg)		1.17		0.50	mg/L	28-JAN-20				
Sodium (Na)		0.72		0.50	mg/L	28-JAN-20				
Metals										
Antimony (Sb)		<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
Arsenic (As)		2.3		1.0	ug/g	28-JAN-20	11	18	18	18
Barium (Ba)		18.2		1.0	ug/g	28-JAN-20	210	220	390	670
Beryllium (Be)		<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
Boron (B)		<5.0		5.0	ug/g	28-JAN-20	36	36	120	120
Boron (B), Hot Water Ext.		<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
Cadmium (Cd)		<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
Chromium (Cr)		8.1		1.0	ug/g	28-JAN-20	67	70	160	160
Cobalt (Co)		3.1		1.0	ug/g	28-JAN-20	19	21	22	80
Copper (Cu)		8.8		1.0	ug/g	28-JAN-20	62	92	140	230
Lead (Pb)		7.0		1.0	ug/g	28-JAN-20	45	120	120	120
Mercury (Hg)		<0.0050		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
Molybdenum (Mo)		<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
Nickel (Ni)		6.8		1.0	ug/g	28-JAN-20	37	82	100	270
Selenium (Se)		<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
Silver (Ag)		<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
Thallium (Tl)		<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3
Uranium (U)		<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
Vanadium (V)		16.0		1.0	ug/g	28-JAN-20	86	86	86	86
Zinc (Zn)		29.4		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
Chromium, Hexavalent		<0.20		0.20	ug/g	28-JAN-20	0.66	0.66	8	8
L2409682-2 MW2 SAM2										
Sampled By: CLIENT on 10-JAN-20 @ 10:20										
Matrix: SOIL										
Physical Tests										
Conductivity		0.0869		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
% Moisture		12.1		0.25	%	27-JAN-20				
pH		7.82		0.10	pH units	27-JAN-20				
Cyanides										
Cyanide, Weak Acid Diss		<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
SAR		0.33		0.10	SAR	28-JAN-20	1	2.4	5	12

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIIC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



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ANALYTICAL GUIDELINE REPORT

L2409682 CONTD....

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G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte									
L2409682-2 MW2 SAM2										
Sampled By: CLIENT on 10-JAN-20 @ 10:20										
Matrix: SOIL							#1	#2	#3	#4
Saturated Paste Extractables										
	Calcium (Ca)	10.9		0.50	mg/L	28-JAN-20				
	Magnesium (Mg)	1.52		0.50	mg/L	28-JAN-20				
	Sodium (Na)	4.45		0.50	mg/L	28-JAN-20				
Metals										
	Antimony (Sb)	<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
	Arsenic (As)	2.3		1.0	ug/g	28-JAN-20	11	18	18	18
	Barium (Ba)	19.0		1.0	ug/g	28-JAN-20	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
	Boron (B)	5.6		5.0	ug/g	28-JAN-20	36	36	120	120
	Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
	Cadmium (Cd)	<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
	Chromium (Cr)	8.6		1.0	ug/g	28-JAN-20	67	70	160	160
	Cobalt (Co)	3.2		1.0	ug/g	28-JAN-20	19	21	22	80
	Copper (Cu)	8.9		1.0	ug/g	28-JAN-20	62	92	140	230
	Lead (Pb)	6.7		1.0	ug/g	28-JAN-20	45	120	120	120
	Mercury (Hg)	0.0058		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
	Nickel (Ni)	7.1		1.0	ug/g	28-JAN-20	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
	Vanadium (V)	16.8		1.0	ug/g	28-JAN-20	86	86	86	86
	Zinc (Zn)	45.3		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
	Chromium, Hexavalent	<0.20		0.20	ug/g	28-JAN-20	0.66	0.66	8	8
L2409682-3 MW3 SAM2										
Sampled By: CLIENT on 10-JAN-20 @ 15:25										
Matrix: SOIL							#1	#2	#3	#4
Physical Tests										
	Conductivity	0.0992		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
	% Moisture	12.6		0.25	%	27-JAN-20				
	pH	7.78		0.10	pH units	27-JAN-20				
Cyanides										
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
	SAR	0.28		0.10	SAR	28-JAN-20	1	2.4	5	12
	Calcium (Ca)	10.8		0.50	mg/L	28-JAN-20				
	Magnesium (Mg)	1.37		0.50	mg/L	28-JAN-20				
	Sodium (Na)	3.69		0.50	mg/L	28-JAN-20				
Metals										
	Antimony (Sb)	<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
	Arsenic (As)	2.2		1.0	ug/g	28-JAN-20	11	18	18	18
	Barium (Ba)	16.2		1.0	ug/g	28-JAN-20	210	220	390	670

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIIC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



Environmental

ANALYTICAL GUIDELINE REPORT

L2409682 CONTD....

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30-JAN-20 14:23 (MT)

G4223-20-1

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L2409682-3 MW3 SAM2							#1	#2	#3	#4
Sampled By: CLIENT on 10-JAN-20 @ 15:25										
Matrix: SOIL										
Metals										
Beryllium (Be)		<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
Boron (B)		5.3		5.0	ug/g	28-JAN-20	36	36	120	120
Boron (B), Hot Water Ext.		<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
Cadmium (Cd)		<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
Chromium (Cr)		8.1		1.0	ug/g	28-JAN-20	67	70	160	160
Cobalt (Co)		2.9		1.0	ug/g	28-JAN-20	19	21	22	80
Copper (Cu)		8.3		1.0	ug/g	28-JAN-20	62	92	140	230
Lead (Pb)		6.5		1.0	ug/g	28-JAN-20	45	120	120	120
Mercury (Hg)		0.0052		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
Molybdenum (Mo)		<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
Nickel (Ni)		6.0		1.0	ug/g	28-JAN-20	37	82	100	270
Selenium (Se)		<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
Silver (Ag)		<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
Thallium (Tl)		<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3
Uranium (U)		<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
Vanadium (V)		16.3		1.0	ug/g	28-JAN-20	86	86	86	86
Zinc (Zn)		28.0		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
Chromium, Hexavalent		<0.20		0.20	ug/g	28-JAN-20	0.66	0.66	8	8
L2409682-4 MW4 SAM1							#1	#2	#3	#4
Sampled By: CLIENT on 10-JAN-20 @ 12:20										
Matrix: SOIL										
Physical Tests										
Conductivity		0.150		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
% Moisture		8.68		0.25	%	27-JAN-20				
pH		7.69		0.10	pH units	27-JAN-20				
Cyanides										
Cyanide, Weak Acid Diss		<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
SAR		0.11		0.10	SAR	28-JAN-20	1	2.4	5	12
Calcium (Ca)		20.9		0.50	mg/L	28-JAN-20				
Magnesium (Mg)		2.96		0.50	mg/L	28-JAN-20				
Sodium (Na)		2.05		0.50	mg/L	28-JAN-20				
Metals										
Antimony (Sb)		<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
Arsenic (As)		3.4		1.0	ug/g	28-JAN-20	11	18	18	18
Barium (Ba)		30.5		1.0	ug/g	28-JAN-20	210	220	390	670
Beryllium (Be)		<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
Boron (B)		5.7		5.0	ug/g	28-JAN-20	36	36	120	120
Boron (B), Hot Water Ext.		<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
Cadmium (Cd)		<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
Chromium (Cr)		13.3		1.0	ug/g	28-JAN-20	67	70	160	160
Cobalt (Co)		4.4		1.0	ug/g	28-JAN-20	19	21	22	80
Copper (Cu)		10.5		1.0	ug/g	28-JAN-20	62	92	140	230

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



Environmental

ANALYTICAL GUIDELINE REPORT

L2409682 CONTD....

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30-JAN-20 14:23 (MT)

G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2409682-4 MW4 SAM1										
Sampled By: CLIENT on 10-JAN-20 @ 12:20										
Matrix: SOIL										
Metals										
	Lead (Pb)	8.4		1.0	ug/g	28-JAN-20	45	120	120	120
	Mercury (Hg)	0.0115		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
	Nickel (Ni)	9.3		1.0	ug/g	28-JAN-20	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
	Vanadium (V)	26.8		1.0	ug/g	28-JAN-20	86	86	86	86
	Zinc (Zn)	35.8		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
	Chromium, Hexavalent	0.21		0.20	ug/g	28-JAN-20	0.66	0.66	8	8
L2409682-5 MW5 SAM1										
Sampled By: CLIENT on 10-JAN-20 @ 09:16										
Matrix: SOIL										
Physical Tests										
	Conductivity	0.0978		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
	% Moisture	12.5		0.25	%	27-JAN-20				
	pH	7.78		0.10	pH units	27-JAN-20				
Cyanides										
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
	SAR	0.29		0.10	SAR	28-JAN-20	1	2.4	5	12
	Calcium (Ca)	13.4		0.50	mg/L	28-JAN-20				
	Magnesium (Mg)	1.35		0.50	mg/L	28-JAN-20				
	Sodium (Na)	4.21		0.50	mg/L	28-JAN-20				
Metals										
	Antimony (Sb)	<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
	Arsenic (As)	2.5		1.0	ug/g	28-JAN-20	11	18	18	18
	Barium (Ba)	20.4		1.0	ug/g	28-JAN-20	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
	Boron (B)	5.5		5.0	ug/g	28-JAN-20	36	36	120	120
	Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
	Cadmium (Cd)	<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
	Chromium (Cr)	9.3		1.0	ug/g	28-JAN-20	67	70	160	160
	Cobalt (Co)	3.5		1.0	ug/g	28-JAN-20	19	21	22	80
	Copper (Cu)	8.9		1.0	ug/g	28-JAN-20	62	92	140	230
	Lead (Pb)	7.0		1.0	ug/g	28-JAN-20	45	120	120	120
	Mercury (Hg)	0.0083		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
	Nickel (Ni)	7.1		1.0	ug/g	28-JAN-20	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



Environmental

ANALYTICAL GUIDELINE REPORT

L2409682 CONTD....

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30-JAN-20 14:23 (MT)

G4223-20-1

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte									
L2409682-5 MW5 SAM1										
Sampled By: CLIENT on 10-JAN-20 @ 09:16										
Matrix: SOIL										
Metals							#1	#2	#3	#4
	Uranium (U)	<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
	Vanadium (V)	18.3		1.0	ug/g	28-JAN-20	86	86	86	86
	Zinc (Zn)	28.7		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
	Chromium, Hexavalent	<0.20		0.20	ug/g	28-JAN-20	0.66	0.66	8	8
L2409682-6 MW6 SAM2										
Sampled By: CLIENT on 10-JAN-20 @ 14:23										
Matrix: SOIL										
Physical Tests							#1	#2	#3	#4
	Conductivity	0.0793		0.0040	mS/cm	29-JAN-20	0.47	0.57	0.7	1.4
	% Moisture	11.4		0.25	%	27-JAN-20				
	pH	7.78		0.10	pH units	27-JAN-20				
Cyanides										
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	27-JAN-20	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
	SAR	<0.10		0.10	SAR	28-JAN-20	1	2.4	5	12
	Calcium (Ca)	10.4		0.50	mg/L	28-JAN-20				
	Magnesium (Mg)	1.22		0.50	mg/L	28-JAN-20				
	Sodium (Na)	0.62		0.50	mg/L	28-JAN-20				
Metals										
	Antimony (Sb)	<1.0		1.0	ug/g	28-JAN-20	1	1.3	7.5	40
	Arsenic (As)	2.0		1.0	ug/g	28-JAN-20	11	18	18	18
	Barium (Ba)	16.1		1.0	ug/g	28-JAN-20	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	28-JAN-20	2.5	2.5	4	8
	Boron (B)	<5.0		5.0	ug/g	28-JAN-20	36	36	120	120
	Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	28-JAN-20	36	36	1.5	2
	Cadmium (Cd)	<0.50		0.50	ug/g	28-JAN-20	1	1.2	1.2	1.9
	Chromium (Cr)	7.7		1.0	ug/g	28-JAN-20	67	70	160	160
	Cobalt (Co)	2.9		1.0	ug/g	28-JAN-20	19	21	22	80
	Copper (Cu)	7.9		1.0	ug/g	28-JAN-20	62	92	140	230
	Lead (Pb)	6.6		1.0	ug/g	28-JAN-20	45	120	120	120
	Mercury (Hg)	<0.0050		0.0050	ug/g	28-JAN-20	0.16	0.27	0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	28-JAN-20	2	2	6.9	40
	Nickel (Ni)	5.7		1.0	ug/g	28-JAN-20	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	28-JAN-20	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	28-JAN-20	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	28-JAN-20	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	28-JAN-20	1.9	2.5	23	33
	Vanadium (V)	15.3		1.0	ug/g	28-JAN-20	86	86	86	86
	Zinc (Zn)	24.4		5.0	ug/g	28-JAN-20	290	290	340	340
Speciated Metals										
	Chromium, Hexavalent	<0.20		0.20	ug/g	28-JAN-20	0.66	0.66	8	8

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIIC-C

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD
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The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199
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This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138
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A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
------------------	------	--------------------------	-----------------------

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
-------------------	------	-----------------------------	-----------------------

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H₂S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C
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A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

17-641590

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Quality Control Report

Workorder: L2409682

Report Date: 30-JAN-20

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Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT								
Soil								
Batch	R4983358							
WG3264656-4	DUP	WG3264656-3						
Conductivity		0.147	0.150		mS/cm	1.9	20	29-JAN-20
WG3264656-2	IRM	WT SAR3						
Conductivity			107.7		%		70-130	29-JAN-20
WG3264919-1	LCS							
Conductivity			100.7		%		90-110	29-JAN-20
WG3264656-1	MB							
Conductivity			<0.0040		mS/cm		0.004	29-JAN-20
HG-200.2-CVAA-WT								
Soil								
Batch	R4981289							
WG3264639-2	CRM	WT-CANMET-TILL2						
Mercury (Hg)			103.8		%		70-130	28-JAN-20
WG3264639-6	DUP	WG3264639-5						
Mercury (Hg)		0.0178	0.0177		ug/g	0.4	40	28-JAN-20
WG3264639-3	LCS							
Mercury (Hg)			113.0		%		80-120	28-JAN-20
WG3264639-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	28-JAN-20
MET-200.2-CCMS-WT								
Soil								
Batch	R4983014							
WG3264639-2	CRM	WT-CANMET-TILL2						
Antimony (Sb)			105.2		%		70-130	28-JAN-20
Arsenic (As)			104.9		%		70-130	28-JAN-20
Barium (Ba)			100.8		%		70-130	28-JAN-20
Beryllium (Be)			108.5		%		70-130	28-JAN-20
Boron (B)			4.0		mg/kg		0-8.6	28-JAN-20
Cadmium (Cd)			112.4		%		70-130	28-JAN-20
Chromium (Cr)			104.8		%		70-130	28-JAN-20
Cobalt (Co)			102.3		%		70-130	28-JAN-20
Copper (Cu)			109.5		%		70-130	28-JAN-20
Lead (Pb)			112.6		%		70-130	28-JAN-20
Molybdenum (Mo)			105.9		%		70-130	28-JAN-20
Nickel (Ni)			105.5		%		70-130	28-JAN-20
Selenium (Se)			0.40		mg/kg		0.15-0.55	28-JAN-20
Silver (Ag)			0.26		mg/kg		0.16-0.36	28-JAN-20
Thallium (Tl)			99.5		%		70-130	28-JAN-20



Quality Control Report

Workorder: L2409682

Report Date: 30-JAN-20

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Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch	R4983014							
WG3264639-2 CRM		WT-CANMET-TILL2						
Uranium (U)			102.1		%		70-130	28-JAN-20
Vanadium (V)			103.7		%		70-130	28-JAN-20
Zinc (Zn)			102.7		%		70-130	28-JAN-20
WG3264639-6 DUP		WG3264639-5						
Antimony (Sb)		0.21	0.19		ug/g	7.4	30	28-JAN-20
Arsenic (As)		6.82	6.91		ug/g	1.3	30	28-JAN-20
Barium (Ba)		70.7	71.4		ug/g	0.9	40	28-JAN-20
Beryllium (Be)		0.79	0.79		ug/g	0.7	30	28-JAN-20
Boron (B)		18.3	17.3		ug/g	5.8	30	28-JAN-20
Cadmium (Cd)		0.088	0.092		ug/g	3.9	30	28-JAN-20
Chromium (Cr)		21.9	22.0		ug/g	0.6	30	28-JAN-20
Cobalt (Co)		14.1	14.1		ug/g	0.6	30	28-JAN-20
Copper (Cu)		40.3	41.6		ug/g	3.2	30	28-JAN-20
Lead (Pb)		12.5	12.5		ug/g	0.4	40	28-JAN-20
Molybdenum (Mo)		0.67	0.66		ug/g	1.6	40	28-JAN-20
Nickel (Ni)		28.5	28.9		ug/g	1.5	30	28-JAN-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	28-JAN-20
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	28-JAN-20
Thallium (Tl)		0.145	0.136		ug/g	6.2	30	28-JAN-20
Uranium (U)		0.549	0.546		ug/g	0.6	30	28-JAN-20
Vanadium (V)		31.6	30.9		ug/g	2.1	30	28-JAN-20
Zinc (Zn)		63.1	65.2		ug/g	3.2	30	28-JAN-20
WG3264639-4 LCS								
Antimony (Sb)			106.9		%		80-120	28-JAN-20
Arsenic (As)			96.3		%		80-120	28-JAN-20
Barium (Ba)			96.9		%		80-120	28-JAN-20
Beryllium (Be)			100.0		%		80-120	28-JAN-20
Boron (B)			93.7		%		80-120	28-JAN-20
Cadmium (Cd)			99.7		%		80-120	28-JAN-20
Chromium (Cr)			98.4		%		80-120	28-JAN-20
Cobalt (Co)			95.2		%		80-120	28-JAN-20
Copper (Cu)			97.9		%		80-120	28-JAN-20
Lead (Pb)			99.1		%		80-120	28-JAN-20



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
Batch	R4983014							
WG3264639-4	LCS							
Molybdenum (Mo)			101.6		%		80-120	28-JAN-20
Nickel (Ni)			98.2		%		80-120	28-JAN-20
Selenium (Se)			96.8		%		80-120	28-JAN-20
Silver (Ag)			97.9		%		80-120	28-JAN-20
Thallium (Tl)			98.8		%		80-120	28-JAN-20
Uranium (U)			96.4		%		80-120	28-JAN-20
Vanadium (V)			100.0		%		80-120	28-JAN-20
Zinc (Zn)			97.3		%		80-120	28-JAN-20
WG3264639-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	28-JAN-20
Arsenic (As)			<0.10		mg/kg		0.1	28-JAN-20
Barium (Ba)			<0.50		mg/kg		0.5	28-JAN-20
Beryllium (Be)			<0.10		mg/kg		0.1	28-JAN-20
Boron (B)			<5.0		mg/kg		5	28-JAN-20
Cadmium (Cd)			<0.020		mg/kg		0.02	28-JAN-20
Chromium (Cr)			<0.50		mg/kg		0.5	28-JAN-20
Cobalt (Co)			<0.10		mg/kg		0.1	28-JAN-20
Copper (Cu)			<0.50		mg/kg		0.5	28-JAN-20
Lead (Pb)			<0.50		mg/kg		0.5	28-JAN-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	28-JAN-20
Nickel (Ni)			<0.50		mg/kg		0.5	28-JAN-20
Selenium (Se)			<0.20		mg/kg		0.2	28-JAN-20
Silver (Ag)			<0.10		mg/kg		0.1	28-JAN-20
Thallium (Tl)			<0.050		mg/kg		0.05	28-JAN-20
Uranium (U)			<0.050		mg/kg		0.05	28-JAN-20
Vanadium (V)			<0.20		mg/kg		0.2	28-JAN-20
Zinc (Zn)			<2.0		mg/kg		2	28-JAN-20
MOISTURE-WT		Soil						
Batch	R4979827							
WG3263861-3	DUP	L2409711-14						
% Moisture		10.7	10.9		%	1.6	20	27-JAN-20
WG3263861-2	LCS							
% Moisture			99.9		%		90-110	27-JAN-20
WG3263861-1	MB							



Quality Control Report

Workorder: L2409682

Report Date: 30-JAN-20

Page 5 of 7

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT								
Soil								
Batch	R4979827							
WG3263861-1	MB							
% Moisture			<0.25		%		0.25	27-JAN-20
Batch	R4980106							
WG3264012-3	DUP	L2409600-2						
% Moisture		6.28	6.59		%	4.8	20	27-JAN-20
WG3264012-2	LCS							
% Moisture			100.9		%		90-110	27-JAN-20
WG3264012-1	MB							
% Moisture			<0.25		%		0.25	27-JAN-20
PH-WT								
Soil								
Batch	R4980429							
WG3264062-1	DUP	L2409552-1						
pH		5.39	5.21	J	pH units	0.18	0.3	27-JAN-20
WG3264463-1	LCS							
pH			6.93		pH units		6.9-7.1	27-JAN-20
SAR-R511-WT								
Soil								
Batch	R4982219							
WG3264656-4	DUP	WG3264656-3						
Calcium (Ca)		11.3	11.6		mg/L	2.6	30	28-JAN-20
Sodium (Na)		3.70	3.79		mg/L	2.4	30	28-JAN-20
Magnesium (Mg)		6.19	6.36		mg/L	2.7	30	28-JAN-20
WG3264656-2	IRM	WT SAR3						
Calcium (Ca)			110.7		%		70-130	28-JAN-20
Sodium (Na)			100.9		%		70-130	28-JAN-20
Magnesium (Mg)			111.5		%		70-130	28-JAN-20
WG3264656-5	LCS							
Calcium (Ca)			102.0		%		80-120	28-JAN-20
Sodium (Na)			100.6		%		80-120	28-JAN-20
Magnesium (Mg)			101.2		%		80-120	28-JAN-20
WG3264656-1	MB							
Calcium (Ca)			<0.50		mg/L		0.5	28-JAN-20
Sodium (Na)			<0.50		mg/L		0.5	28-JAN-20
Magnesium (Mg)			<0.50		mg/L		0.5	28-JAN-20

Quality Control Report

Workorder: L2409682

Report Date: 30-JAN-20

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2409682

Report Date: 30-JAN-20

Client: V.A. WOOD (GUELPH)
405 YORK ROAD
GUELPH ON N1E 3H3
Contact: JOHN BROAD

Page 7 of 7

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
% Moisture							
	1	10-JAN-20 11:15	27-JAN-20 11:56	14	17	days	EHTL
	2	10-JAN-20 10:20	27-JAN-20 08:20	14	17	days	EHTR
	3	10-JAN-20 15:25	27-JAN-20 11:57	14	17	days	EHTL
	4	10-JAN-20 12:20	27-JAN-20 11:58	14	17	days	EHTL
	5	10-JAN-20 09:16	27-JAN-20 08:21	14	17	days	EHTR
	6	10-JAN-20 14:23	27-JAN-20 11:59	14	17	days	EHTL
Cyanides							
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
	1	10-JAN-20 11:15	26-JAN-20 14:00	14	16	days	EHTL
	2	10-JAN-20 10:20	26-JAN-20 14:00	14	16	days	EHTR
	3	10-JAN-20 15:25	26-JAN-20 14:00	14	16	days	EHTL
	4	10-JAN-20 12:20	26-JAN-20 14:00	14	16	days	EHTL
	5	10-JAN-20 09:16	26-JAN-20 14:00	14	16	days	EHTR
	6	10-JAN-20 14:23	26-JAN-20 14:00	14	16	days	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2409682 were received on 24-JAN-20 10:05.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2409682-COFC

COC Number: 17-641590

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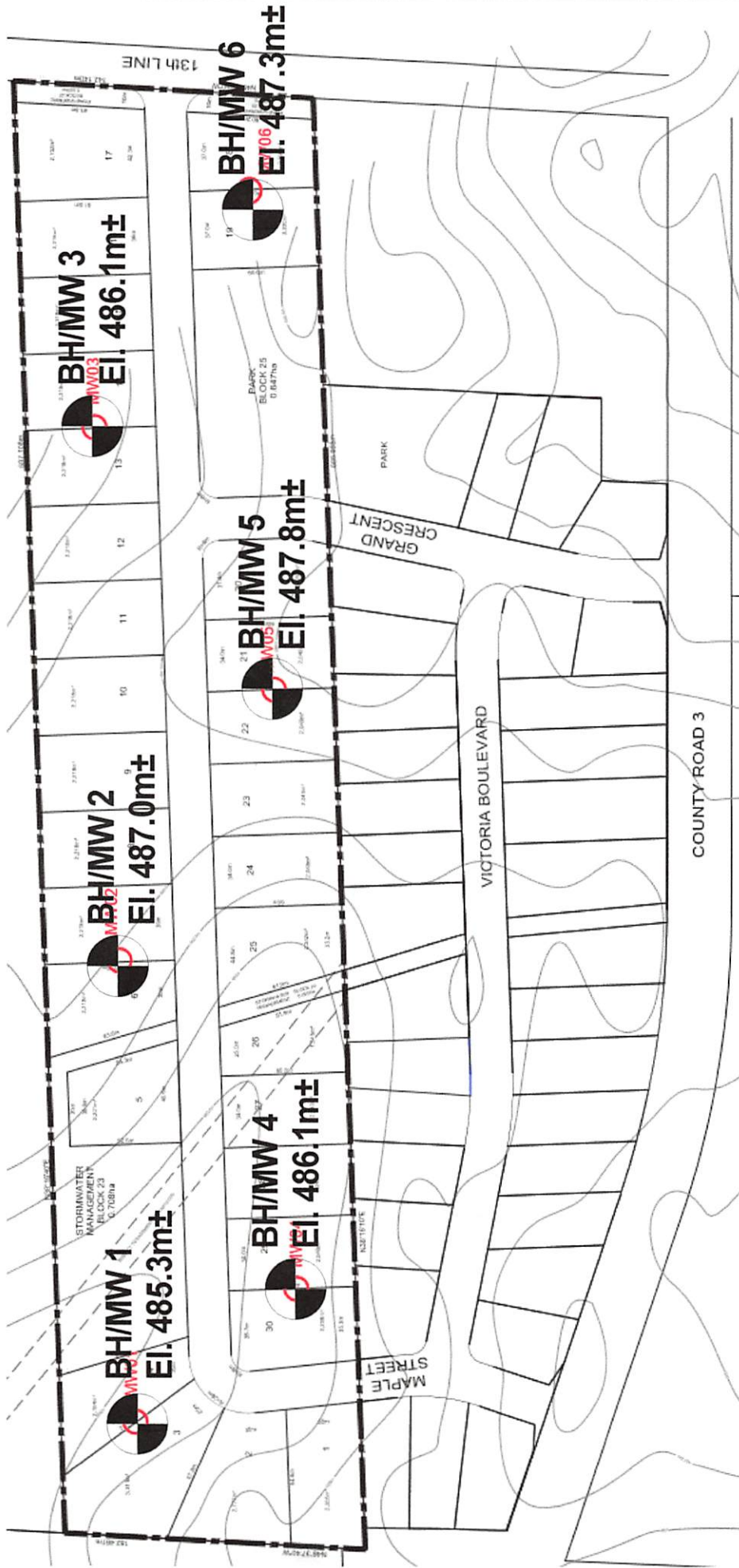
Report To Company: VA Water (Geoph) Inc. Contact: John Broad Phone: 519-763-3101 Company address below will appear on the final report		Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDO (DIGITAL) Quality Control (QC) Report with Report: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: john.broad@va-water.com Email 2: Email 3:		Select Service Level Below - Contact your AM to confirm all EAP TATs (surcharges may apply) Regular (R) <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply 4 day (P4-20%) <input type="checkbox"/> 1 Business day (E-100%) <input type="checkbox"/> 3 day (P3-25%) <input type="checkbox"/> Same Day, Weekend or Statutory holiday (E2-200%) (Laboratory opening fees may apply) <input type="checkbox"/> 2 day (P2-50%) <input type="checkbox"/>	
Street: 405 York Rd City/Province: Guelph / ONTARIO Postal Code: N1E 3H3		Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Copy of Invoice with Report: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Company: Contact:		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below For tests that can not be performed according to the service level selected, you will be contacted.	
Project Information ALS Account # / Quote #: 64223-20-1 Job #: 64223-20-1 PO / AFE: LSD:		AFECost Center: Mass/Minor Code: Requisitioner: Location:		Invoice Distribution Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: Email 2:	
ALS Lab Work Order # (lab use only): L2409682 R		ALS Contact:		Sampler:	
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	
	MW 1 SAM 1	10-JAN-20	11:15	SOIL	X
	MW 2 SAM 2	10-JAN-20	10:20	SOIL	X
	MW 3 SAM 2	10-JAN-20	15:25	SOIL	X
	MW 4 SAM 1	10-JAN-20	12:10	SOIL	X
	MW 5 SAM 1	10-JAN-20	9:16	SOIL	X
	MW 6 SAM 2	10-JAN-20	14:23	SOIL	X
Drinking Water (DW) Samples* (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen <input type="checkbox"/> SIP Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input type="checkbox"/> Ice Cubes <input checked="" type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 14.8 FINAL COOLER TEMPERATURES °C:	
SHIPMENT RELEASE (client use) Released by: Date: Time: Received by: PK Date: 1-24-20 Time: 10:45		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only) Received by: M Date: 1-24-20 Time: 14:30	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form

ALS 1011-0001

ENCLOSURES



Notes:

1. Borehole Ground Elevations provided by GM BluePlan Engineering Ltd.
2. The stratigraphy referred to in the report is based on the data from the boreholes supplemented by geological data where available. The actual stratigraphy between and beyond the boreholes may vary. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.

V.A. WOOD (GUELPH) INC.
 Consulting Geotechnical Engineers
 405 York Road, Guelph, Ontario N1E 3H3
 Ph. (519) 763-3101 Fax. (519) 763-5912

Borehole/Monitoring Well Location Plan
 Marsville-Thunderbird Subdivision
 Part of Lot 5, Concession 3
 Township of East Garafraxa (Marsville), ON

Scale: NTS

Date: February 6, 2020

Ref. No. G4223-20-2

Enclosure 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 1

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 2

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	485.3						20 40 60 80	5 10 15 20 25	
0.5	500mm Topsoil	484.8								
	brown, loose to compact SILT AND SAND trace gravel, wet				1	SS	6			
	saturated @ 4.6m				2	SS	4			
3.0		482.3			3	SS	19			
	grey, hard SILT AND CLAY TILL trace sand, saturated				4	SS	42			
6.1		479.2			5	SS	30			
6.6	brown, dense SAND some silt, saturated	478.7			6	SS	35			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 2

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 3

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE				SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE		
0.0	Ground Surface	487.0		<p>Protective Well Casing</p> <p>51mm OD Riser Pipe</p> <p>W.L. @ El. 485.9m± (12-FEB-20)</p> <p>Bentonite</p> <p>Filter Sand</p> <p>51mm OD Screen</p>					
0.3	300mm Topsoil	486.7			1	SS	5		
	brown, loose to compact SILT AND SAND trace gravel, wet				2	SS	7		
					3	SS	8		
					4	SS	16		
4.6		482.4			5	SS	16		
	brown, compact SILT AND SAND TILL trace clay, occasional cobbles, moist to wet				6	SS	50		
6.6		480.4							
	End of Borehole								

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 3

CLIENT: Thomasfield Homes Ltd.

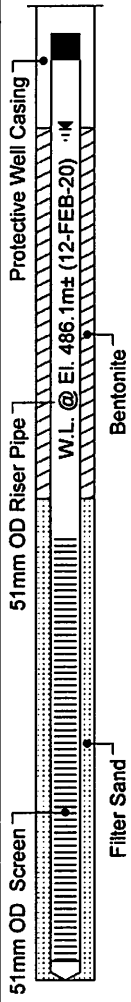
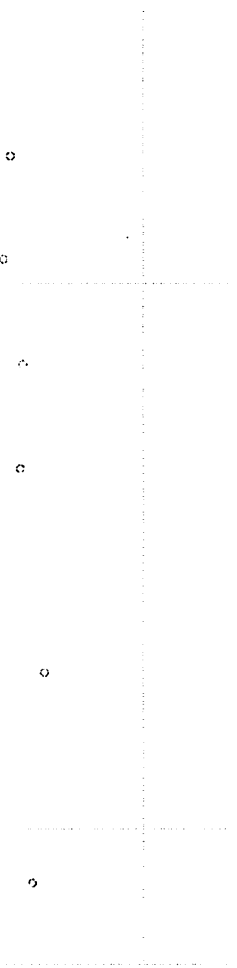
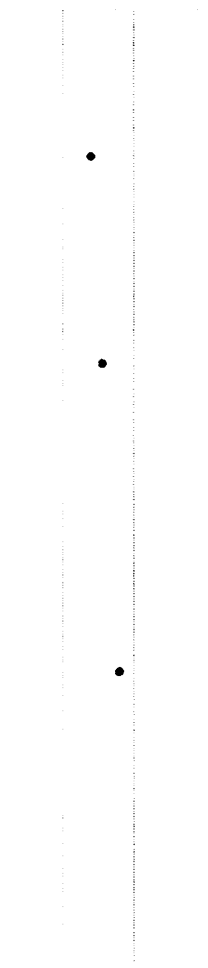

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 4

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE										
0.0	Ground Surface	486.1		 <p>Protective Well Casing</p> <p>51mm OD Riser Pipe</p> <p>W.L. @ El. 486.1m± (12-FEB-20)</p> <p>Bentonite</p> <p>Filter Sand</p> <p>51mm OD Screen</p>													
0.3	300mm Topsoil	485.8															
1.2	brown, loose SILT AND SAND (Re-worked) trace organics, wet	484.9			1	SS	6										
4.9	brown, very loose to compact SILT AND SAND trace gravel, wet to saturated	481.2			2	SS	3										
					3	SS	11										
					4	SS	10										
6.6	brown to grey, compact SILT AND SAND TILL trace clay, saturated	479.5			5	SS	20										
	End of Borehole			6	SS	15											

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 4

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 5

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	486.1						20 40 60 80	5 10 15 20 25	
0.3	300mm Topsoil	485.8								
1.2	brown, compact SILT AND SAND (Re-worked) trace organic, trace gravel, moist	484.9			1	SS	19			
	brown, compact SILT AND SAND trace gravel, wet				2	SS	14			
3.0		483.1			3	SS	15			
	brown, very stiff SILT AND CLAY TILL wet				4	SS	23			
6.1		480.0		51mm OD Screen Filter Sand 480.2m± (12-FEB-20)	5	SS	26			
6.6	brown, dense SAND some silt, saturated	479.5			6	SS	30			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 5

CLIENT: Thomasfield Homes Ltd.

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 6

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	487.8						20 40 60 80	5 10 15 20 25	
0.3	300mm Topsoil	487.5								
2.3	brown, very loose SILT AND SAND trace gravel, wet	485.5			1	SS	4			
					2	SS	3			
					3	SS	6			
					4	SS	7			
6.1	grey, loose to dense SILT AND SAND TILL some clay, wet to saturated	481.7			5	SS	39			
6.6	grey, very stiff SILT AND CLAY wet	481.2			6	SS	22			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 6

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 7

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	487.3						20 40 60 80 5 10 15 20 25		
0.3	300mm Topsoil	487.0								
	brown, loose to compact SILT AND SAND trace gravel, trace clay, wet				1	SS	8			
					2	SS	7			
					3	SS	11			
					4	SS	10			
					5	SS	12			
6.1		481.2								
6.6	brown, compact SILT AND SAND TILL trace clay, wet	480.7			6	SS	15			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

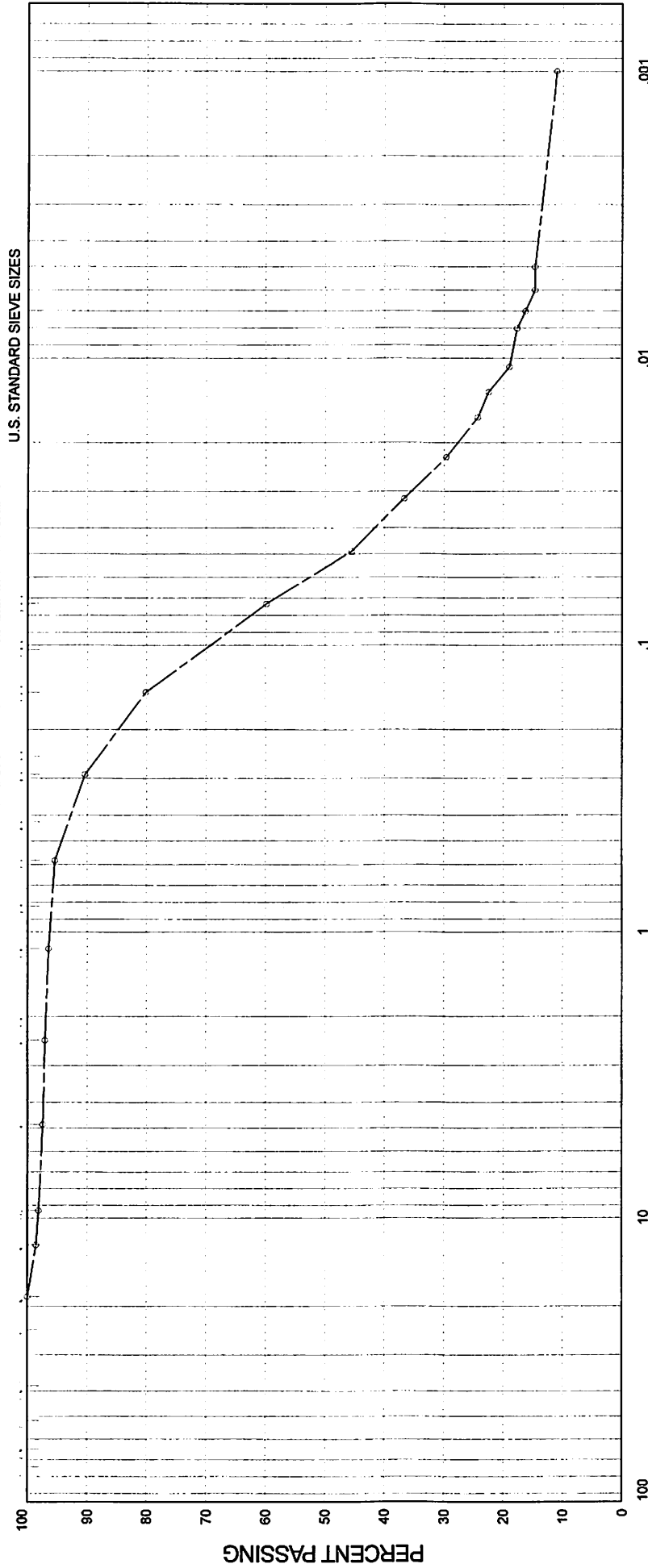
DRILL DATE: January 10, 2020

SHEET: 1 of 1

OUR REFERENCE N° G4223-20-1

GRAVEL			SAND		SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

ENCLOSURE N° 8

PROJECT: Marsville Thunderbird
LOCATION: Maple St, Marsville, ON
BOREHOLE N°: 3
SAMPLE N°: 1
DEPTH: 0.8 - 1.2 m±
ELEVATION: 485.3 - 484.9 m±

COEFFICIENT OF UNIFORMITY:
COEFFICIENT OF CURVATURE:

PLASTIC PROPERTIES	
LIQUID LIMIT	% = 16.5
PLASTIC LIMIT	% = 16.2
PLASTICITY INDEX	% = 0.3
MOISTURE CONTENT	% = 13.3

Classification of Sample and Group Symbol:

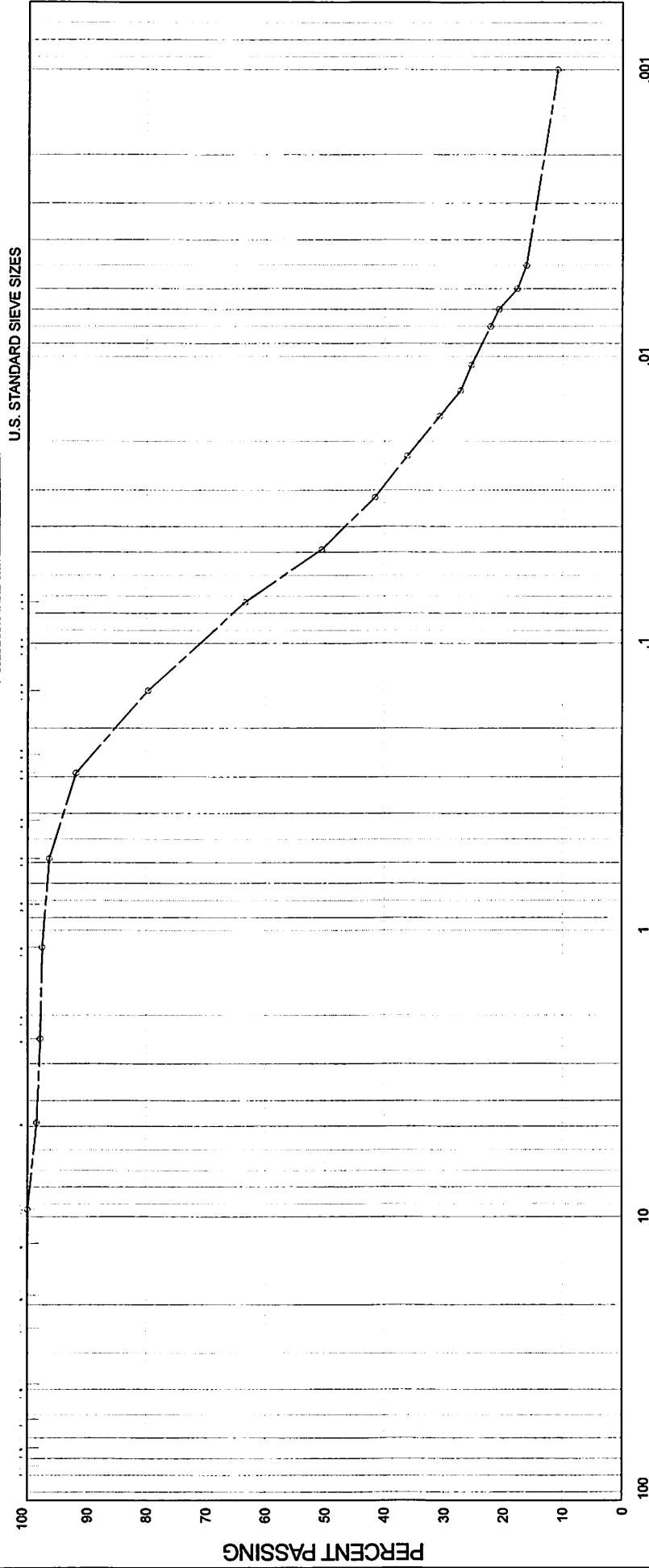
SILT AND SAND, some clay, trace gravel (ML)

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4223-20-1

GRAVEL		SAND		SILT & CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM



Grain Size in Millimeters

PROJECT: Marsville Thunderbird
 LOCATION: Maple Street, Marsville, ON
 BOREHOLE N°: 5
 SAMPLE N°: 3
 DEPTH: 3.0 - 3.5 m±
 ELEVATION: 384.8 - 384.3 m±

COEFFICIENT OF UNIFORMITY:
 COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

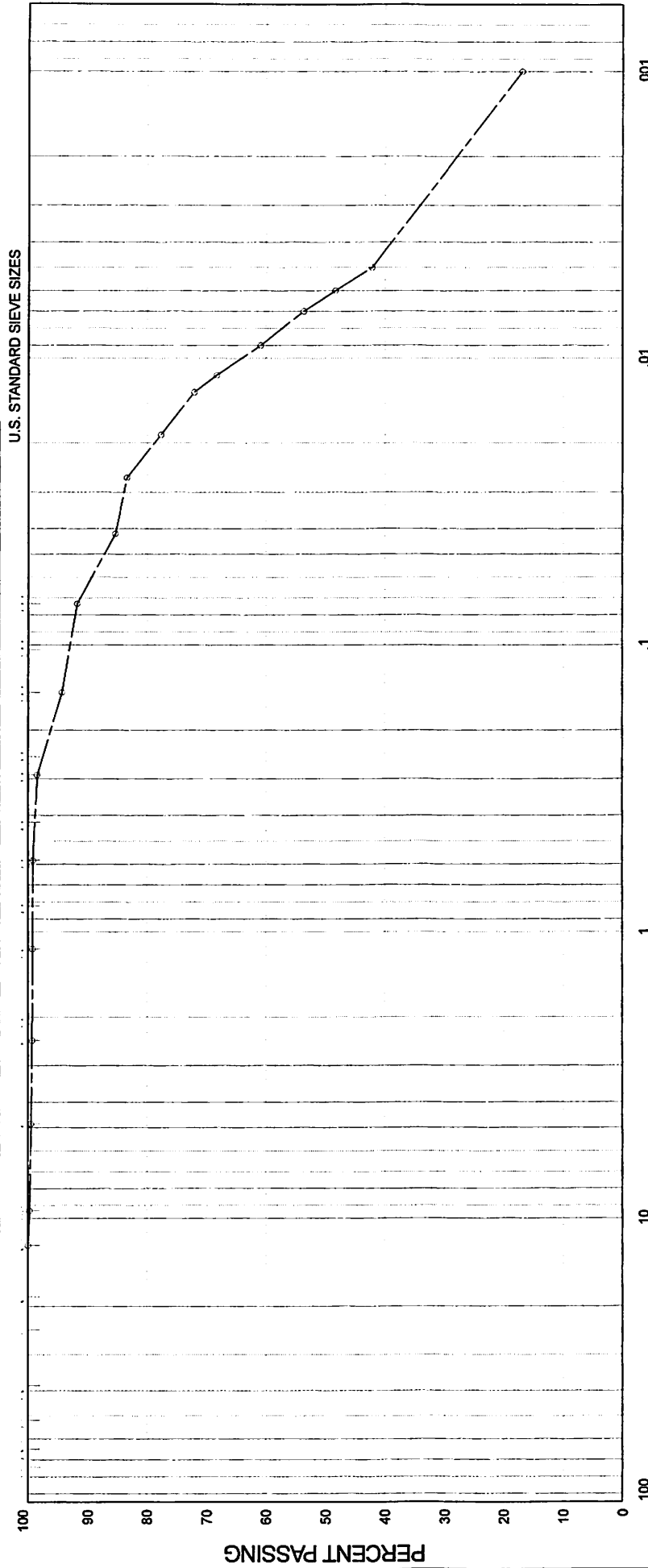
SILT AND SAND TILL, some clay, trace gravel (ML)

ENCLOSURE N° 9

PLASTIC PROPERTIES
 LIQUID LIMIT % = 0
 PLASTIC LIMIT % = 0
 PLASTICITY INDEX % = 0
 MOISTURE CONTENT % = 14.4

OUR REFERENCE N° G4223-20-1

UNIFIED SOIL CLASSIFICATION SYSTEM



Grain Size in Millimeters

PROJECT: Marsville Thunderbird
LOCATION: Maple Street, Marsville, ON
BOREHOLE N°: 1
SAMPLE N°: 4
DEPTH: 3.0 - 3.5 m±
ELEVATION: 483.1 - 482.6 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILT AND CLAY, trace sand (CL)

ENCLOSURE N° 10

PLASTIC PROPERTIES	
LIQUID LIMIT	% = 23.9
PLASTIC LIMIT	% = 16.3
PLASTICITY INDEX	% = 7.6
MOISTURE CONTENT	% = 15.7

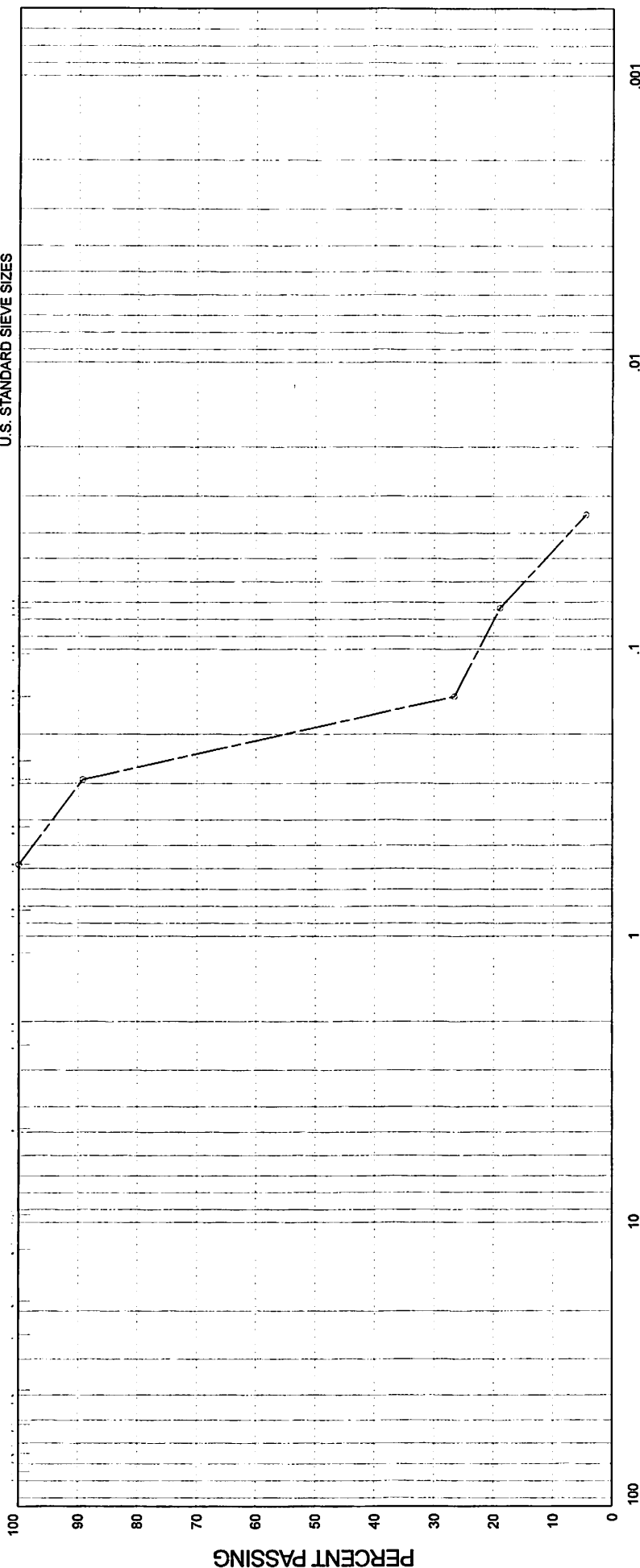
GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4223-20-1

GRAVEL		SAND		SILT & CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

U.S. STANDARD SIEVE SIZES



Grain Size in Millimeters

PROJECT: Marsville Thunderbird
 LOCATION: Maple Street, Marsville, ON
 BOREHOLE N°: 4
 SAMPLE N°: 6
 DEPTH: 6.1 - 6.6 m±
 ELEVATION: 480.0 - 479.5 m±

COEFFICIENT OF UNIFORMITY:
 COEFFICIENT OF CURVATURE:

PLASTIC PROPERTIES
 LIQUID LIMIT % = 0
 PLASTIC LIMIT % = 0
 PLASTICITY INDEX % = 0
 MOISTURE CONTENT % = 10.7

Classification of Sample and Group Symbol:

SAND, some silt (SM)

ENCLOSURE N° 11



April 4, 2022

Reference No. G4223-22-3

Thomasfield Homes Ltd.
295 Southgate Drive
Guelph, Ontario
N1G 3M5

Attention: Mr. Paul Heitshu, General Manager

RE: Foundation Recommendations
Marsville North Subdivision
Maple Street and 13 Line
Township of East Garafraxa, ON

Dear Mr. Heitshu,

As requested of Angela Kroestsch of GM BluePlan Engineering Limited, JLP Services Inc. (JLP) carried out a review of the preliminary site plans for the Marsville North Subdivision and our comments are as follows.

The preliminary site plans consisted of Existing Conditions Plan, General Plan, Site Grading Plans, Site Servicing Plans, Storm Water Management Pond Grading Plan and Details, Thunderbird Municipal Drain Plan and Profile and Storm Sewer Drainage Area Plan, Drawings 1 to 11, Project No. 418153, dated March 2020, and were prepared by GM BluePlan Engineering Limited.

The purpose of this review is to determine the potential impact of the soil and groundwater conditions at the site and to provide recommendations pertaining to the design and construction of site grading, site servicing and building foundations for the proposed residential subdivision.

The soil and groundwater conditions at the site are referenced to the following documents:

- Geotechnical investigation report titled "Geotechnical Investigation, Marsville North (Marsville Thunderbird) Subdivision, Maple Street, Township of East Garafraxa (Marsville), Ontario", Reference No. G4223-20-2, dated February 2020, carried out for the proposed development.
- Summary of Water Levels, Hydraulic Gradients, and Monitoring Well Details for the existing monitoring wells at the site provided by GM BluePlan Engineering Ltd.



- Hydrographs for six (6) monitoring wells, MW1, MW2, MW3, MW4, MW5 and MW6, for the period between February 2020 and December 2021 provided by GM BluePlan Engineering Ltd.

In general, the soils encountered at the site area comprised of a surficial deposit of topsoil over loose, reworked silt and sand or very loose to compact silt and sand and underlain by deposits of loose to dense silt, loose to compact silt and sand, and/or very stiff to hard silt and clay till on dense sand. The proposed residential dwellings will have no basement and be supported on slab-on-grade (raft) foundations and be serviced with municipal water supply, storm drain to a local storm water management facility and a private tertiary wastewater treatment facility.

Considering the soil and groundwater conditions and the preliminary site grading, we have the following comments and recommendations:

1. The observed groundwater levels are at Elevations between 480.1 and 487.7 across the site.
2. Soil bearing pressures at SLS and ULS of 75 kPa and 115 kPa, respectively, are available immediately below the existing topsoil and the loose, reworked, upper zone of the native silt and sand or sand deposits.
3. The observed groundwater levels in MW1, MW2 and MW4, installed in the vicinity of the proposed storm water management facility, are up to about 1.8m higher than the top of the storm water pond level of Elevation 484.9, which is about 0.2 to 6.8m higher than the bottom of pond level of Elevation 479.9. As such, an impermeable liner will be required to separate the storm water collected from the subdivision from the natural groundwater at the site. The impermeable liner will have to resist hydrostatic uplift due to the high groundwater levels in the vicinity.
4. Consideration may be given to raise the site grades in the vicinity of MW2, MW3, MW5 and MW6 to keep the proposed underside of raft foundations (USF) higher than the observed groundwater level to minimize requirements for permanent perimeter and underfloor drainage.
5. The observed groundwater levels in MW3 and MW6, installed beside the proposed park, are at about 0.1 to 0.6m below the finished grades of between Elevations 488.12 and 486.26. USF of structures will be below the observed groundwater levels. Dewatering will be required during excavation and construction.

A summary of the findings is presented in the table attached.

Thomasfield Homes Ltd.

April 4, 2022

Ref. No. G4223-22-3



We trust this report has been completed within our terms of reference, however, should you have any questions or concerns regarding this report, please do not hesitate to contact us.

Yours very truly,

JLP SERVICES INC.

A handwritten signature in black ink, appearing to read 'Alex Lee'.

Alexander Lee, M. Sc. (Eng.), P.Eng.

Senior Geotechnical Engineer

A handwritten signature in black ink, appearing to read 'J. Broad'.

J. Broad, B.A.

General Manager

AL:al

Cc: GM BluePlan Engineering Limited

Marsville North Subdivision (G4223)

Monitoring Well Number	Ground Elevation	Proposed Lots	Elevation/Depth where 75kPa bearing is available	Proposed USF Grade	Proposed Finished Floor Elevation	Observed Highest Groundwater Level		Water Level Depth Below USF	Recommended Construction Method
						Date	water level		
1	485.44	4	484.8±/0.6±	485.26	487.37	03-Nov-20	483.5	1.76	USF above suitable bearing level, engineering fill required.
		5		484.90	487.06	11-Dec-21	481.9	3.00	
2	487.29	6	487.3±/1.0±	484.33	486.67	03-Nov-20	486.6	-2.27	USF in suitable bearing level but below ground water level, dewatering required.
		7		484.49	486.83	11-Dec-21	486.7	-2.21	
3	486.30	13	484.0±/2.3±	485.57	487.91	21-Mar-20	486.1	-0.53	USF above suitable bearing level and below ground water level, engineered fill and dewatering required.
		14		485.75	488.09	20-Dec-21	486.1	-0.35	
4	486.29	29	485.5±/1.3±	484.60	486.92	11-Feb-20	480.1	4.50	USF in suitable bearing level and above ground water level, no engineered fill or dewatering required.
		30		484.88	487.28	11-Dec-21	480.1	4.78	
5	488.00	21	485.7±/2.3±	485.05	487.39	11-Mar-20	487.6	-2.55	USF in suitable bearing level but below ground water level, dewatering required.
		22		484.88	487.22	11-Dec-21	487.7	-2.82	
6	487.47	18	486.9±/0.6±	486.30	488.44	11-Mar-20	487.5	-1.20	USF in suitable bearing level but below ground water level, dewatering required.
		19		486.07	488.41	11-Dec-21	487.5	-1.43	

APPENDIX C:

GEOTECHNICAL INVESTIGATION REPORT

**(V.A. WOOD (GUELPH) INC. DATED JANUARY 2020) AND THE
FOUNDATION RECOMMENDATIONS MARSVILLE SOUTH SUBDIVISION**

(JLP SERVICES INC., DATED APRIL 4, 2022)

April 4, 2022

Reference No. G4216-22-3

Thomasfield Homes Ltd.
295 Southgate Drive
Guelph, Ontario
N1G 3M5

Attention: Mr. Paul Heitshu, General Manager

RE: Foundation Recommendations
Marsville South Subdivision
County Road 3 and 13 Line
Township of East Garafraxa, ON

Dear Mr. Heitshu,

As requested of Angela Kroestsch of GM BluePlan Engineering Limited, JLP Services Inc. (JLP) carried out a review of the preliminary site plans for the Marsville South Subdivision and our comments are as follows.

The preliminary site plans consisted of Existing Conditions Plan, General Plan, Site Grading Plans, Site Servicing Plans, Storm Water Management Pond Grading Plan and Details, and Storm Sewer Drainage Area Plan, Drawings 1 to 22, Project No. 420004, dated March 2020, and were prepared by GM BluePlan Engineering Limited.

The purpose of this review is to determine the potential impact of the soil and groundwater conditions at the site and to provide recommendations pertaining to the design and construction of site grading, site servicing and building foundations for the proposed residential subdivision.

The soil and groundwater conditions at the site are referenced to the following documents:

- Geotechnical Investigation report titled "Geotechnical Investigation, Blackwell Subdivision, Part of Lot 5, Concession 13, Township of East Garafraxa (Marsville), Ontario", Reference No. G4216-20-1, dated February 2020, carried out for the proposed development.
- Summary of Water Levels, Hydraulic Gradients, and Monitoring Well Details for the existing monitoring wells at the site provided by GM BluePlan Engineering Ltd.



- Hydrographs for eight (8) monitoring wells, MW1S, MW2, MW6, MW9, MW13, MW15, MW17S and MW19, for the period between January 2020 and January 2022 provided by GM BluePlan Engineering Ltd.

In general, the soils encountered at the site are comprised of a surficial deposit of topsoil over deposits of loose to dense silt and sand and/or loose to compact sand and underlain by deposits of loose to very dense sandy clayey silt till and/or compact to dense silt and sand till.

It is understood the proposed residential dwellings will have a basement and be serviced with municipal water supply, storm drain to a local storm water management facility and a private tertiary wastewater treatment facility.

Considering the soil and groundwater conditions and the preliminary site grading, we have the following comments and recommendations:

1. The observed groundwater levels are at Elevations between 486.0 and 492.9 across the site.
2. Soil bearing pressures at SLS and ULS of 75 kPa and 115 kPa, respectively, are available immediately below the existing topsoil and the loose upper zone of the native silt and sand or sand deposits.
3. The observed groundwater levels in MW1S and MW2, installed within the proposed storm water management facility, are at about 0.1m higher than the top of the storm water pond level, which is about 2.8 to 3.1m higher than the bottom of pond level. As such, an impermeable liner will be required to separate the storm water collected from the subdivision from the natural groundwater at the site. The impermeable liner will have to resist hydrostatic uplift due to the high groundwater levels in the vicinity.
4. Consideration may be given to raise the site grades in the vicinity of MW6, MW9 and MW17S to keep the proposed underside of footings (USF) higher than the observed groundwater level to minimize requirements for permanent perimeter and underfloor drainage.
5. The observed groundwater levels in MW19, installed in the proposed park, are at about 0.5 to 0.6m higher than the finished grades. USF of structures will be below the observed groundwater levels. Dewatering will be required during excavation and construction.

A summary of the findings is presented in the table attached.

Thomasfield Homes Ltd.

April 4, 2022

Ref. No. G4216-22-3



Geotechnical & Environmental Consultants

We trust this report has been completed within our terms of reference, however, should you have any questions or concerns regarding this report, please do not hesitate to contact us.

Yours very truly,

JLP SERVICES INC.

Alexander Lee, M. Sc. (Eng.), P.Eng.
Senior Geotechnical Engineer

J. Broad, B.A.
General Manager

AL:al

Cc: GM BluePlan Engineering Limited

Marsville South Subdivision (G4216)

Monitoring Well Number	Ground Elevation	Proposed Lots	Elevation/Depth where 75kPa soil bearing at SLS is available	Proposed USF Grade	Proposed Finished Floor Elevation	Observed Highest Groundwater Level		Water Level Depth Below USF	Recommended Construction Method
						Date	Water Level		
1S	487.60	SWM Pond	487.0±/0.6±	487.40	Top	22-Mar-20	487.50	-0.10	Water Level is higher than pond bottom elevation
				484.40	Bottom	12-Dec-21	487.50	-3.10	
2	487.40	SWM Pond	486.5±/0.9±	487.40	Top	22-Mar-21	487.50	-0.10	Water Level is higher than pond bottom elevation
				484.70	Bottom	22-Dec-21	487.50	-2.80	
6	489.20	44	488.3±/0.9±	488.16	490.95	22-Mar-21	489.00	-0.84	USF at suitable bearing level but below groundwater level, dewatering will be required.
		45		488.30	491.09	22-Dec-21	489.00	-0.70	
9	490.00	55	489.1±/0.9±	489.35	492.14	22-Mar-21	489.80	-0.45	USF slightly above suitable bearing level, subexcavation or engineered fill required. USF below groundwater level, dewatering will be required.
		56		489.19	491.98	22-Dec-21	489.60	-0.41	
13	488.20	20	487.7±/0.5±	489.98	492.77	22-Mar-21	488.20	1.78	USF above suitable bearing level, engineered fill required.
		21		490.07	492.86	22-Dec-21	488.10	1.97	
15	492.20	10	491.3±/0.9±	489.40	492.19	22-Mar-21	486.00	3.40	USF at suitable bearing level and above groundwater level, no engineering fill or dewatering required.
		11		489.45	492.24	22-Dec-21	486.00	3.45	
17S	493.6	1	492.7±/0.9±	493.14	495.93	22-Mar-21	492.80	0.34	USF above suitable bearing level, subexcavation or engineered fill required. USF below groundwater level, dewatering will be required.
		2		492.42	495.21	22-Dec-21	492.90	-0.48	
19	490.7	Park	489.8±/0.9±	488.40	490.00	22-Mar-21	490.50	-2.10	Finished grades slightly above groundwater level. USF for structures will be at suitable bearing level. Dewatering required for excavation during construction.
				489.40	491.00	22-Nov-21	490.60	-1.20	

APPENDIX D:
**GROUNDWATER LEVEL MONITORING REPORT (GEI CONSULTANTS
CANADA LTD., DATED AUGUST 2024)**

August 7, 2024
Project No. 2401738

ATTN: Carley Dixon
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

**Re: Draft Plan of Subdivision Application S1-14 and Zoning By-Law Amendment Z5-14
Groundwater Level Monitoring Report
Marsville North Subdivision, Township of East Garafraxa**

Dear Ms. Dixon,

In response to the comments received on September 30, 2022, which requested groundwater level monitoring data be provided in the form of hydrographs, we offer the following to satisfy this request.

Background

GEI Consultants Canada Ltd. (formerly GM BluePlan Engineering Limited) was retained by Thomasfield Homes to provide hydrogeological services in regards to the proposed development of lands into a residential subdivision (referred to as the Marsville North Subdivision). The proposed subdivision is anticipated to consist of 30 single-detached units, park space, a stormwater management block, and associated roadways.

The subject Site is located within the Township of East Garafraxa with the civic address 191384 13th Line Road and is further described as Part of lot 6, Concession 13 of the Geographic Township of East Garafraxa. The Site occupies an area of approximately 9.73 hectares (approximately 24 acres) and is currently undeveloped agricultural lands. The reader is referred to other reports prepared by GM BluePlan and other consultants for further details regarding existing site conditions and the hydrogeological characterization of the Site.

This letter provides groundwater level monitoring data as requested by reviewers R.J. Burnside & Associates Limited (2022) in Comment #7 of their letter dated September 30, 2022:

An updated hydrogeology tech memo should be submitted documenting the groundwater hydrographs measured between Feb. 2020 and Dec. 2021. The levels noted in the table included in the JLP Consultants letter dated April 4, 2022 have not been documented and reviewed.

Groundwater Monitoring

On January 10, 2020, JLP Services Inc (formerly VA Wood Inc.) advanced 6 boreholes as part of the Geotechnical Investigation to support the development of the proposed residential subdivision. Each borehole was equipped with a 2" Ø monitoring well (MW-01 to MW-06). The locations of these monitoring wells and the associated borehole logs are provided in Appendix A.

For the purposes of supporting the development and approvals process, GEI Consultants conducted continuous groundwater level monitoring at these JLP monitoring wells. On February 11, 2020, GEI visited the Site to collect water levels and install dedicated dataloggers manufactured by Solinst Canada in each of the six (6) monitoring wells. The dataloggers are described as self-contained pressure transducers which have been set to record the pressure of the water column above the unit at a frequency of once every four hours. The dataloggers were set to begin recording on the day of installation (i.e., February 11, 2020). The data was collected through to May 30th, 2024. It is noted the data record for MW-01 does not extend past November 11, 2023, which is the second most recent monitoring event. This is because on the April 9, 2024 visit the data for logger MW-01 was irretrievable.

The groundwater level data has been presented in the form of hydrographs enclosed within Appendix B.

Discussion

From the data collected, the following observations have been made regarding the trends in the groundwater level:

- During the late winter months and into the spring, the groundwater level at monitoring well MW-03 was observed to be at ground surface. This is not considered to be indicative of groundwater discharge but rather due the presence of water (e.g., precipitation, snowmelt, ponding in microtopography) in excess of the capacity of the soil to permit infiltration, resulting in groundwater levels rising to ground surface. A similar phenomenon is observed at MW-06, though the high groundwater levels are less persistent at that location compared to MW-03.
- Monitoring wells MW-01 and MW-04 exhibited considerably lower groundwater levels than the other monitoring wells on site. This is inferred to be due to the proximity of the bottom of these wells to the underlying sand aquifer, which provides drainage to the overlying silt aquitard. This is evidence that the Site exhibits recharge (rather than discharge) conditions.
- The contrast in groundwater levels between the two sets of wells described above (i.e., MW-03 and MW-06 versus MW-01 and MW-04) indicate that the predominantly-silt soils of the shallow overburden are of relatively low hydraulic conductivity compared to the underlying sand and allow the development of a perched water table.
- The groundwater was generally observed to be at higher elevations along the south property boundary (i.e. MW-05 and MW-06) and slightly lower at the north property boundary (i.e. MW-02 and MW-03).
- Throughout the monitoring period, the maximum groundwater level observed was approximately 487.7 metres above sea level (masl); observed at monitoring well MW-05 located near the midpoint of the southern boundary of the Site.

- In terms of seasonal trends from year-to-year, the groundwater level was generally highest across the Site during the winter and spring months, and gradually declined during the summer months. The groundwater level in the aquitard was observed to fluctuate 3.5 to 4.5 m vertically between high and low periods.

Closing

We trust this letter provides the information that has been requested by the reviewer. Should further information be needed, please do not hesitate to contact the undersigned.

Sincerely,

GEI CONSULTANTS CANADA LTD.



Matthew Long, M.Eng., P.Eng.
Senior Project Engineer



Abdirahman Faarah, P.Geo.
Project Geoscientist

AF/af

B:\Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Hydrogeology\Memo - Groundwater Level Monitoring Letter\4201738 - Groundwater Monitoring Letter.docx

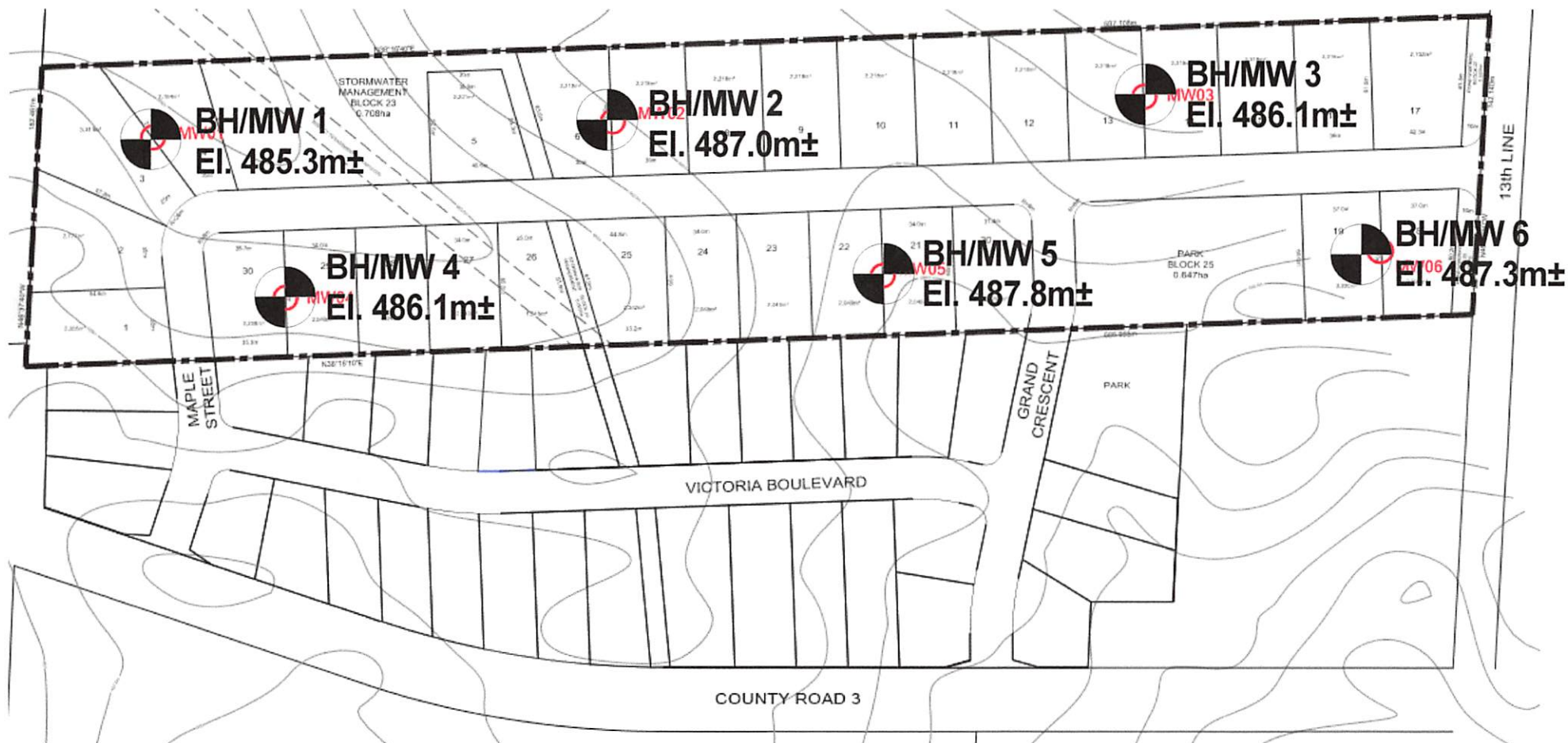
Appendices

- Appendix A JLP Services Monitoring Well Plan Figure and Borehole Logs
Appendix B Hydrographs (MW-01 to MW-06)

REFERENCES

R.J. Burnside & Associates Limited. 2022. Letter re: Marsville North, Owner Thomasfield Homes Limited, Application for Draft Plan of Subdivision 22T-141585 & Zoning By-Law Amendment, 2nd Submission, Project No.: MSO020868.0000. Dated September 30, 2022. Addressed to Sue Stone, Township of East Garafraxa.

Appendix A JLP Services Monitoring Well Plan Figure and Borehole Logs



Notes:

1. Borehole Ground Elevations provided by GM BluePlan Engineering Ltd.
2. The stratigraphy referred to in the report is based on the data from the boreholes supplemented by geological data where available. The actual stratigraphy between and beyond the boreholes may vary. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.



V.A. WOOD (GUELPH) INC.
Consulting Geotechnical Engineers

405 York Road, Guelph, Ontario N1E 3H3
Ph. (519) 763-3101 Fax. (519) 763-5912

Borehole/Monitoring Well Location Plan
Marsville-Thunderbird Subdivision
Part of Lot 5, Concession 3
Township of East Garafraxa (Marsville), ON

Scale: NTS

Ref. No. G4223-20-2

Date: February 6, 2020

Enclosure 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 1

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 2

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	485.3						20 40 60 80	5 10 15 20 25	
0.5	500mm Topsoil	484.8								
	brown, loose to compact SILT AND SAND trace gravel, wet				1	SS	6			
	saturated @ 4.6m				2	SS	4			
3.0		482.3			3	SS	19			
	grey, hard SILT AND CLAY TILL trace sand, saturated				4	SS	42			
6.1		479.2			5	SS	30			
6.6	brown, dense SAND some silt, saturated	478.7			6	SS	35			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 2

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 3

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	487.0		<p>Protective Well Casing</p> <p>51mm OD Riser Pipe</p> <p>W.L. @ El. 485.9m± (12-FEB-20)</p> <p>Bentonite</p> <p>Filter Sand</p> <p>51mm OD Screen</p>						
0.3	300mm Topsoil	486.7			1	SS	5			
	brown, loose to compact SILT AND SAND trace gravel, wet				2	SS	7			
					3	SS	8			
					4	SS	16			
4.6		482.4			5	SS	16			
	brown, compact SILT AND SAND TILL trace clay, occasional cobbles, moist to wet				6	SS	50			
6.6		480.4								
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 3

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 4

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE				SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE		
0.0	Ground Surface	486.1							
0.3	300mm Topsoil	485.8							
1.2	brown, loose SILT AND SAND (Re-worked) trace organics, wet	484.9			1	SS	6		
	brown, very loose to compact SILT AND SAND trace gravel, wet to saturated				2	SS	3		
					3	SS	11		
					4	SS	10		
4.9		481.2			5	SS	20		
	brown to grey, compact SILT AND SAND TILL trace clay, saturated								
6.6		479.5			6	SS	15		
	End of Borehole								

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 4

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 5

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	486.1								
0.3	300mm Topsoil	485.8								
1.2	brown, compact SILT AND SAND (Re-worked) trace organic, trace gravel, moist	484.9			1	SS	19			
	brown, compact SILT AND SAND trace gravel, wet				2	SS	14			
3.0		483.1			3	SS	15			
	brown, very stiff SILT AND CLAY TILL wet				4	SS	23			
6.1		480.0			5	SS	26			
6.6	brown, dense SAND some silt, saturated	479.5			6	SS	30			
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

MONITORING WELL No: 5

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 6

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

[illegible]

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 6

CLIENT: Thomasfield Homes Ltd.

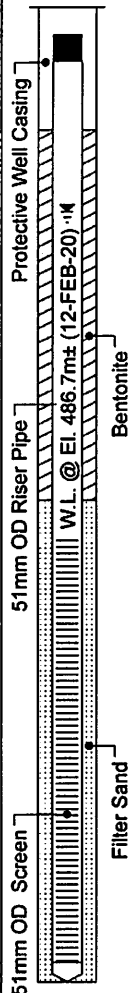
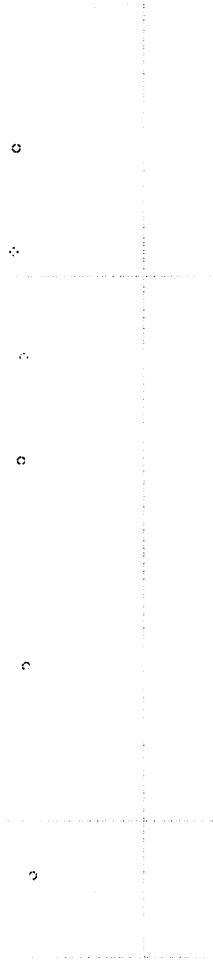
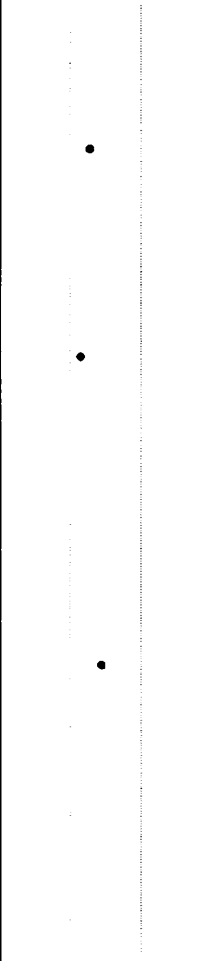




PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 7

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE										
0.0	Ground Surface	487.3															
0.3	300mm Topsoil	487.0			1	SS	8										
	brown, loose to compact SILT AND SAND trace gravel, trace clay, wet saturated @ 3.0m				2	SS	7										
					3	SS	11										
					4	SS	10										
					5	SS	12										
6.1		481.2			6	SS	15										
6.6	brown, compact SILT AND SAND TILL trace clay, wet	480.7															
	End of Borehole																

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

Appendix B Hydrographs (MW-01 to MW-06)

Chart 1: Hydrograph of MW-01

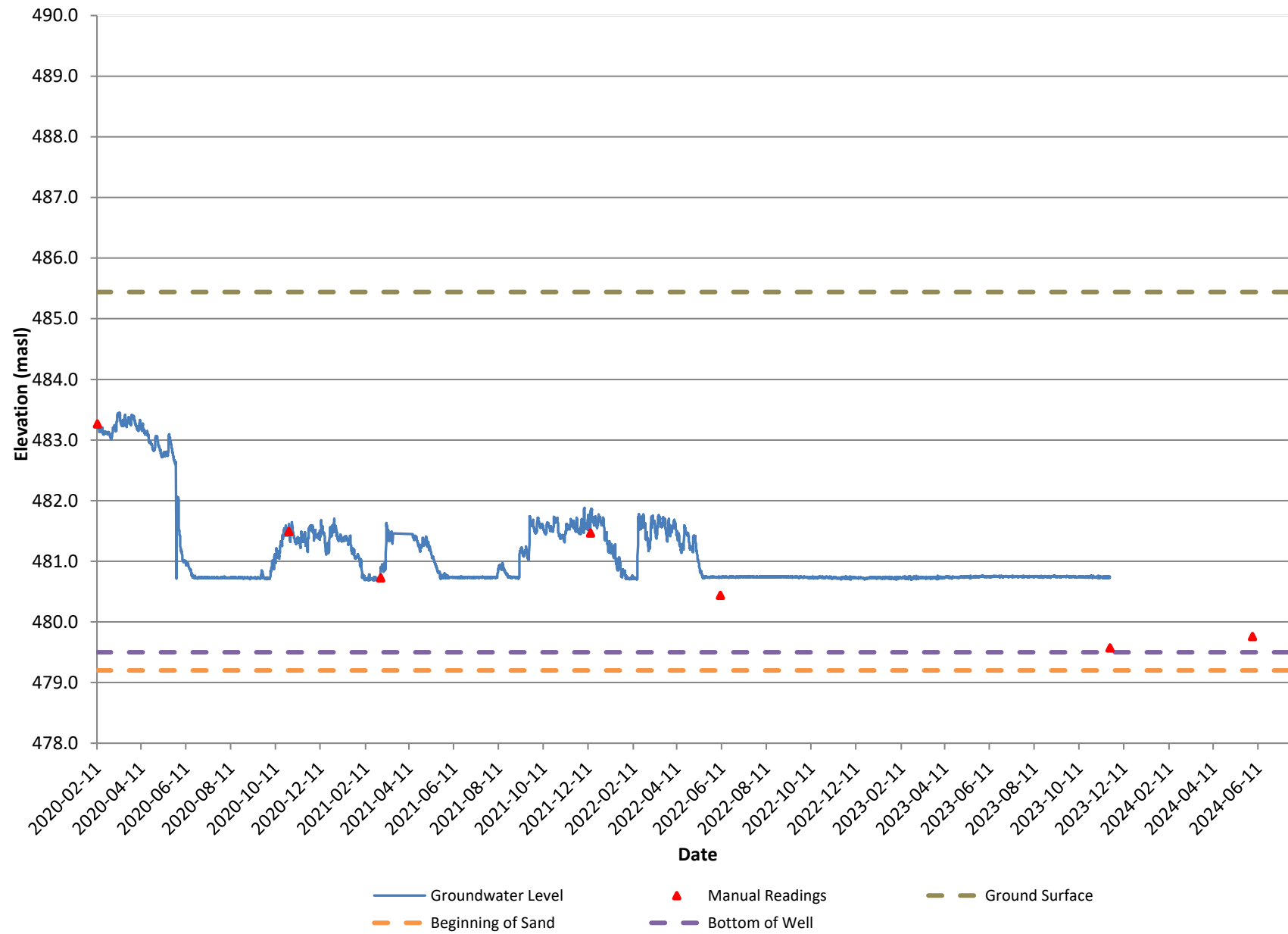
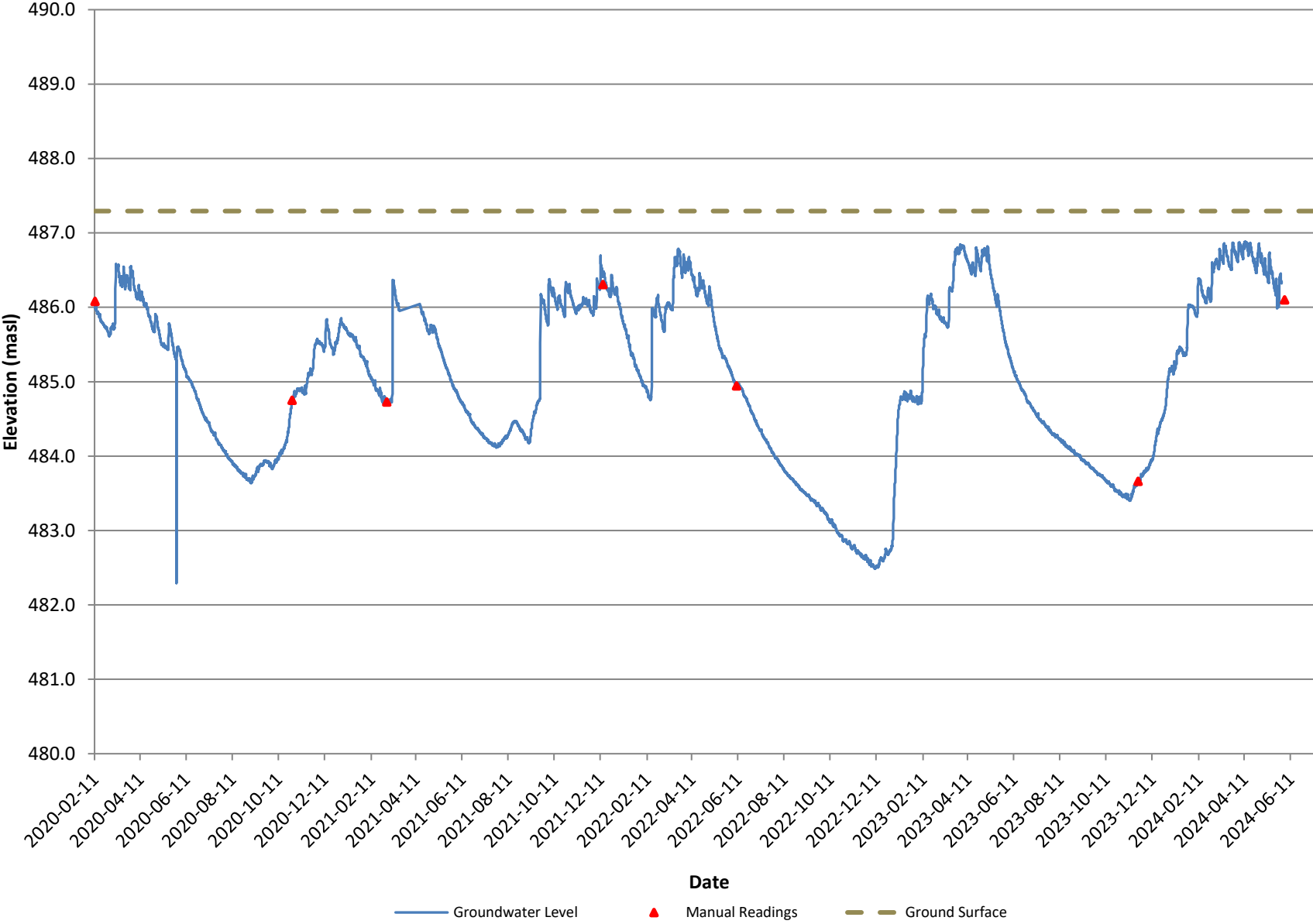


Chart 2: Hydrograph of MW-02



Hydrograph: MW-03

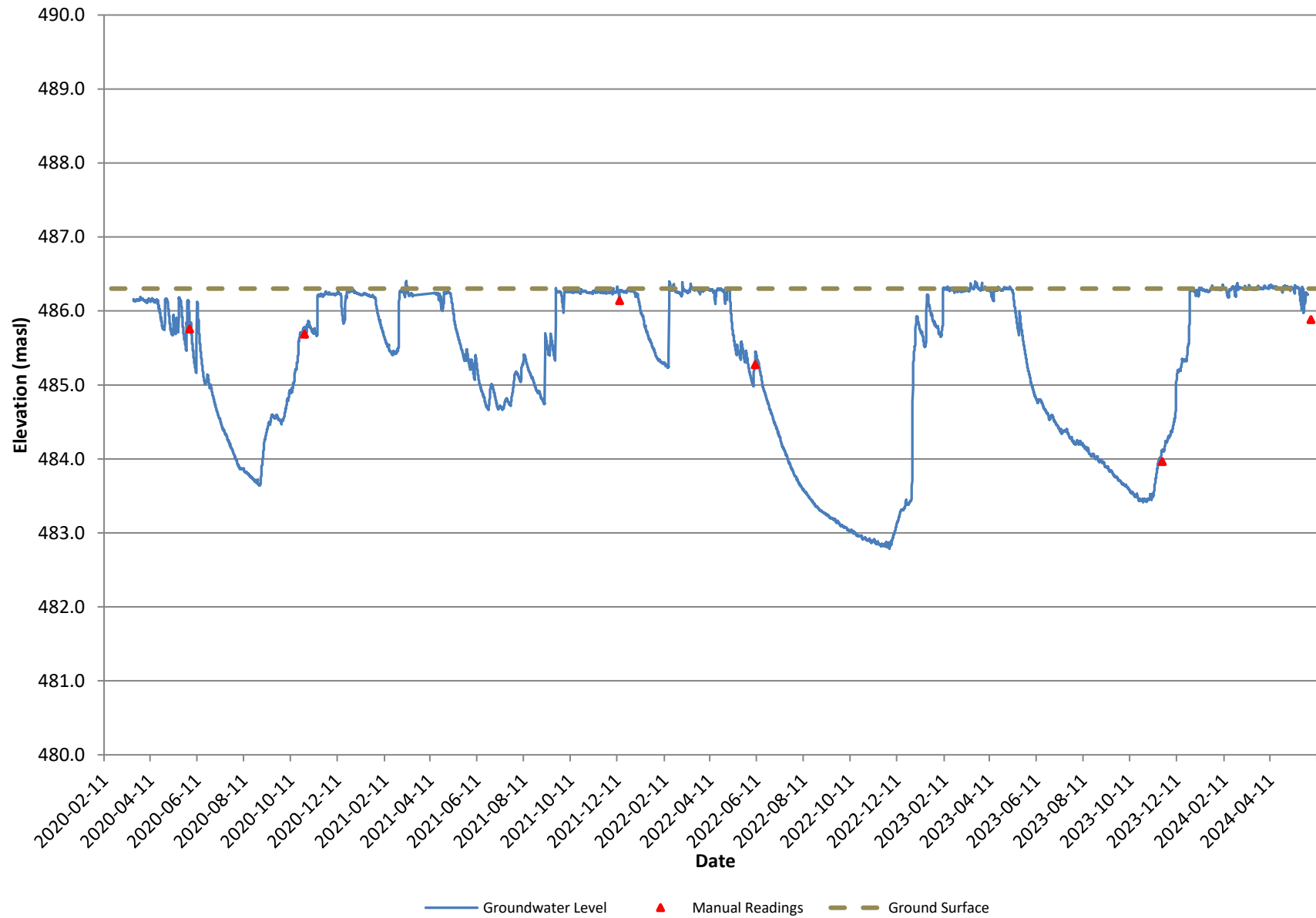


Chart 4: Hydrograph of MW-04

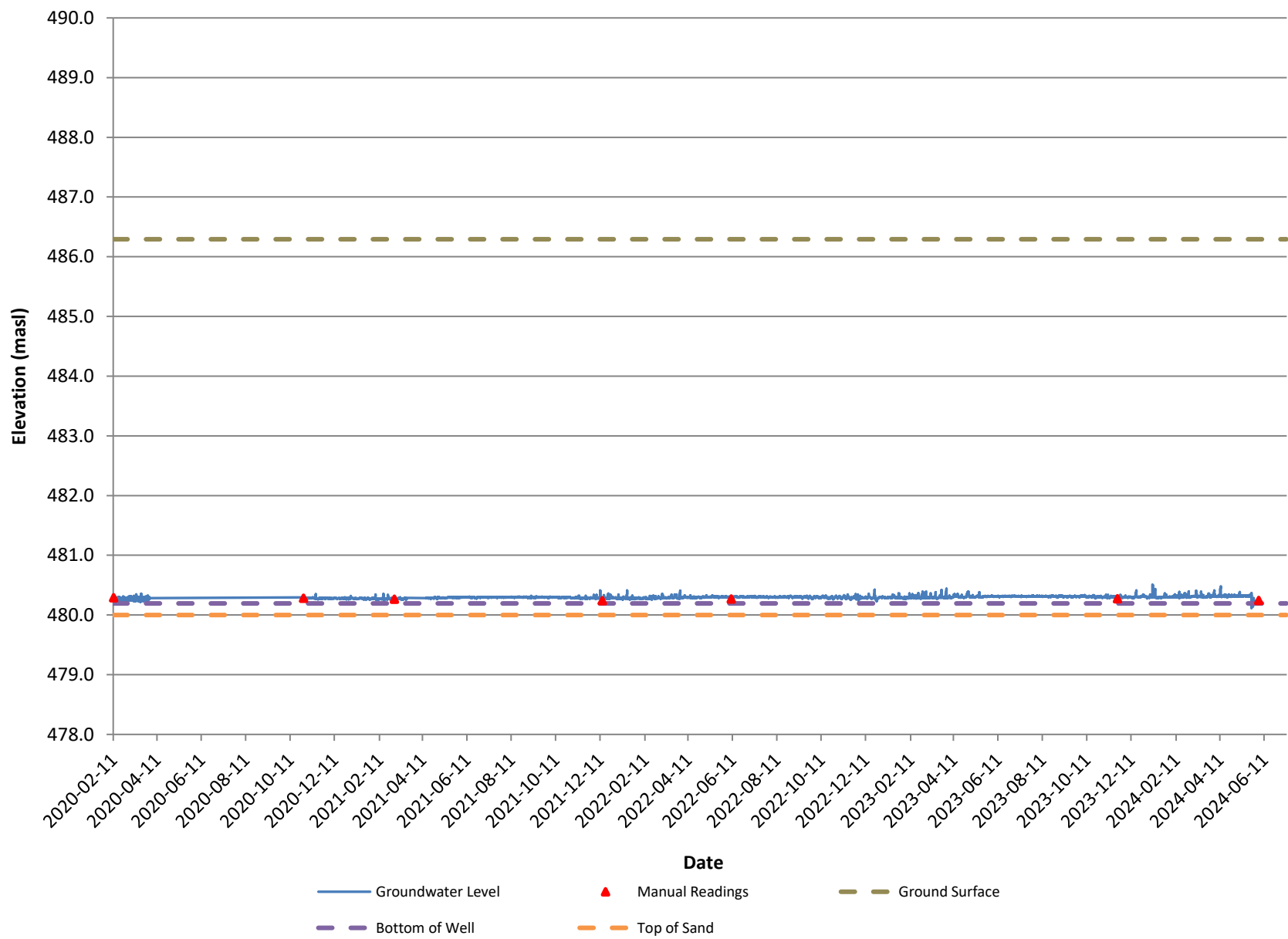


Chart 5: Hydrograph of MW-05

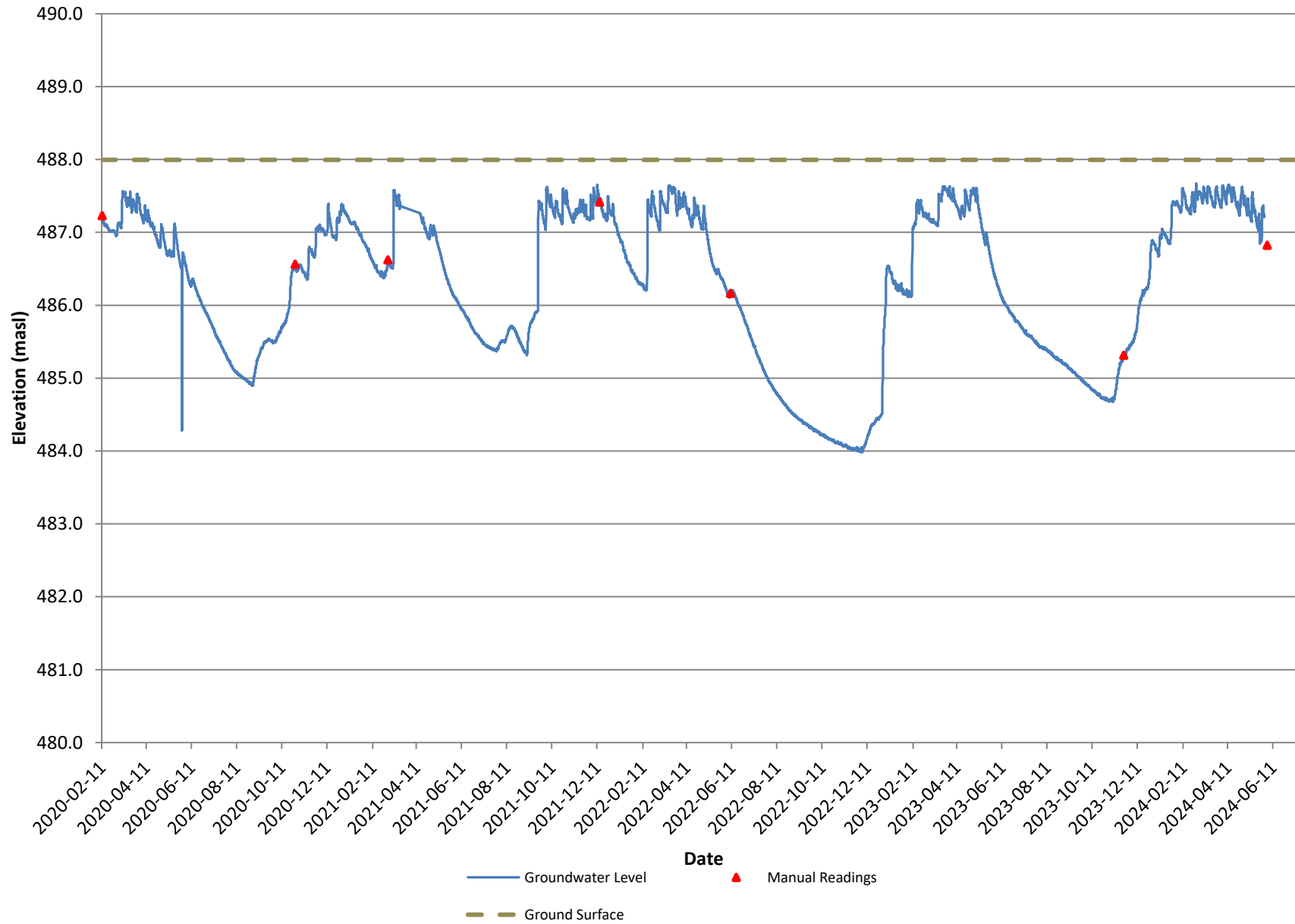
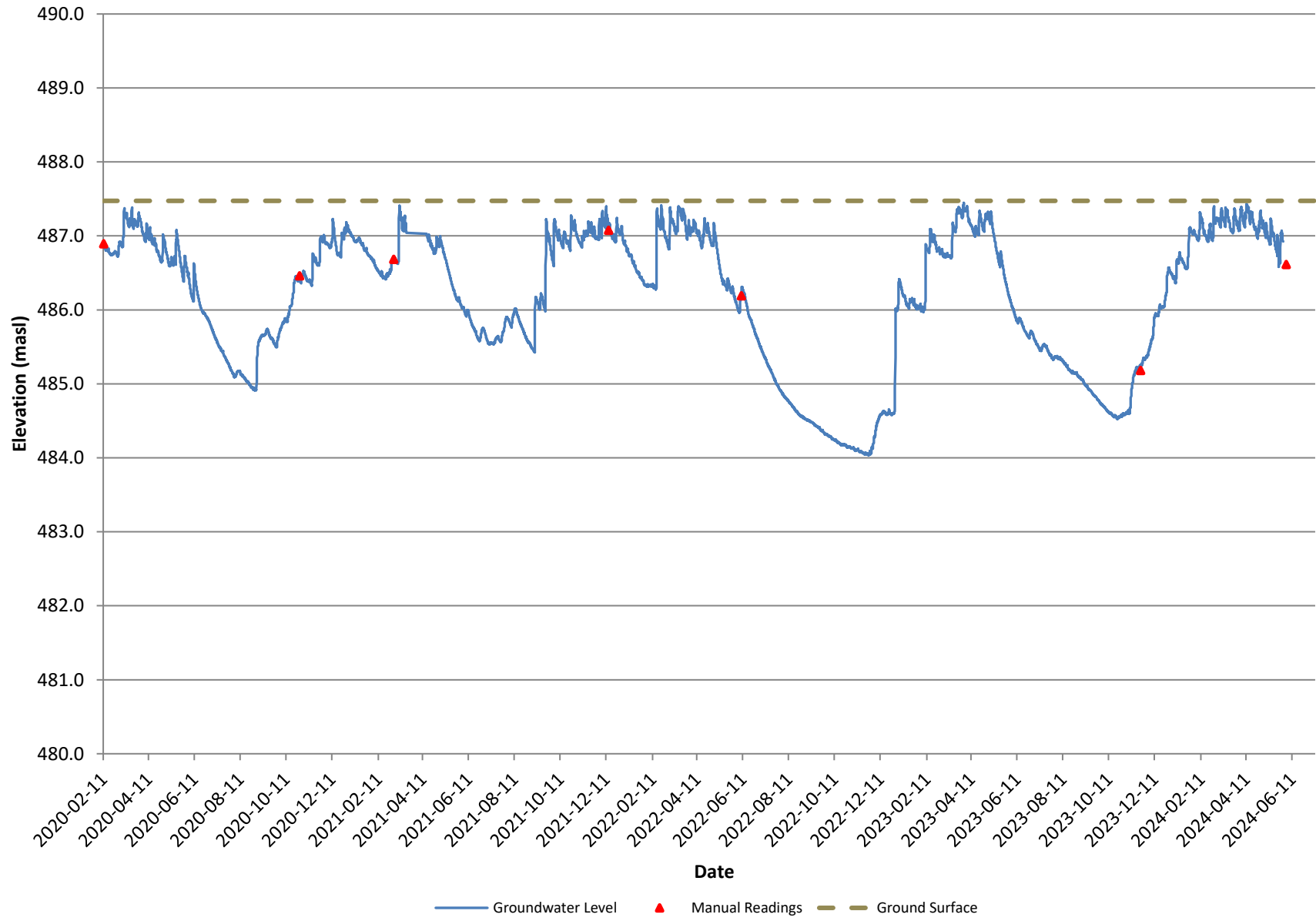


Chart 6: Hydrograph of MW-06



MARSVILLE SOUTH HYDROGRAPHS

Chart 1: MW01-S Hydrograph

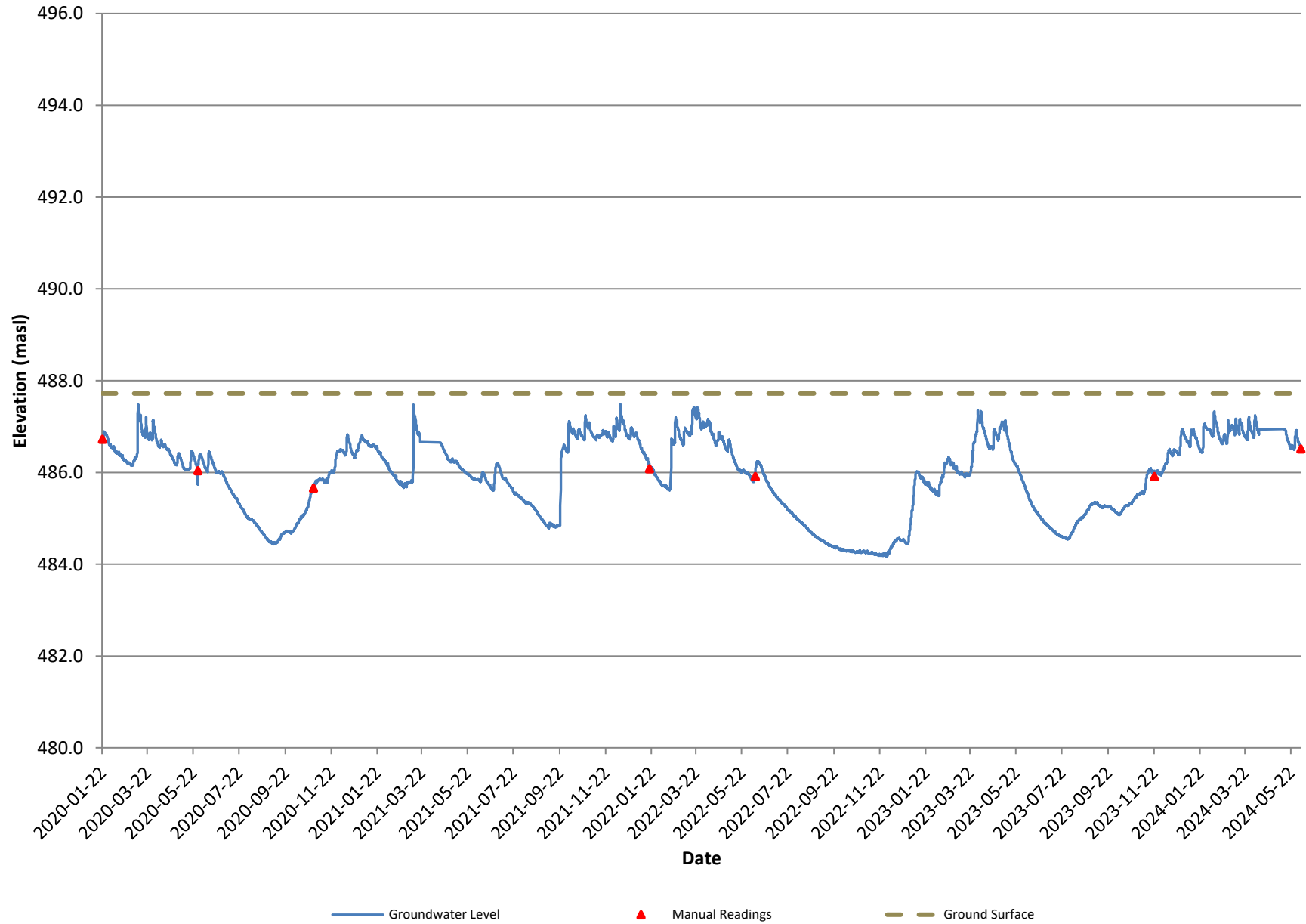


Chart 2: MW02 Hydrograph

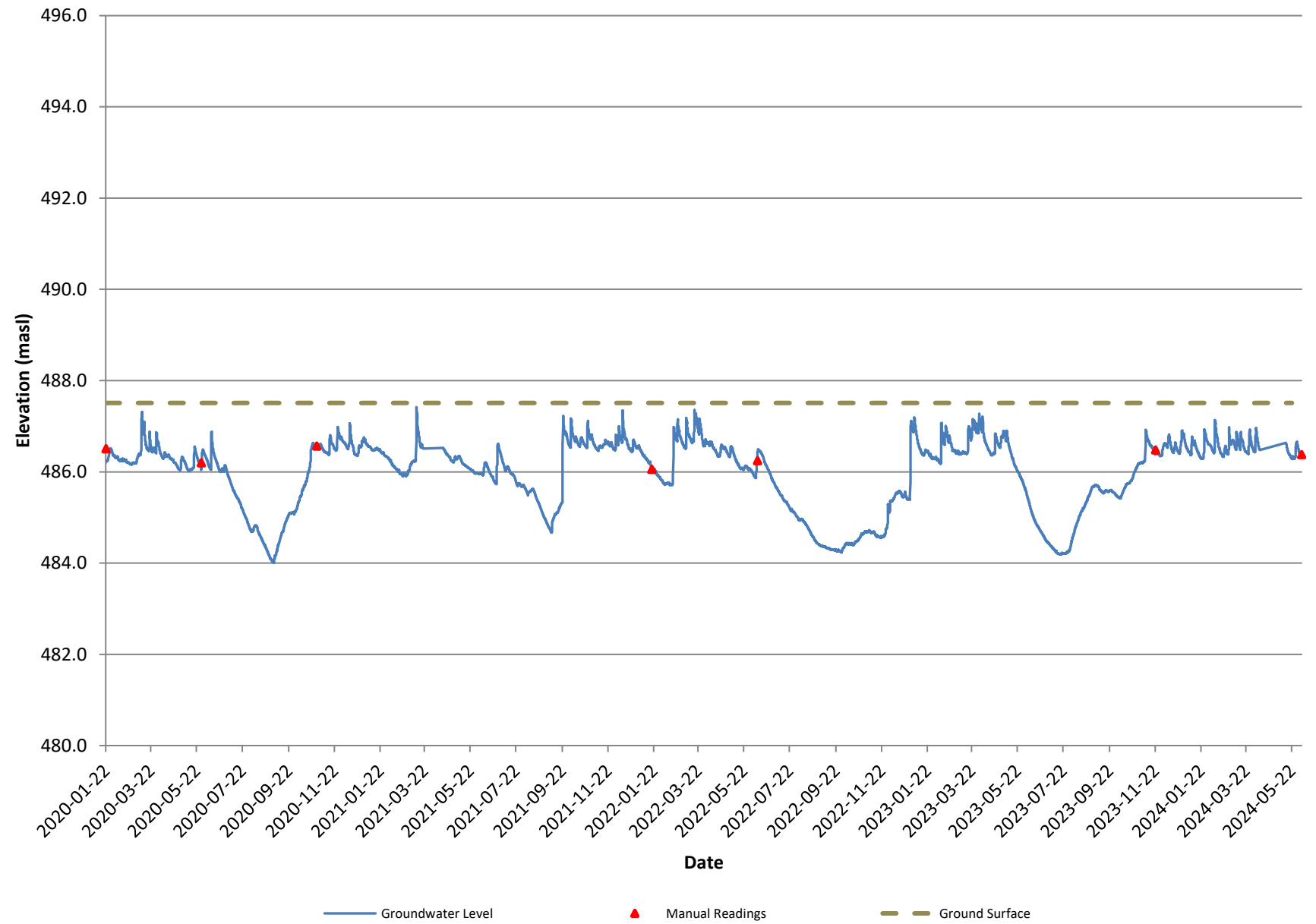


Chart 3: MW06 Hydrograph

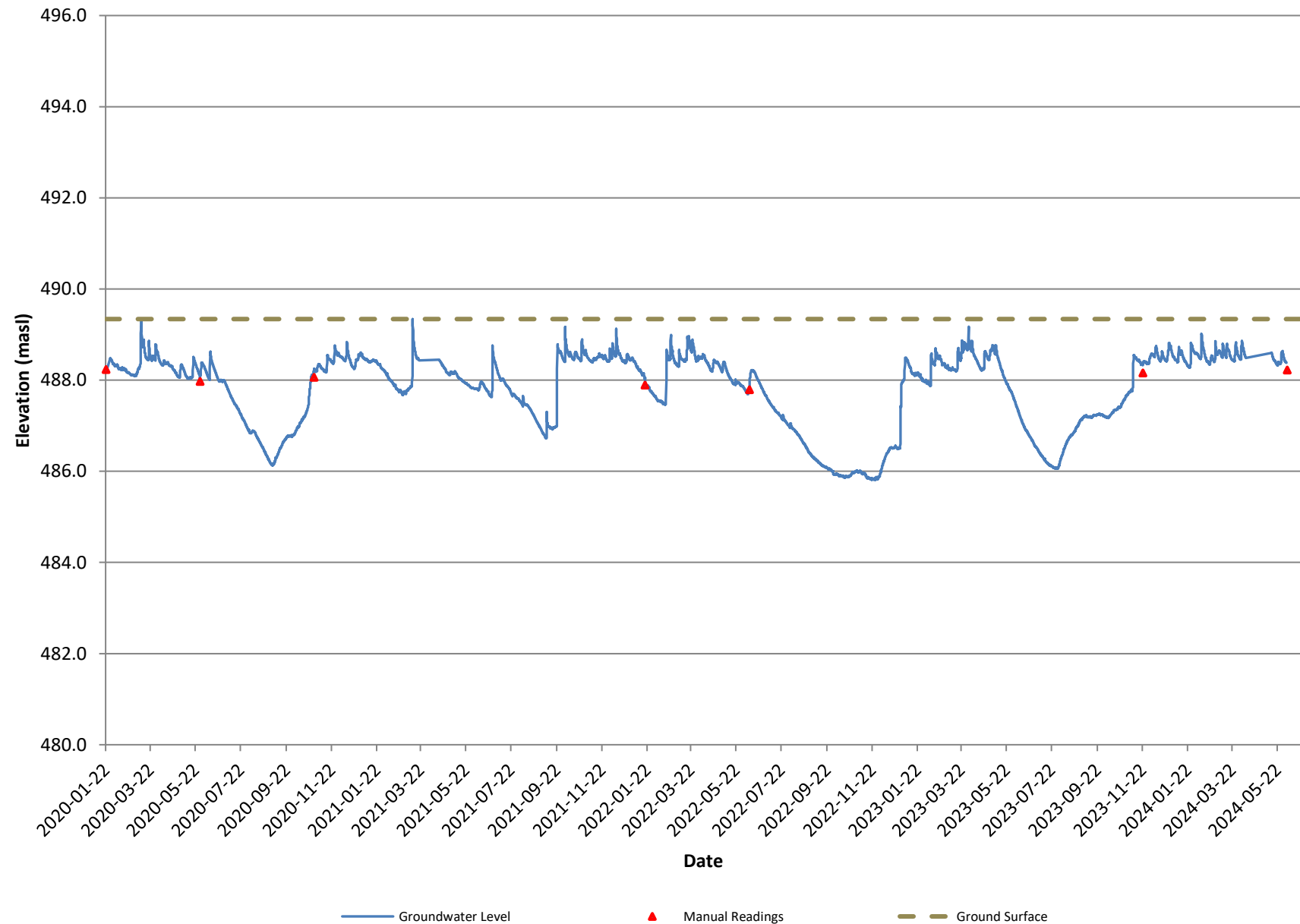


Chart 4: MW09 Hydrograph

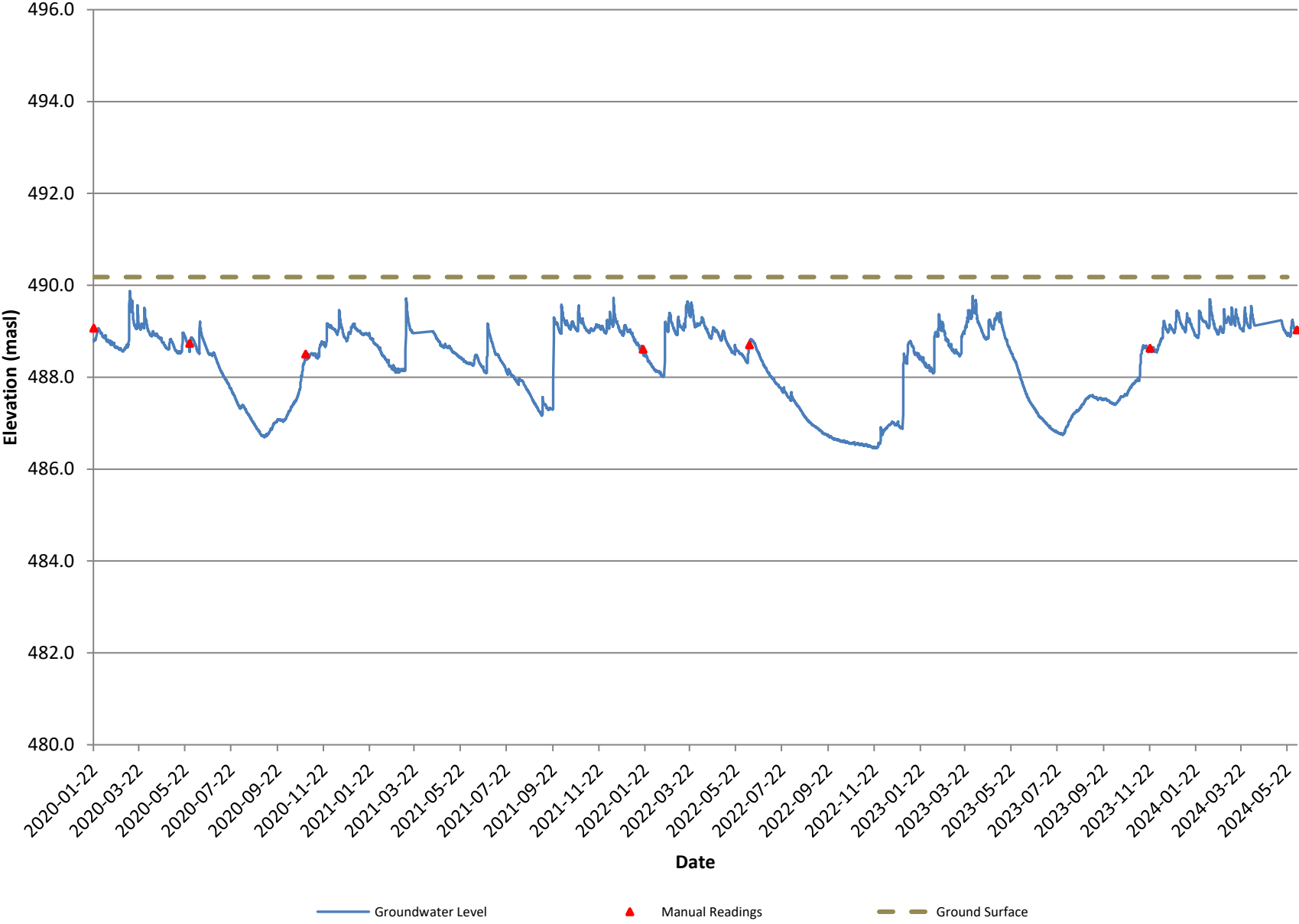


Chart 5: MW13 Hydrograph

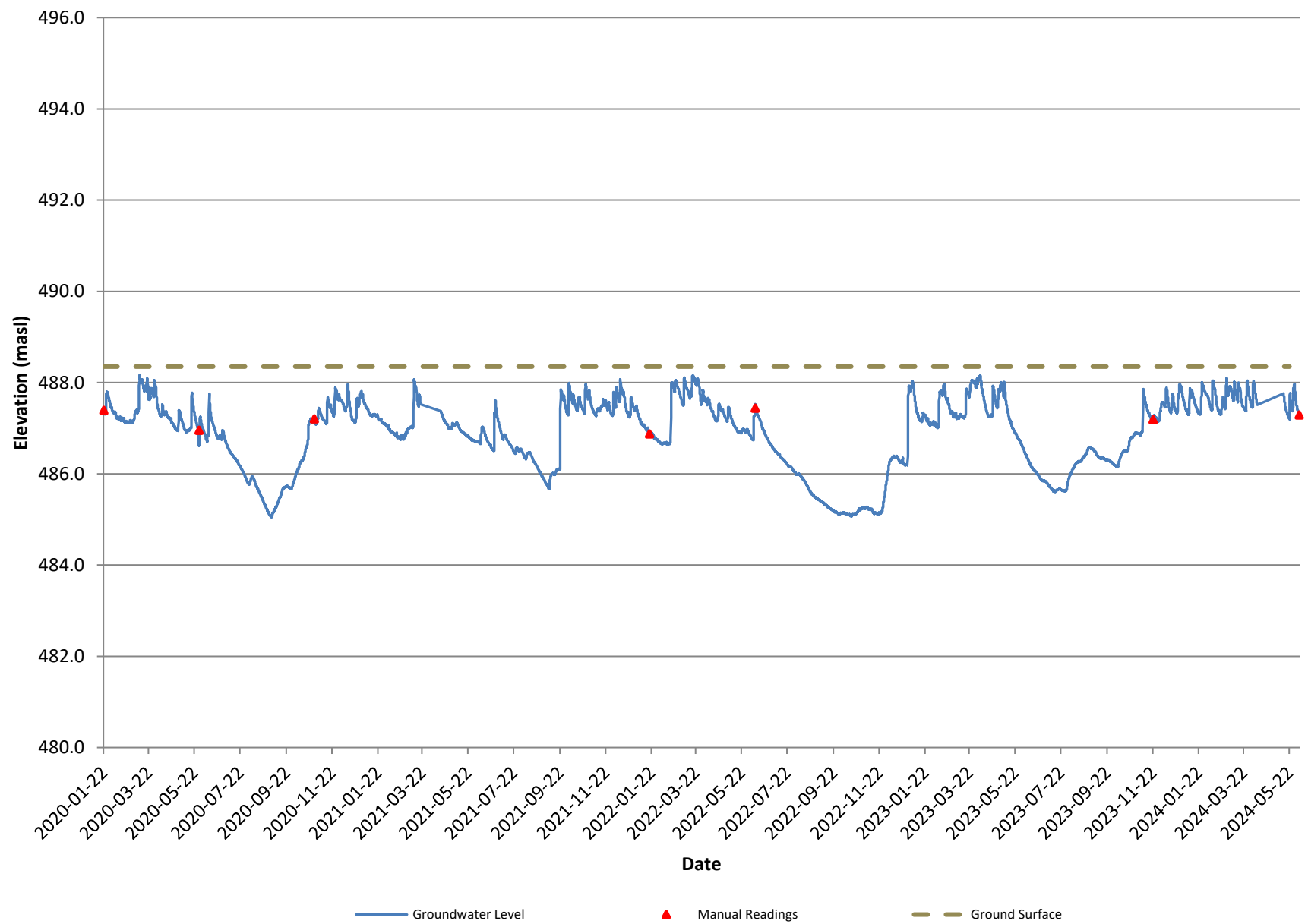


Chart 6: MW15 Hydrograph

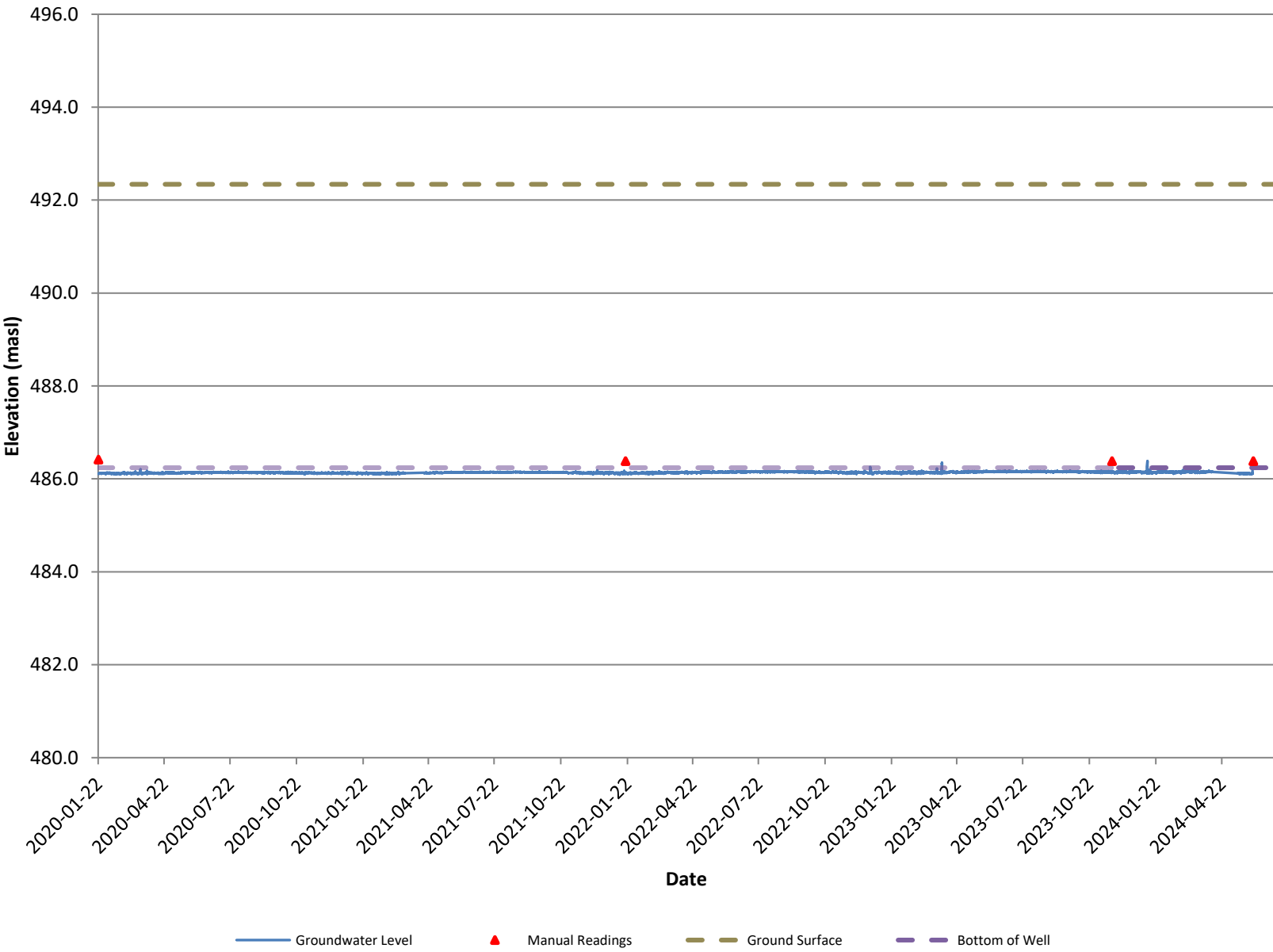


Chart 7: MW17-S Hydrograph

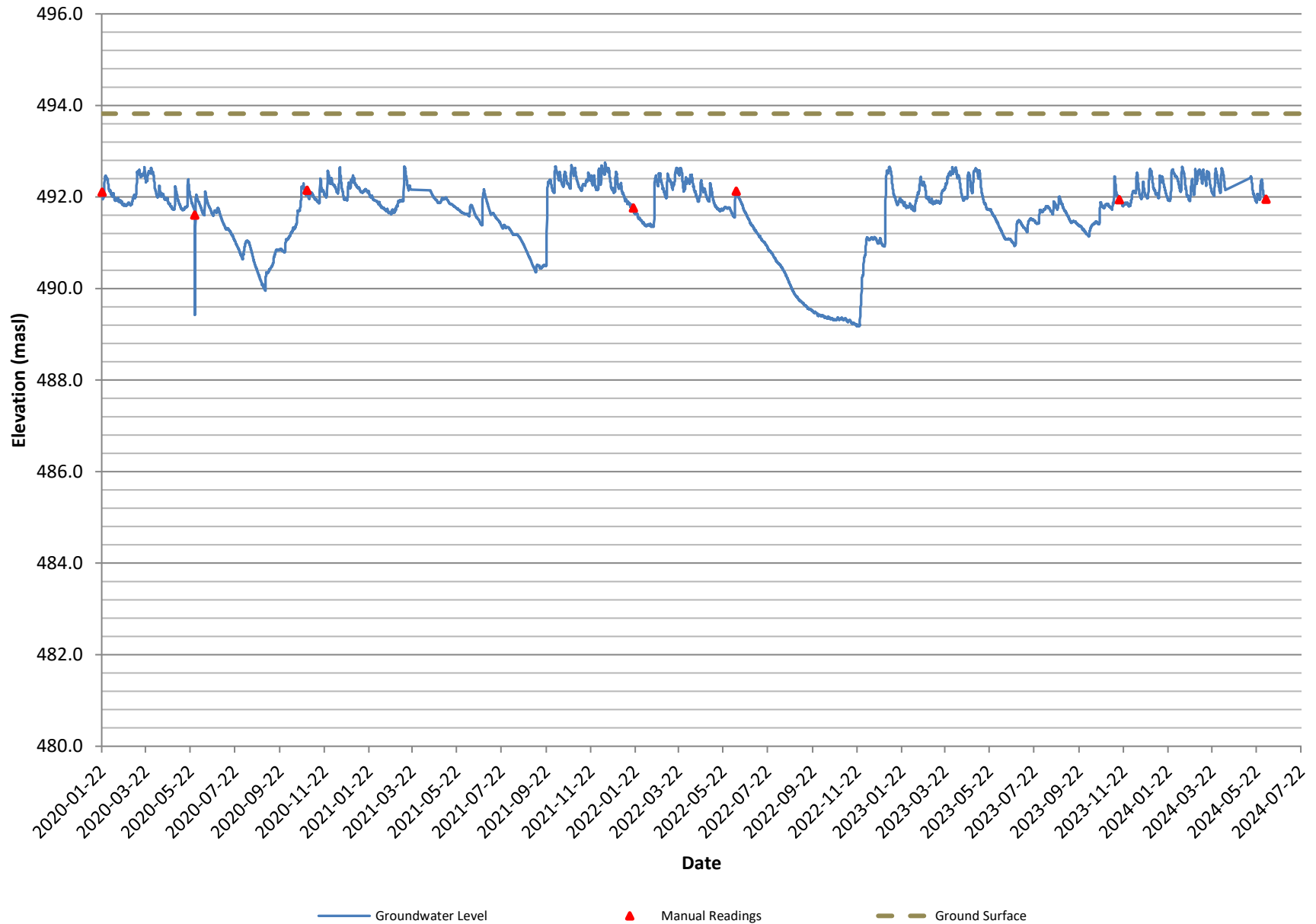
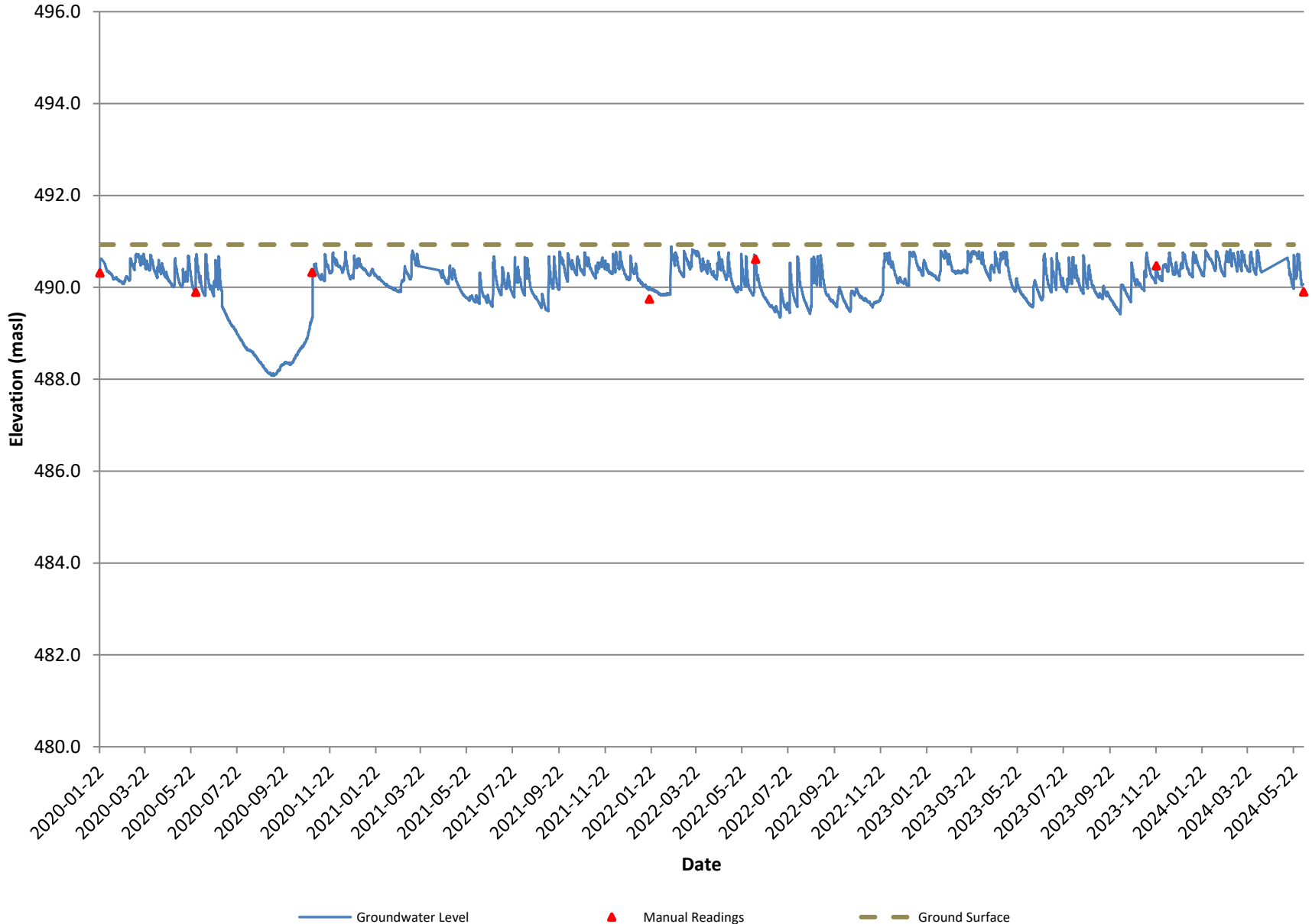


Chart 8: MW19 Hydrograph



APPENDIX E:
THUNDERBIRD DRAINAGE WORKS

(UDERSTADT BURNSIDE LTD., DATED APRIL 28, 1981)

AND

THE BROUWER DRAINAGE WORKS

(E.H UDERSTADT INC. DATED AUGUST 10, 1979)



Uderstadt Burnside Ltd.

Municipal Drainage Consultants

162 Broadway, Orangeville, Ont. L9W 1K3 (519) 941-1161

8
E.H.U.

Dated: 1980 05 14

Revised: 1981 04 28

File No: D-GA-E-108

The Reeve and Council,
Township of East Garafraxa.

Members of Council:

THUNDERBIRD DRAINAGE WORKS

Under the provisions of the Drainage Act 1975 Section 4 and in accordance with our appointment, pursuant to a petition signed by owners in an area described as requiring drainage, we have made an examination and survey of the area and submit herewith report, plan, profiles, specifications and assessments for the proposed work.

We have held an on-site meeting, have determined the area requiring drainage as Pt. Lots 5, 6, 7 and 8 Con. 13 including Thunderbird Estates Subdivision, Registered Plan No. 107 and found that the petition complied with Section 4, ss 1a and b.

The drainage area comprises approximately 162 ha.

A preliminary report was submitted under date of 1980 01 25 and was considered on February 20, 1980. The proposed storm sewer system, designed on a 5 year storm frequency, was rejected due to cost.

A system complying with Section 14, based on presently accepted practice for farm drainage, in conjunction with overflow runways, was basically agreed upon. Due to the relatively high watertable within the subdivision, it was requested that the drains, if possible, be installed at or below basement elevations.

The petitioners downstream from the subdivision had also requested a tile drain through their farm lands.

Our report dated 1980 05 14 provided for an open drain in Lot 9 Con. 12, a main drain tile (A Drain) from sizes 530 to 300 mm diameter up to the County Road and for tile branches B to J.

This said report was considered on June 23, 1980 at a meeting called for that purpose. After a lengthy discussion, several names were withdrawn from the petition, but not enough to render the petition invalid. With 53.5% of the owners remaining within the area described as requiring drainage, the petition still complied with Section 4 ss. 1a.

Under date of 1980 08 05 the said report was referred back to us for revision.

After discussing the matter with several downstream owners a new proposal was mailed out in letter form, inviting comments. Prior to preparing this revised report further interviews were held with individual owners, the watershed was re-checked and corrected where necessary.

The proposal under this revised report, again in compliance with Section 14, is as follows:

From the outlet in Lot NE $\frac{1}{2}$ 9 Con. 12 (J. Schnitzler) to the line between Lots 8 and 7 Con. 13 (Mitchell-VanderAvoird), the existing channel will remain.

In order to provide the depth for the tile outlet, a new lane culvert and deepening of the existing drain will be necessary in Lot 7 (Vander Avoird).

The owner of Lot SW $\frac{1}{2}$ 6 and Pt. of Lot SW $\frac{1}{2}$ 7 (G. Woods) has requested a tile be installed through his land instead of an open drain. The main tile (A Drain) will be carried upstream to the County Road as in the previous report.

The tile branches in the subdivision have been modified, either eliminated or shortened, as they have been supported by the petitioners.

Due to the fact that the tile drains along the streets cannot be installed below the bottom of the existing side ditches without considerable difficulties, it was determined that the shoulders between pavement and side ditch were the next best location, with catch basins offset into the ditch banks.

There would be no need to relocate hydro poles, some of which are located in the side ditches or to remove and re-install driveway culverts, also interruption of house services would be kept to a minimum and the side ditches would be left undisturbed wherever possible.

The elevation of the tile branches has been set at approximate basement elevations and at a depth of about 0.75 metres below the average ditch bottom. The house services are said to be installed at a minimum depth of 1.2 m below the ditch bottom when constructed. Their actual elevation shall however be determined by the contractor prior to construction.

Ontario Hydro has been informed and on notification will safeguard their poles, if necessary.

Where surface inlets have been provided, basement drain connections are not recommended and are not authorized under this report. This is due to the fact that this system is primarily designed to assist in carrying off surface water during the wet season and to lower the ground watertable during other times.

Where the surface slope on farm land is such that erosion occurs, permanently grassed overflow runways are recommended.

The plan shows the location of the work and the lands affected by it; the profile and specifications show the dimensions, grades, disposal of material and other particulars of the work.

In order to comply with Section 14 and not to impede the flow of water within the overflow runway, it will be necessary to maintain adequate culverts under all streets, farm lanes, driveways, etc. An appropriate amount for such is contained in the allowances under Section 33. The owners receiving this allowance are responsible for their own culverts.

Attention is drawn to Section 80 and Section 83 regarding responsibilities of owners with respect to obstructions and pollution, also to Section 73(3) which states that the municipality has no liability where the drainage works is flooded by ice or snow.

The amounts to be paid in allowances to owners entitled thereto under Section 29-33 where applicable, which shall become due in accordance with Section 62(3) and (4) are determined as follows:

ALLOWANCES TO OWNERS:

Con.	Lot or Part	Owner	Lands Used	Damages to Lands, Crops, etc.	Existing Drain	Compen- sation	Severance
			Sec.29 \$	Sec.30 \$	Sec.31 \$	Sec.32 \$	Sec.33 \$
12	NE ¹ / ₂ 9	J. Schnitzler			500.00	100.00	
	NE ¹ / ₂ 8	N. & C. & N. & M. Danielak			75.00	100.00	
13	Pt. SW ¹ / ₂ 8	W. Taylor			75.00	100.00	
	Pt. SW ¹ / ₂ 8	G. & H. Mitchell			150.00	200.00	
	Pt. SW ¹ / ₂ 7	F. & R. & J. Vander Avoird	300.00	500.00	150.00		
	Pt. SW ¹ / ₂ 7	G. Woods		300.00	150.00		650.00
	Pt. SW ¹ / ₂ 6	G. Woods		500.00	250.00		
	Pt. NE ¹ / ₂ 6	K. Brouwer		150.00	150.00		500.00
	Pt. NE ¹ / ₂ 6	Thunderbird Estates Ltd.		200.00	200.00		
Reg'd. Plan 107	Block D & E	Thunderbird Estates Ltd.		200.00	150.00		
	18	K. & I. Hodgson		50.00			200.00
	19	G. Connolly and D. Hollas		50.00			200.00
	20	D. & N. Glover		75.00			200.00
	21	J. & E. Simpson		100.00			200.00
	22	J. & G. Wetli		100.00			200.00
	23	L. Nicholson		175.00			200.00
	24	R. & E. Noben		175.00			200.00
	25	D. & E. Dow		100.00			200.00
	26	S. Barnes		100.00			200.00
	27	J. Lipp		50.00			200.00
	28	A. Curran		50.00			200.00
	29	K. & J. Stephany		50.00			200.00
	30	J. & M. Mooney		50.00			200.00
	31	H. & K. Cull		50.00			200.00
	14	B. & P. Cummings		50.00			200.00
	13	J. & S. Robinson		50.00			200.00
	12	W. & D. Taylor		50.00			200.00
	11	F. & S. Cole		50.00			200.00
	10	J. & A. Wassell		100.00			200.00
	9	J. & L. Peterson		100.00			200.00
	8	M. & L. Lamarsh		100.00			200.00
	7	M. Dzikowski		175.00			200.00
	6	M. & P. McCulloch		125.00			200.00
	5	J. & J. Lomis		50.00			200.00
	4	K. Ajib		50.00			200.00
	3	G. & C. Gardiner		50.00			200.00
	2	I. Jackson		50.00			
Totals			300.00	4,025.00	1,850.00	500.00	6,150.00

TOTAL ALLOWANCES, THUNDERBIRD DRAINAGE WORKS

\$12,825.00

**MATERIAL
SUPPLIED**

THE ESTIMATE OF THE COST of the work is as follows:

OPEN WORK

Approximately 600 m³ of Excavation,
Spreading and Levelling Excavated Material,
Clearing Brush and Trees, if any,
Removal of Existing Lane Culverts,

TWP. 10 m 1200 mm Dia. 14 Ga. C.S.P., Delivered,
Installation of C.S.P. under Farm Lane,

TWP. Restoration of Lane Surface (150 mm Granular A),
Heavy Fieldstone Spillway in Place,
Fence Repair and General Clean-up,

TOTAL OPEN WORK

\$ 2,300.00

TILE WORK (Material, Tile, Pipes, Etc.)

A Drain

TWP. 6 m 500 mm Dia. 16 Ga. M.P. with Grate,
119 m 450 mm Dia. Field Tile,
369 m 400 mm Dia. Field Tile,
6 m 500 mm Dia. 16 Ga. M.P. (Farm Lane),
332 m 350 mm Dia. Field Tile,
472 m 300 mm Dia. Field Tile,
6 m 400 mm Dia. 16 Ga. M.P. (Driveway),
15 m 400 mm Dia. 16 Ga. M.P. (Victoria Blvd.),
2 Standard Off-Set Catch Basins with Grate,
3 Standard Off-Set Ditch Inlet Catch Basins with Grate,
1 Twin Ditch Inlet Catch Basin with Grate,

C Drain

TWP. 186 m 150 mm Dia. Slotted Plastic Tubing with Filter,
12 m 150 mm Dia. 16 Ga. M.P. (Maple Street),
1 Standard Off-Set Ditch Inlet Catch Basin with Grate

D Drain

TWP. 191 m 150 mm Dia. Slotted Plastic Tubing with Filter,
3 Standard Off-Set Ditch Inlet Catch Basins with Grate,

E Drain

TWP. 200 m 150 mm Dia. Slotted Plastic Tubing with Filter,
3 Standard Off-Set Ditch Inlet Catch Basins with Grate,

F Drain

TWP. 108 m 150 mm Dia. Slotted Plastic Tubing with Filter,
1 Standard Off-Set Catch Basin with Grate,

G Drain

TWP. 96 m 150 mm Dia. Slotted Plastic Tubing with Filter,
1 Standard Off-set Catch Basin with Grate,

H Drain

TWP. 198 m 150 mm Dia. Slotted Plastic Tubing with Filter,
3 Standard Off-Set Ditch Inlet Catch Basins with Grate,

I Drain

TWP. 163 m 150 mm Dia. Slotted Plastic Tubing with Filter,
2 Standard Off-Set Ditch Inlet Catch Basins with Grate,

All Delivered at Site,

TOTAL MATERIAL

15,575.00

174752102
SUPPLIED

BY:

THE ESTIMATE OF THE COST Cont'd.

TILE WORK (Construction)A Drain

Installation of Outlet Pipe with Heavy Fieldstone Protection,
Digging, Laying and Backfilling of all Field Tile,
Installation of Metal Pipes Under Streets, Roads,
Farm Lanes, Driveways etc.,
Restoration of Street, Road, Lane and Driveway Surfaces
✓ Including 150 mm Granular A and Pavement Victoria Boulevard,
Installation of Catch Basins and Leads,
Clearing Brush and Trees, if any, Graded Overflow Runway,
Backfill Compaction and Overflow Shaping, 100 mm Topsoil and
Sod through Subdivision,
Removal and Disposal of Excess Material from
Runway through Subdivision,
Fence Repair, Tile Connections and General Clean-up,

C Drain

Installation of Slotted Plastic Tubing,
Installation of Metal Pipe under Maple Street, .
✓ Restoration of Street Surface (Granular A),
Installation of Catch Basin,
Fence Repair and General Clean-up,

D Drain

Installation of Slotted Plastic Tubing,
Backfilling and Compacting,
Restoration of Side Ditch, 100 mm Topsoil and Sodding, if any,
✓ Restoration of Street Shoulder (Granular A),
✓ Restoration of Driveways, including Pavement, if any,
Removal and Disposal of Excess Material,
Installation of Catch Basins and Leads,
General Clean-up,

E Drain

Installation of Slotted Plastic Tubing,
Backfilling and Compacting,
Restoration of Side Ditch, 100 mm Topsoil and Sodding, if any,
✓ Restoration of Street Shoulder (Granular A),
✓ Restoration of Driveways, including Pavement, if any,
Removal and Disposal of Excess Material,
Installation of Catch Basins and Leads,
General Clean-up,

F Drain

Installation of Slotted Plastic Tubing,
Installation of Catch Basin,
100 mm Topsoil and Seeding,
General Clean-up,

G Drain

Installation of Slotted Plastic Tubing,
Installation of Catch Basin,
General Clean-up,

14752122
 SUPPLIES
 BY:

THE ESTIMATE OF THE COST Cont'd.

TILE WORK (Construction) Cont'd.

H Drain

Installation of Slotted Plastic Tubing,
 Backfilling and Compacting,
 Restoration of Side Ditch, 100 mm Topsoil and Sodding, if any,
 Restoration of Street Shoulder (Granular A),
 Restoration of Driveways, including Pavement, if any,
 Restoration of Grand Crescent, including Pavement,
 Removal and Disposal of Excess Material,
 Installation of Catch Basins and Leads,
 General Clean-up,

744. ✓
 744. ✓
 744. ✓

I Drain

Installation of Slotted Plastic Tubing,
 Backfilling and Compacting,
 Restoration of Side Ditch, 100 mm Topsoil and Sodding, if any,
 Restoration of Street Shoulder (Granular A),
 Restoration of Driveways, including Pavement, if any,
 Removal and Disposal of Excess Material,
 Installation of Catch Basins and Leads,
 General Clean-up,

744. ✓
 744. ✓

TOTAL TILE WORK: CONSTRUCTION \$29,300.00

Allowances to Owners, 12,825.00

OVERHEAD COSTS

On-site Meeting, Investigations, Field Survey,
 Preliminary Report and Alternatives,
 Meeting to Consider Same, Additional Survey,
 Design, Plan, Profiles, Final Report and Disbursements,
 Re-Design, Plan, Profiles, Revised Report, Etc.,
 Assistance on Procedure,
 Advertising, Letting Contract,
 Superintendence of Construction,
 Interest and Other Contingencies, 18,000.00

TOTAL ESTIMATED COST, THUNDERBIRD DRAINAGE WORKS \$78,000.00

This sum of \$78,000.00 is assessed as benefit and outlet liability against the lands and roads affected according to the following Construction Assessment Schedule. Injuring liability has been considered and has been combined with the outlet assessment.

Special Benefit on lands has been determined in accordance with Section 1(28) and has been assessed under Section 24. Special Benefit on roads is governed by Section 26.

In addition to the work included in the above estimate, should repairs, replacements, underpinning or other alterations be required for existing bridges, culverts, overflow culverts or any other structure necessary to conduct overflow water, or water in open channels under or across a highway, street, road or road allowance, as affected by this drainage works, the work and cost thereof, including any necessary expenses incidental thereto, and if not determined otherwise, shall be the responsibility of and shall be assessed against the authority having control of such highway, street, road or road allowance.

CONSTRUCTION ASSESSMENT SCHEDULE:

Con.	Lot or Part	Approx. Hectare Affected	Owner	Special Benefit \$	Benefit \$	Outlet & Injuring Liability \$	Total Estimated Net Cost To Nearest \$
12	NE $\frac{1}{2}$ 8	9	N. & C. & N. & M. Danielak		88.00	45.00	(+ 86.00)
	NE $\frac{1}{2}$ 9	9	J. Schnitzler		570.00		(+220.00
13	Pt. NE $\frac{1}{2}$ 4	0.6	A. Beardmore			62.00	(41.00)
	Pt. SW $\frac{1}{2}$ 5	11.2	R. Graham			568.00	(379.00)
	Pt. NE $\frac{1}{2}$ 5	25	Howard Graham		340.00	1,763.00 1,363.00	(1,402.00)
	Pt. NE $\frac{1}{2}$ 5	0.41 *	D. & K. Blackwell			135.00	(135.00)
	Pt. NE $\frac{1}{2}$ 5	0.74 *	Hazel Graham			135.00	(135.00)
	Pt. NE $\frac{1}{2}$ 5	0.81 *	Twp. E. Garafraxa			135.00	(135.00)
	Pt. E $\frac{1}{2}$ 5	0.13 *	S. & B. Howlett			135.00	(135.00)
Reg'd. Plan No. 45	2 & 3	0.14 *	J. & J. McVeat			135.00	(135.00)
	4	0.05 *	F. & H. Tuesink			135.00	(135.00)
	5	0.06 *	O. Cooper			135.00	(135.00)
	Pt. 6	0.07 *	C. Lucas Est.			135.00	(135.00)
	Pt. 6	0.05 *	W. & L. Fisher			135.00	(135.00)
	Pt. 11, Pt. 12	0.25 *	E. Geffs			135.00	(135.00)
	Pt. 12, Pt. 13 & Pt. 14	0.29 *	P. E. Snyder Ltd.			135.00	(135.00)
	Pt. 14	0.09 *	Twp. E. Garafraxa			135.00	(135.00)
	Pt. 12, Pt. 13 & Pt. 14	0.19 *	R. & C. Fletcher			135.00	(135.00)
Reg'd. Plan No. 107	1	0.13 *	F. Alexander		113.00	235.00	(348.00)
	2	0.12 *	I. Jackson		397.00	235.00	(582.00)
	3	0.19 *	G. & C. Gardiner	150.00	397.00	215.00	(512.00)
	4	0.19 *	K. Ajib	150.00	397.00	195.00	(492.00)
	5	0.22 *	J. & J. Lomis	150.00	397.00	175.00	(472.00)
	6	0.24 *	M. & P. McCulloch	150.00	1,248.00	155.00	(1,228.00)
	Block E	0.07 *	Thunderbird Est. Ltd.	(+152) 150.00	567.00 717.00	135.00	(527.00)
	7	0.18 *	M. Dzikowski	150.00	1,419.00	165.00	(1,359.00)
	8	0.17 *	M. & L. Lamarsh	150.00	567.00	195.00	(612.00)
	9	0.17 *	J. & L. Peterson	150.00	567.00	225.00	(642.00)
	10	0.13 *	J. & A. Wassell	150.00	567.00	255.00	(672.00)
	11	0.13 *	F. & S. Cole	150.00	511.00	285.00	(696.00)
	12	0.12 *	W. & D. Taylor	150.00	482.00	305.00	(687.00)
	13	0.14 *	J. & S. Robinson	150.00	454.00	325.00	(679.00)
	14	0.16 *	B. & P. Cummings	150.00	426.00	320.00	(646.00)
	15	0.17 *	L. Boon & R. Clarkson		57.00	210.00	(276.00)
	16	0.15 *	N. Patterson		85.00	210.00	(295.00)
	17	0.14 *	M. & A. Dupuy		113.00	210.00	(323.00)
Lane Easement		0.08 *	Thunderbird Est. Ltd.			210.00	(210.00)

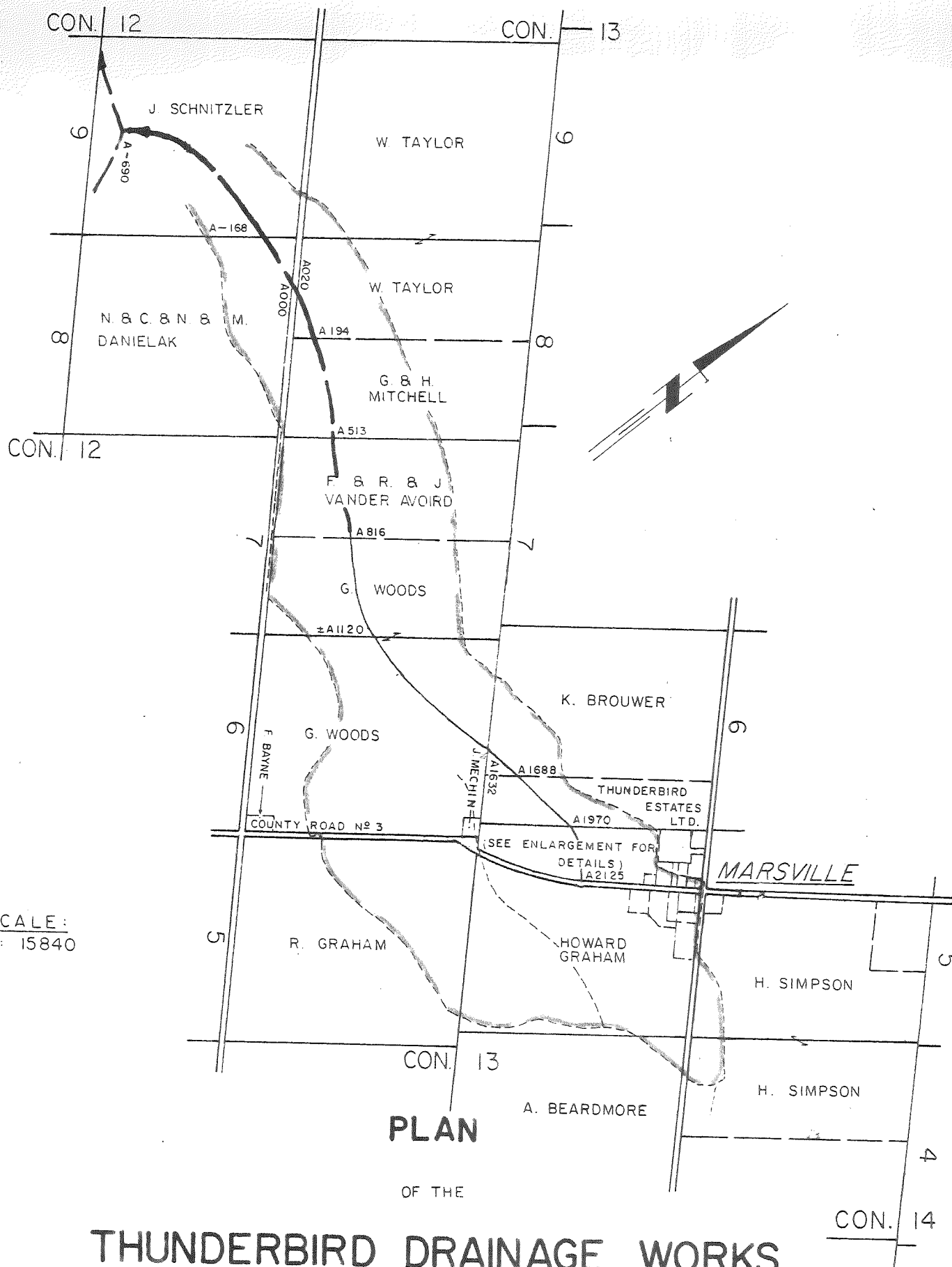
Thunderbird
820108

Thunderbird
820108

CONSTRUCTION ASSESSMENT SHCHEDULE: (Cont'd.)

Con.	Lot or Part	Approx. Hectare Affected	Owner	Special Benefit \$	Benefit \$	Outlet & Injuring Liability \$	Total Estimated Net Cost To Nearest \$
Reg'd. Plan No. 107	18	0.15 *	K. & I. Hodgson	150.00	511.00	375.00	(786.00)
	19	0.14 *	G. Connolly & D. Hollas	150.00	511.00	335.00	(746.00)
	20	0.14 *	D. & N. Glover	150.00	567.00	295.00	(737.00)
	21	0.13 *	J. & E. Simpson	150.00	567.00	255.00	(672.00)
	22	0.14 *	J. & G. Wetli	150.00	567.00	215.00	(632.00)
	23	0.18 *	L. Nicholson	150.00	1,419.00	175.00	(1,369.00)
	Block D	0.05 *	Thunderbird Est. Ltd.	(+225.00)	851.00 ^{1076.00}	135.00	(811.00)
	24	0.18 *	R. & E. Noben	150.00	1,419.00	165.00	(1,359.00)
	25	0.14 *	D. & E. Dow	150.00	567.00	195.00	(612.00)
	26	0.14 *	S. Barnes	150.00	567.00	225.00	(642.00)
	27	0.14 *	J. Lipp	150.00	511.00	255.00	(666.00)
	28	0.15 *	A. Curran	150.00	482.00	275.00	(657.00)
	29	0.16 *	K. & J. Stephany	150.00	454.00	295.00	(649.00)
	30	0.15 *	J. & M. Mooney	150.00	426.00	315.00	(641.00)
	31	0.16 *	H. & K. Cull		340.00	295.00	(585.00)
	32	0.19 *	B. Prouse		227.00	295.00	(522.00)
	33	0.14 *	C. Canini		113.00	295.00	(408.00)
	Block A	0.43 *	Thunderbird Est. Ltd.	(+600.00)	227.00 ^{287.00}	335.00	(562.00)
13	Pt. SW $\frac{1}{2}$ 6	0.27 *	J. Mechin			135.00	(135.00)
	Pt. SW $\frac{1}{2}$ 6	28	G. Woods	(-652.00)	7,377.00 ^{6,727.00}	1,187.00	(4,959.00)
	Pt. NE $\frac{1}{2}$ 6	5.5	Thunderbird Est. Ltd.	(+1000.00)	4,029.00 ^{5,029.00}	580.00	(2,673.00)
	Pt. NE $\frac{1}{2}$ 6	4.5	K. Brouwer	375.00	1,702.00	284.00	(774.00)
	Pt. SW $\frac{1}{2}$ 7	15.5	G. Woods	500.00	4,667.00 ^{5,167.00}	416.00	(2,915.00)
	Pt. SW $\frac{1}{2}$ 7	14.2	F. & R. & J. Vander Avoird	800.00	1,192.00	207.00	(516.00)
	Pt. SW $\frac{1}{2}$ 8	11	G. & H. Mitchell		170.00	106.00	(+166.00)
	Pt. SW $\frac{1}{2}$ 8	7	W. Taylor		85.00	52.00	(+ 84.00)
	SW $\frac{1}{2}$ 9	1	W. Taylor			10.00	(7.00)
14	Pt. SW $\frac{1}{2}$ 4 & Pt. SW $\frac{1}{2}$ 5	2.5	H. Simpson			204.00	(136.00)
Total Lands				5,425.00	39,750.00 ^{40,150.00}	16,364.00 ^{16,964.00}	(-400.00)
County Road No. 3, County of Dufferin					908.00	1,328.00	
Con. Road 12-13, Twp. of East Garafraxa					567.00	47.00	
Con. Road 13-14, Twp. of East Garafraxa						143.00	
Subdivision Rds., Twp. of East Garafraxa				1,000.00	11,775.00	693.00	
Total Roads				1,000.00	13,250.00	2,211.00	
Total Lands and Roads				6,425.00	53,000.00 ^{53,400.00}	18,575.00 ^{18,175.00}	
TOTAL ASSESSMENT, THUNDERBIRD DRAINAGE WORKS					\$ 78,000.00		

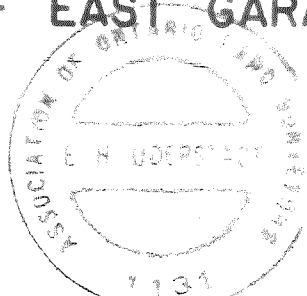
NOTE: For the purpose of Section 85 all lands assessed are agricultural, unless marked thus, *.



THUNDERBIRD DRAINAGE WORKS

IN THE TOWNSHIP OF EAST GARAFRAXA

DATED, 1980 05 14
 REVISED, 1981 04 28
 Orangeville, Ontario

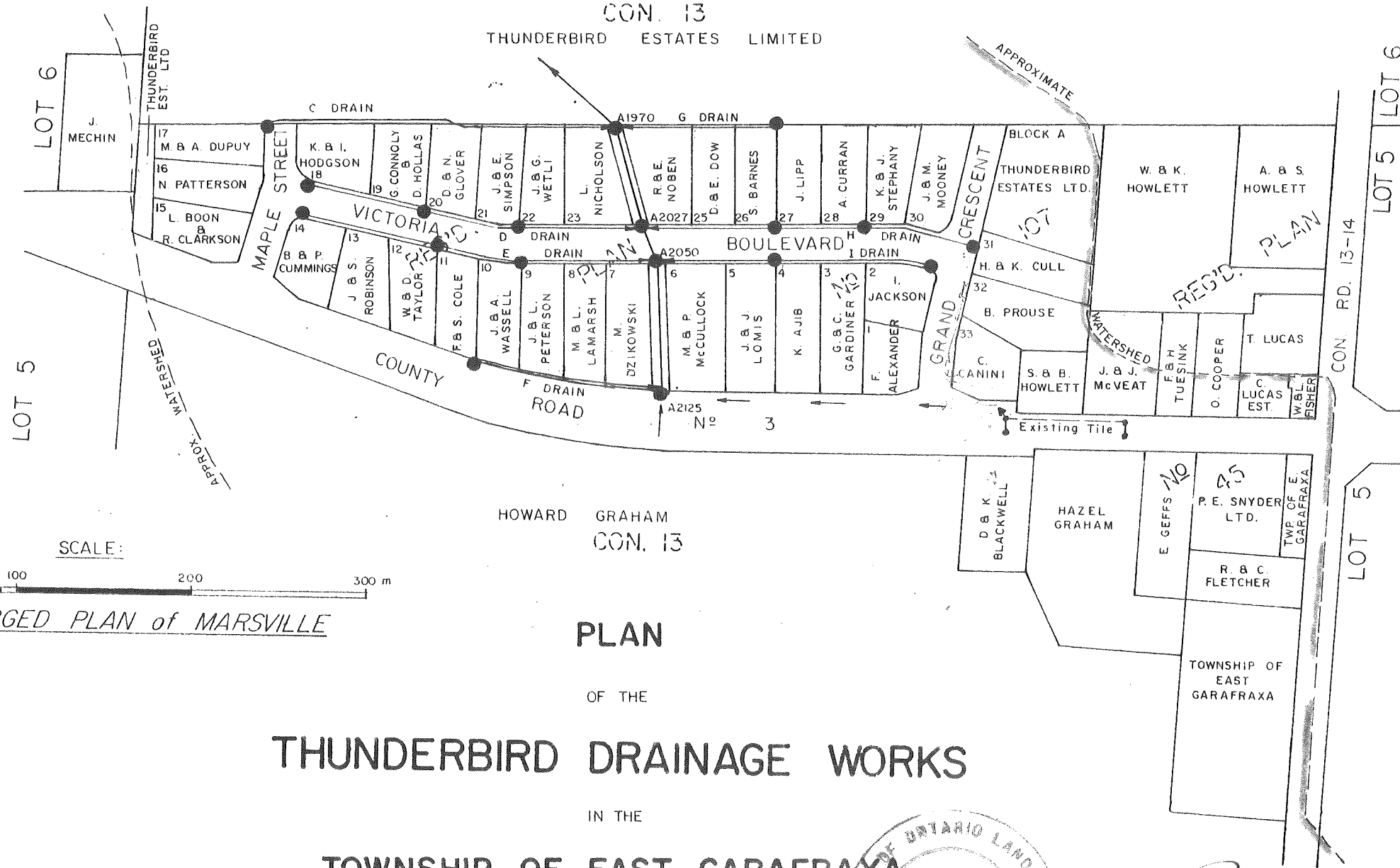


SIGNED, *E. H. Understadt*, O.L.S.
 E. H. UNDERSTADT INC
 Land Surveyors & Municipal Drainage Consultants

Sheet 1 of 3

D-GA-E-108

CON. 13
THUNDERBIRD ESTATES LIMITED



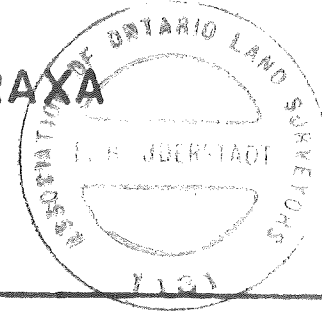
ENLARGED PLAN of MARSVILLE

PLAN

THUNDERBIRD DRAINAGE WORKS

TOWNSHIP OF EAST GARAFRAXA

DATED, 1980 05 14
REVISED, 1981 04 28
Orangeville, Ontario



SIGNED, *E. H. Uderstadt*, O.L.S.
E. H. UDERSTADT INC.
Land Surveyors & Municipal Drainage Consultants

TILE SIZES

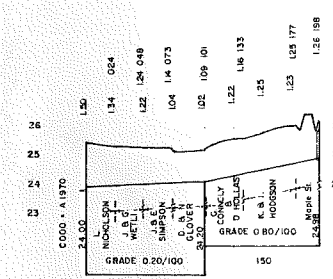
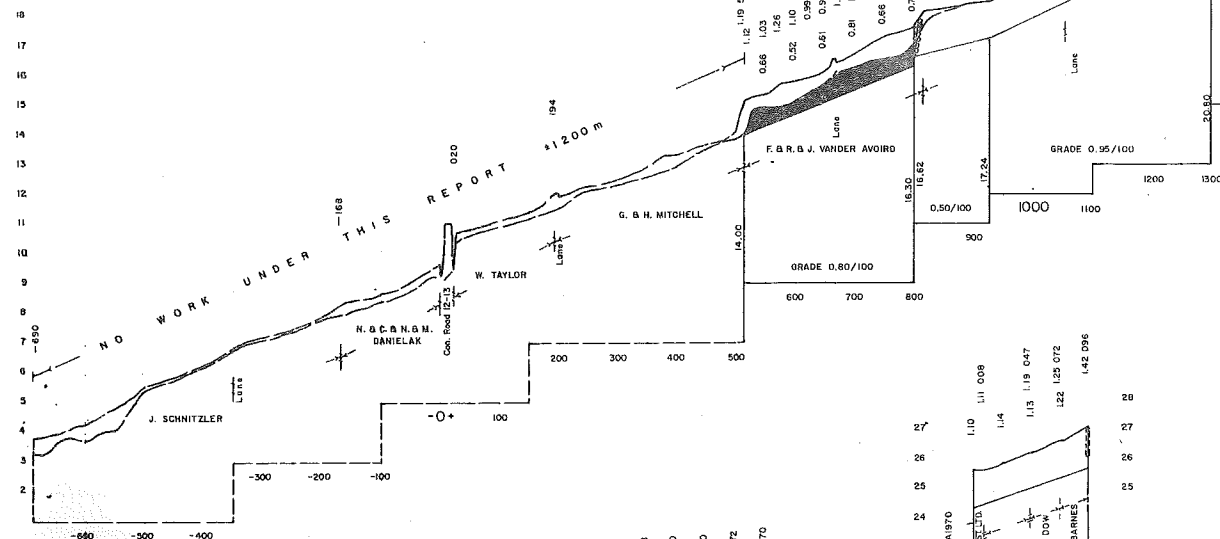
A DRAIN

A 800 - A 806 6 m 500mm DIA. 16 GA. M.P. WITH GRATE
 A 806 - A 925 119 m 490mm DIA. FIELD TILE
 A 925 - A 1300 359 m 400mm DIA. FIELD TILE
 FARM LANE 6 m 500mm DIA. 16 GA. M.P.
 A 1300 - A 1632 332 m 330mm DIA. FIELD TILE
 A 1632 - A 2125 492 m 300mm DIA. FIELD TILE
 DRIVEWAY 5 m 400mm DIA. 16 GA. M.P.
 VICTORIA BLVD. 15 m 400mm DIA. 16 GA. M.P.
 CATCH BASINS: A 1094, A 1632
 DITCH INLET CATCH BASINS: A 1970, A 2027, A 2050
 TWIN DITCH INLET CATCH BASIN: A 2125 (In-Line)

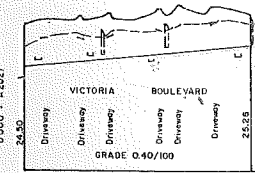
BENCH MARKS

A-375 SPIKE IN TRIAD POPLAR TREE 6m N. 7.00
 A 000 SPIKE IN FENCE POST 80m N. 10.00
 A 816 SPIKE IN FENCE POST 22m W. 18.64
 A 1562 SPIKE IN TWIN MAPLE 20m E. 23.69
 A 1780 SPIKE IN HYDRO POLE 6m S. 25.04
 A 2129 TOP CENTRE DIST. C.S.P.A. 4m S. 26.83
 H 196 SPIKE IN HYDRO POLE 13m E. 27.49

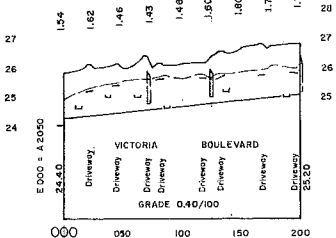
REMOVE 3 - 360mm DIA. C.S.P.
 INSTALL 10m 1200mm DIA. 14 GA. C.S.P.



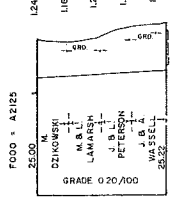
C DRAIN



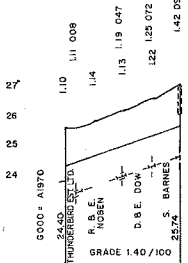
D DRAIN



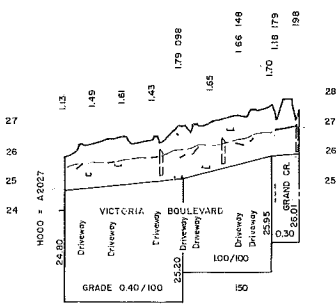
E DRAIN



F DRAIN



G DRAIN

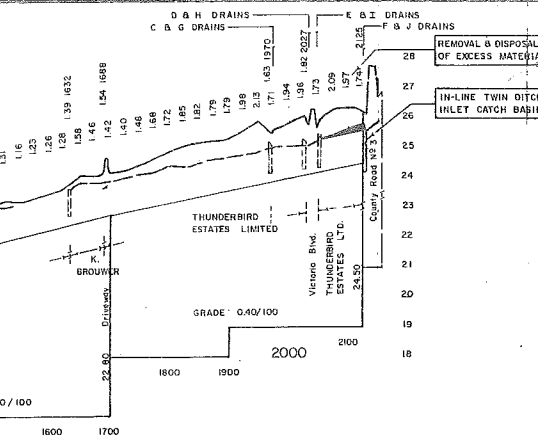


H DRAIN

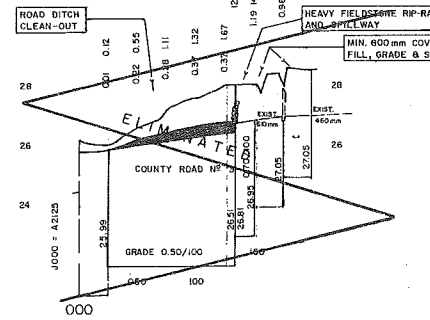
LEGEND

--- LOW GROUND
 --- CULVERT ELEVATION
 --- BASEMENT ELEVATION
 --- METAL PIPE

BOTTOM WIDTH: 1m throughout
 SIDE SLOPES: 1:1.5 (v:h)



I DRAIN

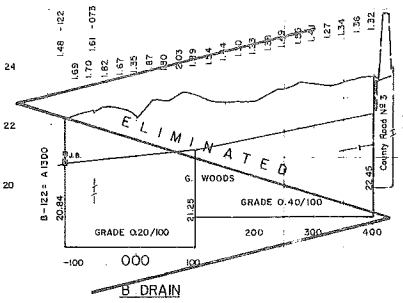


J DRAIN

TILE SIZES

G DRAIN
 6000 - G 096 96 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASIN G 096
 H DRAIN
 1000 - H 198 198 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASINS (Ditch Inlet) H 198, H 198, H 198
 I DRAIN
 1000 - I 163 163 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASINS (Ditch Inlet) I 173, I 163

NOTE: Construction Drawings of Larger Dimensions can be Seen at the Clerk's Office.



TILE SIZES

C DRAIN
 0000 - C 198 186 m 150 mm DIA. SLOTTED TUBING W/FILTER
 MAPLE STREET 12 m 150 mm DIA. 16 GA. M.P.
 CATCH BASIN (Ditch Inlet) C 198
 D DRAIN
 0000 - D 191 191 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASINS (Ditch Inlet) D 66, D 120, D 191
 E DRAIN
 0000 - E 200 200 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASINS (Ditch Inlet) E 073, E 124, E 200
 F DRAIN
 0000 - F 108 108 m 150 mm DIA. SLOTTED TUBING W/FILTER
 CATCH BASIN F 108

PROFILES

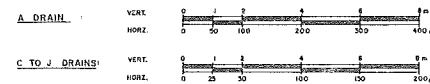
OF THE

THUNDERBIRD DRAINAGE WORKS

IN THE

TOWNSHIP OF EAST GARAFRAXA

SCALES:



DATED: 1980.09.18
 REVISED: 1981.05.29
 Orangeville, Ontario



SIGNED: *E. H. Understall*
 E. H. UNDERSTALL INC.
 Land Surveyors & Municipal Drainage Consultants

LAND SURVEYORS
MUNICIPAL DRAINAGE CONSULTANTS
PRINCIPAL - E. H. UDERSTADT O.L.S.

E. H. UDERSTADT INC.

162 BROADWAY
ORANGEVILLE, ONT. L9W 1K3
TELEPHONE (519) 941-1161



By-law N^o 23-79

E.H.U.
#10

Dated: 1979 05 10

Revised: 1979 08 10

File No.: D-GA-E-106

The Reeve and Council,
Township of East Garafraxa.

Gentlemen:

BROUWER DRAINAGE WORKS

Under the provisions of the Drainage Act 1975 Section 4 and in accordance with our appointment, pursuant to a petition signed by owners in an area described as requiring drainage, we made an examination and survey of the area and submitted our report, dated 1979 05 10 including plan, profiles, specifications and assessments for the proposed work.

We did hold an on-site meeting, did determine the area requiring drainage, and found that the petition complied with Section 4.

We found that the drainage area comprises approximately 1980 acres.

Our investigation showed that the area is presently served by several small and inadequate open drains. Our calculations showed that tile drains through the cultivated fields, as requested, were quite feasible.

The said report provided for a drainage system composed of open and tile work.

On July 3, 1979, at a meeting called for that purpose, the said report was considered at length, as provided for in Section 42, several owners added their signatures to the petition and their requests were duly noted. Two owners questioned the liability of their lots for outlet assessment. The said report was referred back to us to make the following revisions:

- a) eliminate E Drain
- b) extend C Drain
- c) extend D Drain open work upstream for approximately 150 - 200 lin.ft.
- d) construct a driveway culvert on A Drain, and
- e) check the watershed where questioned.

We have now re-drafted plan and profiles, recalculated and re-distributed the cost and submit herewith our revised report which implements the above items a to d. The watershed (item e) has been re-checked in the field and has been found as shown. No changes were necessary.

The plan shows the location of the work and the lands affected by it; the profiles and specifications show the dimensions, grades, disposal of material and other particulars of the work.

In accordance with Section 18 and where requested by the owners, one driveway and one farm crossing are proposed to be constructed as part of the work, for all others it is considered equitable to make an allowance for Severance under Section 33 instead of providing for the construction, enlargement or other improvement of crossings rendered necessary by the work.

Attention is drawn to Section 80 and Section 83 regarding responsibilities of owners with respect to obstructions and pollution.

The amounts to be paid in allowances to owners entitled thereto under Section 29-33 where applicable, which shall become due in accordance with Section 62 (3) and (4) are determined as follows:

ALLOWANCES TO OWNERS:

Con.	Lot or Part	Owner	Land Used	Damage to Lands, Crops, etc.	Existing Drain, Work Con- structed	Compen- sation	Severance Farm Cros- sing, Land Value
			Sec.29	Sec.30	Sec.31	Sec.32	Sec.33
13	NE $\frac{1}{2}$ 10	T. Henkenhaf (A)	200.00	500.00	500.00	300.00	3,500.00
		(B)	25.00	150.00	150.00		1,800.00
		(C)	100.00	350.00	275.00		1,000.00
	SW $\frac{1}{2}$ 10	W. Taylor (C)	250.00	550.00	500.00		
	PtNE $\frac{1}{2}$ 9	D. White (A)	100.00	275.00	275.00		1,000.00
		(B)	25.00	150.00	150.00		
	PtNE $\frac{1}{2}$ 9	W.&J.Spencer (A)	100.00	300.00	275.00		800.00
		(D)	25.00	100.00	75.00		
	SW $\frac{1}{2}$ 9	W. Taylor (C)	200.00	575.00	325.00		
	PtNE $\frac{1}{2}$ 8	N.Hoogendoorn(A)	25.00	125.00	125.00		800.00
	PtNE $\frac{1}{2}$ 8	G. Sawitzki (A)	75.00	275.00	250.00		
		(D)	25.00	250.00	50.00		
	PtNE $\frac{1}{2}$ 8	R.&M.Starret (A)	25.00	25.00	25.00		
		(D)		250.00			
	PtSW $\frac{1}{2}$ 8	W. Taylor (C)		250.00			
	PtSW $\frac{1}{2}$ 8	G.&H.Mitchell(C)		250.00			
	NE $\frac{1}{2}$ 7	G. Woods (D)		250.00			
	PtSW $\frac{1}{2}$ 7	F.&R.&J. (C)		50.00			
		Vander Avoird					
14	PtSW $\frac{1}{2}$ 9	L. Reid (B)	200.00	700.00	500.00		
	PtSW $\frac{1}{2}$ 8	G. Simpson (B)		250.00			
	PtSW $\frac{1}{2}$ 8	A.&E.Brouwer (A)		75.00			
	PtSW $\frac{1}{2}$ 8	M. Brouwer (A)		225.00			
	SW $\frac{1}{2}$ 7	M. Brouwer (A)		575.00			
	PtSW $\frac{1}{2}$ 6	G. Simpson (A)		225.00			
	NE $\frac{1}{2}$ 6	W. McKenna (A)		350.00			
	PtNE $\frac{1}{2}$ 5	G. Simpson (A)		175.00			
Totals			1,375.00	7,250.00	3,475.00	300.00	8,900.00
TOTAL ALLOWANCES, BROUWER DRAINAGE WORKS:					<u>\$21,300.00</u>		

MINIMUM RECOMMENDED SIZES FOR FARM CULVERTS

Con.	Lot or Part	Owner	Size
13	NE $\frac{1}{2}$ 10	(A) T. Henkenhaf	50 sq. ft.
		(B)	6' dia. or equiv.
		(C)	4.5' dia. or equiv.
	PtNE $\frac{1}{2}$ 9	(A) D. White	4.5' dia. or equiv.
	PtNE $\frac{1}{2}$ 9	(A) W. & J. Spencer	4' dia. or equiv. — 5.0' HBL
	PtNE $\frac{1}{2}$ 8	(A) N. Hoogendoorn	4' dia. or equiv.

THE ESTIMATE OF THE COST of the work is as follows:

OPEN WORK:A Drain

Approx. 8,000 cu.yds. of Excavation,

B Drain

Approx. 5,800 cu.yds. of Excavation,

C Drain

Approx. 8,850 cu.yds. of Excavation,

D Drain

Approx. 850 cu.yds. of Excavation,

including all Silt Traps,

Clean-out under Road Culvert,

Removal of Beaver Dams,

Spreading and Levelling Excavated Material,

X 30 lin.ft. 4.5' dia. 14 Ga. C.S.P., Delivered, Sta.A46+50,

Remove Existing 4' dia. C.S.P.,

Install Driveway Culvert with Inverts 6" below Grade,

Constructing Farm Pond (1 day's work),

X 30 lin.ft. 4.5' dia. 14 Ga. C.S.P., Delivered, Sta.C21+00,

Install Culvert with Inverts 6" below Grade,

4 Heavy Field Stone Spillways, in place,

Clearing Brush and Trees,

Fence Repair and General Clean-up,

21,200.00

TILE WORK (Material)A Drain

20 lin.ft. 21" dia. 16 Ga. M.P., with Grate,

290 lin.ft. 18" dia. Field Tile,

X 40 lin.ft. 21" dia. 14 Ga. M.P., Con. Rd. 13-14,

3880 lin.ft. 16" dia. Field Tile,

X 20 lin.ft. 18" dia. 16 Ga. M.P., Farm Lane,

2215 lin.ft. 14" dia. Field Tile,

X 20 lin.ft. 15" dia. 16 Ga. M.P., Farm Lane,

50 lin.ft. 18" dia. Smoothwall Welded Pipe (0.25"), County Rd.,

X 40 lin.ft. 18" dia. 16 Ga. M.P. (2x20 ft.), County Rd.,

4 - 2'x2' Concrete Catch Basins, with Grates,

B Drain

20 lin.ft. 12" dia. 16 Ga. M.P., with Grate,

410 lin.ft. 10" dia. Field Tile,

X 20 lin.ft. 12" dia. 16 Ga. M.P., Farm Lane,

690 lin.ft. 8" dia. Field Tile,

1 - 2'x2' Concrete Catch Basin, with Grate,

C Drain

X 20 lin.ft. 21" dia. 16 Ga. M.P., with Grate,

405 lin.ft. 18" dia. Field Tile,

258 lin.ft. 16" dia. Field Tile,

1742 lin.ft. 14" dia. Field Tile,

300 lin.ft. 12" dia. Field Tile,

X 40 lin.ft. 12" dia. 16 Ga. C.S.P. Inlet Pipe with Horizontal Grate Bars,

3 - 2'x2' Concrete Catch Basins, with Grates,

D Drain

X 20 lin.ft. 15" dia. 16 Ga. M.P., with Grate,

1500 lin.ft. 12" dia. Field Tile,

1465 lin.ft. 10" dia. Field Tile,

X 40 lin.ft. 12" dia. 14 Ga. M.P., Con. Rd. 13 - 14,

3 - 2'x2' Concrete Catch Basins, with Grates,

ALL DELIVERED AT SITE

25,200.00

TILE WORK (Construction)

Installation of Outlet Pipes with Heavy Field Stone Protection, Digging, Laying and Backfill of all Field Tile, Installation of Pipe (Boring) under County Road, Installation of M.P., 20' each side, County Road, Restoring Ground Surface and Seeding, County Road, Installation of Pipes under Township Roads, Restoration of Ground and Road Surfaces (6" Granular A), Installation of Pipes under Farm Lanes, Restoration of Lane Surfaces, Installation of Off-set Catch Basins, with Tile Connections, Installation of Inlet Pipe with Anti-Seepage Collar and Heavy Field Stone Rip-Rap, Graded Overflow Runways, Clearing Brush and Trees, if any, Tile Connections, Fence Repair and General Clean-up,	30,500.00
Allowances to Owners,	21,300.00
On-site Meeting, Investigations, Field Survey, Plan, Profile, Report and Disbursements, dated 1979 05 10, Revised Plan, Profile and Report, Assistance on Procedure, Advertising, Letting Contract, Superintendence of Construction, Interest and Other Contingencies,	<u>14,800.00</u>
TOTAL ESTIMATED COST, BROUWER DRAINAGE WORKS	<u>\$113,000.00</u>

This sum of \$113,000.00 is assessed as benefit and outlet liability against the lands and roads affected according to the following construction assessment schedule. Injuring liability is deemed not applicable. Special benefit on lands has been determined in accordance with Section 1(28) and has been assessed under Section 24.

In addition to the work included in the above estimate, should repairs, replacements, underpinning or other alterations be required for existing bridges, culverts, overflow culverts or any other structure necessary to conduct overflow water, or water in open channels under or across a highway, street, road or road allowance as affected by this drainage works, the work and cost thereof, including any necessary expenses incidental thereto, and if not determined otherwise, shall be the responsibility of and shall be assessed against the authority having control of such highway, street, road or road allowance.

Whether or not the Road Authority of the County of Dufferin elects to do the work on its property, Sta. All8+25 to All9+25, supplying and installing 50 lin.ft. 18" dia. smoothwall (0.25") welded pipe by boring method, supplying and installing 2 x 20 lin.ft. 18" dia. 16 Ga. M.P. at each end of bored pipe, two off-set catch basins, etc., as specified under its own contract or directs the work to be done under different design or specifications, it shall be assessed the increased cost of the work (Section 26) estimated as \$4,000.00 and shown as Special Benefit, plus the amounts stated in the benefit and outlet columns. The Authority in charge has given instructions that the work be included in the tender call as a separate item.

CONSTRUCTION ASSESSMENT SCHEDULE:

OPEN WORK

Con.	Lot or Part	Approx. Acres Affected	Owner	Special Benefit \$	Benefit \$	Outlet Liability \$
13	PtNE ¹ / ₂ 5	1	* A. & S. Howlett			11.00 ✓
	PtNE ¹ / ₂ 5	1	* W. & K. Howlett			11.00 ✓
	NE ¹ / ₂ 6	76	Thunderbird Est. Ltd.			802.00
	SW ¹ / ₂ 6	3	G. Woods			32.00
	NE ¹ / ₂ 7	100	G. Woods			1,002.00
	PtSW ¹ / ₂ 7	10	G. Woods			108.00
	PtSW ¹ / ₂ 7	15	F.&R.&J.Vanderavouird			162.00
	PtNE ¹ / ₂ 8	50	R.&M. Starret		200.00	425.00
	PtNE ¹ / ₂ 8	43	G. Sawitzki	1,500.00	1,500.00	320.00
	PtNE ¹ / ₂ 8&9	10	* N.Hoogendoorn	800.00 ✓	600.00 ✓	40.00 ✓
	PtSW ¹ / ₂ 8	23	G.&H.Mitchell			249.00
	PtSW ¹ / ₂ 8	33	W. Taylor			358.00
	PtNE ¹ / ₂ 9	50.7	W.&J. Spencer	800.00	1,700.00	192.00
	PtNE ¹ / ₂ 9	49.9	D. White	1,000.00	2,000.00	126.00
	SW ¹ / ₂ 9	74	W. Taylor		2,700.00	655.00
	NE ¹ / ₂ 10	52	T. Henkenhaf	6,300.00	6,800.00	
	SW ¹ / ₂ 10	72	W. Taylor	1,000.00	3,500.00	305.00
14	PtSW ¹ / ₂ 4	1	* B. Matts			5.00 ✓
	PtSW ¹ / ₂ 4	12	W. Johnston			58.00
	PtSW ¹ / ₂ 4	44	H. Simpson			245.00
	NE ¹ / ₂ 4	24	W. Johnston			116.00
	PtSW ¹ / ₂ 5	53	H. Simpson			461.00
	PtSW ¹ / ₂ 5	0.9	* E. Howlett			10.00 ✓
	PtSW ¹ / ₂ 5	8	* Dufferin County B.O.E.			48.00 ✓
	PtSW ¹ / ₂ 5	3.3	* E. Dobson			18.00 ✓
	PtSW ¹ / ₂ 5	1.1	* B. & G. Dobson			7.00 ✓

CONSTRUCTION ASSESSMENT SCHEDULE: (Cont'd.)OPEN WORK (Cont'd.)

Con.	Lot or Part	Approx. Acres Affected	Owner	Special Benefit \$	Benefit \$	Outlet Liability \$
14	PtSW ¹ / ₂ 5	1.1	* R. & J. Heath			7.00 ✓
	PtSW ¹ / ₂ 5	3	* C. Lawton			20.00 ✓
	PtSW ¹ / ₂ 5	4.4	* L. Prokopchuk/S. Olek			57.00 ✓
	PtSW ¹ / ₂ 5	5.9	* C. Wolfe			64.00 ✓
	PtSW ¹ / ₂ 5	0.8	* Marsville United Church			9.00 ✓
	PtSW ¹ / ₂ 5	0.6	* W. Edwards			7.00 ✓
	PtSW ¹ / ₂ 5&6	57	J. Lowe			415.00
	NE ¹ / ₂ 5	98.2	G. Simpson			478.00
	PtSW ¹ / ₂ 6	50	G. Simpson			308.00
	NE ¹ / ₂ 6	100	W. McKenna			503.00
	SW ¹ / ₂ 7	100	M. Brouwer			570.00
	NE ¹ / ₂ 7	100	H. Booi			515.00
	PtSW ¹ / ₂ 8	48	M. Brouwer			329.00
	PtSW ¹ / ₂ 8	2	* A.&E. Brouwer		100.00 ✓	10.00 ✓
	PtSW ¹ / ₂ 8	50	G. Simpson		200.00	373.00
	NE ¹ / ₂ 8	94	P. Perry			484.00
	PtSW ¹ / ₂ 9	93	L. Reid		2,000.00	406.00
	PtSW ¹ / ₂ 9	1	* S. Reid			5.00 ✓
	NE ¹ / ₂ 9	16	L. Reid			82.00
	PtSW ¹ / ₂ 10	7	* M.&O. Francone		300.00 ✓	30.00 ✓
	PtSW ¹ / ₂ 10	6	* H.&F. Jakobson		150.00 ✓	26.00 ✓
	PtSW ¹ / ₂ 10	2	* N.&M. Brown		50.00 ✓	8.00 ✓
	PtSW ¹ / ₂ 10	2	* C. Sabetti			8.00 ✓
	PtSW ¹ / ₂ 10	2	* P. Sabetti			8.00 ✓
	PtSW ¹ / ₂ 10	1	* D.&E. Baker			5.00 ✓
15	SW ¹ / ₂ 4	2	H.&B. Miller			10.00
	NE ¹ / ₂ 4	3	V.&R. Gray			16.00
	PtSW ¹ / ₂ 5	45	H.&B. Miller			232.00
	PtSW ¹ / ₂ 5	8.7	* R.&J. McBroom			45.00 ✓
	PtSW ¹ / ₂ 5	46	L.&A. Vecchiarelli			237.00
	PtNE ¹ / ₂ 5	18	N.&R. Slavnic			93.00
	PtNE ¹ / ₂ 5	6	* R. Unthank			31.00 ✓
	SW ¹ / ₂ 6	92	W. McKenna			474.00
	NE ¹ / ₂ 6	3	J.&M. Smith			16.00
	SW ¹ / ₂ 7	46	P.&M. Rasi			237.00
	SW ¹ / ₂ 8	5	G. Manley			26.00
Total Lands				11,400.00	21,800.00	11,910.00

21104
42620

CONSTRUCTION ASSESSMENT SCHEDULE: (Cont'd.)OPEN WORK (Cont'd.)

Con.	Lot or Part	Owner	Special Benefit \$	Benefit \$	Outlet Liability \$	
Con.Rd.12-13,	Twp. of E. Garafraxa				10.00	x
Con.Rd.13-14,	Twp. of E. Garafraxa			1,100.00	281.00	x
Highway No. 25,	Ontario				391.00	x
County Rd. No. 3,	Dufferin		4,000.00		469.00	x
Street PtSW $\frac{1}{2}$ 5	Con.14, Twp. E. Garafraxa				39.00	x
Total Roads			4,000.00	1,100.00	1,190.00	
Total Lands and Roads			15,400.00	22,900.00	13,100.00	
TOTAL ASSESSMENT, OPEN WORK, BROUWER DRAINAGE WORKS: \$51,400.00						

NOTE: For the purposes of Section 85 all lands assessed are agricultural, unless marked thus, *.

CONSTRUCTION ASSESSMENT SCHEDULE: (Cont'd.)TILE WORK

Con.	Lot or Part	Owner	Benefit \$	Outlet Liability \$	
13	PtNE $\frac{1}{2}$ 5	* A. & S. Howlett		7.00	✓
	PtNE $\frac{1}{2}$ 5	* W. & K. Howlett		7.00	✓
	NE $\frac{1}{2}$ 6	Thunderbird Est.Ltd.		784.00	
	SW $\frac{1}{2}$ 6	G. Woods		30.00	
	NE $\frac{1}{2}$ 7	G. Woods	2,400.00	696.00	
	PtSW $\frac{1}{2}$ 7	G. Woods		100.00	
	PtSW $\frac{1}{2}$ 7	F.&R.&J. Vanderavoird	475.00	150.00	
	PtNE $\frac{1}{2}$ 8	R. & M. Starret	2,800.00	167.00	
	PtNE $\frac{1}{2}$ 8	G. Sawitzki	2,600.00	27.00	
	PtSW $\frac{1}{2}$ 8	G. & H. Mitchell	3,500.00	134.00	
	PtSW $\frac{1}{2}$ 8	W. Taylor	3,500.00	91.00	
	PtNE $\frac{1}{2}$ 9	W. & J. Spencer			
	SW $\frac{1}{2}$ 9	W. Taylor	4,200.00		
14	PtSW $\frac{1}{2}$ 4	* B. Matts		22.00	✓
	PtSW $\frac{1}{2}$ 4	W. Johnston		260.00	
	PtSW $\frac{1}{2}$ 4	H. Simpson		918.00	
	NE $\frac{1}{2}$ 4	W. Johnston		520.00	
	PtSW $\frac{1}{2}$ 5	H. Simpson		740.00	
	PtSW $\frac{1}{2}$ 5	* E. Howlett		6.00	✓
	PtSW $\frac{1}{2}$ 5	* Dufferin County B.O.E.		143.00	x
	PtSW $\frac{1}{2}$ 5	* E. Dobson		47.00	✓
	PtSW $\frac{1}{2}$ 5	* B. & G. Dobson		14.00	✓

CONSTRUCTION ASSESSMENT SCHEDULE: (Cont'd.)TILE WORK (Cont'd.)

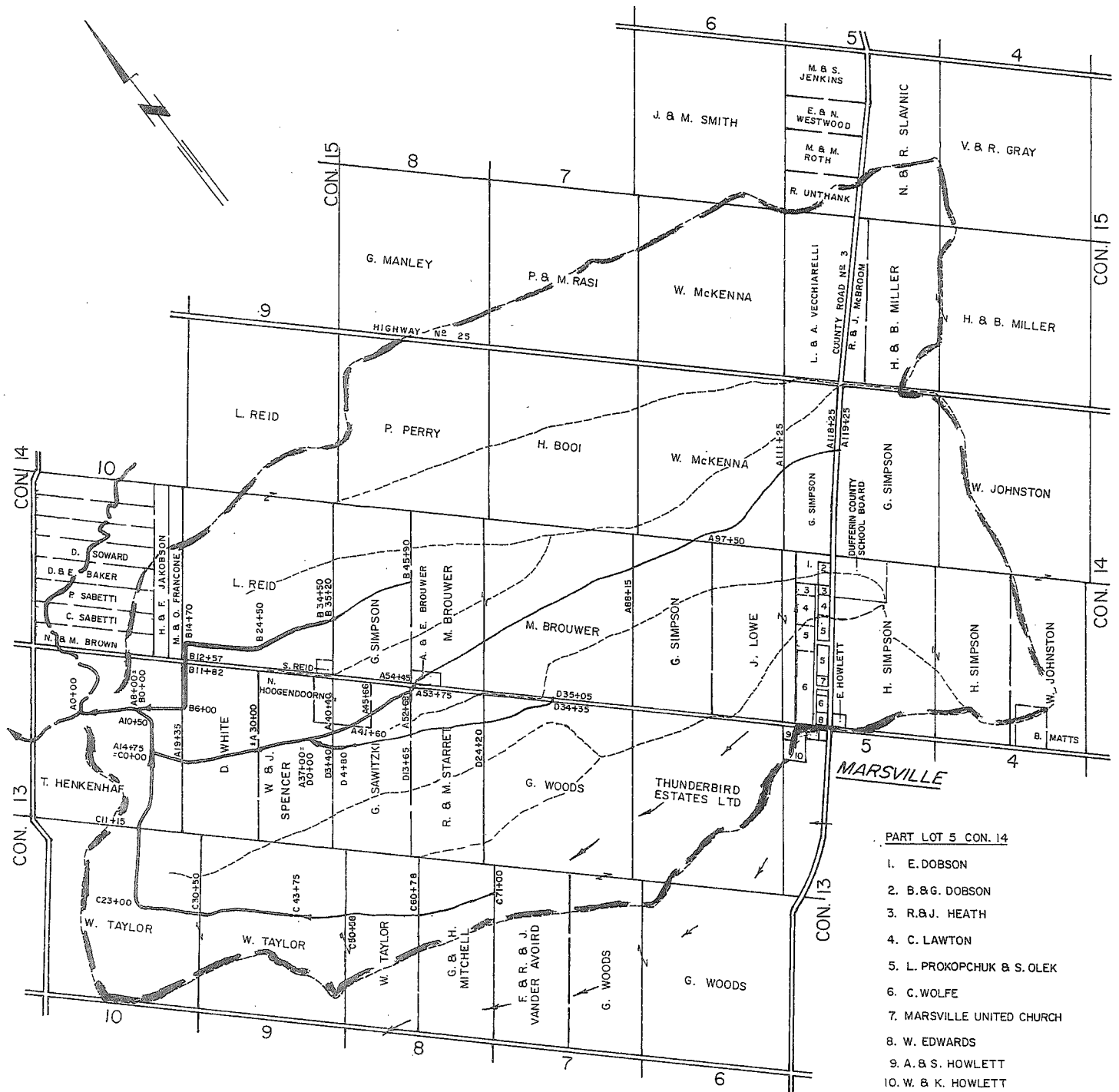
Con.	Lot or Part	Owner	Benefit \$	Outlet Liability \$
14	PtSW $\frac{1}{2}$ 5	* R. & J. Heath		14.00 ✓
	PtSW $\frac{1}{2}$ 5	* C. Lawton		42.00 ✓
	PtSW $\frac{1}{2}$ 5	* L. Prokopchuk/S. Olek		44.00 ✓
	PtSW $\frac{1}{2}$ 5	* C. Wolfe		59.00 ✓
	PtSW $\frac{1}{2}$ 5	* Marsville United Church		6.00 ✓
	PtSW $\frac{1}{2}$ 5	* W. Edwards		4.00 ✓
	PtSW $\frac{1}{2}$ 5&6	J. Lowe	200.00	762.00
	NE $\frac{1}{2}$ 5	G. Simpson	3,000.00	1,865.00
	PtSW $\frac{1}{2}$ 6	G. Simpson	4,000.00	662.00
	NE $\frac{1}{2}$ 6	W. McKenna	4,800.00	549.00
	SW $\frac{1}{2}$ 7	M. Brouwer	10,100.00	685.00
	NE $\frac{1}{2}$ 7	H. Booi		12.00
	PtSW $\frac{1}{2}$ 8	M. Brouwer	3,500.00	236.00
	PtSW $\frac{1}{2}$ 8	* A. & E. Brouwer	850.00 ✓	3.00 ✓
	PtSW $\frac{1}{2}$ 8	G. Simpson	2,500.00	30.00
	PtSW $\frac{1}{2}$ 9	L. Reid	300.00	
Total Lands			48,725.00	9,836.00
Con.Rd.13-14, Township of East Garafraxa			1,200.00 x	258.00 x
Highway No. 25, Ontario				152.00
County Rd. No. 3, Dufferin			500.00 x	879.00 x
Street PtSW $\frac{1}{2}$ 5 Con.14, Township of E. Garafraxa				50.00 x
Total Roads			1,700.00	1,339.00
Total Lands and Roads			50,425.00	11,175.00
TOTAL ASSESSMENT, TILE WORK, BROUWER DRAINAGE WORKS:			<u>\$61,600.00</u>	

NOTE: For the purposes of Section 85 all lands assessed are agricultural, unless marked thus, *.

RECAPITULATION

TOTAL ASSESSMENT, OPEN WORK	\$51,400.00
TOTAL ASSESSMENT, TILE WORK	<u>\$61,600.00</u>
TOTAL ASSESSMENT, BROUWER DRAINAGE WORKS:	<u>\$113,000.00</u>

After construction, the drainage works shall be maintained by the Municipality of the Township of East Garafraxa at the expense of lands and roads assessed in the following maintenance schedule for benefit and outlet and in the same relative proportion until said assessment shall be varied according to the provision of the Drainage Act 1975.



PART LOT 5 CON. 14

1. E. DOBSON
2. B. & G. DOBSON
3. R. & J. HEATH
4. C. LAWTON
5. L. PROKOPCHUK & S. OLEK
6. C. WOLFE
7. MARSVILLE UNITED CHURCH
8. W. EDWARDS
9. A. & S. HOWLETT
10. W. & K. HOWLETT

NOTE: Numbers are for identification on this plan only.

PLAN
OF THE
BROUWER DRAINAGE WORKS
IN THE
TOWNSHIP OF EAST GARAFRAXA

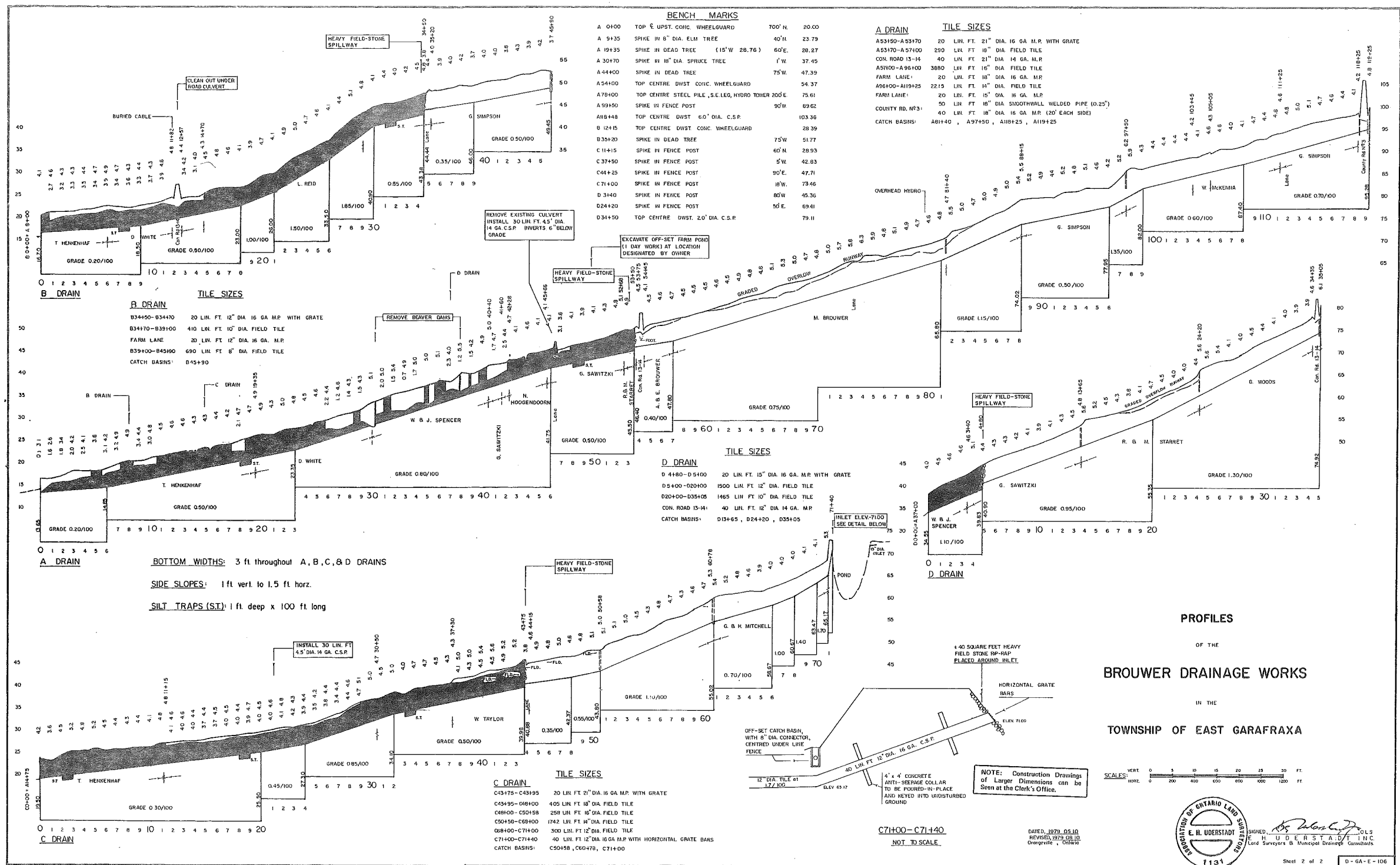
SCALE: 0 1000 2000 3000 4000 FT.

NOTE: Construction Drawings of Larger Dimensions can be Seen at the Clerk's Office.

DATED, 1979 05 10
REVISED, 1979 08 10
Orangeville, Ontario



SIGNED, *E. H. Uderstadt*, O.L.S.
E. H. UDERSTADT INC.
Land Surveyors & Municipal Drainage Consultants



BENCH MARKS

A 0+00	TOP E. UPST. CONC. WHEELGUARD	700' N.	20.00
A 9+35	SPIKE IN 8" DIA. ELM. TREE	40' N.	23.79
A 19+35	SPIKE IN DEAD TREE (15' W. 28.76)	60' E.	28.27
A 30+70	SPIKE IN 18" DIA. SPRUCE TREE	1' W.	37.45
A 44+00	SPIKE IN DEAD TREE	75' W.	47.39
A 54+00	TOP CENTRE DWST CONC. WHEELGUARD		54.37
A 79+00	TOP CENTRE STEEL PILE, S.E. LEG, HYDRO TOWER 200' E.		75.61
A 93+50	SPIKE IN FENCE POST	90' W.	69.62
A 18+48	TOP CENTRE DWST 6.0' DIA. C.S.P.		103.36
B 12+15	TOP CENTRE DWST CONC. WHEELGUARD		28.39
B 35+20	SPIKE IN DEAD TREE	75' W.	51.77
C 11+15	SPIKE IN FENCE POST	60' N.	28.93
C 37+50	SPIKE IN FENCE POST	5' W.	42.83
C 44+25	SPIKE IN FENCE POST	90' E.	47.71
C 71+00	SPIKE IN FENCE POST	18' W.	73.46
D 3+40	SPIKE IN FENCE POST	80' W.	45.36
D 24+20	SPIKE IN FENCE POST	50' E.	69.41
D 34+50	TOP CENTRE DWST 2.0' DIA. C.S.P.		79.11

A DRAIN TILE SIZES

A 53+50-A 53+70	20 LIN. FT. 21" DIA. 16 GA. M.P. WITH GRATE
A 53+70-A 57+00	250 LIN. FT. 18" DIA. FIELD TILE
CON. ROAD 13-14	40 LIN. FT. 21" DIA. 14 GA. M.P.
A 57+00-A 58+00	100 LIN. FT. 16" DIA. FIELD TILE
FARM LAKE	20 LIN. FT. 18" DIA. 16 GA. M.P.
A 58+00-A 119+25	2215 LIN. FT. 14" DIA. FIELD TILE
FARM LAKE	20 LIN. FT. 15" DIA. 16 GA. M.P.
COUNTY RD. #3	50 LIN. FT. 18" DIA. SMOOTHWALL WELDED PIPE (0.25')
CATCH BASINS:	40 LIN. FT. 18" DIA. 16 GA. M.P. (20' EACH SIDE)
	A 81+40, A 97+50, A 118+25, A 119+25

D DRAIN TILE SIZES

D 4+80-D 5+00	20 LIN. FT. 15" DIA. 16 GA. M.P. WITH GRATE
D 5+00-D 20+00	1500 LIN. FT. 12" DIA. FIELD TILE
D 20+00-D 35+05	1465 LIN. FT. 10" DIA. FIELD TILE
CON. ROAD 13-14	40 LIN. FT. 12" DIA. 14 GA. M.P.
CATCH BASINS:	D 13+65, D 24+20, D 35+05

PROFILES

OF THE

BROUWER DRAINAGE WORKS

IN THE

TOWNSHIP OF EAST GARAFRAXA

SCALE: VERT. 1" = 10' HORIZ. 1" = 100'

NOTE: Construction Drawings of Larger Dimensions can be Seen at the Clerk's Office.

C71+00-C71+40
NOT TO SCALE

DATED: 1979.05.10
REVISED: 1979.08.10
Georgierville, Ontario

ASSOCIATION OF ONTARIO LAND SURVEYORS
E. H. ODERSTADT
SIGNED: [Signature]
LORD SURVEYORS & MUNICIPAL DRAINAGE CONSULTANTS

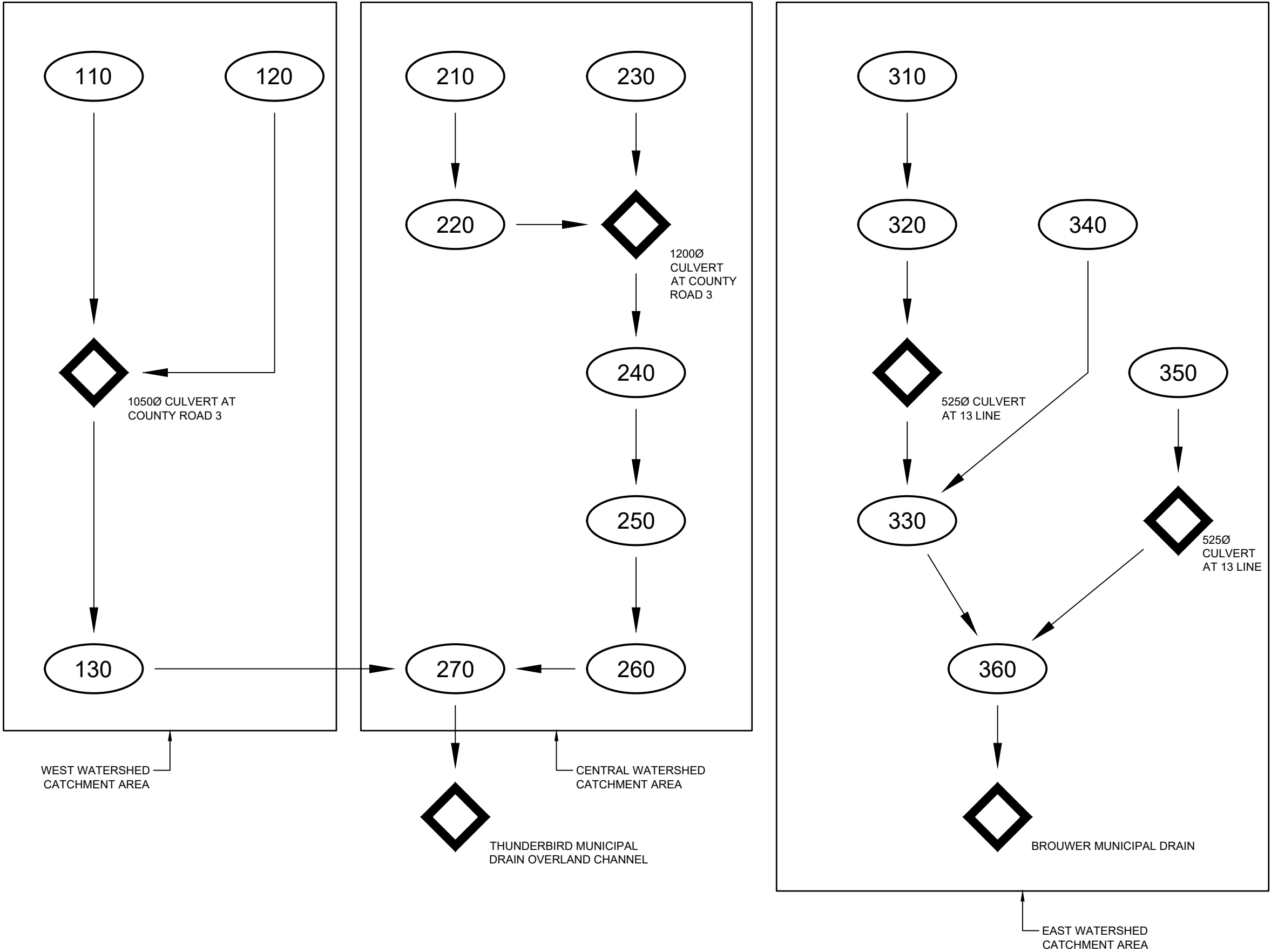
Sheet 2 of 2 D-GA-E-106

APPENDIX F:

PRE-DEVELOPMENT CONDITIONS ANALYSIS

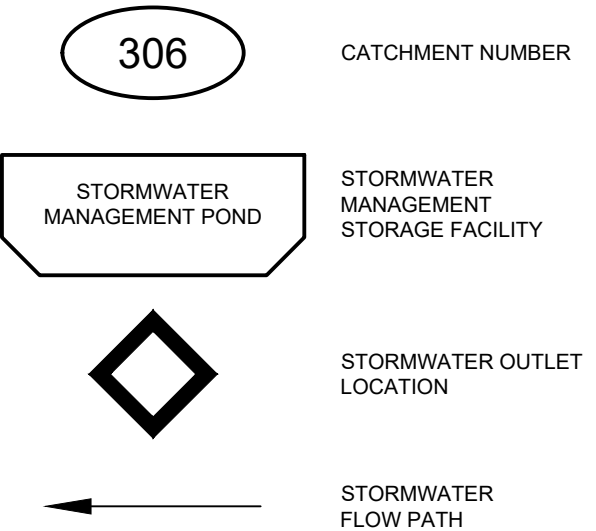
- MIDUSS MODEL SCHEMATIC – Pre-Development Model
- MIDUSS Output Files
 - 25mm
 - 2-Year
 - 5-Year
 - 25-Year
 - 50-Year
 - 100-Year
 - 100-Year SCS Type II
 - Regional

FILE: B:\Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tuntio Prop)\Drawings\418153 - FSR FIGURES - APPENDIX A AND B.dwg LAYOUT: PRE DEV MODEL SCHEMATIC
LAST SAVED BY: E:\vabir3950, 9/3/2024 3:41:35 PM PLOTTED BY: Birch, Evan 9/3/2024 4:20:40 PM



MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA

LEGEND



PRE DEVELOPMENT
MODELING SCHEMATIC

APPENDIX F



418153 - 420004
MAY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                      Pre__25mm.out"
"          Licensee name:                      gmbp"
"          Company"
"          Date & Time last used:                9/4/2024 at 11:25:19 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          367.000  Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          72.993  mm/hr"
"          Total depth          24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380  Total Area"
"          275.000  Flow length"
"          1.400  Overland Slope"
"          10.172  Pervious Area"
"          275.000  Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.025	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	---	10.581	10.581	minutes"
"		Time to Centroid	0.000	73.794	73.794	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	2542.63	51.89	2594.52	c.m"
"		Rainfall losses	24.995	1.565	24.527	mm"
"		Runoff depth	0.000	23.430	0.469	mm"
"		Runoff volume	0.00	48.64	48.64	c.m"
"		Runoff coefficient	0.000	0.937	0.019	"
"		Maximum flow	0.000	0.025	0.025	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.025	0.025	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.078	0.025	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	---	7.519	7.519	minutes"
"		Time to Centroid	0.000	69.840	69.840	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	2360.31	124.23	2484.54	c.m"
"		Rainfall losses	24.995	1.625	23.827	mm"
"		Runoff depth	0.000	23.370	1.169	mm"

"	Runoff volume	0.00	116.15	116.15	c.m"
"	Runoff coefficient	0.000	0.935	0.047	"
"	Maximum flow	0.000	0.078	0.078	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.078	0.103	0.000	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		0.103	c.m/sec"	
"	Hydrograph volume		164.791	c.m"	
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.066	0.103	0.000	0.000 c.m/sec"
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	---	8.347	8.347	minutes"
"	Time to Centroid	0.000	70.856	70.856	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	3779.87	116.90	3896.77	c.m"
"	Rainfall losses	24.995	1.548	24.292	mm"
"	Runoff depth	0.000	23.447	0.703	mm"
"	Runoff volume	0.00	109.66	109.66	c.m"
"	Runoff coefficient	0.000	0.938	0.028	"
"	Maximum flow	0.000	0.066	0.066	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.066	0.169	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.066	0.169	0.169	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"		Maximum flow	0.169	c.m/sec"	
"		Hydrograph volume	274.454	c.m"	
"		0.066	0.169	0.169	0.169"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.066	0.000	0.169	0.169"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.017	0.000	0.169	0.169 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	---	8.326	8.326	minutes"
"	Time to Centroid	0.000	70.915	70.915	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	887.38	27.44	914.83	c.m"
"	Rainfall losses	24.995	1.547	24.292	mm"
"	Runoff depth	0.000	23.449	0.703	mm"
"	Runoff volume	0.00	25.75	25.75	c.m"
"	Runoff coefficient	0.000	0.938	0.028	"

"	Maximum flow	0.000	0.017	0.017	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.017 0.017 0.169 0.169"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.066 0.017 0.169 0.169 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration --- 11.998 11.998 minutes"				
"	Time to Centroid 0.000 75.632 75.632 minutes"				
"	Rainfall depth 24.995 24.995 24.995 mm"				
"	Rainfall volume 4572.70 141.42 4714.12 c.m"				
"	Rainfall losses 24.995 1.553 24.292 mm"				
"	Runoff depth 0.000 23.442 0.703 mm"				
"	Runoff volume 0.00 132.63 132.63 c.m"				
"	Runoff coefficient 0.000 0.938 0.028 "				
"	Maximum flow 0.000 0.066 0.066 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.066 0.079 0.169 0.169"				
" 33	CATCHMENT 230"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	230 Catchment 230"				
"	35.000 % Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.147	0.079	0.169	0.169 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	---	3.498	3.498	minutes"
"		Time to Centroid	0.000	64.571	64.571	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	464.66	250.20	714.87	c.m"
"		Rainfall losses	24.995	1.979	16.940	mm"
"		Runoff depth	0.000	23.016	8.056	mm"
"		Runoff volume	0.00	230.39	230.39	c.m"
"		Runoff coefficient	0.000	0.921	0.322	"
"		Maximum flow	0.000	0.147	0.147	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.147	0.224	0.169	0.169"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.224	c.m/sec"		
"		Hydrograph volume	388.770	c.m"		
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.427	0.224	0.169	0.169 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	---	5.411	5.411	minutes"
"		Time to Centroid	0.000	67.070	67.070	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	1286.76	692.87	1979.63	c.m"
"		Rainfall losses	24.995	1.608	16.810	mm"
"		Runoff depth	0.000	23.388	8.186	mm"
"		Runoff volume	0.00	648.30	648.30	c.m"
"		Runoff coefficient	0.000	0.936	0.327	"
"		Maximum flow	0.000	0.427	0.427	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.427	0.651	0.169	0.169"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		0.651	c.m/sec"	
"		Hydrograph volume		1037.074	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

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"      125.000  Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"              0.000      0.651      0.169      0.169 c.m/sec"
"      Catchment 250      Pervious      Impervious Total Area "
"      Surface Area      5.680      0.000      5.680      hectare"
"      Time of concentration      ---      7.806      7.806      minutes"
"      Time to Centroid      0.000      70.224      70.224      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      1419.73      0.00      1419.74      c.m"
"      Rainfall losses      24.995      1.574      24.995      mm"
"      Runoff depth      0.000      23.422      0.000      mm"
"      Runoff volume      0.00      0.00      0.00      c.m"
"      Runoff coefficient      0.000      0.000      0.000      "
"      Maximum flow      0.000      0.000      0.000      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.000      0.651      0.169      0.169"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      0.651      c.m/sec"
"      Hydrograph volume      1037.075      c.m"
" 33      CATCHMENT 260"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      260      Catchment 260"
"      0.000      % Impervious"
"      12.060      Total Area"
"      287.000      Flow length"
"      1.000      Overland Slope"
"      12.060      Pervious Area"
"      287.000      Pervious length"
"      1.000      Pervious slope"
"      0.000      Impervious Area"
"      287.000      Impervious length"
"      1.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"      125.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"

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"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.651	0.169	0.169 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	---	12.008	12.008 minutes"
"		Time to Centroid	0.000	75.646	75.646 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	3014.43	0.00	3014.44 c.m"
"		Rainfall losses	24.995	1.553	24.995 mm"
"		Runoff depth	0.000	23.442	0.000 mm"
"		Runoff volume	0.00	0.00	0.00 c.m"
"		Runoff coefficient	0.000	0.000	0.000 "
"		Maximum flow	0.000	0.000	0.000 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.000	0.651	0.169	0.169"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.651	0.169	0.169 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	---	12.504	12.504 minutes"
"		Time to Centroid	0.000	76.302	76.302 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"

"	Rainfall volume	3739.30	0.00	3739.30	c.m"
"	Rainfall losses	24.995	1.558	24.995	mm"
"	Runoff depth	0.000	23.437	0.000	mm"
"	Runoff volume	0.00	0.00	0.00	c.m"
"	Runoff coefficient	0.000	0.000	0.000	"
"	Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.000	0.651	0.169	0.169"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		0.651		c.m/sec"
"	Hydrograph volume		1037.081		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.000	0.651	0.651	0.169"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		0.820		c.m/sec"
"	Hydrograph volume		1311.535		c.m"
"		0.000	0.651	0.651	0.820"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		0.820		c.m/sec"
"	Hydrograph volume		1311.536		c.m"
"		0.000	0.820	0.651	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		0.820		c.m/sec"
"	Hydrograph volume		1311.536		c.m"
" 52	CHANNEL DESIGN"				
"	0.820 Current peak flow				c.m/sec"
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth				metre"
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth				metre"
"	1.000 Gradient				%"
"	Depth of flow		0.191		metre"
"	Velocity		0.771		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.136		metre"
" 53	ROUTE Channel Route 750"				

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"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.478      X-factor <= 0.5"
"    243.142      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"      3          No. of sub-reaches"
"      Peak outflow              0.749      c.m/sec"
"      0.000      0.820      0.749      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"      5          Next link "
"      0.000      0.749      0.749      0.000"
" 52      CHANNEL DESIGN"
"      0.749      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"      0.          Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"      Depth of flow              0.429      metre"
"      Velocity                    1.062      m/sec"
"      Channel capacity            19.656      c.m/sec"
"      Critical depth              0.325      metre"
" 64      SHOW TABLE"
"      2          Flow hydrograph"
"      5          Outflow Hydrograph"
"      Maximum flow              0.749      c.m/sec"
"      Hydrograph volume          1311.535      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"      8          Copy to Outflow"
"      0.000      0.749      0.749      0.000"
" 40      HYDROGRAPH Combine 900"
"      6          Combine "
"      900      Node #"
"      Combined West and Central Watershed"
"      Maximum flow              0.749      c.m/sec"
"      Hydrograph volume          1311.535      c.m"
"      0.000      0.749      0.749      0.749"
" 40      HYDROGRAPH Start - New Tributary"
"      2          Start - New Tributary"
"      0.000      0.000      0.749      0.749"
" 33      CATCHMENT 310"
"      1          Triangular SCS"
"      1          Equal length"
"      2          Horton equation"
"      310      Catchment 310."

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"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.118 0.000 0.749 0.749 c.m/sec"			
"		Catchment 310 Pervious Impervious Total Area "			
"		Surface Area 19.342 1.018 20.360 hectare"			
"		Time of concentration --- 12.891 12.891 minutes"			
"		Time to Centroid 0.000 76.815 76.815 minutes"			
"		Rainfall depth 24.995 24.995 24.995 mm"			
"		Rainfall volume 4834.60 254.45 5089.05 c.m"			
"		Rainfall losses 24.995 1.596 23.825 mm"			
"		Runoff depth 0.000 23.399 1.170 mm"			
"		Runoff volume 0.00 238.20 238.20 c.m"			
"		Runoff coefficient 0.000 0.936 0.047 "			
"		Maximum flow 0.000 0.118 0.118 c.m/sec"			
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.118 0.118 0.749 0.749"			
" 33		CATCHMENT 320"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	320	Catchment 320"			
"	35.000	% Impervious"			
"	5.060	Total Area"			
"	89.000	Flow length"			
"	1.000	Overland Slope"			
"	3.289	Pervious Area"			
"	89.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.771	Impervious Area"			
"	89.000	Impervious length"			
"	1.000	Impervious slope"			

"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.272	0.118	0.749	0.749 c.m/sec"
"		Catchment 320	Pervious	Impervious	Total Area "
"		Surface Area	3.289	1.771	5.060 hectare"
"		Time of concentration	---	5.948	5.948 minutes"
"		Time to Centroid	0.000	67.778	67.778 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	822.10	442.67	1264.76 c.m"
"		Rainfall losses	24.995	1.622	16.815 mm"
"		Runoff depth	0.000	23.374	8.181 mm"
"		Runoff volume	0.00	413.95	413.95 c.m"
"		Runoff coefficient	0.000	0.935	0.327 "
"		Maximum flow	0.000	0.272	0.272 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.272	0.371	0.749	0.749"
" 33		CATCHMENT 330"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	330	Catchment 330"			
"	35.000	% Impervious"			
"	0.750	Total Area"			
"	50.000	Flow length"			
"	0.500	Overland Slope"			
"	0.488	Pervious Area"			
"	50.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.262	Impervious Area"			
"	50.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

	0.040	0.371	0.749	0.749 c.m/sec"	
"	Catchment 330	Pervious	Impervious	Total Area	"
"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	---	5.181	5.181	minutes"
"	Time to Centroid	0.000	66.756	66.756	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	121.85	65.61	187.47	c.m"
"	Rainfall losses	24.995	1.653	16.826	mm"
"	Runoff depth	0.000	23.342	8.170	mm"
"	Runoff volume	0.00	61.27	61.27	c.m"
"	Runoff coefficient	0.000	0.934	0.327	"
"	Maximum flow	0.000	0.040	0.040	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "		
"		0.040	0.411	0.749 0.749"

" 33	CATCHMENT 340"
"	1 Triangular SCS"
"	1 Equal length"
"	2 Horton equation"
"	340 Catchment 340"
"	35.000 % Impervious"
"	1.910 Total Area"
"	100.000 Flow length"
"	0.500 Overland Slope"
"	1.241 Pervious Area"
"	100.000 Pervious length"
"	0.500 Pervious slope"
"	0.669 Impervious Area"
"	100.000 Impervious length"
"	0.500 Impervious slope"
"	0.250 Pervious Manning 'n' "
"	125.000 Pervious Max.infiltration"
"	5.000 Pervious Min.infiltration"
"	0.250 Pervious Lag constant (hours)"
"	5.000 Pervious Depression storage"
"	0.015 Impervious Manning 'n' "
"	0.000 Impervious Max.infiltration"
"	0.000 Impervious Min.infiltration"
"	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage"

	0.104	0.411	0.749	0.749 c.m/sec"	
"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	---	7.854	7.854	minutes"
"	Time to Centroid	0.000	70.289	70.289	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	310.32	167.09	477.41	c.m"
"	Rainfall losses	24.995	1.566	16.795	mm"
"	Runoff depth	0.000	23.429	8.200	mm"
"	Runoff volume	0.00	156.62	156.62	c.m"

"	Runoff coefficient	0.000	0.937	0.328	"
"	Maximum flow	0.000	0.104	0.104	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.104	0.516	0.749	0.749"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.010	0.516	0.749	0.749 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	---	5.712	5.712	minutes"
"	Time to Centroid	0.000	67.451	67.451	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	299.19	15.75	314.94	c.m"
"	Rainfall losses	24.995	1.598	23.825	mm"
"	Runoff depth	0.000	23.398	1.170	mm"
"	Runoff volume	0.00	14.74	14.74	c.m"
"	Runoff coefficient	0.000	0.936	0.047	"
"	Maximum flow	0.000	0.010	0.010	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.010	0.525	0.749	0.749"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

```

"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.010      0.525      0.749      0.749 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration      ---      10.832      10.832      minutes"
"      Time to Centroid      0.000      74.130      74.130      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      992.07      20.25      1012.31      c.m"
"      Rainfall losses      24.995      1.549      24.526      mm"
"      Runoff depth      0.000      23.446      0.469      mm"
"      Runoff volume      0.00      18.99      18.99      c.m"
"      Runoff coefficient      0.000      0.938      0.019      "
"      Maximum flow      0.000      0.010      0.010      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.010      0.535      0.749      0.749"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow          0.535      c.m/sec"
"      Hydrograph volume      903.779      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area          135.300      hectare"
"      Total Impervious area          9.485      hectare"
"      Total % impervious          7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__2yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:27:31 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          414.876 Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity      100.235  mm/hr"
"          Total depth            39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380 Total Area"
"          275.000 Flow length"
"          1.400  Overland Slope"
"          10.172 Pervious Area"
"          275.000 Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.042	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	---	9.320	9.320	minutes"
"		Time to Centroid	0.000	125.908	125.908	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	4018.51	82.01	4100.52	c.m"
"		Rainfall losses	39.504	1.645	38.747	mm"
"		Runoff depth	0.000	37.859	0.757	mm"
"		Runoff volume	0.00	78.59	78.59	c.m"
"		Runoff coefficient	0.000	0.958	0.019	"
"		Maximum flow	0.000	0.042	0.042	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.042	0.042	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.113	0.042	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	---	6.623	6.623	minutes"
"		Time to Centroid	0.000	121.797	121.797	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	3730.36	196.33	3926.70	c.m"
"		Rainfall losses	39.504	1.831	37.620	mm"
"		Runoff depth	0.000	37.673	1.884	mm"

"	Runoff volume	0.00	187.24	187.24	c.m"
"	Runoff coefficient	0.000	0.954	0.048	"
"	Maximum flow	0.000	0.113	0.113	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.113	0.156	0.000	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.156	c.m/sec"		
"	Hydrograph volume	265.831	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.108	0.156	0.000	0.000 c.m/sec"	
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	---	7.352	7.352	minutes"
"	Time to Centroid	0.000	122.862	122.862	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	5973.92	184.76	6158.68	c.m"
"	Rainfall losses	39.504	1.661	38.369	mm"
"	Runoff depth	0.000	37.843	1.135	mm"
"	Runoff volume	0.00	176.99	176.99	c.m"
"	Runoff coefficient	0.000	0.958	0.029	"
"	Maximum flow	0.000	0.108	0.108	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.108	0.263	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.108	0.263	0.263	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"		Maximum flow	0.263	c.m/sec"	
"		Hydrograph volume	442.825	c.m"	
"		0.108	0.263	0.263	0.263"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.108	0.000	0.263	0.263"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.025	0.000	0.263	0.263 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	---	7.334	7.334	minutes"
"	Time to Centroid	0.000	122.833	122.833	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	1402.47	43.38	1445.85	c.m"
"	Rainfall losses	39.504	1.664	38.369	mm"
"	Runoff depth	0.000	37.840	1.135	mm"
"	Runoff volume	0.00	41.55	41.55	c.m"
"	Runoff coefficient	0.000	0.958	0.029	"

"		Maximum flow	0.000	0.025	0.025	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.025	0.025	0.263	0.263"	
" 33		CATCHMENT 220"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	220	Catchment 220"				
"	3.000	% Impervious"				
"	18.860	Total Area"				
"	351.000	Flow length"				
"	1.500	Overland Slope"				
"	18.294	Pervious Area"				
"	351.000	Pervious length"				
"	1.500	Pervious slope"				
"	0.566	Impervious Area"				
"	351.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.109	0.025	0.263	0.263 c.m/sec"	
"		Catchment 220	Pervious	Impervious	Total Area	"
"		Surface Area	18.294	0.566	18.860	hectare"
"		Time of concentration	---	10.569	10.569	minutes"
"		Time to Centroid	0.000	127.865	127.865	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	7226.94	223.51	7450.46	c.m"
"		Rainfall losses	39.504	1.588	38.367	mm"
"		Runoff depth	0.000	37.916	1.137	mm"
"		Runoff volume	0.00	214.53	214.53	c.m"
"		Runoff coefficient	0.000	0.960	0.029	"
"		Maximum flow	0.000	0.109	0.109	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.109	0.134	0.263	0.263"	
" 33		CATCHMENT 230"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	230	Catchment 230"				
"	35.000	% Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.247	0.134	0.263	0.263 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	---	3.081	3.081	minutes"
"		Time to Centroid	0.000	116.272	116.272	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	734.38	395.44	1129.81	c.m"
"		Rainfall losses	39.504	2.281	26.476	mm"
"		Runoff depth	0.000	37.223	13.028	mm"
"		Runoff volume	0.00	372.60	372.60	c.m"
"		Runoff coefficient	0.000	0.942	0.330	"
"		Maximum flow	0.000	0.247	0.247	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.247	0.334	0.263	0.263"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		0.334	c.m/sec"	
"		Hydrograph volume		628.677	c.m"	
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.606	0.334	0.263	0.263 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	---	4.766	4.766	minutes"
"		Time to Centroid	0.000	118.752	118.752	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	2033.67	1095.05	3128.72	c.m"
"		Rainfall losses	39.504	1.647	26.254	mm"
"		Runoff depth	0.000	37.857	13.250	mm"
"		Runoff volume	0.00	1049.38	1049.38	c.m"
"		Runoff coefficient	0.000	0.958	0.335	"
"		Maximum flow	0.000	0.606	0.606	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.606	0.941	0.263	0.263"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.941	c.m/sec"		
"		Hydrograph volume	1678.060	c.m"		
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.000	0.941	0.263	0.263 c.m/sec"	
"		Catchment 250	Pervious	Impervious	Total Area	"
"		Surface Area	5.680	0.000	5.680	hectare"
"		Time of concentration	---	6.876	6.876	minutes"
"		Time to Centroid	0.000	122.204	122.204	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	2243.83	0.00	2243.83	c.m"
"		Rainfall losses	39.504	1.800	39.504	mm"
"		Runoff depth	0.000	37.705	0.000	mm"
"		Runoff volume	0.00	0.00	0.00	c.m"
"		Runoff coefficient	0.000	0.000	0.000	"
"		Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.941	0.263	0.263"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.941	c.m/sec"		
"		Hydrograph volume	1678.062	c.m"		
" 33		CATCHMENT 260"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	260	Catchment 260"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.941	0.263	0.263 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	---	10.578	10.578 minutes"
"		Time to Centroid	0.000	127.879	127.879 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	4764.18	0.00	4764.18 c.m"
"		Rainfall losses	39.504	1.588	39.504 mm"
"		Runoff depth	0.000	37.916	0.000 mm"
"		Runoff volume	0.00	0.00	0.00 c.m"
"		Runoff coefficient	0.000	0.000	0.000 "
"		Maximum flow	0.000	0.000	0.000 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.000	0.941	0.263	0.263"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.941	0.263	0.263 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	---	11.014	11.014 minutes"
"		Time to Centroid	0.000	128.567	128.567 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"

"	Rainfall volume	5909.79	0.01	5909.80	c.m"
"	Rainfall losses	39.504	1.605	39.504	mm"
"	Runoff depth	0.000	37.899	0.000	mm"
"	Runoff volume	0.00	0.01	0.01	c.m"
"	Runoff coefficient	0.000	0.000	0.000	"
"	Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.000	0.941	0.263	0.263"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		0.941		c.m/sec"
"	Hydrograph volume		1678.073		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.000	0.941	0.941	0.263"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		1.136		c.m/sec"
"	Hydrograph volume		2120.897		c.m"
"		0.000	0.941	0.941	1.136"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		1.136		c.m/sec"
"	Hydrograph volume		2120.897		c.m"
"		0.000	1.136	0.941	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		1.136		c.m/sec"
"	Hydrograph volume		2120.897		c.m"
" 52	CHANNEL DESIGN"				
"	1.136 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.231		metre"
"	Velocity		0.865		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.168		metre"
" 53	ROUTE Channel Route 750"				

```

"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.473      X-factor <= 0.5"
"    216.856      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"      3          No. of sub-reaches"
"      Peak outflow              1.136      c.m/sec"
"      0.000      1.136      1.136      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"      5          Next link "
"      0.000      1.136      1.136      0.000"
" 52      CHANNEL DESIGN"
"      1.136      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"      0.          Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"      Depth of flow              0.532      metre"
"      Velocity              1.188      m/sec"
"      Channel capacity              19.656      c.m/sec"
"      Critical depth              0.411      metre"
" 64      SHOW TABLE"
"      2          Flow hydrograph"
"      5          Outflow Hydrograph"
"      Maximum flow              1.136      c.m/sec"
"      Hydrograph volume              2120.898      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"      8          Copy to Outflow"
"      0.000      1.136      1.136      0.000"
" 40      HYDROGRAPH Combine 900"
"      6          Combine "
"      900      Node #"
"      Combined West and Central Watershed"
"      Maximum flow              1.136      c.m/sec"
"      Hydrograph volume              2120.898      c.m"
"      0.000      1.136      1.136      1.136"
" 40      HYDROGRAPH Start - New Tributary"
"      2          Start - New Tributary"
"      0.000      0.000      1.136      1.136"
" 33      CATCHMENT 310"
"      1          Triangular SCS"
"      1          Equal length"
"      2          Horton equation"
"      310      Catchment 310."

```

"	5.000	% Impervious"
"	20.360	Total Area"
"	323.000	Flow length"
"	1.000	Overland Slope"
"	19.342	Pervious Area"
"	323.000	Pervious length"
"	1.000	Pervious slope"
"	1.018	Impervious Area"
"	323.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	0.188	0.000 1.136 1.136 c.m/sec"
"	Catchment 310	Pervious Impervious Total Area "
"	Surface Area	19.342 1.018 20.360 hectare"
"	Time of concentration	--- 11.355 11.355 minutes"
"	Time to Centroid	0.000 129.111 129.111 minutes"
"	Rainfall depth	39.504 39.504 39.504 mm"
"	Rainfall volume	7640.87 402.15 8043.02 c.m"
"	Rainfall losses	39.504 1.608 37.609 mm"
"	Runoff depth	0.000 37.896 1.895 mm"
"	Runoff volume	0.00 385.79 385.79 c.m"
"	Runoff coefficient	0.000 0.959 0.048 "
"	Maximum flow	0.000 0.188 0.188 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	0.188 0.188 1.136 1.136"	
" 33	CATCHMENT 320"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	320 Catchment 320"	
"	35.000 % Impervious"	
"	5.060 Total Area"	
"	89.000 Flow length"	
"	1.000 Overland Slope"	
"	3.289 Pervious Area"	
"	89.000 Pervious length"	
"	1.000 Pervious slope"	
"	1.771 Impervious Area"	
"	89.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.381	0.188	1.136	1.136 c.m/sec"
"		Catchment 320	Pervious	Impervious	Total Area "
"		Surface Area	3.289	1.771	5.060 hectare"
"		Time of concentration	---	5.240	5.240 minutes"
"		Time to Centroid	0.000	119.494	119.494 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	1299.29	699.62	1998.90 c.m"
"		Rainfall losses	39.504	1.649	26.255 mm"
"		Runoff depth	0.000	37.855	13.249 mm"
"		Runoff volume	0.00	670.41	670.41 c.m"
"		Runoff coefficient	0.000	0.958	0.335 "
"		Maximum flow	0.000	0.381	0.381 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.381	0.569	1.136	1.136"
" 33		CATCHMENT 330"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	330	Catchment 330"			
"	35.000	% Impervious"			
"	0.750	Total Area"			
"	50.000	Flow length"			
"	0.500	Overland Slope"			
"	0.488	Pervious Area"			
"	50.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.262	Impervious Area"			
"	50.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

	0.058	0.569	1.136	1.136 c.m/sec"	
"	Catchment 330	Pervious	Impervious	Total Area	"
"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	---	4.564	4.564	minutes"
"	Time to Centroid	0.000	118.438	118.438	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	192.58	103.70	296.28	c.m"
"	Rainfall losses	39.504	1.673	26.263	mm"
"	Runoff depth	0.000	37.831	13.241	mm"
"	Runoff volume	0.00	99.31	99.31	c.m"
"	Runoff coefficient	0.000	0.958	0.335	"
"	Maximum flow	0.000	0.058	0.058	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.058	0.621	1.136	1.136"
--	-------	-------	-------	--------

" 33 CATCHMENT 340"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	340	Catchment 340"
"	35.000	% Impervious"
"	1.910	Total Area"
"	100.000	Flow length"
"	0.500	Overland Slope"
"	1.241	Pervious Area"
"	100.000	Pervious length"
"	0.500	Pervious slope"
"	0.669	Impervious Area"
"	100.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

	0.153	0.621	1.136	1.136 c.m/sec"
--	-------	-------	-------	----------------

"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	---	6.918	6.918	minutes"
"	Time to Centroid	0.000	122.267	122.267	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	490.44	264.08	754.53	c.m"
"	Rainfall losses	39.504	1.781	26.301	mm"
"	Runoff depth	0.000	37.723	13.203	mm"
"	Runoff volume	0.00	252.18	252.18	c.m"

"	Runoff coefficient	0.000	0.955	0.334	"
"	Maximum flow	0.000	0.153	0.153	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.153	0.774	1.136	1.136"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.013	0.774	1.136	1.136 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	---	5.031	5.031	minutes"
"	Time to Centroid	0.000	119.147	119.147	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	472.86	24.89	497.75	c.m"
"	Rainfall losses	39.504	1.643	37.611	mm"
"	Runoff depth	0.000	37.861	1.893	mm"
"	Runoff volume	0.00	23.85	23.85	c.m"
"	Runoff coefficient	0.000	0.958	0.048	"
"	Maximum flow	0.000	0.013	0.013	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.013	0.788	1.136	1.136"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

```

"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.016      0.788      1.136      1.136 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration      ---      9.541      9.541      minutes"
"      Time to Centroid      0.000      126.260      126.260      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      1567.91      32.00      1599.91      c.m"
"      Rainfall losses      39.504      1.665      38.747      mm"
"      Runoff depth      0.000      37.839      0.757      mm"
"      Runoff volume      0.00      30.65      30.65      c.m"
"      Runoff coefficient      0.000      0.958      0.019      "
"      Maximum flow      0.000      0.016      0.016      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.016      0.804      1.136      1.136"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      0.804      c.m/sec"
"      Hydrograph volume      1462.179      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__5yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:29:04 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          544.711 Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          130.581  mm/hr"
"          Total depth                50.743  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380 Total Area"
"          275.000 Flow length"
"          1.400  Overland Slope"
"          10.172 Pervious Area"
"          275.000 Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.098	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	72.424	8.385	58.694	minutes"
"		Time to Centroid	177.209	123.667	165.730	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	5161.78	105.34	5267.12	c.m"
"		Rainfall losses	47.072	1.656	46.164	mm"
"		Runoff depth	3.671	49.087	4.579	mm"
"		Runoff volume	373.41	101.90	475.31	c.m"
"		Runoff coefficient	0.072	0.967	0.090	"
"		Maximum flow	0.092	0.057	0.098	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.098	0.098	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.171	0.098	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	51.469	5.958	32.733	minutes"
"		Time to Centroid	155.526	119.917	140.866	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	4791.66	252.19	5043.85	c.m"
"		Rainfall losses	47.070	1.909	44.812	mm"
"		Runoff depth	3.673	48.834	5.931	mm"

"	Runoff volume	346.83	242.71	589.54	c.m"
"	Runoff coefficient	0.072	0.962	0.117	"
"	Maximum flow	0.115	0.145	0.171	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.171	0.244	0.000	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.244	c.m/sec"		
"	Hydrograph volume	1064.848	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.187	0.244	0.000	0.000 c.m/sec"	
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	57.133	6.614	42.411	minutes"
"	Time to Centroid	161.440	120.984	149.651	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	7673.50	237.32	7910.83	c.m"
"	Rainfall losses	47.072	1.923	45.717	mm"
"	Runoff depth	3.671	48.820	5.026	mm"
"	Runoff volume	555.21	228.33	783.54	c.m"
"	Runoff coefficient	0.072	0.962	0.099	"
"	Maximum flow	0.171	0.139	0.187	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.187	0.418	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.187	0.418	0.418	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"		Maximum flow	0.418	c.m/sec"	
"		Hydrograph volume	1848.387	c.m"	
"		0.187	0.418	0.418	0.418"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.187	0.000	0.418	0.418"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.044	0.000	0.418	0.418 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	56.991	6.598	42.304	minutes"
"	Time to Centroid	161.287	120.956	149.533	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	1801.48	55.72	1857.19	c.m"
"	Rainfall losses	47.072	1.920	45.717	mm"
"	Runoff depth	3.671	48.823	5.025	mm"
"	Runoff volume	130.32	53.61	183.93	c.m"
"	Runoff coefficient	0.072	0.962	0.099	"

"	Maximum flow	0.040	0.033	0.044	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.044 0.044 0.418 0.418"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.170 0.044 0.418 0.418 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration 82.126 9.508 60.898 minutes"				
"	Time to Centroid 187.114 125.447 169.087 minutes"				
"	Rainfall depth 50.743 50.743 50.743 mm"				
"	Rainfall volume 9283.02 287.10 9570.12 c.m"				
"	Rainfall losses 47.072 1.709 45.711 mm"				
"	Runoff depth 3.671 49.034 5.032 mm"				
"	Runoff volume 671.63 277.44 949.06 c.m"				
"	Runoff coefficient 0.072 0.966 0.099 "				
"	Maximum flow 0.148 0.149 0.170 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.170 0.211 0.418 0.418"				
" 33	CATCHMENT 230"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	230 Catchment 230"				
"	35.000 % Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.333	0.211	0.418	0.418 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	23.945	2.772	5.382	minutes"
"		Time to Centroid	126.743	114.796	116.268	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	943.31	507.94	1451.25	c.m"
"		Rainfall losses	47.069	2.213	31.370	mm"
"		Runoff depth	3.674	48.530	19.373	mm"
"		Runoff volume	68.29	485.79	554.08	c.m"
"		Runoff coefficient	0.072	0.956	0.382	"
"		Maximum flow	0.045	0.327	0.333	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.333	0.471	0.418	0.418"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.471	c.m/sec"		
"		Hydrograph volume	1687.073	c.m"		
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.830	0.471	0.418	0.418 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	37.035	4.288	8.298	minutes"
"		Time to Centroid	140.408	117.180	120.024	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	2612.25	1406.59	4018.84	c.m"
"		Rainfall losses	47.070	1.869	31.250	mm"
"		Runoff depth	3.672	48.874	19.493	mm"
"		Runoff volume	189.06	1354.79	1543.85	c.m"
"		Runoff coefficient	0.072	0.963	0.384	"
"		Maximum flow	0.082	0.821	0.830	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.830	1.300	0.418	0.418"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.300	c.m/sec"	
"		Hydrograph volume		3230.920	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.066	1.300	0.418	0.418 c.m/sec"	
"		Catchment 250	Pervious	Impervious	Total Area	"
"		Surface Area	5.680	0.000	5.680	hectare"
"		Time of concentration	53.432	6.186	53.431	minutes"
"		Time to Centroid	157.563	120.287	157.563	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	2882.20	0.00	2882.20	c.m"
"		Rainfall losses	47.072	1.885	47.072	mm"
"		Runoff depth	3.671	48.858	3.671	mm"
"		Runoff volume	208.49	0.00	208.49	c.m"
"		Runoff coefficient	0.072	0.000	0.072	"
"		Maximum flow	0.066	0.000	0.066	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.066	1.305	0.418	0.418"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	1.305	c.m/sec"		
"		Hydrograph volume	3439.411	c.m"		
" 33		CATCHMENT 260"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	260	Catchment 260"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.097	1.305	0.418	0.418 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	82.196	9.516	82.195 minutes"
"		Time to Centroid	187.186	125.460	187.186 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"
"		Rainfall volume	6119.59	0.01	6119.60 c.m"
"		Rainfall losses	47.072	1.710	47.072 mm"
"		Runoff depth	3.671	49.033	3.671 mm"
"		Runoff volume	442.77	0.01	442.77 c.m"
"		Runoff coefficient	0.072	0.000	0.072 "
"		Maximum flow	0.097	0.000	0.097 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.097	1.310	0.418	0.418"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.114	1.310	0.418	0.418 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	85.587	9.908	85.586 minutes"
"		Time to Centroid	190.634	126.103	190.633 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"

"	Rainfall volume	7591.14	0.01	7591.15	c.m"
"	Rainfall losses	47.071	1.748	47.071	mm"
"	Runoff depth	3.672	48.995	3.672	mm"
"	Runoff volume	549.27	0.01	549.27	c.m"
"	Runoff coefficient	0.072	0.000	0.072	"
"	Maximum flow	0.114	0.000	0.114	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.114	1.316	0.418	0.418"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		1.316		c.m/sec"
"	Hydrograph volume		4431.458		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.114	1.316	1.316	0.418"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		1.623		c.m/sec"
"	Hydrograph volume		6279.847		c.m"
"		0.114	1.316	1.316	1.623"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		1.623		c.m/sec"
"	Hydrograph volume		6279.848		c.m"
"		0.114	1.623	1.316	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		1.623		c.m/sec"
"	Hydrograph volume		6279.848		c.m"
" 52	CHANNEL DESIGN"				
"	1.623 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.284		metre"
"	Velocity		0.977		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.211		metre"
" 53	ROUTE Channel Route 750"				

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"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.478      X-factor <= 0.5"
" 287.791      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"   300.000      Routing time step  ( seconds)"
"          2      No. of sub-reaches"
"          Peak outflow              1.620      c.m/sec"
"          0.114      1.623      1.620      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          0.114      1.620      1.620      0.000"
" 52      CHANNEL DESIGN"
"      1.620      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"      0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow              0.636      metre"
"          Velocity              1.305      m/sec"
"          Channel capacity              19.656      c.m/sec"
"          Critical depth              0.500      metre"
" 64      SHOW TABLE"
"          2      Flow hydrograph"
"          5      Outflow Hydrograph"
"          Maximum flow              1.620      c.m/sec"
"          Hydrograph volume              6279.828      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.114      1.620      1.620      0.000"
" 40      HYDROGRAPH Combine 900"
"          6      Combine "
"      900      Node #"
"          Combined West and Central Watershed"
"          Maximum flow              1.620      c.m/sec"
"          Hydrograph volume              6279.828      c.m"
"          0.114      1.620      1.620      1.620"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.114      0.000      1.620      1.620"
" 33      CATCHMENT 310"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"      310      Catchment 310."

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"	5.000	% Impervious"
"	20.360	Total Area"
"	323.000	Flow length"
"	1.000	Overland Slope"
"	19.342	Pervious Area"
"	323.000	Pervious length"
"	1.000	Pervious slope"
"	1.018	Impervious Area"
"	323.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	0.278	0.000 1.620 1.620 c.m/sec"
"	Catchment 310	Pervious Impervious Total Area "
"	Surface Area	19.342 1.018 20.360 hectare"
"	Time of concentration	88.236 10.215 56.008 minutes"
"	Time to Centroid	193.317 126.574 165.748 minutes"
"	Rainfall depth	50.743 50.743 50.743 mm"
"	Rainfall volume	0.9815 0.0517 1.0331 ha-m"
"	Rainfall losses	47.072 1.659 44.802 mm"
"	Runoff depth	3.671 49.083 5.941 mm"
"	Runoff volume	710.00 499.67 1209.67 c.m"
"	Runoff coefficient	0.072 0.967 0.117 "
"	Maximum flow	0.144 0.258 0.278 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	0.278 0.278 1.620 1.620"	
" 33	CATCHMENT 320"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	320 Catchment 320"	
"	35.000 % Impervious"	
"	5.060 Total Area"	
"	89.000 Flow length"	
"	1.000 Overland Slope"	
"	3.289 Pervious Area"	
"	89.000 Pervious length"	
"	1.000 Pervious slope"	
"	1.771 Impervious Area"	
"	89.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.511 0.278 1.620 1.620 c.m/sec"			
"		Catchment 320 Pervious Impervious Total Area "			
"		Surface Area 3.289 1.771 5.060 hectare"			
"		Time of concentration 40.715 4.714 9.106 minutes"			
"		Time to Centroid 144.265 117.850 121.073 minutes"			
"		Rainfall depth 50.743 50.743 50.743 mm"			
"		Rainfall volume 1668.94 898.66 2567.59 c.m"			
"		Rainfall losses 47.073 1.696 31.191 mm"			
"		Runoff depth 3.670 49.047 19.552 mm"			
"		Runoff volume 120.71 868.62 989.33 c.m"			
"		Runoff coefficient 0.072 0.967 0.385 "			
"		Maximum flow 0.051 0.506 0.511 c.m/sec"			
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.511 0.758 1.620 1.620"			
" 33		CATCHMENT 330"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	330	Catchment 330"			
"	35.000	% Impervious"			
"	0.750	Total Area"			
"	50.000	Flow length"			
"	0.500	Overland Slope"			
"	0.488	Pervious Area"			
"	50.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.262	Impervious Area"			
"	50.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

"	0.080	0.758	1.620	1.620 c.m/sec"
"	Catchment 330	Pervious	Impervious	Total Area "
"	Surface Area	0.488	0.262	0.750 hectare"
"	Time of concentration	35.466	4.106	7.955 minutes"
"	Time to Centroid	138.756	116.922	119.602 minutes"
"	Rainfall depth	50.743	50.743	50.743 mm"
"	Rainfall volume	247.37	133.20	380.57 c.m"
"	Rainfall losses	47.073	2.023	31.305 mm"
"	Runoff depth	3.670	48.720	19.438 mm"
"	Runoff volume	17.89	127.89	145.78 c.m"
"	Runoff coefficient	0.072	0.960	0.383 "
"	Maximum flow	0.008	0.079	0.080 c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

"	0.080	0.825	1.620	1.620"
---	-------	-------	-------	--------

" 33 CATCHMENT 340"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	340	Catchment 340"
"	35.000	% Impervious"
"	1.910	Total Area"
"	100.000	Flow length"
"	0.500	Overland Slope"
"	1.241	Pervious Area"
"	100.000	Pervious length"
"	0.500	Pervious slope"
"	0.669	Impervious Area"
"	100.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"	0.200	0.825	1.620	1.620 c.m/sec"
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"	Catchment 340	Pervious	Impervious	Total Area "
"	Surface Area	1.241	0.669	1.910 hectare"
"	Time of concentration	53.757	6.223	12.043 minutes"
"	Time to Centroid	157.900	120.348	124.945 minutes"
"	Rainfall depth	50.743	50.743	50.743 mm"
"	Rainfall volume	629.97	339.22	969.19 c.m"
"	Rainfall losses	47.073	1.888	31.258 mm"
"	Runoff depth	3.670	48.855	19.485 mm"
"	Runoff volume	45.57	326.60	372.16 c.m"

"	Runoff coefficient	0.072	0.963	0.384	"
"	Maximum flow	0.014	0.196	0.200	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.200	1.024	1.620	1.620"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.022	1.024	1.620	1.620 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	39.097	4.526	24.835	minutes"
"	Time to Centroid	142.577	117.560	132.256	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	607.39	31.97	639.36	c.m"
"	Rainfall losses	47.070	1.738	44.803	mm"
"	Runoff depth	3.673	49.005	5.939	mm"
"	Runoff volume	43.96	30.87	74.84	c.m"
"	Runoff coefficient	0.072	0.966	0.117	"
"	Maximum flow	0.019	0.018	0.022	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.022	1.046	1.620	1.620"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

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"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.038      1.046      1.620      1.620 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration  74.143      8.584      60.103      minutes"
"      Time to Centroid      178.991      123.993      167.213      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      2013.99      41.10      2055.09      c.m"
"      Rainfall losses      47.070      1.697      46.163      mm"
"      Runoff depth      3.673      49.046      4.580      mm"
"      Runoff volume      145.77      39.73      185.50      c.m"
"      Runoff coefficient      0.072      0.967      0.090      "
"      Maximum flow      0.035      0.022      0.038      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.038      1.074      1.620      1.620"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      1.074      c.m/sec"
"      Hydrograph volume      2977.280      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__10yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:30:23 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          627.308 Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          150.159  mm/hr"
"          Total depth                58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380 Total Area"
"          275.000 Flow length"
"          1.400  Overland Slope"
"          10.172 Pervious Area"
"          275.000 Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.248	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	54.445	7.929	49.497	minutes"
"		Time to Centroid	195.203	122.686	187.489	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	5912.11	120.66	6032.76	c.m"
"		Rainfall losses	48.439	1.659	47.503	mm"
"		Runoff depth	9.680	56.460	10.616	mm"
"		Runoff volume	984.71	117.21	1101.92	c.m"
"		Runoff coefficient	0.167	0.971	0.183	"
"		Maximum flow	0.239	0.072	0.248	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.248	0.248	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.326	0.248	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	38.692	5.635	30.950	minutes"
"		Time to Centroid	171.406	119.023	159.138	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	5488.19	288.85	5777.04	c.m"
"		Rainfall losses	48.442	1.890	46.114	mm"
"		Runoff depth	9.677	56.229	12.005	mm"

"	Runoff volume	913.83	279.46	1193.28	c.m"
"	Runoff coefficient	0.167	0.967	0.207	"
"	Maximum flow	0.303	0.164	0.326	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.326	0.532	0.000	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		0.532	c.m/sec"	
"	Hydrograph volume	2295.200	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.463	0.532	0.000	0.000 c.m/sec"
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	42.950	6.255	37.368	minutes"
"	Time to Centroid	177.837	120.073	169.049	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	8788.95	271.82	9060.77	c.m"
"	Rainfall losses	48.437	1.950	47.043	mm"
"	Runoff depth	9.682	56.169	11.076	mm"
"	Runoff volume	1464.12	262.70	1726.82	c.m"
"	Runoff coefficient	0.167	0.966	0.191	"
"	Maximum flow	0.440	0.158	0.463	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.463	0.995	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.463	0.995	0.995	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"		Maximum flow	0.995	c.m/sec"	
"		Hydrograph volume	4022.027	c.m"	
"		0.463	0.995	0.995	0.995"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.463	0.000	0.995	0.995"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.109	0.000	0.995	0.995 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	42.843	6.239	37.275	minutes"
"	Time to Centroid	177.675	120.047	168.908	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	2063.34	63.81	2127.16	c.m"
"	Rainfall losses	48.437	1.948	47.042	mm"
"	Runoff depth	9.682	56.171	11.077	mm"
"	Runoff volume	343.73	61.68	405.41	c.m"
"	Runoff coefficient	0.167	0.966	0.191	"

"	Maximum flow	0.104	0.037	0.109	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.109 0.109 0.995 0.995"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.402 0.109 0.995 0.995 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration 61.739 8.991 53.682 minutes"				
"	Time to Centroid 206.176 124.327 193.675 minutes"				
"	Rainfall depth 58.119 58.119 58.119 mm"				
"	Rainfall volume 1.0632 0.0329 1.0961 ha-m"				
"	Rainfall losses 48.438 1.689 47.035 mm"				
"	Runoff depth 9.682 56.430 11.084 mm"				
"	Runoff volume 1771.16 319.28 2090.44 c.m"				
"	Runoff coefficient 0.167 0.971 0.191 "				
"	Maximum flow 0.381 0.175 0.402 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.402 0.491 0.995 0.995"				
" 33	CATCHMENT 230"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	230 Catchment 230"				
"	35.000 % Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.401	0.491	0.995	0.995 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	18.001	2.621	6.362	minutes"
"		Time to Centroid	140.110	114.128	120.447	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1080.43	581.77	1662.21	c.m"
"		Rainfall losses	48.439	2.187	32.251	mm"
"		Runoff depth	9.680	55.932	25.868	mm"
"		Runoff volume	179.95	559.88	739.83	c.m"
"		Runoff coefficient	0.167	0.962	0.445	"
"		Maximum flow	0.109	0.378	0.401	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.401	0.608	0.995	0.995"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.608	c.m/sec"		
"		Hydrograph volume	3235.671	c.m"		
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.990	0.608	0.995	0.995 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	27.841	4.055	9.835	minutes"
"		Time to Centroid	154.997	116.514	125.866	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	2991.97	1611.06	4603.03	c.m"
"		Rainfall losses	48.443	2.150	32.241	mm"
"		Runoff depth	9.676	55.969	25.878	mm"
"		Runoff volume	498.11	1551.46	2049.57	c.m"
"		Runoff coefficient	0.166	0.963	0.445	"
"		Maximum flow	0.209	0.960	0.990	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.990	1.580	0.995	0.995"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.580	c.m/sec"	
"		Hydrograph volume		5285.250	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.180	1.580	0.995	0.995 c.m/sec"
"		Catchment 250	Pervious	Impervious	Total Area "
"		Surface Area	5.680	0.000	5.680 hectare"
"		Time of concentration	40.168	5.850	40.167 minutes"
"		Time to Centroid	173.639	119.404	173.639 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	3301.16	0.00	3301.17 c.m"
"		Rainfall losses	48.439	1.981	48.439 mm"
"		Runoff depth	9.680	56.138	9.680 mm"
"		Runoff volume	549.83	0.00	549.84 c.m"
"		Runoff coefficient	0.167	0.000	0.167 "
"		Maximum flow	0.180	0.000	0.180 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.180	1.597	0.995	0.995"
" 64		SHOW TABLE"			
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"		Maximum flow	1.597	c.m/sec"	
"		Hydrograph volume	5835.078	c.m"	
" 33		CATCHMENT 260"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	260	Catchment 260"			
"	0.000	% Impervious"			
"	12.060	Total Area"			
"	287.000	Flow length"			
"	1.000	Overland Slope"			
"	12.060	Pervious Area"			
"	287.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	287.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.251	1.597	0.995	0.995 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	61.792	8.999	61.791 minutes"
"		Time to Centroid	206.255	124.339	206.255 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	7009.16	0.01	7009.16 c.m"
"		Rainfall losses	48.438	1.689	48.438 mm"
"		Runoff depth	9.681	56.430	9.681 mm"
"		Runoff volume	1167.58	0.01	1167.59 c.m"
"		Runoff coefficient	0.167	0.000	0.167 "
"		Maximum flow	0.251	0.000	0.251 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.251	1.613	0.995	0.995"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.307	1.613	0.995	0.995 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	64.340	9.370	64.340 minutes"
"		Time to Centroid	210.090	124.933	210.090 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"

"	Rainfall volume	8694.61	0.01	8694.62	c.m"
"	Rainfall losses	48.438	1.722	48.438	mm"
"	Runoff depth	9.681	56.397	9.681	mm"
"	Runoff volume	1448.34	0.01	1448.35	c.m"
"	Runoff coefficient	0.167	0.000	0.167	"
"	Maximum flow	0.307	0.000	0.307	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.307	1.633	0.995	0.995"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		1.633		c.m/sec"
"	Hydrograph volume		8451.021		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.307	1.633	1.633	0.995"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		2.371		c.m/sec"
"	Hydrograph volume		12473.042		c.m"
"		0.307	1.633	1.633	2.371"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		2.371		c.m/sec"
"	Hydrograph volume		12473.042		c.m"
"		0.307	2.371	1.633	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.371		c.m/sec"
"	Hydrograph volume		12473.042		c.m"
" 52	CHANNEL DESIGN"				
"	2.371 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.353		metre"
"	Velocity		1.109		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.269		metre"
" 53	ROUTE Channel Route 750"				

```

"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.473      X-factor <= 0.5"
"    253.537      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"          2      No. of sub-reaches"
"          Peak outflow              2.371      c.m/sec"
"          0.307      2.371      2.371      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          0.307      2.371      2.371      0.000"
" 52      CHANNEL DESIGN"
"      2.371      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow              0.766      metre"
"          Velocity              1.441      m/sec"
"          Channel capacity              19.656      c.m/sec"
"          Critical depth              0.613      metre"
" 64      SHOW TABLE"
"          2      Flow hydrograph"
"          5      Outflow Hydrograph"
"          Maximum flow              2.371      c.m/sec"
"          Hydrograph volume              12473.035      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.307      2.371      2.371      0.000"
" 40      HYDROGRAPH Combine 900"
"          6      Combine "
"      900      Node #"
"          Combined West and Central Watershed"
"          Maximum flow              2.371      c.m/sec"
"          Hydrograph volume              12473.035      c.m"
"          0.307      2.371      2.371      2.371"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.307      0.000      2.371      2.371"
" 33      CATCHMENT 310"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"      310      Catchment 310."

```

"	5.000	% Impervious"				
"	20.360	Total Area"				
"	323.000	Flow length"				
"	1.000	Overland Slope"				
"	19.342	Pervious Area"				
"	323.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.018	Impervious Area"				
"	323.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.431	0.000	2.371	2.371 c.m/sec"	
"		Catchment 310	Pervious	Impervious	Total Area	"
"		Surface Area	19.342	1.018	20.360	hectare"
"		Time of concentration	66.332	9.660	53.034	minutes"
"		Time to Centroid	213.090	125.400	192.515	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1.1241	0.0592	1.1833	ha-m"
"		Rainfall losses	48.442	1.749	46.107	mm"
"		Runoff depth	9.677	56.370	12.012	mm"
"		Runoff volume	1871.78	573.85	2445.62	c.m"
"		Runoff coefficient	0.167	0.970	0.207	"
"		Maximum flow	0.393	0.305	0.431	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.431	0.431	2.371	2.371"	
" 33		CATCHMENT 320"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	320	Catchment 320"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				

"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.611	0.431	2.371	2.371 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	30.608	4.457	10.786	minutes"
"		Time to Centroid	159.183	117.112	127.293	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1911.54	1029.29	2940.83	c.m"
"		Rainfall losses	48.439	1.811	32.119	mm"
"		Runoff depth	9.681	56.308	26.000	mm"
"		Runoff volume	318.39	997.21	1315.61	c.m"
"		Runoff coefficient	0.167	0.969	0.447	"
"		Maximum flow	0.129	0.594	0.611	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.611	0.945	2.371	2.371"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				

	0.095	0.945	2.371	2.371 c.m/sec"	
"	Catchment 330	Pervious	Impervious	Total Area	"
"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	26.662	3.883	9.439	minutes"
"	Time to Centroid	153.211	116.293	125.297	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	283.33	152.56	435.89	c.m"
"	Rainfall losses	48.439	2.392	32.323	mm"
"	Runoff depth	9.680	55.727	25.797	mm"
"	Runoff volume	47.19	146.28	193.47	c.m"
"	Runoff coefficient	0.167	0.959	0.444	"
"	Maximum flow	0.021	0.092	0.095	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

" 4 Add Runoff "

	0.095	1.026	2.371	2.371"
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" 33 CATCHMENT 340"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	340	Catchment 340"
"	35.000	% Impervious"
"	1.910	Total Area"
"	100.000	Flow length"
"	0.500	Overland Slope"
"	1.241	Pervious Area"
"	100.000	Pervious length"
"	0.500	Pervious slope"
"	0.669	Impervious Area"
"	100.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

	0.234	1.026	2.371	2.371 c.m/sec"
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"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	40.412	5.885	14.260	minutes"
"	Time to Centroid	174.013	119.470	132.700	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	721.55	388.53	1110.07	c.m"
"	Rainfall losses	48.441	1.995	32.185	mm"
"	Runoff depth	9.678	56.124	25.934	mm"
"	Runoff volume	120.16	375.19	495.35	c.m"

"	Runoff coefficient	0.167	0.966	0.446	"
"	Maximum flow	0.039	0.223	0.234	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.234	1.260	2.371	2.371"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.051	1.260	2.371	2.371 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	29.391	4.280	23.513	minutes"
"	Time to Centroid	157.347	116.830	147.862	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	695.69	36.62	732.30	c.m"
"	Rainfall losses	48.444	1.931	46.118	mm"
"	Runoff depth	9.676	56.188	12.001	mm"
"	Runoff volume	115.82	35.40	151.21	c.m"
"	Runoff coefficient	0.166	0.967	0.206	"
"	Maximum flow	0.048	0.021	0.051	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.051	1.297	2.371	2.371"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

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"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.096      1.297      2.371      2.371 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration  55.738      8.117      50.673      minutes"
"      Time to Centroid      197.150      122.997      189.263      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      2306.75      47.08      2353.82      c.m"
"      Rainfall losses      48.438      1.658      47.502      mm"
"      Runoff depth      9.681      56.461      10.617      mm"
"      Runoff volume      384.25      45.73      429.98      c.m"
"      Runoff coefficient      0.167      0.971      0.183      "
"      Maximum flow      0.093      0.028      0.096      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.096      1.345      2.371      2.371"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      1.345      c.m/sec"
"      Hydrograph volume      5031.245      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__25yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:31:42 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          746.059 Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          175.653  mm/hr"
"          Total depth                67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380 Total Area"
"          275.000 Flow length"
"          1.400  Overland Slope"
"          10.172 Pervious Area"
"          275.000 Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.463	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	45.166	7.447	42.628	minutes"
"		Time to Centroid	191.681	121.468	186.956	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	6839.81	139.59	6979.40	c.m"
"		Rainfall losses	48.714	1.748	47.775	mm"
"		Runoff depth	18.525	65.491	19.464	mm"
"		Runoff volume	1884.40	135.96	2020.36	c.m"
"		Runoff coefficient	0.276	0.974	0.289	"
"		Maximum flow	0.453	0.084	0.463	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.463	0.463	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.626	0.463	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	32.097	5.292	27.890	minutes"
"		Time to Centroid	169.374	117.990	161.309	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	6349.37	334.18	6683.54	c.m"
"		Rainfall losses	48.732	1.772	46.384	mm"
"		Runoff depth	18.507	65.466	20.855	mm"

"	Runoff volume	1747.61	325.37	2072.98	c.m"
"	Runoff coefficient	0.275	0.974	0.310	"
"	Maximum flow	0.593	0.188	0.626	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.626	1.004	0.000	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	1.004	c.m/sec"		
"	Hydrograph volume	4093.340	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.856	1.004	0.000	0.000 c.m/sec"	
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	35.630	5.875	32.709	minutes"
"	Time to Centroid	175.384	118.999	169.850	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1.0168	0.0314	1.0483	ha-m"
"	Rainfall losses	48.719	2.068	47.320	mm"
"	Runoff depth	18.520	65.171	19.919	mm"
"	Runoff volume	2800.61	304.80	3105.41	c.m"
"	Runoff coefficient	0.275	0.969	0.296	"
"	Maximum flow	0.824	0.182	0.856	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.856	1.859	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.856	1.859	1.859	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"			1.859	c.m/sec"	
"			7198.753	c.m"	
"		0.856	1.859	1.859	1.859"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.856	0.000	1.859	1.859"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.202	0.000	1.859	1.859 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	35.541	5.860	32.627	minutes"
"	Time to Centroid	175.235	118.972	169.711	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	2387.11	73.83	2460.94	c.m"
"	Rainfall losses	48.721	2.060	47.321	mm"
"	Runoff depth	18.518	65.178	19.918	mm"
"	Runoff volume	657.43	71.57	728.99	c.m"
"	Runoff coefficient	0.275	0.969	0.296	"

"	Maximum flow	0.194	0.043	0.202	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.202 0.202 1.859 1.859"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.770 0.202 1.859 1.859 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration 51.216 8.444 46.998 minutes"				
"	Time to Centroid 202.020 123.016 194.230 minutes"				
"	Rainfall depth 67.239 67.239 67.239 mm"				
"	Rainfall volume 1.2301 0.0380 1.2681 ha-m"				
"	Rainfall losses 48.715 1.721 47.306 mm"				
"	Runoff depth 18.523 65.518 19.933 mm"				
"	Runoff volume 3388.71 370.70 3759.41 c.m"				
"	Runoff coefficient 0.275 0.974 0.296 "				
"	Maximum flow 0.741 0.208 0.770 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.770 0.941 1.859 1.859"				
" 33	CATCHMENT 230"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	230 Catchment 230"				
"	35.000 % Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.495	0.941	1.859	1.859 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	14.933	2.462	6.773	minutes"
"		Time to Centroid	140.037	113.371	122.590	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1249.97	673.06	1923.03	c.m"
"		Rainfall losses	48.719	2.147	32.419	mm"
"		Runoff depth	18.520	65.092	34.820	mm"
"		Runoff volume	344.28	651.57	995.85	c.m"
"		Runoff coefficient	0.275	0.968	0.518	"
"		Maximum flow	0.214	0.446	0.495	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.495	0.998	1.859	1.859"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	0.998	c.m/sec"		
"		Hydrograph volume	5484.259	c.m"		
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.209	0.998	1.859	1.859 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	23.096	3.808	10.509	minutes"
"		Time to Centroid	153.990	115.729	129.022	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	3461.46	1863.86	5325.32	c.m"
"		Rainfall losses	48.729	2.672	32.609	mm"
"		Runoff depth	18.510	64.567	34.630	mm"
"		Runoff volume	952.88	1789.80	2742.67	c.m"
"		Runoff coefficient	0.275	0.960	0.515	"
"		Maximum flow	0.421	1.142	1.209	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.209	1.972	1.859	1.859"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.972	c.m/sec"	
"		Hydrograph volume		8226.934	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.352	1.972	1.859	1.859 c.m/sec"	
"		Catchment 250	Pervious	Impervious	Total Area	"
"		Surface Area	5.680	0.000	5.680	hectare"
"		Time of concentration	33.322	5.494	33.321	minutes"
"		Time to Centroid	171.454	118.326	171.454	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	3819.16	0.00	3819.17	c.m"
"		Rainfall losses	48.712	1.874	48.711	mm"
"		Runoff depth	18.527	65.365	18.527	mm"
"		Runoff volume	1052.35	0.00	1052.36	c.m"
"		Runoff coefficient	0.276	0.000	0.276	"
"		Maximum flow	0.352	0.000	0.352	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.352	2.076	1.859	1.859"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	2.076	c.m/sec"		
"		Hydrograph volume	9279.288	c.m"		
" 33		CATCHMENT 260"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	260	Catchment 260"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.488	2.076	1.859	1.859 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	51.260	8.452	51.260 minutes"
"		Time to Centroid	202.095	123.028	202.095 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"
"		Rainfall volume	8109.00	0.01	8109.01 c.m"
"		Rainfall losses	48.715	1.723	48.715 mm"
"		Runoff depth	18.524	65.516	18.524 mm"
"		Runoff volume	2233.98	0.01	2233.98 c.m"
"		Runoff coefficient	0.275	0.000	0.275 "
"		Maximum flow	0.488	0.000	0.488 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.488	2.189	1.859	1.859"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.576	2.189	1.859	1.859 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	53.374	8.800	53.374 minutes"
"		Time to Centroid	205.714	123.584	205.714 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"

"	Rainfall volume	1.0059	0.0000	1.0059	ha-m"
"	Rainfall losses	48.720	1.732	48.720	mm"
"	Runoff depth	18.519	65.507	18.519	mm"
"	Runoff volume	2770.43	0.01	2770.44	c.m"
"	Runoff coefficient	0.275	0.000	0.275	"
"	Maximum flow	0.576	0.000	0.576	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.576	2.640	1.859	1.859"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.640		c.m/sec"
"	Hydrograph volume		14283.709		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.576	2.640	2.640	1.859"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		4.415		c.m/sec"
"	Hydrograph volume		21482.451		c.m"
"		0.576	2.640	2.640	4.415"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		4.415		c.m/sec"
"	Hydrograph volume		21482.449		c.m"
"		0.576	4.415	2.640	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		4.415		c.m/sec"
"	Hydrograph volume		21482.449		c.m"
" 52	CHANNEL DESIGN"				
"	4.415 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.501		metre"
"	Velocity		1.355		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.396		metre"
" 53	ROUTE Channel Route 750"				

```

"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.463      X-factor <= 0.5"
"    207.601      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"          2      No. of sub-reaches"
"          Peak outflow              4.415      c.m/sec"
"          0.576      4.415      4.415      0.000 c.m/sec"
"  40      HYDROGRAPH Next link "
"          5      Next link "
"          0.576      4.415      4.415      0.000"
"  52      CHANNEL DESIGN"
"      4.415      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow              1.028      metre"
"          Velocity                    1.689      m/sec"
"          Channel capacity            19.656      c.m/sec"
"          Critical depth              0.845      metre"
"  64      SHOW TABLE"
"          2      Flow hydrograph"
"          5      Outflow Hydrograph"
"          Maximum flow              4.415      c.m/sec"
"          Hydrograph volume          21482.430      c.m"
"  40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.576      4.415      4.415      0.000"
"  40      HYDROGRAPH Combine 900"
"          6      Combine "
"      900      Node #"
"          Combined West and Central Watershed"
"          Maximum flow              4.415      c.m/sec"
"          Hydrograph volume          21482.430      c.m"
"          0.576      4.415      4.415      4.415"
"  40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.576      0.000      4.415      4.415"
"  33      CATCHMENT 310"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"      310      Catchment 310."

```

"	5.000	% Impervious"
"	20.360	Total Area"
"	323.000	Flow length"
"	1.000	Overland Slope"
"	19.342	Pervious Area"
"	323.000	Pervious length"
"	1.000	Pervious slope"
"	1.018	Impervious Area"
"	323.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	0.783	0.000 4.415 4.415 c.m/sec"
"	Catchment 310	Pervious Impervious Total Area "
"	Surface Area	19.342 1.018 20.360 hectare"
"	Time of concentration	55.026 9.073 47.816 minutes"
"	Time to Centroid	208.530 124.016 195.269 minutes"
"	Rainfall depth	67.239 67.239 67.239 mm"
"	Rainfall volume	1.3005 0.0684 1.3690 ha-m"
"	Rainfall losses	48.711 1.726 46.362 mm"
"	Runoff depth	18.528 65.513 20.877 mm"
"	Runoff volume	3583.63 666.92 4250.55 c.m"
"	Runoff coefficient	0.276 0.974 0.310 "
"	Maximum flow	0.737 0.366 0.783 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	0.783 0.783 4.415 4.415"	
" 33	CATCHMENT 320"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	320 Catchment 320"	
"	35.000 % Impervious"	
"	5.060 Total Area"	
"	89.000 Flow length"	
"	1.000 Overland Slope"	
"	3.289 Pervious Area"	
"	89.000 Pervious length"	
"	1.000 Pervious slope"	
"	1.771 Impervious Area"	
"	89.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.746	0.783	4.415	4.415 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	25.391	4.186	11.505	minutes"
"		Time to Centroid	157.919	116.225	130.615	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2211.49	1190.80	3402.29	c.m"
"		Rainfall losses	48.753	2.099	32.424	mm"
"		Runoff depth	18.486	65.140	34.815	mm"
"		Runoff volume	608.01	1153.63	1761.63	c.m"
"		Runoff coefficient	0.275	0.969	0.518	"
"		Maximum flow	0.243	0.710	0.746	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.746	1.223	4.415	4.415"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				

"	0.116	1.223	4.415	4.415 c.m/sec"	
"	Catchment 330	Pervious	Impervious	Total Area	"
"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	22.118	3.647	10.077	minutes"
"	Time to Centroid	152.328	115.517	128.333	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	327.79	176.50	504.29	c.m"
"	Rainfall losses	48.754	2.965	32.728	mm"
"	Runoff depth	18.485	64.274	34.511	mm"
"	Runoff volume	90.11	168.72	258.83	c.m"
"	Runoff coefficient	0.275	0.956	0.513	"
"	Maximum flow	0.040	0.109	0.116	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "		
"	0.116	1.324	4.415	4.415"

" 33	CATCHMENT 340"
"	1 Triangular SCS"
"	1 Equal length"
"	2 Horton equation"
"	340 Catchment 340"
"	35.000 % Impervious"
"	1.910 Total Area"
"	100.000 Flow length"
"	0.500 Overland Slope"
"	1.241 Pervious Area"
"	100.000 Pervious length"
"	0.500 Pervious slope"
"	0.669 Impervious Area"
"	100.000 Impervious length"
"	0.500 Impervious slope"
"	0.250 Pervious Manning 'n' "
"	125.000 Pervious Max.infiltration"
"	5.000 Pervious Min.infiltration"
"	0.250 Pervious Lag constant (hours)"
"	5.000 Pervious Depression storage"
"	0.015 Impervious Manning 'n' "
"	0.000 Impervious Max.infiltration"
"	0.000 Impervious Min.infiltration"
"	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage"

"	0.282	1.324	4.415	4.415 c.m/sec"	
"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	33.524	5.527	15.184	minutes"
"	Time to Centroid	171.778	118.383	136.800	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	834.77	449.49	1284.26	c.m"
"	Rainfall losses	48.712	1.893	32.325	mm"
"	Runoff depth	18.527	65.346	34.914	mm"
"	Runoff volume	230.01	436.84	666.85	c.m"

"	Runoff coefficient	0.276	0.972	0.519	"
"	Maximum flow	0.073	0.256	0.282	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.282 1.605 4.415 4.415"				
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.101 1.605 4.415 4.415 c.m/sec"				
"	Catchment 350 Pervious Impervious Total Area "				
"	Surface Area 1.197 0.063 1.260 hectare"				
"	Time of concentration 24.382 4.020 21.210 minutes"				
"	Time to Centroid 156.183 116.000 149.924 minutes"				
"	Rainfall depth 67.239 67.239 67.239 mm"				
"	Rainfall volume 804.85 42.36 847.21 c.m"				
"	Rainfall losses 48.716 2.305 46.395 mm"				
"	Runoff depth 18.523 64.934 20.844 mm"				
"	Runoff volume 221.72 40.91 262.63 c.m"				
"	Runoff coefficient 0.275 0.966 0.310 "				
"	Maximum flow 0.096 0.026 0.101 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.101 1.668 4.415 4.415"				
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

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"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.180      1.668      4.415      4.415 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration 46.238      7.624      43.638      minutes"
"      Time to Centroid      193.509      121.751      188.678      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      2668.71      54.46      2723.17      c.m"
"      Rainfall losses      48.712      1.698      47.772      mm"
"      Runoff depth      18.527      65.541      19.467      mm"
"      Runoff volume      735.32      53.09      788.41      c.m"
"      Runoff coefficient      0.276      0.975      0.290      "
"      Maximum flow      0.175      0.033      0.180      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.180      1.746      4.415      4.415"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      1.746      c.m/sec"
"      Hydrograph volume      7988.909      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__50yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:33:02 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          820.361  Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          194.803  mm/hr"
"          Total depth          74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380  Total Area"
"          275.000  Flow length"
"          1.400  Overland Slope"
"          10.172  Pervious Area"
"          275.000  Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.615	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	42.388	7.145	40.458	minutes"
"		Time to Centroid	187.124	120.895	183.497	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	7563.97	154.37	7718.34	c.m"
"		Rainfall losses	48.833	1.899	47.894	mm"
"		Runoff depth	25.525	72.459	26.464	mm"
"		Runoff volume	2596.50	150.42	2746.92	c.m"
"		Runoff coefficient	0.343	0.974	0.356	"
"		Maximum flow	0.601	0.092	0.615	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.615	0.615	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.788	0.615	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	30.123	5.077	26.863	minutes"
"		Time to Centroid	166.372	117.468	160.005	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	7021.61	369.56	7391.16	c.m"
"		Rainfall losses	48.831	1.762	46.478	mm"
"		Runoff depth	25.526	72.596	27.880	mm"

"	Runoff volume	2410.46	360.80	2771.26	c.m"
"	Runoff coefficient	0.343	0.976	0.375	"
"	Maximum flow	0.752	0.205	0.788	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.788	1.306	0.000	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	1.306	c.m/sec"		
"	Hydrograph volume	5518.178	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.136	1.306	0.000	0.000 c.m/sec"	
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	33.439	5.636	31.198	minutes"
"	Time to Centroid	171.977	118.416	167.660	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1.1245	0.0348	1.1592	ha-m"
"	Rainfall losses	48.832	1.996	47.427	mm"
"	Runoff depth	25.525	72.361	26.930	mm"
"	Runoff volume	3860.02	338.43	4198.46	c.m"
"	Runoff coefficient	0.343	0.973	0.362	"
"	Maximum flow	1.102	0.200	1.136	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		1.136	2.442	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		1.136	2.442	2.442	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"			2.442	c.m/sec"	
"			9716.646	c.m"	
"		1.136	2.442	2.442	2.442"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		1.136	0.000	2.442	2.442"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.268	0.000	2.442	2.442 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	33.356	5.622	31.120	minutes"
"	Time to Centroid	171.836	118.392	167.527	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	2639.85	81.64	2721.50	c.m"
"	Rainfall losses	48.832	1.991	47.427	mm"
"	Runoff depth	25.525	72.367	26.931	mm"
"	Runoff volume	906.21	79.46	985.66	c.m"
"	Runoff coefficient	0.343	0.973	0.362	"

"		Maximum flow	0.259	0.047	0.268	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.268 0.268 2.442 2.442"				
" 33		CATCHMENT 220"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	220	Catchment 220"				
"	3.000	% Impervious"				
"	18.860	Total Area"				
"	351.000	Flow length"				
"	1.500	Overland Slope"				
"	18.294	Pervious Area"				
"	351.000	Pervious length"				
"	1.500	Pervious slope"				
"	0.566	Impervious Area"				
"	351.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.017 0.268 2.442 2.442 c.m/sec"				
"		Catchment 220 Pervious Impervious Total Area "				
"		Surface Area 18.294 0.566 18.860 hectare"				
"		Time of concentration 48.067 8.102 44.832 minutes"				
"		Time to Centroid 196.742 122.391 190.725 minutes"				
"		Rainfall depth 74.358 74.358 74.358 mm"				
"		Rainfall volume 1.3603 0.0421 1.4024 ha-m"				
"		Rainfall losses 48.837 1.697 47.423 mm"				
"		Runoff depth 25.521 72.661 26.935 mm"				
"		Runoff volume 4668.79 411.12 5079.91 c.m"				
"		Runoff coefficient 0.343 0.977 0.362 "				
"		Maximum flow 0.985 0.252 1.017 c.m/sec"				
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.017 1.235 2.442 2.442"				
" 33		CATCHMENT 230"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	230	Catchment 230"				
"	35.000	% Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.567	1.235	2.442	2.442 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	14.015	2.362	6.977	minutes"
"		Time to Centroid	139.138	113.075	123.397	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1382.31	744.32	2126.63	c.m"
"		Rainfall losses	48.855	2.135	32.503	mm"
"		Runoff depth	25.503	72.223	41.855	mm"
"		Runoff volume	474.10	722.95	1197.05	c.m"
"		Runoff coefficient	0.343	0.971	0.563	"
"		Maximum flow	0.274	0.496	0.567	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.567	1.318	2.442	2.442"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.318	c.m/sec"	
"		Hydrograph volume		7262.617	c.m"	
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.376	1.318	2.442	2.442 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	21.676	3.654	10.850	minutes"
"		Time to Centroid	152.088	115.358	130.024	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	3827.94	2061.20	5889.14	c.m"
"		Rainfall losses	48.855	3.104	32.843	mm"
"		Runoff depth	25.502	71.253	41.515	mm"
"		Runoff volume	1312.86	1975.15	3288.01	c.m"
"		Runoff coefficient	0.343	0.958	0.558	"
"		Maximum flow	0.535	1.280	1.376	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.376	2.326	2.442	2.442"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		2.326	c.m/sec"	
"		Hydrograph volume		10550.629	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.445	2.326	2.442	2.442 c.m/sec"
"		Catchment 250	Pervious	Impervious	Total Area "
"		Surface Area	5.680	0.000	5.680 hectare"
"		Time of concentration	31.273	5.271	31.272 minutes"
"		Time to Centroid	168.334	117.799	168.334 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	4223.52	0.00	4223.52 c.m"
"		Rainfall losses	48.850	1.795	48.850 mm"
"		Runoff depth	25.508	72.562	25.508 mm"
"		Runoff volume	1448.85	0.00	1448.86 c.m"
"		Runoff coefficient	0.343	0.000	0.343 "
"		Maximum flow	0.445	0.000	0.445 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.445	2.488	2.442	2.442"
" 64		SHOW TABLE"			
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"		Maximum flow	2.488	c.m/sec"	
"		Hydrograph volume	11999.488	c.m"	
" 33		CATCHMENT 260"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	260	Catchment 260"			
"	0.000	% Impervious"			
"	12.060	Total Area"			
"	287.000	Flow length"			
"	1.000	Overland Slope"			
"	12.060	Pervious Area"			
"	287.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	287.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.649	2.488	2.442	2.442 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	48.108	8.109	48.108 minutes"
"		Time to Centroid	196.811	122.402	196.811 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	8967.54	0.01	8967.55 c.m"
"		Rainfall losses	48.837	1.697	48.837 mm"
"		Runoff depth	25.521	72.661	25.521 mm"
"		Runoff volume	3077.85	0.01	3077.86 c.m"
"		Runoff coefficient	0.343	0.000	0.343 "
"		Maximum flow	0.649	0.000	0.649 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.649	2.779	2.442	2.442"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.766	2.779	2.442	2.442 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	50.092	8.443	50.092 minutes"
"		Time to Centroid	200.168	122.877	200.168 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"

"	Rainfall volume	1.1124	0.0000	1.1124	ha-m"
"	Rainfall losses	48.840	1.746	48.840	mm"
"	Runoff depth	25.518	72.612	25.518	mm"
"	Runoff volume	3817.47	0.01	3817.48	c.m"
"	Runoff coefficient	0.343	0.000	0.343	"
"	Maximum flow	0.766	0.000	0.766	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.766	3.467	2.442	2.442"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		3.467		c.m/sec"
"	Hydrograph volume		18894.832		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.766	3.467	3.467	2.442"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		5.768		c.m/sec"
"	Hydrograph volume		28611.457		c.m"
"		0.766	3.467	3.467	5.768"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		5.768		c.m/sec"
"	Hydrograph volume		28611.457		c.m"
"		0.766	5.768	3.467	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		5.768		c.m/sec"
"	Hydrograph volume		28611.457		c.m"
" 52	CHANNEL DESIGN"				
"	5.768 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.581		metre"
"	Velocity		1.472		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.466		metre"
" 53	ROUTE Channel Route 750"				

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"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.457      X-factor <= 0.5"
"    191.089      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"          2      No. of sub-reaches"
"          Peak outflow          5.768      c.m/sec"
"          0.766      5.768      5.768      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          0.766      5.768      5.768      0.000"
" 52      CHANNEL DESIGN"
"      5.768      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"      0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow          1.163      metre"
"          Velocity          1.807      m/sec"
"          Channel capacity          19.656      c.m/sec"
"          Critical depth          0.966      metre"
" 64      SHOW TABLE"
"          2      Flow hydrograph"
"          5      Outflow Hydrograph"
"          Maximum flow          5.768      c.m/sec"
"          Hydrograph volume          28611.463      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.766      5.768      5.768      0.000"
" 40      HYDROGRAPH Combine 900"
"          6      Combine "
"      900      Node #"
"          Combined West and Central Watershed"
"          Maximum flow          5.768      c.m/sec"
"          Hydrograph volume          28611.463      c.m"
"          0.766      5.768      5.768      5.768"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.766      0.000      5.768      5.768"
" 33      CATCHMENT 310"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"      310      Catchment 310."

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"	5.000	% Impervious"
"	20.360	Total Area"
"	323.000	Flow length"
"	1.000	Overland Slope"
"	19.342	Pervious Area"
"	323.000	Pervious length"
"	1.000	Pervious slope"
"	1.018	Impervious Area"
"	323.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	1.012	0.000 5.768 5.768 c.m/sec"
"	Catchment 310	Pervious Impervious Total Area "
"	Surface Area	19.342 1.018 20.360 hectare"
"	Time of concentration	51.643 8.705 46.053 minutes"
"	Time to Centroid	202.786 123.296 192.438 minutes"
"	Rainfall depth	74.358 74.358 74.358 mm"
"	Rainfall volume	1.4382 0.0757 1.5139 ha-m"
"	Rainfall losses	48.832 1.773 46.479 mm"
"	Runoff depth	25.526 72.585 27.879 mm"
"	Runoff volume	4937.18 738.91 5676.09 c.m"
"	Runoff coefficient	0.343 0.976 0.375 "
"	Maximum flow	0.953 0.411 1.012 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	1.012 1.012 5.768 5.768"	
" 33	CATCHMENT 320"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	320 Catchment 320"	
"	35.000 % Impervious"	
"	5.060 Total Area"	
"	89.000 Flow length"	
"	1.000 Overland Slope"	
"	3.289 Pervious Area"	
"	89.000 Pervious length"	
"	1.000 Pervious slope"	
"	1.771 Impervious Area"	
"	89.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.849	1.012	5.768	5.768 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	23.830	4.017	11.885	minutes"
"		Time to Centroid	155.737	115.834	131.680	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2445.63	1316.88	3762.50	c.m"
"		Rainfall losses	48.833	2.393	32.579	mm"
"		Runoff depth	25.525	71.965	41.779	mm"
"		Runoff volume	839.52	1274.50	2114.03	c.m"
"		Runoff coefficient	0.343	0.968	0.562	"
"		Maximum flow	0.330	0.797	0.849	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.849	1.421	5.768	5.768"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				

"	0.132	1.421	5.768	5.768 c.m/sec"
"	Catchment 330	Pervious	Impervious	Total Area "
"	Surface Area	0.488	0.262	0.750 hectare"
"	Time of concentration	20.758	3.499	10.393 minutes"
"	Time to Centroid	150.514	115.093	129.243 minutes"
"	Rainfall depth	74.358	74.358	74.358 mm"
"	Rainfall volume	362.49	195.19	557.68 c.m"
"	Rainfall losses	48.835	3.107	32.831 mm"
"	Runoff depth	25.522	71.250	41.527 mm"
"	Runoff volume	124.42	187.03	311.45 c.m"
"	Runoff coefficient	0.343	0.958	"
"	Maximum flow	0.051	0.123	0.132 c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "
"	0.132	1.536 5.768 5.768"

" 33	CATCHMENT 340"
"	1 Triangular SCS"
"	1 Equal length"
"	2 Horton equation"
"	340 Catchment 340"
"	35.000 % Impervious"
"	1.910 Total Area"
"	100.000 Flow length"
"	0.500 Overland Slope"
"	1.241 Pervious Area"
"	100.000 Pervious length"
"	0.500 Pervious slope"
"	0.669 Impervious Area"
"	100.000 Impervious length"
"	0.500 Impervious slope"
"	0.250 Pervious Manning 'n' "
"	125.000 Pervious Max.infiltration"
"	5.000 Pervious Min.infiltration"
"	0.250 Pervious Lag constant (hours)"
"	5.000 Pervious Depression storage"
"	0.015 Impervious Manning 'n' "
"	0.000 Impervious Max.infiltration"
"	0.000 Impervious Min.infiltration"
"	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage"

"	0.315	1.536	5.768	5.768 c.m/sec"
"	Catchment 340	Pervious	Impervious	Total Area "
"	Surface Area	1.241	0.669	1.910 hectare"
"	Time of concentration	31.463	5.303	15.635 minutes"
"	Time to Centroid	168.660	117.853	137.919 minutes"
"	Rainfall depth	74.358	74.358	74.358 mm"
"	Rainfall volume	923.15	497.08	1420.23 c.m"
"	Rainfall losses	48.857	1.808	32.390 mm"
"	Runoff depth	25.501	72.550	41.968 mm"
"	Runoff volume	316.59	484.99	801.59 c.m"

"	Runoff coefficient	0.343	0.976	0.564	"
"	Maximum flow	0.097	0.280	0.315	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.315	1.851	5.768	5.768"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.128	1.851	5.768	5.768 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	22.882	3.857	20.430	minutes"
"	Time to Centroid	154.149	115.624	149.184	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	890.06	46.85	936.91	c.m"
"	Rainfall losses	48.865	2.693	46.556	mm"
"	Runoff depth	25.493	71.664	27.801	mm"
"	Runoff volume	305.15	45.15	350.30	c.m"
"	Runoff coefficient	0.343	0.964	0.374	"
"	Maximum flow	0.122	0.029	0.128	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.128	1.932	5.768	5.768"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

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"      2.000  % Impervious"
"      4.050  Total Area"
"    296.000  Flow length"
"      1.500  Overland Slope"
"      3.969  Pervious Area"
"    296.000  Pervious length"
"      1.500  Pervious slope"
"      0.081  Impervious Area"
"    296.000  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.233      1.932      5.768      5.768 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration 43.394      7.314      41.417      minutes"
"      Time to Centroid      188.828      121.113      185.116      minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume      2951.26      60.23      3011.49      c.m"
"      Rainfall losses      48.836      1.825      47.895      mm"
"      Runoff depth      25.522      72.532      26.462      mm"
"      Runoff volume      1012.98      58.75      1071.73      c.m"
"      Runoff coefficient      0.343      0.975      0.356      "
"      Maximum flow      0.227      0.036      0.233      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.233      2.030      5.768      5.768"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      2.030      c.m/sec"
"      Hydrograph volume      10325.184      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__100yr.out"
"          Licensee name:                      gmbp"
"          Company                            "
"          Date & Time last used:              9/4/2024 at 11:34:10 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          901.088 Coefficient A"
"          0.043  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          212.928  mm/hr"
"          Total depth                81.221  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380 Total Area"
"          275.000 Flow length"
"          1.400  Overland Slope"
"          10.172 Pervious Area"
"          275.000 Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.794	0.000	0.000	0.000 c.m/sec"	
"		Catchment 110	Pervious	Impervious	Total Area	"
"		Surface Area	10.172	0.208	10.380	hectare"
"		Time of concentration	40.239	6.895	38.649	minutes"
"		Time to Centroid	182.417	120.354	179.459	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	8262.11	168.61	8430.73	c.m"
"		Rainfall losses	48.963	2.114	48.026	mm"
"		Runoff depth	32.258	79.107	33.195	mm"
"		Runoff volume	3281.36	164.23	3445.59	c.m"
"		Runoff coefficient	0.397	0.974	0.409	"
"		Maximum flow	0.779	0.101	0.794	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.794	0.794	0.000	0.000"	
" 33		CATCHMENT 120"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	120	Catchment 120"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	1.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	1.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	1.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.976	0.794	0.000	0.000 c.m/sec"	
"		Catchment 120	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	28.596	4.900	25.874	minutes"
"		Time to Centroid	163.149	116.994	157.848	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	7669.69	403.67	8073.36	c.m"
"		Rainfall losses	49.008	1.802	46.647	mm"
"		Runoff depth	32.213	79.419	34.573	mm"

"	Runoff volume	3041.89	394.71	3436.60	c.m"
"	Runoff coefficient	0.397	0.978	0.426	"
"	Maximum flow	0.937	0.227	0.976	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.976	1.659	0.000	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	1.659	c.m/sec"		
"	Hydrograph volume	6882.191	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.465	1.659	0.000	0.000 c.m/sec"	
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	31.743	5.439	29.882	minutes"
"	Time to Centroid	168.367	117.908	164.798	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.2282	0.0380	1.2662	ha-m"
"	Rainfall losses	49.002	1.917	47.589	mm"
"	Runoff depth	32.219	79.304	33.632	mm"
"	Runoff volume	4872.30	370.90	5243.20	c.m"
"	Runoff coefficient	0.397	0.976	0.414	"
"	Maximum flow	1.427	0.216	1.465	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		1.465	3.112	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		1.465	3.112	3.112	0.000"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"			3.112	c.m/sec"	
"			12125.396	c.m"	
"		1.465	3.112	3.112	3.112"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		1.465	0.000	3.112	3.112"
" 33	CATCHMENT 210"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	210	Catchment 210"			
"	3.000	% Impervious"			
"	3.660	Total Area"			
"	135.000	Flow length"			
"	0.750	Overland Slope"			
"	3.550	Pervious Area"			
"	135.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.110	Impervious Area"			
"	135.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.344	0.000	3.112	3.112 c.m/sec"
"	Catchment 210	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	31.664	5.426	29.808	minutes"
"	Time to Centroid	168.233	117.886	164.671	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2883.50	89.18	2972.68	c.m"
"	Rainfall losses	48.998	1.908	47.585	mm"
"	Runoff depth	32.223	79.313	33.636	mm"
"	Runoff volume	1143.98	87.09	1231.06	c.m"
"	Runoff coefficient	0.397	0.977	0.414	"

"	Maximum flow	0.335	0.051	0.344	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.344 0.344 3.112 3.112"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.256 0.344 3.112 3.112 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration 45.629 7.819 42.951 minutes"				
"	Time to Centroid 191.337 121.757 186.410 minutes"				
"	Rainfall depth 81.221 81.221 81.221 mm"				
"	Rainfall volume 1.4859 0.0460 1.5318 ha-m"				
"	Rainfall losses 48.958 1.720 47.541 mm"				
"	Runoff depth 32.263 79.501 33.680 mm"				
"	Runoff volume 5902.26 449.82 6352.08 c.m"				
"	Runoff coefficient 0.397 0.979 0.415 "				
"	Maximum flow 1.221 0.276 1.256 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.256 1.532 3.112 3.112"				
" 33	CATCHMENT 230"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	230 Catchment 230"				
"	35.000 % Impervious"				

"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.641	1.532	3.112	3.112 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	13.304	2.280	7.022	minutes"
"		Time to Centroid	137.866	112.774	123.568	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1509.90	813.02	2322.92	c.m"
"		Rainfall losses	49.087	2.170	32.666	mm"
"		Runoff depth	32.134	79.051	48.555	mm"
"		Runoff volume	597.37	791.30	1388.67	c.m"
"		Runoff coefficient	0.396	0.973	0.598	"
"		Maximum flow	0.342	0.543	0.641	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.641	1.640	3.112	3.112"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.640	c.m/sec"	
"		Hydrograph volume		8971.813	c.m"	
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				

"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.546	1.640	3.112	3.112 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	20.576	3.526	10.935	minutes"
"		Time to Centroid	149.834	114.953	130.110	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	4181.25	2251.44	6432.69	c.m"
"		Rainfall losses	48.963	3.260	32.967	mm"
"		Runoff depth	32.258	77.961	48.254	mm"
"		Runoff volume	1660.63	2161.08	3821.72	c.m"
"		Runoff coefficient	0.397	0.960	0.594	"
"		Maximum flow	0.669	1.413	1.546	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.546	2.706	3.112	3.112"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		2.706	c.m/sec"	
"		Hydrograph volume		12793.537	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.554	2.706	3.112	3.112 c.m/sec"	
"		Catchment 250	Pervious	Impervious	Total Area	"
"		Surface Area	5.680	0.000	5.680	hectare"
"		Time of concentration	29.686	5.087	29.686	minutes"
"		Time to Centroid	164.930	117.312	164.929	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	4613.34	0.00	4613.35	c.m"
"		Rainfall losses	48.967	1.786	48.967	mm"
"		Runoff depth	32.254	79.435	32.254	mm"
"		Runoff volume	1832.00	0.00	1832.01	c.m"
"		Runoff coefficient	0.397	0.000	0.397	"
"		Maximum flow	0.554	0.000	0.554	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.554	2.923	3.112	3.112"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	2.923	c.m/sec"		
"		Hydrograph volume	14625.544	c.m"		
" 33		CATCHMENT 260"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	260	Catchment 260"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.805	2.923	3.112	3.112 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	45.668	7.825	45.668 minutes"
"		Time to Centroid	191.402	121.768	191.401 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	9795.23	0.01	9795.24 c.m"
"		Rainfall losses	48.958	1.720	48.958 mm"
"		Runoff depth	32.263	79.501	32.263 mm"
"		Runoff volume	3890.95	0.01	3890.96 c.m"
"		Runoff coefficient	0.397	0.000	0.397 "
"		Maximum flow	0.805	0.000	0.805 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.805	3.517	3.112	3.112"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.978	3.517	3.112	3.112 c.m/sec"
"		Catchment 270	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	47.551	8.148	47.551 minutes"
"		Time to Centroid	194.533	122.304	194.533 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"

"	Rainfall volume	1.2151	0.0000	1.2151	ha-m"
"	Rainfall losses	48.975	1.717	48.975	mm"
"	Runoff depth	32.246	79.504	32.246	mm"
"	Runoff volume	4824.02	0.01	4824.03	c.m"
"	Runoff coefficient	0.397	0.000	0.397	"
"	Maximum flow	0.978	0.000	0.978	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.978	4.383	3.112	3.112"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		4.383		c.m/sec"
"	Hydrograph volume		23340.527		c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.978	4.383	4.383	3.112"
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		7.359		c.m/sec"
"	Hydrograph volume		35465.934		c.m"
"		0.978	4.383	4.383	7.359"
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow		7.359		c.m/sec"
"	Hydrograph volume		35465.934		c.m"
"		0.978	7.359	4.383	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		7.359		c.m/sec"
"	Hydrograph volume		35465.934		c.m"
" 52	CHANNEL DESIGN"				
"	7.359 Current peak flow		c.m/sec"		
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth		metre"		
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth		metre"		
"	1.000 Gradient		%"		
"	Depth of flow		0.664		metre"
"	Velocity		1.585		m/sec"
"	Channel capacity		15.864		c.m/sec"
"	Critical depth		0.539		metre"
" 53	ROUTE Channel Route 750"				

```

"      750.00      Channel Route 750 Reach length  ( metre)"
"      0.452      X-factor <= 0.5"
"    177.467      K-lag  ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"     30.000      K-lag  ( seconds)"
"      0.500      Beta weighting factor"
"    300.000      Routing time step  ( seconds)"
"          2      No. of sub-reaches"
"          Peak outflow              7.359      c.m/sec"
"          0.978      7.359      7.359      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          0.978      7.359      7.359      0.000"
" 52      CHANNEL DESIGN"
"      7.359      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow              1.299      metre"
"          Velocity              1.922      m/sec"
"          Channel capacity              19.656      c.m/sec"
"          Critical depth              1.089      metre"
" 64      SHOW TABLE"
"          2      Flow hydrograph"
"          5      Outflow Hydrograph"
"          Maximum flow              7.359      c.m/sec"
"          Hydrograph volume              35465.934      c.m"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.978      7.359      7.359      0.000"
" 40      HYDROGRAPH Combine 900"
"          6      Combine "
"      900      Node #"
"          Combined West and Central Watershed"
"          Maximum flow              7.359      c.m/sec"
"          Hydrograph volume              35465.934      c.m"
"          0.978      7.359      7.359      7.359"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.978      0.000      7.359      7.359"
" 33      CATCHMENT 310"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"      310      Catchment 310."

```

"	5.000	% Impervious"
"	20.360	Total Area"
"	323.000	Flow length"
"	1.000	Overland Slope"
"	19.342	Pervious Area"
"	323.000	Pervious length"
"	1.000	Pervious slope"
"	1.018	Impervious Area"
"	323.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	1.308	0.000 7.359 7.359 c.m/sec"
"	Catchment 310	Pervious Impervious Total Area "
"	Surface Area	19.342 1.018 20.360 hectare"
"	Time of concentration	49.023 8.400 44.361 minutes"
"	Time to Centroid	196.963 122.644 188.434 minutes"
"	Rainfall depth	81.221 81.221 81.221 mm"
"	Rainfall volume	1.5710 0.0827 1.6537 ha-m"
"	Rainfall losses	48.958 1.756 46.598 mm"
"	Runoff depth	32.263 79.465 34.623 mm"
"	Runoff volume	6240.29 808.95 7049.24 c.m"
"	Runoff coefficient	0.397 0.978 0.426 "
"	Maximum flow	1.244 0.455 1.308 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	1.308 1.308 7.359 7.359"	
" 33	CATCHMENT 320"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	320 Catchment 320"	
"	35.000 % Impervious"	
"	5.060 Total Area"	
"	89.000 Flow length"	
"	1.000 Overland Slope"	
"	3.289 Pervious Area"	
"	89.000 Pervious length"	
"	1.000 Pervious slope"	
"	1.771 Impervious Area"	
"	89.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.952	1.308	7.359	7.359 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	22.621	3.876	11.984	minutes"
"		Time to Centroid	153.263	115.470	131.816	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2671.35	1438.42	4109.78	c.m"
"		Rainfall losses	49.022	2.763	32.831	mm"
"		Runoff depth	32.199	78.458	48.389	mm"
"		Runoff volume	1059.01	1389.49	2448.51	c.m"
"		Runoff coefficient	0.396	0.966	0.596	"
"		Maximum flow	0.409	0.880	0.952	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.952	1.635	7.359	7.359"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				

"	0.149	1.635	7.359	7.359 c.m/sec"	
"	Catchment 330	Pervious	Impervious	Total Area	"
"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	19.705	3.377	10.466	minutes"
"	Time to Centroid	148.417	114.704	129.343	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	395.95	213.20	609.16	c.m"
"	Rainfall losses	49.017	3.290	33.013	mm"
"	Runoff depth	32.204	77.931	48.208	mm"
"	Runoff volume	156.99	204.57	361.56	c.m"
"	Runoff coefficient	0.396	0.959	0.594	"
"	Maximum flow	0.064	0.135	0.149	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "		
"	0.149	1.763	7.359	7.359"

" 33	CATCHMENT 340"
"	1 Triangular SCS"
"	1 Equal length"
"	2 Horton equation"
"	340 Catchment 340"
"	35.000 % Impervious"
"	1.910 Total Area"
"	100.000 Flow length"
"	0.500 Overland Slope"
"	1.241 Pervious Area"
"	100.000 Pervious length"
"	0.500 Pervious slope"
"	0.669 Impervious Area"
"	100.000 Impervious length"
"	0.500 Impervious slope"
"	0.250 Pervious Manning 'n' "
"	125.000 Pervious Max.infiltration"
"	5.000 Pervious Min.infiltration"
"	0.250 Pervious Lag constant (hours)"
"	5.000 Pervious Depression storage"
"	0.015 Impervious Manning 'n' "
"	0.000 Impervious Max.infiltration"
"	0.000 Impervious Min.infiltration"
"	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage"

"	0.349	1.763	7.359	7.359 c.m/sec"	
"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	29.867	5.118	15.758	minutes"
"	Time to Centroid	165.227	117.365	137.942	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1008.36	542.96	1551.32	c.m"
"	Rainfall losses	48.963	1.785	32.451	mm"
"	Runoff depth	32.258	79.436	48.770	mm"
"	Runoff volume	400.48	531.03	931.51	c.m"

"	Runoff coefficient	0.397	0.978	0.600	"
"	Maximum flow	0.121	0.302	0.349	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.349	2.112	7.359	7.359"	
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.158	2.112	7.359	7.359 c.m/sec"	
"	Catchment 350	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	21.722	3.722	19.685	minutes"
"	Time to Centroid	151.750	115.263	147.622	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	972.21	51.17	1023.38	c.m"
"	Rainfall losses	48.987	3.090	46.692	mm"
"	Runoff depth	32.234	78.131	34.529	mm"
"	Runoff volume	385.84	49.22	435.06	c.m"
"	Runoff coefficient	0.397	0.962	0.425	"
"	Maximum flow	0.152	0.032	0.158	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.158	2.214	7.359	7.359"	
" 33	CATCHMENT 360"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	360 Catchment 360"				

"	2.000	% Impervious"				
"	4.050	Total Area"				
"	296.000	Flow length"				
"	1.500	Overland Slope"				
"	3.969	Pervious Area"				
"	296.000	Pervious length"				
"	1.500	Pervious slope"				
"	0.081	Impervious Area"				
"	296.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.306	2.214	7.359	7.359 c.m/sec"	
"		Catchment 360	Pervious	Impervious	Total Area	"
"		Surface Area	3.969	0.081	4.050	hectare"
"		Time of concentration	41.193	7.059	39.563	minutes"
"		Time to Centroid	184.016	120.599	180.987	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	3223.66	65.79	3289.45	c.m"
"		Rainfall losses	48.983	1.982	48.043	mm"
"		Runoff depth	32.238	79.239	33.178	mm"
"		Runoff volume	1279.53	64.18	1343.71	c.m"
"		Runoff coefficient	0.397	0.976	0.408	"
"		Maximum flow	0.300	0.039	0.306	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.306	2.337	7.359	7.359"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow	2.337	c.m/sec"		
"		Hydrograph volume	12569.597	c.m"		
" 38		START/RE-START TOTALS 360"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.300	hectare"	
"		Total Impervious area		9.485	hectare"	
"		Total % impervious		7.010"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                      Pre__REG.out"
"          Licensee name:                      gmbp"
"          Company
"          Date & Time last used:                9/4/2024 at 11:35:18 AM"
" 31          TIME PARAMETERS"
"          60.000  Time Step"
"          2880.000  Max. Storm length"
"          7500.000  Max. Hydrograph"
" 32          STORM Historic"
"          5  Historic"
"          2880.000  Duration"
"          48.000  Rainfall intensity values"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.026      2.026      2.026      2.028"
"                  2.026      6.000      4.000      6.000      13.000"
"                  17.000      13.000      23.000      13.000      13.000"
"                  53.000      38.000      13.000"
"          Maximum intensity                    53.000      mm/hr"
"          Total depth                          285.000      mm"
"          6  000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380  Total Area"
"          275.000  Flow length"
"          1.400  Overland Slope"
"          10.172  Pervious Area"
"          275.000  Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.043	0.000	0.000	0.000 c.m/sec"
"		Catchment 110	Pervious	Impervious	Total Area "
"		Surface Area	10.172	0.208	10.380 hectare"
"		Time of concentration	67.677	12.026	65.646 minutes"
"		Time to Centroid	2775.928	2294.771	2758.366 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	2.8991	0.0592	2.9583 ha-m"
"		Rainfall losses	138.207	12.505	135.693 mm"
"		Runoff depth	146.793	272.495	149.307 mm"
"		Runoff volume	1.4932	0.0566	1.5498 ha-m"
"		Runoff coefficient	0.515	0.956	0.524 "
"		Maximum flow	1.022	0.026	1.043 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		1.043	1.043	0.000	0.000"
" 33		CATCHMENT 120"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	120	Catchment 120"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	1.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	1.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	1.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.074	1.043	0.000	0.000 c.m/sec"
"		Catchment 120	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"

"	Time of concentration	48.095	8.546	44.614	minutes"
"	Time to Centroid	2755.898	2260.155	2712.258	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	2.6913	0.1416	2.8329	ha-m"
"	Rainfall losses	139.398	17.966	133.327	mm"
"	Runoff depth	145.602	267.034	151.673	mm"
"	Runoff volume	1.3749	0.1327	1.5076	ha-m"
"	Runoff coefficient	0.511	0.937	0.532	"
"	Maximum flow	1.027	0.062	1.074	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.074	2.117	0.000	0.000"
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.117		c.m/sec"
"	Hydrograph volume		30574.426		c.m"
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.666	2.117	0.000	0.000 c.m/sec"
"	Catchment 130	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	53.388	9.487	51.030	minutes"
"	Time to Centroid	2761.652	2270.285	2735.255	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4.3099	0.1333	4.4432	ha-m"
"	Rainfall losses	138.300	15.713	134.622	mm"

"	Runoff depth	146.700	269.287	150.378	mm"
"	Runoff volume	2.2184	0.1259	2.3444	ha-m"
"	Runoff coefficient	0.515	0.945	0.528	"
"	Maximum flow	1.620	0.059	1.666	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.666 3.783 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	1.666 3.783 3.783 0.000"				
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow	3.783	c.m/sec"		
"	Hydrograph volume	54018.305	c.m"		
"	1.666 3.783 3.783 3.783"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.666 0.000 3.783 3.783"				
" 33	CATCHMENT 210"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	210 Catchment 210"				
"	3.000 % Impervious"				
"	3.660 Total Area"				
"	135.000 Flow length"				
"	0.750 Overland Slope"				
"	3.550 Pervious Area"				
"	135.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.110 Impervious Area"				
"	135.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.391 0.000 3.783 3.783 c.m/sec"				
"	Catchment 210 Pervious Impervious Total Area "				
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	53.255	9.463	50.903	minutes"
"	Time to Centroid	2761.502	2270.032	2735.103	minutes"

"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1.0118	0.0313	1.0431	ha-m"
"	Rainfall losses	138.305	15.759	134.628	mm"
"	Runoff depth	146.695	269.241	150.372	mm"
"	Runoff volume	5207.98	295.63	5503.60	c.m"
"	Runoff coefficient	0.515	0.945	0.528	"
"	Maximum flow	0.381	0.014	0.391	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.391 0.391 3.783 3.783"				
" 33	CATCHMENT 220"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	220 Catchment 220"				
"	3.000 % Impervious"				
"	18.860 Total Area"				
"	351.000 Flow length"				
"	1.500 Overland Slope"				
"	18.294 Pervious Area"				
"	351.000 Pervious length"				
"	1.500 Pervious slope"				
"	0.566 Impervious Area"				
"	351.000 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.806 0.391 3.783 3.783 c.m/sec"				
"	Catchment 220 Pervious Impervious Total Area "				
"	Surface Area 18.294 0.566 18.860 hectare"				
"	Time of concentration 76.743 13.637 73.245 minutes"				
"	Time to Centroid 2785.271 2291.955 2757.928 minutes"				
"	Rainfall depth 285.000 285.000 285.000 mm"				
"	Rainfall volume 5.2138 0.1613 5.3751 ha-m"				
"	Rainfall losses 138.909 7.815 134.976 mm"				
"	Runoff depth 146.091 277.185 150.024 mm"				
"	Runoff volume 2.6726 0.1568 2.8294 ha-m"				
"	Runoff coefficient 0.513 0.973 0.526 "				
"	Maximum flow 1.746 0.069 1.806 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.806 2.198 3.783 3.783"				

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" 33      CATCHMENT 230"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          230  Catchment 230"
"          35.000 % Impervious"
"          2.860  Total Area"
"          45.000 Flow length"
"          1.500  Overland Slope"
"          1.859  Pervious Area"
"          45.000 Pervious length"
"          1.500  Pervious slope"
"          1.001  Impervious Area"
"          45.000 Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.305      2.198      3.783      3.783 c.m/sec"
"          Catchment 230      Pervious      Impervious      Total Area  "
"          Surface Area      1.859      1.001      2.860      hectare"
"          Time of concentration 22.376      3.976      13.575      minutes"
"          Time to Centroid 2727.910      2234.376      2491.853      minutes"
"          Rainfall depth      285.000      285.000      285.000      mm"
"          Rainfall volume      5298.15      2852.85      8151.00      c.m"
"          Rainfall losses      139.447      37.174      103.652      mm"
"          Runoff depth      145.553      247.826      181.348      mm"
"          Runoff volume      2705.83      2480.74      5186.56      c.m"
"          Runoff coefficient      0.511      0.870      0.636      "
"          Maximum flow      0.193      0.126      0.305      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.305      2.480      3.783      3.783"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"          Maximum flow      2.480      c.m/sec"
"          Hydrograph volume      38984.656      c.m"
" 33      CATCHMENT 240"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          240  Catchment 240"

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"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.804	2.480	3.783	3.783 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	34.608	6.150	20.700	minutes"
"		Time to Centroid	2738.756	2234.994	2492.571	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	1.4672	0.7900	2.2572	ha-m"
"		Rainfall losses	140.191	27.963	100.911	mm"
"		Runoff depth	144.809	257.037	184.089	mm"
"		Runoff volume	0.7455	0.7125	1.4580	ha-m"
"		Runoff coefficient	0.508	0.902	0.646	"
"		Maximum flow	0.566	0.351	0.804	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.804	3.283	3.783	3.783"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		3.283	c.m/sec"	
"		Hydrograph volume		53564.465	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				

"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	0.615	3.283	3.783	3.783	c.m/sec"	
"	Catchment 250	Pervious	Impervious	Total Area	"	
"	Surface Area	5.680	0.000	5.680	hectare"	
"	Time of concentration	49.930	8.872	49.930	minutes"	
"	Time to Centroid	2757.493	2263.670	2757.493	minutes"	
"	Rainfall depth	285.000	285.000	285.000	mm"	
"	Rainfall volume	1.6188	0.0000	1.6188	ha-m"	
"	Rainfall losses	138.790	17.091	138.790	mm"	
"	Runoff depth	146.210	267.909	146.210	mm"	
"	Runoff volume	8304.71	0.02	8304.72	c.m"	
"	Runoff coefficient	0.513	0.000	0.513	"	
"	Maximum flow	0.615	0.000	0.615	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4 Add Runoff "					
"	0.615	3.899	3.783	3.783"		
" 64	SHOW TABLE"					
"	2 Flow hydrograph"					
"	4 Inflow Hydrograph"					
"	Maximum flow	3.899	c.m/sec"			
"	Hydrograph volume	61869.184	c.m"			
" 33	CATCHMENT 260"					
"	1 Triangular SCS"					
"	1 Equal length"					
"	2 Horton equation"					
"	260 Catchment 260"					
"	0.000 % Impervious"					
"	12.060 Total Area"					
"	287.000 Flow length"					
"	1.000 Overland Slope"					
"	12.060 Pervious Area"					
"	287.000 Pervious length"					
"	1.000 Pervious slope"					
"	0.000 Impervious Area"					
"	287.000 Impervious length"					
"	1.000 Impervious slope"					

"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.151	3.899	3.783	3.783 c.m/sec"
"		Catchment 260	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	76.809	13.649	76.809 minutes"
"		Time to Centroid	2785.352	2291.947	2785.351 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	3.4371	0.0000	3.4371 ha-m"
"		Rainfall losses	138.909	7.790	138.909 mm"
"		Runoff depth	146.091	277.210	146.091 mm"
"		Runoff volume	1.7619	0.0000	1.7619 ha-m"
"		Runoff coefficient	0.513	0.000	0.513 "
"		Maximum flow	1.151	0.000	1.151 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		1.151	5.049	3.783	3.783"
" 33		CATCHMENT 270"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	270	Catchment 270"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

"		1.406	5.049	3.783	3.783 c.m/sec"
"	Catchment 270		Pervious	Impervious	Total Area "
"	Surface Area		14.960	0.000	14.960 hectare"
"	Time of concentration		79.977	14.212	79.977 minutes"
"	Time to Centroid		2789.071	2291.762	2789.070 minutes"
"	Rainfall depth		285.000	285.000	285.000 mm"
"	Rainfall volume		4.2636	0.0000	4.2636 ha-m"
"	Rainfall losses		139.034	6.693	139.034 mm"
"	Runoff depth		145.966	278.307	145.966 mm"
"	Runoff volume		2.1836	0.0000	2.1837 ha-m"
"	Runoff coefficient		0.512	0.000	0.512 "
"	Maximum flow		1.406	0.000	1.406 c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		1.406	6.455	3.783	3.783"
" 64	SHOW TABLE"				
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"				6.455	c.m/sec"
"				101324.313	c.m"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		1.406	6.455	6.455	3.783"
" 40	HYDROGRAPH Combine 1000"				
"	6	Combine "			
"	1000	Node #"			
"		Node 1000"			
"				10.238	c.m/sec"
"				155342.609	c.m"
"		1.406	6.455	6.455	10.238"
" 40	HYDROGRAPH Confluence 1000"				
"	7	Confluence "			
"	1000	Node #"			
"		Node 1000"			
"				10.238	c.m/sec"
"				155342.594	c.m"
"		1.406	10.238	6.455	0.000"
" 64	SHOW TABLE"				
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"				10.238	c.m/sec"
"				155342.594	c.m"
" 52	CHANNEL DESIGN"				
"	10.238	Current peak flow		c.m/sec"	
"	0.040	Manning 'n'"			
"	0.	Cross-section type: 0=trapezoidal; 1=general"			
"	5.000	Basewidth metre"			
"	3.000	Left bank slope"			
"	3.000	Right bank slope"			
"	1.000	Channel depth metre"			

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"      1.000 Gradient %"
"      Depth of flow          0.794 metre"
"      Velocity              1.748 m/sec"
"      Channel capacity      15.864 c.m/sec"
"      Critical depth        0.656 metre"
" 53    ROUTE Channel Route 750"
"      750.00 Channel Route 750 Reach length ( metre)"
"      0.472 X-factor <= 0.5"
" 321.813 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
" 327.273 Routing time step ( seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          9.887 c.m/sec"
"      1.406 10.238 9.887 0.000 c.m/sec"
" 40    HYDROGRAPH Next link "
"      5 Next link "
"      1.406 9.887 9.887 0.000"
" 52    CHANNEL DESIGN"
"      9.887 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          1.482 metre"
"      Velocity              2.069 m/sec"
"      Channel capacity      19.656 c.m/sec"
"      Critical depth        1.256 metre"
" 64    SHOW TABLE"
"      2 Flow hydrograph"
"      5 Outflow Hydrograph"
"      Maximum flow          9.887 c.m/sec"
"      Hydrograph volume     155343.719 c.m"
" 40    HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"      1.406 9.887 9.887 0.000"
" 40    HYDROGRAPH Combine 900"
"      6 Combine "
"      900 Node #"
"      Combined West and Central Watershed"
"      Maximum flow          9.887 c.m/sec"
"      Hydrograph volume     155343.719 c.m"
"      1.406 9.887 9.887 9.887"
" 40    HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"

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"		1.406	0.000	9.887	9.887"
" 33	CATCHMENT 310"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	310	Catchment 310."			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.918	0.000	9.887	9.887 c.m/sec"
"	Catchment 310	Pervious	Impervious	Total Area	"
"	Surface Area	19.342	1.018	20.360	hectare"
"	Time of concentration	82.453	14.651	76.268	minutes"
"	Time to Centroid	2792.146	2291.855	2746.514	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	5.5125	0.2901	5.8026	ha-m"
"	Rainfall losses	138.693	6.005	132.058	mm"
"	Runoff depth	146.307	278.995	152.942	mm"
"	Runoff volume	2.8299	0.2840	3.1139	ha-m"
"	Runoff coefficient	0.513	0.979	0.537	"
"	Maximum flow	1.808	0.123	1.918	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		1.918	1.918	9.887	9.887"
" 33	CATCHMENT 320"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	320	Catchment 320"			
"	35.000	% Impervious"			
"	5.060	Total Area"			
"	89.000	Flow length"			
"	1.000	Overland Slope"			

"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.516	1.918	9.887	9.887 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	38.047	6.761	22.590	minutes"
"		Time to Centroid	2740.901	2241.050	2493.947	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	0.9374	0.5047	1.4421	ha-m"
"		Rainfall losses	141.553	24.859	100.710	mm"
"		Runoff depth	143.447	260.141	184.290	mm"
"		Runoff volume	4717.97	4607.09	9325.06	c.m"
"		Runoff coefficient	0.503	0.913	0.647	"
"		Maximum flow	0.361	0.224	0.516	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.516	2.434	9.887	9.887"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				

"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.076	2.434	9.887	9.887 c.m/sec"	
"		Catchment 330	Pervious	Impervious	Total Area	"
"		Surface Area	0.488	0.262	0.750	hectare"
"		Time of concentration	33.142	5.889	19.870	minutes"
"		Time to Centroid	2737.929	2233.504	2492.287	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	1389.38	748.12	2137.50	c.m"
"		Rainfall losses	139.790	29.018	101.020	mm"
"		Runoff depth	145.210	255.982	183.980	mm"
"		Runoff volume	707.90	671.95	1379.85	c.m"
"		Runoff coefficient	0.510	0.898	0.646	"
"		Maximum flow	0.054	0.033	0.076	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.076	2.511	9.887	9.887"	
" 33		CATCHMENT 340"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	340	Catchment 340"				
"	35.000	% Impervious"				
"	1.910	Total Area"				
"	100.000	Flow length"				
"	0.500	Overland Slope"				
"	1.241	Pervious Area"				
"	100.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.669	Impervious Area"				
"	100.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.198	2.511	9.887	9.887 c.m/sec"	
"		Catchment 340	Pervious	Impervious	Total Area	"
"		Surface Area	1.241	0.669	1.910	hectare"
"		Time of concentration	50.233	8.926	29.719	minutes"

"	Time to Centroid	2757.880	2264.252	2512.726	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	3538.27	1905.22	5443.50	c.m"
"	Rainfall losses	138.715	16.956	96.099	mm"
"	Runoff depth	146.285	268.044	188.901	mm"
"	Runoff volume	1816.13	1791.87	3608.01	c.m"
"	Runoff coefficient	0.513	0.941	0.663	"
"	Maximum flow	0.134	0.084	0.198	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.198 2.709 9.887 9.887"				
" 33	CATCHMENT 350"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	350 Catchment 350"				
"	5.000 % Impervious"				
"	1.260 Total Area"				
"	93.000 Flow length"				
"	1.250 Overland Slope"				
"	1.197 Pervious Area"				
"	93.000 Pervious length"				
"	1.250 Pervious slope"				
"	0.063 Impervious Area"				
"	93.000 Impervious length"				
"	1.250 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.137 2.709 9.887 9.887 c.m/sec"				
"	Catchment 350 Pervious Impervious Total Area "				
"	Surface Area 1.197 0.063 1.260 hectare"				
"	Time of concentration 36.534 6.492 33.939 minutes"				
"	Time to Centroid 2739.813 2238.163 2696.477 minutes"				
"	Rainfall depth 285.000 285.000 285.000 mm"				
"	Rainfall volume 3411.45 179.55 3591.00 c.m"				
"	Rainfall losses 140.971 26.244 135.234 mm"				
"	Runoff depth 144.029 258.756 149.766 mm"				
"	Runoff volume 1724.03 163.02 1887.05 c.m"				
"	Runoff coefficient 0.505 0.908 0.525 "				
"	Maximum flow 0.132 0.008 0.137 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				

"		0.137	2.846	9.887	9.887"
" 33	CATCHMENT 360"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	360	Catchment 360"			
"	2.000	% Impervious"			
"	4.050	Total Area"			
"	296.000	Flow length"			
"	1.500	Overland Slope"			
"	3.969	Pervious Area"			
"	296.000	Pervious length"			
"	1.500	Pervious slope"			
"	0.081	Impervious Area"			
"	296.000	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.404	2.846	9.887	9.887 c.m/sec"
"		Catchment 360	Pervious	Impervious	Total Area "
"		Surface Area	3.969	0.081	4.050 hectare"
"		Time of concentration	69.284	12.311	67.193 minutes"
"		Time to Centroid	2777.271	2293.990	2759.537 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	1.1312	0.0231	1.1543 ha-m"
"		Rainfall losses	138.476	11.491	135.937 mm"
"		Runoff depth	146.524	273.509	149.063 mm"
"		Runoff volume	5815.53	221.54	6037.07 c.m"
"		Runoff coefficient	0.514	0.960	0.523 "
"		Maximum flow	0.395	0.010	0.404 c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.404	3.249	9.887	9.887"
" 64	SHOW TABLE"				
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"		Maximum flow	3.249	c.m/sec"	
"		Hydrograph volume	53375.961	c.m"	
" 38	START/RE-START TOTALS 360"				
"	3	Runoff Totals on EXIT"			
"		Total Catchment area		135.300	hectare"
"		Total Impervious area		9.485	hectare"

"	Total % impervious	7.010"
" 19	EXIT"	

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-09-04"
"          Output filename:                    Pre__100yrSCS.out"
"          Licensee name:                      gmbp"
"          Company                             "
"          Date & Time last used:              9/4/2024 at 11:38:07 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          1440.000  Max. Storm length"
"          12000.000  Max. Hydrograph"
" 32          STORM Mass Curve"
"          3  Mass Curve"
"          81.221  Rainfall depth"
"          1440.000  Duration"
"          48  C:\Program Files (x86)\MIDUSS\SCS_Type2_24hr.mrd  SCS 24 hour Type
II storm"
"          Maximum intensity                    99.415  mm/hr"
"          Total depth                          81.221  mm"
"          7  1000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 110"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          110  Catchment 110"
"          2.000  % Impervious"
"          10.380  Total Area"
"          275.000  Flow length"
"          1.400  Overland Slope"
"          10.172  Pervious Area"
"          275.000  Pervious length"
"          1.400  Pervious slope"
"          0.208  Impervious Area"
"          275.000  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.544  0.000  0.000  0.000 c.m/sec"

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"	Catchment 110	Pervious	Impervious	Total Area	"
"	Surface Area	10.172	0.208	10.380	hectare"
"	Time of concentration	53.129	9.351	49.665	minutes"
"	Time to Centroid	777.215	753.324	775.325	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	8262.13	168.61	8430.74	c.m"
"	Rainfall losses	62.365	1.830	61.154	mm"
"	Runoff depth	18.856	79.391	20.067	mm"
"	Runoff volume	1918.09	164.82	2082.91	c.m"
"	Runoff coefficient	0.232	0.977	0.247	"
"	Maximum flow	0.538	0.056	0.544	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.544	0.544	0.000	0.000"

" 33 CATCHMENT 120"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	120	Catchment 120"
"	5.000	% Impervious"
"	9.940	Total Area"
"	174.000	Flow length"
"	1.750	Overland Slope"
"	9.443	Pervious Area"
"	174.000	Pervious length"
"	1.750	Pervious slope"
"	0.497	Impervious Area"
"	174.000	Impervious length"
"	1.750	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"	0.679	0.544	0.000	0.000 c.m/sec"
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"	Catchment 120	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	37.756	6.645	32.136	minutes"
"	Time to Centroid	760.894	747.421	758.461	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	7669.70	403.67	8073.37	c.m"
"	Rainfall losses	62.377	2.277	59.372	mm"
"	Runoff depth	18.844	78.944	21.849	mm"
"	Runoff volume	1779.43	392.35	2171.78	c.m"
"	Runoff coefficient	0.232	0.972	0.269	"

"	Maximum flow	0.667	0.143	0.679	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.679 1.162 0.000 0.000"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	1.162	c.m/sec"		
"	Hydrograph volume	4254.688	c.m"		
" 33	CATCHMENT 130"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	130 Catchment 130"				
"	3.000 % Impervious"				
"	15.590 Total Area"				
"	198.000 Flow length"				
"	1.600 Overland Slope"				
"	15.122 Pervious Area"				
"	198.000 Pervious length"				
"	1.600 Pervious slope"				
"	0.468 Impervious Area"				
"	198.000 Impervious length"				
"	1.600 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.999 1.162 0.000 0.000 c.m/sec"				
"	Catchment 130 Pervious Impervious Total Area "				
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	41.912	7.377	37.937	minutes"
"	Time to Centroid	765.323	748.991	763.443	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.2282	0.0380	1.2662	ha-m"
"	Rainfall losses	62.358	1.895	60.544	mm"
"	Runoff depth	18.863	79.326	20.677	mm"
"	Runoff volume	2852.51	371.01	3223.52	c.m"
"	Runoff coefficient	0.232	0.977	0.255	"
"	Maximum flow	0.986	0.133	0.999	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.999 2.162 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				

"	8	Copy to Outflow"				
"		0.999	2.162	2.162	0.000"	
" 40		HYDROGRAPH Combine	1000"			
"	6	Combine "				
"	1000	Node #"				
"		Node 1000"				
"		Maximum flow	2.162	c.m/sec"		
"		Hydrograph volume	7478.208	c.m"		
"		0.999	2.162	2.162	2.162"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.999	0.000	2.162	2.162"	
" 33		CATCHMENT 210"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	210	Catchment 210"				
"	3.000	% Impervious"				
"	3.660	Total Area"				
"	135.000	Flow length"				
"	0.750	Overland Slope"				
"	3.550	Pervious Area"				
"	135.000	Pervious length"				
"	0.750	Pervious slope"				
"	0.110	Impervious Area"				
"	135.000	Impervious length"				
"	0.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.235	0.000	2.162	2.162 c.m/sec"	
"		Catchment 210	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	41.808	7.358	37.843	minutes"
"		Time to Centroid	765.211	748.954	763.340	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2883.51	89.18	2972.69	c.m"
"		Rainfall losses	62.359	1.906	60.546	mm"
"		Runoff depth	18.862	79.315	20.675	mm"
"		Runoff volume	669.63	87.09	756.71	c.m"
"		Runoff coefficient	0.232	0.977	0.255	"
"		Maximum flow	0.232	0.031	0.235	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.235	0.235	2.162	2.162"	
" 33		CATCHMENT 220"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	220	Catchment 220"				
"	3.000	% Impervious"				
"	18.860	Total Area"				
"	351.000	Flow length"				
"	1.500	Overland Slope"				
"	18.294	Pervious Area"				
"	351.000	Pervious length"				
"	1.500	Pervious slope"				
"	0.566	Impervious Area"				
"	351.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.884	0.235	2.162	2.162 c.m/sec"	
"		Catchment 220	Pervious	Impervious	Total Area "	
"		Surface Area	18.294	0.566	18.860	hectare"
"		Time of concentration	60.246	10.603	54.519	minutes"
"		Time to Centroid	784.776	756.174	781.477	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.4859	0.0460	1.5318	ha-m"
"		Rainfall losses	62.359	1.687	60.539	mm"
"		Runoff depth	18.862	79.534	20.682	mm"
"		Runoff volume	3450.69	450.00	3900.70	c.m"
"		Runoff coefficient	0.232	0.979	0.255	"
"		Maximum flow	0.868	0.147	0.884	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.884	1.078	2.162	2.162"	
" 33		CATCHMENT 230"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	230	Catchment 230"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				

"	1.500	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.500	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.378	1.078	2.162	2.162 c.m/sec"	
"		Catchment 230	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	17.566	3.092	7.551	minutes"
"		Time to Centroid	739.487	739.135	739.243	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1509.90	813.02	2322.92	c.m"
"		Rainfall losses	62.355	2.528	41.416	mm"
"		Runoff depth	18.866	78.693	39.805	mm"
"		Runoff volume	350.72	787.71	1138.43	c.m"
"		Runoff coefficient	0.232	0.969	0.490	"
"		Maximum flow	0.240	0.281	0.378	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.378	1.118	2.162	2.162"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.118	c.m/sec"	
"		Hydrograph volume		5795.845	c.m"	
" 33		CATCHMENT 240"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	240	Catchment 240"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				

"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.927	1.118	2.162	2.162 c.m/sec"	
"		Catchment 240	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	27.168	4.782	11.628	minutes"
"		Time to Centroid	749.675	743.051	745.076	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	4181.26	2251.45	6432.70	c.m"
"		Rainfall losses	62.356	1.695	41.125	mm"
"		Runoff depth	18.865	79.526	40.096	mm"
"		Runoff volume	971.15	2204.46	3175.61	c.m"
"		Runoff coefficient	0.232	0.979	0.494	"
"		Maximum flow	0.482	0.782	0.927	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.927	1.655	2.162	2.162"	
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		1.655	c.m/sec"	
"		Hydrograph volume		8971.455	c.m"	
" 33		CATCHMENT 250"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	250	Catchment 250"				
"	0.000	% Impervious"				
"	5.680	Total Area"				
"	140.000	Flow length"				
"	1.000	Overland Slope"				
"	5.680	Pervious Area"				
"	140.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	140.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.388	1.655	2.162	2.162 c.m/sec"
"		Catchment 250	Pervious	Impervious	Total Area "
"		Surface Area	5.680	0.000	5.680 hectare"
"		Time of concentration	39.197	6.899	39.197 minutes"
"		Time to Centroid	762.449	747.994	762.450 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	4613.35	0.00	4613.35 c.m"
"		Rainfall losses	62.355	2.294	62.355 mm"
"		Runoff depth	18.866	78.927	18.866 mm"
"		Runoff volume	1071.57	0.00	1071.57 c.m"
"		Runoff coefficient	0.232	0.000	0.232 "
"		Maximum flow	0.388	0.000	0.388 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.388	1.888	2.162	2.162"
" 64		SHOW TABLE"			
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"		Maximum flow	1.888	c.m/sec"	
"		Hydrograph volume	10043.035	c.m"	
" 33		CATCHMENT 260"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	260	Catchment 260"			
"	0.000	% Impervious"			
"	12.060	Total Area"			
"	287.000	Flow length"			
"	1.000	Overland Slope"			
"	12.060	Pervious Area"			
"	287.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	287.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			

"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.572	1.888	2.162	2.162 c.m/sec"	
"		Catchment 260	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	60.298	10.612	60.298	minutes"
"		Time to Centroid	784.832	756.193	784.832	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	9795.24	0.01	9795.25	c.m"
"		Rainfall losses	62.358	1.684	62.358	mm"
"		Runoff depth	18.863	79.537	18.863	mm"
"		Runoff volume	2274.84	0.01	2274.85	c.m"
"		Runoff coefficient	0.232	0.000	0.232	"
"		Maximum flow	0.572	0.000	0.572	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.572	2.350	2.162	2.162"	
" 33		CATCHMENT 270"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	270	Catchment 270"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.679	2.350	2.162	2.162 c.m/sec"	
"		Catchment 270	Pervious	Impervious	Total Area	"
"		Surface Area	14.960	0.000	14.960	hectare"
"		Time of concentration	62.785	11.050	62.785	minutes"
"		Time to Centroid	787.465	757.147	787.466	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.2151	0.0000	1.2151	ha-m"
"		Rainfall losses	62.361	1.589	62.361	mm"

"	Runoff depth	18.860	79.632	18.860	mm"
"	Runoff volume	2821.38	0.01	2821.39	c.m"
"	Runoff coefficient	0.232	0.000	0.232	"
"	Maximum flow	0.679	0.000	0.679	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.679	2.965	2.162	2.162"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	2.965		c.m/sec"	
"	Hydrograph volume	15139.266		c.m"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.679	2.965	2.965	2.162"	
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow	5.031		c.m/sec"	
"	Hydrograph volume	22617.477		c.m"	
"	0.679	2.965	2.965	5.031"	
" 40	HYDROGRAPH Confluence 1000"				
"	7 Confluence "				
"	1000 Node #"				
"	Node 1000"				
"	Maximum flow	5.031		c.m/sec"	
"	Hydrograph volume	22617.473		c.m"	
"	0.679	5.031	2.965	0.000"	
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	5.031		c.m/sec"	
"	Hydrograph volume	22617.473		c.m"	
" 52	CHANNEL DESIGN"				
"	5.031 Current peak flow	c.m/sec"			
"	0.040 Manning 'n'"				
"	0. Cross-section type: 0=trapezoidal; 1=general"				
"	5.000 Basewidth	metre"			
"	3.000 Left bank slope"				
"	3.000 Right bank slope"				
"	1.000 Channel depth	metre"			
"	1.000 Gradient	%"			
"	Depth of flow	0.539		metre"	
"	Velocity	1.411		m/sec"	
"	Channel capacity	15.864		c.m/sec"	
"	Critical depth	0.428		metre"	
" 53	ROUTE Channel Route 750"				
"	750.00 Channel Route 750 Reach length	(metre)"			
"	0.460 X-factor <= 0.5"				

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"      199.317   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"      2       No. of sub-reaches"
"      Peak outflow                5.031    c.m/sec"
"      0.679    5.031    5.031    0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"      5       Next link "
"      0.679    5.031    5.031    0.000"
" 52      CHANNEL DESIGN"
"      5.031   Current peak flow    c.m/sec"
"      0.040   Manning 'n'"
"      0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000   Basewidth    metre"
"      1.500   Left bank slope"
"      1.500   Right bank slope"
"      2.000   Channel depth    metre"
"      1.000   Gradient    %"
"      Depth of flow                1.092    metre"
"      Velocity                    1.746    m/sec"
"      Channel capacity              19.656    c.m/sec"
"      Critical depth                0.902    metre"
" 64      SHOW TABLE"
"      2       Flow hydrograph"
"      5       Outflow Hydrograph"
"      Maximum flow                5.031    c.m/sec"
"      Hydrograph volume            22617.457    c.m"
" 40      HYDROGRAPH Copy to Outflow"
"      8       Copy to Outflow"
"      0.679    5.031    5.031    0.000"
" 40      HYDROGRAPH Combine 900"
"      6       Combine "
"      900     Node #"
"      Combined West and Central Watershed"
"      Maximum flow                5.031    c.m/sec"
"      Hydrograph volume            22617.457    c.m"
"      0.679    5.031    5.031    5.031"
" 40      HYDROGRAPH Start - New Tributary"
"      2       Start - New Tributary"
"      0.679    0.000    5.031    5.031"
" 33      CATCHMENT 310"
"      1       Triangular SCS"
"      1       Equal length"
"      2       Horton equation"
"      310     Catchment 310."
"      5.000   % Impervious"
"      20.360   Total Area"

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"	323.000	Flow length"				
"	1.000	Overland Slope"				
"	19.342	Pervious Area"				
"	323.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.018	Impervious Area"				
"	323.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.886	0.000	5.031	5.031 c.m/sec"	
"		Catchment 310	Pervious	Impervious	Total Area	"
"		Surface Area	19.342	1.018	20.360	hectare"
"		Time of concentration	64.728	11.392	55.028	minutes"
"		Time to Centroid	789.543	757.896	783.786	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.5710	0.0827	1.6537	ha-m"
"		Rainfall losses	62.356	1.540	59.315	mm"
"		Runoff depth	18.865	79.681	21.906	mm"
"		Runoff volume	3648.86	811.15	4460.00	c.m"
"		Runoff coefficient	0.232	0.981	0.270	"
"		Maximum flow	0.857	0.264	0.886	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.886	0.886	5.031	5.031"	
" 33		CATCHMENT 320"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	320	Catchment 320"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.584	0.886	5.031	5.031 c.m/sec"	
"		Catchment 320	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	29.868	5.257	12.781	minutes"
"		Time to Centroid	752.544	744.064	746.657	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2671.36	1438.42	4109.78	c.m"
"		Rainfall losses	62.357	1.661	41.113	mm"
"		Runoff depth	18.864	79.560	40.108	mm"
"		Runoff volume	620.45	1409.01	2029.46	c.m"
"		Runoff coefficient	0.232	0.980	0.494	"
"		Maximum flow	0.280	0.505	0.584	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.584	1.073	5.031	5.031"	
" 33		CATCHMENT 330"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	330	Catchment 330"				
"	35.000	% Impervious"				
"	0.750	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.488	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.262	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.088	1.073	5.031	5.031 c.m/sec"	
"		Catchment 330	Pervious	Impervious	Total Area	"

"	Surface Area	0.488	0.262	0.750	hectare"
"	Time of concentration	26.017	4.579	11.138	minutes"
"	Time to Centroid	748.436	742.605	744.388	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	395.95	213.21	609.16	c.m"
"	Rainfall losses	62.378	1.832	41.187	mm"
"	Runoff depth	18.843	79.389	40.034	mm"
"	Runoff volume	91.86	208.40	300.25	c.m"
"	Runoff coefficient	0.232	0.977	0.493	"
"	Maximum flow	0.047	0.073	0.088	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.088	1.098	5.031	5.031"

" 33 CATCHMENT 340"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	340	Catchment 340"
"	35.000	% Impervious"
"	1.910	Total Area"
"	100.000	Flow length"
"	0.500	Overland Slope"
"	1.241	Pervious Area"
"	100.000	Pervious length"
"	0.500	Pervious slope"
"	0.669	Impervious Area"
"	100.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.209	1.098	5.031	5.031 c.m/sec"
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"	Catchment 340	Pervious	Impervious	Total Area	"
"	Surface Area	1.241	0.669	1.910	hectare"
"	Time of concentration	39.435	6.941	16.927	minutes"
"	Time to Centroid	762.705	748.059	752.561	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1008.36	542.96	1551.32	c.m"
"	Rainfall losses	62.355	2.255	41.320	mm"
"	Runoff depth	18.866	78.966	39.901	mm"
"	Runoff volume	234.22	527.89	762.11	c.m"
"	Runoff coefficient	0.232	0.972	0.491	"
"	Maximum flow	0.085	0.191	0.209	c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.209      1.255      5.031      5.031"
" 33      CATCHMENT 350"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"      350  Catchment 350"
"      5.000 % Impervious"
"      1.260 Total Area"
"      93.000 Flow length"
"      1.250 Overland Slope"
"      1.197 Pervious Area"
"      93.000 Pervious length"
"      1.250 Pervious slope"
"      0.063 Impervious Area"
"      93.000 Impervious length"
"      1.250 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.050 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.108      1.255      5.031      5.031 c.m/sec"
"      Catchment 350      Pervious      Impervious      Total Area "
"      Surface Area      1.197      0.063      1.260      hectare"
"      Time of concentration 28.681      5.048      24.380      minutes"
"      Time to Centroid      751.251      743.590      749.857      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      972.22      51.17      1023.38      c.m"
"      Rainfall losses      62.394      1.632      59.356      mm"
"      Runoff depth      18.827      79.589      21.865      mm"
"      Runoff volume      225.36      50.14      275.50      c.m"
"      Runoff coefficient      0.232      0.980      0.269      "
"      Maximum flow      0.106      0.018      0.108      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.108      1.327      5.031      5.031"
" 33      CATCHMENT 360"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"      360  Catchment 360"
"      2.000 % Impervious"
"      4.050 Total Area"

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"      296.000  Flow length"
"      1.500   Overland Slope"
"      3.969   Pervious Area"
"      296.000  Pervious length"
"      1.500   Pervious slope"
"      0.081   Impervious Area"
"      296.000  Impervious length"
"      1.500   Impervious slope"
"      0.250   Pervious Manning 'n'"
"      125.000  Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"      0.207      1.327      5.031      5.031 c.m/sec"
"      Catchment 360      Pervious      Impervious      Total Area  "
"      Surface Area      3.969      0.081      4.050      hectare"
"      Time of concentration  54.390      9.573      50.848      minutes"
"      Time to Centroid      778.569      753.896      776.619      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      3223.66      65.79      3289.45      c.m"
"      Rainfall losses      62.356      1.886      61.147      mm"
"      Runoff depth      18.865      79.335      20.074      mm"
"      Runoff volume      748.74      64.26      813.01      c.m"
"      Runoff coefficient      0.232      0.977      0.247      "
"      Maximum flow      0.205      0.022      0.207      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      0.207      1.441      5.031      5.031"
" 64      SHOW TABLE"
"      2      Flow hydrograph"
"      4      Inflow Hydrograph"
"      Maximum flow      1.441      c.m/sec"
"      Hydrograph volume      8640.338      c.m"
" 38      START/RE-START TOTALS 360"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      135.300      hectare"
"      Total Impervious area      9.485      hectare"
"      Total % impervious      7.010"
" 19      EXIT"

```

APPENDIX G:

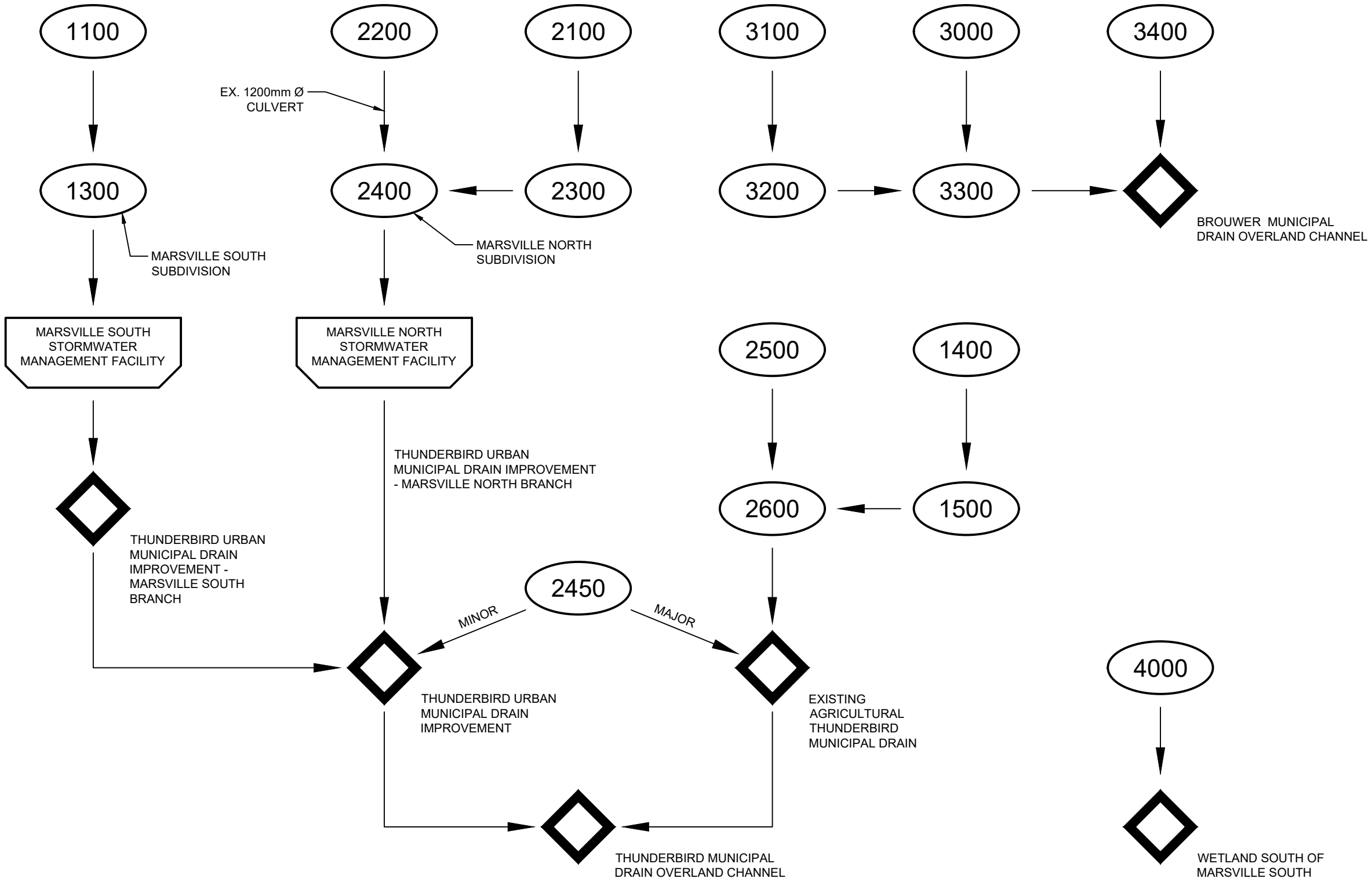
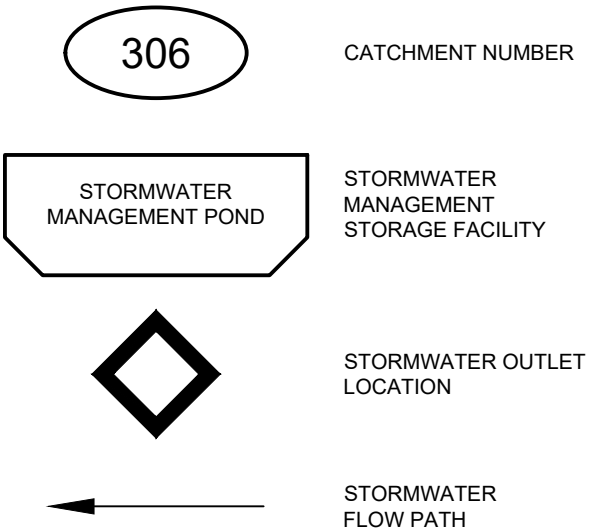
POST-DEVELOPMENT CONDITIONS ANALYSIS

- MIDUSS MODEL SCHEMATIC – Post-Development Model
- Marsville North SWM Facility Storage Volume Calculations, Outlet Controls and Stage-Storage Discharge Table
- Marsville North Hydraulic Gradeline Flowrate Table, SWM Facility – Storage Volume Calculations, and Drawdown Calculations
- Marsville South SWM Facility Storage Volume Calculations, Outlet Controls and Stage-Storage Discharge Table
- Marsville South Hydraulic Gradeline Flowrate Table, SWM Facility – Storage Volume Calculations, and Drawdown Calculations
- MIDUSS Output Files
 - 25mm
 - 2-Year
 - 5-Year
 - 25-Year
 - 50-Year
 - 100-Year
 - 100-Year SCS Type II
 - Regional

FILE: B:\Working\THOMASFIELD HOMES LIMITED\2401738 - 418153 Marsville North (Thunderbird Tunic Prop)\Drawings\418153 - FSR FIGURES - APPENDIX A AND B.dwg LAYOUT: POST DEV MODEL SCHEMATIC
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MARSVILLE NORTH AND
SOUTH SUBDIVISION
FUNCTIONAL
SERVICING REPORT
TOWNSHIP OF EAST
GARAFRAXA

LEGEND



POST DEVELOPMENT
MODELING SCHEMATIC

APPENDIX G



418153 - 420004
MAY 2022
Scale: N.T.S. | NAD 1983 UTM Zone 17N

**MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations**

SWM Facility - Stage/Storage Volume Calculations - Marsville South

Forebay/Permanent Pool Storage Volume Calculations

Elevation (m)	Depth (m)	Forebay Surface Area (m ²)	Forebay Incremental Storage Vol. (m ³)	Perm. Pool Surface Area (m ²)	Perm. Pool Incremental Storage Vol. (m ³)	Accum. Volume (m ³)	
483.60	0.00	761.4	0			0.0	Bottom of Forebay
483.70	0.10	815.9	79			78.9	
483.80	0.20	871.6	84			163.2	
483.90	0.30	928.4	90			253.2	
484.00	0.40	986.3	96			349.0	
484.10	0.50	1,045.3	102			450.6	
484.20	0.60	1,105.5	108			558.1	
484.30	0.70	1,166.8	114			671.7	
484.40	0.80	1,229.3	120			791.5	
484.50	0.90	1,292.8	126			917.6	
484.60	1.00	1,357.5	133	5,360.7	0.00	1,050.1	Pond Bottom / Bottom of Permanent Pool
484.70	1.10			5,664.0	551.23	1,601.4	
484.80	1.20			5,968.8	581.64	2,183.0	
484.90	1.30			6,275.0	612.19	2,795.2	

MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations

Active Storage Volume Calculations

Elevation (m)	Depth (m)	Active Surface Area (m²)	Active Incremental Volume (m³)	Accumulative Active Volume (m³)	
484.90	0.00	6,275.0	0.0	0.0	Bottom of Active Storage
485.00	0.10	6,582.7	642.9	642.9	
485.10	0.20	6,891.8	673.7	1,316.6	T/G Elevation (Lip Elevation) DICB
485.20	0.30	7,202.5	704.7	2,021.3	
485.30	0.40	7,514.6	735.9	2,757.2	
485.40	0.50	7,828.2	767.1	3,524.3	
485.50	0.60	8,143.2	798.6	4,322.9	
485.60	0.70	8,459.8	830.2	5,153.0	
485.70	0.80	8,777.8	861.9	6,014.9	
485.80	0.90	9,097.3	893.8	6,908.7	
485.90	1.00	9,418.4	925.8	7,834.5	
486.00	1.10	9,740.9	958.0	8,792.4	
486.10	1.20	10,064.9	990.3	9,782.7	
486.20	1.30	10,390.4	1,022.8	10,805.5	
486.30	1.40	10,717.4	1,055.4	11,860.9	
486.40	1.50	11,046.0	1,088.2	12,949.0	
486.50	1.60	11,376.0	1,121.1	14,070.1	
486.60	1.70	11,707.6	1,154.2	15,224.3	
486.70	1.80	12,040.7	1,187.4	16,411.7	
486.80	1.90	12,375.3	1,220.8	17,632.5	
486.90	2.00	12,711.5	1,254.3	18,886.9	
487.00	2.10	13,049.2	1,288.0	20,174.9	Weir
487.10	2.20	13,388.4	1,321.9	21,496.8	
487.20	2.30	13,722.8	1,355.6	22,852.3	Top of Pond

MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations
1800 x1800 Structure Controls

Orifice Outlet (Extended Detention)

INV 484.90 m
 Q = 0.040 m³/s
 Cd = 0.600
 H = 0.308 m
 2g = 19.620

 A = 0.027 m²
 D = 0.185 m

Overflow Weir

d1 = 2.300 m
 h = 2.100
 H = 0.200 m
 2g = 19.620
 L = 24.0 m
 Q = 2.977 m³/s

Pipe Outflow

Diameter = 525 mm
 Invert @ Pond = 484.22 m
 Section 1
 Gradient = 1%
 Pipe Capacity = 0.449 m³/s
 Length = 816.30 m

Major Control - Flow Over Grate

modelled with 50% blockage
 d1 = 0.40 m
 h = 0.20
 H = 0.20 m
 2g = 19.62
 L = 2.464 m
 Q = 0.345 m³/s

$$\text{Orifice Flow} = Cd A \sqrt{2gH}$$

Cd = Discharge Coefficient

A = Area of Orifice

2g = 19.62

H = Depth of Water above orifice - half
 of orifice diameter

$$\text{Weir Flow} = 0.433 \sqrt{2g\left(\frac{d}{d+h}\right)} LH^{3/2}$$

L = Length of Weir

2g = 19.62

d = total depth of water

h = depth of water below weir

H = depth of water above weir

**Major Control - Flow Over
 Grate
 (T/G Lip Elevation 485.10m)**

Head over Grate (m)	Length (m)
0	1.200
0.1	1.832
0.2	2.464
0.3	3.66

MARSVILLE SUBDIVISION SOUTH

TOWN OF EAST GARAFRAXA

GMBP File: 418153 / 420004

SWM Facility - Storage Volume Calculations

Stage-Storage-Discharge Table

Elevation (m)	Stage (m)	Storage (m ³)	185mm dia. Knockout (m ³ /s)	Major Control Grate (m ³ /s)	Major Control Pipe Outlet (m ³ /s)	Weir Overflow (m ³ /s)	Actual Discharge (m ³ /s)	
484.90	0.00	0.0	0.000	0.000	0.304	0.000	0.000	Bottom of Active Storage
485.00	0.10	642.9	0.012	0.000	0.308	0.000	0.012	
485.10	0.20	1,316.6	0.023	0.000	0.308	0.000	0.023	T/G Elevation (Lip Elevation) DICB
485.20	0.30	2,021.3	0.033	0.086	0.311	0.000	0.119	
485.30	0.40	2,757.2	0.040	0.345	0.314	0.000	0.314	
485.40	0.50	3,524.3			0.314	0.000	0.314	
485.50	0.60	4,322.9			0.317	0.000	0.317	
485.60	0.70	5,153.0			0.317	0.000	0.317	
485.70	0.80	6,014.9			0.321	0.000	0.321	
485.80	0.90	6,908.7			0.324	0.000	0.324	
485.90	1.00	7,834.5			0.324	0.000	0.324	
486.00	1.10	8,792.4			0.327	0.000	0.327	
486.10	1.20	9,782.7			0.330	0.000	0.330	
486.20	1.30	10,805.5			0.330	0.000	0.330	
486.30	1.40	11,860.9			0.333	0.000	0.333	
486.40	1.50	12,949.0			0.333	0.000	0.333	
486.50	1.60	14,070.1			0.336	0.000	0.336	
486.60	1.70	15,224.3			0.339	0.000	0.339	
486.70	1.80	16,411.7			0.339	0.000	0.339	
486.80	1.90	17,632.5			0.342	0.000	0.342	
486.90	2.00	18,886.9			0.345	0.000	0.345	
487.00	2.10	20,174.9			0.345	0.000	0.345	Weir
487.10	2.20	21,496.8			0.348	1.041	1.389	
487.20	2.30	22,852.3			0.351	2.977	3.328	Top of Pond

Notes:

Major Controls - the minimum of flow over grate and pipe discharge flow rate is used in the actual discharge calculation

MARSVILLE SUBDIVISION SOUTH

TOWN OF EAST GARAFRAXA

GMBP File: 418153 / 420004

SWM Facility - Storage Volume Calculations

Knockout Controls - the knockout is assumed to contribute to discharge flow rates until the pipe discharge rate is the controlling release rate.

Major Control Pipe Flow - based on HGL from Pond Elevation to 750mm dia. obvert

418153 Marsville South - Hydraulic Gradeline Flowrate Table

Background

Pond Outlet to 750mm Drain Outlet

Main 750 mm Invert =	476.91	m	750 mm Obvert =	477.660	m	(A)
525mm Length =	816.30	m				
750mm Length =	758.70	m				
Total Length =	1575.00	m				
525 mm pipefull capacity @ 0.5% =	0.317	cu m/s				

Flowrate Calculations for Stage/Storage/Discharge Table

Location	Elevation m	Depth	Gradient %	Flowrate - Pipe
		Elevation - (A) m		Pipes flowing full Table cu m /s
Pond Bottom Active	484.90	7.24	0.46%	0.304
	485.00	7.34	0.47%	0.308
	485.10	7.44	0.47%	0.308
	485.20	7.54	0.48%	0.311
	485.30	7.64	0.49%	0.314
	485.40	7.74	0.49%	0.314
	485.50	7.84	0.50%	0.317
	485.60	7.94	0.50%	0.317
	485.70	8.04	0.51%	0.321
	485.80	8.14	0.52%	0.324
	485.90	8.24	0.52%	0.324
	486.00	8.34	0.53%	0.327
	486.10	8.44	0.54%	0.330
	486.20	8.54	0.54%	0.330
	486.30	8.64	0.55%	0.333
	486.40	8.74	0.55%	0.333
	486.50	8.84	0.56%	0.336
	486.60	8.94	0.57%	0.339
	486.70	9.04	0.57%	0.339
	486.80	9.14	0.58%	0.342
Weir Lip	486.90	9.24	0.59%	0.345
	487.00	9.34	0.59%	0.345
Top of Bank (B)	487.10	9.44	0.60%	0.348
	487.20	9.54	0.61%	0.351

MARSVILLE SUBDIVISION NORTH
TOWNSHIP OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations

SWM Facility - Stage/Storage Volume Calculations - Marsville North

Forebay/Permanent Pool Storage Volume Calculations

Elevation (m)	Depth (m)	Forebay Surface Area (m ²)	Forebay Incremental Storage Volume (m ³)	Outlet Pool Surface Area (m ²)	Outlet Pool Incremental Storage Vol. (m ³)	Perm. Pool Surface Area (m ²)	Perm. Pool Incremental Storage Vol. (m ³)	Accumulative Volume (m ³)	
481.05	0.00	422.8	0.0	315.17	0.0			0.0	Bottom of Forebay / Bottom of Outlet Pool
481.10	0.05	438.4	21.5	325.43	16.0			37.5	
481.20	0.15	469.8	45.4	346.38	33.6			116.5	
481.30	0.25	501.9	48.6	367.89	35.7			200.8	
481.40	0.35	534.5	51.8	389.97	37.9			290.6	
481.50	0.45	567.7	55.1	412.61	40.1			385.8	
481.60	0.55	601.5	58.5	435.82	42.4			486.7	
481.70	0.65	635.8	61.9	459.60	44.8			593.3	
481.80	0.75	670.7	65.3	483.94	47.2			705.8	
481.90	0.85	706.1	68.8	508.84	49.6			824.3	
482.00	0.95	742.1	72.4	534.32	52.2			948.9	
482.05	1.00	760.3	37.6	547.26	27.0	1,715.5	0.0	1013.5	Top of Forebay / Top of Outlet Pool / Bottom of Permanent Pool
482.20	1.15					1,891.5	270.5	1284.0	
482.35	1.30					2,070.9	297.2	1581.2	Top of Permanent Pool / Invert of Knockout on DICB

MARSVILLE SUBDIVISION NORTH
TOWNSHIP OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations

Active Storage Volume Calculations

Elevation (m)	Depth (m)	Active Surface Area (m²)	Active Incremental Volume (m³)	Accumulative Active Volume (m³)	
482.35	0.00	2,070.9	0.0	0.0	Invert of Knockout on DICB
482.40	0.05	2,131.5	105.1	105.1	
482.50	0.15	2,253.8	219.3	324.3	
482.60	0.25	2,377.6	231.6	555.9	
482.70	0.35	2,502.9	244.0	799.9	
482.80	0.45	2,629.7	256.6	1,056.5	T/G Elevation (Lip Elevation) DICB
482.90	0.55	2,758.0	269.4	1,325.9	
483.00	0.65	2,887.8	282.3	1,608.2	
483.10	0.75	3,019.2	295.3	1,903.6	
483.20	0.85	3,152.0	308.6	2,212.1	
483.30	0.95	3,286.4	321.9	2,534.0	
483.40	1.05	3,422.2	335.4	2,869.5	
483.50	1.15	3,559.6	349.1	3,218.6	
483.60	1.25	3,698.5	362.9	3,581.5	
483.70	1.35	3,838.9	376.9	3,958.3	
483.80	1.45	3,980.9	391.0	4,349.3	
483.90	1.55	4,124.3	405.3	4,754.6	
484.00	1.65	4,269.2	419.7	5,174.3	
484.10	1.75	4,415.7	434.2	5,608.5	
484.20	1.85	4,563.7	449.0	6,057.5	
484.30	1.95	4,713.1	463.8	6,521.3	
484.40	2.05	4,864.1	478.9	7,000.2	
484.50	2.15	5,016.6	494.0	7,494.2	
484.60	2.25	5,170.6	509.4	8,003.6	
484.70	2.35	5,326.1	524.8	8,528.4	Weir
484.80	2.45	5,483.2	540.5	9,068.9	
484.90	2.55	5,641.7	556.2	9,625.1	
485.00	2.65	5,801.8	572.2	10,197.3	Top of Pond
485.10	2.75	5,963.4	588.3	10,785.6	
485.20	2.85	6126.46	604.5	11,390.1	

MARSVILLE SUBDIVISION NORTH
TOWNSHIP OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations

Orifice Outlet (Knockout on DICB)

INV	482.40	m
Q =	0.064	m ³ /s
Cd =	0.600	
H =	0.808	m
2g =	19.620	
A =	0.027	m ²
D =	0.185	m

Major Control - Flow Over Grate

modelled with 50% blockage		
d1 =	0.95	m
h =	0.45	
H =	0.50	m
2g =	19.62	
L =	3.66	m
Q =	1.023	m ³ /s

Major Control - Flow Over Grate
(T/G Lip Elevation 482.80m)

Head over Grate (m)	Length (m)
0	1.20
0.1	1.83
0.2	2.46
0.3	3.66

Overflow Weir

d1 =	2.800	m
h =	2.400	
H =	0.400	m
2g =	19.620	
L =	25.0	m
Q =	8.901	m ³ /s

Orifice Flow = $Cd A \sqrt{2gH}$

Cd =	Discharge Coefficient
A =	Area of Orifice
2g =	19.62
H =	Depth of Water above orifice - half of orifice diameter

Weir Flow = $0.433 \sqrt{2g(\frac{d}{d+h})} LH^{3/2}$

L =	Length of Weir
2g =	19.62
d =	total depth of water
h =	depth of water below weir
H =	depth of water above weir

Pipe Outflow

Invert @ Pond =	481.30	m						
	Section 1		Section 2		Section 3			
Diameter =	675	mm	Diameter =	675	mm	Diameter =	750	mm
Gradient =	1%		Gradient =	0.40%		Gradient =	0.40%	
Pipe Capacity =	0.877	m ³ /s	Pipe Capacity =	0.555	m ³ /s	Pipe Cap. =	0.735	m ³ /s
Length =	32.80	m	Length =	190.50	m	Length =	758.7	m

Stage-Storage-Discharge Table

Elevation (m)	Stage (m)	Storage (m ³)	185mm dia. Knockout on DICB (m ³ /s)	Major Control Flow over Grate (m ³ /s)	Major Control Pipe Flow (m ³ /s)	Overflow Weir (m ³ /s)	Actual Discharge (m ³ /s)	
482.35	0.00	0.0	0.000	0.000	0.000	0.000	0.000	Invert of Knockout on DICB
482.40	0.05	105.1	0.003	0.000	0.608	0.000	0.003	
482.50	0.15	324.3	0.006	0.000	0.614	0.000	0.006	
482.60	0.25	555.9	0.023	0.000	0.620	0.000	0.023	
482.70	0.35	799.9	0.033	0.000	0.626	0.000	0.033	
482.80	0.45	1,056.5	0.040	0.000	0.632	0.000	0.040	T/G Elevation (Lip Elevation) DICB

MARSVILLE SUBDIVISION NORTH
TOWNSHIP OF EAST GARAFRAXA
GMBP File: 418153 / 420004

SWM Facility - Storage Volume Calculations							
482.90	0.55	1,325.9	0.046	0.041	0.638	0.000	0.087
483.00	0.65	1,608.2	0.051	0.162	0.644	0.000	0.213
483.10	0.75	1,903.6	0.056	0.456	0.650	0.000	0.512
483.20	0.85	2,212.1	0.060	0.719	0.656	0.000	0.656
483.30	0.95	2,534.0	0.064	1.023	0.662	0.000	0.662
483.40	1.05	2,869.5			0.668	0.000	0.668
483.50	1.15	3,218.6			0.674	0.000	0.674
483.60	1.25	3,581.5			0.679	0.000	0.679
483.70	1.35	3,958.3			0.691	0.000	0.691
483.80	1.45	4,349.3			0.697	0.000	0.697
483.90	1.55	4,754.6			0.702	0.000	0.702
484.00	1.65	5,174.3			0.707	0.000	0.707
484.10	1.75	5,608.5			0.712	0.000	0.712
484.40	2.05	7,000.2			0.729	0.000	0.729
484.50	2.15	7,494.2			0.734	0.000	0.734
484.60	2.25	8,003.6			0.739	0.000	0.739
484.70	2.35	8,528.4			0.744	0.000	0.744
484.80	2.45	9,068.9			0.747	0.000	0.747
484.90	2.55	9,625.1			0.749	0.000	0.749
485.00	2.65	10,197.3			0.752	1.082	1.834
485.10	2.75	10,785.6			0.754	3.089	3.843
485.20	2.85	11,390.1			0.760	5.724	6.484

Weir

Top of Pond

Notes:

Major Controls - the minimum of flow over grate and pipe discharge flow rate is used in the actual discharge calculation
Knockout Controls - the knockout is assumed to contribute to discharge flow rates until the pipe discharge rate is the controlling release rate.
Major Control Pipe Flow - based on HGL from Pond Elevation to 750mm dia. obvert

418153 Marsville North - Hydraulic Gradeline Flowrate Table**Background****Main Drain to Pond Outlet**

Main 750 mm Invert =	476.91	m	750 mm Obvert =	477.660	m	(A)
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Pond 675 mm Invert =	481.30	m	675 mm Obvert =	481.975	m
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Proposed Drain Length

Main Drain - 750 mm	758.70	m
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675 mm	223.30	m
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Total Length =	982.00	m
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675 mm pipefull capacity @ 0.40% =	0.555	cu m/s
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Flowrate Calculations for Stage/Storage/Discharge Table

Location	Elevation m	Depth	Gradient %	Flowrate - Pipe Pipes flowing full Table cu m /s
		Elevation - (A) m		
Pond Bottom Active	482.45	4.79	0.49%	0.608
	482.55	4.89	0.50%	0.614
	482.65	4.99	0.51%	0.620
	482.75	5.09	0.52%	0.626
	482.85	5.19	0.53%	0.632
	482.95	5.29	0.54%	0.638
	483.05	5.39	0.55%	0.644
	483.15	5.49	0.56%	0.650
	483.25	5.59	0.57%	0.656
	483.35	5.69	0.58%	0.662
	483.45	5.79	0.59%	0.668
	483.55	5.89	0.60%	0.674
	483.65	5.99	0.61%	0.679
	483.75	6.09	0.62%	0.691
	483.85	6.19	0.63%	0.697
	483.95	6.29	0.64%	0.702
	484.05	6.39	0.65%	0.707
	484.15	6.49	0.66%	0.712
	484.25	6.59	0.67%	0.718
	484.35	6.69	0.68%	0.723
	484.45	6.79	0.69%	0.729
Weir Lip	484.55	6.89	0.70%	0.734
	484.65	6.99	0.71%	0.739
	484.75	7.09	0.72%	0.744
	484.85	7.19	0.73%	0.747
Top of Bank	484.95	7.29	0.74%	0.749
	485.05	7.39	0.75%	0.752
	485.15	7.49	0.76%	0.754
	485.20	7.54	0.77%	0.760

**MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
Ponding/Conveyance Calculations**

100-Year Design Storm Event

a = 901.088
b = 0.0426
c = 0.692
Tc = 10 minutes
I = 182.6 mm/hr

Marsville North

Rear Yards - Lots 1-3

Area = 0.395 ha
C = 0.305
Q (100-Yr) = 0.061 m³/s

Swale Conveyance Capacity

Depth = 0.54 m
Slope = 1.2 %

Left Side Slope 16%
Right Side Slope 3.20%

Capacity = 6.244 m³/s

Depth of 100-Year Ponding over CB

Q = 0.061 m³/s
Cd = 0.600
H = 0.086 m
2g = 19.620
A = 0.036

Assumes 50% Blockage

100-Year Depth 0.09 m
Available Depth 0.15 m

Rear Yards - Lots 4-5

Area = 0.36 ha
C = 0.305
Q (100-Yr) = 0.056 m³/s

Swale Conveyance Capacity

Depth = 0.1 m
Slope = 1 %

Left Side Slope 25%
Right Side Slope 6.00%

MARSVILLE SUBDIVISION SOUTH

TOWN OF EAST GARAFRAXA

GMBP File: 418153 / 420004

Ponding/Conveyance Calculations

Capacity = 0.035 m³/s

Depth of 100-Year Ponding over CB

$$Q = 0.056 \text{ m}^3/\text{s}$$

$$Cd = 0.600$$

$$H = 0.082 \text{ m}$$

$$2g = 19.620$$

$$A = 0.036$$

Assumes 50% Blockage

100-Year Depth 0.08 m

Available Depth 0.23 m

Sag at 13th Line

$$\text{Area} = 0.35 \text{ ha}$$

$$C = 0.445$$

$$Q (100\text{-Yr}) = 0.079 \text{ m}^3/\text{s}$$

Depth of 100-Year Ponding over 2 DCBs

$$Q = 0.079 \text{ m}^3/\text{s}$$

$$Cd = 0.600$$

$$H = 0.049 \text{ m}$$

$$2g = 19.620$$

$$A = 0.144$$

Assumes 50% Blockage

100-Year Depth 0.05 m

Available Depth 0.18 m

**MARSVILLE SUBDIVISION NORTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations**

Proposed Forebay

Forebay Length =	47.0 m	(Dist)
Forebay Top Width =	10.0 m	
Active Forebay Depth =	1.3 m	(d)
Active Forebay Bottom Width =	4.0 m	

Approximate Permanent Forebay Pool Volume = 424.645 m³

Length Width Ratio =	4.7 :1	(r)
25 mm Storm Pond Outlet Flowrate =	0.074 m ³ /s	(Q25mm)
5 Year Storm Inflow Rate =	1.730 m ³ /s	(Q5)
Desired Forebay Velocity =	0.500 m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003 m/s	(Vs)

Settling Length

Dist = ((r x Q25mm)/Vs)^{.5} = 34.1 m 25mm

Forebay length (47 m) exceeds the settling length (34.1 m).

Dispersion Length

Dist = (8 x Q5)/(d x Vf) = 21.3 m 5 Year

Forebay length (47.0 m) exceeds the dispersion length (21.3 m).

Flow Velocity in Forebay

Cross-sectional Area (Forebay Only) =	9.035 m ²	
Cross-sectional Area (With Permanent Pool) =	14.27 m ²	(A)
Q5 =	1.730 m ³ /s	

Velocity = Q5/A = 0.12 m/s 5 Year

The average flow velocity through the forebay is less than the allowable velocity of 0.15 m/s.

**MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations**

Proposed West Forebay

Forebay Length =	25.0 m	(Dist)
Forebay Top Width =	14.4 m	
Active Forebay Depth =	1.0 m	(d)
Active Forebay Bottom Width =	8.4 m	
Approximate Permanent Forebay Pool Volume =	285 m ³	
Length Width Ratio =	1.7 :1	(r)
25 mm Storm Pond Outlet Flowrate =	0.110 m ³ /s	(Q25mm)
5 Year Storm Inflow Rate =	1.029 m ³ /s	(Q5)
Desired Forebay Velocity =	0.500 m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003 m/s	(Vs)

Settling Length

$$\text{Dist} = ((r \times Q25\text{mm})/V_s)^{.5} = 25.2 \text{ m} \quad 25\text{mm}$$

Forebay length (25 m) exceeds the settling length (25 m).

Dispersion Length

$$\text{Dist} = (8 \times Q5)/(d \times V_f) = 16.5 \text{ m} \quad 5 \text{ Year}$$

Forebay length (25.0 m) exceeds the dispersion length (16.5 m).

Flow Velocity in Forebay

Cross-sectional Area (Forebay Only) =	11.4 m ²	
Cross-sectional Area (With Permanent Pool) =	17.97 m ²	(A)
Q5 =	1.029 m ³ /s	
Velocity = Q5/A =	0.06 m/s	5 Year

The average flow velocity through the forebay is less than the allowable velocity of 0.15 m/s.

**MARSVILLE SUBDIVISION SOUTH
TOWN OF EAST GARAFRAXA
GMBP File: 418153 / 420004
SWM Facility - Storage Volume Calculations**

Proposed West Forebay

Forebay Length =	38.0 m	(Dist)
Forebay Top Width =	8.0 m	
Active Forebay Depth =	1.0 m	(d)
Active Forebay Bottom Width =	2.0 m	

Approximate Permanent Forebay Pool Volume = 190 m³

Length Width Ratio =	4.8 :1	(r)
25 mm Storm Pond Outlet Flowrate =	0.110 m ³ /s	(Q25mm)
5 Year Storm Inflow Rate =	1.364 m ³ /s	(Q5)

Desired Forebay Velocity =	0.500 m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003 m/s	(Vs)

Settling Length

Dist = ((r x Q25mm)/Vs)^{.5} = 41.7 m 25mm

Forebay length (47 m) exceeds the settling length (34.1 m).

Dispersion Length

Dist = (8 x Q5)/(d x Vf) = 21.8 m 5 Year

Forebay length (47.0 m) exceeds the dispersion length (21.3 m).

Flow Velocity in Forebay

Cross-sectional Area (Forebay Only) =	5 m ²	
Cross-sectional Area (With Permanent Pool) =	9.65 m ²	(A)
Q5 =	1.364 m ³ /s	

Velocity = Q5/A = 0.14 m/s 5 Year

The average flow velocity through the forebay is less than the allowable velocity of 0.15 m/s.

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_25mm.out"
"          Licensee name:                     "
"          Company                           "
"          Date & Time last used:              10/29/2024 at 9:40:43 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          367.000 Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    72.993  mm/hr"
"          Total depth                        24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.017	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	---	8.326	8.326	minutes"
"		Time to Centroid	0.000	70.915	70.915	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	887.38	27.44	914.83	c.m"
"		Rainfall losses	24.995	1.547	24.292	mm"
"		Runoff depth	0.000	23.449	0.703	mm"
"		Runoff volume	0.00	25.75	25.75	c.m"
"		Runoff coefficient	0.000	0.938	0.028	"
"		Maximum flow	0.000	0.017	0.017	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.017	0.017	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.996	0.017	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	---	16.551	16.551	minutes"
"		Time to Centroid	0.000	81.617	81.617	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	4396.43	2367.31	6763.74	c.m"
"		Rainfall losses	24.995	1.560	16.793	mm"
"		Runoff depth	0.000	23.435	8.202	mm"

"	Runoff volume	0.00	2219.52	2219.52	c.m"
"	Runoff coefficient	0.000	0.938	0.328	"
"	Maximum flow	0.000	0.996	0.996	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.996	1.009	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.061	1.009	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	---	2.348	2.348	minutes"
"	Time to Centroid	0.000	62.917	62.917	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	178.72	96.23	274.95	c.m"
"	Rainfall losses	24.995	1.910	16.915	mm"
"	Runoff depth	0.000	23.086	8.080	mm"
"	Runoff volume	0.00	88.88	88.88	c.m"
"	Runoff coefficient	0.000	0.924	0.323	"
"	Maximum flow	0.000	0.061	0.061	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.061	1.036	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	0.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.064	1.036	0.000	0.000 c.m/sec"
"		Catchment 1400	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"
"		Time of concentration	---	9.695	9.695 minutes"
"		Time to Centroid	0.000	72.623	72.623 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	2360.31	124.23	2484.54 c.m"
"		Rainfall losses	24.995	1.656	23.828 mm"
"		Runoff depth	0.000	23.339	1.167 mm"
"		Runoff volume	0.00	116.00	116.00 c.m"
"		Runoff coefficient	0.000	0.934	0.047 "
"		Maximum flow	0.000	0.064	0.064 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.064	1.097	0.000	0.000"
" 33		CATCHMENT 1500"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1500	Catchment 1500"			
"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			

"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	0.066	1.097	0.000	0.000	c.m/sec"	
"	Catchment 1500	Pervious	Impervious	Total Area	"	
"	Surface Area	15.122	0.468	15.590	hectare"	
"	Time of concentration	---	8.347	8.347	minutes"	
"	Time to Centroid	0.000	70.856	70.856	minutes"	
"	Rainfall depth	24.995	24.995	24.995	mm"	
"	Rainfall volume	3779.87	116.90	3896.77	c.m"	
"	Rainfall losses	24.995	1.548	24.292	mm"	
"	Runoff depth	0.000	23.447	0.703	mm"	
"	Runoff volume	0.00	109.66	109.66	c.m"	
"	Runoff coefficient	0.000	0.938	0.028	"	
"	Maximum flow	0.000	0.066	0.066	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4 Add Runoff "					
"	0.066	1.154	0.000	0.000"		
" 40	HYDROGRAPH Copy to Outflow"					
"	8 Copy to Outflow"					
"	0.066	1.154	1.154	0.000"		
" 40	HYDROGRAPH Combine 600"					
"	6 Combine "					
"	600 Node #"					
"	West Watershed Catchment Areas"					
"	Maximum flow	1.154	c.m/sec"			
"	Hydrograph volume	2559.804	c.m"			
"	0.066	1.154	1.154	1.154"		
" 40	HYDROGRAPH Start - New Tributary"					
"	2 Start - New Tributary"					
"	0.066	0.000	1.154	1.154"		
" 33	CATCHMENT 2200"					
"	1 Triangular SCS"					
"	1 Equal length"					
"	2 Horton equation"					
"	2200 Catchment 2200"					
"	35.000 % Impervious"					
"	2.860 Total Area"					
"	45.000 Flow length"					
"	1.000 Overland Slope"					
"	1.859 Pervious Area"					
"	45.000 Pervious length"					

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.157	0.000	1.154	1.154 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	30.965	3.951	13.753	minutes"
"		Time to Centroid	95.629	65.181	76.229	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	464.66	250.20	714.87	c.m"
"		Rainfall losses	17.901	1.861	12.287	mm"
"		Runoff depth	7.095	23.135	12.709	mm"
"		Runoff volume	131.89	231.58	363.47	c.m"
"		Runoff coefficient	0.284	0.926	0.508	"
"		Maximum flow	0.045	0.151	0.157	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.157	0.157	1.154	1.154"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.088	0.157	1.154	1.154 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	---	5.243	5.243	minutes"
"		Time to Centroid	0.000	66.843	66.843	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	142.47	142.47	284.95	c.m"
"		Rainfall losses	24.995	1.636	13.316	mm"
"		Runoff depth	0.000	23.360	11.680	mm"
"		Runoff volume	0.00	133.15	133.15	c.m"
"		Runoff coefficient	0.000	0.935	0.467	"
"		Maximum flow	0.000	0.088	0.088	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.088	0.245	1.154	1.154"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.427	0.245	1.154	1.154 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	---	5.411	5.411	minutes"
"		Time to Centroid	0.000	67.070	67.070	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"

"	Rainfall volume	1286.76	692.87	1979.63	c.m"
"	Rainfall losses	24.995	1.608	16.810	mm"
"	Runoff depth	0.000	23.388	8.186	mm"
"	Runoff volume	0.00	648.30	648.30	c.m"
"	Runoff coefficient	0.000	0.936	0.327	"
"	Maximum flow	0.000	0.427	0.427	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.427	0.672	1.154	1.154"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.493	0.672	1.154	1.154 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	---	4.926	4.926	minutes"
"	Time to Centroid	0.000	66.447	66.447	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	1483.35	798.73	2282.07	c.m"
"	Rainfall losses	24.995	1.678	16.834	mm"
"	Runoff depth	0.000	23.317	8.161	mm"
"	Runoff volume	0.00	745.11	745.11	c.m"
"	Runoff coefficient	0.000	0.933	0.327	"
"	Maximum flow	0.000	0.493	0.493	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.493	1.165	1.154	1.154"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.008	1.165	1.154	1.154 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	---	3.681	3.681	minutes"
"		Time to Centroid	0.000	64.852	64.852	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	76.49	13.50	89.98	c.m"
"		Rainfall losses	24.995	1.990	21.545	mm"
"		Runoff depth	0.000	23.005	3.451	mm"
"		Runoff volume	0.00	12.42	12.42	c.m"
"		Runoff coefficient	0.000	0.920	0.138	"
"		Maximum flow	0.000	0.008	0.008	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.008	1.173	1.154	1.154"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	0.000	1.173	1.154	1.154 c.m/sec"		
"	Catchment 2500	Pervious	Impervious	Total Area	"	
"	Surface Area	12.060	0.000	12.060	hectare"	
"	Time of concentration	---	12.008	12.008	minutes"	
"	Time to Centroid	0.000	75.646	75.646	minutes"	
"	Rainfall depth	24.995	24.995	24.995	mm"	
"	Rainfall volume	3014.43	0.00	3014.44	c.m"	
"	Rainfall losses	24.995	1.553	24.995	mm"	
"	Runoff depth	0.000	23.442	0.000	mm"	
"	Runoff volume	0.00	0.00	0.00	c.m"	
"	Runoff coefficient	0.000	0.000	0.000	"	
"	Maximum flow	0.000	0.000	0.000	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4 Add Runoff "					
"	0.000	1.173	1.154	1.154"		
" 33	CATCHMENT 2600"					
"	1 Triangular SCS"					
"	1 Equal length"					
"	2 Horton equation"					
"	2600 Catchment 2600"					
"	0.000 % Impervious"					
"	14.960 Total Area"					
"	307.000 Flow length"					
"	1.000 Overland Slope"					
"	14.960 Pervious Area"					
"	307.000 Pervious length"					
"	1.000 Pervious slope"					
"	0.000 Impervious Area"					
"	307.000 Impervious length"					
"	1.000 Impervious slope"					
"	0.250 Pervious Manning 'n'"					
"	125.000 Pervious Max.infiltration"					
"	5.000 Pervious Min.infiltration"					
"	0.250 Pervious Lag constant (hours)"					
"	5.000 Pervious Depression storage"					
"	0.015 Impervious Manning 'n'"					

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	1.173	1.154	1.154 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	---	12.504	12.504 minutes"
"		Time to Centroid	0.000	76.302	76.302 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	3739.30	0.00	3739.30 c.m"
"		Rainfall losses	24.995	1.558	24.995 mm"
"		Runoff depth	0.000	23.437	0.000 mm"
"		Runoff volume	0.00	0.00	0.00 c.m"
"		Runoff coefficient	0.000	0.000	0.000 "
"		Maximum flow	0.000	0.000	0.000 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.000	1.173	1.154	1.154"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.000	1.173	1.173	1.154"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	1.173		c.m/sec"
"		Hydrograph volume	1902.462		c.m"
"		0.000	1.173	1.173	1.173"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.000	0.000	1.173	1.173"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.112	0.000	1.173	1.173 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	---	7.854	7.854 minutes"
"		Time to Centroid	0.000	70.289	70.289 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	333.06	179.34	512.40 c.m"
"		Rainfall losses	24.995	1.566	16.795 mm"
"		Runoff depth	0.000	23.429	8.200 mm"
"		Runoff volume	0.00	168.10	168.10 c.m"
"		Runoff coefficient	0.000	0.937	0.328 "
"		Maximum flow	0.000	0.112	0.112 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.112	0.112	1.173	1.173"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.118	0.112	1.173	1.173 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	---	12.891	12.891	minutes"
"	Time to Centroid	0.000	76.815	76.815	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	4834.60	254.45	5089.05	c.m"
"	Rainfall losses	24.995	1.596	23.825	mm"
"	Runoff depth	0.000	23.399	1.170	mm"
"	Runoff volume	0.00	238.20	238.20	c.m"
"	Runoff coefficient	0.000	0.936	0.047	"
"	Maximum flow	0.000	0.118	0.118	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.118 0.211 1.173 1.173"				
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.045 0.211 1.173 1.173 c.m/sec"				
"	Catchment 3200 Pervious Impervious Total Area "				
"	Surface Area 0.546 0.294 0.840 hectare"				
"	Time of concentration --- 5.181 5.181 minutes"				
"	Time to Centroid 0.000 66.756 66.756 minutes"				
"	Rainfall depth 24.995 24.995 24.995 mm"				
"	Rainfall volume 136.47 73.49 209.96 c.m"				
"	Rainfall losses 24.995 1.653 16.826 mm"				
"	Runoff depth 0.000 23.342 8.170 mm"				
"	Runoff volume 0.00 68.63 68.63 c.m"				
"	Runoff coefficient 0.000 0.934 0.327 "				
"	Maximum flow 0.000 0.045 0.045 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.045	0.256	1.173	1.173"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.272	0.256	1.173	1.173 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area "	
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	---	5.948	5.948	minutes"
"		Time to Centroid	0.000	67.778	67.778	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	822.10	442.67	1264.76	c.m"
"		Rainfall losses	24.995	1.622	16.815	mm"
"		Runoff depth	0.000	23.374	8.181	mm"
"		Runoff volume	0.00	413.95	413.95	c.m"
"		Runoff coefficient	0.000	0.935	0.327	"
"		Maximum flow	0.000	0.272	0.272	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.272	0.528	1.173	1.173"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.010	0.528	1.173	1.173 c.m/sec"
"		Catchment 3400	Pervious	Impervious	Total Area "
"		Surface Area	1.197	0.063	1.260 hectare"
"		Time of concentration	---	5.712	5.712 minutes"
"		Time to Centroid	0.000	67.451	67.451 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	299.19	15.75	314.94 c.m"
"		Rainfall losses	24.995	1.598	23.825 mm"
"		Runoff depth	0.000	23.398	1.170 mm"
"		Runoff volume	0.00	14.74	14.74 c.m"
"		Runoff coefficient	0.000	0.936	0.047 "
"		Maximum flow	0.000	0.010	0.010 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.010	0.538	1.173	1.173"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.010	0.538	0.538	1.173"
" 40		HYDROGRAPH Combine 1000"			
"	6	Combine "			
"	1000	Node #"			
"		East Watershed Catchment Areas"			
"		Maximum flow	0.538		c.m/sec"
"		Hydrograph volume	903.620		c.m"
"		0.010	0.538	0.538	0.538"
" 40		HYDROGRAPH Confluence 600"			
"	7	Confluence "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	1.154		c.m/sec"
"		Hydrograph volume	2559.804		c.m"
"		0.010	1.154	0.538	0.000"
" 40		HYDROGRAPH Copy to Outflow"			

"	8	Copy to Outflow"				
"		0.010	1.154	1.154	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		1.960	c.m/sec"	
"		Hydrograph volume		4462.266	c.m"	
"		0.010	1.154	1.154	1.960"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		1.960	c.m/sec"	
"		Hydrograph volume		4462.266	c.m"	
"		0.010	1.960	1.154	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_2yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:20:15 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          414.876 Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          100.234  mm/hr"
"          Total depth                39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100 Catchment 1100"
"          3.000 % Impervious"
"          3.660 Total Area"
"          135.000 Flow length"
"          0.750 Overland Slope"
"          3.550 Pervious Area"
"          135.000 Pervious length"
"          0.750 Pervious slope"
"          0.110 Impervious Area"
"          135.000 Impervious length"
"          0.750 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"	0.025	0.000	0.000	0.000	c.m/sec"	
"	Catchment 1100	Pervious	Impervious	Total Area	"	
"	Surface Area	3.550	0.110	3.660	hectare"	
"	Time of concentration	---	7.334	7.334	minutes"	
"	Time to Centroid	0.000	122.833	122.833	minutes"	
"	Rainfall depth	39.504	39.504	39.504	mm"	
"	Rainfall volume	1402.47	43.38	1445.85	c.m"	
"	Rainfall losses	39.504	1.664	38.369	mm"	
"	Runoff depth	0.000	37.840	1.135	mm"	
"	Runoff volume	0.00	41.55	41.55	c.m"	
"	Runoff coefficient	0.000	0.958	0.029	"	
"	Maximum flow	0.000	0.025	0.025	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"	0.025	0.025	0.000	0.000"		
" 33	CATCHMENT 1300"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	1.561	0.025	0.000	0.000	c.m/sec"	
"	Catchment 1300	Pervious	Impervious	Total Area	"	
"	Surface Area	17.589	9.471	27.060	hectare"	
"	Time of concentration	---	14.579	14.579	minutes"	
"	Time to Centroid	0.000	134.181	134.181	minutes"	
"	Rainfall depth	39.504	39.504	39.504	mm"	
"	Rainfall volume	0.6948	0.3741	1.0690	ha-m"	
"	Rainfall losses	39.504	1.542	26.217	mm"	
"	Runoff depth	0.000	37.962	13.287	mm"	

"	Runoff volume	0.00	3595.36	3595.36	c.m"
"	Runoff coefficient	0.000	0.961	0.336	"
"	Maximum flow	0.000	1.561	1.561	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.561	1.575	0.000	0.000"	
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.099	1.575	0.000	0.000 c.m/sec"	
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	---	2.068	2.068	minutes"
"	Time to Centroid	0.000	114.449	114.449	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	282.45	152.09	434.54	c.m"
"	Rainfall losses	39.504	1.912	26.347	mm"
"	Runoff depth	0.000	37.592	13.157	mm"
"	Runoff volume	0.00	144.73	144.73	c.m"
"	Runoff coefficient	0.000	0.952	0.333	"
"	Maximum flow	0.000	0.099	0.099	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.099	1.596	0.000	0.000"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	0.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.104	1.596	0.000	0.000 c.m/sec"
"		Catchment 1400	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"
"		Time of concentration	---	8.540	8.540 minutes"
"		Time to Centroid	0.000	124.691	124.691 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	3730.36	196.33	3926.70 c.m"
"		Rainfall losses	39.504	1.643	37.611 mm"
"		Runoff depth	0.000	37.861	1.893 mm"
"		Runoff volume	0.00	188.17	188.17 c.m"
"		Runoff coefficient	0.000	0.958	0.048 "
"		Maximum flow	0.000	0.104	0.104 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.104	1.669	0.000	0.000"
" 33		CATCHMENT 1500"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1500	Catchment 1500"			
"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			

"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.108	1.669	0.000	0.000	c.m/sec"
"	Catchment 1500	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	---	7.352	7.352	minutes"
"	Time to Centroid	0.000	122.862	122.862	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	5973.91	184.76	6158.67	c.m"
"	Rainfall losses	39.504	1.661	38.369	mm"
"	Runoff depth	0.000	37.843	1.135	mm"
"	Runoff volume	0.00	176.99	176.99	c.m"
"	Runoff coefficient	0.000	0.958	0.029	"
"	Maximum flow	0.000	0.108	0.108	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.108	1.731	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.108	1.731	1.731	0.000"	
" 40	HYDROGRAPH Combine 600"				
"	6 Combine "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	1.731	c.m/sec"		
"	Hydrograph volume	4146.801	c.m"		
"	0.108	1.731	1.731	1.731"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.108	0.000	1.731	1.731"	
" 33	CATCHMENT 2200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2200 Catchment 2200"				
"	35.000 % Impervious"				
"	2.860 Total Area"				
"	45.000 Flow length"				
"	1.000 Overland Slope"				
"	1.859 Pervious Area"				
"	45.000 Pervious length"				

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.271	0.000	1.731	1.731 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	19.214	3.480	10.302	minutes"
"		Time to Centroid	126.641	116.889	121.117	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	734.38	395.43	1129.81	c.m"
"		Rainfall losses	24.188	2.344	16.542	mm"
"		Runoff depth	15.316	37.160	22.962	mm"
"		Runoff volume	284.73	371.97	656.70	c.m"
"		Runoff coefficient	0.388	0.941	0.581	"
"		Maximum flow	0.140	0.242	0.271	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.271	0.271	1.731	1.731"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.126	0.271	1.731	1.731 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	---	4.619	4.619	minutes"
"		Time to Centroid	0.000	118.524	118.524	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	225.17	225.17	450.35	c.m"
"		Rainfall losses	39.504	1.660	20.582	mm"
"		Runoff depth	0.000	37.844	18.922	mm"
"		Runoff volume	0.00	215.71	215.71	c.m"
"		Runoff coefficient	0.000	0.958	0.479	"
"		Maximum flow	0.000	0.126	0.126	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.126	0.397	1.731	1.731"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.606	0.397	1.731	1.731 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	---	4.766	4.766	minutes"
"		Time to Centroid	0.000	118.752	118.752	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"

"	Rainfall volume	2033.67	1095.05	3128.72	c.m"
"	Rainfall losses	39.504	1.647	26.254	mm"
"	Runoff depth	0.000	37.857	13.250	mm"
"	Runoff volume	0.00	1049.38	1049.38	c.m"
"	Runoff coefficient	0.000	0.958	0.335	"
"	Maximum flow	0.000	0.606	0.606	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.606	1.004	1.731	1.731"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.725	1.004	1.731	1.731 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	---	4.339	4.339	minutes"
"	Time to Centroid	0.000	118.083	118.083	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	2344.36	1262.35	3606.71	c.m"
"	Rainfall losses	39.504	1.761	26.294	mm"
"	Runoff depth	0.000	37.743	13.210	mm"
"	Runoff volume	0.00	1206.09	1206.09	c.m"
"	Runoff coefficient	0.000	0.955	0.334	"
"	Maximum flow	0.000	0.725	0.725	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.725	1.728	1.731	1.731"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.013	1.728	1.731	1.731 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	---	3.243	3.243	minutes"
"		Time to Centroid	0.000	116.539	116.539	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	120.88	21.33	142.21	c.m"
"		Rainfall losses	39.504	2.354	33.932	mm"
"		Runoff depth	0.000	37.150	5.572	mm"
"		Runoff volume	0.00	20.06	20.06	c.m"
"		Runoff coefficient	0.000	0.940	0.141	"
"		Maximum flow	0.000	0.013	0.013	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.013	1.741	1.731	1.731"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	287.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.000	1.741	1.731	1.731 c.m/sec"	
"	Catchment 2500	Pervious	Impervious	Total Area	"
"	Surface Area	12.060	0.000	12.060	hectare"
"	Time of concentration	---	10.578	10.578	minutes"
"	Time to Centroid	0.000	127.879	127.879	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	4764.18	0.00	4764.18	c.m"
"	Rainfall losses	39.504	1.588	39.504	mm"
"	Runoff depth	0.000	37.916	0.000	mm"
"	Runoff volume	0.00	0.00	0.00	c.m"
"	Runoff coefficient	0.000	0.000	0.000	"
"	Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.000	1.741	1.731	1.731"	
" 33	CATCHMENT 2600"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2600 Catchment 2600"				
"	0.000 % Impervious"				
"	14.960 Total Area"				
"	307.000 Flow length"				
"	1.000 Overland Slope"				
"	14.960 Pervious Area"				
"	307.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	307.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	0.000	1.741 1.731 1.731 c.m/sec"
"	Catchment 2600	Pervious Impervious Total Area "
"	Surface Area	14.960 0.000 14.960 hectare"
"	Time of concentration	--- 11.014 11.014 minutes"
"	Time to Centroid	0.000 128.567 128.567 minutes"
"	Rainfall depth	39.504 39.504 39.504 mm"
"	Rainfall volume	5909.79 0.01 5909.80 c.m"
"	Rainfall losses	39.504 1.605 39.504 mm"
"	Runoff depth	0.000 37.899 0.000 mm"
"	Runoff volume	0.00 0.01 0.01 c.m"
"	Runoff coefficient	0.000 0.000 0.000 "
"	Maximum flow	0.000 0.000 0.000 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	0.000	1.741 1.731 1.731"
" 40	HYDROGRAPH Copy to Outflow"	
"	8 Copy to Outflow"	
"	0.000	1.741 1.741 1.731"
" 40	HYDROGRAPH Combine 800"	
"	6 Combine "	
"	800 Node #"	
"	Central Watershed Catchment Areas"	
"	Maximum flow	1.741 c.m/sec"
"	Hydrograph volume	3147.951 c.m"
"	0.000	1.741 1.741 1.741"
" 40	HYDROGRAPH Start - New Tributary"	
"	2 Start - New Tributary"	
"	0.000	0.000 1.741 1.741"
" 33	CATCHMENT 3100"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	3100 Catchment 3100"	
"	35.000 % Impervious"	
"	2.050 Total Area"	
"	100.000 Flow length"	
"	0.500 Overland Slope"	
"	1.332 Pervious Area"	
"	100.000 Pervious length"	
"	0.500 Pervious slope"	
"	0.717 Impervious Area"	
"	100.000 Impervious length"	
"	0.500 Impervious slope"	
"	0.250 Pervious Manning 'n'"	
"	125.000 Pervious Max.infiltration"	
"	5.000 Pervious Min.infiltration"	

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.164	0.000	1.741	1.741 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	---	6.918	6.918 minutes"
"		Time to Centroid	0.000	122.267	122.267 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	526.39	283.44	809.83 c.m"
"		Rainfall losses	39.504	1.781	26.301 mm"
"		Runoff depth	0.000	37.723	13.203 mm"
"		Runoff volume	0.00	270.66	270.66 c.m"
"		Runoff coefficient	0.000	0.955	0.334 "
"		Maximum flow	0.000	0.164	0.164 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.164	0.164	1.741	1.741"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.188	0.164	1.741	1.741 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	---	11.355	11.355	minutes"
"	Time to Centroid	0.000	129.111	129.111	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	7640.86	402.15	8043.01	c.m"
"	Rainfall losses	39.504	1.608	37.609	mm"
"	Runoff depth	0.000	37.896	1.895	mm"
"	Runoff volume	0.00	385.79	385.79	c.m"
"	Runoff coefficient	0.000	0.959	0.048	"
"	Maximum flow	0.000	0.188	0.188	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.188	0.352	1.741	1.741"	
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.065	0.352	1.741	1.741 c.m/sec"	
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	---	4.564	4.564	minutes"
"	Time to Centroid	0.000	118.438	118.438	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	215.69	116.14	331.83	c.m"
"	Rainfall losses	39.504	1.673	26.263	mm"
"	Runoff depth	0.000	37.831	13.241	mm"
"	Runoff volume	0.00	111.22	111.22	c.m"
"	Runoff coefficient	0.000	0.958	0.335	"
"	Maximum flow	0.000	0.065	0.065	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.065	0.411	1.741	1.741"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.381	0.411	1.741	1.741 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	---	5.240	5.240	minutes"
"		Time to Centroid	0.000	119.495	119.495	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	1299.29	699.62	1998.90	c.m"
"		Rainfall losses	39.504	1.649	26.255	mm"
"		Runoff depth	0.000	37.855	13.249	mm"
"		Runoff volume	0.00	670.41	670.41	c.m"
"		Runoff coefficient	0.000	0.958	0.335	"
"		Maximum flow	0.000	0.381	0.381	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.381	0.792	1.741	1.741"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.013	0.792	1.741	1.741 c.m/sec"
"		Catchment 3400	Pervious	Impervious	Total Area "
"		Surface Area	1.197	0.063	1.260 hectare"
"		Time of concentration	---	5.031	5.031 minutes"
"		Time to Centroid	0.000	119.147	119.147 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	472.86	24.89	497.75 c.m"
"		Rainfall losses	39.504	1.643	37.611 mm"
"		Runoff depth	0.000	37.861	1.893 mm"
"		Runoff volume	0.00	23.85	23.85 c.m"
"		Runoff coefficient	0.000	0.958	0.048 "
"		Maximum flow	0.000	0.013	0.013 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.013	0.805	1.741	1.741"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.013	0.805	0.805	1.741"
" 40		HYDROGRAPH Combine 1000"			
"	6	Combine "			
"	1000	Node #"			
"		East Watershed Catchment Areas"			
"		Maximum flow	0.805		c.m/sec"
"		Hydrograph volume	1461.930		c.m"
"		0.013	0.805	0.805	0.805"
" 40		HYDROGRAPH Confluence 600"			
"	7	Confluence "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	1.731		c.m/sec"
"		Hydrograph volume	4146.801		c.m"
"		0.013	1.731	0.805	0.000"
" 40		HYDROGRAPH Copy to Outflow"			

"	8	Copy to Outflow"				
"		0.013	1.731	1.731	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		3.211	c.m/sec"	
"		Hydrograph volume		7294.753	c.m"	
"		0.013	1.731	1.731	3.211"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		3.211	c.m/sec"	
"		Hydrograph volume		7294.753	c.m"	
"		0.013	3.211	1.731	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_5yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:22:34 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          544.711 Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          130.581  mm/hr"
"          Total depth                50.743  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100 Catchment 1100"
"          3.000 % Impervious"
"          3.660 Total Area"
"          135.000 Flow length"
"          0.750 Overland Slope"
"          3.550 Pervious Area"
"          135.000 Pervious length"
"          0.750 Pervious slope"
"          0.110 Impervious Area"
"          135.000 Impervious length"
"          0.750 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.044	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	56.991	6.598	42.304	minutes"
"		Time to Centroid	161.300	120.956	149.542	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1801.48	55.72	1857.19	c.m"
"		Rainfall losses	47.072	1.920	45.717	mm"
"		Runoff depth	3.671	48.823	5.025	mm"
"		Runoff volume	130.33	53.61	183.93	c.m"
"		Runoff coefficient	0.072	0.962	0.099	"
"		Maximum flow	0.040	0.033	0.044	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.044	0.044	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		2.062	0.044	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	113.289	13.115	25.337	minutes"
"		Time to Centroid	220.260	131.201	142.067	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	0.8925	0.4806	1.3731	ha-m"
"		Rainfall losses	47.070	1.656	31.175	mm"
"		Runoff depth	3.673	49.087	19.568	mm"

"	Runoff volume	646.03	4649.04	5295.06	c.m"
"	Runoff coefficient	0.072	0.967	0.386	"
"	Maximum flow	0.104	2.044	2.062	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.062	2.093	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.133	2.093	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	16.069	1.860	3.597	minutes"
"	Time to Centroid	118.494	113.157	113.809	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	362.81	195.36	558.17	c.m"
"	Rainfall losses	47.099	2.127	31.359	mm"
"	Runoff depth	3.644	48.615	19.384	mm"
"	Runoff volume	26.06	187.17	213.23	c.m"
"	Runoff coefficient	0.072	0.958	0.382	"
"	Maximum flow	0.024	0.128	0.133	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.133	2.164	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	0.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	0.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	0.750	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.166	2.164	0.000	0.000 c.m/sec"	
"		Catchment 1400	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	66.364	7.683	42.123	minutes"
"		Time to Centroid	171.120	122.604	151.078	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	4791.66	252.19	5043.85	c.m"
"		Rainfall losses	47.071	1.640	44.800	mm"
"		Runoff depth	3.672	49.103	5.943	mm"
"		Runoff volume	346.71	244.04	590.75	c.m"
"		Runoff coefficient	0.072	0.968	0.117	"
"		Maximum flow	0.094	0.149	0.166	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.166	2.330	0.000	0.000"	
" 33		CATCHMENT 1500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				

"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.187	2.330	0.000	0.000 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area "
"		Surface Area	15.122	0.468	15.590 hectare"
"		Time of concentration	57.133	6.614	42.411 minutes"
"		Time to Centroid	161.454	120.984	149.660 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"
"		Rainfall volume	7673.50	237.32	7910.83 c.m"
"		Rainfall losses	47.071	1.923	45.717 mm"
"		Runoff depth	3.671	48.820	5.026 mm"
"		Runoff volume	555.21	228.33	783.55 c.m"
"		Runoff coefficient	0.072	0.962	0.099 "
"		Maximum flow	0.171	0.139	0.187 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.187	2.504	0.000	0.000"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.187	2.504	2.504	0.000"
" 40		HYDROGRAPH Combine 600"			
"	6	Combine "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	2.504		c.m/sec"
"		Hydrograph volume	7066.517		c.m"
"		0.187	2.504	2.504	2.504"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.187	0.000	2.504	2.504"
" 33		CATCHMENT 2200"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2200	Catchment 2200"			
"	35.000	% Impervious"			
"	2.860	Total Area"			
"	45.000	Flow length"			
"	1.000	Overland Slope"			
"	1.859	Pervious Area"			
"	45.000	Pervious length"			

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.393	0.000	2.504	2.504 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	17.200	3.131	10.010	minutes"
"		Time to Centroid	126.112	115.512	120.695	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	943.31	507.94	1451.25	c.m"
"		Rainfall losses	25.921	2.566	17.747	mm"
"		Runoff depth	24.822	48.177	32.996	mm"
"		Runoff volume	461.44	482.25	943.70	c.m"
"		Runoff coefficient	0.489	0.949	0.650	"
"		Maximum flow	0.255	0.321	0.393	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.393	0.393	2.504	2.504"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.172	0.393	2.504	2.504 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	35.890	4.155	6.377	minutes"
"		Time to Centroid	139.210	116.979	118.536	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	289.23	289.23	578.47	c.m"
"		Rainfall losses	47.070	1.977	24.524	mm"
"		Runoff depth	3.672	48.766	26.219	mm"
"		Runoff volume	20.93	277.97	298.90	c.m"
"		Runoff coefficient	0.072	0.961	0.517	"
"		Maximum flow	0.009	0.170	0.172	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.172	0.565	2.504	2.504"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.830	0.565	2.504	2.504 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	37.035	4.288	8.298	minutes"
"		Time to Centroid	140.408	117.180	120.024	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"

"	Rainfall volume	2612.25	1406.59	4018.84	c.m"
"	Rainfall losses	47.070	1.869	31.250	mm"
"	Runoff depth	3.672	48.874	19.493	mm"
"	Runoff volume	189.06	1354.79	1543.85	c.m"
"	Runoff coefficient	0.072	0.963	0.384	"
"	Maximum flow	0.082	0.821	0.830	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.830 1.394 2.504 2.504"				
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.985 1.394 2.504 2.504 c.m/sec"				
"	Catchment 2400 Pervious Impervious Total Area "				
"	Surface Area 5.934 3.196 9.130 hectare"				
"	Time of concentration 33.719 3.904 7.580 minutes"				
"	Time to Centroid 136.938 116.671 119.170 minutes"				
"	Rainfall depth 50.743 50.743 50.743 mm"				
"	Rainfall volume 3011.34 1621.49 4632.83 c.m"				
"	Rainfall losses 47.070 2.251 31.383 mm"				
"	Runoff depth 3.673 48.492 19.360 mm"				
"	Runoff volume 217.97 1549.55 1767.53 c.m"				
"	Runoff coefficient 0.072 0.956 0.382 "				
"	Maximum flow 0.105 0.973 0.985 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.985 2.379 2.504 2.504"				
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.019	2.379	2.504	2.504 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	25.198	2.917	9.606	minutes"
"		Time to Centroid	127.987	115.104	118.972	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	155.27	27.40	182.67	c.m"
"		Rainfall losses	47.079	2.347	40.369	mm"
"		Runoff depth	3.664	48.396	10.374	mm"
"		Runoff volume	11.21	26.13	37.35	c.m"
"		Runoff coefficient	0.072	0.954	0.204	"
"		Maximum flow	0.007	0.017	0.019	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.019	2.398	2.504	2.504"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.097	2.398	2.504	2.504 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	82.196	9.516	82.195	minutes"
"		Time to Centroid	187.703	125.460	187.702	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	6119.59	0.01	6119.60	c.m"
"		Rainfall losses	47.070	1.710	47.070	mm"
"		Runoff depth	3.673	49.033	3.673	mm"
"		Runoff volume	442.92	0.01	442.92	c.m"
"		Runoff coefficient	0.072	0.000	0.072	"
"		Maximum flow	0.097	0.000	0.097	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.097	2.403	2.504	2.504"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.114	2.403	2.504	2.504 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	85.587	9.908	85.586 minutes"
"		Time to Centroid	191.254	126.103	191.253 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"
"		Rainfall volume	7591.14	0.01	7591.15 c.m"
"		Rainfall losses	47.070	1.748	47.070 mm"
"		Runoff depth	3.673	48.995	3.673 mm"
"		Runoff volume	549.49	0.01	549.49 c.m"
"		Runoff coefficient	0.072	0.000	0.072 "
"		Maximum flow	0.114	0.000	0.114 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.114	2.408	2.504	2.504"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.114	2.408	2.408	2.504"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	2.408		c.m/sec"
"		Hydrograph volume	5583.735		c.m"
"		0.114	2.408	2.408	2.408"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.114	0.000	2.408	2.408"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.214	0.000	2.408	2.408 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	53.757	6.223	12.043 minutes"
"		Time to Centroid	157.901	120.348	124.945 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"
"		Rainfall volume	676.15	364.08	1040.23 c.m"
"		Rainfall losses	47.073	1.888	31.258 mm"
"		Runoff depth	3.670	48.855	19.485 mm"
"		Runoff volume	48.90	350.54	399.44 c.m"
"		Runoff coefficient	0.072	0.963	0.384 "
"		Maximum flow	0.015	0.211	0.214 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.214	0.214	2.408	2.408"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.278	0.214	2.408	2.408 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	88.236	10.215	56.017	minutes"
"	Time to Centroid	194.021	126.574	166.168	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	0.9815	0.0517	1.0331	ha-m"
"	Rainfall losses	47.071	1.659	44.800	mm"
"	Runoff depth	3.672	49.083	5.943	mm"
"	Runoff volume	710.32	499.67	1209.99	c.m"
"	Runoff coefficient	0.072	0.967	0.117	"
"	Maximum flow	0.144	0.258	0.278	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.278	0.492	2.408	2.408"
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.089	0.492	2.408	2.408 c.m/sec"
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	35.466	4.106	7.955	minutes"
"	Time to Centroid	138.756	116.922	119.602	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	277.06	149.18	426.24	c.m"
"	Rainfall losses	47.073	2.023	31.305	mm"
"	Runoff depth	3.670	48.720	19.438	mm"
"	Runoff volume	20.04	143.24	163.28	c.m"
"	Runoff coefficient	0.072	0.960	0.383	"
"	Maximum flow	0.009	0.088	0.089	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.089	0.568	2.408	2.408"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.511	0.568	2.408	2.408 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	40.715	4.714	9.106	minutes"
"		Time to Centroid	144.265	117.850	121.073	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1668.94	898.66	2567.59	c.m"
"		Rainfall losses	47.073	1.696	31.191	mm"
"		Runoff depth	3.670	49.047	19.552	mm"
"		Runoff volume	120.71	868.62	989.33	c.m"
"		Runoff coefficient	0.072	0.967	0.385	"
"		Maximum flow	0.051	0.506	0.511	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.511	1.047	2.408	2.408"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.022	1.047	2.408	2.408 c.m/sec"	
"	Catchment 3400	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	39.097	4.526	24.835	minutes"
"	Time to Centroid	142.577	117.560	132.256	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	607.39	31.97	639.36	c.m"
"	Rainfall losses	47.070	1.738	44.803	mm"
"	Runoff depth	3.673	49.005	5.939	mm"
"	Runoff volume	43.96	30.87	74.84	c.m"
"	Runoff coefficient	0.072	0.966	0.117	"
"	Maximum flow	0.019	0.018	0.022	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.022	1.069	2.408	2.408"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.022	1.069	1.069	2.408"	
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	East Watershed Catchment Areas"				
"	Maximum flow	1.069	c.m/sec"		
"	Hydrograph volume	2836.868	c.m"		
"	0.022	1.069	1.069	1.069"	
" 40	HYDROGRAPH Confluence 600"				
"	7 Confluence "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	2.504	c.m/sec"		
"	Hydrograph volume	7066.518	c.m"		
"	0.022	2.504	1.069	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				

"	8	Copy to Outflow"				
"		0.022	2.504	2.504	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		4.584	c.m/sec"	
"		Hydrograph volume		12650.239	c.m"	
"		0.022	2.504	2.504	4.584"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		4.584	c.m/sec"	
"		Hydrograph volume		12650.238	c.m"	
"		0.022	4.584	2.504	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_10yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:30:11 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          5760.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          627.308  Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          150.159  mm/hr"
"          Total depth          58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.109	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	42.843	6.239	37.275	minutes"
"		Time to Centroid	177.675	120.047	168.908	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	2063.34	63.81	2127.16	c.m"
"		Rainfall losses	48.437	1.948	47.042	mm"
"		Runoff depth	9.682	56.171	11.077	mm"
"		Runoff volume	343.73	61.68	405.41	c.m"
"		Runoff coefficient	0.167	0.966	0.191	"
"		Maximum flow	0.104	0.037	0.109	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.109	0.109	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		2.482	0.109	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	85.165	12.403	29.964	minutes"
"		Time to Centroid	241.662	129.769	156.774	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1.0223	0.5504	1.5727	ha-m"
"		Rainfall losses	48.439	1.611	32.049	mm"
"		Runoff depth	9.680	56.508	26.070	mm"

"	Runoff volume	1702.60	5351.87	7054.47	c.m"
"	Runoff coefficient	0.167	0.972	0.449	"
"	Maximum flow	0.276	2.443	2.482	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.482	2.548	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.164	2.548	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	12.080	1.759	4.270	minutes"
"	Time to Centroid	131.168	112.601	117.118	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	415.55	223.76	639.31	c.m"
"	Rainfall losses	48.454	2.289	32.297	mm"
"	Runoff depth	9.665	55.830	25.823	mm"
"	Runoff volume	69.10	214.94	284.05	c.m"
"	Runoff coefficient	0.166	0.961	0.444	"
"	Maximum flow	0.052	0.148	0.164	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.164	2.672	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	0.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	0.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	0.750	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.272 2.672 0.000 0.000 c.m/sec"				
"		Catchment 1400 Pervious Impervious Total Area "				
"		Surface Area 9.443 0.497 9.940 hectare"				
"		Time of concentration 49.890 7.265 39.892 minutes"				
"		Time to Centroid 188.344 121.626 172.694 minutes"				
"		Rainfall depth 58.119 58.119 58.119 mm"				
"		Rainfall volume 5488.19 288.85 5777.04 c.m"				
"		Rainfall losses 48.440 1.765 46.106 mm"				
"		Runoff depth 9.679 56.354 12.013 mm"				
"		Runoff volume 913.98 280.08 1194.06 c.m"				
"		Runoff coefficient 0.167 0.970 0.207 "				
"		Maximum flow 0.251 0.171 0.272 c.m/sec"				
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.272 2.901 0.000 0.000"				
" 33		CATCHMENT 1500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				

"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.463	2.901	0.000	0.000 c.m/sec"	
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	42.950	6.255	37.368	minutes"
"		Time to Centroid	177.837	120.073	169.049	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	8788.95	271.82	9060.77	c.m"
"		Rainfall losses	48.437	1.950	47.043	mm"
"		Runoff depth	9.682	56.169	11.076	mm"
"		Runoff volume	1464.12	262.70	1726.82	c.m"
"		Runoff coefficient	0.167	0.966	0.191	"
"		Maximum flow	0.440	0.158	0.463	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.463	3.181	0.000	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.463	3.181	3.181	0.000"	
" 40		HYDROGRAPH Combine 600"				
"	6	Combine "				
"	600	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	3.181	c.m/sec"		
"		Hydrograph volume	10664.800	c.m"		
"		0.463	3.181	3.181	3.181"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.463	0.000	3.181	3.181"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.484	0.000	3.181	3.181 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	16.232	2.961	9.749	minutes"
"		Time to Centroid	126.786	114.830	120.946	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1080.43	581.77	1662.21	c.m"
"		Rainfall losses	26.769	2.517	18.281	mm"
"		Runoff depth	31.350	55.602	39.838	mm"
"		Runoff volume	582.80	556.58	1139.38	c.m"
"		Runoff coefficient	0.539	0.957	0.685	"
"		Maximum flow	0.346	0.372	0.484	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.484	0.484	3.181	3.181"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.203	0.484	3.181	3.181 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	26.981	3.929	7.337	minutes"
"		Time to Centroid	153.690	116.351	121.872	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	331.28	331.28	662.56	c.m"
"		Rainfall losses	48.437	2.318	25.377	mm"
"		Runoff depth	9.682	55.802	32.742	mm"
"		Runoff volume	55.19	318.07	373.26	c.m"
"		Runoff coefficient	0.167	0.960	0.563	"
"		Maximum flow	0.024	0.199	0.203	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.203	0.687	3.181	3.181"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.990	0.687	3.181	3.181 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	27.841	4.055	9.835	minutes"
"		Time to Centroid	154.997	116.514	125.866	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"

"	Rainfall volume	2991.97	1611.06	4603.03	c.m"
"	Rainfall losses	48.443	2.150	32.241	mm"
"	Runoff depth	9.676	55.969	25.878	mm"
"	Runoff volume	498.11	1551.46	2049.57	c.m"
"	Runoff coefficient	0.166	0.963	0.445	"
"	Maximum flow	0.209	0.960	0.990	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.990	1.677	3.181	3.181"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.177	1.677	3.181	3.181 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	25.348	3.691	8.985	minutes"
"	Time to Centroid	151.251	116.044	124.650	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	3449.08	1857.20	5306.27	c.m"
"	Rainfall losses	48.462	2.680	32.438	mm"
"	Runoff depth	9.657	55.439	25.681	mm"
"	Runoff volume	573.12	1771.56	2344.68	c.m"
"	Runoff coefficient	0.166	0.954	0.442	"
"	Maximum flow	0.272	1.136	1.177	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.177	2.853	3.181	3.181"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.024	2.853	3.181	3.181 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	18.942	2.759	10.768	minutes"
"		Time to Centroid	141.573	114.415	127.856	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	177.84	31.38	209.23	c.m"
"		Rainfall losses	48.469	2.308	41.545	mm"
"		Runoff depth	9.651	55.811	16.575	mm"
"		Runoff volume	29.53	30.14	59.67	c.m"
"		Runoff coefficient	0.166	0.960	0.285	"
"		Maximum flow	0.017	0.020	0.024	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.024	2.877	3.181	3.181"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.251	2.877	3.181	3.181 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	61.792	8.999	61.791	minutes"
"		Time to Centroid	206.322	124.339	206.322	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	7009.16	0.01	7009.16	c.m"
"		Rainfall losses	48.437	1.689	48.437	mm"
"		Runoff depth	9.682	56.430	9.682	mm"
"		Runoff volume	1167.64	0.01	1167.64	c.m"
"		Runoff coefficient	0.167	0.000	0.167	"
"		Maximum flow	0.251	0.000	0.251	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.251	2.894	3.181	3.181"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	0.307	2.894 3.181 3.181 c.m/sec"
"	Catchment 2600	Pervious Impervious Total Area "
"	Surface Area	14.960 0.000 14.960 hectare"
"	Time of concentration	64.340 9.370 64.340 minutes"
"	Time to Centroid	210.179 124.933 210.178 minutes"
"	Rainfall depth	58.119 58.119 58.119 mm"
"	Rainfall volume	8694.61 0.01 8694.62 c.m"
"	Rainfall losses	48.437 1.722 48.437 mm"
"	Runoff depth	9.682 56.397 9.682 mm"
"	Runoff volume	1448.43 0.01 1448.44 c.m"
"	Runoff coefficient	0.167 0.000 0.167 "
"	Maximum flow	0.307 0.000 0.307 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	0.307	2.913 3.181 3.181"
" 40	HYDROGRAPH Copy to Outflow"	
"	8 Copy to Outflow"	
"	0.307	2.913 2.913 3.181"
" 40	HYDROGRAPH Combine 800"	
"	6 Combine "	
"	800 Node #"	
"	Central Watershed Catchment Areas"	
"	Maximum flow	2.913 c.m/sec"
"	Hydrograph volume	8582.642 c.m"
"	0.307	2.913 2.913 2.913"
" 40	HYDROGRAPH Start - New Tributary"	
"	2 Start - New Tributary"	
"	0.307	0.000 2.913 2.913"
" 33	CATCHMENT 3100"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	3100 Catchment 3100"	
"	35.000 % Impervious"	
"	2.050 Total Area"	
"	100.000 Flow length"	
"	0.500 Overland Slope"	
"	1.332 Pervious Area"	
"	100.000 Pervious length"	
"	0.500 Pervious slope"	
"	0.717 Impervious Area"	
"	100.000 Impervious length"	
"	0.500 Impervious slope"	
"	0.250 Pervious Manning 'n'"	
"	125.000 Pervious Max.infiltration"	
"	5.000 Pervious Min.infiltration"	

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.251	0.000	2.913	2.913 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	40.412	5.885	14.260 minutes"
"		Time to Centroid	174.013	119.470	132.701 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	774.44	417.00	1191.44 c.m"
"		Rainfall losses	48.441	1.995	32.185 mm"
"		Runoff depth	9.678	56.124	25.934 mm"
"		Runoff volume	128.96	402.69	531.66 c.m"
"		Runoff coefficient	0.167	0.966	0.446 "
"		Maximum flow	0.042	0.239	0.251 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.251	0.251	2.913	2.913"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.431	0.251	2.913	2.913 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	66.332	9.660	53.035	minutes"
"	Time to Centroid	213.197	125.400	192.598	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1.1241	0.0592	1.1833	ha-m"
"	Rainfall losses	48.441	1.749	46.107	mm"
"	Runoff depth	9.678	56.370	12.013	mm"
"	Runoff volume	1871.92	573.85	2445.76	c.m"
"	Runoff coefficient	0.167	0.970	0.207	"
"	Maximum flow	0.393	0.305	0.431	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.431	0.626	2.913	2.913"
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.106	0.626	2.913	2.913 c.m/sec"
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	26.662	3.883	9.439	minutes"
"	Time to Centroid	153.211	116.293	125.297	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	317.33	170.87	488.20	c.m"
"	Rainfall losses	48.439	2.392	32.323	mm"
"	Runoff depth	9.680	55.727	25.797	mm"
"	Runoff volume	52.85	163.84	216.69	c.m"
"	Runoff coefficient	0.167	0.959	0.444	"
"	Maximum flow	0.024	0.103	0.106	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.106	0.716	2.913	2.913"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.611	0.716	2.913	2.913 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	30.608	4.457	10.786	minutes"
"		Time to Centroid	159.183	117.112	127.293	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1911.54	1029.29	2940.83	c.m"
"		Rainfall losses	48.439	1.811	32.119	mm"
"		Runoff depth	9.681	56.308	26.000	mm"
"		Runoff volume	318.39	997.21	1315.61	c.m"
"		Runoff coefficient	0.167	0.969	0.447	"
"		Maximum flow	0.129	0.594	0.611	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.611	1.286	2.913	2.913"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.051	1.286	2.913	2.913 c.m/sec"
"		Catchment 3400	Pervious	Impervious	Total Area "
"		Surface Area	1.197	0.063	1.260 hectare"
"		Time of concentration	29.391	4.280	23.513 minutes"
"		Time to Centroid	157.347	116.830	147.862 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	695.69	36.62	732.30 c.m"
"		Rainfall losses	48.444	1.931	46.118 mm"
"		Runoff depth	9.676	56.188	12.001 mm"
"		Runoff volume	115.82	35.40	151.21 c.m"
"		Runoff coefficient	0.166	0.967	0.206 "
"		Maximum flow	0.048	0.021	0.051 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.051	1.324	2.913	2.913"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.051	1.324	1.324	2.913"
" 40		HYDROGRAPH Combine 1000"			
"	6	Combine "			
"	1000	Node #"			
"		East Watershed Catchment Areas"			
"		Maximum flow	1.324		c.m/sec"
"		Hydrograph volume	4660.931		c.m"
"		0.051	1.324	1.324	1.324"
" 40		HYDROGRAPH Confluence 600"			
"	7	Confluence "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	3.181		c.m/sec"
"		Hydrograph volume	10664.801		c.m"
"		0.051	3.181	1.324	0.000"
" 40		HYDROGRAPH Copy to Outflow"			

"	8	Copy to Outflow"				
"		0.051	3.181	3.181	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		5.773	c.m/sec"	
"		Hydrograph volume		19247.459	c.m"	
"		0.051	3.181	3.181	5.773"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		5.773	c.m/sec"	
"		Hydrograph volume		19247.457	c.m"	
"		0.051	5.773	3.181	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_25yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:32:47 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          746.059 Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          175.653  mm/hr"
"          Total depth                67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100 Catchment 1100"
"          3.000 % Impervious"
"          3.660 Total Area"
"          135.000 Flow length"
"          0.750 Overland Slope"
"          3.550 Pervious Area"
"          135.000 Pervious length"
"          0.750 Pervious slope"
"          0.110 Impervious Area"
"          135.000 Impervious length"
"          0.750 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.202	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	35.541	5.860	32.627	minutes"
"		Time to Centroid	175.235	118.972	169.711	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2387.11	73.83	2460.94	c.m"
"		Rainfall losses	48.721	2.060	47.321	mm"
"		Runoff depth	18.518	65.178	19.918	mm"
"		Runoff volume	657.43	71.57	728.99	c.m"
"		Runoff coefficient	0.275	0.969	0.296	"
"		Maximum flow	0.194	0.043	0.202	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.202	0.202	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		3.079	0.202	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	70.650	11.649	31.941	minutes"
"		Time to Centroid	235.230	128.137	164.970	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1.1827	0.6368	1.8195	ha-m"
"		Rainfall losses	48.711	1.603	32.223	mm"
"		Runoff depth	18.528	65.636	35.016	mm"

"	Runoff volume	3258.86	6216.37	9475.24	c.m"
"	Runoff coefficient	0.276	0.976	0.521	"
"	Maximum flow	0.531	2.989	3.079	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		3.079	3.187	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.207	3.187	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	10.021	1.652	4.536	minutes"
"	Time to Centroid	131.749	112.001	118.806	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	480.76	258.87	739.63	c.m"
"	Rainfall losses	48.899	2.449	32.642	mm"
"	Runoff depth	18.340	64.790	34.597	mm"
"	Runoff volume	131.13	249.44	380.57	c.m"
"	Runoff coefficient	0.273	0.964	0.515	"
"	Maximum flow	0.098	0.173	0.207	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.207	3.371	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	0.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.509	3.371	0.000	0.000 c.m/sec"
"		Catchment 1400	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"
"		Time of concentration	41.387	6.824	35.983 minutes"
"		Time to Centroid	185.246	120.562	175.134 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"
"		Rainfall volume	6349.37	334.18	6683.54 c.m"
"		Rainfall losses	48.726	2.062	46.393 mm"
"		Runoff depth	18.513	65.177	20.846 mm"
"		Runoff volume	1748.17	323.93	2072.10 c.m"
"		Runoff coefficient	0.275	0.969	0.310 "
"		Maximum flow	0.480	0.199	0.509 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.509	3.701	0.000	0.000"
" 33		CATCHMENT 1500"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1500	Catchment 1500"			
"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			

"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.856	3.701	0.000	0.000	c.m/sec"
"	Catchment 1500	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	35.630	5.875	32.709	minutes"
"	Time to Centroid	175.384	118.999	169.850	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1.0168	0.0314	1.0483	ha-m"
"	Rainfall losses	48.719	2.068	47.320	mm"
"	Runoff depth	18.520	65.171	19.919	mm"
"	Runoff volume	2800.61	304.80	3105.41	c.m"
"	Runoff coefficient	0.275	0.969	0.296	"
"	Maximum flow	0.824	0.182	0.856	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.856	4.159	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.856	4.159	4.159	0.000"	
" 40	HYDROGRAPH Combine 600"				
"	6 Combine "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	4.159	c.m/sec"		
"	Hydrograph volume	15762.318	c.m"		
"	0.856	4.159	4.159	4.159"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.856	0.000	4.159	4.159"	
" 33	CATCHMENT 2200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2200 Catchment 2200"				
"	35.000 % Impervious"				
"	2.860 Total Area"				
"	45.000 Flow length"				
"	1.000 Overland Slope"				
"	1.859 Pervious Area"				
"	45.000 Pervious length"				

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.607	0.000	4.159	4.159 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	15.215	2.781	9.428	minutes"
"		Time to Centroid	127.913	113.998	121.437	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1249.97	673.06	1923.03	c.m"
"		Rainfall losses	27.168	2.463	18.521	mm"
"		Runoff depth	40.071	64.776	48.718	mm"
"		Runoff volume	744.92	648.41	1393.33	c.m"
"		Runoff coefficient	0.596	0.963	0.725	"
"		Maximum flow	0.432	0.439	0.607	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.607	0.607	4.159	4.159"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.245	0.607	4.159	4.159 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	22.382	3.690	7.858	minutes"
"		Time to Centroid	152.801	115.577	123.876	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	383.26	383.26	766.52	c.m"
"		Rainfall losses	48.772	2.879	25.826	mm"
"		Runoff depth	18.467	64.359	41.413	mm"
"		Runoff volume	105.26	366.85	472.11	c.m"
"		Runoff coefficient	0.275	0.957	0.616	"
"		Maximum flow	0.047	0.237	0.245	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.245	0.848	4.159	4.159"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.209	0.848	4.159	4.159 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	23.096	3.808	10.509	minutes"
"		Time to Centroid	153.990	115.729	129.022	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"

"	Rainfall volume	3461.46	1863.86	5325.32	c.m"
"	Rainfall losses	48.729	2.672	32.609	mm"
"	Runoff depth	18.510	64.567	34.630	mm"
"	Runoff volume	952.88	1789.80	2742.67	c.m"
"	Runoff coefficient	0.275	0.960	0.515	"
"	Maximum flow	0.421	1.142	1.209	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.209	2.056	4.159	4.159"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.440	2.056	4.159	4.159 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	21.028	3.467	9.589	minutes"
"	Time to Centroid	150.423	115.200	127.479	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	3990.29	2148.62	6138.91	c.m"
"	Rainfall losses	48.713	2.954	32.697	mm"
"	Runoff depth	18.526	64.285	34.541	mm"
"	Runoff volume	1099.42	2054.22	3153.64	c.m"
"	Runoff coefficient	0.276	0.956	0.514	"
"	Maximum flow	0.497	1.350	1.440	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.440	3.496	4.159	4.159"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.039	3.496	4.159	4.159 c.m/sec"
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	15.714	2.591	10.687	minutes"
"		Time to Centroid	141.430	113.606	130.772	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	205.75	36.31	242.06	c.m"
"		Rainfall losses	48.771	2.264	41.795	mm"
"		Runoff depth	18.468	64.975	25.444	mm"
"		Runoff volume	56.51	35.09	91.60	c.m"
"		Runoff coefficient	0.275	0.966	0.378	"
"		Maximum flow	0.035	0.024	0.039	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.039	3.528	4.159	4.159"
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.488	3.528	4.159	4.159 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	51.260	8.452	51.260	minutes"
"		Time to Centroid	202.095	123.028	202.095	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	8109.00	0.01	8109.01	c.m"
"		Rainfall losses	48.715	1.723	48.715	mm"
"		Runoff depth	18.524	65.516	18.524	mm"
"		Runoff volume	2233.98	0.01	2233.98	c.m"
"		Runoff coefficient	0.275	0.000	0.275	"
"		Maximum flow	0.488	0.000	0.488	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.488	3.566	4.159	4.159"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.576	3.566	4.159	4.159 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	53.374	8.800	53.374 minutes"
"		Time to Centroid	205.714	123.584	205.714 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"
"		Rainfall volume	1.0059	0.0000	1.0059 ha-m"
"		Rainfall losses	48.720	1.732	48.720 mm"
"		Runoff depth	18.519	65.507	18.519 mm"
"		Runoff volume	2770.43	0.01	2770.44 c.m"
"		Runoff coefficient	0.275	0.000	0.275 "
"		Maximum flow	0.576	0.000	0.576 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.576	3.609	4.159	4.159"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.576	3.609	3.609	4.159"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	3.609		c.m/sec"
"		Hydrograph volume	12857.777		c.m"
"		0.576	3.609	3.609	3.609"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.576	0.000	3.609	3.609"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.302	0.000	3.609	3.609 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	33.524	5.527	15.184 minutes"
"		Time to Centroid	171.778	118.383	136.800 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"
"		Rainfall volume	895.96	482.44	1378.40 c.m"
"		Rainfall losses	48.712	1.893	32.325 mm"
"		Runoff depth	18.527	65.346	34.914 mm"
"		Runoff volume	246.87	468.86	715.73 c.m"
"		Runoff coefficient	0.276	0.972	0.519 "
"		Maximum flow	0.078	0.275	0.302 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.302	0.302	3.609	3.609"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.783	0.302	3.609	3.609 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	55.026	9.073	47.816	minutes"
"	Time to Centroid	208.530	124.016	195.269	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1.3005	0.0684	1.3690	ha-m"
"	Rainfall losses	48.711	1.726	46.362	mm"
"	Runoff depth	18.528	65.513	20.877	mm"
"	Runoff volume	3583.63	666.92	4250.55	c.m"
"	Runoff coefficient	0.276	0.974	0.310	"
"	Maximum flow	0.737	0.366	0.783	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.783	0.866	3.609	3.609"
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.130	0.866	3.609	3.609 c.m/sec"
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	22.118	3.647	10.077	minutes"
"	Time to Centroid	152.328	115.517	128.333	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	367.12	197.68	564.81	c.m"
"	Rainfall losses	48.754	2.965	32.728	mm"
"	Runoff depth	18.485	64.274	34.511	mm"
"	Runoff volume	100.93	188.96	289.89	c.m"
"	Runoff coefficient	0.275	0.956	0.513	"
"	Maximum flow	0.045	0.123	0.130	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.130	0.940	3.609	3.609"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.746	0.940	3.609	3.609 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area "	
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	25.391	4.186	11.505	minutes"
"		Time to Centroid	157.919	116.225	130.615	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2211.49	1190.80	3402.29	c.m"
"		Rainfall losses	48.753	2.099	32.424	mm"
"		Runoff depth	18.486	65.140	34.815	mm"
"		Runoff volume	608.01	1153.63	1761.63	c.m"
"		Runoff coefficient	0.275	0.969	0.518	"
"		Maximum flow	0.243	0.710	0.746	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.746	1.638	3.609	3.609"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.101	1.638	3.609	3.609 c.m/sec"	
"	Catchment 3400	Pervious	Impervious	Total Area	"
"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	24.382	4.020	21.210	minutes"
"	Time to Centroid	156.183	116.000	149.924	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	804.85	42.36	847.21	c.m"
"	Rainfall losses	48.716	2.305	46.395	mm"
"	Runoff depth	18.523	64.934	20.844	mm"
"	Runoff volume	221.72	40.91	262.63	c.m"
"	Runoff coefficient	0.275	0.966	0.310	"
"	Maximum flow	0.096	0.026	0.101	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.101	1.701	3.609	3.609"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.101	1.701	1.701	3.609"	
" 40	HYDROGRAPH Combine 1000"				
"	6 Combine "				
"	1000 Node #"				
"	East Watershed Catchment Areas"				
"	Maximum flow	1.701	c.m/sec"		
"	Hydrograph volume	7280.438	c.m"		
"	0.101	1.701	1.701	1.701"	
" 40	HYDROGRAPH Confluence 600"				
"	7 Confluence "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	4.159	c.m/sec"		
"	Hydrograph volume	15762.317	c.m"		
"	0.101	4.159	1.701	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				

"	8	Copy to Outflow"				
"		0.101	4.159	4.159	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		7.521	c.m/sec"	
"		Hydrograph volume		28620.094	c.m"	
"		0.101	4.159	4.159	7.521"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		7.521	c.m/sec"	
"		Hydrograph volume		28620.096	c.m"	
"		0.101	7.521	4.159	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_50yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:34:37 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          820.361 Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          194.803  mm/hr"
"          Total depth                74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.268	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	33.356	5.622	31.120	minutes"
"		Time to Centroid	171.836	118.392	167.527	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2639.85	81.64	2721.50	c.m"
"		Rainfall losses	48.832	1.991	47.427	mm"
"		Runoff depth	25.525	72.367	26.931	mm"
"		Runoff volume	906.21	79.46	985.66	c.m"
"		Runoff coefficient	0.343	0.973	0.362	"
"		Maximum flow	0.259	0.047	0.268	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.268	0.268	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		3.522	0.268	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	66.305	11.176	32.939	minutes"
"		Time to Centroid	227.609	127.257	166.871	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1.3079	0.7042	2.0121	ha-m"
"		Rainfall losses	48.839	1.695	32.338	mm"
"		Runoff depth	25.519	72.663	42.019	mm"

"	Runoff volume	0.4489	0.6882	1.1370	ha-m"
"	Runoff coefficient	0.343	0.977	0.565	"
"	Maximum flow	0.714	3.396	3.522	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		3.522	3.659	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.241	3.659	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	9.405	1.585	4.686	minutes"
"	Time to Centroid	131.373	111.785	119.552	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	531.66	286.28	817.94	c.m"
"	Rainfall losses	48.971	2.606	32.743	mm"
"	Runoff depth	25.387	71.752	41.615	mm"
"	Runoff volume	181.52	276.25	457.76	c.m"
"	Runoff coefficient	0.341	0.965	0.560	"
"	Maximum flow	0.132	0.192	0.241	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.241	3.883	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	0.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.640	3.883	0.000	0.000 c.m/sec"
"		Catchment 1400	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"
"		Time of concentration	38.842	6.547	34.654 minutes"
"		Time to Centroid	181.131	119.947	173.197 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	7021.61	369.56	7391.16 c.m"
"		Rainfall losses	48.837	2.107	46.501 mm"
"		Runoff depth	25.521	72.250	27.857 mm"
"		Runoff volume	2409.93	359.08	2769.01 c.m"
"		Runoff coefficient	0.343	0.972	0.375 "
"		Maximum flow	0.608	0.219	0.640 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.640	4.285	0.000	0.000"
" 33		CATCHMENT 1500"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1500	Catchment 1500"			
"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			

"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	1.136	4.285	0.000	0.000	c.m/sec"
"	Catchment 1500	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	33.439	5.636	31.198	minutes"
"	Time to Centroid	171.977	118.416	167.660	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1.1245	0.0348	1.1592	ha-m"
"	Rainfall losses	48.832	1.996	47.427	mm"
"	Runoff depth	25.525	72.361	26.930	mm"
"	Runoff volume	3860.02	338.43	4198.46	c.m"
"	Runoff coefficient	0.343	0.973	0.362	"
"	Maximum flow	1.102	0.200	1.136	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.136	4.867	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	1.136	4.867	4.867	0.000"	
" 40	HYDROGRAPH Combine 600"				
"	6 Combine "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	4.867	c.m/sec"		
"	Hydrograph volume	19781.355	c.m"		
"	1.136	4.867	4.867	4.867"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.136	0.000	4.867	4.867"	
" 33	CATCHMENT 2200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2200 Catchment 2200"				
"	35.000 % Impervious"				
"	2.860 Total Area"				
"	45.000 Flow length"				
"	1.000 Overland Slope"				
"	1.859 Pervious Area"				
"	45.000 Pervious length"				

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.709	0.000	4.867	4.867 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	14.581	2.668	9.189	minutes"
"		Time to Centroid	128.562	113.597	121.789	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1382.31	744.32	2126.63	c.m"
"		Rainfall losses	27.517	2.436	18.739	mm"
"		Runoff depth	46.841	71.922	55.619	mm"
"		Runoff volume	870.77	719.94	1590.70	c.m"
"		Runoff coefficient	0.630	0.967	0.748	"
"		Maximum flow	0.499	0.489	0.709	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.709	0.709	4.867	4.867"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.277	0.709	4.867	4.867 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	21.006	3.541	8.147	minutes"
"		Time to Centroid	150.939	115.159	124.597	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	423.84	423.84	847.68	c.m"
"		Rainfall losses	48.834	3.111	25.972	mm"
"		Runoff depth	25.524	71.247	48.385	mm"
"		Runoff volume	145.49	406.11	551.59	c.m"
"		Runoff coefficient	0.343	0.958	0.651	"
"		Maximum flow	0.060	0.265	0.277	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.277	0.970	4.867	4.867"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.376	0.970	4.867	4.867 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	21.676	3.654	10.850	minutes"
"		Time to Centroid	152.088	115.358	130.024	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"

"	Rainfall volume	3827.94	2061.20	5889.14	c.m"
"	Rainfall losses	48.855	3.104	32.843	mm"
"	Runoff depth	25.502	71.253	41.515	mm"
"	Runoff volume	1312.86	1975.15	3288.01	c.m"
"	Runoff coefficient	0.343	0.958	0.558	"
"	Maximum flow	0.535	1.280	1.376	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.376	2.346	4.867	4.867"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.639	2.346	4.867	4.867 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	19.735	3.326	9.878	minutes"
"	Time to Centroid	148.817	114.795	128.379	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	4412.76	2376.10	6788.87	c.m"
"	Rainfall losses	48.876	3.160	32.875	mm"
"	Runoff depth	25.482	71.198	41.482	mm"
"	Runoff volume	1512.21	2275.13	3787.34	c.m"
"	Runoff coefficient	0.343	0.958	0.558	"
"	Maximum flow	0.635	1.509	1.639	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.639	3.985	4.867	4.867"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.049	3.985	4.867	4.867 c.m/sec"
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	14.748	2.486	10.667	minutes"
"		Time to Centroid	140.371	113.245	131.344	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	227.53	40.15	267.69	c.m"
"		Rainfall losses	48.840	2.238	41.850	mm"
"		Runoff depth	25.517	72.120	32.508	mm"
"		Runoff volume	78.08	38.94	117.03	c.m"
"		Runoff coefficient	0.343	0.970	0.437	"
"		Maximum flow	0.044	0.027	0.049	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.049	4.022	4.867	4.867"
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.649	4.022	4.867	4.867 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	48.108	8.109	48.108	minutes"
"		Time to Centroid	196.811	122.402	196.811	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	8967.54	0.01	8967.55	c.m"
"		Rainfall losses	48.837	1.697	48.837	mm"
"		Runoff depth	25.521	72.661	25.521	mm"
"		Runoff volume	3077.85	0.01	3077.86	c.m"
"		Runoff coefficient	0.343	0.000	0.343	"
"		Maximum flow	0.649	0.000	0.649	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.649	4.077	4.867	4.867"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.766	4.077	4.867	4.867 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	50.092	8.443	50.092 minutes"
"		Time to Centroid	200.168	122.877	200.168 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	1.1124	0.0000	1.1124 ha-m"
"		Rainfall losses	48.840	1.746	48.840 mm"
"		Runoff depth	25.518	72.612	25.518 mm"
"		Runoff volume	3817.47	0.01	3817.48 c.m"
"		Runoff coefficient	0.343	0.000	0.343 "
"		Maximum flow	0.766	0.000	0.766 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.766	4.139	4.867	4.867"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.766	4.139	4.139	4.867"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	4.139		c.m/sec"
"		Hydrograph volume	16230.010		c.m"
"		0.766	4.139	4.139	4.139"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.766	0.000	4.139	4.139"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.338	0.000	4.139	4.139 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	31.463	5.303	15.635 minutes"
"		Time to Centroid	168.659	117.853	137.919 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	990.82	533.52	1524.33 c.m"
"		Rainfall losses	48.857	1.808	32.390 mm"
"		Runoff depth	25.501	72.550	41.968 mm"
"		Runoff volume	339.80	520.54	860.34 c.m"
"		Runoff coefficient	0.343	0.976	0.564 "
"		Maximum flow	0.104	0.301	0.338 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.338	0.338	4.139	4.139"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.012	0.338	4.139	4.139 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	51.643	8.705	46.053	minutes"
"	Time to Centroid	202.786	123.296	192.438	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1.4382	0.0757	1.5139	ha-m"
"	Rainfall losses	48.832	1.773	46.479	mm"
"	Runoff depth	25.526	72.585	27.879	mm"
"	Runoff volume	4937.18	738.91	5676.09	c.m"
"	Runoff coefficient	0.343	0.976	0.375	"
"	Maximum flow	0.953	0.411	1.012	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.012	1.130	4.139	4.139"
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.148	1.130	4.139	4.139 c.m/sec"
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	20.758	3.499	10.393	minutes"
"	Time to Centroid	150.514	115.093	129.243	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	405.99	218.61	624.61	c.m"
"	Rainfall losses	48.835	3.107	32.831	mm"
"	Runoff depth	25.522	71.250	41.527	mm"
"	Runoff volume	139.35	209.48	348.83	c.m"
"	Runoff coefficient	0.343	0.958	0.558	"
"	Maximum flow	0.058	0.137	0.148	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.148	1.170	4.139	4.139"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.849	1.170	4.139	4.139 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	23.830	4.017	11.885	minutes"
"		Time to Centroid	155.737	115.834	131.680	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2445.63	1316.88	3762.50	c.m"
"		Rainfall losses	48.833	2.393	32.579	mm"
"		Runoff depth	25.525	71.965	41.779	mm"
"		Runoff volume	839.52	1274.50	2114.03	c.m"
"		Runoff coefficient	0.343	0.968	0.562	"
"		Maximum flow	0.330	0.797	0.849	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.849	1.888	4.139	4.139"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.128	1.888	4.139	4.139 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"
"		Surface Area	1.197	0.063	1.260	hectare"
"		Time of concentration	22.882	3.857	20.430	minutes"
"		Time to Centroid	154.149	115.624	149.184	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	890.06	46.85	936.91	c.m"
"		Rainfall losses	48.865	2.693	46.556	mm"
"		Runoff depth	25.493	71.664	27.801	mm"
"		Runoff volume	305.15	45.15	350.30	c.m"
"		Runoff coefficient	0.343	0.964	0.374	"
"		Maximum flow	0.122	0.029	0.128	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.128	1.968	4.139	4.139"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.128	1.968	1.968	4.139"	
" 40		HYDROGRAPH Combine 1000"				
"	6	Combine "				
"	1000	Node #"				
"		East Watershed Catchment Areas"				
"		Maximum flow	1.968	c.m/sec"		
"		Hydrograph volume	9349.580	c.m"		
"		0.128	1.968	1.968	1.968"	
" 40		HYDROGRAPH Confluence 600"				
"	7	Confluence "				
"	600	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	4.867	c.m/sec"		
"		Hydrograph volume	19781.355	c.m"		
"		0.128	4.867	1.968	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				

"	8	Copy to Outflow"				
"		0.128	4.867	4.867	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		8.768	c.m/sec"	
"		Hydrograph volume		36011.352	c.m"	
"		0.128	4.867	4.867	8.768"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow		8.768	c.m/sec"	
"		Hydrograph volume		36011.344	c.m"	
"		0.128	8.768	4.867	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_100yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:38:34 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          901.088 Coefficient A"
"          0.043  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          212.928  mm/hr"
"          Total depth                81.221  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.344	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	31.664	5.426	29.808	minutes"
"		Time to Centroid	168.233	117.886	164.671	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2883.50	89.18	2972.68	c.m"
"		Rainfall losses	48.998	1.908	47.585	mm"
"		Runoff depth	32.223	79.313	33.636	mm"
"		Runoff volume	1143.98	87.09	1231.06	c.m"
"		Runoff coefficient	0.397	0.977	0.414	"
"		Maximum flow	0.335	0.051	0.344	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.344	0.344	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		3.963	0.344	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	62.943	10.785	33.195	minutes"
"		Time to Centroid	220.024	126.471	166.667	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.4286	0.7692	2.1978	ha-m"
"		Rainfall losses	48.968	1.710	32.428	mm"
"		Runoff depth	32.252	79.511	48.793	mm"

"	Runoff volume	0.5673	0.7530	1.3203	ha-m"
"	Runoff coefficient	0.397	0.979	0.601	"
"	Maximum flow	0.884	3.794	3.963	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		3.963	4.134	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.277	4.134	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	8.928	1.530	4.729	minutes"
"	Time to Centroid	130.565	111.553	119.774	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	580.73	312.70	893.43	c.m"
"	Rainfall losses	49.048	2.794	32.859	mm"
"	Runoff depth	32.173	78.427	48.362	mm"
"	Runoff volume	230.03	301.94	531.98	c.m"
"	Runoff coefficient	0.396	0.966	0.595	"
"	Maximum flow	0.170	0.210	0.277	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.277	4.404	0.000	0.000"
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

"	1400	Catchment 1400"			
"	5.000	% Impervious"			
"	9.940	Total Area"			
"	174.000	Flow length"			
"	0.750	Overland Slope"			
"	9.443	Pervious Area"			
"	174.000	Pervious length"			
"	0.750	Pervious slope"			
"	0.497	Impervious Area"			
"	174.000	Impervious length"			
"	0.750	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.790	4.404	0.000	0.000 c.m/sec"
"		Catchment 1400	Pervious	Impervious	Total Area "
"		Surface Area	9.443	0.497	9.940 hectare"
"		Time of concentration	36.872	6.318	33.380 minutes"
"		Time to Centroid	176.830	119.394	170.267 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	7669.69	403.67	8073.36 c.m"
"		Rainfall losses	48.961	2.150	46.621 mm"
"		Runoff depth	32.260	79.071	34.600 mm"
"		Runoff volume	3046.29	392.98	3439.28 c.m"
"		Runoff coefficient	0.397	0.974	0.426 "
"		Maximum flow	0.756	0.238	0.790 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.790	4.886	0.000	0.000"
" 33		CATCHMENT 1500"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1500	Catchment 1500"			
"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			

"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.465	4.886	0.000	0.000 c.m/sec"	
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	31.743	5.439	29.882	minutes"
"		Time to Centroid	168.367	117.908	164.798	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.2282	0.0380	1.2662	ha-m"
"		Rainfall losses	49.002	1.917	47.589	mm"
"		Runoff depth	32.219	79.304	33.632	mm"
"		Runoff volume	4872.30	370.90	5243.20	c.m"
"		Runoff coefficient	0.397	0.976	0.414	"
"		Maximum flow	1.427	0.216	1.465	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.465	5.613	0.000	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		1.465	5.613	5.613	0.000"	
" 40		HYDROGRAPH Combine 600"				
"	6	Combine "				
"	600	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	5.613	c.m/sec"		
"		Hydrograph volume	23648.846	c.m"		
"		1.465	5.613	5.613	5.613"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		1.465	0.000	5.613	5.613"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				

"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.824	0.000	5.613	5.613 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	14.059	2.575	8.971	minutes"
"		Time to Centroid	128.913	113.231	121.965	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1509.90	813.02	2322.92	c.m"
"		Rainfall losses	27.874	2.413	18.963	mm"
"		Runoff depth	53.347	78.808	62.258	mm"
"		Runoff volume	991.72	788.86	1780.59	c.m"
"		Runoff coefficient	0.657	0.970	0.767	"
"		Maximum flow	0.561	0.538	0.824	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.824	0.824	5.613	5.613"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.308	0.824	5.613	5.613 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	19.940	3.417	8.250	minutes"
"		Time to Centroid	148.794	114.774	124.725	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	462.96	462.96	925.92	c.m"
"		Rainfall losses	48.994	3.275	26.134	mm"
"		Runoff depth	32.227	77.946	55.086	mm"
"		Runoff volume	183.69	444.29	627.99	c.m"
"		Runoff coefficient	0.397	0.960	0.678	"
"		Maximum flow	0.075	0.293	0.308	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.308	1.074	5.613	5.613"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.546	1.074	5.613	5.613 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	20.576	3.526	10.935	minutes"
"		Time to Centroid	149.834	114.953	130.110	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"

"	Rainfall volume	4181.25	2251.44	6432.69	c.m"
"	Rainfall losses	48.963	3.260	32.967	mm"
"	Runoff depth	32.258	77.961	48.254	mm"
"	Runoff volume	1660.63	2161.08	3821.72	c.m"
"	Runoff coefficient	0.397	0.960	0.594	"
"	Maximum flow	0.669	1.413	1.546	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.546	2.621	5.613	5.613"
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.842	2.621	5.613	5.613 c.m/sec"
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	18.734	3.210	9.953	minutes"
"	Time to Centroid	146.802	114.433	128.492	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	4820.05	2595.41	7415.47	c.m"
"	Rainfall losses	49.007	3.305	33.012	mm"
"	Runoff depth	32.214	77.915	48.209	mm"
"	Runoff volume	1911.71	2489.79	4401.50	c.m"
"	Runoff coefficient	0.397	0.959	0.594	"
"	Maximum flow	0.806	1.662	1.842	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.842	4.462	5.613	5.613"
" 33	CATCHMENT 2450"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.061	4.462	5.613	5.613 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	14.000	2.399	10.496	minutes"
"		Time to Centroid	138.966	112.935	131.105	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	248.54	43.86	292.40	c.m"
"		Rainfall losses	49.000	2.225	41.983	mm"
"		Runoff depth	32.221	78.996	39.237	mm"
"		Runoff volume	98.60	42.66	141.26	c.m"
"		Runoff coefficient	0.397	0.973	0.483	"
"		Maximum flow	0.055	0.029	0.061	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.061	4.506	5.613	5.613"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				

"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.805	4.506	5.613	5.613 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	45.668	7.825	45.668	minutes"
"		Time to Centroid	191.402	121.768	191.401	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	9795.23	0.01	9795.24	c.m"
"		Rainfall losses	48.958	1.720	48.958	mm"
"		Runoff depth	32.263	79.501	32.263	mm"
"		Runoff volume	3890.95	0.01	3890.96	c.m"
"		Runoff coefficient	0.397	0.000	0.397	"
"		Maximum flow	0.805	0.000	0.805	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.805	4.582	5.613	5.613"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.978	4.582	5.613	5.613 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	47.551	8.148	47.551 minutes"
"		Time to Centroid	194.533	122.304	194.533 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1.2151	0.0000	1.2151 ha-m"
"		Rainfall losses	48.975	1.717	48.975 mm"
"		Runoff depth	32.246	79.504	32.246 mm"
"		Runoff volume	4824.02	0.01	4824.03 c.m"
"		Runoff coefficient	0.397	0.000	0.397 "
"		Maximum flow	0.978	0.000	0.978 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.978	4.670	5.613	5.613"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.978	4.670	4.670	5.613"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	4.670	c.m/sec"	
"		Hydrograph volume	19488.041	c.m"	
"		0.978	4.670	4.670	4.670"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.978	0.000	4.670	4.670"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.375	0.000	4.670	4.670 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	29.867	5.118	15.758 minutes"
"		Time to Centroid	165.226	117.365	137.942 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1082.27	582.76	1665.03 c.m"
"		Rainfall losses	48.963	1.785	32.451 mm"
"		Runoff depth	32.258	79.436	48.770 mm"
"		Runoff volume	429.83	569.95	999.78 c.m"
"		Runoff coefficient	0.397	0.978	0.600 "
"		Maximum flow	0.130	0.325	0.375 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.375	0.375	4.670	4.670"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.308	0.375	4.670	4.670 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"

"	Time of concentration	49.023	8.400	44.361	minutes"
"	Time to Centroid	196.963	122.644	188.434	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.5710	0.0827	1.6537	ha-m"
"	Rainfall losses	48.958	1.756	46.598	mm"
"	Runoff depth	32.263	79.465	34.623	mm"
"	Runoff volume	6240.29	808.95	7049.24	c.m"
"	Runoff coefficient	0.397	0.978	0.426	"
"	Maximum flow	1.244	0.455	1.308	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.308	1.450	4.670	4.670"
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.167	1.450	4.670	4.670 c.m/sec"
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	19.705	3.377	10.466	minutes"
"	Time to Centroid	148.417	114.704	129.343	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	443.47	238.79	682.26	c.m"
"	Rainfall losses	49.017	3.290	33.013	mm"
"	Runoff depth	32.204	77.931	48.208	mm"
"	Runoff volume	175.83	229.12	404.95	c.m"
"	Runoff coefficient	0.396	0.959	0.594	"
"	Maximum flow	0.072	0.151	0.167	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.167	1.497	4.670	4.670"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.952	1.497	4.670	4.670 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	22.621	3.876	11.984	minutes"
"		Time to Centroid	153.263	115.470	131.816	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2671.35	1438.42	4109.78	c.m"
"		Rainfall losses	49.022	2.763	32.831	mm"
"		Runoff depth	32.199	78.458	48.389	mm"
"		Runoff volume	1059.01	1389.49	2448.51	c.m"
"		Runoff coefficient	0.396	0.966	0.596	"
"		Maximum flow	0.409	0.880	0.952	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.952	2.153	4.670	4.670"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				

"	1.250	Overland Slope"			
"	1.197	Pervious Area"			
"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.158	2.153	4.670	4.670 c.m/sec"
"		Catchment 3400	Pervious	Impervious	Total Area "
"		Surface Area	1.197	0.063	1.260 hectare"
"		Time of concentration	21.722	3.722	19.685 minutes"
"		Time to Centroid	151.750	115.263	147.622 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	972.21	51.17	1023.38 c.m"
"		Rainfall losses	48.987	3.090	46.692 mm"
"		Runoff depth	32.234	78.131	34.529 mm"
"		Runoff volume	385.84	49.22	435.06 c.m"
"		Runoff coefficient	0.397	0.962	0.425 "
"		Maximum flow	0.152	0.032	0.158 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.158	2.255	4.670	4.670"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.158	2.255	2.255	4.670"
" 40		HYDROGRAPH Combine 1000"			
"	6	Combine "			
"	1000	Node #"			
"		East Watershed Catchment Areas"			
"		Maximum flow	2.255		c.m/sec"
"		Hydrograph volume	11337.545		c.m"
"		0.158	2.255	2.255	2.255"
" 40		HYDROGRAPH Confluence 600"			
"	7	Confluence "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	5.613		c.m/sec"
"		Hydrograph volume	23648.846		c.m"
"		0.158	5.613	2.255	0.000"
" 40		HYDROGRAPH Copy to Outflow"			

"	8	Copy to Outflow"				
"		0.158	5.613	5.613	0.000"	
" 40		HYDROGRAPH	Combine	800"		
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow	10.114	c.m/sec"		
"		Hydrograph volume	43136.867	c.m"		
"		0.158	5.613	5.613	10.114"	
" 40		HYDROGRAPH	Confluence	800"		
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow	10.115	c.m/sec"		
"		Hydrograph volume	43136.867	c.m"		
"		0.158	10.115	5.613	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
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"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_REG.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:43:37 AM"
" 31          TIME PARAMETERS"
"          60.000  Time Step"
"          2880.000  Max. Storm length"
"          7500.000  Max. Hydrograph"
" 32          STORM Historic"
"          5  Historic"
"          2880.000  Duration"
"          48.000  Rainfall intensity values"
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"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.026      2.026      2.026      2.028"
"                  2.026      6.000      4.000      6.000      13.000"
"                  17.000      13.000      23.000      13.000      13.000"
"                  53.000      38.000      13.000"
"          Maximum intensity                    53.000      mm/hr"
"          Total depth                          285.000      mm"
"          6  000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"

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"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.391	0.000	0.000	0.000 c.m/sec"
"		Catchment 1100	Pervious	Impervious	Total Area "
"		Surface Area	3.550	0.110	3.660 hectare"
"		Time of concentration	53.255	9.463	50.903 minutes"
"		Time to Centroid	2761.502	2270.032	2735.103 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	1.0118	0.0313	1.0431 ha-m"
"		Rainfall losses	138.305	15.759	134.628 mm"
"		Runoff depth	146.695	269.241	150.372 mm"
"		Runoff volume	5207.98	295.63	5503.60 c.m"
"		Runoff coefficient	0.515	0.945	0.528 "
"		Maximum flow	0.381	0.014	0.391 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.391	0.391	0.000	0.000"
" 33		CATCHMENT 1300"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1300	Catchment 1300"			
"	35.000	% Impervious"			
"	27.060	Total Area"			
"	600.000	Flow length"			
"	1.500	Overland Slope"			
"	17.589	Pervious Area"			
"	600.000	Pervious length"			
"	1.500	Pervious slope"			
"	9.471	Impervious Area"			
"	600.000	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		2.589	0.391	0.000	0.000 c.m/sec"
"		Catchment 1300	Pervious	Impervious	Total Area "
"		Surface Area	17.589	9.471	27.060 hectare"

"	Time of concentration	105.863	18.811	61.783	minutes"
"	Time to Centroid	2815.631	2299.711	2554.387	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	5.0129	2.6992	7.7121	ha-m"
"	Rainfall losses	137.760	4.502	91.120	mm"
"	Runoff depth	147.240	280.498	193.880	mm"
"	Runoff volume	2.5898	2.6566	5.2464	ha-m"
"	Runoff coefficient	0.517	0.984	0.680	"
"	Maximum flow	1.507	1.092	2.589	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.589	2.980	0.000	0.000"
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.124	2.980	0.000	0.000 c.m/sec"
"	Catchment 4000	Pervious	Impervious	Total Area	"
"	Surface Area	0.715	0.385	1.100	hectare"
"	Time of concentration	15.015	2.668	9.134	minutes"
"	Time to Centroid	2718.577	2255.846	2498.166	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	2037.75	1097.25	3135.00	c.m"
"	Rainfall losses	139.935	39.949	104.940	mm"
"	Runoff depth	145.065	245.051	180.060	mm"
"	Runoff volume	1037.22	943.45	1980.66	c.m"
"	Runoff coefficient	0.509	0.860	0.632	"
"	Maximum flow	0.075	0.049	0.124	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"		0.124	3.084	0.000	0.000"	
" 33		CATCHMENT 1400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1400	Catchment 1400"				
"	5.000	% Impervious"				
"	9.940	Total Area"				
"	174.000	Flow length"				
"	0.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	0.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	0.750	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.026	3.084	0.000	0.000 c.m/sec"	
"		Catchment 1400	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	62.015	11.020	57.507	minutes"
"		Time to Centroid	2770.835	2286.567	2728.027	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	2.6913	0.1416	2.8329	ha-m"
"		Rainfall losses	137.698	13.610	131.494	mm"
"		Runoff depth	147.302	271.390	153.506	mm"
"		Runoff volume	1.3910	0.1349	1.5259	ha-m"
"		Runoff coefficient	0.517	0.952	0.539	"
"		Maximum flow	0.976	0.062	1.026	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.026	4.110	0.000	0.000"	
" 33		CATCHMENT 1500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				

"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			
"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	1.666	4.110	0.000	0.000 c.m/sec"	
"	Catchment 1500	Pervious	Impervious	Total Area	"
"	Surface Area	15.122	0.468	15.590	hectare"
"	Time of concentration	53.388	9.487	51.030	minutes"
"	Time to Centroid	2761.652	2270.285	2735.255	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4.3099	0.1333	4.4432	ha-m"
"	Rainfall losses	138.300	15.713	134.622	mm"
"	Runoff depth	146.700	269.287	150.378	mm"
"	Runoff volume	2.2184	0.1259	2.3444	ha-m"
"	Runoff coefficient	0.515	0.945	0.528	"
"	Maximum flow	1.620	0.059	1.666	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.666	5.776	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	1.666	5.776	5.776	0.000"	
" 40	HYDROGRAPH Combine 600"				
"	6 Combine "				
"	600 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	5.776	c.m/sec"		
"	Hydrograph volume	98650.680	c.m"		
"	1.666	5.776	5.776	5.776"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.666	0.000	5.776	5.776"	
" 33	CATCHMENT 2200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2200 Catchment 2200"				

"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.300 0.000 5.776 5.776 c.m/sec"				
"		Catchment 2200 Pervious Impervious Total Area "				
"		Surface Area 1.859 1.001 2.860 hectare"				
"		Time of concentration 25.270 4.490 15.299 minutes"				
"		Time to Centroid 2731.705 2231.857 2491.850 minutes"				
"		Rainfall depth 285.000 285.000 285.000 mm"				
"		Rainfall volume 5298.15 2852.85 8151.00 c.m"				
"		Rainfall losses 139.057 34.957 102.622 mm"				
"		Runoff depth 145.943 250.043 182.378 mm"				
"		Runoff volume 2713.09 2502.93 5216.02 c.m"				
"		Runoff coefficient 0.512 0.877 0.640 "				
"		Maximum flow 0.198 0.127 0.300 c.m/sec"				
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.300 0.300 5.776 5.776"				
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				

"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.121 0.300 5.776 5.776 c.m/sec"				
"		Catchment 2100 Pervious Impervious Total Area "				
"		Surface Area 0.570 0.570 1.140 hectare"				
"		Time of concentration 33.538 5.960 15.930 minutes"				
"		Time to Centroid 2738.155 2233.898 2416.206 minutes"				
"		Rainfall depth 285.000 285.000 285.000 mm"				
"		Rainfall volume 1624.50 1624.50 3249.00 c.m"				
"		Rainfall losses 139.880 28.723 84.302 mm"				
"		Runoff depth 145.120 256.277 200.698 mm"				
"		Runoff volume 827.18 1460.78 2287.96 c.m"				
"		Runoff coefficient 0.509 0.899 0.704 "				
"		Maximum flow 0.063 0.072 0.121 c.m/sec"				
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.121 0.421 5.776 5.776"				
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				

"	0.804	0.421	5.776	5.776 c.m/sec"	
"	Catchment 2300	Pervious	Impervious	Total Area	"
"	Surface Area	5.148	2.772	7.920	hectare"
"	Time of concentration	34.608	6.150	20.700	minutes"
"	Time to Centroid	2738.756	2234.994	2492.571	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1.4672	0.7900	2.2572	ha-m"
"	Rainfall losses	140.191	27.963	100.911	mm"
"	Runoff depth	144.809	257.037	184.089	mm"
"	Runoff volume	0.7455	0.7125	1.4580	ha-m"
"	Runoff coefficient	0.508	0.902	0.646	"
"	Maximum flow	0.566	0.351	0.804	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "		
"	0.804	1.204	5.776	5.776"

" 33	CATCHMENT 2400"
"	1 Triangular SCS"
"	1 Equal length"
"	2 Horton equation"
"	2400 Catchment 2400"
"	35.000 % Impervious"
"	9.130 Total Area"
"	65.000 Flow length"
"	1.000 Overland Slope"
"	5.934 Pervious Area"
"	65.000 Pervious length"
"	1.000 Pervious slope"
"	3.196 Impervious Area"
"	65.000 Impervious length"
"	1.000 Impervious slope"
"	0.250 Pervious Manning 'n' "
"	125.000 Pervious Max.infiltration"
"	5.000 Pervious Min.infiltration"
"	0.250 Pervious Lag constant (hours)"
"	5.000 Pervious Depression storage"
"	0.015 Impervious Manning 'n' "
"	0.000 Impervious Max.infiltration"
"	0.000 Impervious Min.infiltration"
"	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage"

"	0.927	1.204	5.776	5.776 c.m/sec"	
"	Catchment 2400	Pervious	Impervious	Total Area	"
"	Surface Area	5.934	3.196	9.130	hectare"
"	Time of concentration	31.509	5.599	18.940	minutes"
"	Time to Centroid	2736.849	2231.958	2491.920	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1.6913	0.9107	2.6021	ha-m"
"	Rainfall losses	139.446	30.317	101.251	mm"
"	Runoff depth	145.554	254.683	183.749	mm"
"	Runoff volume	0.8638	0.8138	1.6776	ha-m"

"	Runoff coefficient	0.511	0.894	0.645	"
"	Maximum flow	0.650	0.405	0.927	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.927	2.129	5.776	5.776"	
" 33	CATCHMENT 2450"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2450 Catchment 2450"				
"	15.000 % Impervious"				
"	0.360 Total Area"				
"	40.000 Flow length"				
"	1.000 Overland Slope"				
"	0.306 Pervious Area"				
"	40.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.054 Impervious Area"				
"	40.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.037	2.129	5.776	5.776 c.m/sec"	
"	Catchment 2450	Pervious	Impervious	Total Area	"
"	Surface Area	0.306	0.054	0.360	hectare"
"	Time of concentration	23.546	4.184	19.066	minutes"
"	Time to Centroid	2729.526	2233.218	2614.694	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	872.10	153.90	1026.00	c.m"
"	Rainfall losses	139.157	36.222	123.717	mm"
"	Runoff depth	145.843	248.778	161.283	mm"
"	Runoff volume	446.28	134.34	580.62	c.m"
"	Runoff coefficient	0.512	0.873	0.566	"
"	Maximum flow	0.032	0.007	0.037	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.037	2.166	5.776	5.776"	
" 33	CATCHMENT 2500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2500 Catchment 2500"				

"	0.000	% Impervious"
"	12.060	Total Area"
"	287.000	Flow length"
"	1.000	Overland Slope"
"	12.060	Pervious Area"
"	287.000	Pervious length"
"	1.000	Pervious slope"
"	0.000	Impervious Area"
"	287.000	Impervious length"
"	1.000	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"	1.151	2.166 5.776 5.776 c.m/sec"
"	Catchment 2500	Pervious Impervious Total Area "
"	Surface Area	12.060 0.000 12.060 hectare"
"	Time of concentration	76.809 13.649 76.809 minutes"
"	Time to Centroid	2785.352 2291.947 2785.351 minutes"
"	Rainfall depth	285.000 285.000 285.000 mm"
"	Rainfall volume	3.4371 0.0000 3.4371 ha-m"
"	Rainfall losses	138.909 7.790 138.909 mm"
"	Runoff depth	146.091 277.210 146.091 mm"
"	Runoff volume	1.7619 0.0000 1.7619 ha-m"
"	Runoff coefficient	0.513 0.000 0.513 "
"	Maximum flow	1.151 0.000 1.151 c.m/sec"
" 40	HYDROGRAPH Add Runoff "	
"	4 Add Runoff "	
"	1.151 3.316 5.776 5.776"	
" 33	CATCHMENT 2600"	
"	1 Triangular SCS"	
"	1 Equal length"	
"	2 Horton equation"	
"	2600 Catchment 2600"	
"	0.000 % Impervious"	
"	14.960 Total Area"	
"	307.000 Flow length"	
"	1.000 Overland Slope"	
"	14.960 Pervious Area"	
"	307.000 Pervious length"	
"	1.000 Pervious slope"	
"	0.000 Impervious Area"	
"	307.000 Impervious length"	
"	1.000 Impervious slope"	

"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.406	3.316	5.776	5.776 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	79.977	14.212	79.977 minutes"
"		Time to Centroid	2789.071	2291.762	2789.070 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	4.2636	0.0000	4.2636 ha-m"
"		Rainfall losses	139.034	6.693	139.034 mm"
"		Runoff depth	145.966	278.307	145.966 mm"
"		Runoff volume	2.1836	0.0000	2.1837 ha-m"
"		Runoff coefficient	0.512	0.000	0.512 "
"		Maximum flow	1.406	0.000	1.406 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		1.406	4.722	5.776	5.776"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		1.406	4.722	4.722	5.776"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	4.722		c.m/sec"
"		Hydrograph volume	78895.852		c.m"
"		1.406	4.722	4.722	4.722"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		1.406	0.000	4.722	4.722"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			

"	0.717	Impervious Area"				
"	100.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.212	0.000	4.722	4.722 c.m/sec"	
"		Catchment 3100	Pervious	Impervious	Total Area	"
"		Surface Area	1.332	0.717	2.050	hectare"
"		Time of concentration	50.233	8.926	29.719	minutes"
"		Time to Centroid	2757.880	2264.252	2512.726	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	3797.63	2044.87	5842.50	c.m"
"		Rainfall losses	138.715	16.956	96.099	mm"
"		Runoff depth	146.285	268.044	188.901	mm"
"		Runoff volume	1949.25	1923.21	3872.47	c.m"
"		Runoff coefficient	0.513	0.941	0.663	"
"		Maximum flow	0.144	0.090	0.212	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.212	0.212	4.722	4.722"	
" 33		CATCHMENT 3000"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3000	Catchment 3000"				
"	5.000	% Impervious"				
"	20.360	Total Area"				
"	323.000	Flow length"				
"	1.000	Overland Slope"				
"	19.342	Pervious Area"				
"	323.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.018	Impervious Area"				
"	323.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				

"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.918	0.212	4.722	4.722 c.m/sec"	
"		Catchment 3000	Pervious	Impervious	Total Area	"
"		Surface Area	19.342	1.018	20.360	hectare"
"		Time of concentration	82.453	14.651	76.268	minutes"
"		Time to Centroid	2792.146	2291.855	2746.514	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	5.5125	0.2901	5.8026	ha-m"
"		Rainfall losses	138.693	6.005	132.058	mm"
"		Runoff depth	146.307	278.995	152.942	mm"
"		Runoff volume	2.8299	0.2840	3.1139	ha-m"
"		Runoff coefficient	0.513	0.979	0.537	"
"		Maximum flow	1.808	0.123	1.918	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.918	2.131	4.722	4.722"	
" 33		CATCHMENT 3200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3200	Catchment 3200"				
"	35.000	% Impervious"				
"	0.840	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.085	2.131	4.722	4.722 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	33.142	5.889	19.870	minutes"
"		Time to Centroid	2737.929	2233.505	2492.287	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	1556.10	837.90	2394.00	c.m"

"	Rainfall losses	139.790	29.018	101.020	mm"
"	Runoff depth	145.210	255.982	183.980	mm"
"	Runoff volume	792.85	752.59	1545.44	c.m"
"	Runoff coefficient	0.510	0.898	0.646	"
"	Maximum flow	0.060	0.037	0.085	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.085 2.216 4.722 4.722"				
" 33	CATCHMENT 3300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3300 Catchment 3300"				
"	35.000 % Impervious"				
"	5.060 Total Area"				
"	89.000 Flow length"				
"	1.000 Overland Slope"				
"	3.289 Pervious Area"				
"	89.000 Pervious length"				
"	1.000 Pervious slope"				
"	1.771 Impervious Area"				
"	89.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.516 2.216 4.722 4.722 c.m/sec"				
"	Catchment 3300 Pervious Impervious Total Area "				
"	Surface Area 3.289 1.771 5.060 hectare"				
"	Time of concentration 38.047 6.761 22.590 minutes"				
"	Time to Centroid 2740.901 2241.050 2493.947 minutes"				
"	Rainfall depth 285.000 285.000 285.000 mm"				
"	Rainfall volume 0.9374 0.5047 1.4421 ha-m"				
"	Rainfall losses 141.553 24.859 100.710 mm"				
"	Runoff depth 143.447 260.141 184.290 mm"				
"	Runoff volume 4717.97 4607.09 9325.06 c.m"				
"	Runoff coefficient 0.503 0.913 0.647 "				
"	Maximum flow 0.361 0.224 0.516 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.516 2.732 4.722 4.722"				
" 33	CATCHMENT 3400"				
"	1 Triangular SCS"				

"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.137	2.732	4.722	4.722 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"
"		Surface Area	1.197	0.063	1.260	hectare"
"		Time of concentration	36.534	6.492	33.939	minutes"
"		Time to Centroid	2739.813	2238.163	2696.477	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	3411.45	179.55	3591.00	c.m"
"		Rainfall losses	140.971	26.244	135.234	mm"
"		Runoff depth	144.029	258.756	149.766	mm"
"		Runoff volume	1724.03	163.02	1887.05	c.m"
"		Runoff coefficient	0.505	0.908	0.525	"
"		Maximum flow	0.132	0.008	0.137	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.137	2.869	4.722	4.722"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.137	2.869	2.869	4.722"	
" 40		HYDROGRAPH Combine	1000"			
"	6	Combine "				
"	1000	Node #"				
"		East Watershed Catchment Areas"				
"		Maximum flow	2.869	c.m/sec"		
"		Hydrograph volume	47768.934	c.m"		
"		0.137	2.869	2.869	2.869"	
" 40		HYDROGRAPH Confluence	600"			
"	7	Confluence "				

"	600	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	5.776		c.m/sec"	
"		Hydrograph volume	98650.672		c.m"	
"		0.137	5.776	2.869	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.137	5.776	5.776	0.000"	
" 40		HYDROGRAPH Combine	800"			
"	6	Combine "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow	10.498		c.m/sec"	
"		Hydrograph volume	177546.500		c.m"	
"		0.137	5.776	5.776	10.498"	
" 40		HYDROGRAPH Confluence	800"			
"	7	Confluence "				
"	800	Node #"				
"		Central Watershed Catchment Areas"				
"		Maximum flow	10.498		c.m/sec"	
"		Hydrograph volume	177546.516		c.m"	
"		0.137	10.498	5.776	0.000"	
" 38		START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    UnconPost_100yrSCS.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 9:50:19 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          1440.000  Max. Storm length"
"          12000.000  Max. Hydrograph"
" 32          STORM Mass Curve"
"          3  Mass Curve"
"          81.221  Rainfall depth"
"          1440.000  Duration"
"          48  C:\Program Files (x86)\MIDUSS\SCS_Type2_24hr.mrd  SCS 24 hour Type
II storm"
"          Maximum intensity                    99.415  mm/hr"
"          Total depth                          81.221  mm"
"          7  1000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.235  0.000  0.000  0.000 c.m/sec"

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"	Catchment 1100	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	41.808	7.358	37.843	minutes"
"	Time to Centroid	765.211	748.954	763.340	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2883.51	89.18	2972.69	c.m"
"	Rainfall losses	62.359	1.906	60.546	mm"
"	Runoff depth	18.862	79.315	20.675	mm"
"	Runoff volume	669.63	87.09	756.71	c.m"
"	Runoff coefficient	0.232	0.977	0.255	"
"	Maximum flow	0.232	0.031	0.235	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.235	0.235	0.000	0.000"

" 33 CATCHMENT 1300"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	1300	Catchment 1300"
"	35.000	% Impervious"
"	27.060	Total Area"
"	600.000	Flow length"
"	1.500	Overland Slope"
"	17.589	Pervious Area"
"	600.000	Pervious length"
"	1.500	Pervious slope"
"	9.471	Impervious Area"
"	600.000	Impervious length"
"	1.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		2.446	0.235	0.000	0.000 c.m/sec"
"	Catchment 1300	Pervious	Impervious	Total Area	"
"	Surface Area	17.589	9.471	27.060	hectare"
"	Time of concentration	83.107	14.627	35.542	minutes"
"	Time to Centroid	809.048	765.241	778.620	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.4286	0.7692	2.1978	ha-m"
"	Rainfall losses	62.355	1.539	41.069	mm"
"	Runoff depth	18.866	79.682	40.152	mm"
"	Runoff volume	0.3318	0.7547	1.0865	ha-m"
"	Runoff coefficient	0.232	0.981	0.494	"

"	Maximum flow	0.627	2.322	2.446	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	2.446 2.562 0.000 0.000"				
" 33	CATCHMENT 4000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	4000 Catchment 4000"				
"	35.000 % Impervious"				
"	1.100 Total Area"				
"	50.000 Flow length"				
"	7.000 Overland Slope"				
"	0.715 Pervious Area"				
"	50.000 Pervious length"				
"	7.000 Pervious slope"				
"	0.385 Impervious Area"				
"	50.000 Impervious length"				
"	7.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.185 2.562 0.000 0.000 c.m/sec"				
"	Catchment 4000 Pervious Impervious Total Area "				
"	Surface Area 0.715 0.385 1.100 hectare"				
"	Time of concentration 11.788 2.075 5.057 minutes"				
"	Time to Centroid 733.334 736.860 735.777 minutes"				
"	Rainfall depth 81.221 81.221 81.221 mm"				
"	Rainfall volume 580.73 312.70 893.43 c.m"				
"	Rainfall losses 62.373 2.213 41.317 mm"				
"	Runoff depth 18.848 79.008 39.904 mm"				
"	Runoff volume 134.76 304.18 438.95 c.m"				
"	Runoff coefficient 0.232 0.973 0.491 "				
"	Maximum flow 0.118 0.106 0.185 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.185 2.726 0.000 0.000"				
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				

"	9.940	Total Area"				
"	174.000	Flow length"				
"	0.750	Overland Slope"				
"	9.443	Pervious Area"				
"	174.000	Pervious length"				
"	0.750	Pervious slope"				
"	0.497	Impervious Area"				
"	174.000	Impervious length"				
"	0.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.557	2.726	0.000	0.000 c.m/sec"	
"		Catchment 1400	Pervious	Impervious	Total Area	"
"		Surface Area	9.443	0.497	9.940	hectare"
"		Time of concentration	48.684	8.568	41.390	minutes"
"		Time to Centroid	772.522	751.537	768.707	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	7669.70	403.67	8073.37	c.m"
"		Rainfall losses	62.355	1.557	59.315	mm"
"		Runoff depth	18.866	79.664	21.906	mm"
"		Runoff volume	1781.55	395.93	2177.48	c.m"
"		Runoff coefficient	0.232	0.981	0.270	"
"		Maximum flow	0.542	0.138	0.557	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.557	3.031	0.000	0.000"	
" 33		CATCHMENT 1500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				

"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.999	3.031	0.000	0.000 c.m/sec"	
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	41.912	7.377	37.937	minutes"
"		Time to Centroid	765.323	748.991	763.443	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.2282	0.0380	1.2662	ha-m"
"		Rainfall losses	62.358	1.895	60.544	mm"
"		Runoff depth	18.863	79.326	20.677	mm"
"		Runoff volume	2852.51	371.01	3223.52	c.m"
"		Runoff coefficient	0.232	0.977	0.255	"
"		Maximum flow	0.986	0.133	0.999	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.999	3.525	0.000	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.999	3.525	3.525	0.000"	
" 40		HYDROGRAPH Combine 600"				
"	6	Combine "				
"	600	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	3.525	c.m/sec"		
"		Hydrograph volume	17461.691	c.m"		
"		0.999	3.525	3.525	3.525"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.999	0.000	3.525	3.525"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.001	Impervious Area"				

"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.475	0.000	3.525	3.525 c.m/sec"	
"		Catchment 2200	Pervious	Impervious	Total Area	"
"		Surface Area	1.859	1.001	2.860	hectare"
"		Time of concentration	19.279	3.492	9.864	minutes"
"		Time to Centroid	737.817	740.253	739.270	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1509.90	813.02	2322.92	c.m"
"		Rainfall losses	52.756	3.124	35.385	mm"
"		Runoff depth	28.465	78.097	45.836	mm"
"		Runoff volume	529.17	781.75	1310.92	c.m"
"		Runoff coefficient	0.350	0.962	0.564	"
"		Maximum flow	0.319	0.277	0.475	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.475	0.475	3.525	3.525"	
" 33		CATCHMENT 2100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2100	Catchment 2100"				
"	50.000	% Impervious"				
"	1.140	Total Area"				
"	51.000	Flow length"				
"	0.500	Overland Slope"				
"	0.570	Pervious Area"				
"	51.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.570	Impervious Area"				
"	51.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				

"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.177	0.475	3.525	3.525 c.m/sec"	
"		Catchment 2100	Pervious	Impervious	Total Area	"
"		Surface Area	0.570	0.570	1.140	hectare"
"		Time of concentration	26.328	4.634	8.796	minutes"
"		Time to Centroid	748.778	742.727	743.887	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	462.96	462.96	925.92	c.m"
"		Rainfall losses	62.365	1.796	32.080	mm"
"		Runoff depth	18.856	79.425	49.141	mm"
"		Runoff volume	107.48	452.73	560.21	c.m"
"		Runoff coefficient	0.232	0.978	0.605	"
"		Maximum flow	0.055	0.160	0.177	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.177	0.651	3.525	3.525"	
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.927	0.651	3.525	3.525 c.m/sec"	
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	27.168	4.782	11.628	minutes"
"		Time to Centroid	749.675	743.051	745.076	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	4181.26	2251.45	6432.70	c.m"
"		Rainfall losses	62.356	1.695	41.125	mm"

"	Runoff depth	18.865	79.526	40.096	mm"
"	Runoff volume	971.15	2204.46	3175.61	c.m"
"	Runoff coefficient	0.232	0.979	0.494	"
"	Maximum flow	0.482	0.782	0.927	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.927 1.579 3.525 3.525"				
" 33	CATCHMENT 2400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2400 Catchment 2400"				
"	35.000 % Impervious"				
"	9.130 Total Area"				
"	65.000 Flow length"				
"	1.000 Overland Slope"				
"	5.934 Pervious Area"				
"	65.000 Pervious length"				
"	1.000 Pervious slope"				
"	3.196 Impervious Area"				
"	65.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.079 1.579 3.525 3.525 c.m/sec"				
"	Catchment 2400 Pervious Impervious Total Area "				
"	Surface Area 5.934 3.196 9.130 hectare"				
"	Time of concentration 24.736 4.353 10.604 minutes"				
"	Time to Centroid 747.100 742.105 743.637 minutes"				
"	Rainfall depth 81.221 81.221 81.221 mm"				
"	Rainfall volume 4820.06 2595.42 7415.48 c.m"				
"	Rainfall losses 62.378 2.107 41.283 mm"				
"	Runoff depth 18.843 79.114 39.938 mm"				
"	Runoff volume 1118.22 2528.09 3646.31 c.m"				
"	Runoff coefficient 0.232 0.974 0.492 "				
"	Maximum flow 0.612 0.882 1.079 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.079 2.658 3.525 3.525"				
" 33	CATCHMENT 2450"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	2450	Catchment 2450"				
"	15.000	% Impervious"				
"	0.360	Total Area"				
"	40.000	Flow length"				
"	1.000	Overland Slope"				
"	0.306	Pervious Area"				
"	40.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.054	Impervious Area"				
"	40.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.040	2.658	3.525	3.525 c.m/sec"	
"		Catchment 2450	Pervious	Impervious	Total Area	"
"		Surface Area	0.306	0.054	0.360	hectare"
"		Time of concentration	18.485	3.253	12.026	minutes"
"		Time to Centroid	740.434	739.852	740.189	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	248.54	43.86	292.40	c.m"
"		Rainfall losses	62.394	2.684	53.437	mm"
"		Runoff depth	18.827	78.537	27.784	mm"
"		Runoff volume	57.61	42.41	100.02	c.m"
"		Runoff coefficient	0.232	0.967	0.342	"
"		Maximum flow	0.038	0.015	0.040	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.040	2.689	3.525	3.525"	
" 33		CATCHMENT 2500"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2500	Catchment 2500"				
"	0.000	% Impervious"				
"	12.060	Total Area"				
"	287.000	Flow length"				
"	1.000	Overland Slope"				
"	12.060	Pervious Area"				
"	287.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				

"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.572	2.689	3.525	3.525 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	60.298	10.612	60.298	minutes"
"		Time to Centroid	784.832	756.193	784.832	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	9795.24	0.01	9795.25	c.m"
"		Rainfall losses	62.358	1.684	62.358	mm"
"		Runoff depth	18.863	79.537	18.863	mm"
"		Runoff volume	2274.84	0.01	2274.85	c.m"
"		Runoff coefficient	0.232	0.000	0.232	"
"		Maximum flow	0.572	0.000	0.572	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.572	2.769	3.525	3.525"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				

"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.679	2.769	3.525	3.525 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	62.785	11.050	62.785 minutes"
"		Time to Centroid	787.465	757.147	787.466 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1.2151	0.0000	1.2151 ha-m"
"		Rainfall losses	62.361	1.589	62.361 mm"
"		Runoff depth	18.860	79.632	18.860 mm"
"		Runoff volume	2821.38	0.01	2821.39 c.m"
"		Runoff coefficient	0.232	0.000	0.232 "
"		Maximum flow	0.679	0.000	0.679 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.679	2.860	3.525	3.525"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.679	2.860	2.860	3.525"
" 40		HYDROGRAPH Combine 800"			
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	2.860		c.m/sec"
"		Hydrograph volume	13889.303		c.m"
"		0.679	2.860	2.860	2.860"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.679	0.000	2.860	2.860"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			

"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.225	0.000	2.860	2.860 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	39.435	6.941	16.927 minutes"
"		Time to Centroid	762.706	748.058	752.560 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1082.27	582.76	1665.03 c.m"
"		Rainfall losses	62.355	2.255	41.320 mm"
"		Runoff depth	18.866	78.966	39.901 mm"
"		Runoff volume	251.39	566.58	817.97 c.m"
"		Runoff coefficient	0.232	0.972	0.491 "
"		Maximum flow	0.091	0.205	0.225 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.225	0.225	2.860	2.860"
" 33		CATCHMENT 3000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.886	0.225	2.860	2.860 c.m/sec"
"		Catchment 3000	Pervious	Impervious	Total Area "
"		Surface Area	19.342	1.018	20.360 hectare"
"		Time of concentration	64.728	11.392	55.028 minutes"
"		Time to Centroid	789.543	757.896	783.786 minutes"

"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.5710	0.0827	1.6537	ha-m"
"	Rainfall losses	62.356	1.540	59.315	mm"
"	Runoff depth	18.865	79.681	21.906	mm"
"	Runoff volume	3648.86	811.15	4460.00	c.m"
"	Runoff coefficient	0.232	0.981	0.270	"
"	Maximum flow	0.857	0.264	0.886	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.886 0.966 2.860 2.860"				
" 33	CATCHMENT 3200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3200 Catchment 3200"				
"	35.000 % Impervious"				
"	0.840 Total Area"				
"	50.000 Flow length"				
"	0.500 Overland Slope"				
"	0.546 Pervious Area"				
"	50.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.294 Impervious Area"				
"	50.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.099 0.966 2.860 2.860 c.m/sec"				
"	Catchment 3200 Pervious Impervious Total Area "				
"	Surface Area 0.546 0.294 0.840 hectare"				
"	Time of concentration 26.017 4.579 11.138 minutes"				
"	Time to Centroid 748.436 742.607 744.388 minutes"				
"	Rainfall depth 81.221 81.221 81.221 mm"				
"	Rainfall volume 443.47 238.79 682.26 c.m"				
"	Rainfall losses 62.378 1.832 41.187 mm"				
"	Runoff depth 18.843 79.389 40.034 mm"				
"	Runoff volume 102.88 233.40 336.29 c.m"				
"	Runoff coefficient 0.232 0.977 0.493 "				
"	Maximum flow 0.053 0.082 0.099 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.099 0.993 2.860 2.860"				

```

" 33      CATCHMENT 3300"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          3300 Catchment 3300"
"          35.000 % Impervious"
"          5.060 Total Area"
"          89.000 Flow length"
"          1.000 Overland Slope"
"          3.289 Pervious Area"
"          89.000 Pervious length"
"          1.000 Pervious slope"
"          1.771 Impervious Area"
"          89.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.584      0.993      2.860      2.860 c.m/sec"
"          Catchment 3300      Pervious      Impervious      Total Area  "
"          Surface Area      3.289      1.771      5.060      hectare"
"          Time of concentration 29.868      5.257      12.781      minutes"
"          Time to Centroid 752.544      744.064      746.657      minutes"
"          Rainfall depth 81.221      81.221      81.221      mm"
"          Rainfall volume 2671.36      1438.42      4109.78      c.m"
"          Rainfall losses 62.357      1.661      41.113      mm"
"          Runoff depth 18.864      79.560      40.108      mm"
"          Runoff volume 620.45      1409.01      2029.46      c.m"
"          Runoff coefficient 0.232      0.980      0.494      "
"          Maximum flow 0.280      0.505      0.584      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"              0.584      1.278      2.860      2.860"
" 33      CATCHMENT 3400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          3400 Catchment 3400"
"          5.000 % Impervious"
"          1.260 Total Area"
"          93.000 Flow length"
"          1.250 Overland Slope"
"          1.197 Pervious Area"

```

"	93.000	Pervious length"			
"	1.250	Pervious slope"			
"	0.063	Impervious Area"			
"	93.000	Impervious length"			
"	1.250	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.108	1.278	2.860	2.860 c.m/sec"
"		Catchment 3400	Pervious	Impervious	Total Area "
"		Surface Area	1.197	0.063	1.260 hectare"
"		Time of concentration	28.681	5.048	24.380 minutes"
"		Time to Centroid	751.251	743.590	749.857 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	972.22	51.17	1023.38 c.m"
"		Rainfall losses	62.394	1.632	59.356 mm"
"		Runoff depth	18.827	79.589	21.865 mm"
"		Runoff volume	225.36	50.14	275.50 c.m"
"		Runoff coefficient	0.232	0.980	0.269 "
"		Maximum flow	0.106	0.018	0.108 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.108	1.350	2.860	2.860"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.108	1.350	1.350	2.860"
" 40		HYDROGRAPH Combine 1000"			
"	6	Combine "			
"	1000	Node #"			
"		East Watershed Catchment Areas"			
"		Maximum flow	1.350		c.m/sec"
"		Hydrograph volume	7919.222		c.m"
"		0.108	1.350	1.350	1.350"
" 40		HYDROGRAPH Confluence 600"			
"	7	Confluence "			
"	600	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	3.525		c.m/sec"
"		Hydrograph volume	17461.689		c.m"
"		0.108	3.525	1.350	0.000"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.108	3.525	3.525	0.000"

" 40	HYDROGRAPH	Combine	800"		
"	6	Combine "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	6.239	c.m/sec"	
"		Hydrograph volume	31350.988	c.m"	
"		0.108	3.525	3.525	6.239"
" 40	HYDROGRAPH	Confluence	800"		
"	7	Confluence "			
"	800	Node #"			
"		Central Watershed Catchment Areas"			
"		Maximum flow	6.239	c.m/sec"	
"		Hydrograph volume	31350.988	c.m"	
"		0.108	6.239	3.525	0.000"
" 38	START/RE-START TOTALS	800"			
"	3	Runoff Totals on EXIT"			
"		Total Catchment area	135.350	hectare"	
"		Total Impervious area	22.387	hectare"	
"		Total % impervious	16.540"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\"
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_25mm.out"
"          Licensee name:                      "
"          Company                      "
"          Date & Time last used:                10/29/2024 at 9:02:51 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          5760.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          367.000  Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                72.993  mm/hr"
"          Total depth                24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.017	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	---	8.326	8.326	minutes"
"		Time to Centroid	0.000	70.915	70.915	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	887.38	27.44	914.83	c.m"
"		Rainfall losses	24.995	1.547	24.292	mm"
"		Runoff depth	0.000	23.449	0.703	mm"
"		Runoff volume	0.00	25.75	25.75	c.m"
"		Runoff coefficient	0.000	0.938	0.028	"
"		Maximum flow	0.000	0.017	0.017	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.017	0.017	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.996	0.017	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	---	16.551	16.551	minutes"
"		Time to Centroid	0.000	81.617	81.617	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	4396.43	2367.31	6763.74	c.m"
"		Rainfall losses	24.995	1.560	16.793	mm"
"		Runoff depth	0.000	23.435	8.202	mm"

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"          Runoff volume          0.00      2219.52    2219.52    c.m"
"          Runoff coefficient      0.000      0.938      0.328      "
"          Maximum flow            0.000      0.996      0.996      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"                  0.996      1.009      0.000      0.000"
" 81      ADD COMMENT=====
"          1      Lines of comment"
"                  Marsville South Subdivision Stormwater Management Facility"
" 64      SHOW TABLE"
"          2      Flow hydrograph"
"          4      Inflow Hydrograph"
"                  Maximum flow          1.009      c.m/sec"
"                  Hydrograph volume      2245.265    c.m"
" 54      POND DESIGN"
"          1.009    Current peak flow      c.m/sec"
"          0.200    Target outflow      c.m/sec"
"          2245.3    Hydrograph volume      c.m"
"          24.      Number of stages"
"          484.900    Minimum water level      metre"
"          487.200    Maximum water level      metre"
"          484.900    Starting water level      metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge      Volume"
"          484.900      0.000      0.000"
"          485.000      0.01200      642.900"
"          485.100      0.02300      1316.600"
"          485.200      0.1190      2021.300"
"          485.300      0.3140      2757.200"
"          485.400      0.3140      3524.300"
"          485.500      0.3170      4322.900"
"          485.600      0.3170      5153.000"
"          485.700      0.3210      6014.900"
"          485.800      0.3240      6908.700"
"          485.900      0.3240      7834.500"
"          486.000      0.3270      8792.400"
"          486.100      0.3300      9782.700"
"          486.200      0.3300      10805.50"
"          486.300      0.3330      11860.90"
"          486.400      0.3330      12949.00"
"          486.500      0.3360      14070.10"
"          486.600      0.3390      15224.30"
"          486.700      0.3390      16411.70"
"          486.800      0.3420      17632.50"
"          486.900      0.3450      18886.90"
"          487.000      0.3450      20174.90"
"          487.100      1.389      21496.80"
"          487.200      3.328      22852.30"
"          Peak outflow          0.091      c.m/sec"
"          Maximum level          485.171      metre"

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"           Maximum storage           1814.841    c.m"
"           Centroidal lag             13.291    hours"
"           0.996    1.009    0.091    0.000 c.m/sec"
" 40    HYDROGRAPH Next link "
"           5    Next link "
"           0.996    0.091    0.091    0.000"
" 56    DIVERSION"
"           1300    Node number"
"           0.345    Overflow threshold"
"           1.000    Required diverted fraction"
"           0    Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow        0.000    c.m/sec"
"           Volume of diverted flow      0.000    c.m"
"           DIV01300.0025hyd"
"           Overflow at the South Pond"
"           0.996    0.091    0.091    0.000 c.m/sec"
" 40    HYDROGRAPH Next link "
"           5    Next link "
"           0.996    0.091    0.091    0.000"
" 81    ADD COMMENT=====
"           1    Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
" 51    PIPE DESIGN"
"           0.091    Current peak flow    c.m/sec"
"           0.013    Manning 'n'"
"           0.525    Diameter    metre"
"           0.500    Gradient    %"
"           Depth of flow                0.197    metre"
"           Velocity                    1.227    m/sec"
"           Pipe capacity                0.304    c.m/sec"
"           Critical depth                0.199    metre"
" 53    ROUTE    Pipe Route 546"
"           546.00    Pipe Route 546 Reach length    ( metre)"
"           0.460    X-factor <= 0.5"
"           166.918    K-lag    ( seconds)"
"           0.000    Default(0) or user spec.(1) values used"
"           0.500    X-factor <= 0.5"
"           30.000    K-lag    ( seconds)"
"           0.500    Beta weighting factor"
"           300.000    Routing time step    ( seconds)"
"           2    No. of sub-reaches"
"           Peak outflow                0.091    c.m/sec"
"           0.996    0.091    0.091    0.000 c.m/sec"
" 40    HYDROGRAPH Next link "
"           5    Next link "
"           0.996    0.091    0.091    0.000"
" 40    HYDROGRAPH Copy to Outflow"
"           8    Copy to Outflow"
"           0.996    0.091    0.091    0.000"
" 40    HYDROGRAPH    Combine    5000"

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"          6   Combine "
"      5000   Node #"
"          Closed Pipe"
"          Maximum flow          0.091   c.m/sec"
"          Hydrograph volume      2242.471   c.m"
"              0.996   0.091   0.091   0.091"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.996   0.000   0.091   0.091"
" 33      CATCHMENT 4000"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      4000   Catchment 4000"
"      35.000 % Impervious"
"          1.100 Total Area"
"      50.000 Flow length"
"          7.000 Overland Slope"
"          0.715 Pervious Area"
"      50.000 Pervious length"
"          7.000 Pervious slope"
"          0.385 Impervious Area"
"      50.000 Impervious length"
"          7.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.061   0.000   0.091   0.091 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration      ---      2.348      2.348      minutes"
"          Time to Centroid      0.000      62.917      62.917      minutes"
"          Rainfall depth      24.995      24.995      24.995      mm"
"          Rainfall volume      178.72      96.23      274.95      c.m"
"          Rainfall losses      24.995      1.910      16.915      mm"
"          Runoff depth      0.000      23.086      8.080      mm"
"          Runoff volume      0.00      88.88      88.88      c.m"
"          Runoff coefficient      0.000      0.924      0.323      "
"          Maximum flow      0.000      0.061      0.061      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"              0.061   0.061   0.091   0.091"
" 40      HYDROGRAPH Copy to Outflow"

```

"	8	Copy to Outflow"				
"		0.061	0.061	0.061	0.091"	
" 40		HYDROGRAPH Combine	5001"			
"	6	Combine "				
"	5001	Node #"				
"		To Wetland South of Site"				
"		Maximum flow	0.061	c.m/sec"		
"		Hydrograph volume	88.880	c.m"		
"		0.061	0.061	0.061	0.061"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.061	0.000	0.061	0.061"	
" 47		FILEI_0 Read/Open DIV01300.0025hyd"				
"	1	1=read/open; 2=write/save"				
"	2	1=rainfall; 2=hydrograph"				
"	1	1=runoff; 2=inflow; 3=outflow; 4=junction"				
"		DIV01300.0025hyd"				
"		Overflow at the South Pond"				
"		Total volume	0.000	c.m"		
"		Maximum flow	0.000	c.m/sec"		
"		0.000	0.000	0.061	0.061 c.m/sec"	
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.061	0.061"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.157	0.000	0.061	0.061 c.m/sec"	

"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	30.965	3.951	13.753	minutes"
"	Time to Centroid	95.629	65.181	76.229	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	464.66	250.20	714.87	c.m"
"	Rainfall losses	17.901	1.861	12.287	mm"
"	Runoff depth	7.095	23.135	12.709	mm"
"	Runoff volume	131.89	231.58	363.47	c.m"
"	Runoff coefficient	0.284	0.926	0.508	"
"	Maximum flow	0.045	0.151	0.157	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.157	0.157	0.061	0.061"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.088	0.157	0.061	0.061 c.m/sec"
---	--	-------	-------	-------	----------------

"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	---	5.243	5.243	minutes"
"	Time to Centroid	0.000	66.843	66.843	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	142.47	142.47	284.95	c.m"
"	Rainfall losses	24.995	1.636	13.316	mm"
"	Runoff depth	0.000	23.360	11.680	mm"
"	Runoff volume	0.00	133.15	133.15	c.m"
"	Runoff coefficient	0.000	0.935	0.467	"

"	Maximum flow	0.000	0.088	0.088	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.088 0.245 0.061 0.061"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.245	c.m/sec"		
"	Hydrograph volume	496.619	c.m"		
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.427 0.245 0.061 0.061 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration --- 5.411 5.411 minutes"				
"	Time to Centroid 0.000 67.070 67.070 minutes"				
"	Rainfall depth 24.995 24.995 24.995 mm"				
"	Rainfall volume 1286.76 692.87 1979.63 c.m"				
"	Rainfall losses 24.995 1.608 16.810 mm"				
"	Runoff depth 0.000 23.388 8.186 mm"				
"	Runoff volume 0.00 648.30 648.30 c.m"				
"	Runoff coefficient 0.000 0.936 0.327 "				
"	Maximum flow 0.000 0.427 0.427 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

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"          4   Add Runoff "
"              0.427      0.672      0.061      0.061"
" 81      ADD COMMENT=====
"          1   Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"              Maximum flow              0.672      c.m/sec"
"              Hydrograph volume        1144.922      c.m"
" 52      CHANNEL DESIGN"
"          0.672   Current peak flow      c.m/sec"
"          0.040   Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500   Basewidth      metre"
"          3.000   Left bank slope"
"          3.000   Right bank slope"
"          1.000   Channel depth      metre"
"          1.500   Gradient      %"
"              Depth of flow              0.277      metre"
"              Velocity                  1.042      m/sec"
"              Channel capacity          9.529      c.m/sec"
"              Critical depth            0.232      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.480      X-factor <= 0.5"
"          174.232      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.500      Beta weighting factor"
"          150.000      Routing time step      ( seconds)"
"          1   No. of sub-reaches"
"              Peak outflow              0.584      c.m/sec"
"                  0.427      0.672      0.584      0.061 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5   Next link "
"              0.427      0.584      0.584      0.061"
" 33      CATCHMENT 2400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2400   Catchment 2400"
"          35.000   % Impervious"
"          9.130   Total Area"
"          65.000   Flow length"
"          1.000   Overland Slope"
"          5.934   Pervious Area"
"          65.000   Pervious length"
"          1.000   Pervious slope"

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"      3.196  Impervious Area"
"      65.000 Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.493      0.584      0.584      0.061 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration      ---      4.926      4.926      minutes"
"      Time to Centroid      0.000      66.447      66.447      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      1483.35      798.73      2282.07      c.m"
"      Rainfall losses      24.995      1.678      16.834      mm"
"      Runoff depth      0.000      23.317      8.161      mm"
"      Runoff volume      0.00      745.11      745.11      c.m"
"      Runoff coefficient      0.000      0.933      0.327      "
"      Maximum flow      0.000      0.493      0.493      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.493      1.077      0.584      0.061"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      1.077      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"    1890.0      Hydrograph volume      c.m"
"      28.      Number of stages"
"    482.350      Minimum water level      metre"
"    485.200      Maximum water level      metre"
"    482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"    482.350      0.000      0.000"
"    482.400      0.00300      105.100"
"    482.500      0.00600      324.300"
"    482.600      0.02300      555.900"
"    482.700      0.03300      799.900"
"    482.800      0.04000      1056.500"
"    482.900      0.08700      1325.900"
"    483.000      0.2130      1608.200"
"    483.100      0.5120      1903.600"

```

"	483.200	0.6560	2212.100"	
"	483.300	0.6620	2534.000"	
"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.129	c.m/sec"	
"	Maximum level	482.934	metre"	
"	Maximum storage	1420.750	c.m"	
"	Centroidal lag	8.054	hours"	
"	0.493	1.077	0.129	0.061 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	0.493	0.129	0.129	0.061"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.0025hyd"			
"	Major flow at 2400"			
"	0.493	0.129	0.129	0.061 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	0.493	0.129	0.129	0.061"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	0.493	0.129	0.129	0.061"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.129	c.m/sec"		
"	Hydrograph volume	1889.906	c.m"		
"	0.493	0.129	0.129	0.129"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.493	0.000	0.129	0.129"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.064	0.000	0.129	0.129 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	---	9.695	9.695	minutes"
"	Time to Centroid	0.000	72.623	72.623	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	2360.31	124.23	2484.54	c.m"
"	Rainfall losses	24.995	1.656	23.828	mm"
"	Runoff depth	0.000	23.339	1.167	mm"
"	Runoff volume	0.00	116.00	116.00	c.m"
"	Runoff coefficient	0.000	0.934	0.047	"
"	Maximum flow	0.000	0.064	0.064	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.064	0.064	0.129	0.129"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.066	0.064	0.129	0.129 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	---	8.347	8.347	minutes"
"		Time to Centroid	0.000	70.856	70.856	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	3779.87	116.90	3896.77	c.m"
"		Rainfall losses	24.995	1.548	24.292	mm"
"		Runoff depth	0.000	23.447	0.703	mm"
"		Runoff volume	0.00	109.66	109.66	c.m"
"		Runoff coefficient	0.000	0.938	0.028	"
"		Maximum flow	0.000	0.066	0.066	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.066	0.130	0.129	0.129"
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"			0.066	0.130	0.130	0.129"
" 40		HYDROGRAPH Combine 5002"				
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow		0.130		c.m/sec"
"		Hydrograph volume		225.660		c.m"
"			0.066	0.130	0.130	0.130"
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"			0.066	0.000	0.130	0.130"

```

" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"  15.000   % Impervious"
"    0.360   Total Area"
"  40.000   Flow length"
"    1.000   Overland Slope"
"    0.306   Pervious Area"
"  40.000   Pervious length"
"    1.000   Pervious slope"
"    0.054   Impervious Area"
"  40.000   Impervious length"
"    1.000   Impervious slope"
"    0.250   Pervious Manning 'n'"
" 125.000   Pervious Max.infiltration"
"    5.000   Pervious Min.infiltration"
"    0.250   Pervious Lag constant (hours)"
"    5.000   Pervious Depression storage"
"    0.015   Impervious Manning 'n'"
"    0.000   Impervious Max.infiltration"
"    0.000   Impervious Min.infiltration"
"    0.050   Impervious Lag constant (hours)"
"    1.500   Impervious Depression storage"
"          0.008      0.000      0.130      0.130 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration      ---      3.681      3.681      minutes"
"      Time to Centroid      0.000      64.852      64.852      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      76.49      13.50      89.98      c.m"
"      Rainfall losses      24.995      1.990      21.545      mm"
"      Runoff depth      0.000      23.005      3.451      mm"
"      Runoff volume      0.00      12.42      12.42      c.m"
"      Runoff coefficient      0.000      0.920      0.138      "
"      Maximum flow      0.000      0.008      0.008      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"          4   Add Runoff  "
"          0.008      0.008      0.130      0.130"
" 56      DIVERSION"
"      2450   Node number"
"    0.018   Overflow threshold"
"    1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.000      c.m/sec"
"      Volume of diverted flow      0.000      c.m"
"      DIV02450.0025hyd"
"      Major flow at 2450"
"          0.008      0.008      0.008      0.130 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.130      c.m/sec"
"              Hydrograph volume          1902.329    c.m"
"                  0.008      0.008      0.008      0.130"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.130      c.m/sec"
"              Hydrograph volume          1902.329    c.m"
"                  0.008      0.130      0.008      0.000"
" 51      PIPE DESIGN"
"          0.130   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Depth of flow              0.227      metre"
"              Velocity                  1.228      m/sec"
"              Pipe capacity              0.532      c.m/sec"
"              Critical depth            0.223      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length  ( metre)"
"          0.418   X-factor <= 0.5"
"          116.389 K-lag  ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000 K-lag  ( seconds)"
"          0.500   Beta weighting factor"
"          100.000 Routing time step  ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.130      c.m/sec"
"                  0.008      0.130      0.130      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              0.211      c.m/sec"
"              Hydrograph volume          4144.797    c.m"
"                  0.008      0.130      0.130      0.211"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.008      0.000      0.130      0.211"
" 47      FILEI_0 Read/Open DIV02400.0025hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"              DIV02400.0025hyd"

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"          Major flow at 2400"
"          Total volume              0.000      c.m"
"          Maximum flow              0.000      c.m/sec"
"          0.000      0.000      0.130      0.211 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.130      0.211"
" 47      FILEI_O Read/Open DIV02450.0025hyd"
"          1      1=read/open; 2=write/save"
"          2      1=rainfall; 2=hydrograph"
"          1      1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.0025hyd"
"          Major flow at 2450"
"          Total volume              0.000      c.m"
"          Maximum flow              0.000      c.m/sec"
"          0.000      0.000      0.130      0.211 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.130      0.211"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.000      0.000      0.000      0.211"
" 40      HYDROGRAPH Combine 5005"
"          6      Combine "
"          5005      Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow              0.000      c.m/sec"
"          Hydrograph volume          0.000      c.m"
"          0.000      0.000      0.000      0.000"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.000      0.000      0.000      0.000"
" 33      CATCHMENT 2500"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"          2500      Catchment 2500"
"          0.000      % Impervious"
"          12.060      Total Area"
"          287.000      Flow length"
"          1.000      Overland Slope"
"          12.060      Pervious Area"
"          287.000      Pervious length"
"          1.000      Pervious slope"
"          0.000      Impervious Area"
"          287.000      Impervious length"
"          1.000      Impervious slope"
"          0.250      Pervious Manning 'n'"
"          125.000      Pervious Max.infiltration"
"          5.000      Pervious Min.infiltration"

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"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.000	0.000	0.000 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	---	12.008	12.008 minutes"
"		Time to Centroid	0.000	75.646	75.646 minutes"
"		Rainfall depth	24.995	24.995	24.995 mm"
"		Rainfall volume	3014.43	0.00	3014.44 c.m"
"		Rainfall losses	24.995	1.553	24.995 mm"
"		Runoff depth	0.000	23.442	0.000 mm"
"		Runoff volume	0.00	0.00	0.00 c.m"
"		Runoff coefficient	0.000	0.000	0.000 "
"		Maximum flow	0.000	0.000	0.000 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.000	0.000	0.000	0.000"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.000	0.000	0.000 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	---	12.504	12.504	minutes"
"	Time to Centroid	0.000	76.302	76.302	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	3739.30	0.00	3739.30	c.m"
"	Rainfall losses	24.995	1.558	24.995	mm"
"	Runoff depth	0.000	23.437	0.000	mm"
"	Runoff volume	0.00	0.00	0.00	c.m"
"	Runoff coefficient	0.000	0.000	0.000	"
"	Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.000	0.000	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.000	0.000	0.000	0.000"	
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.000		c.m/sec"	
"	Hydrograph volume	0.006		c.m"	
"	0.000	0.000	0.000	0.000"	
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.000		c.m/sec"	
"	Hydrograph volume	0.006		c.m"	
"	0.000	0.000	0.000	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.000	0.000	0.000	0.000"	
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	0.130		c.m/sec"	
"	Hydrograph volume	225.666		c.m"	
"	0.000	0.000	0.000	0.130"	
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow	0.211		c.m/sec"	
"	Hydrograph volume	4144.797		c.m"	
"	0.000	0.211	0.000	0.000"	
" 51	PIPE DESIGN"				
"	0.211	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	0.750	Diameter	metre"		

```

"      0.400 Gradient %"
"      Depth of flow          0.281 metre"
"      Velocity              1.392 m/sec"
"      Pipe capacity         0.704 c.m/sec"
"      Critical depth        0.277 metre"
" 53      ROUTE Pipe Route 760"
"      760.00 Pipe Route 760 Reach length (metre)"
"      0.448 X-factor <= 0.5"
"      204.683 K-lag (seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag (seconds)"
"      0.500 Beta weighting factor"
"      300.000 Routing time step (seconds)"
"      2 No. of sub-reaches"
"      Peak outflow          0.211 c.m/sec"
"      0.000 0.211 0.211 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          0.222 c.m/sec"
"      Hydrograph volume     4370.442 c.m"
"      0.000 0.211 0.211 0.222"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          0.222 c.m/sec"
"      Hydrograph volume     4370.442 c.m"
"      0.000 0.222 0.211 0.000"
" 52      CHANNEL DESIGN"
"      0.222 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.222 metre"
"      Velocity              0.750 m/sec"
"      Channel capacity       19.656 c.m/sec"
"      Critical depth         0.158 metre"
" 52      CHANNEL DESIGN"
"      0.222 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

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"      0.   Cross-section type: 0=trapezoidal; 1=general"
"      1.000  Basewidth      metre"
"      1.500  Left bank slope"
"      1.500  Right bank slope"
"      2.000  Channel depth   metre"
"      1.000  Gradient      %"
"          Depth of flow          0.222      metre"
"          Velocity              0.750      m/sec"
"          Channel capacity      19.656      c.m/sec"
"          Critical depth        0.158      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.000      0.000      0.211      0.000"
" 33      CATCHMENT 3100"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          3100  Catchment 3100"
"          35.000 % Impervious"
"          2.050  Total Area"
"          100.000 Flow length"
"          0.500  Overland Slope"
"          1.332  Pervious Area"
"          100.000 Pervious length"
"          0.500  Pervious slope"
"          0.717  Impervious Area"
"          100.000 Impervious length"
"          0.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.112      0.000      0.211      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious Total Area "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration      ---      7.854      7.854      minutes"
"          Time to Centroid      0.000      70.289      70.289      minutes"
"          Rainfall depth      24.995      24.995      24.995      mm"
"          Rainfall volume      333.06      179.34      512.40      c.m"
"          Rainfall losses      24.995      1.566      16.795      mm"
"          Runoff depth      0.000      23.429      8.200      mm"
"          Runoff volume      0.00      168.10      168.10      c.m"
"          Runoff coefficient      0.000      0.937      0.328      "
"          Maximum flow      0.000      0.112      0.112      c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.112      0.112      0.211      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.118      0.112      0.211      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration      ---      12.891      12.891      minutes"
"          Time to Centroid      0.000      76.815      76.815      minutes"
"          Rainfall depth      24.995      24.995      24.995      mm"
"          Rainfall volume      4834.60      254.45      5089.05      c.m"
"          Rainfall losses      24.995      1.596      23.825      mm"
"          Runoff depth      0.000      23.399      1.170      mm"
"          Runoff volume      0.00      238.20      238.20      c.m"
"          Runoff coefficient      0.000      0.936      0.047      "
"          Maximum flow      0.000      0.118      0.118      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.118      0.211      0.211      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.045	0.211	0.211	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	---	5.181	5.181	minutes"
"		Time to Centroid	0.000	66.756	66.756	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	136.47	73.49	209.96	c.m"
"		Rainfall losses	24.995	1.653	16.826	mm"
"		Runoff depth	0.000	23.342	8.170	mm"
"		Runoff volume	0.00	68.63	68.63	c.m"
"		Runoff coefficient	0.000	0.934	0.327	"
"		Maximum flow	0.000	0.045	0.045	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.045	0.256	0.211	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.272	0.256	0.211	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	---	5.948	5.948	minutes"
"		Time to Centroid	0.000	67.778	67.778	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	822.10	442.67	1264.76	c.m"
"		Rainfall losses	24.995	1.622	16.815	mm"
"		Runoff depth	0.000	23.374	8.181	mm"
"		Runoff volume	0.00	413.95	413.95	c.m"
"		Runoff coefficient	0.000	0.935	0.327	"
"		Maximum flow	0.000	0.272	0.272	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.272	0.528	0.211	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.010	0.528	0.211	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	---	5.712	5.712	minutes"
"	Time to Centroid	0.000	67.451	67.451	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	299.19	15.75	314.94	c.m"
"	Rainfall losses	24.995	1.598	23.825	mm"
"	Runoff depth	0.000	23.398	1.170	mm"
"	Runoff volume	0.00	14.74	14.74	c.m"
"	Runoff coefficient	0.000	0.936	0.047	"
"	Maximum flow	0.000	0.010	0.010	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.010	0.538	0.211	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		135.350		hectare"
"	Total Impervious area		22.387		hectare"
"	Total % impervious		16.540"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    Post_2yr.out"
"          Licensee name:                      "
"          Company                            "
"          Date & Time last used:              10/29/2024 at 8:37:34 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          414.876 Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          100.235  mm/hr"
"          Total depth                39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"	0.025	0.000	0.000	0.000	c.m/sec"	
"	Catchment 1100	Pervious	Impervious	Total Area	"	
"	Surface Area	3.550	0.110	3.660	hectare"	
"	Time of concentration	---	7.334	7.334	minutes"	
"	Time to Centroid	0.000	122.833	122.833	minutes"	
"	Rainfall depth	39.504	39.504	39.504	mm"	
"	Rainfall volume	1402.47	43.38	1445.85	c.m"	
"	Rainfall losses	39.504	1.664	38.369	mm"	
"	Runoff depth	0.000	37.840	1.135	mm"	
"	Runoff volume	0.00	41.55	41.55	c.m"	
"	Runoff coefficient	0.000	0.958	0.029	"	
"	Maximum flow	0.000	0.025	0.025	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"	0.025	0.025	0.000	0.000"		
" 33	CATCHMENT 1300"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	1.561	0.025	0.000	0.000	c.m/sec"	
"	Catchment 1300	Pervious	Impervious	Total Area	"	
"	Surface Area	17.589	9.471	27.060	hectare"	
"	Time of concentration	---	14.579	14.579	minutes"	
"	Time to Centroid	0.000	134.181	134.181	minutes"	
"	Rainfall depth	39.504	39.504	39.504	mm"	
"	Rainfall volume	0.6948	0.3741	1.0690	ha-m"	
"	Rainfall losses	39.504	1.542	26.217	mm"	
"	Runoff depth	0.000	37.962	13.287	mm"	

```

"          Runoff volume          0.00      3595.36    3595.36    c.m"
"          Runoff coefficient      0.000      0.961      0.336      "
"          Maximum flow            0.000      1.561      1.561      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"              1.561      1.575      0.000      0.000"
" 81      ADD COMMENT=====
"          1    Lines of comment"
"              Marsville South Subdivision Stormwater Management Facility"
" 64      SHOW TABLE"
"          2    Flow hydrograph"
"          4    Inflow Hydrograph"
"              Maximum flow              1.575      c.m/sec"
"              Hydrograph volume        3636.912    c.m"
" 54      POND DESIGN"
"          1.575    Current peak flow      c.m/sec"
"          0.200    Target outflow      c.m/sec"
"          3636.9    Hydrograph volume      c.m"
"          24.      Number of stages"
"          484.900    Minimum water level    metre"
"          487.200    Maximum water level    metre"
"          484.900    Starting water level    metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"              Level Discharge      Volume"
"          484.900      0.000      0.000"
"          485.000      0.01200      642.900"
"          485.100      0.02300      1316.600"
"          485.200      0.1190      2021.300"
"          485.300      0.3140      2757.200"
"          485.400      0.3140      3524.300"
"          485.500      0.3170      4322.900"
"          485.600      0.3170      5153.000"
"          485.700      0.3210      6014.900"
"          485.800      0.3240      6908.700"
"          485.900      0.3240      7834.500"
"          486.000      0.3270      8792.400"
"          486.100      0.3300      9782.700"
"          486.200      0.3300      10805.50"
"          486.300      0.3330      11860.90"
"          486.400      0.3330      12949.00"
"          486.500      0.3360      14070.10"
"          486.600      0.3390      15224.30"
"          486.700      0.3390      16411.70"
"          486.800      0.3420      17632.50"
"          486.900      0.3450      18886.90"
"          487.000      0.3450      20174.90"
"          487.100      1.389      21496.80"
"          487.200      3.328      22852.30"
"          Peak outflow              0.189      c.m/sec"
"          Maximum level              485.236      metre"

```



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"           Maximum storage           2286.639    c.m"
"           Centroidal lag             10.873    hours"
"           1.561    1.575    0.189    0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"           5    Next link "
"           1.561    0.189    0.189    0.000"
" 56      DIVERSION"
"           1300    Node number"
"           0.345    Overflow threshold"
"           1.000    Required diverted fraction"
"           0    Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow       0.000    c.m/sec"
"           Volume of diverted flow     0.000    c.m"
"           DIV01300.002hyd"
"           Overflow at the South Pond"
"           1.561    0.189    0.189    0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"           5    Next link "
"           1.561    0.189    0.189    0.000"
" 81      ADD COMMENT=====
"           1    Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
" 51      PIPE DESIGN"
"           0.189    Current peak flow    c.m/sec"
"           0.013    Manning 'n'"
"           0.525    Diameter    metre"
"           0.500    Gradient    %"
"           Depth of flow                0.300    metre"
"           Velocity                    1.481    m/sec"
"           Pipe capacity                0.304    c.m/sec"
"           Critical depth                0.293    metre"
" 53      ROUTE    Pipe Route 546"
"           546.00    Pipe Route 546 Reach length    ( metre)"
"           0.465    X-factor <= 0.5"
"           276.518    K-lag    ( seconds)"
"           0.000    Default(0) or user spec.(1) values used"
"           0.500    X-factor <= 0.5"
"           30.000    K-lag    ( seconds)"
"           0.500    Beta weighting factor"
"           150.000    Routing time step    ( seconds)"
"           1    No. of sub-reaches"
"           Peak outflow                0.189    c.m/sec"
"           1.561    0.189    0.189    0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"           5    Next link "
"           1.561    0.189    0.189    0.000"
" 40      HYDROGRAPH Copy to Outflow"
"           8    Copy to Outflow"
"           1.561    0.189    0.189    0.000"
" 40      HYDROGRAPH    Combine    5000"

```

```

"          6   Combine "
"      5000   Node #"
"          Closed Pipe"
"          Maximum flow          0.189   c.m/sec"
"          Hydrograph volume      3633.496   c.m"
"              1.561   0.189   0.189   0.189"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              1.561   0.000   0.189   0.189"
" 33      CATCHMENT 4000"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      4000   Catchment 4000"
"      35.000 % Impervious"
"          1.100   Total Area"
"      50.000   Flow length"
"          7.000   Overland Slope"
"          0.715   Pervious Area"
"      50.000   Pervious length"
"          7.000   Pervious slope"
"          0.385   Impervious Area"
"      50.000   Impervious length"
"          7.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"              0.099   0.000   0.189   0.189 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration      ---      2.068      2.068      minutes"
"          Time to Centroid      0.000      114.449      114.449      minutes"
"          Rainfall depth      39.504      39.504      39.504      mm"
"          Rainfall volume      282.45      152.09      434.54      c.m"
"          Rainfall losses      39.504      1.912      26.347      mm"
"          Runoff depth      0.000      37.592      13.157      mm"
"          Runoff volume      0.00      144.73      144.73      c.m"
"          Runoff coefficient      0.000      0.952      0.333      "
"          Maximum flow      0.000      0.099      0.099      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"              0.099   0.099   0.189   0.189"
" 40      HYDROGRAPH Copy to Outflow"

```

"	8	Copy to Outflow"				
"		0.099	0.099	0.099	0.189"	
" 40		HYDROGRAPH Combine	5001"			
"	6	Combine "				
"	5001	Node #"				
"		To Wetland South of Site"				
"		Maximum flow	0.099		c.m/sec"	
"		Hydrograph volume	144.728		c.m"	
"		0.099	0.099	0.099	0.099"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.099	0.000	0.099	0.099"	
" 47		FILEI_0 Read/Open DIV01300.002hyd"				
"	1	1=read/open; 2=write/save"				
"	2	1=rainfall; 2=hydrograph"				
"	1	1=runoff; 2=inflow; 3=outflow; 4=junction"				
"		DIV01300.002hyd"				
"		Overflow at the South Pond"				
"		Total volume	0.000		c.m"	
"		Maximum flow	0.000		c.m/sec"	
"		0.000	0.000	0.099	0.099 c.m/sec"	
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.099	0.099"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.271	0.000	0.099	0.099 c.m/sec"	

"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	19.214	3.480	10.302	minutes"
"	Time to Centroid	126.641	116.889	121.117	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	734.38	395.44	1129.81	c.m"
"	Rainfall losses	24.188	2.344	16.542	mm"
"	Runoff depth	15.316	37.160	22.962	mm"
"	Runoff volume	284.73	371.97	656.70	c.m"
"	Runoff coefficient	0.388	0.941	0.581	"
"	Maximum flow	0.140	0.242	0.271	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.271	0.271	0.099	0.099"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.126	0.271	0.099	0.099 c.m/sec"
---	--	-------	-------	-------	----------------

"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	---	4.619	4.619	minutes"
"	Time to Centroid	0.000	118.524	118.524	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	225.17	225.17	450.35	c.m"
"	Rainfall losses	39.504	1.660	20.582	mm"
"	Runoff depth	0.000	37.844	18.922	mm"
"	Runoff volume	0.00	215.71	215.71	c.m"
"	Runoff coefficient	0.000	0.958	0.479	"

"		Maximum flow	0.000	0.126	0.126	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.126	0.397	0.099	0.099"
" 81		ADD COMMENT=====				
"	1	Lines of comment"				
"		1200 mm dia. Culvert at County Road 3"				
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		0.397		c.m/sec"
"		Hydrograph volume		872.413		c.m"
" 33		CATCHMENT 2300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2300	Catchment 2300"				
"	35.000	% Impervious"				
"	7.920	Total Area"				
"	76.000	Flow length"				
"	1.000	Overland Slope"				
"	5.148	Pervious Area"				
"	76.000	Pervious length"				
"	1.000	Pervious slope"				
"	2.772	Impervious Area"				
"	76.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.606	0.397	0.099	0.099 c.m/sec"
"		Catchment 2300	Pervious	Impervious	Total Area	"
"		Surface Area	5.148	2.772	7.920	hectare"
"		Time of concentration	---	4.766	4.766	minutes"
"		Time to Centroid	0.000	118.752	118.752	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	2033.67	1095.05	3128.72	c.m"
"		Rainfall losses	39.504	1.647	26.254	mm"
"		Runoff depth	0.000	37.857	13.250	mm"
"		Runoff volume	0.00	1049.38	1049.38	c.m"
"		Runoff coefficient	0.000	0.958	0.335	"
"		Maximum flow	0.000	0.606	0.606	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				

```

"          4   Add Runoff "
"              0.606      1.004      0.099      0.099"
" 81      ADD COMMENT=====
"          1   Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"              Maximum flow              1.004      c.m/sec"
"              Hydrograph volume        1921.796      c.m"
" 52      CHANNEL DESIGN"
"          1.004   Current peak flow      c.m/sec"
"          0.040   Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500   Basewidth      metre"
"          3.000   Left bank slope"
"          3.000   Right bank slope"
"          1.000   Channel depth      metre"
"          1.500   Gradient      %"
"              Depth of flow              0.341      metre"
"              Velocity              1.167      m/sec"
"              Channel capacity          9.529      c.m/sec"
"              Critical depth           0.292      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.476   X-factor <= 0.5"
"          155.535   K-lag      ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag      ( seconds)"
"          0.500   Beta weighting factor"
"          150.000   Routing time step      ( seconds)"
"          1   No. of sub-reaches"
"              Peak outflow              0.966      c.m/sec"
"              0.606      1.004      0.966      0.099 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5   Next link "
"              0.606      0.966      0.966      0.099"
" 33      CATCHMENT 2400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2400   Catchment 2400"
"          35.000   % Impervious"
"          9.130   Total Area"
"          65.000   Flow length"
"          1.000   Overland Slope"
"          5.934   Pervious Area"
"          65.000   Pervious length"
"          1.000   Pervious slope"

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"      3.196  Impervious Area"
"      65.000 Impervious length"
"      1.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"    125.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.050 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.725      0.966      0.966      0.099 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration      ---      4.339      4.339      minutes"
"      Time to Centroid      0.000      118.083      118.083      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      2344.37      1262.35      3606.72      c.m"
"      Rainfall losses      39.504      1.761      26.294      mm"
"      Runoff depth      0.000      37.743      13.210      mm"
"      Runoff volume      0.00      1206.09      1206.09      c.m"
"      Runoff coefficient      0.000      0.955      0.334      "
"      Maximum flow      0.000      0.725      0.725      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.725      1.585      0.966      0.099"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      1.585      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      3127.9      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"

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"	483.200	0.6560	2212.100"		
"	483.300	0.6620	2534.000"		
"	483.400	0.6680	2869.500"		
"	483.500	0.6740	3218.600"		
"	483.600	0.6790	3581.500"		
"	483.700	0.6910	3958.300"		
"	483.800	0.6970	4349.300"		
"	483.900	0.7020	4754.600"		
"	484.000	0.7070	5174.300"		
"	484.100	0.7120	5608.500"		
"	484.400	0.7290	7000.200"		
"	484.500	0.7340	7494.200"		
"	484.600	0.7390	8003.600"		
"	484.700	0.7440	8528.400"		
"	484.800	0.7470	9068.900"		
"	484.900	0.7490	9625.100"		
"	485.000	1.834	10197.30"		
"	485.100	3.843	10785.60"		
"	485.200	6.484	11390.10"		
"	Peak outflow		0.352	c.m/sec"	
"	Maximum level		483.047	metre"	
"	Maximum storage		1745.848	c.m"	
"	Centroidal lag		6.851	hours"	
"	0.725	1.585	0.352	0.099	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	0.725	0.352	0.352	0.099"	
" 56	DIVERSION"				
"	2400	Node number"			
"	0.747	Overflow threshold"			
"	1.000	Required diverted fraction"			
"	0	Conduit type; 1=Pipe;2=Channel"			
"	Peak of diverted flow		0.000	c.m/sec"	
"	Volume of diverted flow		0.000	c.m"	
"	DIV02400.002hyd"				
"	Major flow at 2400"				
"	0.725	0.352	0.352	0.099	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	0.725	0.352	0.352	0.099"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"	0.725	0.352	0.352	0.099"	
" 81	ADD COMMENT=====				
"	2	Lines of comment"			
"	Thunderbird Drain Improvements - Marsville North "				
"	Subdivision Branch"				
" 40	HYDROGRAPH Combine 5004"				
"	6	Combine "			
"	5004	Node #"			

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.352	c.m/sec"		
"	Hydrograph volume	3128.974	c.m"		
"	0.725	0.352	0.352	0.352"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.725	0.000	0.352	0.352"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.104	0.000	0.352	0.352 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	---	8.540	8.540	minutes"
"	Time to Centroid	0.000	124.691	124.691	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	3730.36	196.33	3926.70	c.m"
"	Rainfall losses	39.504	1.643	37.611	mm"
"	Runoff depth	0.000	37.861	1.893	mm"
"	Runoff volume	0.00	188.17	188.17	c.m"
"	Runoff coefficient	0.000	0.958	0.048	"
"	Maximum flow	0.000	0.104	0.104	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.104	0.104	0.352	0.352"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

```

"          2 Horton equation"
"        1500 Catchment 1500"
"        3.000 % Impervious"
"       15.590 Total Area"
"      198.000 Flow length"
"        1.600 Overland Slope"
"       15.122 Pervious Area"
"      198.000 Pervious length"
"        1.600 Pervious slope"
"         0.468 Impervious Area"
"      198.000 Impervious length"
"        1.600 Impervious slope"
"         0.250 Pervious Manning 'n'"
"     125.000 Pervious Max.infiltration"
"         5.000 Pervious Min.infiltration"
"         0.250 Pervious Lag constant (hours)"
"         5.000 Pervious Depression storage"
"         0.015 Impervious Manning 'n'"
"         0.000 Impervious Max.infiltration"
"         0.000 Impervious Min.infiltration"
"         0.050 Impervious Lag constant (hours)"
"         1.500 Impervious Depression storage"
"           0.108      0.104      0.352      0.352 c.m/sec"
"      Catchment 1500      Pervious      Impervious      Total Area "
"      Surface Area      15.122      0.468      15.590      hectare"
"      Time of concentration      ---      7.352      7.352      minutes"
"      Time to Centroid      0.000      122.862      122.862      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      5973.92      184.76      6158.68      c.m"
"      Rainfall losses      39.504      1.661      38.369      mm"
"      Runoff depth      0.000      37.843      1.135      mm"
"      Runoff volume      0.00      176.99      176.99      c.m"
"      Runoff coefficient      0.000      0.958      0.029      "
"      Maximum flow      0.000      0.108      0.108      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"           0.108      0.212      0.352      0.352"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"           0.108      0.212      0.212      0.352"
" 40      HYDROGRAPH Combine      5002"
"      6      Combine "
"     5002      Node #"
"           West Watershed Catchment Areas"
"           Maximum flow      0.212      c.m/sec"
"           Hydrograph volume      365.163      c.m"
"           0.108      0.212      0.212      0.212"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"           0.108      0.000      0.212      0.212"

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" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"      15.000 % Impervious"
"          0.360 Total Area"
"      40.000 Flow length"
"          1.000 Overland Slope"
"          0.306 Pervious Area"
"      40.000 Pervious length"
"          1.000 Pervious slope"
"          0.054 Impervious Area"
"      40.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.013      0.000      0.212      0.212 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration      ---      3.243      3.243      minutes"
"      Time to Centroid      0.000      116.539      116.539      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      120.88      21.33      142.21      c.m"
"      Rainfall losses      39.504      2.354      33.932      mm"
"      Runoff depth      0.000      37.150      5.572      mm"
"      Runoff volume      0.00      20.06      20.06      c.m"
"      Runoff coefficient      0.000      0.940      0.141      "
"      Maximum flow      0.000      0.013      0.013      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"          4   Add Runoff  "
"              0.013      0.013      0.212      0.212"
" 56      DIVERSION"
"      2450   Node number"
"      0.018   Overflow threshold"
"      1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.000      c.m/sec"
"      Volume of diverted flow      0.000      c.m"
"      DIV02450.002hyd"
"      Major flow at 2450"
"          0.013      0.013      0.013      0.212 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.354      c.m/sec"
"              Hydrograph volume          3149.035    c.m"
"                  0.013      0.013      0.013      0.354"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.354      c.m/sec"
"              Hydrograph volume          3149.035    c.m"
"                  0.013      0.354      0.013      0.000"
" 51      PIPE DESIGN"
"          0.354   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Depth of flow              0.403      metre"
"              Velocity                  1.590      m/sec"
"              Pipe capacity              0.532      c.m/sec"
"              Critical depth             0.376      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length  ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag  ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag  ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step  ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.350      c.m/sec"
"                  0.013      0.354      0.350      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              0.489      c.m/sec"
"              Hydrograph volume          6782.536    c.m"
"                  0.013      0.354      0.350      0.489"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.013      0.000      0.350      0.489"
" 47      FILEI_0 Read/Open DIV02400.002hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02400.002hyd"

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"          Major flow at 2400"
"          Total volume                0.000    c.m"
"          Maximum flow                0.000    c.m/sec"
"          0.000    0.000    0.350    0.489 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"          0.000    0.000    0.350    0.489"
" 47      FILEI_O Read/Open DIV02450.002hyd"
"          1    1=read/open; 2=write/save"
"          2    1=rainfall; 2=hydrograph"
"          1    1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.002hyd"
"          Major flow at 2450"
"          Total volume                0.000    c.m"
"          Maximum flow                0.000    c.m/sec"
"          0.000    0.000    0.350    0.489 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"          0.000    0.000    0.350    0.489"
" 40      HYDROGRAPH Copy to Outflow"
"          8    Copy to Outflow"
"          0.000    0.000    0.000    0.489"
" 40      HYDROGRAPH Combine 5005"
"          6    Combine "
"          5005    Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow                0.000    c.m/sec"
"          Hydrograph volume          0.000    c.m"
"          0.000    0.000    0.000    0.000"
" 40      HYDROGRAPH Start - New Tributary"
"          2    Start - New Tributary"
"          0.000    0.000    0.000    0.000"
" 33      CATCHMENT 2500"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"          2500    Catchment 2500"
"          0.000    % Impervious"
"          12.060    Total Area"
"          287.000    Flow length"
"          1.000    Overland Slope"
"          12.060    Pervious Area"
"          287.000    Pervious length"
"          1.000    Pervious slope"
"          0.000    Impervious Area"
"          287.000    Impervious length"
"          1.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"          125.000    Pervious Max.infiltration"
"          5.000    Pervious Min.infiltration"

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"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.000	0.000	0.000 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	---	10.578	10.578 minutes"
"		Time to Centroid	0.000	127.879	127.879 minutes"
"		Rainfall depth	39.504	39.504	39.504 mm"
"		Rainfall volume	4764.18	0.00	4764.18 c.m"
"		Rainfall losses	39.504	1.588	39.504 mm"
"		Runoff depth	0.000	37.916	0.000 mm"
"		Runoff volume	0.00	0.00	0.00 c.m"
"		Runoff coefficient	0.000	0.000	0.000 "
"		Maximum flow	0.000	0.000	0.000 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.000	0.000	0.000	0.000"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.000	0.000	0.000	0.000 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	---	11.014	11.014	minutes"
"	Time to Centroid	0.000	128.567	128.567	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	5909.79	0.01	5909.80	c.m"
"	Rainfall losses	39.504	1.605	39.504	mm"
"	Runoff depth	0.000	37.899	0.000	mm"
"	Runoff volume	0.00	0.01	0.01	c.m"
"	Runoff coefficient	0.000	0.000	0.000	"
"	Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.000 0.000 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.000 0.000 0.000 0.000"				
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.000	c.m/sec"		
"	Hydrograph volume	0.010	c.m"		
"	0.000 0.000 0.000 0.000"				
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.000	c.m/sec"		
"	Hydrograph volume	0.010	c.m"		
"	0.000 0.000 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.000 0.000 0.000 0.000"				
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	0.212	c.m/sec"		
"	Hydrograph volume	365.173	c.m"		
"	0.000 0.000 0.000 0.212"				
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow	0.489	c.m/sec"		
"	Hydrograph volume	6782.537	c.m"		
"	0.000 0.489 0.000 0.000"				
" 51	PIPE DESIGN"				
"	0.489 Current peak flow	c.m/sec"			
"	0.013 Manning 'n'"				
"	0.750 Diameter	metre"			

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"      0.400 Gradient %"
"      Depth of flow          0.460 metre"
"      Velocity              1.722 m/sec"
"      Pipe capacity         0.704 c.m/sec"
"      Critical depth        0.431 metre"
" 53      ROUTE      Pipe Route 760"
"      760.00      Pipe Route 760 Reach length (metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag (seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag (seconds)"
"      0.500 Beta weighting factor"
" 300.000 Routing time step (seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          0.488 c.m/sec"
"      0.000 0.489 0.488 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          0.512 c.m/sec"
"      Hydrograph volume     7147.683 c.m"
"      0.000 0.489 0.488 0.512"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          0.512 c.m/sec"
"      Hydrograph volume     7147.683 c.m"
"      0.000 0.512 0.488 0.000"
" 52      CHANNEL DESIGN"
"      0.512 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.351 metre"
"      Velocity              0.956 m/sec"
"      Channel capacity       19.656 c.m/sec"
"      Critical depth         0.261 metre"
" 52      CHANNEL DESIGN"
"      0.512 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

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"      0.  Cross-section type: 0=trapezoidal; 1=general"
"      1.000  Basewidth      metre"
"      1.500  Left bank slope"
"      1.500  Right bank slope"
"      2.000  Channel depth  metre"
"      1.000  Gradient      %"
"          Depth of flow          0.351      metre"
"          Velocity                0.956      m/sec"
"          Channel capacity        19.656      c.m/sec"
"          Critical depth          0.261      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2  Start - New Tributary"
"              0.000      0.000      0.488      0.000"
" 33      CATCHMENT 3100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3100  Catchment 3100"
"          35.000  % Impervious"
"          2.050  Total Area"
"          100.000  Flow length"
"          0.500  Overland Slope"
"          1.332  Pervious Area"
"          100.000  Pervious length"
"          0.500  Pervious slope"
"          0.717  Impervious Area"
"          100.000  Impervious length"
"          0.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.164      0.000      0.488      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious Total Area  "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration      ---      6.918      6.918      minutes"
"          Time to Centroid      0.000      122.267      122.267      minutes"
"          Rainfall depth      39.504      39.504      39.504      mm"
"          Rainfall volume      526.39      283.44      809.83      c.m"
"          Rainfall losses      39.504      1.781      26.301      mm"
"          Runoff depth      0.000      37.723      13.203      mm"
"          Runoff volume      0.00      270.66      270.66      c.m"
"          Runoff coefficient      0.000      0.955      0.334      "
"          Maximum flow      0.000      0.164      0.164      c.m/sec"

```

```

" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.164      0.164      0.488      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.188      0.164      0.488      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration      ---      11.355      11.355      minutes"
"          Time to Centroid      0.000      129.111      129.111      minutes"
"          Rainfall depth      39.504      39.504      39.504      mm"
"          Rainfall volume      7640.87      402.15      8043.02      c.m"
"          Rainfall losses      39.504      1.608      37.609      mm"
"          Runoff depth      0.000      37.896      1.895      mm"
"          Runoff volume      0.00      385.79      385.79      c.m"
"          Runoff coefficient      0.000      0.959      0.048      "
"          Maximum flow      0.000      0.188      0.188      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.188      0.352      0.488      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.065	0.352	0.488	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	---	4.564	4.564	minutes"
"		Time to Centroid	0.000	118.438	118.438	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	215.69	116.14	331.83	c.m"
"		Rainfall losses	39.504	1.673	26.263	mm"
"		Runoff depth	0.000	37.831	13.241	mm"
"		Runoff volume	0.00	111.22	111.22	c.m"
"		Runoff coefficient	0.000	0.958	0.335	"
"		Maximum flow	0.000	0.065	0.065	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.065	0.411	0.488	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.381	0.411	0.488	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	---	5.240	5.240	minutes"
"		Time to Centroid	0.000	119.494	119.494	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	1299.29	699.62	1998.90	c.m"
"		Rainfall losses	39.504	1.649	26.255	mm"
"		Runoff depth	0.000	37.855	13.249	mm"
"		Runoff volume	0.00	670.41	670.41	c.m"
"		Runoff coefficient	0.000	0.958	0.335	"
"		Maximum flow	0.000	0.381	0.381	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.381	0.792	0.488	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.013	0.792	0.488	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	---	5.031	5.031	minutes"
"	Time to Centroid	0.000	119.147	119.147	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	472.86	24.89	497.75	c.m"
"	Rainfall losses	39.504	1.643	37.611	mm"
"	Runoff depth	0.000	37.861	1.893	mm"
"	Runoff volume	0.00	23.85	23.85	c.m"
"	Runoff coefficient	0.000	0.958	0.048	"
"	Maximum flow	0.000	0.013	0.013	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.013	0.805	0.488	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		135.350		hectare"
"	Total Impervious area		22.387		hectare"
"	Total % impervious		16.540"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    Post_5yr.out"
"          Licensee name:                     "
"          Company                           "
"          Date & Time last used:              10/29/2024 at 8:46:39 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          544.711 Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          130.581  mm/hr"
"          Total depth                50.743  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.044	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	56.991	6.598	42.304	minutes"
"		Time to Centroid	161.300	120.956	149.542	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1801.48	55.72	1857.19	c.m"
"		Rainfall losses	47.072	1.920	45.717	mm"
"		Runoff depth	3.671	48.823	5.025	mm"
"		Runoff volume	130.33	53.61	183.93	c.m"
"		Runoff coefficient	0.072	0.962	0.099	"
"		Maximum flow	0.040	0.033	0.044	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.044	0.044	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		2.062	0.044	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	113.289	13.115	25.337	minutes"
"		Time to Centroid	220.260	131.201	142.067	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	0.8925	0.4806	1.3731	ha-m"
"		Rainfall losses	47.070	1.656	31.175	mm"
"		Runoff depth	3.673	49.087	19.568	mm"

"	Runoff volume	646.03	4649.04	5295.06	c.m"
"	Runoff coefficient	0.072	0.967	0.386	"
"	Maximum flow	0.104	2.044	2.062	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.062	2.093	0.000	0.000"
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	Marsville South Subdivision Stormwater Management Facility"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.093		c.m/sec"
"	Hydrograph volume		5478.990		c.m"
" 54	POND DESIGN"				
"	2.093	Current peak flow			c.m/sec"
"	0.200	Target outflow			c.m/sec"
"	5479.0	Hydrograph volume			c.m"
"	24.	Number of stages"			
"	484.900	Minimum water level			metre"
"	487.200	Maximum water level			metre"
"	484.900	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	484.900	0.000	0.000"		
"	485.000	0.01200	642.900"		
"	485.100	0.02300	1316.600"		
"	485.200	0.1190	2021.300"		
"	485.300	0.3140	2757.200"		
"	485.400	0.3140	3524.300"		
"	485.500	0.3170	4322.900"		
"	485.600	0.3170	5153.000"		
"	485.700	0.3210	6014.900"		
"	485.800	0.3240	6908.700"		
"	485.900	0.3240	7834.500"		
"	486.000	0.3270	8792.400"		
"	486.100	0.3300	9782.700"		
"	486.200	0.3300	10805.50"		
"	486.300	0.3330	11860.90"		
"	486.400	0.3330	12949.00"		
"	486.500	0.3360	14070.10"		
"	486.600	0.3390	15224.30"		
"	486.700	0.3390	16411.70"		
"	486.800	0.3420	17632.50"		
"	486.900	0.3450	18886.90"		
"	487.000	0.3450	20174.90"		
"	487.100	1.389	21496.80"		
"	487.200	3.328	22852.30"		
"	Peak outflow		0.314		c.m/sec"
"	Maximum level		485.303		metre"


```

"           Maximum storage           2779.594    c.m"
"           Centroidal lag             8.833    hours"
"           2.062    2.093    0.314    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           2.062    0.314    0.314    0.000"
56 DIVERSION"
"           1300    Node number"
"           0.345    Overflow threshold"
"           1.000    Required diverted fraction"
"           0    Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow       0.000    c.m/sec"
"           Volume of diverted flow     0.000    c.m"
"           DIV01300.005hyd"
"           Overflow at the South Pond"
"           2.062    0.314    0.314    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           2.062    0.314    0.314    0.000"
81 ADD COMMENT=====
"           1    Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
51 PIPE DESIGN"
"           0.314    Current peak flow    c.m/sec"
"           0.013    Manning 'n'"
"           0.525    Diameter    metre"
"           0.500    Gradient    %"
"           Surcharged HGL             0.533    %"
"           Velocity                   1.451    m/sec"
"           Pipe capacity              0.304    c.m/sec"
"           Critical depth             0.000    metre"
53 ROUTE    Pipe Route 546"
"           546.00    Pipe Route 546 Reach length    ( metre)"
"           0.465    X-factor <= 0.5"
"           276.518    K-lag    ( seconds)"
"           0.000    Default(0) or user spec.(1) values used"
"           0.500    X-factor <= 0.5"
"           30.000    K-lag    ( seconds)"
"           0.000    Beta weighting factor"
"           0.000    Routing time step    ( seconds)"
"           0    No. of sub-reaches"
"           Peak outflow               0.314    c.m/sec"
"           2.062    0.314    0.314    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           2.062    0.314    0.314    0.000"
40 HYDROGRAPH Copy to Outflow"
"           8    Copy to Outflow"
"           2.062    0.314    0.314    0.000"
40 HYDROGRAPH    Combine    5000"

```

```

"          6   Combine "
"      5000   Node #"
"          Closed Pipe"
"          Maximum flow          0.314   c.m/sec"
"          Hydrograph volume      5476.421   c.m"
"              2.062   0.314   0.314   0.314"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              2.062   0.000   0.314   0.314"
" 33      CATCHMENT 4000"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      4000   Catchment 4000"
"      35.000 % Impervious"
"          1.100 Total Area"
"      50.000 Flow length"
"          7.000 Overland Slope"
"          0.715 Pervious Area"
"      50.000 Pervious length"
"          7.000 Pervious slope"
"          0.385 Impervious Area"
"      50.000 Impervious length"
"          7.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.133   0.000   0.314   0.314 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration 16.069      1.860      3.597      minutes"
"          Time to Centroid      118.494      113.157      113.809      minutes"
"          Rainfall depth      50.743      50.743      50.743      mm"
"          Rainfall volume      362.81      195.36      558.17      c.m"
"          Rainfall losses      47.099      2.127      31.359      mm"
"          Runoff depth      3.644      48.615      19.384      mm"
"          Runoff volume      26.06      187.17      213.23      c.m"
"          Runoff coefficient      0.072      0.958      0.382      "
"          Maximum flow      0.024      0.128      0.133      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"              0.133   0.133   0.314   0.314"
" 40      HYDROGRAPH Copy to Outflow"

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```

"          8   Copy to Outflow"
"          0.133      0.133      0.133      0.314"
" 40      HYDROGRAPH   Combine   5001"
"          6   Combine "
" 5001    Node #"
"          To Wetland South of Site"
"          Maximum flow          0.133      c.m/sec"
"          Hydrograph volume      213.227      c.m"
"          0.133      0.133      0.133      0.133"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"          0.133      0.000      0.133      0.133"
" 47      FILEI_0 Read/Open DIV01300.005hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV01300.005hyd"
"          Overflow at the South Pond"
"          Total volume          0.000      c.m"
"          Maximum flow          0.000      c.m/sec"
"          0.000      0.000      0.133      0.133 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.000      0.000      0.133      0.133"
" 33      CATCHMENT 2200"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2200  Catchment 2200"
"          35.000 % Impervious"
"          2.860  Total Area"
"          45.000 Flow length"
"          1.000  Overland Slope"
"          1.859  Pervious Area"
"          45.000 Pervious length"
"          1.000  Pervious slope"
"          1.001  Impervious Area"
"          45.000 Impervious length"
"          1.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.050  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.393      0.000      0.133      0.133 c.m/sec"

```

"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	17.200	3.131	10.010	minutes"
"	Time to Centroid	126.112	115.512	120.695	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	943.31	507.94	1451.25	c.m"
"	Rainfall losses	25.921	2.566	17.747	mm"
"	Runoff depth	24.822	48.177	32.996	mm"
"	Runoff volume	461.44	482.25	943.70	c.m"
"	Runoff coefficient	0.489	0.949	0.650	"
"	Maximum flow	0.255	0.321	0.393	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.393	0.393	0.133	0.133"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.172	0.393	0.133	0.133 c.m/sec"
"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	35.890	4.155	6.377	minutes"
"	Time to Centroid	139.210	116.979	118.536	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	289.23	289.23	578.47	c.m"
"	Rainfall losses	47.070	1.977	24.524	mm"
"	Runoff depth	3.672	48.766	26.219	mm"
"	Runoff volume	20.93	277.97	298.90	c.m"
"	Runoff coefficient	0.072	0.961	0.517	"

"	Maximum flow	0.009	0.170	0.172	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.172 0.565 0.133 0.133"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.565	c.m/sec"		
"	Hydrograph volume	1242.597	c.m"		
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.830 0.565 0.133 0.133 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration 37.035 4.288 8.298 minutes"				
"	Time to Centroid 140.408 117.180 120.024 minutes"				
"	Rainfall depth 50.743 50.743 50.743 mm"				
"	Rainfall volume 2612.25 1406.59 4018.84 c.m"				
"	Rainfall losses 47.070 1.869 31.250 mm"				
"	Runoff depth 3.672 48.874 19.493 mm"				
"	Runoff volume 189.06 1354.79 1543.85 c.m"				
"	Runoff coefficient 0.072 0.963 0.384 "				
"	Maximum flow 0.082 0.821 0.830 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

```

"          4    Add Runoff "
"              0.830      1.394      0.133      0.133"
" 81      ADD COMMENT=====
"          1    Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2    Flow hydrograph"
"          4    Inflow Hydrograph"
"              Maximum flow              1.394      c.m/sec"
"              Hydrograph volume        2786.443      c.m"
" 52      CHANNEL DESIGN"
"          1.394    Current peak flow      c.m/sec"
"          0.040    Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500    Basewidth      metre"
"          3.000    Left bank slope"
"          3.000    Right bank slope"
"          1.000    Channel depth      metre"
"          1.500    Gradient      %"
"              Depth of flow              0.403      metre"
"              Velocity              1.278      m/sec"
"              Channel capacity        9.529      c.m/sec"
"              Critical depth          0.350      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.472    X-factor <= 0.5"
"          142.058    K-lag      ( seconds)"
"          0.000    Default(0) or user spec.(1) values used"
"          0.500    X-factor <= 0.5"
"          30.000    K-lag      ( seconds)"
"          0.500    Beta weighting factor"
"          100.000    Routing time step      ( seconds)"
"          1    No. of sub-reaches"
"              Peak outflow              1.309      c.m/sec"
"              0.830      1.394      1.309      0.133 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5    Next link "
"              0.830      1.309      1.309      0.133"
" 33      CATCHMENT 2400"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"          2400    Catchment 2400"
"          35.000    % Impervious"
"          9.130    Total Area"
"          65.000    Flow length"
"          1.000    Overland Slope"
"          5.934    Pervious Area"
"          65.000    Pervious length"
"          1.000    Pervious slope"

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"      3.196  Impervious Area"
"      65.000  Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.985      1.309      1.309      0.133 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration  33.719      3.904      7.580      minutes"
"      Time to Centroid      136.938      116.671      119.170      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      3011.34      1621.49      4632.83      c.m"
"      Rainfall losses      47.070      2.251      31.383      mm"
"      Runoff depth      3.673      48.492      19.360      mm"
"      Runoff volume      217.97      1549.55      1767.53      c.m"
"      Runoff coefficient      0.072      0.956      0.382      "
"      Maximum flow      0.105      0.973      0.985      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.985      2.105      1.309      0.133"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      2.105      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      4554.0      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"

```

"	483.200	0.6560	2212.100"	
"	483.300	0.6620	2534.000"	
"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.655	c.m/sec"	
"	Maximum level	483.199	metre"	
"	Maximum storage	2209.387	c.m"	
"	Centroidal lag	5.580	hours"	
"	0.985	2.105	0.655	0.133 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	0.985	0.655	0.655	0.133"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.005hyd"			
"	Major flow at 2400"			
"	0.985	0.655	0.655	0.133 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	0.985	0.655	0.655	0.133"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	0.985	0.655	0.655	0.133"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.655	c.m/sec"		
"	Hydrograph volume	4547.246	c.m"		
"	0.985	0.655	0.655	0.655"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.985	0.000	0.655	0.655"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.166	0.000	0.655	0.655 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	66.364	7.683	42.123	minutes"
"	Time to Centroid	171.120	122.604	151.078	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	4791.66	252.19	5043.85	c.m"
"	Rainfall losses	47.071	1.640	44.800	mm"
"	Runoff depth	3.672	49.103	5.943	mm"
"	Runoff volume	346.71	244.04	590.75	c.m"
"	Runoff coefficient	0.072	0.968	0.117	"
"	Maximum flow	0.094	0.149	0.166	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.166	0.166	0.655	0.655"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.187	0.166	0.655	0.655 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	57.133	6.614	42.411	minutes"
"		Time to Centroid	161.454	120.984	149.660	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	7673.50	237.32	7910.83	c.m"
"		Rainfall losses	47.071	1.923	45.717	mm"
"		Runoff depth	3.671	48.820	5.026	mm"
"		Runoff volume	555.21	228.33	783.55	c.m"
"		Runoff coefficient	0.072	0.962	0.099	"
"		Maximum flow	0.171	0.139	0.187	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.187	0.340	0.655	0.655"
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"			0.187	0.340	0.340	0.655"
" 40		HYDROGRAPH Combine 5002"				
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow		0.340		c.m/sec"
"		Hydrograph volume		1374.296		c.m"
"			0.187	0.340	0.340	0.340"
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"			0.187	0.000	0.340	0.340"

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" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"  15.000   % Impervious"
"    0.360   Total Area"
"  40.000   Flow length"
"    1.000   Overland Slope"
"    0.306   Pervious Area"
"  40.000   Pervious length"
"    1.000   Pervious slope"
"    0.054   Impervious Area"
"  40.000   Impervious length"
"    1.000   Impervious slope"
"    0.250   Pervious Manning 'n'"
" 125.000   Pervious Max.infiltration"
"    5.000   Pervious Min.infiltration"
"    0.250   Pervious Lag constant (hours)"
"    5.000   Pervious Depression storage"
"    0.015   Impervious Manning 'n'"
"    0.000   Impervious Max.infiltration"
"    0.000   Impervious Min.infiltration"
"    0.050   Impervious Lag constant (hours)"
"    1.500   Impervious Depression storage"
"          0.019   0.000   0.340   0.340 c.m/sec"
"      Catchment 2450      Pervious   Impervious   Total Area   "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration 25.198      2.917      9.606      minutes"
"      Time to Centroid 127.987      115.104      118.972      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      155.27      27.40      182.67      c.m"
"      Rainfall losses      47.079      2.347      40.369      mm"
"      Runoff depth      3.664      48.396      10.374      mm"
"      Runoff volume      11.21      26.13      37.35      c.m"
"      Runoff coefficient      0.072      0.954      0.204      "
"      Maximum flow      0.007      0.017      0.019      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.019   0.019   0.340   0.340"
" 56      DIVERSION"
"      2450   Node number"
"    0.018   Overflow threshold"
"    1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.001      c.m/sec"
"      Volume of diverted flow      0.155      c.m"
"      DIV02450.005hyd"
"      Major flow at 2450"
"          0.019   0.019   0.018   0.340 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.662      c.m/sec"
"              Hydrograph volume          4584.436    c.m"
"                  0.019      0.019      0.018      0.662"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.662      c.m/sec"
"              Hydrograph volume          4584.436    c.m"
"                  0.019      0.662      0.018      0.000"
" 51      PIPE DESIGN"
"          0.662   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Surcharged HGL              0.620      %"
"              Velocity                    1.849      m/sec"
"              Pipe capacity                0.532      c.m/sec"
"              Critical depth                0.000      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length      ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag      ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag      ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step      ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.662      c.m/sec"
"                  0.019      0.662      0.662      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              0.972      c.m/sec"
"              Hydrograph volume          10060.851    c.m"
"                  0.019      0.662      0.662      0.972"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.019      0.000      0.662      0.972"
" 47      FILEI_0 Read/Open DIV02400.005hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"              DIV02400.005hyd"

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"          Major flow at 2400"
"          Total volume                0.000      c.m"
"          Maximum flow                0.000      c.m/sec"
"          0.000      0.000      0.662      0.972 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.662      0.972"
" 47      FILEI_O Read/Open DIV02450.005hyd"
"          1      1=read/open; 2=write/save"
"          2      1=rainfall; 2=hydrograph"
"          1      1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.005hyd"
"          Major flow at 2450"
"          Total volume                0.155      c.m"
"          Maximum flow                0.001      c.m/sec"
"          0.001      0.000      0.662      0.972 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.001      0.001      0.662      0.972"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.001      0.001      0.001      0.972"
" 40      HYDROGRAPH Combine 5005"
"          6      Combine "
"          5005      Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow                0.001      c.m/sec"
"          Hydrograph volume          0.155      c.m"
"          0.001      0.001      0.001      0.001"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.001      0.000      0.001      0.001"
" 33      CATCHMENT 2500"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"          2500      Catchment 2500"
"          0.000      % Impervious"
"          12.060      Total Area"
"          287.000      Flow length"
"          1.000      Overland Slope"
"          12.060      Pervious Area"
"          287.000      Pervious length"
"          1.000      Pervious slope"
"          0.000      Impervious Area"
"          287.000      Impervious length"
"          1.000      Impervious slope"
"          0.250      Pervious Manning 'n'"
"          125.000      Pervious Max.infiltration"
"          5.000      Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.097	0.000	0.001	0.001 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	82.196	9.516	82.195 minutes"
"		Time to Centroid	187.703	125.460	187.702 minutes"
"		Rainfall depth	50.743	50.743	50.743 mm"
"		Rainfall volume	6119.59	0.01	6119.60 c.m"
"		Rainfall losses	47.070	1.710	47.070 mm"
"		Runoff depth	3.673	49.033	3.673 mm"
"		Runoff volume	442.92	0.01	442.92 c.m"
"		Runoff coefficient	0.072	0.000	0.072 "
"		Maximum flow	0.097	0.000	0.097 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.097	0.097	0.001	0.001"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.114	0.097	0.001	0.001 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	85.587	9.908	85.586	minutes"
"	Time to Centroid	191.254	126.103	191.253	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	7591.14	0.01	7591.15	c.m"
"	Rainfall losses	47.070	1.748	47.070	mm"
"	Runoff depth	3.673	48.995	3.673	mm"
"	Runoff volume	549.49	0.01	549.49	c.m"
"	Runoff coefficient	0.072	0.000	0.072	"
"	Maximum flow	0.114	0.000	0.114	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.114	0.211	0.001	0.001"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.114	0.211	0.211	0.001"	
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.211		c.m/sec"	
"	Hydrograph volume	992.574		c.m"	
"	0.114	0.211	0.211	0.211"	
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	0.211		c.m/sec"	
"	Hydrograph volume	992.574		c.m"	
"	0.114	0.211	0.211	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.114	0.211	0.211	0.000"	
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	0.454		c.m/sec"	
"	Hydrograph volume	2366.869		c.m"	
"	0.114	0.211	0.211	0.454"	
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow	0.972		c.m/sec"	
"	Hydrograph volume	10060.851		c.m"	
"	0.114	0.972	0.211	0.000"	
" 51	PIPE DESIGN"				
"	0.972	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	0.750	Diameter	metre"		

```

"      0.400 Gradient %"
"      Surcharged HGL          0.763 %"
"      Velocity                2.201 m/sec"
"      Pipe capacity           0.704 c.m/sec"
"      Critical depth          0.000 metre"
" 53      ROUTE Pipe Route 760"
"      760.00 Pipe Route 760 Reach length ( metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
" 100.000 Routing time step ( seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          0.972 c.m/sec"
"      0.114 0.972 0.972 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          1.383 c.m/sec"
"      Hydrograph volume      12427.715 c.m"
"      0.114 0.972 0.972 1.383"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          1.383 c.m/sec"
"      Hydrograph volume      12427.714 c.m"
"      0.114 1.383 0.972 0.000"
" 52      CHANNEL DESIGN"
"      1.383 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.587 metre"
"      Velocity                1.252 m/sec"
"      Channel capacity        19.656 c.m/sec"
"      Critical depth          0.458 metre"
" 52      CHANNEL DESIGN"
"      1.383 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

```



```

"      0.  Cross-section type: 0=trapezoidal; 1=general"
"      1.000  Basewidth      metre"
"      1.500  Left bank slope"
"      1.500  Right bank slope"
"      2.000  Channel depth    metre"
"      1.000  Gradient      %"
"          Depth of flow          0.587      metre"
"          Velocity              1.252      m/sec"
"          Channel capacity      19.656      c.m/sec"
"          Critical depth        0.458      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2  Start - New Tributary"
"              0.114      0.000      0.972      0.000"
" 33      CATCHMENT 3100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3100  Catchment 3100"
"          35.000  % Impervious"
"          2.050  Total Area"
"          100.000  Flow length"
"              0.500  Overland Slope"
"              1.332  Pervious Area"
"          100.000  Pervious length"
"              0.500  Pervious slope"
"              0.717  Impervious Area"
"          100.000  Impervious length"
"              0.500  Impervious slope"
"              0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"              5.000  Pervious Min.infiltration"
"              0.250  Pervious Lag constant (hours)"
"              5.000  Pervious Depression storage"
"              0.015  Impervious Manning 'n'"
"              0.000  Impervious Max.infiltration"
"              0.000  Impervious Min.infiltration"
"              0.050  Impervious Lag constant (hours)"
"              1.500  Impervious Depression storage"
"                  0.214      0.000      0.972      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious      Total Area  "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration  53.757      6.223      12.043      minutes"
"          Time to Centroid      157.901      120.348      124.945      minutes"
"          Rainfall depth      50.743      50.743      50.743      mm"
"          Rainfall volume      676.15      364.08      1040.23      c.m"
"          Rainfall losses      47.073      1.888      31.258      mm"
"          Runoff depth      3.670      48.855      19.485      mm"
"          Runoff volume      48.90      350.54      399.44      c.m"
"          Runoff coefficient      0.072      0.963      0.384      "
"          Maximum flow      0.015      0.211      0.214      c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.214      0.214      0.972      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.278      0.214      0.972      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration 88.236      10.215      56.017      minutes"
"          Time to Centroid      194.021      126.574      166.168      minutes"
"          Rainfall depth      50.743      50.743      50.743      mm"
"          Rainfall volume      0.9815      0.0517      1.0331      ha-m"
"          Rainfall losses      47.071      1.659      44.800      mm"
"          Runoff depth      3.672      49.083      5.943      mm"
"          Runoff volume      710.32      499.67      1209.99      c.m"
"          Runoff coefficient      0.072      0.967      0.117      "
"          Maximum flow      0.144      0.258      0.278      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.278      0.492      0.972      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.089	0.492	0.972	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	35.466	4.106	7.955	minutes"
"		Time to Centroid	138.756	116.922	119.602	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	277.06	149.18	426.24	c.m"
"		Rainfall losses	47.073	2.023	31.305	mm"
"		Runoff depth	3.670	48.720	19.438	mm"
"		Runoff volume	20.04	143.24	163.28	c.m"
"		Runoff coefficient	0.072	0.960	0.383	"
"		Maximum flow	0.009	0.088	0.089	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.089	0.568	0.972	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.511	0.568	0.972	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	40.715	4.714	9.106	minutes"
"		Time to Centroid	144.265	117.850	121.073	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1668.94	898.66	2567.59	c.m"
"		Rainfall losses	47.073	1.696	31.191	mm"
"		Runoff depth	3.670	49.047	19.552	mm"
"		Runoff volume	120.71	868.62	989.33	c.m"
"		Runoff coefficient	0.072	0.967	0.385	"
"		Maximum flow	0.051	0.506	0.511	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.511	1.047	0.972	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.022	1.047	0.972	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	39.097	4.526	24.835	minutes"
"	Time to Centroid	142.577	117.560	132.256	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	607.39	31.97	639.36	c.m"
"	Rainfall losses	47.070	1.738	44.803	mm"
"	Runoff depth	3.673	49.005	5.939	mm"
"	Runoff volume	43.96	30.87	74.84	c.m"
"	Runoff coefficient	0.072	0.966	0.117	"
"	Maximum flow	0.019	0.018	0.022	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.022	1.069	0.972	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			135.350	hectare"
"	Total Impervious area			22.387	hectare"
"	Total % impervious			16.540"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_10yr.out"
"          Licensee name:                      "
"          Company                              "
"          Date & Time last used:                10/29/2024 at 8:48:59 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          5760.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          627.308  Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          150.159  mm/hr"
"          Total depth          58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.109	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	42.843	6.239	37.275	minutes"
"		Time to Centroid	177.675	120.047	168.908	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	2063.34	63.81	2127.16	c.m"
"		Rainfall losses	48.437	1.948	47.042	mm"
"		Runoff depth	9.682	56.171	11.077	mm"
"		Runoff volume	343.73	61.68	405.41	c.m"
"		Runoff coefficient	0.167	0.966	0.191	"
"		Maximum flow	0.104	0.037	0.109	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.109	0.109	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		2.482	0.109	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	85.165	12.403	29.964	minutes"
"		Time to Centroid	241.662	129.769	156.774	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1.0223	0.5504	1.5727	ha-m"
"		Rainfall losses	48.439	1.611	32.049	mm"
"		Runoff depth	9.680	56.508	26.070	mm"

"	Runoff volume	1702.60	5351.87	7054.47	c.m"
"	Runoff coefficient	0.167	0.972	0.449	"
"	Maximum flow	0.276	2.443	2.482	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.482	2.548	0.000	0.000"
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	Marsville South Subdivision Stormwater Management Facility"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.548		c.m/sec"
"	Hydrograph volume		7459.872		c.m"
" 54	POND DESIGN"				
"	2.548	Current peak flow			c.m/sec"
"	0.200	Target outflow			c.m/sec"
"	7459.9	Hydrograph volume			c.m"
"	24.	Number of stages"			
"	484.900	Minimum water level			metre"
"	487.200	Maximum water level			metre"
"	484.900	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	484.900	0.000	0.000"		
"	485.000	0.01200	642.900"		
"	485.100	0.02300	1316.600"		
"	485.200	0.1190	2021.300"		
"	485.300	0.3140	2757.200"		
"	485.400	0.3140	3524.300"		
"	485.500	0.3170	4322.900"		
"	485.600	0.3170	5153.000"		
"	485.700	0.3210	6014.900"		
"	485.800	0.3240	6908.700"		
"	485.900	0.3240	7834.500"		
"	486.000	0.3270	8792.400"		
"	486.100	0.3300	9782.700"		
"	486.200	0.3300	10805.50"		
"	486.300	0.3330	11860.90"		
"	486.400	0.3330	12949.00"		
"	486.500	0.3360	14070.10"		
"	486.600	0.3390	15224.30"		
"	486.700	0.3390	16411.70"		
"	486.800	0.3420	17632.50"		
"	486.900	0.3450	18886.90"		
"	487.000	0.3450	20174.90"		
"	487.100	1.389	21496.80"		
"	487.200	3.328	22852.30"		
"	Peak outflow		0.317		c.m/sec"
"	Maximum level		485.496		metre"


```

"           Maximum storage           4287.746    c.m"
"           Centroidal lag             8.607    hours"
"           2.482    2.548    0.317    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           2.482    0.317    0.317    0.000"
56 DIVERSION"
"           1300 Node number"
"           0.345 Overflow threshold"
"           1.000 Required diverted fraction"
"           0 Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow      0.000    c.m/sec"
"           Volume of diverted flow    0.000    c.m"
"           DIV01300.010hyd"
"           Overflow at the South Pond"
"           2.482    0.317    0.317    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           2.482    0.317    0.317    0.000"
81 ADD COMMENT=====
"           1 Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
51 PIPE DESIGN"
"           0.317 Current peak flow    c.m/sec"
"           0.013 Manning 'n'"
"           0.525 Diameter    metre"
"           0.500 Gradient    %"
"           Surcharged HGL            0.543    %"
"           Velocity                   1.464    m/sec"
"           Pipe capacity              0.304    c.m/sec"
"           Critical depth             0.000    metre"
53 ROUTE Pipe Route 546"
"           546.00 Pipe Route 546 Reach length ( metre)"
"           0.465 X-factor <= 0.5"
"           276.518 K-lag ( seconds)"
"           0.000 Default(0) or user spec.(1) values used"
"           0.500 X-factor <= 0.5"
"           30.000 K-lag ( seconds)"
"           0.000 Beta weighting factor"
"           0.000 Routing time step ( seconds)"
"           0 No. of sub-reaches"
"           Peak outflow              0.317    c.m/sec"
"           2.482    0.317    0.317    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           2.482    0.317    0.317    0.000"
40 HYDROGRAPH Copy to Outflow"
"           8 Copy to Outflow"
"           2.482    0.317    0.317    0.000"
40 HYDROGRAPH Combine 5000"

```

"	6	Combine "			
"	5000	Node #"			
"		Closed Pipe"			
"		Maximum flow	0.317	c.m/sec"	
"		Hydrograph volume	7455.943	c.m"	
"		2.482	0.317	0.317	0.317"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		2.482	0.000	0.317	0.317"
" 33		CATCHMENT 4000"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	4000	Catchment 4000"			
"	35.000	% Impervious"			
"	1.100	Total Area"			
"	50.000	Flow length"			
"	7.000	Overland Slope"			
"	0.715	Pervious Area"			
"	50.000	Pervious length"			
"	7.000	Pervious slope"			
"	0.385	Impervious Area"			
"	50.000	Impervious length"			
"	7.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.164	0.000	0.317	0.317 c.m/sec"
"		Catchment 4000	Pervious	Impervious	Total Area "
"		Surface Area	0.715	0.385	1.100 hectare"
"		Time of concentration	12.080	1.759	4.270 minutes"
"		Time to Centroid	131.168	112.601	117.118 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	415.55	223.76	639.31 c.m"
"		Rainfall losses	48.454	2.289	32.297 mm"
"		Runoff depth	9.665	55.830	25.823 mm"
"		Runoff volume	69.10	214.94	284.05 c.m"
"		Runoff coefficient	0.166	0.961	0.444 "
"		Maximum flow	0.052	0.148	0.164 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.164	0.164	0.317	0.317"
" 40		HYDROGRAPH Copy to Outflow"			

```

"      8   Copy to Outflow"
"      0.164      0.164      0.164      0.317"
" 40      HYDROGRAPH   Combine      5001"
"      6   Combine "
" 5001   Node #"
"      To Wetland South of Site"
"      Maximum flow      0.164      c.m/sec"
"      Hydrograph volume      284.048      c.m"
"      0.164      0.164      0.164      0.164"
" 40      HYDROGRAPH Start - New Tributary"
"      2   Start - New Tributary"
"      0.164      0.000      0.164      0.164"
" 47      FILEI_0 Read/Open DIV01300.010hyd"
"      1   1=read/open; 2=write/save"
"      2   1=rainfall; 2=hydrograph"
"      1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"      DIV01300.010hyd"
"      Overflow at the South Pond"
"      Total volume      0.000      c.m"
"      Maximum flow      0.000      c.m/sec"
"      0.000      0.000      0.164      0.164 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4   Add Runoff "
"      0.000      0.000      0.164      0.164"
" 33      CATCHMENT 2200"
"      1   Triangular SCS"
"      1   Equal length"
"      2   Horton equation"
"      2200   Catchment 2200"
"      35.000   % Impervious"
"      2.860   Total Area"
"      45.000   Flow length"
"      1.000   Overland Slope"
"      1.859   Pervious Area"
"      45.000   Pervious length"
"      1.000   Pervious slope"
"      1.001   Impervious Area"
"      45.000   Impervious length"
"      1.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"      125.000   Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.050   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"      0.484      0.000      0.164      0.164 c.m/sec"

```

	Catchment 2200	Pervious	Impervious	Total Area	
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	16.232	2.961	9.749	minutes"
"	Time to Centroid	126.786	114.830	120.946	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1080.43	581.77	1662.21	c.m"
"	Rainfall losses	26.769	2.517	18.281	mm"
"	Runoff depth	31.350	55.602	39.838	mm"
"	Runoff volume	582.80	556.58	1139.38	c.m"
"	Runoff coefficient	0.539	0.957	0.685	"
"	Maximum flow	0.346	0.372	0.484	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.484	0.484	0.164	0.164"	
" 33	CATCHMENT 2100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2100 Catchment 2100"				
"	50.000 % Impervious"				
"	1.140 Total Area"				
"	51.000 Flow length"				
"	0.500 Overland Slope"				
"	0.570 Pervious Area"				
"	51.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.570 Impervious Area"				
"	51.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n' "				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n' "				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.203	0.484	0.164	0.164 c.m/sec"	
"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	26.981	3.929	7.337	minutes"
"	Time to Centroid	153.690	116.351	121.872	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	331.28	331.28	662.56	c.m"
"	Rainfall losses	48.437	2.318	25.377	mm"
"	Runoff depth	9.682	55.802	32.742	mm"
"	Runoff volume	55.19	318.07	373.26	c.m"
"	Runoff coefficient	0.167	0.960	0.563	"

"	Maximum flow	0.024	0.199	0.203	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.203 0.687 0.164 0.164"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.687	c.m/sec"		
"	Hydrograph volume	1512.631	c.m"		
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.990 0.687 0.164 0.164 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration 27.841 4.055 9.835 minutes"				
"	Time to Centroid 154.997 116.514 125.866 minutes"				
"	Rainfall depth 58.119 58.119 58.119 mm"				
"	Rainfall volume 2991.97 1611.06 4603.03 c.m"				
"	Rainfall losses 48.443 2.150 32.241 mm"				
"	Runoff depth 9.676 55.969 25.878 mm"				
"	Runoff volume 498.11 1551.46 2049.57 c.m"				
"	Runoff coefficient 0.166 0.963 0.445 "				
"	Maximum flow 0.209 0.960 0.990 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

```

"          4  Add Runoff "
"              0.990      1.677      0.164      0.164"
" 81      ADD COMMENT=====
"          1  Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2  Flow hydrograph"
"          4  Inflow Hydrograph"
"              Maximum flow              1.677      c.m/sec"
"              Hydrograph volume      3562.207      c.m"
" 52      CHANNEL DESIGN"
"          1.677  Current peak flow      c.m/sec"
"          0.040  Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500  Basewidth      metre"
"          3.000  Left bank slope"
"          3.000  Right bank slope"
"          1.000  Channel depth      metre"
"          1.500  Gradient      %"
"              Depth of flow              0.442      metre"
"              Velocity              1.344      m/sec"
"              Channel capacity      9.529      c.m/sec"
"              Critical depth      0.387      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.470  X-factor <= 0.5"
"          135.089  K-lag      ( seconds)"
"          0.000  Default(0) or user spec.(1) values used"
"          0.500  X-factor <= 0.5"
"          30.000  K-lag      ( seconds)"
"          0.500  Beta weighting factor"
"          100.000  Routing time step      ( seconds)"
"          1  No. of sub-reaches"
"              Peak outflow              1.576      c.m/sec"
"              0.990      1.677      1.576      0.164 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5  Next link "
"              0.990      1.576      1.576      0.164"
" 33      CATCHMENT 2400"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          2400  Catchment 2400"
"          35.000  % Impervious"
"          9.130  Total Area"
"          65.000  Flow length"
"          1.000  Overland Slope"
"          5.934  Pervious Area"
"          65.000  Pervious length"
"          1.000  Pervious slope"

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"      3.196  Impervious Area"
"      65.000 Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.177      1.576      1.576      0.164 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration 25.348      3.691      8.985      minutes"
"      Time to Centroid      151.251      116.044      124.650      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      3449.08      1857.20      5306.27      c.m"
"      Rainfall losses      48.462      2.680      32.438      mm"
"      Runoff depth      9.657      55.439      25.681      mm"
"      Runoff volume      573.12      1771.56      2344.68      c.m"
"      Runoff coefficient      0.166      0.954      0.442      "
"      Maximum flow      0.272      1.136      1.177      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          1.177      2.540      1.576      0.164"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      2.540      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      5906.9      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"

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"	483.200	0.6560	2212.100"	
"	483.300	0.6620	2534.000"	
"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.669	c.m/sec"	
"	Maximum level	483.416	metre"	
"	Maximum storage	2926.564	c.m"	
"	Centroidal lag	5.116	hours"	
"	1.177	2.540	0.669	0.164 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.177	0.669	0.669	0.164"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.010hyd"			
"	Major flow at 2400"			
"	1.177	0.669	0.669	0.164 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.177	0.669	0.669	0.164"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	1.177	0.669	0.669	0.164"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.669	c.m/sec"		
"	Hydrograph volume	5913.385	c.m"		
"	1.177	0.669	0.669	0.669"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.177	0.000	0.669	0.669"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.272	0.000	0.669	0.669 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	49.890	7.265	39.892	minutes"
"	Time to Centroid	188.344	121.626	172.694	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	5488.19	288.85	5777.04	c.m"
"	Rainfall losses	48.440	1.765	46.106	mm"
"	Runoff depth	9.679	56.354	12.013	mm"
"	Runoff volume	913.98	280.08	1194.06	c.m"
"	Runoff coefficient	0.167	0.970	0.207	"
"	Maximum flow	0.251	0.171	0.272	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.272	0.272	0.669	0.669"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.463	0.272	0.669	0.669 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	42.950	6.255	37.368	minutes"
"		Time to Centroid	177.837	120.073	169.049	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	8788.95	271.82	9060.77	c.m"
"		Rainfall losses	48.437	1.950	47.043	mm"
"		Runoff depth	9.682	56.169	11.076	mm"
"		Runoff volume	1464.12	262.70	1726.82	c.m"
"		Runoff coefficient	0.167	0.966	0.191	"
"		Maximum flow	0.440	0.158	0.463	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.463	0.711	0.669	0.669"
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"			0.463	0.711	0.711	0.669"
" 40		HYDROGRAPH Combine 5002"				
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow		0.711		c.m/sec"
"		Hydrograph volume		2920.879		c.m"
"			0.463	0.711	0.711	0.711"
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"			0.463	0.000	0.711	0.711"

```

" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"    15.000   % Impervious"
"      0.360   Total Area"
"    40.000   Flow length"
"      1.000   Overland Slope"
"      0.306   Pervious Area"
"    40.000   Pervious length"
"      1.000   Pervious slope"
"      0.054   Impervious Area"
"    40.000   Impervious length"
"      1.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"   125.000   Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"          0.024      0.000      0.711      0.711 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration 18.942      2.759      10.768      minutes"
"      Time to Centroid    141.573      114.415      127.856      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      177.84      31.38      209.23      c.m"
"      Rainfall losses      48.469      2.308      41.545      mm"
"      Runoff depth      9.651      55.811      16.575      mm"
"      Runoff volume      29.53      30.14      59.67      c.m"
"      Runoff coefficient    0.166      0.960      0.285      "
"      Maximum flow      0.017      0.020      0.024      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.024      0.024      0.711      0.711"
" 56      DIVERSION"
"      2450   Node number"
"      0.018   Overflow threshold"
"      1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.006      c.m/sec"
"      Volume of diverted flow      4.348      c.m"
"      DIV02450.010hyd"
"      Major flow at 2450"
"          0.024      0.024      0.018      0.711 c.m/sec"

```

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.681      c.m/sec"
"              Hydrograph volume          5968.708    c.m"
"                  0.024      0.024      0.018      0.681"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.681      c.m/sec"
"              Hydrograph volume          5968.708    c.m"
"                  0.024      0.681      0.018      0.000"
" 51      PIPE DESIGN"
"          0.681   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Surcharged HGL              0.657      %"
"              Velocity                    1.903      m/sec"
"              Pipe capacity                0.532      c.m/sec"
"              Critical depth                0.000      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length  ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag  ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag  ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step  ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.681      c.m/sec"
"                  0.024      0.681      0.681      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              0.995      c.m/sec"
"              Hydrograph volume          13424.660    c.m"
"                  0.024      0.681      0.681      0.995"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.024      0.000      0.681      0.995"
" 47      FILEI_0 Read/Open DIV02400.010hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02400.010hyd"

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"          Major flow at 2400"
"          Total volume                0.000    c.m"
"          Maximum flow                0.000    c.m/sec"
"          0.000    0.000    0.681    0.995 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"          0.000    0.000    0.681    0.995"
" 47      FILEI_O Read/Open DIV02450.010hyd"
"          1    1=read/open; 2=write/save"
"          2    1=rainfall; 2=hydrograph"
"          1    1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.010hyd"
"          Major flow at 2450"
"          Total volume                4.348    c.m"
"          Maximum flow                0.006    c.m/sec"
"          0.006    0.000    0.681    0.995 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"          0.006    0.006    0.681    0.995"
" 40      HYDROGRAPH Copy to Outflow"
"          8    Copy to Outflow"
"          0.006    0.006    0.006    0.995"
" 40      HYDROGRAPH Combine 5005"
"          6    Combine "
"          5005    Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow                0.006    c.m/sec"
"          Hydrograph volume          4.348    c.m"
"          0.006    0.006    0.006    0.006"
" 40      HYDROGRAPH Start - New Tributary"
"          2    Start - New Tributary"
"          0.006    0.000    0.006    0.006"
" 33      CATCHMENT 2500"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"          2500    Catchment 2500"
"          0.000    % Impervious"
"          12.060    Total Area"
"          287.000    Flow length"
"          1.000    Overland Slope"
"          12.060    Pervious Area"
"          287.000    Pervious length"
"          1.000    Pervious slope"
"          0.000    Impervious Area"
"          287.000    Impervious length"
"          1.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"          125.000    Pervious Max.infiltration"
"          5.000    Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.251	0.000	0.006	0.006 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	61.792	8.999	61.791 minutes"
"		Time to Centroid	206.322	124.339	206.322 minutes"
"		Rainfall depth	58.119	58.119	58.119 mm"
"		Rainfall volume	7009.16	0.01	7009.16 c.m"
"		Rainfall losses	48.437	1.689	48.437 mm"
"		Runoff depth	9.682	56.430	9.682 mm"
"		Runoff volume	1167.64	0.01	1167.64 c.m"
"		Runoff coefficient	0.167	0.000	0.167 "
"		Maximum flow	0.251	0.000	0.251 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.251	0.251	0.006	0.006"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.307	0.251	0.006	0.006 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	64.340	9.370	64.340	minutes"
"	Time to Centroid	210.179	124.933	210.178	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	8694.61	0.01	8694.62	c.m"
"	Rainfall losses	48.437	1.722	48.437	mm"
"	Runoff depth	9.682	56.397	9.682	mm"
"	Runoff volume	1448.43	0.01	1448.44	c.m"
"	Runoff coefficient	0.167	0.000	0.167	"
"	Maximum flow	0.307	0.000	0.307	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.307	0.559	0.006	0.006"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.307	0.559	0.559	0.006"
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		0.559		c.m/sec"
"	Hydrograph volume		2620.430		c.m"
"		0.307	0.559	0.559	0.559"
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		0.559		c.m/sec"
"	Hydrograph volume		2620.430		c.m"
"		0.307	0.559	0.559	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.307	0.559	0.559	0.000"
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow		1.175		c.m/sec"
"	Hydrograph volume		5541.307		c.m"
"		0.307	0.559	0.559	1.175"
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow		0.995		c.m/sec"
"	Hydrograph volume		13424.660		c.m"
"		0.307	0.995	0.559	0.000"
" 51	PIPE DESIGN"				
"	0.995	Current peak flow		c.m/sec"	
"	0.013	Manning 'n'"			
"	0.750	Diameter		metre"	

```

"      0.400 Gradient %"
"      Surcharged HGL          0.799 %"
"      Velocity                2.252 m/sec"
"      Pipe capacity           0.704 c.m/sec"
"      Critical depth           0.000 metre"
" 53      ROUTE Pipe Route 760"
"      760.00 Pipe Route 760 Reach length ( metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
" 100.000 Routing time step ( seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          0.995 c.m/sec"
"      0.307 0.995 0.995 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          2.164 c.m/sec"
"      Hydrograph volume      18965.961 c.m"
"      0.307 0.995 0.995 2.164"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          2.164 c.m/sec"
"      Hydrograph volume      18965.961 c.m"
"      0.307 2.164 0.995 0.000"
" 52      CHANNEL DESIGN"
"      2.164 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.733 metre"
"      Velocity                1.407 m/sec"
"      Channel capacity        19.656 c.m/sec"
"      Critical depth           0.584 metre"
" 52      CHANNEL DESIGN"
"      2.164 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

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"      0.  Cross-section type: 0=trapezoidal; 1=general"
"      1.000  Basewidth      metre"
"      1.500  Left bank slope"
"      1.500  Right bank slope"
"      2.000  Channel depth  metre"
"      1.000  Gradient      %"
"          Depth of flow          0.733      metre"
"          Velocity              1.407      m/sec"
"          Channel capacity      19.656      c.m/sec"
"          Critical depth        0.584      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2  Start - New Tributary"
"              0.307      0.000      0.995      0.000"
" 33      CATCHMENT 3100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3100  Catchment 3100"
"          35.000  % Impervious"
"          2.050  Total Area"
"          100.000  Flow length"
"              0.500  Overland Slope"
"              1.332  Pervious Area"
"          100.000  Pervious length"
"              0.500  Pervious slope"
"              0.717  Impervious Area"
"          100.000  Impervious length"
"              0.500  Impervious slope"
"              0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"              5.000  Pervious Min.infiltration"
"              0.250  Pervious Lag constant (hours)"
"              5.000  Pervious Depression storage"
"              0.015  Impervious Manning 'n'"
"              0.000  Impervious Max.infiltration"
"              0.000  Impervious Min.infiltration"
"              0.050  Impervious Lag constant (hours)"
"              1.500  Impervious Depression storage"
"                  0.251      0.000      0.995      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious      Total Area  "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration  40.412      5.885      14.260      minutes"
"          Time to Centroid      174.013      119.470      132.701      minutes"
"          Rainfall depth      58.119      58.119      58.119      mm"
"          Rainfall volume      774.44      417.00      1191.44      c.m"
"          Rainfall losses      48.441      1.995      32.185      mm"
"          Runoff depth      9.678      56.124      25.934      mm"
"          Runoff volume      128.96      402.69      531.66      c.m"
"          Runoff coefficient      0.167      0.966      0.446      "
"          Maximum flow      0.042      0.239      0.251      c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.251      0.251      0.995      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.431      0.251      0.995      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration 66.332      9.660      53.035      minutes"
"          Time to Centroid 213.197      125.400      192.598      minutes"
"          Rainfall depth 58.119      58.119      58.119      mm"
"          Rainfall volume 1.1241      0.0592      1.1833      ha-m"
"          Rainfall losses 48.441      1.749      46.107      mm"
"          Runoff depth 9.678      56.370      12.013      mm"
"          Runoff volume 1871.92      573.85      2445.76      c.m"
"          Runoff coefficient 0.167      0.970      0.207      "
"          Maximum flow 0.393      0.305      0.431      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.431      0.626      0.995      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.106	0.626	0.995	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	26.662	3.883	9.439	minutes"
"		Time to Centroid	153.211	116.293	125.297	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	317.33	170.87	488.20	c.m"
"		Rainfall losses	48.439	2.392	32.323	mm"
"		Runoff depth	9.680	55.727	25.797	mm"
"		Runoff volume	52.85	163.84	216.69	c.m"
"		Runoff coefficient	0.167	0.959	0.444	"
"		Maximum flow	0.024	0.103	0.106	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.106	0.716	0.995	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.611	0.716	0.995	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	30.608	4.457	10.786	minutes"
"		Time to Centroid	159.183	117.112	127.293	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1911.54	1029.29	2940.83	c.m"
"		Rainfall losses	48.439	1.811	32.119	mm"
"		Runoff depth	9.681	56.308	26.000	mm"
"		Runoff volume	318.39	997.21	1315.61	c.m"
"		Runoff coefficient	0.167	0.969	0.447	"
"		Maximum flow	0.129	0.594	0.611	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.611	1.286	0.995	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.051	1.286	0.995	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	29.391	4.280	23.513	minutes"
"	Time to Centroid	157.347	116.830	147.862	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	695.69	36.62	732.30	c.m"
"	Rainfall losses	48.444	1.931	46.118	mm"
"	Runoff depth	9.676	56.188	12.001	mm"
"	Runoff volume	115.82	35.40	151.21	c.m"
"	Runoff coefficient	0.166	0.967	0.206	"
"	Maximum flow	0.048	0.021	0.051	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.051	1.324	0.995	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			135.350	hectare"
"	Total Impervious area			22.387	hectare"
"	Total % impervious			16.540"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_25yr.out"
"          Licensee name:                      "
"          Company                      "
"          Date & Time last used:                10/29/2024 at 8:51:00 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          5760.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          746.059  Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          175.653  mm/hr"
"          Total depth          67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"	0.202	0.000	0.000	0.000	c.m/sec"	
"	Catchment 1100	Pervious	Impervious	Total Area	"	
"	Surface Area	3.550	0.110	3.660	hectare"	
"	Time of concentration	35.541	5.860	32.627	minutes"	
"	Time to Centroid	175.235	118.972	169.711	minutes"	
"	Rainfall depth	67.239	67.239	67.239	mm"	
"	Rainfall volume	2387.11	73.83	2460.94	c.m"	
"	Rainfall losses	48.721	2.060	47.321	mm"	
"	Runoff depth	18.518	65.178	19.918	mm"	
"	Runoff volume	657.43	71.57	728.99	c.m"	
"	Runoff coefficient	0.275	0.969	0.296	"	
"	Maximum flow	0.194	0.043	0.202	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4	Add Runoff "				
"	0.202	0.202	0.000	0.000	"	
" 33	CATCHMENT 1300"					
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"	3.079	0.202	0.000	0.000	c.m/sec"	
"	Catchment 1300	Pervious	Impervious	Total Area	"	
"	Surface Area	17.589	9.471	27.060	hectare"	
"	Time of concentration	70.650	11.649	31.941	minutes"	
"	Time to Centroid	235.230	128.137	164.970	minutes"	
"	Rainfall depth	67.239	67.239	67.239	mm"	
"	Rainfall volume	1.1827	0.6368	1.8195	ha-m"	
"	Rainfall losses	48.711	1.603	32.223	mm"	
"	Runoff depth	18.528	65.636	35.016	mm"	

"	Runoff volume	3258.86	6216.37	9475.24	c.m"
"	Runoff coefficient	0.276	0.976	0.521	"
"	Maximum flow	0.531	2.989	3.079	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		3.079	3.187	0.000	0.000"
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	Marsville South Subdivision Stormwater Management Facility"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		3.187		c.m/sec"
"	Hydrograph volume	10204.229			c.m"
" 54	POND DESIGN"				
"	3.187	Current peak flow			c.m/sec"
"	0.200	Target outflow			c.m/sec"
"	10204.2	Hydrograph volume			c.m"
"	24.	Number of stages"			
"	484.900	Minimum water level			metre"
"	487.200	Maximum water level			metre"
"	484.900	Starting water level			metre"
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	484.900	0.000	0.000"		
"	485.000	0.01200	642.900"		
"	485.100	0.02300	1316.600"		
"	485.200	0.1190	2021.300"		
"	485.300	0.3140	2757.200"		
"	485.400	0.3140	3524.300"		
"	485.500	0.3170	4322.900"		
"	485.600	0.3170	5153.000"		
"	485.700	0.3210	6014.900"		
"	485.800	0.3240	6908.700"		
"	485.900	0.3240	7834.500"		
"	486.000	0.3270	8792.400"		
"	486.100	0.3300	9782.700"		
"	486.200	0.3300	10805.50"		
"	486.300	0.3330	11860.90"		
"	486.400	0.3330	12949.00"		
"	486.500	0.3360	14070.10"		
"	486.600	0.3390	15224.30"		
"	486.700	0.3390	16411.70"		
"	486.800	0.3420	17632.50"		
"	486.900	0.3450	18886.90"		
"	487.000	0.3450	20174.90"		
"	487.100	1.389	21496.80"		
"	487.200	3.328	22852.30"		
"	Peak outflow		0.321		c.m/sec"
"	Maximum level		485.712		metre"


```

"           Maximum storage           6123.028    c.m"
"           Centroidal lag             8.583    hours"
"           3.079    3.187    0.321    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           3.079    0.321    0.321    0.000"
56 DIVERSION"
"           1300    Node number"
"           0.345    Overflow threshold"
"           1.000    Required diverted fraction"
"           0    Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow       0.000    c.m/sec"
"           Volume of diverted flow     0.000    c.m"
"           DIV01300.025hyd"
"           Overflow at the South Pond"
"           3.079    0.321    0.321    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           3.079    0.321    0.321    0.000"
81 ADD COMMENT=====
"           1    Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
51 PIPE DESIGN"
"           0.321    Current peak flow    c.m/sec"
"           0.013    Manning 'n'"
"           0.525    Diameter    metre"
"           0.500    Gradient    %"
"           Surcharged HGL              0.558    %"
"           Velocity                    1.485    m/sec"
"           Pipe capacity                0.304    c.m/sec"
"           Critical depth               0.000    metre"
53 ROUTE    Pipe Route 546"
"           546.00    Pipe Route 546 Reach length    ( metre)"
"           0.465    X-factor <= 0.5"
"           276.518    K-lag    ( seconds)"
"           0.000    Default(0) or user spec.(1) values used"
"           0.500    X-factor <= 0.5"
"           30.000    K-lag    ( seconds)"
"           0.000    Beta weighting factor"
"           0.000    Routing time step    ( seconds)"
"           0    No. of sub-reaches"
"           Peak outflow                 0.321    c.m/sec"
"           3.079    0.321    0.321    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5    Next link "
"           3.079    0.321    0.321    0.000"
40 HYDROGRAPH Copy to Outflow"
"           8    Copy to Outflow"
"           3.079    0.321    0.321    0.000"
40 HYDROGRAPH    Combine    5000"

```

```

"          6   Combine "
"      5000   Node #"
"          Closed Pipe"
"          Maximum flow          0.321   c.m/sec"
"          Hydrograph volume      10202.575   c.m"
"              3.079   0.321   0.321   0.321"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              3.079   0.000   0.321   0.321"
" 33      CATCHMENT 4000"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      4000   Catchment 4000"
"      35.000 % Impervious"
"          1.100 Total Area"
"      50.000 Flow length"
"          7.000 Overland Slope"
"          0.715 Pervious Area"
"      50.000 Pervious length"
"          7.000 Pervious slope"
"          0.385 Impervious Area"
"      50.000 Impervious length"
"          7.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.207   0.000   0.321   0.321 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration 10.021      1.652      4.536      minutes"
"          Time to Centroid      131.749      112.001      118.806      minutes"
"          Rainfall depth      67.239      67.239      67.239      mm"
"          Rainfall volume      480.76      258.87      739.63      c.m"
"          Rainfall losses      48.899      2.449      32.642      mm"
"          Runoff depth      18.340      64.790      34.597      mm"
"          Runoff volume      131.13      249.44      380.57      c.m"
"          Runoff coefficient      0.273      0.964      0.515      "
"          Maximum flow      0.098      0.173      0.207      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"              0.207   0.207   0.321   0.321"
" 40      HYDROGRAPH Copy to Outflow"

```

"	8	Copy to Outflow"				
"		0.207	0.207	0.207	0.321"	
" 40		HYDROGRAPH Combine	5001"			
"	6	Combine "				
"	5001	Node #"				
"		To Wetland South of Site"				
"		Maximum flow	0.207		c.m/sec"	
"		Hydrograph volume	380.571		c.m"	
"		0.207	0.207	0.207	0.207"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.207	0.000	0.207	0.207"	
" 47		FILEI_0 Read/Open DIV01300.025hyd"				
"	1	1=read/open; 2=write/save"				
"	2	1=rainfall; 2=hydrograph"				
"	1	1=runoff; 2=inflow; 3=outflow; 4=junction"				
"		DIV01300.025hyd"				
"		Overflow at the South Pond"				
"		Total volume	0.000		c.m"	
"		Maximum flow	0.000		c.m/sec"	
"		0.000	0.000	0.207	0.207 c.m/sec"	
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.207	0.207"	
" 33		CATCHMENT 2200"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2200	Catchment 2200"				
"	35.000	% Impervious"				
"	2.860	Total Area"				
"	45.000	Flow length"				
"	1.000	Overland Slope"				
"	1.859	Pervious Area"				
"	45.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.001	Impervious Area"				
"	45.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.050	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.607	0.000	0.207	0.207 c.m/sec"	

"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	15.215	2.781	9.428	minutes"
"	Time to Centroid	127.913	113.998	121.437	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1249.97	673.06	1923.03	c.m"
"	Rainfall losses	27.168	2.463	18.521	mm"
"	Runoff depth	40.071	64.776	48.718	mm"
"	Runoff volume	744.92	648.41	1393.33	c.m"
"	Runoff coefficient	0.596	0.963	0.725	"
"	Maximum flow	0.432	0.439	0.607	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.607	0.607	0.207	0.207"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.245	0.607	0.207	0.207 c.m/sec"
---	--	-------	-------	-------	----------------

"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	22.382	3.690	7.858	minutes"
"	Time to Centroid	152.801	115.577	123.876	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	383.26	383.26	766.52	c.m"
"	Rainfall losses	48.772	2.879	25.826	mm"
"	Runoff depth	18.467	64.359	41.413	mm"
"	Runoff volume	105.26	366.85	472.11	c.m"
"	Runoff coefficient	0.275	0.957	0.616	"

"	Maximum flow	0.047	0.237	0.245	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.245 0.848 0.207 0.207"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.848		c.m/sec"	
"	Hydrograph volume	1865.443		c.m"	
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.209 0.848 0.207 0.207 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration 23.096 3.808 10.509 minutes"				
"	Time to Centroid 153.990 115.729 129.022 minutes"				
"	Rainfall depth 67.239 67.239 67.239 mm"				
"	Rainfall volume 3461.46 1863.86 5325.32 c.m"				
"	Rainfall losses 48.729 2.672 32.609 mm"				
"	Runoff depth 18.510 64.567 34.630 mm"				
"	Runoff volume 952.88 1789.80 2742.67 c.m"				
"	Runoff coefficient 0.275 0.960 0.515 "				
"	Maximum flow 0.421 1.142 1.209 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

```

"          4   Add Runoff "
"              1.209      2.056      0.207      0.207"
" 81      ADD COMMENT=====
"          1   Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"              Maximum flow              2.056      c.m/sec"
"              Hydrograph volume        4608.114      c.m"
" 52      CHANNEL DESIGN"
"          2.056   Current peak flow      c.m/sec"
"          0.040   Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500   Basewidth      metre"
"          3.000   Left bank slope"
"          3.000   Right bank slope"
"          1.000   Channel depth      metre"
"          1.500   Gradient      %"
"              Depth of flow              0.488      metre"
"              Velocity              1.419      m/sec"
"              Channel capacity        9.529      c.m/sec"
"              Critical depth          0.432      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.467      X-factor <= 0.5"
"          127.872      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.500      Beta weighting factor"
"          100.000      Routing time step      ( seconds)"
"          1   No. of sub-reaches"
"              Peak outflow              1.952      c.m/sec"
"                  1.209      2.056      1.952      0.207 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5   Next link "
"              1.209      1.952      1.952      0.207"
" 33      CATCHMENT 2400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2400   Catchment 2400"
"          35.000   % Impervious"
"          9.130   Total Area"
"          65.000   Flow length"
"          1.000   Overland Slope"
"          5.934   Pervious Area"
"          65.000   Pervious length"
"          1.000   Pervious slope"

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"      3.196  Impervious Area"
"      65.000  Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.440      1.952      1.952      0.207 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration  21.028      3.467      9.589      minutes"
"      Time to Centroid      150.423      115.200      127.479      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      3990.29      2148.62      6138.91      c.m"
"      Rainfall losses      48.713      2.954      32.697      mm"
"      Runoff depth      18.526      64.285      34.541      mm"
"      Runoff volume      1099.42      2054.22      3153.64      c.m"
"      Runoff coefficient      0.276      0.956      0.514      "
"      Maximum flow      0.497      1.350      1.440      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          1.440      3.158      1.952      0.207"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      3.158      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      7761.8      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"

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"	483.200	0.6560	2212.100"		
"	483.300	0.6620	2534.000"		
"	483.400	0.6680	2869.500"		
"	483.500	0.6740	3218.600"		
"	483.600	0.6790	3581.500"		
"	483.700	0.6910	3958.300"		
"	483.800	0.6970	4349.300"		
"	483.900	0.7020	4754.600"		
"	484.000	0.7070	5174.300"		
"	484.100	0.7120	5608.500"		
"	484.400	0.7290	7000.200"		
"	484.500	0.7340	7494.200"		
"	484.600	0.7390	8003.600"		
"	484.700	0.7440	8528.400"		
"	484.800	0.7470	9068.900"		
"	484.900	0.7490	9625.100"		
"	485.000	1.834	10197.30"		
"	485.100	3.843	10785.60"		
"	485.200	6.484	11390.10"		
"	Peak outflow	0.691	c.m/sec"		
"	Maximum level	483.705	metre"		
"	Maximum storage	3977.689	c.m"		
"	Centroidal lag	4.785	hours"		
"	1.440	3.158	0.691	0.207	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	1.440	0.691	0.691	0.207"	
" 56	DIVERSION"				
"	2400	Node number"			
"	0.747	Overflow threshold"			
"	1.000	Required diverted fraction"			
"	0	Conduit type; 1=Pipe;2=Channel"			
"	Peak of diverted flow	0.000	c.m/sec"		
"	Volume of diverted flow	0.000	c.m"		
"	DIV02400.025hyd"				
"	Major flow at 2400"				
"	1.440	0.691	0.691	0.207	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"	1.440	0.691	0.691	0.207"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"	1.440	0.691	0.691	0.207"	
" 81	ADD COMMENT=====				
"	2	Lines of comment"			
"	Thunderbird Drain Improvements - Marsville North "				
"	Subdivision Branch"				
" 40	HYDROGRAPH Combine 5004"				
"	6	Combine "			
"	5004	Node #"			

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.691	c.m/sec"		
"	Hydrograph volume	7754.392	c.m"		
"	1.440	0.691	0.691	0.691"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.440	0.000	0.691	0.691"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.509	0.000	0.691	0.691 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	41.387	6.824	35.983	minutes"
"	Time to Centroid	185.246	120.562	175.134	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	6349.37	334.18	6683.54	c.m"
"	Rainfall losses	48.726	2.062	46.393	mm"
"	Runoff depth	18.513	65.177	20.846	mm"
"	Runoff volume	1748.17	323.93	2072.10	c.m"
"	Runoff coefficient	0.275	0.969	0.310	"
"	Maximum flow	0.480	0.199	0.509	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.509	0.509	0.691	0.691"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			0.856	0.509	0.691	0.691 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	35.630	5.875	32.709	minutes"
"		Time to Centroid	175.384	118.999	169.850	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1.0168	0.0314	1.0483	ha-m"
"		Rainfall losses	48.719	2.068	47.320	mm"
"		Runoff depth	18.520	65.171	19.919	mm"
"		Runoff volume	2800.61	304.80	3105.41	c.m"
"		Runoff coefficient	0.275	0.969	0.296	"
"		Maximum flow	0.824	0.182	0.856	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.856	1.342	0.691	0.691"
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"			0.856	1.342	1.342	0.691"
" 40		HYDROGRAPH Combine 5002"				
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow		1.342		c.m/sec"
"		Hydrograph volume		5177.513		c.m"
"			0.856	1.342	1.342	1.342"
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"			0.856	0.000	1.342	1.342"

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" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"    15.000   % Impervious"
"      0.360   Total Area"
"    40.000   Flow length"
"      1.000   Overland Slope"
"      0.306   Pervious Area"
"    40.000   Pervious length"
"      1.000   Pervious slope"
"      0.054   Impervious Area"
"    40.000   Impervious length"
"      1.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"   125.000   Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"          0.039      0.000      1.342      1.342 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration  15.714      2.591      10.687      minutes"
"      Time to Centroid      141.430      113.606      130.772      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      205.75      36.31      242.06      c.m"
"      Rainfall losses      48.771      2.264      41.795      mm"
"      Runoff depth      18.468      64.975      25.444      mm"
"      Runoff volume      56.51      35.09      91.60      c.m"
"      Runoff coefficient      0.275      0.966      0.378      "
"      Maximum flow      0.035      0.024      0.039      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"          4   Add Runoff  "
"          0.039      0.039      1.342      1.342"
" 56      DIVERSION"
"      2450   Node number"
"      0.018   Overflow threshold"
"      1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.021      c.m/sec"
"      Volume of diverted flow      19.945      c.m"
"      DIV02450.025hyd"
"      Major flow at 2450"
"          0.039      0.039      0.018      1.342 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine  "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.699      c.m/sec"
"              Hydrograph volume          7826.042    c.m"
"                  0.039      0.039      0.018      0.699"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence  "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.699      c.m/sec"
"              Hydrograph volume          7826.042    c.m"
"                  0.039      0.699      0.018      0.000"
" 51      PIPE DESIGN"
"          0.699   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Surcharged HGL              0.692      %"
"              Velocity                    1.954      m/sec"
"              Pipe capacity                0.532      c.m/sec"
"              Critical depth              0.000      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length  ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag  ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag  ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step  ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.699      c.m/sec"
"                  0.039      0.699      0.699      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine  "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              1.016      c.m/sec"
"              Hydrograph volume          18028.641    c.m"
"                  0.039      0.699      0.699      1.016"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.039      0.000      0.699      1.016"
" 47      FILEI_0 Read/Open DIV02400.025hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"              DIV02400.025hyd"

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"          Major flow at 2400"
"          Total volume                0.000      c.m"
"          Maximum flow                0.000      c.m/sec"
"          0.000      0.000      0.699      1.016 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.699      1.016"
" 47      FILEI_O Read/Open DIV02450.025hyd"
"          1      1=read/open; 2=write/save"
"          2      1=rainfall; 2=hydrograph"
"          1      1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.025hyd"
"          Major flow at 2450"
"          Total volume                19.945      c.m"
"          Maximum flow                0.021      c.m/sec"
"          0.021      0.000      0.699      1.016 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.021      0.021      0.699      1.016"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.021      0.021      0.021      1.016"
" 40      HYDROGRAPH Combine 5005"
"          6      Combine "
"          5005      Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow                0.021      c.m/sec"
"          Hydrograph volume            19.945      c.m"
"          0.021      0.021      0.021      0.021"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.021      0.000      0.021      0.021"
" 33      CATCHMENT 2500"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"          2500      Catchment 2500"
"          0.000      % Impervious"
"          12.060      Total Area"
"          287.000      Flow length"
"          1.000      Overland Slope"
"          12.060      Pervious Area"
"          287.000      Pervious length"
"          1.000      Pervious slope"
"          0.000      Impervious Area"
"          287.000      Impervious length"
"          1.000      Impervious slope"
"          0.250      Pervious Manning 'n'"
"          125.000      Pervious Max.infiltration"
"          5.000      Pervious Min.infiltration"

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"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.488	0.000	0.021	0.021 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	51.260	8.452	51.260 minutes"
"		Time to Centroid	202.095	123.028	202.095 minutes"
"		Rainfall depth	67.239	67.239	67.239 mm"
"		Rainfall volume	8109.00	0.01	8109.01 c.m"
"		Rainfall losses	48.715	1.723	48.715 mm"
"		Runoff depth	18.524	65.516	18.524 mm"
"		Runoff volume	2233.98	0.01	2233.98 c.m"
"		Runoff coefficient	0.275	0.000	0.275 "
"		Maximum flow	0.488	0.000	0.488 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.488	0.488	0.021	0.021"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.576	0.488	0.021	0.021 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	53.374	8.800	53.374	minutes"
"	Time to Centroid	205.714	123.584	205.714	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1.0059	0.0000	1.0059	ha-m"
"	Rainfall losses	48.720	1.732	48.720	mm"
"	Runoff depth	18.519	65.507	18.519	mm"
"	Runoff volume	2770.43	0.01	2770.44	c.m"
"	Runoff coefficient	0.275	0.000	0.275	"
"	Maximum flow	0.576	0.000	0.576	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.576	1.057	0.021	0.021"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.576	1.057	1.057	0.021"
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.057		c.m/sec"
"	Hydrograph volume		5024.371		c.m"
"		0.576	1.057	1.057	1.057"
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.057		c.m/sec"
"	Hydrograph volume		5024.371		c.m"
"		0.576	1.057	1.057	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.576	1.057	1.057	0.000"
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow		2.242		c.m/sec"
"	Hydrograph volume		10201.879		c.m"
"		0.576	1.057	1.057	2.242"
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow		1.016		c.m/sec"
"	Hydrograph volume		18028.641		c.m"
"		0.576	1.016	1.057	0.000"
" 51	PIPE DESIGN"				
"	1.016 Current peak flow				c.m/sec"
"	0.013 Manning 'n'"				
"	0.750 Diameter				metre"

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"      0.400 Gradient %"
"      Surcharged HGL          0.832 %"
"      Velocity                2.299 m/sec"
"      Pipe capacity           0.704 c.m/sec"
"      Critical depth          0.000 metre"
" 53      ROUTE Pipe Route 760"
"      760.00 Pipe Route 760 Reach length ( metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
" 100.000 Routing time step ( seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          1.016 c.m/sec"
"      0.576 1.016 1.016 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          3.257 c.m/sec"
"      Hydrograph volume      28230.477 c.m"
"      0.576 1.016 1.016 3.257"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          3.257 c.m/sec"
"      Hydrograph volume      28230.477 c.m"
"      0.576 3.257 1.016 0.000"
" 52      CHANNEL DESIGN"
"      3.257 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.891 metre"
"      Velocity                1.563 m/sec"
"      Channel capacity        19.656 c.m/sec"
"      Critical depth          0.723 metre"
" 52      CHANNEL DESIGN"
"      3.257 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

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"      0.   Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth      metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth  metre"
"      1.000 Gradient      %"
"          Depth of flow          0.891      metre"
"          Velocity              1.563      m/sec"
"          Channel capacity      19.656      c.m/sec"
"          Critical depth        0.723      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.576      0.000      1.016      0.000"
" 33      CATCHMENT 3100"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          3100 Catchment 3100"
"          35.000 % Impervious"
"          2.050 Total Area"
"          100.000 Flow length"
"              0.500 Overland Slope"
"              1.332 Pervious Area"
"          100.000 Pervious length"
"              0.500 Pervious slope"
"              0.717 Impervious Area"
"          100.000 Impervious length"
"              0.500 Impervious slope"
"              0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"              5.000 Pervious Min.infiltration"
"              0.250 Pervious Lag constant (hours)"
"              5.000 Pervious Depression storage"
"              0.015 Impervious Manning 'n'"
"              0.000 Impervious Max.infiltration"
"              0.000 Impervious Min.infiltration"
"              0.050 Impervious Lag constant (hours)"
"              1.500 Impervious Depression storage"
"                  0.302      0.000      1.016      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious Total Area "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration 33.524      5.527      15.184      minutes"
"          Time to Centroid      171.778      118.383      136.800      minutes"
"          Rainfall depth      67.239      67.239      67.239      mm"
"          Rainfall volume      895.96      482.44      1378.40      c.m"
"          Rainfall losses      48.712      1.893      32.325      mm"
"          Runoff depth      18.527      65.346      34.914      mm"
"          Runoff volume      246.87      468.86      715.73      c.m"
"          Runoff coefficient      0.276      0.972      0.519      "
"          Maximum flow      0.078      0.275      0.302      c.m/sec"

```

```

" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"              0.302      0.302      1.016      0.000"
" 33      CATCHMENT 3000"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"          3000  Catchment 3000"
"          5.000  % Impervious"
"          20.360  Total Area"
"          323.000  Flow length"
"          1.000  Overland Slope"
"          19.342  Pervious Area"
"          323.000  Pervious length"
"          1.000  Pervious slope"
"          1.018  Impervious Area"
"          323.000  Impervious length"
"          1.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.783      0.302      1.016      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration      55.026      9.073      47.816      minutes"
"          Time to Centroid      208.530      124.016      195.269      minutes"
"          Rainfall depth      67.239      67.239      67.239      mm"
"          Rainfall volume      1.3005      0.0684      1.3690      ha-m"
"          Rainfall losses      48.711      1.726      46.362      mm"
"          Runoff depth      18.528      65.513      20.877      mm"
"          Runoff volume      3583.63      666.92      4250.55      c.m"
"          Runoff coefficient      0.276      0.974      0.310      "
"          Maximum flow      0.737      0.366      0.783      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"              0.783      0.866      1.016      0.000"
" 33      CATCHMENT 3200"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"          3200  Catchment 3200"
"          35.000  % Impervious"
"          0.840  Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.130	0.866	1.016	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	22.118	3.647	10.077	minutes"
"		Time to Centroid	152.328	115.517	128.333	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	367.12	197.68	564.81	c.m"
"		Rainfall losses	48.754	2.965	32.728	mm"
"		Runoff depth	18.485	64.274	34.511	mm"
"		Runoff volume	100.93	188.96	289.89	c.m"
"		Runoff coefficient	0.275	0.956	0.513	"
"		Maximum flow	0.045	0.123	0.130	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.130	0.940	1.016	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.746	0.940	1.016	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	25.391	4.186	11.505	minutes"
"		Time to Centroid	157.919	116.225	130.615	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2211.49	1190.80	3402.29	c.m"
"		Rainfall losses	48.753	2.099	32.424	mm"
"		Runoff depth	18.486	65.140	34.815	mm"
"		Runoff volume	608.01	1153.63	1761.63	c.m"
"		Runoff coefficient	0.275	0.969	0.518	"
"		Maximum flow	0.243	0.710	0.746	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.746	1.638	1.016	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.101	1.638	1.016	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	24.382	4.020	21.210	minutes"
"	Time to Centroid	156.183	116.000	149.924	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	804.85	42.36	847.21	c.m"
"	Rainfall losses	48.716	2.305	46.395	mm"
"	Runoff depth	18.523	64.934	20.844	mm"
"	Runoff volume	221.72	40.91	262.63	c.m"
"	Runoff coefficient	0.275	0.966	0.310	"
"	Maximum flow	0.096	0.026	0.101	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.101	1.701	1.016	0.000"	
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		135.350		hectare"
"	Total Impervious area		22.387		hectare"
"	Total % impervious		16.540"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_50yr.out"
"          Licensee name:                      "
"          Company                              "
"          Date & Time last used:                10/29/2024 at 8:58:39 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          5760.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          820.361  Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          194.803  mm/hr"
"          Total depth          74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.268	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	33.356	5.622	31.120	minutes"
"		Time to Centroid	171.836	118.392	167.527	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2639.85	81.64	2721.50	c.m"
"		Rainfall losses	48.832	1.991	47.427	mm"
"		Runoff depth	25.525	72.367	26.931	mm"
"		Runoff volume	906.21	79.46	985.66	c.m"
"		Runoff coefficient	0.343	0.973	0.362	"
"		Maximum flow	0.259	0.047	0.268	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.268	0.268	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		3.522	0.268	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	66.305	11.176	32.939	minutes"
"		Time to Centroid	227.609	127.257	166.871	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1.3079	0.7042	2.0121	ha-m"
"		Rainfall losses	48.839	1.695	32.338	mm"
"		Runoff depth	25.519	72.663	42.019	mm"

"	Runoff volume	0.4489	0.6882	1.1370	ha-m"
"	Runoff coefficient	0.343	0.977	0.565	"
"	Maximum flow	0.714	3.396	3.522	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		3.522	3.659	0.000	0.000"
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	Marsville South Subdivision Stormwater Management Facility"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		3.659		c.m/sec"
"	Hydrograph volume	12356.112			c.m"
" 54	POND DESIGN"				
"	3.659	Current peak flow		c.m/sec"	
"	0.200	Target outflow		c.m/sec"	
"	12356.1	Hydrograph volume		c.m"	
"	24.	Number of stages"			
"	484.900	Minimum water level		metre"	
"	487.200	Maximum water level		metre"	
"	484.900	Starting water level		metre"	
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	484.900	0.000	0.000"		
"	485.000	0.01200	642.900"		
"	485.100	0.02300	1316.600"		
"	485.200	0.1190	2021.300"		
"	485.300	0.3140	2757.200"		
"	485.400	0.3140	3524.300"		
"	485.500	0.3170	4322.900"		
"	485.600	0.3170	5153.000"		
"	485.700	0.3210	6014.900"		
"	485.800	0.3240	6908.700"		
"	485.900	0.3240	7834.500"		
"	486.000	0.3270	8792.400"		
"	486.100	0.3300	9782.700"		
"	486.200	0.3300	10805.50"		
"	486.300	0.3330	11860.90"		
"	486.400	0.3330	12949.00"		
"	486.500	0.3360	14070.10"		
"	486.600	0.3390	15224.30"		
"	486.700	0.3390	16411.70"		
"	486.800	0.3420	17632.50"		
"	486.900	0.3450	18886.90"		
"	487.000	0.3450	20174.90"		
"	487.100	1.389	21496.80"		
"	487.200	3.328	22852.30"		
"	Peak outflow		0.324		c.m/sec"
"	Maximum level		485.801		metre"


```

"           Maximum storage           6915.190    c.m"
"           Centroidal lag             8.952    hours"
"           3.522    3.659    0.324    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.522    0.324    0.324    0.000"
56 DIVERSION"
"           1300 Node number"
"           0.345 Overflow threshold"
"           1.000 Required diverted fraction"
"           0 Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow      0.000    c.m/sec"
"           Volume of diverted flow    0.000    c.m"
"           DIV01300.050hyd"
"           Overflow at the South Pond"
"           3.522    0.324    0.324    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.522    0.324    0.324    0.000"
81 ADD COMMENT=====
"           1 Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
51 PIPE DESIGN"
"           0.324 Current peak flow    c.m/sec"
"           0.013 Manning 'n'"
"           0.525 Diameter    metre"
"           0.500 Gradient    %"
"           Surcharged HGL            0.568    %"
"           Velocity                  1.497    m/sec"
"           Pipe capacity              0.304    c.m/sec"
"           Critical depth             0.000    metre"
53 ROUTE Pipe Route 546"
"           546.00 Pipe Route 546 Reach length ( metre)"
"           0.465 X-factor <= 0.5"
"           276.518 K-lag ( seconds)"
"           0.000 Default(0) or user spec.(1) values used"
"           0.500 X-factor <= 0.5"
"           30.000 K-lag ( seconds)"
"           0.000 Beta weighting factor"
"           0.000 Routing time step ( seconds)"
"           0 No. of sub-reaches"
"           Peak outflow              0.324    c.m/sec"
"           3.522    0.324    0.324    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.522    0.324    0.324    0.000"
40 HYDROGRAPH Copy to Outflow"
"           8 Copy to Outflow"
"           3.522    0.324    0.324    0.000"
40 HYDROGRAPH Combine 5000"

```

```

"          6   Combine "
"      5000   Node #"
"          Closed Pipe"
"          Maximum flow          0.324   c.m/sec"
"          Hydrograph volume      12346.680   c.m"
"          3.522   0.324   0.324   0.324"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"          3.522   0.000   0.324   0.324"
" 33      CATCHMENT 4000"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      4000   Catchment 4000"
"      35.000 % Impervious"
"          1.100   Total Area"
"      50.000   Flow length"
"          7.000   Overland Slope"
"          0.715   Pervious Area"
"      50.000   Pervious length"
"          7.000   Pervious slope"
"          0.385   Impervious Area"
"      50.000   Impervious length"
"          7.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"          5.000   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"          0.241   0.000   0.324   0.324 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration 9.405      1.585      4.686      minutes"
"          Time to Centroid      131.373      111.785      119.552      minutes"
"          Rainfall depth      74.358      74.358      74.358      mm"
"          Rainfall volume      531.66      286.28      817.94      c.m"
"          Rainfall losses      48.971      2.606      32.743      mm"
"          Runoff depth      25.387      71.752      41.615      mm"
"          Runoff volume      181.52      276.25      457.76      c.m"
"          Runoff coefficient      0.341      0.965      0.560      "
"          Maximum flow      0.132      0.192      0.241      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.241   0.241   0.324   0.324"
" 40      HYDROGRAPH Copy to Outflow"

```

```

"          8   Copy to Outflow"
"          0.241    0.241    0.241    0.324"
" 40        HYDROGRAPH   Combine    5001"
"          6   Combine "
" 5001      Node #"
"          To Wetland South of Site"
"          Maximum flow          0.241    c.m/sec"
"          Hydrograph volume      457.761    c.m"
"          0.241    0.241    0.241    0.241"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"          0.241    0.000    0.241    0.241"
" 47        FILEI_0 Read/Open DIV01300.050hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV01300.050hyd"
"          Overflow at the South Pond"
"          Total volume          0.000    c.m"
"          Maximum flow          0.000    c.m/sec"
"          0.000    0.000    0.241    0.241 c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.000    0.000    0.241    0.241"
" 33        CATCHMENT 2200"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2200  Catchment 2200"
"          35.000 % Impervious"
"          2.860  Total Area"
"          45.000 Flow length"
"          1.000  Overland Slope"
"          1.859  Pervious Area"
"          45.000 Pervious length"
"          1.000  Pervious slope"
"          1.001  Impervious Area"
"          45.000 Impervious length"
"          1.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.050  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.709    0.000    0.241    0.241 c.m/sec"

```

"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	14.581	2.668	9.189	minutes"
"	Time to Centroid	128.562	113.597	121.789	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1382.31	744.32	2126.63	c.m"
"	Rainfall losses	27.517	2.436	18.739	mm"
"	Runoff depth	46.841	71.922	55.619	mm"
"	Runoff volume	870.77	719.94	1590.70	c.m"
"	Runoff coefficient	0.630	0.967	0.748	"
"	Maximum flow	0.499	0.489	0.709	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.709	0.709	0.241	0.241"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"	0.277	0.709	0.241	0.241 c.m/sec"
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"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	21.006	3.541	8.147	minutes"
"	Time to Centroid	150.939	115.159	124.597	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	423.84	423.84	847.68	c.m"
"	Rainfall losses	48.834	3.111	25.972	mm"
"	Runoff depth	25.524	71.247	48.385	mm"
"	Runoff volume	145.49	406.11	551.59	c.m"
"	Runoff coefficient	0.343	0.958	0.651	"

"	Maximum flow	0.060	0.265	0.277	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.277 0.970 0.241 0.241"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	0.970	c.m/sec"		
"	Hydrograph volume	2142.296	c.m"		
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.376 0.970 0.241 0.241 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration 21.676 3.654 10.850 minutes"				
"	Time to Centroid 152.088 115.358 130.024 minutes"				
"	Rainfall depth 74.358 74.358 74.358 mm"				
"	Rainfall volume 3827.94 2061.20 5889.14 c.m"				
"	Rainfall losses 48.855 3.104 32.843 mm"				
"	Runoff depth 25.502 71.253 41.515 mm"				
"	Runoff volume 1312.86 1975.15 3288.01 c.m"				
"	Runoff coefficient 0.343 0.958 0.558 "				
"	Maximum flow 0.535 1.280 1.376 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

```

"          4   Add Runoff "
"              1.376      2.346      0.241      0.241"
" 81      ADD COMMENT=====
"          1   Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"              Maximum flow              2.346      c.m/sec"
"              Hydrograph volume          5430.306      c.m"
" 52      CHANNEL DESIGN"
"          2.346   Current peak flow      c.m/sec"
"          0.040   Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500   Basewidth      metre"
"          3.000   Left bank slope"
"          3.000   Right bank slope"
"          1.000   Channel depth      metre"
"          1.500   Gradient      %"
"              Depth of flow              0.521      metre"
"              Velocity                  1.470      m/sec"
"              Channel capacity          9.529      c.m/sec"
"              Critical depth            0.463      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.465      X-factor <= 0.5"
"          123.441      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.500      Beta weighting factor"
"          100.000      Routing time step      ( seconds)"
"          1   No. of sub-reaches"
"              Peak outflow              2.226      c.m/sec"
"              1.376      2.346      2.226      0.241 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5   Next link "
"              1.376      2.226      2.226      0.241"
" 33      CATCHMENT 2400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2400   Catchment 2400"
"          35.000   % Impervious"
"          9.130   Total Area"
"          65.000   Flow length"
"          1.000   Overland Slope"
"          5.934   Pervious Area"
"          65.000   Pervious length"
"          1.000   Pervious slope"

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"      3.196  Impervious Area"
"      65.000 Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.639      2.226      2.226      0.241 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration 19.735      3.326      9.878      minutes"
"      Time to Centroid      148.817      114.795      128.379      minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume      4412.76      2376.10      6788.87      c.m"
"      Rainfall losses      48.876      3.160      32.875      mm"
"      Runoff depth      25.482      71.198      41.482      mm"
"      Runoff volume      1512.21      2275.13      3787.34      c.m"
"      Runoff coefficient      0.343      0.958      0.558      "
"      Maximum flow      0.635      1.509      1.639      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          1.639      3.598      2.226      0.241"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      3.598      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      9217.6      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"

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"	483.200	0.6560	2212.100"	
"	483.300	0.6620	2534.000"	
"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.703	c.m/sec"	
"	Maximum level	483.912	metre"	
"	Maximum storage	4803.246	c.m"	
"	Centroidal lag	4.727	hours"	
"	1.639	3.598	0.703	0.241 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.639	0.703	0.703	0.241"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.050hyd"			
"	Major flow at 2400"			
"	1.639	0.703	0.703	0.241 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.639	0.703	0.703	0.241"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	1.639	0.703	0.703	0.241"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.703	c.m/sec"		
"	Hydrograph volume	9209.691	c.m"		
"	1.639	0.703	0.703	0.703"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.639	0.000	0.703	0.703"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.640	0.000	0.703	0.703 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	38.842	6.547	34.654	minutes"
"	Time to Centroid	181.131	119.947	173.197	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	7021.61	369.56	7391.16	c.m"
"	Rainfall losses	48.837	2.107	46.501	mm"
"	Runoff depth	25.521	72.250	27.857	mm"
"	Runoff volume	2409.93	359.08	2769.01	c.m"
"	Runoff coefficient	0.343	0.972	0.375	"
"	Maximum flow	0.608	0.219	0.640	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.640	0.640	0.703	0.703"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.136 0.640 0.703 0.703 c.m/sec"				
"		Catchment 1500 Pervious Impervious Total Area "				
"		Surface Area 15.122 0.468 15.590 hectare"				
"		Time of concentration 33.439 5.636 31.198 minutes"				
"		Time to Centroid 171.977 118.416 167.660 minutes"				
"		Rainfall depth 74.358 74.358 74.358 mm"				
"		Rainfall volume 1.1245 0.0348 1.1592 ha-m"				
"		Rainfall losses 48.832 1.996 47.427 mm"				
"		Runoff depth 25.525 72.361 26.930 mm"				
"		Runoff volume 3860.02 338.43 4198.46 c.m"				
"		Runoff coefficient 0.343 0.973 0.362 "				
"		Maximum flow 1.102 0.200 1.136 c.m/sec"				
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.136 1.717 0.703 0.703"				
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		1.136 1.717 1.717 0.703"				
" 40		HYDROGRAPH Combine 5002"				
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow 1.717 c.m/sec"				
"		Hydrograph volume 6967.466 c.m"				
"		1.136 1.717 1.717 1.717"				
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		1.136 0.000 1.717 1.717"				

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" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"  15.000   % Impervious"
"    0.360   Total Area"
"  40.000   Flow length"
"    1.000   Overland Slope"
"    0.306   Pervious Area"
"  40.000   Pervious length"
"    1.000   Pervious slope"
"    0.054   Impervious Area"
"  40.000   Impervious length"
"    1.000   Impervious slope"
"    0.250   Pervious Manning 'n'"
" 125.000   Pervious Max.infiltration"
"    5.000   Pervious Min.infiltration"
"    0.250   Pervious Lag constant (hours)"
"    5.000   Pervious Depression storage"
"    0.015   Impervious Manning 'n'"
"    0.000   Impervious Max.infiltration"
"    0.000   Impervious Min.infiltration"
"    0.050   Impervious Lag constant (hours)"
"    1.500   Impervious Depression storage"
"          0.049    0.000    1.717    1.717 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration 14.748      2.486      10.667      minutes"
"      Time to Centroid    140.371     113.245     131.344     minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume     227.53      40.15      267.69      c.m"
"      Rainfall losses     48.840      2.238      41.850      mm"
"      Runoff depth        25.517      72.120      32.508      mm"
"      Runoff volume       78.08      38.94      117.03      c.m"
"      Runoff coefficient   0.343      0.970      0.437      "
"      Maximum flow        0.044      0.027      0.049      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.049    0.049    1.717    1.717"
" 56      DIVERSION"
"      2450   Node number"
"    0.018   Overflow threshold"
"    1.000   Required diverted fraction"
"    0       Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow    0.031    c.m/sec"
"      Volume of diverted flow  32.003    c.m"
"      DIV02450.050hyd"
"      Major flow at 2450"
"          0.049    0.049    0.018    1.717 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.715      c.m/sec"
"              Hydrograph volume          9294.719    c.m"
"                  0.049      0.049      0.018      0.715"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.715      c.m/sec"
"              Hydrograph volume          9294.719    c.m"
"                  0.049      0.715      0.018      0.000"
" 51      PIPE DESIGN"
"          0.715   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Surcharged HGL              0.723      %"
"              Velocity                    1.997      m/sec"
"              Pipe capacity                0.532      c.m/sec"
"              Critical depth                0.000      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length      ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag      ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag      ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step      ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.715      c.m/sec"
"                  0.049      0.715      0.715      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              1.032      c.m/sec"
"              Hydrograph volume          21641.426    c.m"
"                  0.049      0.715      0.715      1.032"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.049      0.000      0.715      1.032"
" 47      FILEI_0 Read/Open DIV02400.050hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02400.050hyd"

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"          Major flow at 2400"
"          Total volume              0.000      c.m"
"          Maximum flow              0.000      c.m/sec"
"          0.000      0.000      0.715      1.032 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.715      1.032"
" 47      FILEI_0 Read/Open DIV02450.050hyd"
"          1      1=read/open; 2=write/save"
"          2      1=rainfall; 2=hydrograph"
"          1      1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.050hyd"
"          Major flow at 2450"
"          Total volume              32.003      c.m"
"          Maximum flow              0.031      c.m/sec"
"          0.031      0.000      0.715      1.032 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.031      0.031      0.715      1.032"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.031      0.031      0.031      1.032"
" 40      HYDROGRAPH Combine 5005"
"          6      Combine "
"          5005      Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow              0.031      c.m/sec"
"          Hydrograph volume          32.003      c.m"
"          0.031      0.031      0.031      0.031"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.031      0.000      0.031      0.031"
" 33      CATCHMENT 2500"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"          2500      Catchment 2500"
"          0.000      % Impervious"
"          12.060      Total Area"
"          287.000      Flow length"
"          1.000      Overland Slope"
"          12.060      Pervious Area"
"          287.000      Pervious length"
"          1.000      Pervious slope"
"          0.000      Impervious Area"
"          287.000      Impervious length"
"          1.000      Impervious slope"
"          0.250      Pervious Manning 'n'"
"          125.000      Pervious Max.infiltration"
"          5.000      Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.649	0.000	0.031	0.031 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	48.108	8.109	48.108 minutes"
"		Time to Centroid	196.811	122.402	196.811 minutes"
"		Rainfall depth	74.358	74.358	74.358 mm"
"		Rainfall volume	8967.54	0.01	8967.55 c.m"
"		Rainfall losses	48.837	1.697	48.837 mm"
"		Runoff depth	25.521	72.661	25.521 mm"
"		Runoff volume	3077.85	0.01	3077.86 c.m"
"		Runoff coefficient	0.343	0.000	0.343 "
"		Maximum flow	0.649	0.000	0.649 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.649	0.649	0.031	0.031"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.766	0.649	0.031	0.031 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	50.092	8.443	50.092	minutes"
"	Time to Centroid	200.168	122.877	200.168	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1.1124	0.0000	1.1124	ha-m"
"	Rainfall losses	48.840	1.746	48.840	mm"
"	Runoff depth	25.518	72.612	25.518	mm"
"	Runoff volume	3817.47	0.01	3817.48	c.m"
"	Runoff coefficient	0.343	0.000	0.343	"
"	Maximum flow	0.766	0.000	0.766	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.766	1.415	0.031	0.031"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.766	1.415	1.415	0.031"
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.415		c.m/sec"
"	Hydrograph volume		6927.344		c.m"
"		0.766	1.415	1.415	1.415"
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.415		c.m/sec"
"	Hydrograph volume		6927.345		c.m"
"		0.766	1.415	1.415	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.766	1.415	1.415	0.000"
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow		2.932		c.m/sec"
"	Hydrograph volume		13894.805		c.m"
"		0.766	1.415	1.415	2.932"
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow		1.032		c.m/sec"
"	Hydrograph volume		21641.426		c.m"
"		0.766	1.032	1.415	0.000"
" 51	PIPE DESIGN"				
"	1.032 Current peak flow				c.m/sec"
"	0.013 Manning 'n'"				
"	0.750 Diameter				metre"

```

"      0.400 Gradient %"
"      Surcharged HGL          0.858 %"
"      Velocity                2.335 m/sec"
"      Pipe capacity           0.704 c.m/sec"
"      Critical depth           0.000 metre"
" 53      ROUTE      Pipe Route 760"
"      760.00      Pipe Route 760 Reach length (metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag (seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag (seconds)"
"      0.500 Beta weighting factor"
" 100.000 Routing time step (seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          1.032 c.m/sec"
"      0.766 1.032 1.032 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          3.964 c.m/sec"
"      Hydrograph volume      35536.234 c.m"
"      0.766 1.032 1.032 3.964"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          3.964 c.m/sec"
"      Hydrograph volume      35536.230 c.m"
"      0.766 3.964 1.032 0.000"
" 52      CHANNEL DESIGN"
"      3.964 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          0.978 metre"
"      Velocity                1.643 m/sec"
"      Channel capacity        19.656 c.m/sec"
"      Critical depth           0.800 metre"
" 52      CHANNEL DESIGN"
"      3.964 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

```



```

"      0.   Cross-section type: 0=trapezoidal; 1=general"
"      1.000  Basewidth      metre"
"      1.500  Left bank slope"
"      1.500  Right bank slope"
"      2.000  Channel depth   metre"
"      1.000  Gradient      %"
"          Depth of flow          0.978      metre"
"          Velocity              1.643      m/sec"
"          Channel capacity      19.656      c.m/sec"
"          Critical depth        0.800      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.766      0.000      1.032      0.000"
" 33      CATCHMENT 3100"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          3100  Catchment 3100"
"          35.000 % Impervious"
"          2.050  Total Area"
"          100.000 Flow length"
"              0.500  Overland Slope"
"              1.332  Pervious Area"
"          100.000 Pervious length"
"              0.500  Pervious slope"
"              0.717  Impervious Area"
"          100.000 Impervious length"
"              0.500  Impervious slope"
"              0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"              5.000  Pervious Min.infiltration"
"              0.250  Pervious Lag constant (hours)"
"              5.000  Pervious Depression storage"
"              0.015  Impervious Manning 'n'"
"              0.000  Impervious Max.infiltration"
"              0.000  Impervious Min.infiltration"
"              0.050  Impervious Lag constant (hours)"
"              1.500  Impervious Depression storage"
"                  0.338      0.000      1.032      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious Total Area "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration 31.463      5.303      15.635      minutes"
"          Time to Centroid      168.659      117.853      137.919      minutes"
"          Rainfall depth      74.358      74.358      74.358      mm"
"          Rainfall volume      990.82      533.52      1524.33      c.m"
"          Rainfall losses      48.857      1.808      32.390      mm"
"          Runoff depth      25.501      72.550      41.968      mm"
"          Runoff volume      339.80      520.54      860.34      c.m"
"          Runoff coefficient      0.343      0.976      0.564      "
"          Maximum flow      0.104      0.301      0.338      c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.338      0.338      1.032      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              1.012      0.338      1.032      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration 51.643      8.705      46.053      minutes"
"          Time to Centroid 202.786      123.296      192.438      minutes"
"          Rainfall depth      74.358      74.358      74.358      mm"
"          Rainfall volume      1.4382      0.0757      1.5139      ha-m"
"          Rainfall losses      48.832      1.773      46.479      mm"
"          Runoff depth      25.526      72.585      27.879      mm"
"          Runoff volume      4937.18      738.91      5676.09      c.m"
"          Runoff coefficient      0.343      0.976      0.375      "
"          Maximum flow      0.953      0.411      1.012      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              1.012      1.130      1.032      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.148	1.130	1.032	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	20.758	3.499	10.393	minutes"
"		Time to Centroid	150.514	115.093	129.243	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	405.99	218.61	624.61	c.m"
"		Rainfall losses	48.835	3.107	32.831	mm"
"		Runoff depth	25.522	71.250	41.527	mm"
"		Runoff volume	139.35	209.48	348.83	c.m"
"		Runoff coefficient	0.343	0.958	0.558	"
"		Maximum flow	0.058	0.137	0.148	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.148	1.170	1.032	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.849	1.170	1.032	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	23.830	4.017	11.885	minutes"
"		Time to Centroid	155.737	115.834	131.680	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2445.63	1316.88	3762.50	c.m"
"		Rainfall losses	48.833	2.393	32.579	mm"
"		Runoff depth	25.525	71.965	41.779	mm"
"		Runoff volume	839.52	1274.50	2114.03	c.m"
"		Runoff coefficient	0.343	0.968	0.562	"
"		Maximum flow	0.330	0.797	0.849	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.849	1.888	1.032	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.128	1.888	1.032	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	22.882	3.857	20.430	minutes"
"	Time to Centroid	154.149	115.624	149.184	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	890.06	46.85	936.91	c.m"
"	Rainfall losses	48.865	2.693	46.556	mm"
"	Runoff depth	25.493	71.664	27.801	mm"
"	Runoff volume	305.15	45.15	350.30	c.m"
"	Runoff coefficient	0.343	0.964	0.374	"
"	Maximum flow	0.122	0.029	0.128	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.128	1.968	1.032	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			135.350	hectare"
"	Total Impervious area			22.387	hectare"
"	Total % impervious			16.540"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                    Post_100yr.out"
"          Licensee name:                     "
"          Company                             "
"          Date & Time last used:              10/29/2024 at 9:00:35 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000 Max. Storm length"
"          5760.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          901.088 Coefficient A"
"          0.043  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          212.928  mm/hr"
"          Total depth                81.221  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000 Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000 Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000 Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.344	0.000	0.000	0.000 c.m/sec"	
"		Catchment 1100	Pervious	Impervious	Total Area	"
"		Surface Area	3.550	0.110	3.660	hectare"
"		Time of concentration	31.664	5.426	29.808	minutes"
"		Time to Centroid	168.233	117.886	164.671	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2883.50	89.18	2972.68	c.m"
"		Rainfall losses	48.998	1.908	47.585	mm"
"		Runoff depth	32.223	79.313	33.636	mm"
"		Runoff volume	1143.98	87.09	1231.06	c.m"
"		Runoff coefficient	0.397	0.977	0.414	"
"		Maximum flow	0.335	0.051	0.344	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.344	0.344	0.000	0.000"	
" 33		CATCHMENT 1300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	1300	Catchment 1300"				
"	35.000	% Impervious"				
"	27.060	Total Area"				
"	600.000	Flow length"				
"	1.500	Overland Slope"				
"	17.589	Pervious Area"				
"	600.000	Pervious length"				
"	1.500	Pervious slope"				
"	9.471	Impervious Area"				
"	600.000	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		3.963	0.344	0.000	0.000 c.m/sec"	
"		Catchment 1300	Pervious	Impervious	Total Area	"
"		Surface Area	17.589	9.471	27.060	hectare"
"		Time of concentration	62.943	10.785	33.195	minutes"
"		Time to Centroid	220.024	126.471	166.667	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.4286	0.7692	2.1978	ha-m"
"		Rainfall losses	48.968	1.710	32.428	mm"
"		Runoff depth	32.252	79.511	48.793	mm"

```

"      Runoff volume      0.5673      0.7530      1.3203      ha-m"
"      Runoff coefficient  0.397      0.979      0.601      "
"      Maximum flow       0.884      3.794      3.963      c.m/sec"
" 40    HYDROGRAPH Add Runoff "
"      4    Add Runoff "
"          3.963      4.134      0.000      0.000"
" 81    ADD COMMENT=====
"      1    Lines of comment"
"          Marsville South Subdivision Stormwater Management Facility"
" 64    SHOW TABLE"
"      2    Flow hydrograph"
"      4    Inflow Hydrograph"
"          Maximum flow      4.134      c.m/sec"
"          Hydrograph volume  14434.398      c.m"
" 54    POND DESIGN"
"      4.134    Current peak flow      c.m/sec"
"      0.200    Target outflow      c.m/sec"
"      14434.4    Hydrograph volume      c.m"
"      24.    Number of stages"
"      484.900    Minimum water level      metre"
"      487.200    Maximum water level      metre"
"      484.900    Starting water level      metre"
"      0    Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      484.900      0.000      0.000"
"      485.000      0.01200      642.900"
"      485.100      0.02300      1316.600"
"      485.200      0.1190      2021.300"
"      485.300      0.3140      2757.200"
"      485.400      0.3140      3524.300"
"      485.500      0.3170      4322.900"
"      485.600      0.3170      5153.000"
"      485.700      0.3210      6014.900"
"      485.800      0.3240      6908.700"
"      485.900      0.3240      7834.500"
"      486.000      0.3270      8792.400"
"      486.100      0.3300      9782.700"
"      486.200      0.3300      10805.50"
"      486.300      0.3330      11860.90"
"      486.400      0.3330      12949.00"
"      486.500      0.3360      14070.10"
"      486.600      0.3390      15224.30"
"      486.700      0.3390      16411.70"
"      486.800      0.3420      17632.50"
"      486.900      0.3450      18886.90"
"      487.000      0.3450      20174.90"
"      487.100      1.389      21496.80"
"      487.200      3.328      22852.30"
"      Peak outflow      0.329      c.m/sec"
"      Maximum level      486.063      metre"

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"           Maximum storage           9416.322    c.m"
"           Centroidal lag             9.465    hours"
"           3.963    4.134    0.329    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.963    0.329    0.329    0.000"
56 DIVERSION"
"           1300 Node number"
"           0.345 Overflow threshold"
"           1.000 Required diverted fraction"
"           0 Conduit type; 1=Pipe;2=Channel"
"           Peak of diverted flow      0.000    c.m/sec"
"           Volume of diverted flow    0.000    c.m"
"           DIV01300.100hyd"
"           Overflow at the South Pond"
"           3.963    0.329    0.329    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.963    0.329    0.329    0.000"
81 ADD COMMENT=====
"           1 Lines of comment"
"           Thunderbird Drain Improvements - Marsville South Branch"
51 PIPE DESIGN"
"           0.329 Current peak flow    c.m/sec"
"           0.013 Manning 'n'"
"           0.525 Diameter    metre"
"           0.500 Gradient    %"
"           Surcharged HGL            0.585    %"
"           Velocity                   1.519    m/sec"
"           Pipe capacity              0.304    c.m/sec"
"           Critical depth             0.000    metre"
53 ROUTE Pipe Route 546"
"           546.00 Pipe Route 546 Reach length ( metre)"
"           0.465 X-factor <= 0.5"
"           276.518 K-lag ( seconds)"
"           0.000 Default(0) or user spec.(1) values used"
"           0.500 X-factor <= 0.5"
"           30.000 K-lag ( seconds)"
"           0.000 Beta weighting factor"
"           0.000 Routing time step ( seconds)"
"           0 No. of sub-reaches"
"           Peak outflow              0.329    c.m/sec"
"           3.963    0.329    0.329    0.000 c.m/sec"
40 HYDROGRAPH Next link "
"           5 Next link "
"           3.963    0.329    0.329    0.000"
40 HYDROGRAPH Copy to Outflow"
"           8 Copy to Outflow"
"           3.963    0.329    0.329    0.000"
40 HYDROGRAPH Combine 5000"

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"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              0.329   c.m/sec"
"              Hydrograph volume        14426.111   c.m"
"              3.963   0.329   0.329   0.329"
" 40          HYDROGRAPH Start - New Tributary"
"              2   Start - New Tributary"
"              3.963   0.000   0.329   0.329"
" 33          CATCHMENT 4000"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"          4000   Catchment 4000"
"          35.000 % Impervious"
"              1.100   Total Area"
"          50.000   Flow length"
"              7.000   Overland Slope"
"              0.715   Pervious Area"
"          50.000   Pervious length"
"              7.000   Pervious slope"
"              0.385   Impervious Area"
"          50.000   Impervious length"
"              7.000   Impervious slope"
"              0.250   Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"              5.000   Pervious Min.infiltration"
"              0.250   Pervious Lag constant (hours)"
"              5.000   Pervious Depression storage"
"              0.015   Impervious Manning 'n'"
"              0.000   Impervious Max.infiltration"
"              0.000   Impervious Min.infiltration"
"              0.050   Impervious Lag constant (hours)"
"              1.500   Impervious Depression storage"
"              0.277   0.000   0.329   0.329 c.m/sec"
"          Catchment 4000      Pervious      Impervious      Total Area "
"          Surface Area      0.715      0.385      1.100      hectare"
"          Time of concentration 8.928      1.530      4.729      minutes"
"          Time to Centroid    130.565      111.553      119.774      minutes"
"          Rainfall depth      81.221      81.221      81.221      mm"
"          Rainfall volume      580.73      312.70      893.43      c.m"
"          Rainfall losses      49.048      2.794      32.859      mm"
"          Runoff depth        32.173      78.427      48.362      mm"
"          Runoff volume        230.03      301.94      531.98      c.m"
"          Runoff coefficient    0.396      0.966      0.595      "
"          Maximum flow        0.170      0.210      0.277      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"              0.277      0.277      0.329      0.329"
" 40          HYDROGRAPH Copy to Outflow"

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"      8   Copy to Outflow"
"      0.277      0.277      0.277      0.329"
" 40      HYDROGRAPH   Combine      5001"
"      6   Combine "
" 5001   Node #"
"      To Wetland South of Site"
"      Maximum flow      0.277      c.m/sec"
"      Hydrograph volume      531.980      c.m"
"      0.277      0.277      0.277      0.277"
" 40      HYDROGRAPH Start - New Tributary"
"      2   Start - New Tributary"
"      0.277      0.000      0.277      0.277"
" 47      FILEI_0 Read/Open DIV01300.100hyd"
"      1   1=read/open; 2=write/save"
"      2   1=rainfall; 2=hydrograph"
"      1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"      DIV01300.100hyd"
"      Overflow at the South Pond"
"      Total volume      0.000      c.m"
"      Maximum flow      0.000      c.m/sec"
"      0.000      0.000      0.277      0.277 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4   Add Runoff "
"      0.000      0.000      0.277      0.277"
" 33      CATCHMENT 2200"
"      1   Triangular SCS"
"      1   Equal length"
"      2   Horton equation"
"      2200   Catchment 2200"
"      35.000   % Impervious"
"      2.860   Total Area"
"      45.000   Flow length"
"      1.000   Overland Slope"
"      1.859   Pervious Area"
"      45.000   Pervious length"
"      1.000   Pervious slope"
"      1.001   Impervious Area"
"      45.000   Impervious length"
"      1.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"      125.000   Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.050   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"      0.824      0.000      0.277      0.277 c.m/sec"

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"	Catchment 2200	Pervious	Impervious	Total Area	"
"	Surface Area	1.859	1.001	2.860	hectare"
"	Time of concentration	14.059	2.575	8.971	minutes"
"	Time to Centroid	128.913	113.231	121.965	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1509.90	813.02	2322.92	c.m"
"	Rainfall losses	27.874	2.413	18.963	mm"
"	Runoff depth	53.347	78.808	62.258	mm"
"	Runoff volume	991.72	788.86	1780.59	c.m"
"	Runoff coefficient	0.657	0.970	0.767	"
"	Maximum flow	0.561	0.538	0.824	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.824	0.824	0.277	0.277"

" 33 CATCHMENT 2100"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	2100	Catchment 2100"
"	50.000	% Impervious"
"	1.140	Total Area"
"	51.000	Flow length"
"	0.500	Overland Slope"
"	0.570	Pervious Area"
"	51.000	Pervious length"
"	0.500	Pervious slope"
"	0.570	Impervious Area"
"	51.000	Impervious length"
"	0.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.308	0.824	0.277	0.277 c.m/sec"
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"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	19.940	3.417	8.250	minutes"
"	Time to Centroid	148.794	114.774	124.725	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	462.96	462.96	925.92	c.m"
"	Rainfall losses	48.994	3.275	26.134	mm"
"	Runoff depth	32.227	77.946	55.086	mm"
"	Runoff volume	183.69	444.29	627.99	c.m"
"	Runoff coefficient	0.397	0.960	0.678	"

"	Maximum flow	0.075	0.293	0.308	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.308 1.074 0.277 0.277"				
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow	1.074	c.m/sec"		
"	Hydrograph volume	2408.570	c.m"		
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300 Catchment 2300"				
"	35.000 % Impervious"				
"	7.920 Total Area"				
"	76.000 Flow length"				
"	1.000 Overland Slope"				
"	5.148 Pervious Area"				
"	76.000 Pervious length"				
"	1.000 Pervious slope"				
"	2.772 Impervious Area"				
"	76.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.546 1.074 0.277 0.277 c.m/sec"				
"	Catchment 2300 Pervious Impervious Total Area "				
"	Surface Area 5.148 2.772 7.920 hectare"				
"	Time of concentration 20.576 3.526 10.935 minutes"				
"	Time to Centroid 149.834 114.953 130.110 minutes"				
"	Rainfall depth 81.221 81.221 81.221 mm"				
"	Rainfall volume 4181.25 2251.44 6432.69 c.m"				
"	Rainfall losses 48.963 3.260 32.967 mm"				
"	Runoff depth 32.258 77.961 48.254 mm"				
"	Runoff volume 1660.63 2161.08 3821.72 c.m"				
"	Runoff coefficient 0.397 0.960 0.594 "				
"	Maximum flow 0.669 1.413 1.546 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

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"          4   Add Runoff "
"              1.546      2.621      0.277      0.277"
" 81      ADD COMMENT=====
"          1   Lines of comment"
"              North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"              Maximum flow              2.621      c.m/sec"
"              Hydrograph volume        6230.288      c.m"
" 52      CHANNEL DESIGN"
"          2.621   Current peak flow      c.m/sec"
"          0.040   Manning 'n'"
"          0.      Cross-section type: 0=trapezoidal; 1=general"
"          1.500   Basewidth      metre"
"          3.000   Left bank slope"
"          3.000   Right bank slope"
"          1.000   Channel depth      metre"
"          1.500   Gradient      %"
"              Depth of flow              0.550      metre"
"              Velocity              1.514      m/sec"
"              Channel capacity          9.529      c.m/sec"
"              Critical depth            0.491      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.463      X-factor <= 0.5"
"          119.856      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.500      Beta weighting factor"
"          100.000      Routing time step      ( seconds)"
"          1   No. of sub-reaches"
"              Peak outflow              2.507      c.m/sec"
"              1.546      2.621      2.507      0.277 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5   Next link "
"              1.546      2.507      2.507      0.277"
" 33      CATCHMENT 2400"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2400   Catchment 2400"
"          35.000   % Impervious"
"          9.130   Total Area"
"          65.000   Flow length"
"          1.000   Overland Slope"
"          5.934   Pervious Area"
"          65.000   Pervious length"
"          1.000   Pervious slope"

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"      3.196  Impervious Area"
"      65.000  Impervious length"
"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.842      2.507      2.507      0.277 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration 18.734      3.210      9.953      minutes"
"      Time to Centroid 146.802      114.433      128.492      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      4820.05      2595.41      7415.47      c.m"
"      Rainfall losses      49.007      3.305      33.012      mm"
"      Runoff depth      32.214      77.915      48.209      mm"
"      Runoff volume      1911.71      2489.79      4401.50      c.m"
"      Runoff coefficient      0.397      0.959      0.594      "
"      Maximum flow      0.806      1.662      1.842      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          1.842      4.064      2.507      0.277"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      4.064      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"    10631.8      Hydrograph volume      c.m"
"      28.      Number of stages"
"    482.350      Minimum water level      metre"
"    485.200      Maximum water level      metre"
"    482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"    482.350      0.000      0.000"
"    482.400      0.00300      105.100"
"    482.500      0.00600      324.300"
"    482.600      0.02300      555.900"
"    482.700      0.03300      799.900"
"    482.800      0.04000      1056.500"
"    482.900      0.08700      1325.900"
"    483.000      0.2130      1608.200"
"    483.100      0.5120      1903.600"

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"	483.200	0.6560	2212.100"	
"	483.300	0.6620	2534.000"	
"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.713	c.m/sec"	
"	Maximum level	484.119	metre"	
"	Maximum storage	5694.486	c.m"	
"	Centroidal lag	4.754	hours"	
"	1.842	4.064	0.713	0.277 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.842	0.713	0.713	0.277"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.100hyd"			
"	Major flow at 2400"			
"	1.842	0.713	0.713	0.277 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.842	0.713	0.713	0.277"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	1.842	0.713	0.713	0.277"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		

"	To Marsville North Thunderbird Drain Improvements"				
"	Maximum flow	0.713	c.m/sec"		
"	Hydrograph volume	10644.169	c.m"		
"	1.842	0.713	0.713	0.713"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	1.842	0.000	0.713	0.713"	
" 33	CATCHMENT 1400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	1400 Catchment 1400"				
"	5.000 % Impervious"				
"	9.940 Total Area"				
"	174.000 Flow length"				
"	0.750 Overland Slope"				
"	9.443 Pervious Area"				
"	174.000 Pervious length"				
"	0.750 Pervious slope"				
"	0.497 Impervious Area"				
"	174.000 Impervious length"				
"	0.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.790	0.000	0.713	0.713 c.m/sec"	
"	Catchment 1400	Pervious	Impervious	Total Area	"
"	Surface Area	9.443	0.497	9.940	hectare"
"	Time of concentration	36.872	6.318	33.380	minutes"
"	Time to Centroid	176.830	119.394	170.267	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	7669.69	403.67	8073.36	c.m"
"	Rainfall losses	48.961	2.150	46.621	mm"
"	Runoff depth	32.260	79.071	34.600	mm"
"	Runoff volume	3046.29	392.98	3439.28	c.m"
"	Runoff coefficient	0.397	0.974	0.426	"
"	Maximum flow	0.756	0.238	0.790	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.790	0.790	0.713	0.713"	
" 33	CATCHMENT 1500"				
"	1 Triangular SCS"				
"	1 Equal length"				

"	2	Horton equation"				
"	1500	Catchment 1500"				
"	3.000	% Impervious"				
"	15.590	Total Area"				
"	198.000	Flow length"				
"	1.600	Overland Slope"				
"	15.122	Pervious Area"				
"	198.000	Pervious length"				
"	1.600	Pervious slope"				
"	0.468	Impervious Area"				
"	198.000	Impervious length"				
"	1.600	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.465	0.790	0.713	0.713 c.m/sec"	
"		Catchment 1500	Pervious	Impervious	Total Area	"
"		Surface Area	15.122	0.468	15.590	hectare"
"		Time of concentration	31.743	5.439	29.882	minutes"
"		Time to Centroid	168.367	117.908	164.798	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1.2282	0.0380	1.2662	ha-m"
"		Rainfall losses	49.002	1.917	47.589	mm"
"		Runoff depth	32.219	79.304	33.632	mm"
"		Runoff volume	4872.30	370.90	5243.20	c.m"
"		Runoff coefficient	0.397	0.976	0.414	"
"		Maximum flow	1.427	0.216	1.465	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.465	2.228	0.713	0.713"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		1.465	2.228	2.228	0.713"	
" 40		HYDROGRAPH Combine	5002"			
"	6	Combine "				
"	5002	Node #"				
"		West Watershed Catchment Areas"				
"		Maximum flow	2.228	c.m/sec"		
"		Hydrograph volume	8682.479	c.m"		
"		1.465	2.228	2.228	2.228"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		1.465	0.000	2.228	2.228"	

```

" 33      CATCHMENT 2450"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"      2450   Catchment 2450"
"    15.000   % Impervious"
"      0.360   Total Area"
"    40.000   Flow length"
"      1.000   Overland Slope"
"      0.306   Pervious Area"
"    40.000   Pervious length"
"      1.000   Pervious slope"
"      0.054   Impervious Area"
"    40.000   Impervious length"
"      1.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"   125.000   Pervious Max.infiltration"
"      5.000   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"          0.061      0.000      2.228      2.228 c.m/sec"
"      Catchment 2450      Pervious      Impervious      Total Area  "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration  14.000      2.399      10.496      minutes"
"      Time to Centroid      138.966      112.935      131.105      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      248.54      43.86      292.40      c.m"
"      Rainfall losses      49.000      2.225      41.983      mm"
"      Runoff depth      32.221      78.996      39.237      mm"
"      Runoff volume      98.60      42.66      141.26      c.m"
"      Runoff coefficient      0.397      0.973      0.483      "
"      Maximum flow      0.055      0.029      0.061      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"          0.061      0.061      2.228      2.228"
" 56      DIVERSION"
"      2450   Node number"
"      0.018   Overflow threshold"
"      1.000   Required diverted fraction"
"          0   Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.043      c.m/sec"
"      Volume of diverted flow      44.921      c.m"
"      DIV02450.100hyd"
"      Major flow at 2450"
"          0.061      0.061      0.018      2.228 c.m/sec"

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" 40      HYDROGRAPH   Combine      5004"
"          6   Combine "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.726      c.m/sec"
"              Hydrograph volume          10740.502    c.m"
"                  0.061      0.061      0.018      0.726"
" 40      HYDROGRAPH   Confluence    5004"
"          7   Confluence "
"          5004   Node #"
"              To Marsville North Thunderbird Drain Improvements"
"              Maximum flow              0.726      c.m/sec"
"              Hydrograph volume          10740.502    c.m"
"                  0.061      0.726      0.018      0.000"
" 51      PIPE DESIGN"
"          0.726   Current peak flow      c.m/sec"
"          0.013   Manning 'n'"
"          0.675   Diameter      metre"
"          0.400   Gradient      %"
"              Surcharged HGL              0.745      %"
"              Velocity                    2.028      m/sec"
"              Pipe capacity                0.532      c.m/sec"
"              Critical depth                0.000      metre"
" 53      ROUTE      Pipe Route 191"
"          190.50   Pipe Route 191 Reach length      ( metre)"
"          0.328   X-factor <= 0.5"
"          89.856   K-lag      ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000   K-lag      ( seconds)"
"          0.500   Beta weighting factor"
"          100.000  Routing time step      ( seconds)"
"              1   No. of sub-reaches"
"              Peak outflow              0.726      c.m/sec"
"                  0.061      0.726      0.726      0.000 c.m/sec"
" 40      HYDROGRAPH   Combine      5000"
"          6   Combine "
"          5000   Node #"
"              Closed Pipe"
"              Maximum flow              1.046      c.m/sec"
"              Hydrograph volume          25166.592    c.m"
"                  0.061      0.726      0.726      1.046"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.061      0.000      0.726      1.046"
" 47      FILEI_0 Read/Open DIV02400.100hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02400.100hyd"

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"          Major flow at 2400"
"          Total volume              0.000      c.m"
"          Maximum flow              0.000      c.m/sec"
"          0.000      0.000      0.726      1.046 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.000      0.000      0.726      1.046"
" 47      FILEI_O Read/Open DIV02450.100hyd"
"          1      1=read/open; 2=write/save"
"          2      1=rainfall; 2=hydrograph"
"          1      1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.100hyd"
"          Major flow at 2450"
"          Total volume              44.921      c.m"
"          Maximum flow              0.043      c.m/sec"
"          0.043      0.000      0.726      1.046 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"          0.043      0.043      0.726      1.046"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          0.043      0.043      0.043      1.046"
" 40      HYDROGRAPH Combine 5005"
"          6      Combine "
"          5005      Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow              0.043      c.m/sec"
"          Hydrograph volume          44.921      c.m"
"          0.043      0.043      0.043      0.043"
" 40      HYDROGRAPH Start - New Tributary"
"          2      Start - New Tributary"
"          0.043      0.000      0.043      0.043"
" 33      CATCHMENT 2500"
"          1      Triangular SCS"
"          1      Equal length"
"          2      Horton equation"
"          2500      Catchment 2500"
"          0.000      % Impervious"
"          12.060      Total Area"
"          287.000      Flow length"
"          1.000      Overland Slope"
"          12.060      Pervious Area"
"          287.000      Pervious length"
"          1.000      Pervious slope"
"          0.000      Impervious Area"
"          287.000      Impervious length"
"          1.000      Impervious slope"
"          0.250      Pervious Manning 'n'"
"          125.000      Pervious Max.infiltration"
"          5.000      Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.805	0.000	0.043	0.043 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	45.668	7.825	45.668 minutes"
"		Time to Centroid	191.402	121.768	191.401 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	9795.23	0.01	9795.24 c.m"
"		Rainfall losses	48.958	1.720	48.958 mm"
"		Runoff depth	32.263	79.501	32.263 mm"
"		Runoff volume	3890.95	0.01	3890.96 c.m"
"		Runoff coefficient	0.397	0.000	0.397 "
"		Maximum flow	0.805	0.000	0.805 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.805	0.805	0.043	0.043"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.978	0.805	0.043	0.043 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"

"	Time of concentration	47.551	8.148	47.551	minutes"
"	Time to Centroid	194.533	122.304	194.533	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.2151	0.0000	1.2151	ha-m"
"	Rainfall losses	48.975	1.717	48.975	mm"
"	Runoff depth	32.246	79.504	32.246	mm"
"	Runoff volume	4824.02	0.01	4824.03	c.m"
"	Runoff coefficient	0.397	0.000	0.397	"
"	Maximum flow	0.978	0.000	0.978	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.978	1.783	0.043	0.043"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.978	1.783	1.783	0.043"
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.783		c.m/sec"
"	Hydrograph volume		8759.918		c.m"
"		0.978	1.783	1.783	1.783"
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow		1.783		c.m/sec"
"	Hydrograph volume		8759.918		c.m"
"		0.978	1.783	1.783	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.978	1.783	1.783	0.000"
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow		3.751		c.m/sec"
"	Hydrograph volume		17442.389		c.m"
"		0.978	1.783	1.783	3.751"
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow		1.046		c.m/sec"
"	Hydrograph volume		25166.598		c.m"
"		0.978	1.046	1.783	0.000"
" 51	PIPE DESIGN"				
"	1.046 Current peak flow				c.m/sec"
"	0.013 Manning 'n'"				
"	0.750 Diameter				metre"

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"      0.400 Gradient %"
"      Surcharged HGL          0.882 %"
"      Velocity                2.367 m/sec"
"      Pipe capacity           0.704 c.m/sec"
"      Critical depth          0.000 metre"
" 53      ROUTE Pipe Route 760"
"      760.00 Pipe Route 760 Reach length (metre)"
"      0.450 X-factor <= 0.5"
" 331.089 K-lag (seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag (seconds)"
"      0.500 Beta weighting factor"
" 100.000 Routing time step (seconds)"
"      1 No. of sub-reaches"
"      Peak outflow          1.046 c.m/sec"
"      0.978 1.046 1.046 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 5002"
"      6 Combine "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          4.794 c.m/sec"
"      Hydrograph volume      42608.898 c.m"
"      0.978 1.046 1.046 4.794"
" 81      ADD COMMENT=====
"      1 Lines of comment"
"      Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH Confluence 5002"
"      7 Confluence "
"      5002 Node #"
"      West Watershed Catchment Areas"
"      Maximum flow          4.794 c.m/sec"
"      Hydrograph volume      42608.898 c.m"
"      0.978 4.794 1.046 0.000"
" 52      CHANNEL DESIGN"
"      4.794 Current peak flow c.m/sec"
"      0.040 Manning 'n'"
"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth metre"
"      1.000 Gradient %"
"      Depth of flow          1.068 metre"
"      Velocity                1.725 m/sec"
"      Channel capacity        19.656 c.m/sec"
"      Critical depth          0.880 metre"
" 52      CHANNEL DESIGN"
"      4.794 Current peak flow c.m/sec"
"      0.040 Manning 'n'"

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"      0. Cross-section type: 0=trapezoidal; 1=general"
"      1.000 Basewidth      metre"
"      1.500 Left bank slope"
"      1.500 Right bank slope"
"      2.000 Channel depth  metre"
"      1.000 Gradient      %"
"          Depth of flow      1.068      metre"
"          Velocity           1.725      m/sec"
"          Channel capacity    19.656      c.m/sec"
"          Critical depth      0.880      metre"
" 40      HYDROGRAPH Start - New Tributary"
"          2 Start - New Tributary"
"              0.978      0.000      1.046      0.000"
" 33      CATCHMENT 3100"
"          1 Triangular SCS"
"          1 Equal length"
"          2 Horton equation"
"          3100 Catchment 3100"
"          35.000 % Impervious"
"          2.050 Total Area"
"          100.000 Flow length"
"          0.500 Overland Slope"
"          1.332 Pervious Area"
"          100.000 Pervious length"
"          0.500 Pervious slope"
"          0.717 Impervious Area"
"          100.000 Impervious length"
"          0.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              0.375      0.000      1.046      0.000 c.m/sec"
"          Catchment 3100      Pervious      Impervious Total Area "
"          Surface Area      1.332      0.717      2.050      hectare"
"          Time of concentration 29.867      5.118      15.758      minutes"
"          Time to Centroid      165.226      117.365      137.942      minutes"
"          Rainfall depth      81.221      81.221      81.221      mm"
"          Rainfall volume      1082.27      582.76      1665.03      c.m"
"          Rainfall losses      48.963      1.785      32.451      mm"
"          Runoff depth      32.258      79.436      48.770      mm"
"          Runoff volume      429.83      569.95      999.78      c.m"
"          Runoff coefficient      0.397      0.978      0.600      "
"          Maximum flow      0.130      0.325      0.375      c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.375      0.375      1.046      0.000"
" 33      CATCHMENT 3000"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3000 Catchment 3000"
"          5.000 % Impervious"
"          20.360 Total Area"
"          323.000 Flow length"
"          1.000 Overland Slope"
"          19.342 Pervious Area"
"          323.000 Pervious length"
"          1.000 Pervious slope"
"          1.018 Impervious Area"
"          323.000 Impervious length"
"          1.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              1.308      0.375      1.046      0.000 c.m/sec"
"          Catchment 3000      Pervious      Impervious      Total Area "
"          Surface Area      19.342      1.018      20.360      hectare"
"          Time of concentration 49.023      8.400      44.361      minutes"
"          Time to Centroid 196.963      122.644      188.434      minutes"
"          Rainfall depth      81.221      81.221      81.221      mm"
"          Rainfall volume      1.5710      0.0827      1.6537      ha-m"
"          Rainfall losses      48.958      1.756      46.598      mm"
"          Runoff depth      32.263      79.465      34.623      mm"
"          Runoff volume      6240.29      808.95      7049.24      c.m"
"          Runoff coefficient      0.397      0.978      0.426      "
"          Maximum flow      1.244      0.455      1.308      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              1.308      1.450      1.046      0.000"
" 33      CATCHMENT 3200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          3200 Catchment 3200"
"          35.000 % Impervious"
"          0.840 Total Area"

```

"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.167	1.450	1.046	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	19.705	3.377	10.466	minutes"
"		Time to Centroid	148.417	114.704	129.343	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	443.47	238.79	682.26	c.m"
"		Rainfall losses	49.017	3.290	33.013	mm"
"		Runoff depth	32.204	77.931	48.208	mm"
"		Runoff volume	175.83	229.12	404.95	c.m"
"		Runoff coefficient	0.396	0.959	0.594	"
"		Maximum flow	0.072	0.151	0.167	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.167	1.497	1.046	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				
"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				

"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.952	1.497	1.046	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	22.621	3.876	11.984	minutes"
"		Time to Centroid	153.263	115.470	131.816	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2671.35	1438.42	4109.78	c.m"
"		Rainfall losses	49.022	2.763	32.831	mm"
"		Runoff depth	32.199	78.458	48.389	mm"
"		Runoff volume	1059.01	1389.49	2448.51	c.m"
"		Runoff coefficient	0.396	0.966	0.596	"
"		Maximum flow	0.409	0.880	0.952	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.952	2.153	1.046	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.158	2.153	1.046	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"

"	Surface Area	1.197	0.063	1.260	hectare"
"	Time of concentration	21.722	3.722	19.685	minutes"
"	Time to Centroid	151.750	115.263	147.622	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	972.21	51.17	1023.38	c.m"
"	Rainfall losses	48.987	3.090	46.692	mm"
"	Runoff depth	32.234	78.131	34.529	mm"
"	Runoff volume	385.84	49.22	435.06	c.m"
"	Runoff coefficient	0.397	0.962	0.425	"
"	Maximum flow	0.152	0.032	0.158	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.158	2.255	1.046	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			135.350	hectare"
"	Total Impervious area			22.387	hectare"
"	Total % impervious			16.540"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_REG.out"
"          Licensee name:                      "
"          Company                              "
"          Date & Time last used:                10/29/2024 at 9:10:59 AM"
" 31          TIME PARAMETERS"
"          60.000  Time Step"
"          2880.000  Max. Storm length"
"          7500.000  Max. Hydrograph"
" 32          STORM Historic"
"          5  Historic"
"          2880.000  Duration"
"          48.000  Rainfall intensity values"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.028      2.028      2.028      2.028"
"                  2.028      2.026      2.026      2.026      2.028"
"                  2.026      6.000      4.000      6.000      13.000"
"                  17.000      13.000      23.000      13.000      13.000"
"                  53.000      38.000      13.000"
"          Maximum intensity                    53.000  mm/hr"
"          Total depth                          285.000  mm"
"          6  000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"

```

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.391	0.000	0.000	0.000 c.m/sec"
"		Catchment 1100	Pervious	Impervious	Total Area "
"		Surface Area	3.550	0.110	3.660 hectare"
"		Time of concentration	53.255	9.463	50.903 minutes"
"		Time to Centroid	2761.502	2270.032	2735.103 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	1.0118	0.0313	1.0431 ha-m"
"		Rainfall losses	138.305	15.759	134.628 mm"
"		Runoff depth	146.695	269.241	150.372 mm"
"		Runoff volume	5207.98	295.63	5503.60 c.m"
"		Runoff coefficient	0.515	0.945	0.528 "
"		Maximum flow	0.381	0.014	0.391 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.391	0.391	0.000	0.000"
" 33		CATCHMENT 1300"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	1300	Catchment 1300"			
"	35.000	% Impervious"			
"	27.060	Total Area"			
"	600.000	Flow length"			
"	1.500	Overland Slope"			
"	17.589	Pervious Area"			
"	600.000	Pervious length"			
"	1.500	Pervious slope"			
"	9.471	Impervious Area"			
"	600.000	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		2.589	0.391	0.000	0.000 c.m/sec"
"		Catchment 1300	Pervious	Impervious	Total Area "
"		Surface Area	17.589	9.471	27.060 hectare"

"	Time of concentration	105.863	18.811	61.783	minutes"
"	Time to Centroid	2815.631	2299.711	2554.387	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	5.0129	2.6992	7.7121	ha-m"
"	Rainfall losses	137.760	4.502	91.120	mm"
"	Runoff depth	147.240	280.498	193.880	mm"
"	Runoff volume	2.5898	2.6566	5.2464	ha-m"
"	Runoff coefficient	0.517	0.984	0.680	"
"	Maximum flow	1.507	1.092	2.589	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		2.589	2.980	0.000	0.000"
" 81	ADD COMMENT=====				
"	1	Lines of comment"			
"		Marsville South Subdivision Stormwater Management Facility"			
" 64	SHOW TABLE"				
"	2	Flow hydrograph"			
"	4	Inflow Hydrograph"			
"		Maximum flow	2.980	c.m/sec"	
"		Hydrograph volume	57967.590	c.m"	
" 54	POND DESIGN"				
"	2.980	Current peak flow	c.m/sec"		
"	0.200	Target outflow	c.m/sec"		
"	57967.6	Hydrograph volume	c.m"		
"	24.	Number of stages"			
"	484.900	Minimum water level	metre"		
"	487.200	Maximum water level	metre"		
"	484.900	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level	Discharge	Volume"	
"	484.900	0.000	0.000"		
"	485.000	0.01200	642.900"		
"	485.100	0.02300	1316.600"		
"	485.200	0.1190	2021.300"		
"	485.300	0.3140	2757.200"		
"	485.400	0.3140	3524.300"		
"	485.500	0.3170	4322.900"		
"	485.600	0.3170	5153.000"		
"	485.700	0.3210	6014.900"		
"	485.800	0.3240	6908.700"		
"	485.900	0.3240	7834.500"		
"	486.000	0.3270	8792.400"		
"	486.100	0.3300	9782.700"		
"	486.200	0.3300	10805.50"		
"	486.300	0.3330	11860.90"		
"	486.400	0.3330	12949.00"		
"	486.500	0.3360	14070.10"		
"	486.600	0.3390	15224.30"		
"	486.700	0.3390	16411.70"		
"	486.800	0.3420	17632.50"		


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"          486.900      0.3450  18886.90"
"          487.000      0.3450  20174.90"
"          487.100      1.389   21496.80"
"          487.200      3.328   22852.30"
"          Peak outflow                2.415    c.m/sec"
"          Maximum level                487.174    metre"
"          Maximum storage              22493.887    c.m"
"          Centroidal lag                49.582    hours"
"          2.589      2.980      2.415      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          2.589      2.415      2.415      0.000"
" 56      DIVERSION"
"          1300      Node number"
"          0.345      Overflow threshold"
"          1.000      Required diverted fraction"
"          0      Conduit type; 1=Pipe;2=Channel"
"          Peak of diverted flow          2.070    c.m/sec"
"          Volume of diverted flow      19451.691    c.m"
"          DIV01300.000hyd"
"          Overflow at the South Pond"
"          2.589      2.415      0.345      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          2.589      0.345      0.345      0.000"
" 81      ADD COMMENT=====
"          1      Lines of comment"
"          Thunderbird Drain Improvements - Marsville South Branch"
" 51      PIPE DESIGN"
"          0.345      Current peak flow    c.m/sec"
"          0.013      Manning 'n'"
"          0.525      Diameter    metre"
"          0.500      Gradient    %"
"          Surcharged HGL                0.644    %"
"          Velocity                1.594    m/sec"
"          Pipe capacity              0.304    c.m/sec"
"          Critical depth              0.000    metre"
" 53      ROUTE      Pipe Route 546"
"          546.00      Pipe Route 546 Reach length    ( metre)"
"          0.465      X-factor <= 0.5"
"          276.518      K-lag    ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag    ( seconds)"
"          0.000      Beta weighting factor"
"          0.000      Routing time step    ( seconds)"
"          0      No. of sub-reaches"
"          Peak outflow                0.345    c.m/sec"
"          2.589      0.345      0.345      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "

```

"	5	Next link "				
"		2.589	0.345	0.345	0.000"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		2.589	0.345	0.345	0.000"	
" 40		HYDROGRAPH Combine 5000"				
"	6	Combine "				
"	5000	Node #"				
"		Closed Pipe"				
"		Maximum flow	0.345		c.m/sec"	
"		Hydrograph volume	39886.262		c.m"	
"		2.589	0.345	0.345	0.345"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		2.589	0.000	0.345	0.345"	
" 33		CATCHMENT 4000"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	4000	Catchment 4000"				
"	35.000	% Impervious"				
"	1.100	Total Area"				
"	50.000	Flow length"				
"	7.000	Overland Slope"				
"	0.715	Pervious Area"				
"	50.000	Pervious length"				
"	7.000	Pervious slope"				
"	0.385	Impervious Area"				
"	50.000	Impervious length"				
"	7.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.124	0.000	0.345	0.345 c.m/sec"	
"		Catchment 4000	Pervious	Impervious	Total Area	"
"		Surface Area	0.715	0.385	1.100	hectare"
"		Time of concentration	15.015	2.668	9.134	minutes"
"		Time to Centroid	2718.577	2255.846	2498.166	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	2037.75	1097.25	3135.00	c.m"
"		Rainfall losses	139.935	39.949	104.940	mm"
"		Runoff depth	145.065	245.051	180.060	mm"
"		Runoff volume	1037.22	943.45	1980.66	c.m"

"	Runoff coefficient	0.509	0.860	0.632	"
"	Maximum flow	0.075	0.049	0.124	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.124	0.124	0.345	0.345"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.124	0.124	0.124	0.345"
" 40	HYDROGRAPH Combine 5001"				
"	6 Combine "				
"	5001 Node #"				
"	To Wetland South of Site"				
"	Maximum flow	0.124			c.m/sec"
"	Hydrograph volume	1980.664			c.m"
"		0.124	0.124	0.124	0.124"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.124	0.000	0.124	0.124"
" 47	FILEI_O Read/Open DIV01300.000hyd"				
"	1 1=read/open; 2=write/save"				
"	2 1=rainfall; 2=hydrograph"				
"	1 1=runoff; 2=inflow; 3=outflow; 4=junction"				
"	DIV01300.000hyd"				
"	Overflow at the South Pond"				
"	Total volume	19451.689			c.m"
"	Maximum flow	2.070			c.m/sec"
"		2.070	0.000	0.124	0.124 c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.070	2.070	0.124	0.124"
" 33	CATCHMENT 2200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2200 Catchment 2200"				
"	35.000 % Impervious"				
"	2.860 Total Area"				
"	45.000 Flow length"				
"	1.000 Overland Slope"				
"	1.859 Pervious Area"				
"	45.000 Pervious length"				
"	1.000 Pervious slope"				
"	1.001 Impervious Area"				
"	45.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.050 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				

"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.300	2.070	0.124	0.124 c.m/sec"
"		Catchment 2200	Pervious	Impervious	Total Area "
"		Surface Area	1.859	1.001	2.860 hectare"
"		Time of concentration	25.270	4.490	15.299 minutes"
"		Time to Centroid	2731.705	2231.857	2491.850 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	5298.15	2852.85	8151.00 c.m"
"		Rainfall losses	139.057	34.957	102.622 mm"
"		Runoff depth	145.943	250.043	182.378 mm"
"		Runoff volume	2713.09	2502.93	5216.02 c.m"
"		Runoff coefficient	0.512	0.877	0.640 "
"		Maximum flow	0.198	0.127	0.300 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.300	2.189	0.124	0.124"
" 33		CATCHMENT 2100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2100	Catchment 2100"			
"	50.000	% Impervious"			
"	1.140	Total Area"			
"	51.000	Flow length"			
"	0.500	Overland Slope"			
"	0.570	Pervious Area"			
"	51.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.570	Impervious Area"			
"	51.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.121	2.189	0.124	0.124 c.m/sec"
"		Catchment 2100	Pervious	Impervious	Total Area "
"		Surface Area	0.570	0.570	1.140 hectare"
"		Time of concentration	33.538	5.960	15.930 minutes"
"		Time to Centroid	2738.155	2233.898	2416.206 minutes"

"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1624.50	1624.50	3249.00	c.m"
"	Rainfall losses	139.880	28.723	84.302	mm"
"	Runoff depth	145.120	256.277	200.698	mm"
"	Runoff volume	827.18	1460.78	2287.96	c.m"
"	Runoff coefficient	0.509	0.899	0.704	"
"	Maximum flow	0.063	0.072	0.121	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.121	2.289	0.124	0.124"
" 81	ADD COMMENT=====				
"	1 Lines of comment"				
"	1200 mm dia. Culvert at County Road 3"				
" 64	SHOW TABLE"				
"	2 Flow hydrograph"				
"	4 Inflow Hydrograph"				
"	Maximum flow		2.289		c.m/sec"
"	Hydrograph volume	26955.664			c.m"
" 33	CATCHMENT 2300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2300	Catchment 2300"			
"	35.000	% Impervious"			
"	7.920	Total Area"			
"	76.000	Flow length"			
"	1.000	Overland Slope"			
"	5.148	Pervious Area"			
"	76.000	Pervious length"			
"	1.000	Pervious slope"			
"	2.772	Impervious Area"			
"	76.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.804	2.289	0.124	0.124 c.m/sec"
"	Catchment 2300	Pervious	Impervious	Total Area	"
"	Surface Area	5.148	2.772	7.920	hectare"
"	Time of concentration	34.608	6.150	20.700	minutes"
"	Time to Centroid	2738.756	2234.994	2492.571	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1.4672	0.7900	2.2572	ha-m"

"		Rainfall losses	140.191	27.963	100.911	mm"
"		Runoff depth	144.809	257.037	184.089	mm"
"		Runoff volume	0.7455	0.7125	1.4580	ha-m"
"		Runoff coefficient	0.508	0.902	0.646	"
"		Maximum flow	0.566	0.351	0.804	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.804	3.092	0.124	0.124"
" 81		ADD COMMENT=====				
"	1	Lines of comment"				
"		North of Thunderbird Subdivision via Stormwater Block"				
" 64		SHOW TABLE"				
"	2	Flow hydrograph"				
"	4	Inflow Hydrograph"				
"		Maximum flow		3.092		c.m/sec"
"		Hydrograph volume	41535.480			c.m"
" 52		CHANNEL DESIGN"				
"	3.092	Current peak flow		c.m/sec"		
"	0.040	Manning 'n'"				
"	0.	Cross-section type: 0=trapezoidal; 1=general"				
"	1.500	Basewidth		metre"		
"	3.000	Left bank slope"				
"	3.000	Right bank slope"				
"	1.000	Channel depth		metre"		
"	1.500	Gradient		%"		
"		Depth of flow	0.595		metre"	
"		Velocity	1.582		m/sec"	
"		Channel capacity	9.529		c.m/sec"	
"		Critical depth	0.535		metre"	
" 53		ROUTE Channel Route 242"				
"	242.00	Channel Route 242 Reach length		(metre)"		
"	0.461	X-factor <= 0.5"				
"	114.732	K-lag (seconds)"				
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag (seconds)"				
"	0.500	Beta weighting factor"				
"	120.000	Routing time step (seconds)"				
"	1	No. of sub-reaches"				
"		Peak outflow		3.032		c.m/sec"
"			0.804	3.092	3.032	0.124 c.m/sec"
" 40		HYDROGRAPH Next link "				
"	5	Next link "				
"			0.804	3.032	3.032	0.124"
" 33		CATCHMENT 2400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2400	Catchment 2400"				
"	35.000	% Impervious"				

```

"      9.130  Total Area"
"      65.000 Flow length"
"      1.000 Overland Slope"
"      5.934 Pervious Area"
"      65.000 Pervious length"
"      1.000 Pervious slope"
"      3.196 Impervious Area"
"      65.000 Impervious length"
"      1.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"     125.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.050 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.927      3.032      3.032      0.124 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration 31.509      5.599      18.940      minutes"
"      Time to Centroid      2736.849      2231.958      2491.920      minutes"
"      Rainfall depth      285.000      285.000      285.000      mm"
"      Rainfall volume      1.6913      0.9107      2.6021      ha-m"
"      Rainfall losses      139.446      30.317      101.251      mm"
"      Runoff depth      145.554      254.683      183.749      mm"
"      Runoff volume      0.8638      0.8138      1.6776      ha-m"
"      Runoff coefficient      0.511      0.894      0.645      "
"      Maximum flow      0.650      0.405      0.927      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.927      3.959      3.032      0.124"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      3.959      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"     58312.1      Hydrograph volume      c.m"
"      28.      Number of stages"
"     482.350      Minimum water level      metre"
"     485.200      Maximum water level      metre"
"     482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"          482.350      0.000      0.000"
"          482.400      0.00300      105.100"
"          482.500      0.00600      324.300"

```

"	482.600	0.02300	555.900"		
"	482.700	0.03300	799.900"		
"	482.800	0.04000	1056.500"		
"	482.900	0.08700	1325.900"		
"	483.000	0.2130	1608.200"		
"	483.100	0.5120	1903.600"		
"	483.200	0.6560	2212.100"		
"	483.300	0.6620	2534.000"		
"	483.400	0.6680	2869.500"		
"	483.500	0.6740	3218.600"		
"	483.600	0.6790	3581.500"		
"	483.700	0.6910	3958.300"		
"	483.800	0.6970	4349.300"		
"	483.900	0.7020	4754.600"		
"	484.000	0.7070	5174.300"		
"	484.100	0.7120	5608.500"		
"	484.400	0.7290	7000.200"		
"	484.500	0.7340	7494.200"		
"	484.600	0.7390	8003.600"		
"	484.700	0.7440	8528.400"		
"	484.800	0.7470	9068.900"		
"	484.900	0.7490	9625.100"		
"	485.000	1.834	10197.30"		
"	485.100	3.843	10785.60"		
"	485.200	6.484	11390.10"		
"	Peak outflow	3.791	c.m/sec"		
"	Maximum level	485.102	metre"		
"	Maximum storage	10796.434	c.m"		
"	Centroidal lag	45.802	hours"		
"	0.927	3.959	3.791	0.124	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.927	3.791	3.791	0.124"	
" 56	DIVERSION"				
"	2400 Node number"				
"	0.747 Overflow threshold"				
"	1.000 Required diverted fraction"				
"	0 Conduit type; 1=Pipe;2=Channel"				
"	Peak of diverted flow	3.044	c.m/sec"		
"	Volume of diverted flow	22169.246	c.m"		
"	DIV02400.000hyd"				
"	Major flow at 2400"				
"	0.927	3.791	0.747	0.124	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.927	0.747	0.747	0.124"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.927	0.747	0.747	0.124"	
" 81	ADD COMMENT=====				


```

"      2 Lines of comment"
"      Thunderbird Drain Improvements - Marsville North "
"      Subdivision Branch"
" 40    HYDROGRAPH   Combine      5004"
"      6   Combine  "
"      5004   Node #"
"          To Marsville North Thunderbird Drain Improvements"
"          Maximum flow              0.747   c.m/sec"
"          Hydrograph volume          39141.996   c.m"
"          0.927   0.747   0.747   0.747"
" 40    HYDROGRAPH Start - New Tributary"
"      2   Start - New Tributary"
"          0.927   0.000   0.747   0.747"
" 33    CATCHMENT 1400"
"      1   Triangular SCS"
"      1   Equal length"
"      2   Horton equation"
"      1400 Catchment 1400"
"      5.000 % Impervious"
"      9.940 Total Area"
"      174.000 Flow length"
"      0.750 Overland Slope"
"      9.443 Pervious Area"
"      174.000 Pervious length"
"      0.750 Pervious slope"
"      0.497 Impervious Area"
"      174.000 Impervious length"
"      0.750 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.050 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          1.026   0.000   0.747   0.747 c.m/sec"
"      Catchment 1400      Pervious   Impervious Total Area "
"      Surface Area      9.443   0.497   9.940   hectare"
"      Time of concentration 62.015   11.020   57.507   minutes"
"      Time to Centroid 2770.835  2286.567  2728.027  minutes"
"      Rainfall depth      285.000   285.000   285.000   mm"
"      Rainfall volume      2.6913   0.1416   2.8329   ha-m"
"      Rainfall losses      137.698   13.610   131.494   mm"
"      Runoff depth      147.302   271.390   153.506   mm"
"      Runoff volume      1.3910   0.1349   1.5259   ha-m"
"      Runoff coefficient   0.517   0.952   0.539   "
"      Maximum flow      0.976   0.062   1.026   c.m/sec"

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" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              1.026      1.026      0.747      0.747"
" 33      CATCHMENT 1500"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1500 Catchment 1500"
"          3.000 % Impervious"
"          15.590 Total Area"
"          198.000 Flow length"
"          1.600 Overland Slope"
"          15.122 Pervious Area"
"          198.000 Pervious length"
"          1.600 Pervious slope"
"          0.468 Impervious Area"
"          198.000 Impervious length"
"          1.600 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              1.666      1.026      0.747      0.747 c.m/sec"
"          Catchment 1500      Pervious      Impervious      Total Area "
"          Surface Area      15.122      0.468      15.590      hectare"
"          Time of concentration 53.388      9.487      51.030      minutes"
"          Time to Centroid 2761.652      2270.285      2735.255      minutes"
"          Rainfall depth      285.000      285.000      285.000      mm"
"          Rainfall volume      4.3099      0.1333      4.4432      ha-m"
"          Rainfall losses      138.300      15.713      134.622      mm"
"          Runoff depth      146.700      269.287      150.378      mm"
"          Runoff volume      2.2184      0.1259      2.3444      ha-m"
"          Runoff coefficient      0.515      0.945      0.528      "
"          Maximum flow      1.620      0.059      1.666      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              1.666      2.692      0.747      0.747"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"              1.666      2.692      2.692      0.747"
" 40      HYDROGRAPH Combine 5002"
"          6  Combine "
"          5002 Node #"
"          West Watershed Catchment Areas"

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"		Maximum flow	2.692	c.m/sec"
"		Hydrograph volume	38702.422	c.m"
"		1.666 2.692 2.692	2.692	2.692"
" 40		HYDROGRAPH Start - New Tributary"		
"	2	Start - New Tributary"		
"		1.666 0.000 2.692	2.692	2.692"
" 33		CATCHMENT 2450"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	2	Horton equation"		
"	2450	Catchment 2450"		
"	15.000	% Impervious"		
"	0.360	Total Area"		
"	40.000	Flow length"		
"	1.000	Overland Slope"		
"	0.306	Pervious Area"		
"	40.000	Pervious length"		
"	1.000	Pervious slope"		
"	0.054	Impervious Area"		
"	40.000	Impervious length"		
"	1.000	Impervious slope"		
"	0.250	Pervious Manning 'n'"		
"	125.000	Pervious Max.infiltration"		
"	5.000	Pervious Min.infiltration"		
"	0.250	Pervious Lag constant (hours)"		
"	5.000	Pervious Depression storage"		
"	0.015	Impervious Manning 'n'"		
"	0.000	Impervious Max.infiltration"		
"	0.000	Impervious Min.infiltration"		
"	0.050	Impervious Lag constant (hours)"		
"	1.500	Impervious Depression storage"		
"		0.037 0.000 2.692	2.692	c.m/sec"
"		Catchment 2450	Pervious	Impervious Total Area "
"		Surface Area	0.306 0.054	0.360 hectare"
"		Time of concentration	23.546 4.184	19.066 minutes"
"		Time to Centroid	2729.526 2233.218	2614.694 minutes"
"		Rainfall depth	285.000 285.000	285.000 mm"
"		Rainfall volume	872.10 153.90	1026.00 c.m"
"		Rainfall losses	139.157 36.222	123.717 mm"
"		Runoff depth	145.843 248.778	161.283 mm"
"		Runoff volume	446.28 134.34	580.62 c.m"
"		Runoff coefficient	0.512 0.873	0.566 "
"		Maximum flow	0.032 0.007	0.037 c.m/sec"
" 40		HYDROGRAPH Add Runoff "		
"	4	Add Runoff "		
"		0.037 0.037 2.692	2.692	2.692"
" 56		DIVERSION"		
"	2450	Node number"		
"	0.018	Overflow threshold"		
"	1.000	Required diverted fraction"		

```

"      0  Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.019    c.m/sec"
"      Volume of diverted flow    132.591    c.m"
"      DIV02450.000hyd"
"      Major flow at 2450"
"          0.037    0.037    0.018    2.692 c.m/sec"
" 40    HYDROGRAPH  Combine    5004"
"      6  Combine "
" 5004  Node #"
"      To Marsville North Thunderbird Drain Improvements"
"      Maximum flow      0.765    c.m/sec"
"      Hydrograph volume    39590.035    c.m"
"          0.037    0.037    0.018    0.765"
" 40    HYDROGRAPH  Confluence    5004"
"      7  Confluence "
" 5004  Node #"
"      To Marsville North Thunderbird Drain Improvements"
"      Maximum flow      0.765    c.m/sec"
"      Hydrograph volume    39590.035    c.m"
"          0.037    0.765    0.018    0.000"
" 51    PIPE DESIGN"
"      0.765  Current peak flow    c.m/sec"
"      0.013  Manning 'n'"
"      0.675  Diameter    metre"
"      0.400  Gradient    %"
"      Surcharged HGL      0.828    %"
"      Velocity      2.138    m/sec"
"      Pipe capacity      0.532    c.m/sec"
"      Critical depth      0.000    metre"
" 53    ROUTE    Pipe Route 191"
"      190.50    Pipe Route 191 Reach length    ( metre)"
"      0.328  X-factor <= 0.5"
"      89.856  K-lag    ( seconds)"
"      0.000  Default(0) or user spec.(1) values used"
"      0.500  X-factor <= 0.5"
"      30.000  K-lag    ( seconds)"
"      0.500  Beta weighting factor"
"      120.000 Routing time step    ( seconds)"
"      1  No. of sub-reaches"
"      Peak outflow      0.765    c.m/sec"
"          0.037    0.765    0.765    0.000 c.m/sec"
" 40    HYDROGRAPH  Combine    5000"
"      6  Combine "
" 5000  Node #"
"      Closed Pipe"
"      Maximum flow      1.110    c.m/sec"
"      Hydrograph volume    79476.297    c.m"
"          0.037    0.765    0.765    1.110"
" 40    HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"

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"          0.037      0.000      0.765      1.110"
" 47      FILEI_0 Read/Open DIV02400.000hyd"
"          1  1=read/open; 2=write/save"
"          2  1=rainfall; 2=hydrograph"
"          1  1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02400.000hyd"
"          Major flow at 2400"
"          Total volume          22169.244      c.m"
"          Maximum flow          3.044      c.m/sec"
"          3.044      0.000      0.765      1.110 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"          3.044      3.044      0.765      1.110"
" 47      FILEI_0 Read/Open DIV02450.000hyd"
"          1  1=read/open; 2=write/save"
"          2  1=rainfall; 2=hydrograph"
"          1  1=runoff; 2=inflow; 3=outflow; 4=junction"
"          DIV02450.000hyd"
"          Major flow at 2450"
"          Total volume          132.591      c.m"
"          Maximum flow          0.019      c.m/sec"
"          0.019      3.044      0.765      1.110 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"          0.019      3.063      0.765      1.110"
" 40      HYDROGRAPH Copy to Outflow"
"          8  Copy to Outflow"
"          0.019      3.063      3.063      1.110"
" 40      HYDROGRAPH Combine 5005"
"          6  Combine "
"          5005  Node #"
"          To Existing Thunderbird Municipal Drain"
"          Maximum flow          3.063      c.m/sec"
"          Hydrograph volume      22301.836      c.m"
"          0.019      3.063      3.063      3.063"
" 40      HYDROGRAPH Start - New Tributary"
"          2  Start - New Tributary"
"          0.019      0.000      3.063      3.063"
" 33      CATCHMENT 2500"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          2500  Catchment 2500"
"          0.000  % Impervious"
"          12.060  Total Area"
"          287.000  Flow length"
"          1.000  Overland Slope"
"          12.060  Pervious Area"
"          287.000  Pervious length"
"          1.000  Pervious slope"

```

"	0.000	Impervious Area"				
"	287.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		1.151	0.000	3.063	3.063 c.m/sec"	
"		Catchment 2500	Pervious	Impervious	Total Area	"
"		Surface Area	12.060	0.000	12.060	hectare"
"		Time of concentration	76.809	13.649	76.809	minutes"
"		Time to Centroid	2785.352	2291.947	2785.351	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	3.4371	0.0000	3.4371	ha-m"
"		Rainfall losses	138.909	7.790	138.909	mm"
"		Runoff depth	146.091	277.210	146.091	mm"
"		Runoff volume	1.7619	0.0000	1.7619	ha-m"
"		Runoff coefficient	0.513	0.000	0.513	"
"		Maximum flow	1.151	0.000	1.151	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.151	1.151	3.063	3.063"	
" 33		CATCHMENT 2600"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	2600	Catchment 2600"				
"	0.000	% Impervious"				
"	14.960	Total Area"				
"	307.000	Flow length"				
"	1.000	Overland Slope"				
"	14.960	Pervious Area"				
"	307.000	Pervious length"				
"	1.000	Pervious slope"				
"	0.000	Impervious Area"				
"	307.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				

"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		1.406	1.151	3.063	3.063 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	79.977	14.212	79.977 minutes"
"		Time to Centroid	2789.071	2291.762	2789.070 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	4.2636	0.0000	4.2636 ha-m"
"		Rainfall losses	139.034	6.693	139.034 mm"
"		Runoff depth	145.966	278.307	145.966 mm"
"		Runoff volume	2.1836	0.0000	2.1837 ha-m"
"		Runoff coefficient	0.512	0.000	0.512 "
"		Maximum flow	1.406	0.000	1.406 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		1.406	2.556	3.063	3.063"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		1.406	2.556	2.556	3.063"
" 40		HYDROGRAPH Combine 5005"			
"	6	Combine "			
"	5005	Node #"			
"		To Existing Thunderbird Municipal Drain"			
"		Maximum flow	5.619	c.m/sec"	
"		Hydrograph volume	61756.973	c.m"	
"		1.406	2.556	2.556	5.619"
" 40		HYDROGRAPH Confluence 5005"			
"	7	Confluence "			
"	5005	Node #"			
"		To Existing Thunderbird Municipal Drain"			
"		Maximum flow	5.619	c.m/sec"	
"		Hydrograph volume	61756.973	c.m"	
"		1.406	5.619	2.556	0.000"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		1.406	5.619	5.619	0.000"
" 40		HYDROGRAPH Combine 5002"			
"	6	Combine "			
"	5002	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	8.311	c.m/sec"	
"		Hydrograph volume	100459.398	c.m"	
"		1.406	5.619	5.619	8.311"
" 40		HYDROGRAPH Confluence 5000"			
"	7	Confluence "			
"	5000	Node #"			
"		Closed Pipe"			
"		Maximum flow	1.110	c.m/sec"	

```

"          Hydrograph volume          79476.289    c.m"
"          1.406      1.110      5.619      0.000"
" 51      PIPE DESIGN"
"      1.110      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.750      Diameter      metre"
"      0.400      Gradient      %"
"          Surcharged HGL          0.994      %"
"          Velocity          2.513      m/sec"
"          Pipe capacity          0.704      c.m/sec"
"          Critical depth          0.000      metre"
" 53      ROUTE      Pipe Route 760"
"      760.00      Pipe Route 760 Reach length      ( metre)"
"      0.450      X-factor <= 0.5"
"      331.089      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      120.000      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"          Peak outflow          1.110      c.m/sec"
"          1.406      1.110      1.110      0.000 c.m/sec"
" 40      HYDROGRAPH      Combine      5002"
"      6      Combine "
"      5002      Node #"
"          West Watershed Catchment Areas"
"          Maximum flow          9.421      c.m/sec"
"          Hydrograph volume          179935.719      c.m"
"          1.406      1.110      1.110      9.421"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"          Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH      Confluence      5002"
"      7      Confluence "
"      5002      Node #"
"          West Watershed Catchment Areas"
"          Maximum flow          9.421      c.m/sec"
"          Hydrograph volume          179935.703      c.m"
"          1.406      9.421      1.110      0.000"
" 52      CHANNEL DESIGN"
"      9.421      Current peak flow      c.m/sec"
"      0.040      Manning 'n'"
"      0.      Cross-section type: 0=trapezoidal; 1=general"
"      1.000      Basewidth      metre"
"      1.500      Left bank slope"
"      1.500      Right bank slope"
"      2.000      Channel depth      metre"
"      1.000      Gradient      %"
"          Depth of flow          1.451      metre"

```


"	Velocity	2.044	m/sec"
"	Channel capacity	19.656	c.m/sec"
"	Critical depth	1.227	metre"
" 52	CHANNEL DESIGN"		
"	9.421	Current peak flow	c.m/sec"
"	0.040	Manning 'n'"	
"	0.	Cross-section type: 0=trapezoidal; 1=general"	
"	1.000	Basewidth	metre"
"	1.500	Left bank slope"	
"	1.500	Right bank slope"	
"	2.000	Channel depth	metre"
"	1.000	Gradient	%"
"	Depth of flow	1.451	metre"
"	Velocity	2.044	m/sec"
"	Channel capacity	19.656	c.m/sec"
"	Critical depth	1.227	metre"
" 40	HYDROGRAPH Start - New Tributary"		
"	2	Start - New Tributary"	
"	1.406	0.000	1.110 0.000"
" 33	CATCHMENT 3100"		
"	1	Triangular SCS"	
"	1	Equal length"	
"	2	Horton equation"	
"	3100	Catchment 3100"	
"	35.000	% Impervious"	
"	2.050	Total Area"	
"	100.000	Flow length"	
"	0.500	Overland Slope"	
"	1.332	Pervious Area"	
"	100.000	Pervious length"	
"	0.500	Pervious slope"	
"	0.717	Impervious Area"	
"	100.000	Impervious length"	
"	0.500	Impervious slope"	
"	0.250	Pervious Manning 'n'"	
"	125.000	Pervious Max.infiltration"	
"	5.000	Pervious Min.infiltration"	
"	0.250	Pervious Lag constant (hours)"	
"	5.000	Pervious Depression storage"	
"	0.015	Impervious Manning 'n'"	
"	0.000	Impervious Max.infiltration"	
"	0.000	Impervious Min.infiltration"	
"	0.050	Impervious Lag constant (hours)"	
"	1.500	Impervious Depression storage"	
"	0.212	0.000	1.110 0.000 c.m/sec"
"	Catchment 3100	Pervious	Impervious Total Area "
"	Surface Area	1.332	0.717 2.050 hectare"
"	Time of concentration	50.233	8.926 29.719 minutes"
"	Time to Centroid	2757.880	2264.252 2512.726 minutes"
"	Rainfall depth	285.000	285.000 285.000 mm"

"	Rainfall volume	3797.63	2044.87	5842.50	c.m"
"	Rainfall losses	138.715	16.956	96.099	mm"
"	Runoff depth	146.285	268.044	188.901	mm"
"	Runoff volume	1949.25	1923.21	3872.47	c.m"
"	Runoff coefficient	0.513	0.941	0.663	"
"	Maximum flow	0.144	0.090	0.212	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.212	0.212	1.110	0.000"
" 33	CATCHMENT 3000"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3000 Catchment 3000"				
"	5.000 % Impervious"				
"	20.360 Total Area"				
"	323.000 Flow length"				
"	1.000 Overland Slope"				
"	19.342 Pervious Area"				
"	323.000 Pervious length"				
"	1.000 Pervious slope"				
"	1.018 Impervious Area"				
"	323.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.918	0.212	1.110	0.000 c.m/sec"
"	Catchment 3000	Pervious	Impervious	Total Area	"
"	Surface Area	19.342	1.018	20.360	hectare"
"	Time of concentration	82.453	14.651	76.268	minutes"
"	Time to Centroid	2792.146	2291.855	2746.514	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	5.5125	0.2901	5.8026	ha-m"
"	Rainfall losses	138.693	6.005	132.058	mm"
"	Runoff depth	146.307	278.995	152.942	mm"
"	Runoff volume	2.8299	0.2840	3.1139	ha-m"
"	Runoff coefficient	0.513	0.979	0.537	"
"	Maximum flow	1.808	0.123	1.918	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.918	2.131	1.110	0.000"
" 33	CATCHMENT 3200"				

"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3200	Catchment 3200"				
"	35.000	% Impervious"				
"	0.840	Total Area"				
"	50.000	Flow length"				
"	0.500	Overland Slope"				
"	0.546	Pervious Area"				
"	50.000	Pervious length"				
"	0.500	Pervious slope"				
"	0.294	Impervious Area"				
"	50.000	Impervious length"				
"	0.500	Impervious slope"				
"	0.250	Pervious Manning 'n' "				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n' "				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.085	2.131	1.110	0.000 c.m/sec"	
"		Catchment 3200	Pervious	Impervious	Total Area	"
"		Surface Area	0.546	0.294	0.840	hectare"
"		Time of concentration	33.142	5.889	19.870	minutes"
"		Time to Centroid	2737.929	2233.505	2492.287	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	1556.10	837.90	2394.00	c.m"
"		Rainfall losses	139.790	29.018	101.020	mm"
"		Runoff depth	145.210	255.982	183.980	mm"
"		Runoff volume	792.85	752.59	1545.44	c.m"
"		Runoff coefficient	0.510	0.898	0.646	"
"		Maximum flow	0.060	0.037	0.085	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.085	2.216	1.110	0.000"	
" 33		CATCHMENT 3300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3300	Catchment 3300"				
"	35.000	% Impervious"				
"	5.060	Total Area"				
"	89.000	Flow length"				
"	1.000	Overland Slope"				
"	3.289	Pervious Area"				
"	89.000	Pervious length"				

"	1.000	Pervious slope"				
"	1.771	Impervious Area"				
"	89.000	Impervious length"				
"	1.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.516	2.216	1.110	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	38.047	6.761	22.590	minutes"
"		Time to Centroid	2740.901	2241.050	2493.947	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	0.9374	0.5047	1.4421	ha-m"
"		Rainfall losses	141.553	24.859	100.710	mm"
"		Runoff depth	143.447	260.141	184.290	mm"
"		Runoff volume	4717.97	4607.09	9325.06	c.m"
"		Runoff coefficient	0.503	0.913	0.647	"
"		Maximum flow	0.361	0.224	0.516	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.516	2.732	1.110	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				

"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.137	2.732	1.110	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"
"		Surface Area	1.197	0.063	1.260	hectare"
"		Time of concentration	36.534	6.492	33.939	minutes"
"		Time to Centroid	2739.813	2238.163	2696.477	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	3411.45	179.55	3591.00	c.m"
"		Rainfall losses	140.971	26.244	135.234	mm"
"		Runoff depth	144.029	258.756	149.766	mm"
"		Runoff volume	1724.03	163.02	1887.05	c.m"
"		Runoff coefficient	0.505	0.908	0.525	"
"		Maximum flow	0.132	0.008	0.137	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.137	2.869	1.110	0.000"	
" 38		START/RE-START TOTALS 3400"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		135.350	hectare"	
"		Total Impervious area		22.387	hectare"	
"		Total % impervious		16.540"		
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        B:\Working\THOMASFIELD HOMES LIMITED\
"          2401738 - 418153 Marsville North (Thunderbird Tunio Prop)\Design
Data\Modelling Files\2024-10-29"
"          Output filename:                      Post_100yrSCS.out"
"          Licensee name:                      "
"          Company                              "
"          Date & Time last used:                10/29/2024 at 9:15:56 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          1440.000  Max. Storm length"
"          12000.000  Max. Hydrograph"
" 32          STORM Mass Curve"
"          3  Mass Curve"
"          81.221  Rainfall depth"
"          1440.000  Duration"
"          48  C:\Program Files (x86)\MIDUSS\SCS_Type2_24hr.mrd  SCS 24 hour Type
II storm"
"          Maximum intensity                      99.415  mm/hr"
"          Total depth                          81.221  mm"
"          7  1000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 1100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          1100  Catchment 1100"
"          3.000  % Impervious"
"          3.660  Total Area"
"          135.000  Flow length"
"          0.750  Overland Slope"
"          3.550  Pervious Area"
"          135.000  Pervious length"
"          0.750  Pervious slope"
"          0.110  Impervious Area"
"          135.000  Impervious length"
"          0.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.235  0.000  0.000  0.000 c.m/sec"

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"	Catchment 1100	Pervious	Impervious	Total Area	"
"	Surface Area	3.550	0.110	3.660	hectare"
"	Time of concentration	41.808	7.358	37.843	minutes"
"	Time to Centroid	765.211	748.954	763.340	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2883.51	89.18	2972.69	c.m"
"	Rainfall losses	62.359	1.906	60.546	mm"
"	Runoff depth	18.862	79.315	20.675	mm"
"	Runoff volume	669.63	87.09	756.71	c.m"
"	Runoff coefficient	0.232	0.977	0.255	"
"	Maximum flow	0.232	0.031	0.235	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.235	0.235	0.000	0.000"

" 33 CATCHMENT 1300"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	1300	Catchment 1300"
"	35.000	% Impervious"
"	27.060	Total Area"
"	600.000	Flow length"
"	1.500	Overland Slope"
"	17.589	Pervious Area"
"	600.000	Pervious length"
"	1.500	Pervious slope"
"	9.471	Impervious Area"
"	600.000	Impervious length"
"	1.500	Impervious slope"
"	0.250	Pervious Manning 'n' "
"	125.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n' "
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.050	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"
"		2.446 0.235 0.000 0.000 c.m/sec"

"	Catchment 1300	Pervious	Impervious	Total Area	"
"	Surface Area	17.589	9.471	27.060	hectare"
"	Time of concentration	83.107	14.627	35.542	minutes"
"	Time to Centroid	809.048	765.241	778.620	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.4286	0.7692	2.1978	ha-m"
"	Rainfall losses	62.355	1.539	41.069	mm"
"	Runoff depth	18.866	79.682	40.152	mm"
"	Runoff volume	0.3318	0.7547	1.0865	ha-m"
"	Runoff coefficient	0.232	0.981	0.494	"

```

"           Maximum flow           0.627           2.322           2.446           c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"           4      Add Runoff "
"                   2.446           2.562           0.000           0.000"
" 81      ADD COMMENT=====
"           1      Lines of comment"
"           Marsville South Subdivision Stormwater Management Facility"
" 64      SHOW TABLE"
"           2      Flow hydrograph"
"           4      Inflow Hydrograph"
"           Maximum flow           2.562           c.m/sec"
"           Hydrograph volume       11621.750       c.m"
" 54      POND DESIGN"
"           2.562      Current peak flow       c.m/sec"
"           0.200      Target outflow       c.m/sec"
"           11621.8    Hydrograph volume       c.m"
"           24.        Number of stages"
"           484.900    Minimum water level     metre"
"           487.200    Maximum water level     metre"
"           484.900    Starting water level    metre"
"           0          Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge       Volume"
"           484.900    0.000       0.000"
"           485.000    0.01200     642.900"
"           485.100    0.02300     1316.600"
"           485.200    0.1190      2021.300"
"           485.300    0.3140      2757.200"
"           485.400    0.3140      3524.300"
"           485.500    0.3170      4322.900"
"           485.600    0.3170      5153.000"
"           485.700    0.3210      6014.900"
"           485.800    0.3240      6908.700"
"           485.900    0.3240      7834.500"
"           486.000    0.3270      8792.400"
"           486.100    0.3300      9782.700"
"           486.200    0.3300      10805.50"
"           486.300    0.3330      11860.90"
"           486.400    0.3330      12949.00"
"           486.500    0.3360      14070.10"
"           486.600    0.3390      15224.30"
"           486.700    0.3390      16411.70"
"           486.800    0.3420      17632.50"
"           486.900    0.3450      18886.90"
"           487.000    0.3450      20174.90"
"           487.100    1.389       21496.80"
"           487.200    3.328       22852.30"
"           Peak outflow           0.323           c.m/sec"
"           Maximum level           485.777         metre"
"           Maximum storage         6699.724         c.m"
"           Centroidal lag           19.163         hours"

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"          2.446      2.562      0.323      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          2.446      0.323      0.323      0.000"
" 56      DIVERSION"
"          1300      Node number"
"          0.345      Overflow threshold"
"          1.000      Required diverted fraction"
"          0      Conduit type; 1=Pipe;2=Channel"
"          Peak of diverted flow      0.000      c.m/sec"
"          Volume of diverted flow      0.000      c.m"
"          DIV01300.1000hyd"
"          Overflow at the South Pond"
"          2.446      0.323      0.323      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          2.446      0.323      0.323      0.000"
" 81      ADD COMMENT=====
"          1      Lines of comment"
"          Thunderbird Drain Improvements - Marsville South Branch"
" 51      PIPE DESIGN"
"          0.323      Current peak flow      c.m/sec"
"          0.013      Manning 'n'"
"          0.525      Diameter      metre"
"          0.500      Gradient      %"
"          Surcharged HGL      0.565      %"
"          Velocity      1.493      m/sec"
"          Pipe capacity      0.304      c.m/sec"
"          Critical depth      0.000      metre"
" 53      ROUTE      Pipe Route 546"
"          546.00      Pipe Route 546 Reach length      ( metre)"
"          0.465      X-factor <= 0.5"
"          276.518      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.000      Beta weighting factor"
"          0.000      Routing time step      ( seconds)"
"          0      No. of sub-reaches"
"          Peak outflow      0.323      c.m/sec"
"          2.446      0.323      0.323      0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5      Next link "
"          2.446      0.323      0.323      0.000"
" 40      HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"          2.446      0.323      0.323      0.000"
" 40      HYDROGRAPH      Combine      5000"
"          6      Combine "
"          5000      Node #"

```

"		Closed Pipe"				
"		Maximum flow	0.323		c.m/sec"	
"		Hydrograph volume	11619.394		c.m"	
"		2.446	0.323	0.323	0.323"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		2.446	0.000	0.323	0.323"	
" 33		CATCHMENT 4000"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	4000	Catchment 4000"				
"	35.000	% Impervious"				
"	1.100	Total Area"				
"	50.000	Flow length"				
"	7.000	Overland Slope"				
"	0.715	Pervious Area"				
"	50.000	Pervious length"				
"	7.000	Pervious slope"				
"	0.385	Impervious Area"				
"	50.000	Impervious length"				
"	7.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.185	0.000	0.323	0.323 c.m/sec"	
"		Catchment 4000	Pervious	Impervious	Total Area	"
"		Surface Area	0.715	0.385	1.100	hectare"
"		Time of concentration	11.788	2.075	5.057	minutes"
"		Time to Centroid	733.334	736.860	735.777	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	580.73	312.70	893.43	c.m"
"		Rainfall losses	62.373	2.213	41.317	mm"
"		Runoff depth	18.848	79.008	39.904	mm"
"		Runoff volume	134.76	304.18	438.95	c.m"
"		Runoff coefficient	0.232	0.973	0.491	"
"		Maximum flow	0.118	0.106	0.185	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.185	0.185	0.323	0.323"	
" 40		HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"				
"		0.185	0.185	0.185	0.323"	

```

" 40      HYDROGRAPH   Combine      5001"
"          6   Combine  "
"          5001   Node #"
"              To Wetland South of Site"
"              Maximum flow              0.185      c.m/sec"
"              Hydrograph volume          438.945      c.m"
"                  0.185      0.185      0.185      0.185"
" 40      HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"              0.185      0.000      0.185      0.185"
" 47      FILEI_0 Read/Open DIV01300.1000hyd"
"          1   1=read/open; 2=write/save"
"          2   1=rainfall; 2=hydrograph"
"          1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"              DIV01300.1000hyd"
"              Overflow at the South Pond"
"              Total volume              0.000      c.m"
"              Maximum flow              0.000      c.m/sec"
"                  0.000      0.000      0.185      0.185 c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"          4   Add Runoff  "
"              0.000      0.000      0.185      0.185"
" 33      CATCHMENT 2200"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"          2200  Catchment 2200"
"          35.000 % Impervious"
"          2.860  Total Area"
"          45.000 Flow length"
"          1.000  Overland Slope"
"          1.859  Pervious Area"
"          45.000 Pervious length"
"          1.000  Pervious slope"
"          1.001  Impervious Area"
"          45.000 Impervious length"
"          1.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000 Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.050  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.475      0.000      0.185      0.185 c.m/sec"
"          Catchment 2200      Pervious      Impervious Total Area  "
"          Surface Area          1.859      1.001      2.860      hectare"

```

"	Time of concentration	19.279	3.492	9.864	minutes"
"	Time to Centroid	737.817	740.253	739.270	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1509.90	813.02	2322.92	c.m"
"	Rainfall losses	52.756	3.124	35.385	mm"
"	Runoff depth	28.465	78.097	45.836	mm"
"	Runoff volume	529.17	781.75	1310.92	c.m"
"	Runoff coefficient	0.350	0.962	0.564	"
"	Maximum flow	0.319	0.277	0.475	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.475	0.475	0.185	0.185"
" 33	CATCHMENT 2100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	2100 Catchment 2100"				
"	50.000 % Impervious"				
"	1.140 Total Area"				
"	51.000 Flow length"				
"	0.500 Overland Slope"				
"	0.570 Pervious Area"				
"	51.000 Pervious length"				
"	0.500 Pervious slope"				
"	0.570 Impervious Area"				
"	51.000 Impervious length"				
"	0.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.050 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		0.177	0.475	0.185	0.185 c.m/sec"
"	Catchment 2100	Pervious	Impervious	Total Area	"
"	Surface Area	0.570	0.570	1.140	hectare"
"	Time of concentration	26.328	4.634	8.796	minutes"
"	Time to Centroid	748.778	742.727	743.887	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	462.96	462.96	925.92	c.m"
"	Rainfall losses	62.365	1.796	32.080	mm"
"	Runoff depth	18.856	79.425	49.141	mm"
"	Runoff volume	107.48	452.73	560.21	c.m"
"	Runoff coefficient	0.232	0.978	0.605	"
"	Maximum flow	0.055	0.160	0.177	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

```

"          4  Add Runoff "
"              0.177      0.651      0.185      0.185"
" 81      ADD COMMENT=====
"          1  Lines of comment"
"              1200 mm dia. Culvert at County Road 3"
" 64      SHOW TABLE"
"          2  Flow hydrograph"
"          4  Inflow Hydrograph"
"              Maximum flow          0.651      c.m/sec"
"              Hydrograph volume      1871.126      c.m"
" 33      CATCHMENT 2300"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          2300  Catchment 2300"
"          35.000  % Impervious"
"          7.920  Total Area"
"          76.000  Flow length"
"          1.000  Overland Slope"
"          5.148  Pervious Area"
"          76.000  Pervious length"
"          1.000  Pervious slope"
"          2.772  Impervious Area"
"          76.000  Impervious length"
"          1.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          125.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.927      0.651      0.185      0.185 c.m/sec"
"          Catchment 2300      Pervious      Impervious      Total Area  "
"          Surface Area      5.148      2.772      7.920      hectare"
"          Time of concentration      27.168      4.782      11.628      minutes"
"          Time to Centroid      749.675      743.051      745.076      minutes"
"          Rainfall depth      81.221      81.221      81.221      mm"
"          Rainfall volume      4181.26      2251.45      6432.70      c.m"
"          Rainfall losses      62.356      1.695      41.125      mm"
"          Runoff depth      18.865      79.526      40.096      mm"
"          Runoff volume      971.15      2204.46      3175.61      c.m"
"          Runoff coefficient      0.232      0.979      0.494      "
"          Maximum flow      0.482      0.782      0.927      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.927      1.579      0.185      0.185"

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" 81      ADD COMMENT=====
"          1  Lines of comment"
"          North of Thunderbird Subdivision via Stormwater Block"
" 64      SHOW TABLE"
"          2  Flow hydrograph"
"          4  Inflow Hydrograph"
"          Maximum flow              1.579      c.m/sec"
"          Hydrograph volume         5046.746    c.m"
" 52      CHANNEL DESIGN"
"          1.579  Current peak flow      c.m/sec"
"          0.040  Manning 'n'"
"          0.    Cross-section type: 0=trapezoidal; 1=general"
"          1.500  Basewidth      metre"
"          3.000  Left bank slope"
"          3.000  Right bank slope"
"          1.000  Channel depth      metre"
"          1.500  Gradient  %"
"          Depth of flow              0.429      metre"
"          Velocity                    1.322      m/sec"
"          Channel capacity            9.529      c.m/sec"
"          Critical depth              0.375      metre"
" 53      ROUTE      Channel Route 242"
"          242.00      Channel Route 242 Reach length      ( metre)"
"          0.471      X-factor <= 0.5"
"          137.313      K-lag      ( seconds)"
"          0.000      Default(0) or user spec.(1) values used"
"          0.500      X-factor <= 0.5"
"          30.000      K-lag      ( seconds)"
"          0.500      Beta weighting factor"
"          100.000      Routing time step      ( seconds)"
"          1  No. of sub-reaches"
"          Peak outflow              1.477      c.m/sec"
"          0.927      1.579      1.477      0.185 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5  Next link "
"          0.927      1.477      1.477      0.185"
" 33      CATCHMENT 2400"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          2400  Catchment 2400"
"          35.000  % Impervious"
"          9.130  Total Area"
"          65.000  Flow length"
"          1.000  Overland Slope"
"          5.934  Pervious Area"
"          65.000  Pervious length"
"          1.000  Pervious slope"
"          3.196  Impervious Area"
"          65.000  Impervious length"

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"      1.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    125.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.079      1.477      1.477      0.185 c.m/sec"
"      Catchment 2400      Pervious      Impervious      Total Area  "
"      Surface Area      5.934      3.196      9.130      hectare"
"      Time of concentration 24.736      4.353      10.604      minutes"
"      Time to Centroid      747.100      742.105      743.637      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      4820.06      2595.42      7415.48      c.m"
"      Rainfall losses      62.378      2.107      41.283      mm"
"      Runoff depth      18.843      79.114      39.938      mm"
"      Runoff volume      1118.22      2528.09      3646.31      c.m"
"      Runoff coefficient      0.232      0.974      0.492      "
"      Maximum flow      0.612      0.882      1.079      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          1.079      2.530      1.477      0.185"
" 81      ADD COMMENT=====
"      1      Lines of comment"
"      Marsville North Development Flow and Volume"
" 54      POND DESIGN"
"      2.530      Current peak flow      c.m/sec"
"      0.394      Target outflow      c.m/sec"
"      8693.0      Hydrograph volume      c.m"
"      28.      Number of stages"
"      482.350      Minimum water level      metre"
"      485.200      Maximum water level      metre"
"      482.350      Starting water level      metre"
"      0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      482.350      0.000      0.000"
"      482.400      0.00300      105.100"
"      482.500      0.00600      324.300"
"      482.600      0.02300      555.900"
"      482.700      0.03300      799.900"
"      482.800      0.04000      1056.500"
"      482.900      0.08700      1325.900"
"      483.000      0.2130      1608.200"
"      483.100      0.5120      1903.600"
"      483.200      0.6560      2212.100"
"      483.300      0.6620      2534.000"

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"	483.400	0.6680	2869.500"	
"	483.500	0.6740	3218.600"	
"	483.600	0.6790	3581.500"	
"	483.700	0.6910	3958.300"	
"	483.800	0.6970	4349.300"	
"	483.900	0.7020	4754.600"	
"	484.000	0.7070	5174.300"	
"	484.100	0.7120	5608.500"	
"	484.400	0.7290	7000.200"	
"	484.500	0.7340	7494.200"	
"	484.600	0.7390	8003.600"	
"	484.700	0.7440	8528.400"	
"	484.800	0.7470	9068.900"	
"	484.900	0.7490	9625.100"	
"	485.000	1.834	10197.30"	
"	485.100	3.843	10785.60"	
"	485.200	6.484	11390.10"	
"	Peak outflow	0.695	c.m/sec"	
"	Maximum level	483.769	metre"	
"	Maximum storage	4228.778	c.m"	
"	Centroidal lag	15.816	hours"	
"	1.079	2.530	0.695	0.185 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.079	0.695	0.695	0.185"
" 56	DIVERSION"			
"	2400	Node number"		
"	0.747	Overflow threshold"		
"	1.000	Required diverted fraction"		
"	0	Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.000	c.m/sec"	
"	Volume of diverted flow	0.000	c.m"	
"	DIV02400.1000hyd"			
"	Major flow at 2400"			
"	1.079	0.695	0.695	0.185 c.m/sec"
" 40	HYDROGRAPH Next link "			
"	5	Next link "		
"	1.079	0.695	0.695	0.185"
" 40	HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"		
"	1.079	0.695	0.695	0.185"
" 81	ADD COMMENT=====			
"	2	Lines of comment"		
"	Thunderbird Drain Improvements - Marsville North "			
"	Subdivision Branch"			
" 40	HYDROGRAPH Combine 5004"			
"	6	Combine "		
"	5004	Node #"		
"	To Marsville North Thunderbird Drain Improvements"			
"	Maximum flow	0.695	c.m/sec"	

"		Hydrograph volume	8698.447	c.m"
"		1.079 0.695 0.695	0.695	0.695"
" 40		HYDROGRAPH Start - New Tributary"		
"		2 Start - New Tributary"		
"		1.079 0.000 0.695	0.695	0.695"
" 33		CATCHMENT 1400"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	2	Horton equation"		
"	1400	Catchment 1400"		
"	5.000	% Impervious"		
"	9.940	Total Area"		
"	174.000	Flow length"		
"	0.750	Overland Slope"		
"	9.443	Pervious Area"		
"	174.000	Pervious length"		
"	0.750	Pervious slope"		
"	0.497	Impervious Area"		
"	174.000	Impervious length"		
"	0.750	Impervious slope"		
"	0.250	Pervious Manning 'n'"		
"	125.000	Pervious Max.infiltration"		
"	5.000	Pervious Min.infiltration"		
"	0.250	Pervious Lag constant (hours)"		
"	5.000	Pervious Depression storage"		
"	0.015	Impervious Manning 'n'"		
"	0.000	Impervious Max.infiltration"		
"	0.000	Impervious Min.infiltration"		
"	0.050	Impervious Lag constant (hours)"		
"	1.500	Impervious Depression storage"		
"		0.557 0.000 0.695	0.695 c.m/sec"	
"		Catchment 1400 Pervious Impervious Total Area "		
"		Surface Area 9.443 0.497 9.940	hectare"	
"		Time of concentration 48.684 8.568 41.390	minutes"	
"		Time to Centroid 772.522 751.537 768.707	minutes"	
"		Rainfall depth 81.221 81.221 81.221	mm"	
"		Rainfall volume 7669.70 403.67 8073.37	c.m"	
"		Rainfall losses 62.355 1.557 59.315	mm"	
"		Runoff depth 18.866 79.664 21.906	mm"	
"		Runoff volume 1781.55 395.93 2177.48	c.m"	
"		Runoff coefficient 0.232 0.981 0.270	"	
"		Maximum flow 0.542 0.138 0.557	c.m/sec"	
" 40		HYDROGRAPH Add Runoff "		
"		4 Add Runoff "		
"		0.557 0.557 0.695	0.695"	
" 33		CATCHMENT 1500"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	2	Horton equation"		
"	1500	Catchment 1500"		

"	3.000	% Impervious"			
"	15.590	Total Area"			
"	198.000	Flow length"			
"	1.600	Overland Slope"			
"	15.122	Pervious Area"			
"	198.000	Pervious length"			
"	1.600	Pervious slope"			
"	0.468	Impervious Area"			
"	198.000	Impervious length"			
"	1.600	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.999	0.557	0.695	0.695 c.m/sec"
"		Catchment 1500	Pervious	Impervious	Total Area "
"		Surface Area	15.122	0.468	15.590 hectare"
"		Time of concentration	41.912	7.377	37.937 minutes"
"		Time to Centroid	765.323	748.991	763.443 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1.2282	0.0380	1.2662 ha-m"
"		Rainfall losses	62.358	1.895	60.544 mm"
"		Runoff depth	18.863	79.326	20.677 mm"
"		Runoff volume	2852.51	371.01	3223.52 c.m"
"		Runoff coefficient	0.232	0.977	0.255 "
"		Maximum flow	0.986	0.133	0.999 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.999	1.537	0.695	0.695"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.999	1.537	1.537	0.695"
" 40		HYDROGRAPH Combine 5002"			
"	6	Combine "			
"	5002	Node #"			
"		West Watershed Catchment Areas"			
"		Maximum flow	1.537		c.m/sec"
"		Hydrograph volume	5401.002		c.m"
"		0.999	1.537	1.537	1.537"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.999	0.000	1.537	1.537"
" 33		CATCHMENT 2450"			
"	1	Triangular SCS"			

```

"          1  Equal length"
"          2  Horton equation"
"      2450  Catchment 2450"
"  15.000  % Impervious"
"    0.360  Total Area"
"  40.000  Flow length"
"    1.000  Overland Slope"
"    0.306  Pervious Area"
"  40.000  Pervious length"
"    1.000  Pervious slope"
"    0.054  Impervious Area"
"  40.000  Impervious length"
"    1.000  Impervious slope"
"    0.250  Pervious Manning 'n'"
" 125.000  Pervious Max.infiltration"
"    5.000  Pervious Min.infiltration"
"    0.250  Pervious Lag constant (hours)"
"    5.000  Pervious Depression storage"
"    0.015  Impervious Manning 'n'"
"    0.000  Impervious Max.infiltration"
"    0.000  Impervious Min.infiltration"
"    0.050  Impervious Lag constant (hours)"
"    1.500  Impervious Depression storage"
"          0.040    0.000    1.537    1.537 c.m/sec"
"      Catchment 2450      Pervious      Impervious Total Area "
"      Surface Area      0.306      0.054      0.360      hectare"
"      Time of concentration 18.485      3.253      12.026      minutes"
"      Time to Centroid 740.434      739.852      740.189      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      248.54      43.86      292.40      c.m"
"      Rainfall losses      62.394      2.684      53.437      mm"
"      Runoff depth      18.827      78.537      27.784      mm"
"      Runoff volume      57.61      42.41      100.02      c.m"
"      Runoff coefficient      0.232      0.967      0.342      "
"      Maximum flow      0.038      0.015      0.040      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.040    0.040    1.537    1.537"
" 56      DIVERSION"
"      2450      Node number"
"    0.018      Overflow threshold"
"    1.000      Required diverted fraction"
"      0      Conduit type; 1=Pipe;2=Channel"
"      Peak of diverted flow      0.022      c.m/sec"
"      Volume of diverted flow      24.112      c.m"
"      DIV02450.1000hyd"
"      Major flow at 2450"
"          0.040    0.040    0.018    1.537 c.m/sec"
" 40      HYDROGRAPH Combine 5004"
"      6      Combine "

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"      5004   Node #"
"      To Marsville North Thunderbird Drain Improvements"
"      Maximum flow           0.708   c.m/sec"
"      Hydrograph volume      8774.358   c.m"
"      0.040   0.040   0.018   0.708"
" 40      HYDROGRAPH   Confluence   5004"
"      7   Confluence  "
"      5004   Node #"
"      To Marsville North Thunderbird Drain Improvements"
"      Maximum flow           0.708   c.m/sec"
"      Hydrograph volume      8774.358   c.m"
"      0.040   0.708   0.018   0.000"
" 51      PIPE DESIGN"
"      0.708   Current peak flow   c.m/sec"
"      0.013   Manning 'n'"
"      0.675   Diameter   metre"
"      0.400   Gradient   %"
"      Surcharged HGL           0.710   %"
"      Velocity                 1.979   m/sec"
"      Pipe capacity            0.532   c.m/sec"
"      Critical depth           0.000   metre"
" 53      ROUTE   Pipe Route 191"
"      190.50   Pipe Route 191 Reach length   ( metre)"
"      0.328   X-factor <= 0.5"
"      89.856   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"      1   No. of sub-reaches"
"      Peak outflow           0.708   c.m/sec"
"      0.040   0.708   0.708   0.000 c.m/sec"
" 40      HYDROGRAPH   Combine   5000"
"      6   Combine  "
"      5000   Node #"
"      Closed Pipe"
"      Maximum flow           1.025   c.m/sec"
"      Hydrograph volume      20393.715   c.m"
"      0.040   0.708   0.708   1.025"
" 40      HYDROGRAPH Start - New Tributary"
"      2   Start - New Tributary"
"      0.040   0.000   0.708   1.025"
" 47      FILEI_0 Read/Open DIV02400.1000hyd"
"      1   1=read/open; 2=write/save"
"      2   1=rainfall; 2=hydrograph"
"      1   1=runoff; 2=inflow; 3=outflow; 4=junction"
"      DIV02400.1000hyd"
"      Major flow at 2400"
"      Total volume           0.000   c.m"

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"           Maximum flow           0.000    c.m/sec"
"           0.000    0.000    0.708    1.025 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4    Add Runoff "
"           0.000    0.000    0.708    1.025"
" 47      FILEI_O Read/Open DIV02450.1000hyd"
"      1    1=read/open; 2=write/save"
"      2    1=rainfall; 2=hydrograph"
"      1    1=runoff; 2=inflow; 3=outflow; 4=junction"
"      DIV02450.1000hyd"
"      Major flow at 2450"
"      Total volume           24.112    c.m"
"      Maximum flow           0.022    c.m/sec"
"           0.022    0.000    0.708    1.025 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4    Add Runoff "
"           0.022    0.022    0.708    1.025"
" 40      HYDROGRAPH Copy to Outflow"
"      8    Copy to Outflow"
"           0.022    0.022    0.022    1.025"
" 40      HYDROGRAPH Combine 5005"
"      6    Combine "
" 5005    Node #"
"      To Existing Thunderbird Municipal Drain"
"      Maximum flow           0.022    c.m/sec"
"      Hydrograph volume       24.112    c.m"
"           0.022    0.022    0.022    0.022"
" 40      HYDROGRAPH Start - New Tributary"
"      2    Start - New Tributary"
"           0.022    0.000    0.022    0.022"
" 33      CATCHMENT 2500"
"      1    Triangular SCS"
"      1    Equal length"
"      2    Horton equation"
"      2500 Catchment 2500"
"      0.000 % Impervious"
"      12.060 Total Area"
"      287.000 Flow length"
"      1.000 Overland Slope"
"      12.060 Pervious Area"
"      287.000 Pervious length"
"      1.000 Pervious slope"
"      0.000 Impervious Area"
"      287.000 Impervious length"
"      1.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      125.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"

```

"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.572	0.000	0.022	0.022 c.m/sec"
"		Catchment 2500	Pervious	Impervious	Total Area "
"		Surface Area	12.060	0.000	12.060 hectare"
"		Time of concentration	60.298	10.612	60.298 minutes"
"		Time to Centroid	784.832	756.193	784.832 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	9795.24	0.01	9795.25 c.m"
"		Rainfall losses	62.358	1.684	62.358 mm"
"		Runoff depth	18.863	79.537	18.863 mm"
"		Runoff volume	2274.84	0.01	2274.85 c.m"
"		Runoff coefficient	0.232	0.000	0.232 "
"		Maximum flow	0.572	0.000	0.572 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.572	0.572	0.022	0.022"
" 33		CATCHMENT 2600"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	2600	Catchment 2600"			
"	0.000	% Impervious"			
"	14.960	Total Area"			
"	307.000	Flow length"			
"	1.000	Overland Slope"			
"	14.960	Pervious Area"			
"	307.000	Pervious length"			
"	1.000	Pervious slope"			
"	0.000	Impervious Area"			
"	307.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.679	0.572	0.022	0.022 c.m/sec"
"		Catchment 2600	Pervious	Impervious	Total Area "
"		Surface Area	14.960	0.000	14.960 hectare"
"		Time of concentration	62.785	11.050	62.785 minutes"
"		Time to Centroid	787.465	757.147	787.466 minutes"

"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.2151	0.0000	1.2151	ha-m"
"	Rainfall losses	62.361	1.589	62.361	mm"
"	Runoff depth	18.860	79.632	18.860	mm"
"	Runoff volume	2821.38	0.01	2821.39	c.m"
"	Runoff coefficient	0.232	0.000	0.232	"
"	Maximum flow	0.679	0.000	0.679	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.679	1.251	0.022	0.022"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.679	1.251	1.251	0.022"	
" 40	HYDROGRAPH Combine 5005"				
"	6 Combine "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	1.251		c.m/sec"	
"	Hydrograph volume	5120.348		c.m"	
"	0.679	1.251	1.251	1.251"	
" 40	HYDROGRAPH Confluence 5005"				
"	7 Confluence "				
"	5005 Node #"				
"	To Existing Thunderbird Municipal Drain"				
"	Maximum flow	1.251		c.m/sec"	
"	Hydrograph volume	5120.348		c.m"	
"	0.679	1.251	1.251	0.000"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.679	1.251	1.251	0.000"	
" 40	HYDROGRAPH Combine 5002"				
"	6 Combine "				
"	5002 Node #"				
"	West Watershed Catchment Areas"				
"	Maximum flow	2.632		c.m/sec"	
"	Hydrograph volume	10521.349		c.m"	
"	0.679	1.251	1.251	2.632"	
" 40	HYDROGRAPH Confluence 5000"				
"	7 Confluence "				
"	5000 Node #"				
"	Closed Pipe"				
"	Maximum flow	1.025		c.m/sec"	
"	Hydrograph volume	20393.715		c.m"	
"	0.679	1.025	1.251	0.000"	
" 51	PIPE DESIGN"				
"	1.025	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	0.750	Diameter	metre"		
"	0.400	Gradient	%"		
"	Surcharged HGL		0.848	%"	

```

"          Velocity                2.321    m/sec"
"          Pipe capacity           0.704    c.m/sec"
"          Critical depth          0.000    metre"
" 53      ROUTE    Pipe Route 760"
"          760.00    Pipe Route 760 Reach length    ( metre)"
"          0.450    X-factor <= 0.5"
"          331.089    K-lag    ( seconds)"
"          0.000    Default(0) or user spec.(1) values used"
"          0.500    X-factor <= 0.5"
"          30.000    K-lag    ( seconds)"
"          0.500    Beta weighting factor"
"          100.000    Routing time step    ( seconds)"
"          1    No. of sub-reaches"
"          Peak outflow                1.025    c.m/sec"
"          0.679    1.025    1.025    0.000 c.m/sec"
" 40      HYDROGRAPH    Combine    5002"
"          6    Combine "
"          5002    Node #"
"          West Watershed Catchment Areas"
"          Maximum flow                3.651    c.m/sec"
"          Hydrograph volume           30915.070    c.m"
"          0.679    1.025    1.025    3.651"
" 81      ADD COMMENT=====
"          1    Lines of comment"
"          Confluence of Closed-Piped and Open Channel"
" 40      HYDROGRAPH    Confluence    5002"
"          7    Confluence "
"          5002    Node #"
"          West Watershed Catchment Areas"
"          Maximum flow                3.651    c.m/sec"
"          Hydrograph volume           30915.072    c.m"
"          0.679    3.651    1.025    0.000"
" 52      CHANNEL DESIGN"
"          3.651    Current peak flow    c.m/sec"
"          0.040    Manning 'n'"
"          0.    Cross-section type: 0=trapezoidal; 1=general"
"          1.000    Basewidth    metre"
"          1.500    Left bank slope"
"          1.500    Right bank slope"
"          2.000    Channel depth    metre"
"          1.000    Gradient    %"
"          Depth of flow                0.941    metre"
"          Velocity                1.609    m/sec"
"          Channel capacity           19.656    c.m/sec"
"          Critical depth            0.767    metre"
" 52      CHANNEL DESIGN"
"          3.651    Current peak flow    c.m/sec"
"          0.040    Manning 'n'"
"          0.    Cross-section type: 0=trapezoidal; 1=general"
"          1.000    Basewidth    metre"

```


"	1.500	Left bank slope"			
"	1.500	Right bank slope"			
"	2.000	Channel depth	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.941	metre"	
"		Velocity	1.609	m/sec"	
"		Channel capacity	19.656	c.m/sec"	
"		Critical depth	0.767	metre"	
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.679	0.000	1.025	0.000"
" 33		CATCHMENT 3100"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3100	Catchment 3100"			
"	35.000	% Impervious"			
"	2.050	Total Area"			
"	100.000	Flow length"			
"	0.500	Overland Slope"			
"	1.332	Pervious Area"			
"	100.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.717	Impervious Area"			
"	100.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.225	0.000	1.025	0.000 c.m/sec"
"		Catchment 3100	Pervious	Impervious	Total Area "
"		Surface Area	1.332	0.717	2.050 hectare"
"		Time of concentration	39.435	6.941	16.927 minutes"
"		Time to Centroid	762.706	748.058	752.560 minutes"
"		Rainfall depth	81.221	81.221	81.221 mm"
"		Rainfall volume	1082.27	582.76	1665.03 c.m"
"		Rainfall losses	62.355	2.255	41.320 mm"
"		Runoff depth	18.866	78.966	39.901 mm"
"		Runoff volume	251.39	566.58	817.97 c.m"
"		Runoff coefficient	0.232	0.972	0.491 "
"		Maximum flow	0.091	0.205	0.225 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			

"		0.225	0.225	1.025	0.000"
" 33	CATCHMENT 3000"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3000	Catchment 3000"			
"	5.000	% Impervious"			
"	20.360	Total Area"			
"	323.000	Flow length"			
"	1.000	Overland Slope"			
"	19.342	Pervious Area"			
"	323.000	Pervious length"			
"	1.000	Pervious slope"			
"	1.018	Impervious Area"			
"	323.000	Impervious length"			
"	1.000	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.886	0.225	1.025	0.000 c.m/sec"
"	Catchment 3000	Pervious	Impervious	Total Area	"
"	Surface Area	19.342	1.018	20.360	hectare"
"	Time of concentration	64.728	11.392	55.028	minutes"
"	Time to Centroid	789.543	757.896	783.786	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.5710	0.0827	1.6537	ha-m"
"	Rainfall losses	62.356	1.540	59.315	mm"
"	Runoff depth	18.865	79.681	21.906	mm"
"	Runoff volume	3648.86	811.15	4460.00	c.m"
"	Runoff coefficient	0.232	0.981	0.270	"
"	Maximum flow	0.857	0.264	0.886	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.886	0.966	1.025	0.000"
" 33	CATCHMENT 3200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	3200	Catchment 3200"			
"	35.000	% Impervious"			
"	0.840	Total Area"			
"	50.000	Flow length"			
"	0.500	Overland Slope"			

"	0.546	Pervious Area"			
"	50.000	Pervious length"			
"	0.500	Pervious slope"			
"	0.294	Impervious Area"			
"	50.000	Impervious length"			
"	0.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	125.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.050	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"	0.099	0.966	1.025	0.000 c.m/sec"	
"	Catchment 3200	Pervious	Impervious	Total Area	"
"	Surface Area	0.546	0.294	0.840	hectare"
"	Time of concentration	26.017	4.579	11.138	minutes"
"	Time to Centroid	748.436	742.607	744.388	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	443.47	238.79	682.26	c.m"
"	Rainfall losses	62.378	1.832	41.187	mm"
"	Runoff depth	18.843	79.389	40.034	mm"
"	Runoff volume	102.88	233.40	336.29	c.m"
"	Runoff coefficient	0.232	0.977	0.493	"
"	Maximum flow	0.053	0.082	0.099	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.099	0.993	1.025	0.000"	
" 33	CATCHMENT 3300"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	3300 Catchment 3300"				
"	35.000 % Impervious"				
"	5.060 Total Area"				
"	89.000 Flow length"				
"	1.000 Overland Slope"				
"	3.289 Pervious Area"				
"	89.000 Pervious length"				
"	1.000 Pervious slope"				
"	1.771 Impervious Area"				
"	89.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	125.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				

"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.584	0.993	1.025	0.000 c.m/sec"	
"		Catchment 3300	Pervious	Impervious	Total Area	"
"		Surface Area	3.289	1.771	5.060	hectare"
"		Time of concentration	29.868	5.257	12.781	minutes"
"		Time to Centroid	752.544	744.064	746.657	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2671.36	1438.42	4109.78	c.m"
"		Rainfall losses	62.357	1.661	41.113	mm"
"		Runoff depth	18.864	79.560	40.108	mm"
"		Runoff volume	620.45	1409.01	2029.46	c.m"
"		Runoff coefficient	0.232	0.980	0.494	"
"		Maximum flow	0.280	0.505	0.584	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.584	1.278	1.025	0.000"	
" 33		CATCHMENT 3400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	3400	Catchment 3400"				
"	5.000	% Impervious"				
"	1.260	Total Area"				
"	93.000	Flow length"				
"	1.250	Overland Slope"				
"	1.197	Pervious Area"				
"	93.000	Pervious length"				
"	1.250	Pervious slope"				
"	0.063	Impervious Area"				
"	93.000	Impervious length"				
"	1.250	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	125.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.050	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.108	1.278	1.025	0.000 c.m/sec"	
"		Catchment 3400	Pervious	Impervious	Total Area	"
"		Surface Area	1.197	0.063	1.260	hectare"
"		Time of concentration	28.681	5.048	24.380	minutes"

"	Time to Centroid	751.251	743.590	749.857	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	972.22	51.17	1023.38	c.m"
"	Rainfall losses	62.394	1.632	59.356	mm"
"	Runoff depth	18.827	79.589	21.865	mm"
"	Runoff volume	225.36	50.14	275.50	c.m"
"	Runoff coefficient	0.232	0.980	0.269	"
"	Maximum flow	0.106	0.018	0.108	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.108	1.350	1.025	0.000"
" 38	START/RE-START TOTALS 3400"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		135.350		hectare"
"	Total Impervious area		22.387		hectare"
"	Total % impervious		16.540"		
" 19	EXIT"				

APPENDIX H:
WATER BALANCE ANALYSIS FOR OFFSITE WETLAND



Wetland Contributing Area

15.32 ha

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
 - Engineered
 - Estimated
 - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
 - Steep
 - Oversteep
 - Toe
- Slope Valley (GRCA)
 - Steep
 - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- Contour 0.5m - CGVD2013 (GRCA)

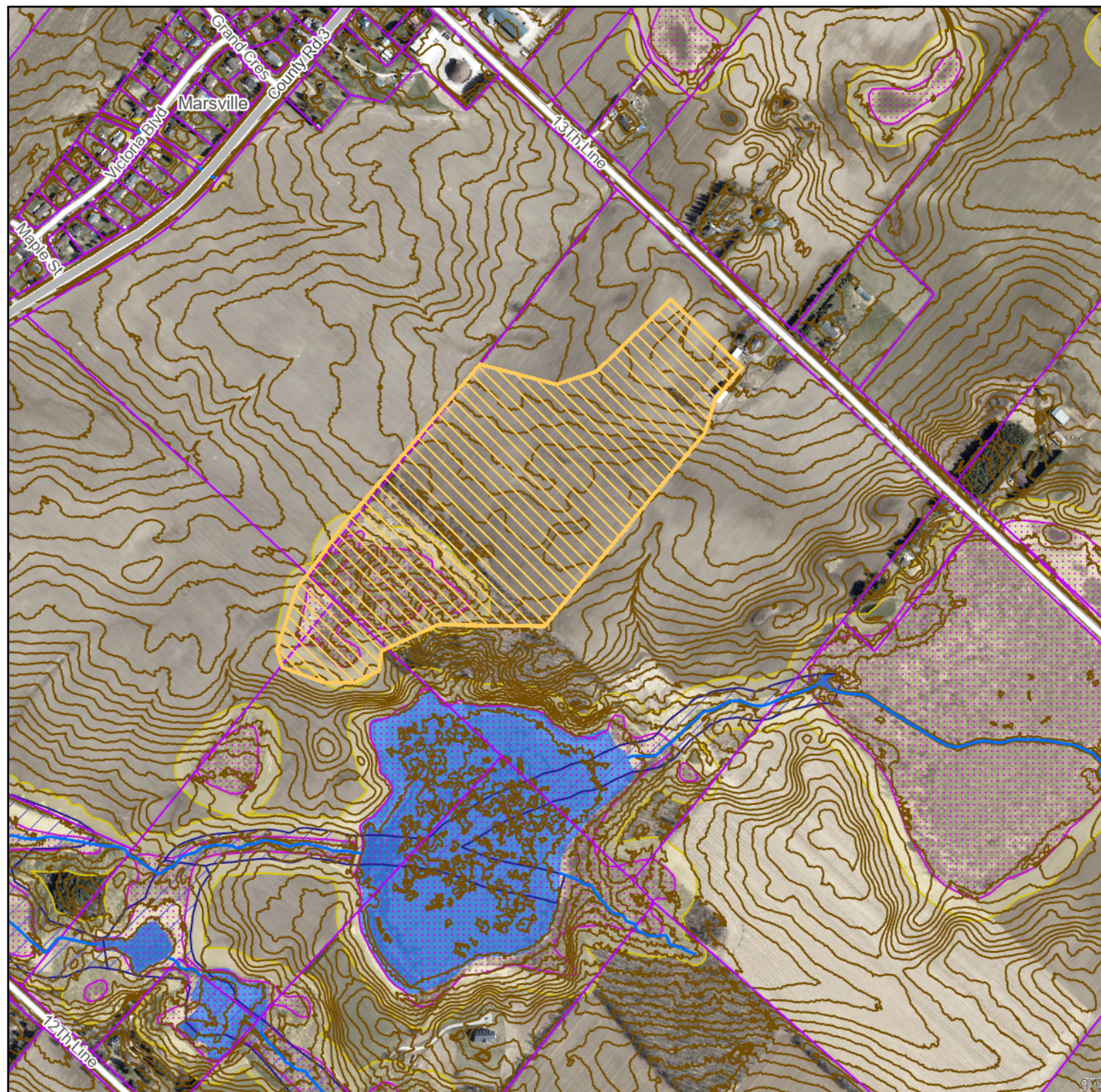
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The source for each data layer is shown in parentheses in the map legend. See [Sources and Citations](#) for details.

Scale 1:7,681

NAD83 UTM zone 17 (EPSG:26917)



Marsville South Subdivision
Township of East Garafraxa (Marsville)
Monthly Water Balance (Thornthwaite and Mather Method)
Date: October 2024

PRE-DEVELOPMENT CONDITIONS - WETLAND

Contributing Catchments:	10	Soil Type: Clayey Silt Till	Impervious Area =	0.3064	ha	Percent of Total Area	Runoff Factor =	0.784
Contributing Area =	15.32	Vegetation: Shallow-rooted crops	Pervious Area =	15.0136	ha	2%	Evapotranspiration	
Percent Impervious =	2%	Root Zone Depth = 0.40m	Total Area =	15.32	ha	98%	Factor for Impervious	
		Soil Moisture Retention Capacity = 100mm				100%	Surfaces =	0.33

Month	Daily Average Temperature	Monthly Heat Index (I)	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration (PE)	Average Precipitation (P)	P-PE	Accum. Pot. Water Loss	Storage (ST)	ΔS	Pervious ET	Actual Evapotranspiration (AE)	Pervious ET - Actual ET	Moisture Deficit (D)	Moisture Surplus (S)	Water Runoff (RO)	Snow Melt Runoff	Total Recharge and Runoff	Total Recharge and Runoff	Recharge	Runoff	Recharge Volume	Runoff Volume
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m ³)	(m ³)
Jan	-7.4	0.0	0.0	24.3	0.0	67.9	67.9		236.5	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	10.9	1,671	2.4	8.6	360	1,310
Feb	-6.3	0.0	0.0	24.6	0.0	55.9	55.9		292.4	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	5.5	835	1.2	4.3	180	655
Mar	-1.9	0.0	0.0	30.6	0.0	59.6	59.6		352.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	2.7	418	0.6	2.1	90	328
Apr	5.7	1.2	0.9	33.6	30.2	74.1	43.9		100.0	0.0	30.2	29.8	0.4	0.4	44.3	23.5	27.7	51.2	7,843	11.0	40.2	1,691	6,152
May	12.2	3.9	1.9	37.8	71.8	86.9	15.1		100.0	0.0	71.8	70.9	1.0	1.0	16.0	19.8	112.2	131.9	20,210	28.4	103.5	4,357	15,853
Jun	17.5	6.7	2.9	38.4	111.4	83.8	-27.6	-27.6	75.0	-25.0	108.8	107.3	1.5	4.0	1.5	10.6	56.1	66.7	10,217	14.4	52.3	2,203	8,014
Jul	20.0	8.2	3.3	38.7	127.7	89.2	-38.5	-66.1	51.0	-24.0	113.2	111.7	1.5	16.0	1.5	6.1	28.0	34.1	5,225	7.4	26.8	1,126	4,098
Aug	19.0	7.6	3.1	36.0	111.6	96.6	-15.0	-81.1	44.0	-7.0	103.6	102.2	1.4	9.4	1.4	3.7	14.0	17.7	2,719	3.8	13.9	586	2,133
Sep	14.9	5.2	2.4	31.2	74.9	93.1	18.2		62.2	18.2	74.9	73.9	1.0	1.0	1.0	2.4	7.5	9.9	1,511	2.1	7.7	326	1,186
Oct	8.3	2.2	1.3	28.5	37.1	77.2	40.2		100.0	37.8	37.1	36.6	0.5	0.5	0.5	1.4	3.8	5.2	794	1.1	4.1	171	623
Nov	2.1	0.3	0.3	24.3	7.3	93.0	85.7		100.0	0.0	7.3	7.2	0.1	0.1	85.8	43.6	1.9	45.5	6,970	9.8	35.7	1,503	5,467
Dec	-3.9	0.0	0.0	23.1	0.0	68.6	68.6		168.6	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.9	22.7	3,485	4.9	17.8	751	2,734
Total		35.1				945.9	374.0					546.9	539.5	7.3	32.4	152.0	252.0	404.0	61,896	87.1	316.9	13,345	48,551

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1981-2010 for the Fergus Shand Dam Weather Station
Monthly water balance strategy as outlined in the document*Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*
For impervious surfaces, evapotranspiration is assumed to be 20% of the yearly precipitation (180.3mm/yr), remainder 721.3mm/yr is runoff.
Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (180.3mm/year) / Average Annual Evapotranspiration for Pervious Surfaces (546.9mm/year) = 0.33
Pervious soil average annual runoff from MOE Stormwater Management Planning and Design Manual Table 3.1 - Hydrologic Cycle Component Values. Table provides 87mm/yr runoff for clay loam soil, shallow rooted crops.
Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces (721.3mm/year)) + (Pervious Percentage of Site x Average Annual Runoff for Pervious Surfaces (87 mm/year))]/ Total Annual Recharge & Runoff

Marsville South Subdivision
Township of East Garafraxa (Marsville)
Monthly Water Balance (Thorntwaite and Mather Method)
Date: October 2024

POST-DEVELOPMENT CONDITIONS

Contributing Catchments:	10		Soil Type: Clayey Silt Till	Impervious Area =	0.3064	ha	Percent of Total Area	2%	Runoff Factor =	0.784
Contributing Area =	15.32	ha	Vegetation: Shallow-rooted crops	Pervious Area =	15.0136	ha		98%	Evapotranspiration	
Percent Impervious =	2%		Root Zone Depth = 0.40m	Total Area =	15.32	ha		100%	Factor for Impervious	
			Soil Moisture Retention Capacity = 100mm						Surfaces =	0.33

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotranspiration	Pervious ET - Actual ET	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Total Recharge and Runoff	Recharge	Recharge Volume	Runoff	Runoff Volume
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m³)	(mm)	(m³)
Jan	-7.4	0.0	0.0	24.3	0.0	67.9	67.9		236.5	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	10.9	1,671	2.4	360	8.6	1,310
Feb	-6.3	0.0	0.0	24.6	0.0	55.9	55.9		292.4	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	5.5	835	1.2	180	4.3	655
Mar	-1.9	0.0	0.0	30.6	0.0	59.6	59.6		352.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	2.7	418	0.6	90	2.1	328
Apr	5.7	1.2	0.9	33.6	30.2	74.1	43.9		100.0	0.0	30.2	29.8	0.4	0.4	44.3	23.5	27.7	51.2	7,843	11.0	1,691	40.2	6,152
May	12.2	3.9	1.9	37.8	71.8	86.9	15.1		100.0	0.0	71.8	70.9	1.0	1.0	16.0	19.8	112.2	131.9	20,210	28.4	4,357	103.5	15,853
Jun	17.5	6.7	2.9	38.4	111.4	83.8	-27.6	-27.6	75.0	-25.0	108.8	107.3	1.5	4.0	1.5	10.6	56.1	66.7	10,217	14.4	2,203	52.3	8,014
Jul	20.0	8.2	3.3	38.7	127.7	89.2	-38.5	-66.1	51.0	-24.0	113.2	111.7	1.5	16.0	1.5	6.1	28.0	34.1	5,225	7.4	1,126	26.8	4,098
Aug	19.0	7.6	3.1	36.0	111.6	96.6	-15.0	-81.1	44.0	-7.0	103.6	102.2	1.4	9.4	1.4	3.7	14.0	17.7	2,719	3.8	586	13.9	2,133
Sep	14.9	5.2	2.4	31.2	74.9	93.1	18.2		62.2	18.2	74.9	73.9	1.0	1.0	1.0	2.4	7.5	9.9	1,511	2.1	326	7.7	1,186
Oct	8.3	2.2	1.3	28.5	37.1	77.2	40.2		100.0	37.8	37.1	36.6	0.5	0.5	0.5	1.4	3.8	5.2	794	1.1	171	4.1	623
Nov	2.1	0.3	0.3	24.3	7.3	93.0	85.7		100.0	0.0	7.3	7.2	0.1	0.1	85.8	43.6	1.9	45.5	6,970	9.8	1,503	35.7	5,467
Dec	-3.9	0.0	0.0	23.1	0.0	68.6	68.6		168.6	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.9	22.7	3,485	4.9	751	17.8	2,734
Total		35.1				945.9	374.0				546.9	539.5	7.3	32.4	152.0	152.0	252.0	404.0	61,896	87.1	13,345	316.9	48,551

Contributing Catchments:	4000		Soil Type: Clayey Silt Till	Impervious Area =	0.39	ha	35%	Runoff Factor =	0.857
Contributing Area =	1.10	ha	Vegetation: Shallow-rooted crops	Pervious Area =	0.72	ha	65%	Evapotranspiration	
Percent Impervious =	35%		Root Zone Depth = 0.40m	Total Area =	1.10	ha	100%	Factor for Impervious	
			Soil Moisture Retention Capacity = 100mm					Surfaces =	0.33

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotranspiration	Pervious ET - Actual ET	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Total Recharge and Runoff	Recharge	Recharge Volume	Runoff	Runoff Volume
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m³)	(mm)	(m³)
Jan	-7.4	0.0	0.0	24.3	0.0	67.9	67.9		236.5	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	12.8	141	1.8	20	11.0	121
Feb	-6.3	0.0	0.0	24.6	0.0	55.9	55.9		292.4	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	6.4	71	0.9	10	5.5	60
Mar	-1.9	0.0	0.0	30.6	0.0	59.6	59.6		352.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	3.2	35	0.5	5	2.7	30
Apr	5.7	1.2	0.9	33.6	30.2	74.1	43.9		100.0	0.0	30.2	23.1	7.1	7.1	51.0	27.0	27.7	54.7	602	7.8	86	46.9	516
May	12.2	3.9	1.9	37.8	71.8	86.9	15.1		100.0	0.0	71.8	55.0	16.8	16.8	31.9	29.5	112.2	141.6	1,558	20.3	223	121.4	1,335
Jun	17.5	6.7	2.9	38.4	111.4	83.8	-27.6	-27.6	75.0	-25.0	108.8	83.3	25.5	28.1	25.5	27.5	56.1	83.6	919	12.0	131	71.6	788
Jul	20.0	8.2	3.3	38.7	127.7	89.2	-38.5	-66.1	51.0	-24.0	113.2	86.6	26.6	41.1	26.6	27.0	28.0	55.1	606	7.9	87	47.2	519
Aug	19.0	7.6	3.1	36.0	111.6	96.6	-15.0	-81.1	44.0	-7.0	103.6	79.3	24.3	32.3	24.3	25.7	14.0	39.7	437	5.7	62	34.0	374
Sep	14.9	5.2	2.4	31.2	74.9	93.1	18.2		62.2	18.2	74.9	57.3	17.6	17.6	17.6	21.6	7.5	29.1	320	4.2	46	25.0	274
Oct	8.3	2.2	1.3	28.5	37.1	77.2	40.2		100.0	37.8	37.1	28.4	8.7	8.7	8.7	15.2	3.8	18.9	208	2.7	30	16.2	178
Nov	2.1	0.3	0.3	24.3	7.3	93.0	85.7		100.0	0.0	7.3	5.6	1.7	1.7	87.4	51.3	1.9	53.2	585	7.6	84	45.6	501
Dec	-3.9	0.0	0.0	23.1	0.0	68.6	68.6		168.6	0.0	0.0	0.0	0.0	0.0	0.0	25.6	0.9	26.6	292	3.8	42	22.8	251
Total		35.1				945.9	374.0				546.9	418.6	128.3	153.4	273.0	272.8	252.0	524.9	5,774	75.1	826	449.8	4,948

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1981-2010 for the Fergus Shand Dam Weather Station
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thorntwaite and Mather, 1957)*
For impervious surfaces, evapotranspiration is assumed to be 20% of the yearly precipitation (180.3mm/yr), remainder 721.3mm/yr is runoff.
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Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces (721.3mm/year)) + (Pervious Percentage of Site x Average Annual Runoff for Pervious Surfaces (87 mm/year))]/ Total Annual Recharge & Runoff

Monthly Water Budget from Site to Wetland

Month	Runoff				
	Existing ¹ (m ³)	Post-development (m ³)	Total Difference (m ³)	Total Difference (%)	Estimated Increase in Wetland Depth (mm)
January	1,310	1,431	121	9%	6.0
February	655	716	60	9%	3.0
March	328	358	30	9%	1.5
April	6,152	6,668	516	8%	25.7
May	15,853	17,188	1,335	8%	66.4
June	8,014	8,802	788	10%	39.2
July	4,098	4,617	519	13%	25.8
August	2,133	2,507	374	18%	18.6
September	1,186	1,460	274	23%	13.7
October	623	801	178	29%	8.9
November	5,467	5,968	501	9%	24.9
December	2,734	2,984	251	9%	12.5
Annual Total	48,551	53,499	4,948	10.19%	246

The monthly runoff volumes under pre-development conditions are generated by the existing contributing area to the wetland. The additional monthly runoff volumes under post-development conditions are generated by Catchment 4000. The increase in wetland depth assumes that the water does not have a quick outlet and does not take into consideration evapotranspiration of these volumes. The area of the wetland was taken from GRCA mapping as 2.01 ha.