GEI Consultants Canada

Preliminary Stormwater Management Report R.1

Teviotdale Industrial Subdivision

Town of Minto, Ontario

Submitted to:
Frontiers Design Build

Submitted by:
GEI Consultants Canada Ltd.
975 Wallace Avenue North
Listowel, Ontario, N4W 1M6
519.291.9339

June 2025
Project No. 2406520

Matt Ash, C.E.T.
Project Designer

Brian Fritz, P.Eng.
Senior Project Engineer

Table of Contents

1. Introduction

This report has been prepared by GEI Consultants Limited to document the preliminary design of the stormwater management system for the proposed Teviotdale industrial subdivision, which is legally described as part of Lot 114 Concession D, Minto, County of Wellington, located north of the Teviotdale roundabout along Wellington Rd 109 (the 'Site').

The draft plan drawing for this development was designed by MHBC Planning Limited and the topographic survey was performed by Van Harten Surveying Inc and further supplemented by GEI.

2. Site Information

The proposed subdivision is located on a parcel of land approximately 8.3 hectares in size and is near the intersection of Wellington Road 109 and Wellington Road 123, with frontage on both. The site is currently used for agricultural purposes and contains field crops. The site is transected by 3 branches of the Minto Municipal Drain No. 59, namely the Main Drain, Branch 'B', and Branch 'C'. The Main Drain and Branch 'C' were last improved in 1981. The Main Drain consists of both 600mm and 530mm diameter concrete field tile, and Branch 'C' consists of 350mm diameter field tile. Branch 'B' was last improved in 2020 and consists of 450mm diameter concrete field tile. Both Branch 'B' and Branch 'C' connect to the Main Drain at the northwest corner of the site. The Main Drain has outlet into the open ditch Teviotdale Drain approximately 550m northwest of the site. See existing drain information included in Appendix 'B'.

The Site is also bound by institutional zone (IN), residential zone and agricultural zone (A-1) to the north, agricultural-commercial zone (AC-21) to the east, and industrial zone (R1N and M1-41), residential zone (R1A) and hamlet commercial zone (C5) to the south. Site topography undulates in a gentle slope from east in a west and south to north direction.

At this time, the intent of the owner is to develop the existing Site into an industrial subdivision split into 12 lots, along with an associated paved street designated as Street A, a stormwater block labelled Block 13, and open un-used spaces designated as Blocks 14 & 15. See the draft plan layout included in Appendix 'A'. Following development, stormwater runoff generated from the Site will be conveyed to an onsite stormwater management facility prior to discharging into a catchbasin connected to Municipal Drain No. 59. Overland runoff from neighbouring properties currently directed towards the Site will sheetflow into a drainage ditch running along the southern and western perimeter of the Site, which will then be routed to Drain No. 59. The existing branches of Drain No. 59 on the site will be re-routed along the road allowance or on easements and will bypass the SWM facility.

3. Stormwater Management Design

3.1. Stormwater Management Criteria

The stormwater management criteria for the site are as follows:

1. Post-development runoff under all storm conditions up to and including the 1% Annual Exceedance Probability (AEP) design storm will be controlled to a rate not exceeding the capacity of the downstream receiver (Drain No. 59)
2. Normal water quality control (70% of TSS removal) is required prior to the discharge of runoff from the proposed development.

The MTO IDF Curve Lookup Tool was used to development the 3-hour Chicago design rainfall events, using the 5 and 100-year IDFs for Teviotdale. Design rainfall events for the site are summarized in the following Table No. 1 and are expressed in terms of Annual Exceedance Probability (AEP). In addition, the 25mm Huff 2nd Quartile design storm was used to determine pond volume and drawdown for quality control purposes and the Regional storm (Hurricane Hazel) was used as a check for overtopping of the perimeter berm during severe conditions.

Table No. 1: IDF Parameters

Parameter	20% AEP	1% AEP
A	546.513	898.583
B	0.096	0.06
C	0.702	0.699
R	0.4	0.4

3.2. Pre-Development Outlet Rate

As noted, the Site is contained within the catchment area of Municipal Drain No. 59 and has legal outlet to the same, within the parameters as determined by the most recent drainage report. As part of the investigation, we reviewed in detail the 1981 Municipal Drain No. 59 engineer's report as well as the plan and profile drawings of the 1981 drain. Typical of drainage reports of that era, no design standard is given. It therefore is necessary to determine the design standard by back-calculating using pipe diameters, slopes, and upstream tributary areas under the most restrictive conditions. It was determined that the tributary area upstream of the 600mm Main Drain was 90.1 hectares, and that the flattest grade the pipe was laid was 0.42%. Using standard agricultural drainage design methodology, it was calculated that this pipe was designed to allow for 38mm (1 ½") of drainage per 24 hours. This equates to a maximum allowable outflow of 36 L/s for the 8.3-hectare site. Without any other changes, it will be necessary to attenuate post-development runoff from the Site to no more than the allowable outflow rate.

3.3. Post-Development Drainage Areas

As a rural un-serviced subdivision, maximum post-development imperiousness will be slightly less than what would be expected of a similar urban development due to the presence of septic systems and water

wells. An urban industrial subdivision would typically be 75% impervious, however this report assumes a maximum imperviousness for this Site under post-development conditions of 70%. This should allow for the maximum development potential of the site.

The Site was modelled using the hydrologic software PCSWMM and with the 20% and 1% AEP design storms. The following table No. 2 outlines the unattenuated post-development runoff from the Site.

Table No. 2: Post-Development Unattenuated Runoff (m^3/s)

Catchment	20% AEP	1% AEP
Site	2.06	4.20

3.4. Post-Development Outlet Rate

As noted in section 3.2 the maximum allowable outlet rate for the Site is 36 L/s. This rate is quite low and will require a stormwater storage facility of unreasonably large size, reducing the available land for development purposes. Consequently, it is proposed to improve the existing Main Drain of Drain No. 59 downstream of the Site to the Teviotdale Drain. The improvement will consist of replacing the existing 600mm and 530mm diameter drain tiles with an 825mm diameter drain tile, starting at the north property line of the Site and extending to the outlet into the Teviotdale Drain. This replacement will be done under a separate report following the process and requirements of the Drainage Act.

The improved Main Drain will support an increase in permissible outlet rate from the Site. The proposed 825mm diameter drain tile, laid at a minimum grade of 0.9%, will provide full flow capacity of 1.53 m^3/s. In comparison, the existing 600mm diameter tile at a minimum grade of 0.42% has a pipe-full capacity of 0.45 m^3/s. It is assumed the capacity of the existing pipe is already utilized by external lands, therefore only the additional capacity provided by the 825mm tile, 1.08 m^3/s, will be considered available for outlet purposes. The stormwater facility will be designed to attenuate all runoff from the Site under full development conditions to no more than 1.08 m^3/s.

The outlet of Drain No. 59 is the Teviotdale Drain. As a check, cross sections of the Teviotdale Drain ditch were surveyed to determine capacity. The Teviotdale Drain was found to have an average slope of 0.3% downstream of Drain No. 59 with a smallest (worst-case) cross sectional flow area of 4.06 m^2. Using Manning's equation, the Teviotdale Drain was found to have a minimum bank full capacity of 3.70 m^3/s. In addition to Drain No. 59 there is also 50 hectares of agricultural land that provides runoff to the Teviotdale Drain upstream of the 59 outlet point. 50 hectares of agricultural land will generate approximately 0.220 m^3/s of runoff using an agricultural standard drainage coefficient of 38mm/24 hours, and 0.290 m^3/s using a higher 50mm/24 hours coefficient. Under pipe-flow conditions, Drain No. 59 will contribute 1.53 m^3/s and the upstream lands will contribute a maximum of 0.29 m^3/s for a total peak flow in the Teviotdale Drain of 1.82 m^3/s. Therefore, the Teviotdale Drain has sufficient capacity to accommodate the peak outlet rate from the proposed development as well as all upstream agricultural lands.

Both the existing Drain No. 59 and the Teviotdale Drain have been included in the PCSWMM model as a check for adequacy. All external catchments were modelled using a 38mm agricultural drainage coefficient. A full schematic is included in Appendix 'C'.

3.5. Routing

It is proposed to construct a hybrid wet pond type stormwater management facility on lands set aside for this purpose between Lot 9 and Lot 12 labelled as Block 13 on the Draft Plan. The facility will have approximate top dimensions of approximately 85m in length by 35m in width. The facility will include sufficient active storage to contain runoff up to and including 100-year design storm, including the Regional storm, as well as a permanent pool for quality control. Outlet from the pond will be controlled by a 110mm diameter orifice for quality control purposes, and a ditch inlet catch basin with a 600mm diameter outlet pipe laid at 0.5% grade for peak flow attenuation for all design storms up to and including the 1% AEP design storm. The pond will also include an overflow weir in case the outlet becomes blocked. The pond is proposed to be 1.65m deep in total which includes a 0.35m deep permanent pool and 1.30m of active storage. Calculated bank-full active storage capacity is 2,891 m^3 and calculated permanent pool volume is approximately 523 m^3.

Runoff from the Site will be conveyed to the SWM facility via a combination of roadside ditches and rear and side-yard swales. The outlet structure will be connected to the improved portion of Municipal Drain No. 59 at a proposed catch basin structure to be installed on the Site property line near the northwest corner of Block 13. The stage/storage/discharge for the proposed SWM facility is given in the following Table:

Table No. 3: SWM Facility Stage/Storage/Discharge

	Peak Inflow m^3/s	**Elevation m**	**Active Storage Depth m**	**Active Storage Volume m^3**	**Peak Outflow m^3/s**
Permanent Pool Bottom	-	415.90	-	-	-
110mm Orifice	-	416.25	0.00	-	-
25mm Quality Storm	0.68	416.79	0.54	992	0.02
DICB Lip	-	416.80	0.55	1,019	-
20% AEP	2.06	416.85	0.60	1,132	0.59

Regional (Hazel)	1.13	417.24	0.99	2,039	0.94
100-Year	4.20	417.29	1.04	2,184	0.98
Weir	-	417.30	1.05	2,201	-
Top of Pond	-	417.55	1.30	2,891	-

The proposed SWM facility will control post-development runoff to not exceed the capacity of the downstream receiver under all storm conditions up to and including the 1% AEP design storm. The Regional design storm is also fully contained within the proposed SWMF and can outlet in a controlled manner.

A preliminary design of the stormwater facility is included in Appendix 'B'. Modelling results are included in Appendix 'C'.

4. Quality Control

Quality control will be provided to the "normal" level which is defined as the long-term removal of 70% of total suspended solids as per the MECP Stormwater Management Manual. The total site area is 8.3 hectares however a portion of the site is occupied by Block 13 which is the stormwater facility itself. Block 13 does not require control measures and is excluded from this calculation, resulting in a site area for quality control purposes of 7.74 hectares. As per table 3.2 of the MECP manual, a hybrid wet pond serving a 7.74-hectare site with a total imperviousness of 70% requires an interpolated storage volume of 105 m3/hectare. Of this, 40 m3/hectare is to be provided as extended detention volume with the remaining 65 m3/hectare included in the permanent pool.

In total, 813 m3 of quality control storage will be required of which a minimum of 503 m3 will be in the permanent pool and the remainder in active storage. The facility will be designed with a permanent pool 0.35 m deep. The volume of the permanent pool was calculated to be approximately 523 m3 which meets the requirement for quality control storage.

Outlet control from active storage for the quality storm is provided by a 110mm diameter orifice. Pond drawdown was checked against the 25mm quality control storm to ensure minimum detention time using the 4.11 equation in the MECP manual. Drawdown time was calculated to be approximately 25.8 hours, satisfying the optimal minimum drawdown time of 24 hours.

5. Sediment and Erosion Control

A silt fence will be installed along the property boundary in all locations where runoff will discharge from the site to adjacent lands. The silt fence will serve to minimize the opportunity for waterborne sediments to be washed on to the adjacent surfaces.

Inspection and maintenance of all silt fencing will start after installation is complete. The fence 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 has been substantially completed, the silt fence will be removed, any accumulated sediment will be removed, and the landscaping will be completed. After construction of the complete development, erosion and sediment transport will be minimal.

6. Summary

In summary, the features of the design for the proposed development are as follows:

1. The existing 600mm and 530mm diameter Main Drain of the Municipal Drain No. 59 will be replaced downstream of the Site with an 825mm diameter drain tile to provide for improved outlet capacity for the Site.
2. The Site will include a hybrid wet pond type SWM facility with a permanent pool and active storage volume sufficient to contain the runoff from all design storms under full post-development conditions.
3. The post-development peak runoff rate under all storm conditions including 1% AEP design storm and the Regional storm will not exceed the capacity of the downstream receiver (825 mm drain tile).
4. Quality control will be provided by the permanent pool and extended detention to the “normal” level of 70% long-term suspended solids removal, as per the MECP Stormwater Management Planning and Design Manual.
5. Prior to construction, a silt fence will be installed along the property boundary in all locations where runoff will discharge from the site to adjacent lands. This will minimize the transport of sediment off-site during the construction period.

7. Statement of Limitations

The information in this report is intended for the sole use of Frontiers Design Build and its assigns. GEI Consultants Canada Ltd. accepts no liability for use of this information by third parties. Any decisions made by third parties on the basis of information provided in this report are made at the sole risk of the third party.

GEI Consultants Canada Ltd. cannot guarantee the accuracy or reliability of information provided by others. GEI Consultants Canada Ltd. does not accept liability for unknown, unidentified, undisclosed, or unforeseen surface or sub-surface conditions that may be later identified.

All of which is respectfully submitted,

GEI Consultants Canada Ltd.

Per:

Matt Ash, C.E.T.

Brian Fritz, P. Eng

Appendix A Draft Plan

DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION

PART OF LOT 114
CONCESSION D
TOWN OF MINTO
COUNTY OF WELLINGTON

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

DATE: MAY 2ND 2023

DOUG TAYLOR
2396584 ONTARIO INC.

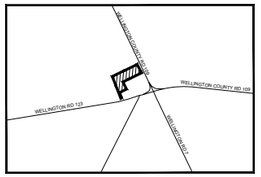
SURVEYOR'S CERTIFICATE

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

DATE: APRIL 21, 2023

JOHN S. SCOTT, OLS
VAN HARTEN SURVEYING INC.

KEY PLAN



Subject Lands

north

SCALE: NTS

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. AS SHOWN
B. AS SHOWN
C. AS SHOWN
D. RURAL INDUSTRIAL, STORMWATER MANAGEMENT, FUTURE DEVELOPMENT
E. AS SHOWN
F. AS SHOWN
G. AS SHOWN
H. NOT APPLICABLE
I. LOAM/ CLAY LOAM
J. AS SHOWN
K. ALL SERVICES AS REQUIRED

AREA SCHEDULE

	LOTS/BLOCKS	AREA (ha.)	AREA (ac.)
RURAL INDUSTRIAL	1-12	6.179	15.27
STORM WATER MANAGEMENT	13	0.623	1.54
0.3m RESERVE	14-15	0.002	0.00
ROADS		1.091	2.70
TOTAL	**15**	**7.896**	**19.51**

Notes

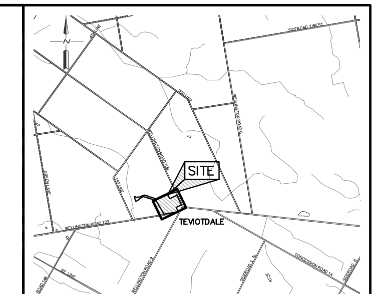
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN

Revision No.	Date	Issued / Revision	By

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp	**Date** May 28, 2025
	File No. 22343A
	Plan Scale 1: 1,000 (Arch D)
	Drawn By LC/CAC
Project TEVIOTDALE	**Checked By** PC
Applicant FRONTIERS DESIGN BUILD INC.	**Other**
File Name DRAFT PLAN OF SUBDIVISION	**Dwg No.** 1 of 1

K:\22343A - TEVIOTDALE, WELLINGTON\DP\DP_28MAY2025.DWG



TOWN OF MINTO
KEY PLAN
NOT TO SCALE

NOTES :

1. TOPOGRAPHIC SURVEY COMPLETED BY GEI CONSULTANTS CANADA LIMITED, DATED DECEMBER 5TH, 2022.
2. SUPPLEMENTAL TOPOGRAPHIC SURVEY COMPLETED BY GEI CONSULTANTS CANADA LIMITED, DATED MAY 28TH, 2025.
3. DRAFT PLAN PREPARED BY MHBC DATED MAY 28, 2025.

LEGEND:

- LOCAL BENCHMARK
- PROPERTY LINE
- ROAD RIGHT OF WAY
- SITE BOUNDARY
- EXISTING TOPOGRAPHICAL CONTOUR (MASL)
- UNDERGROUND CABLE
- UNDERGROUND GAS LINE

BENCH MARKS :

B.M. 322035 - 1 @ ELV. 420.645
TOP OF SPIKE IN HYDRO POLE LOCATED ON THE EAST SIDE OF WELLINGTON ROAD 109 OPPOSITE EXISTING GRAVEL DRIVEWAY.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

PRELIMINARY

NO.	MM/DD/YY	REVISION DESCRIPTION	CHK'D

GEI Consultants
GEI CONSULTANTS, CANADA, LTD.
975 WALLACE AVENUE NORTH
LISTOWEL, ONTARIO N4W 1M6
519.291.9339

TEVIOTDALE INDUSTRIAL SUBDIVISION

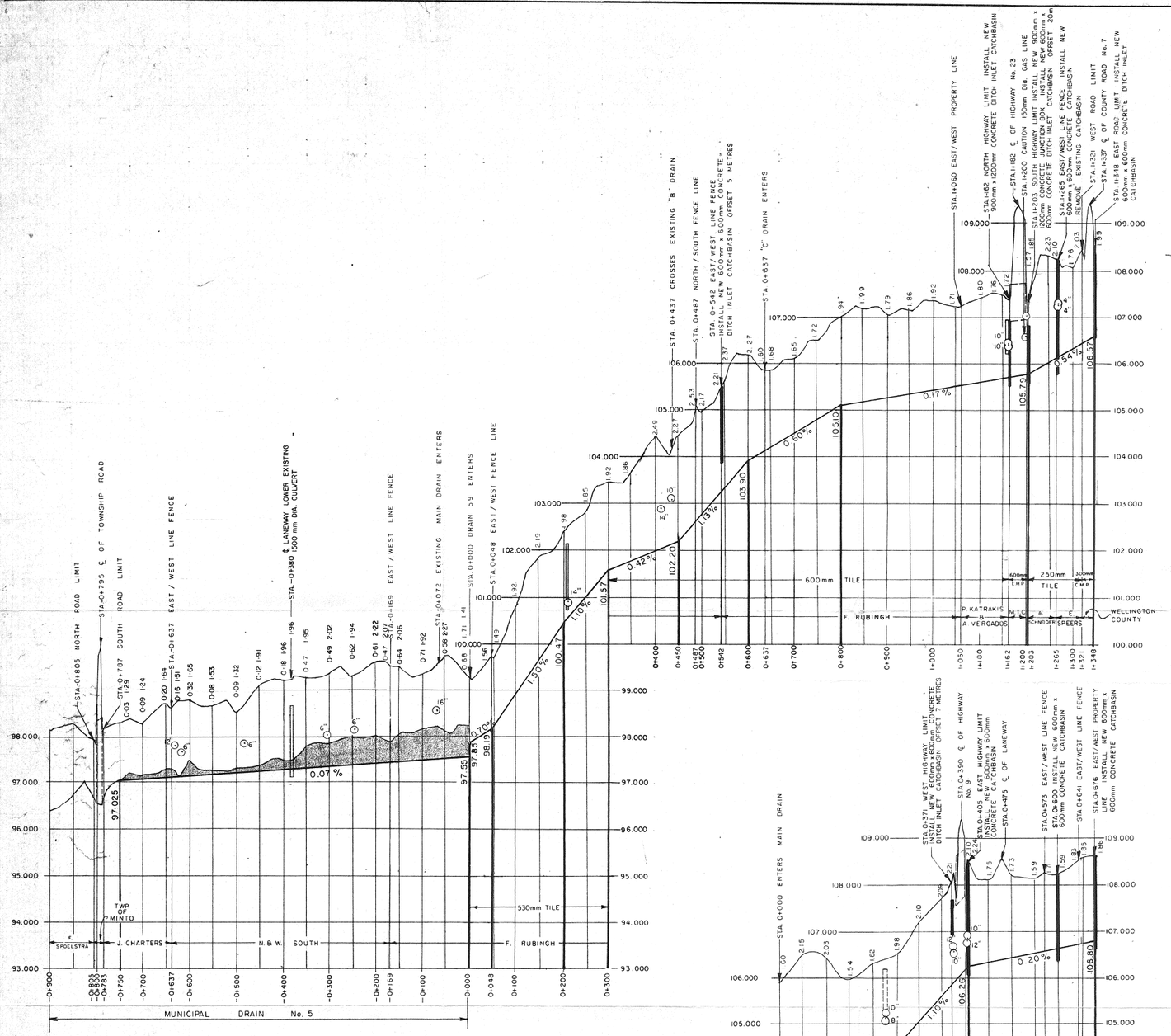
FRONTIERS DESIGN BUILD

TOWN OF MINTO

SITE PLAN

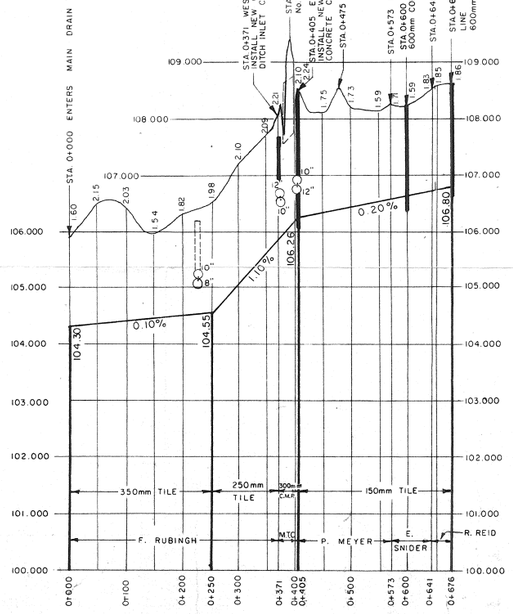
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
CP	-	322035	4
DESIGNED BY :	DATE :	SCALE :	
-	JANUARY 2022	1:1000	

Appendix B Existing Drain Information



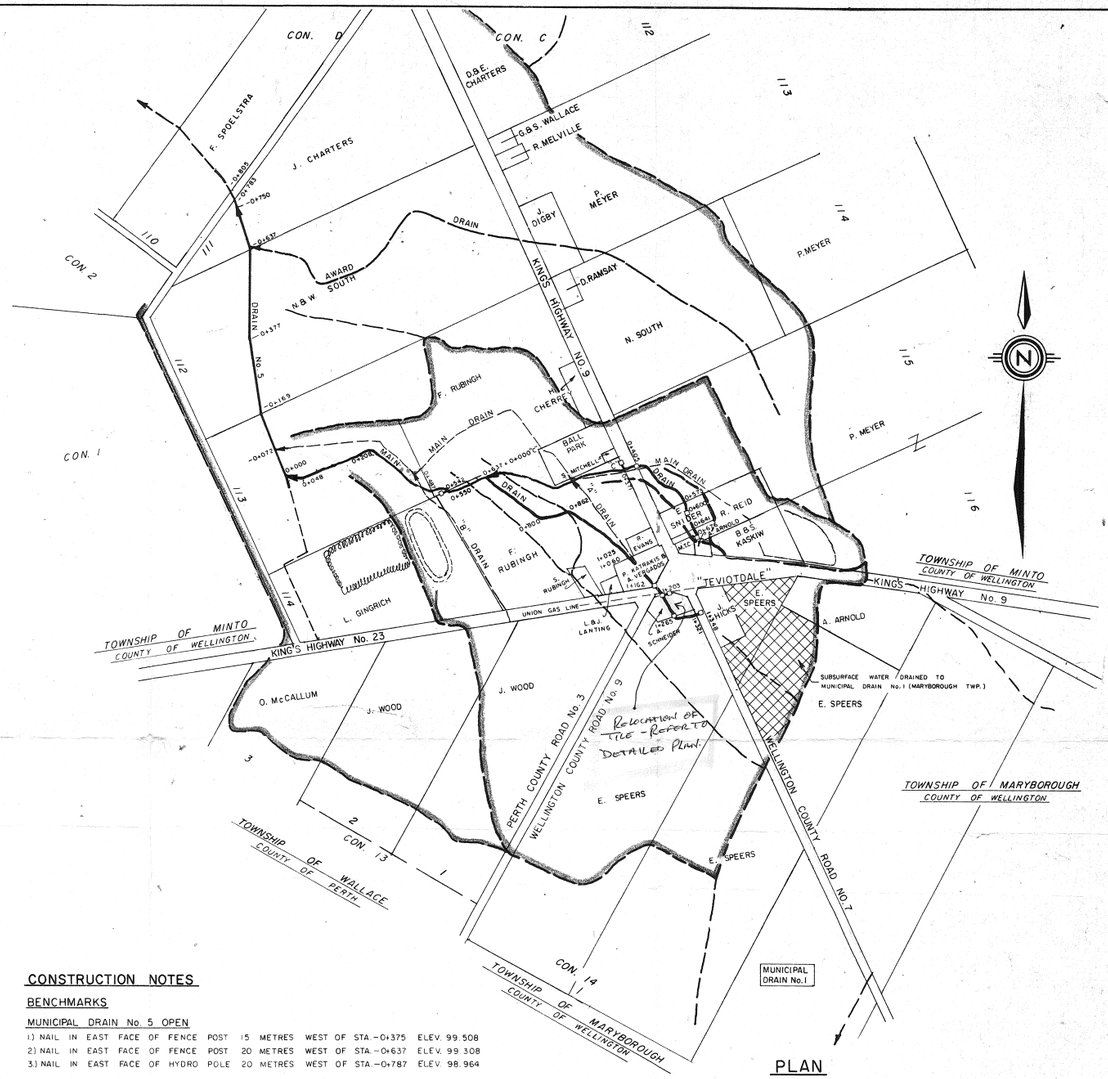
MAIN DRAIN PROFILE

SCALE HOR. 1:5,000
VERT. 1:50



"C" DRAIN PROFILE

SCALE HOR. 1:5,000
VERT. 1:50



PLAN

SCALE 1:7,500

CONSTRUCTION NOTES

BENCHMARKS

MUNICIPAL DRAIN No. 5 OPEN

1.) NAIL IN EAST FACE OF FENCE POST 15 METRES WEST OF STA.-0+375 ELEV. 99.508
2.) NAIL IN EAST FACE OF FENCE POST 20 METRES WEST OF STA.-0+637 ELEV. 99.308
3.) NAIL IN EAST FACE OF HYDRO POLE 20 METRES WEST OF STA.-0+787 ELEV. 98.964

MAIN DRAIN CLOSED

1.) NAIL IN NORTH FACE OF ANCHOR POST 25 METRES WEST OF STA. 0+048 ELEV. 100.000
2.) NAIL IN SOUTH FACE OF FENCE POST 5 METRES NORTH OF STA. 0+190 ELEV. 102.770
3.) NAIL IN SOUTH FACE OF FENCE POST 34 METRES NORTH OF STA. 0+487 ELEV. 105.675
4.) NAIL IN WEST FACE OF 450mm Dia. TREE 77 METRES EAST OF STA.0+700 ELEV. 107.750
5.) NAIL IN WEST FACE OF HYDRO POLE 8 METRES EAST OF STA. 1+162 ELEV. 108.170
6.) NAIL IN SOUTH FACE OF HYDRO POLE 25 METRES NORTH OF STA. 1+323 ELEV. 108.960

"C" DRAIN

1.) NAIL IN WEST FACE OF 450mm Dia. TREE 40 METRES SOUTH OF STA.0+075 ELEV. 107.750
2.) NAIL IN EAST FACE OF FENCE POST 14 METRES NORTH OF STA. 0+371 ELEV. 108.435
3.) NAIL IN WEST FACE OF HYDRO POLE 6 METRES EAST OF STA. 0+641 ELEV. 108.875

MUNICIPAL DRAIN No. 5 OPEN

BOTTOM WIDTHS
1.5 METRES THROUGHOUT

SIDE SLOPES
1½:1

EXISTING CULVERT
LOWER EXISTING 1500mm Dia. LANEWAY CULVERT STA.-0+380, N.B.W. SOUTH PROPERTY INVERT ELEV. 97.13

MAIN DRAIN CLOSED

TILE SIZES
STA.0+000 – 0+006 —— 6 METRES OF 600mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE C/W RODENT GRATE
STA.0+006 – 0+300 —— 294 METRES OF 530mm Dia. FIELD TILE
STA. 0+300 – 1+162 —— 862 METRES OF 600mm Dia. FIELD TILE
STA. 1+162 – 1+167 —— 5 METRES OF 600mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)
STA. 1+167 – 1+193 —— 26 METRES OF 600mm (24") O.D. SMOOTH WALL STEEL CASING, 6mm (0.25") WALL THICKNESS
STA. 1+193 – 1+203 —— 10 METRES OF 600mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)
STA. 1+203 – 1+321 —— 118 METRES OF 250mm Dia. FIELD TILE
STA. 1+321 – 1+326 —— 5 METRES OF 300mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)
STA. 1+326 – 1+345 —— 19 METRES OF 324mm (12¾") O.D. SMOOTH WALL STEEL CASING, 6mm (0.25") WALL THICKNESS
STA. 1+345 – 1+348 —— 3 METRES OF 300mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)

CATCHBASINS AND JUNCTION BOX

1 – STANDARD 600mm x 600mm CONCRETE DITCH INLET CATCHBASIN OFFSET 5 METRES WEST OF STA.0+542
1 – STANDARD 900mm x 1200mm CONCRETE DITCH INLET CATCHBASIN AT STA. 1+162 (INLINE TYPE)
1 – STANDARD 900mm x 1200mm CONCRETE JUNCTION BOX AT STA. 1+203
1 – STANDARD 600mm x 600mm CONCRETE DITCH INLET CATCHBASIN OFFSET 20 METRES EAST OF STA.1+203
1 – STANDARD 600mm x 600mm CONCRETE DITCH INLET CATCHBASIN AT STA.1+348 (INLINE TYPE)

"C" DRAIN

TILE SIZES
STA.0+000 – 0+250 —— 250 METRES OF 350mm Dia. FIELD TILE
STA. 0+250 – 0+371 —— 121 METRES OF 250mm Dia. FIELD TILE
STA. 0+371 – 0+379 —— 8 METRES OF 300mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)
STA. 0+379 – 0+401 —— 22 METRES OF 324mm (12¾") O.D. SMOOTH WALL STEEL CASING, 6mm (0.25") WALL THICKNESS
STA. 0+401 – 0+405 —— 4 METRES OF 300mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (ROAD CROSSING)
STA. 0+405 – 0+472 —— 67 METRES OF 150mm Dia. FIELD TILE
STA. 0+472 – 0+478 —— 6 METRES OF 200mm Dia., 1.60mm THICKNESS CORRUGATED METAL PIPE (LANE CROSSING)
STA. 0+478 – 0+676 —— 198 METRES OF 150mm Dia. FIELD TILE

CATCHBASINS
1 – STANDARD 600mm x 600mm CONCRETE DITCH INLET CATCHBASIN OFFSET 7 METRES NORTH OF STA.0+371
3 – STANDARD 600mm x 600mm CONCRETE CATCHBASINS AT STATION 0+405, 0+600, AND 0+676 (INLINE TYPE)

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO CIVIL WM. E. KELLEY

MUNICIPAL DRAIN No. 59 — 1981
TOWNSHIP OF MINTO

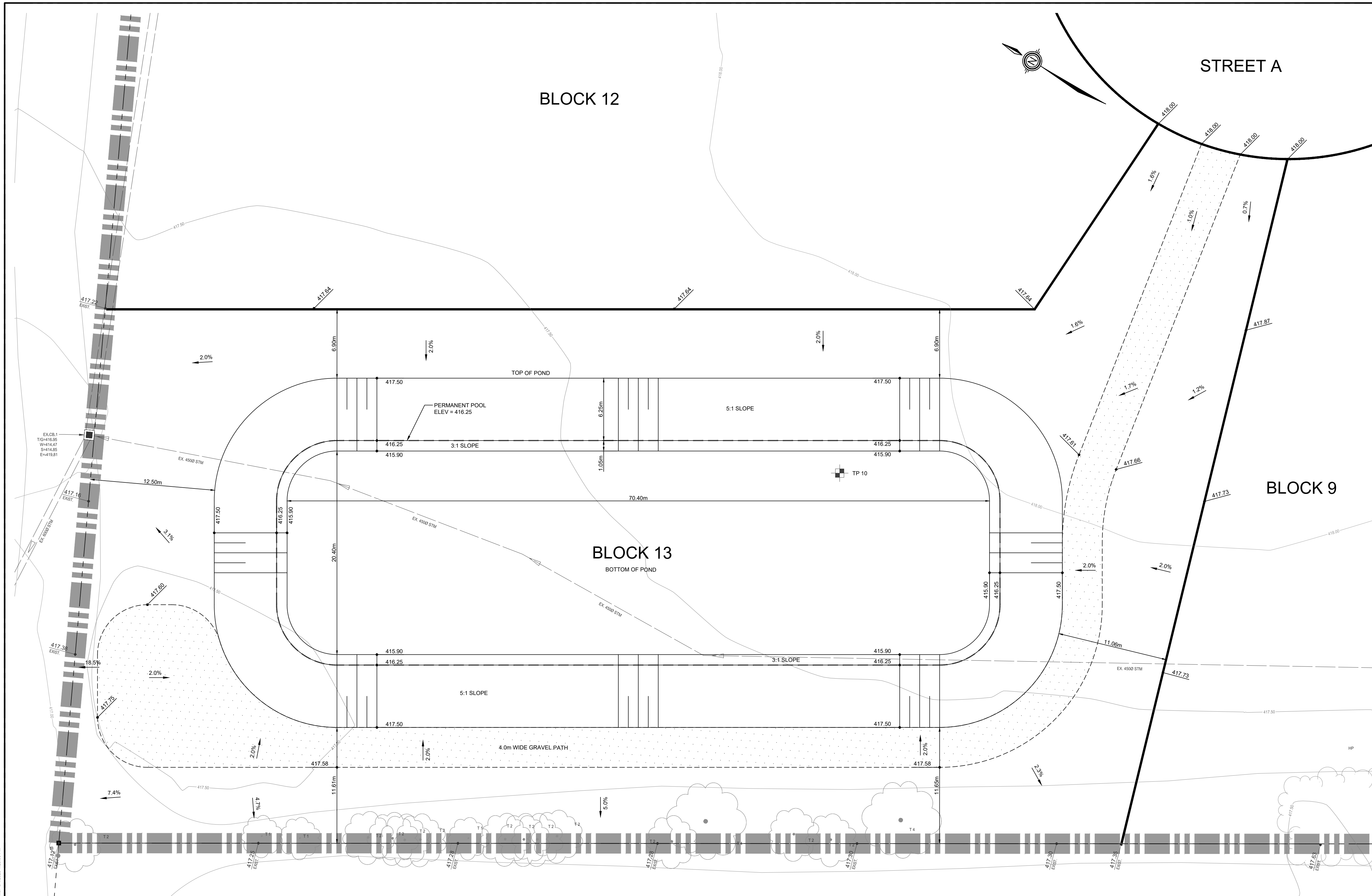
SCALE: AS SHOWN	APPROVED BY:	JOB NO. 8020	DRAWN BY: B.E.
DATE APRIL 6, 1981			REVISED: E.M.C.

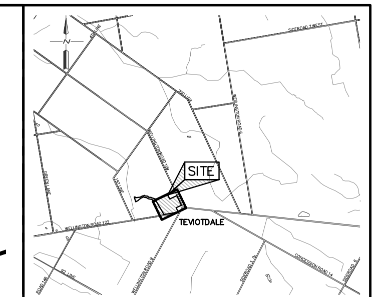
PLAN AND PROFILES

W.E. KELLEY AND ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

DRAWING No. 1 of 2

Appendix C Preliminary SWMF Design





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NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD

GEI Consultants
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975 WALLACE AVENUE NORTH
LISTOWEL, ONTARIO N4W 1M6
519.291.9339

TEVIOTDALE INDUSTRIAL SUBDIVISION

FRONTIERS DESIGN BUILD

TOWN OF MINTO

SWM POND GRADING PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
CP	-	322035	3
DESIGNED BY :	DATE :	SCALE :	
-	JANUARY 2022	1:200	

Appendix D PCSWMM Input and Output


NCatchment
23.2603 (ha)
NWCatchment
14.1586 (ha)
Site
8.25 (ha)
C_Drain_2
20.2085 (ha)
C_Drain_1
1.846 (ha)
B_Main
2.7715 (ha)
Main_Upstream_1
3.6378 (ha)
B_Drain_1
6.665 (ha)
Main_Upstream_3
14.0856 (ha)
SWCatchment
35.7044 (ha)
B_Drain_2
14.786 (ha)
Main_Upstream_2
13.0064 (ha)
B_Drain_3
17.7073 (ha)
Legend
Junctions
Outfalls
Storages
Conduits
Orifices
Weirs
Subcatchments
Parcels
Draft Plan
N
400 m

SWMM MODEL INPUTS

```
[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        YES
SKIP_STEADY_STATE    NO

START_DATE           10/25/2022
START_TIME           00:00:00
REPORT_START_DATE    10/25/2022
REPORT_START_TIME    00:00:00
END_DATE             10/28/2022
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
;Fake storm used to produce no runoff. Subcatchment runoff for municipal drain purposes is included as inflow at
junctions.
FakeStorm        INTENSITY 0:05     1.0      TIMESERIES FakeStorm
Hazel            INTENSITY 1:00     1.0      TIMESERIES Hazel
Huff_(0-10_sq._mi.)_Second_quartile_25mm INTENSITY 0:05     1.0      TIMESERIES Huff_(0-
10_sq._mi.)_Second_quartile_25mm
Tevi_IDF_1%      INTENSITY 0:05     1.0      TIMESERIES Tevi_IDF_1%
Tevi_IDF_20%     INTENSITY 0:05     1.0      TIMESERIES Tevi_IDF_20%

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
;38mm Ag runoff included in juction BDrain
B_Drain_1        FakeStorm        BDrain           6.665    38       666.5    0.5      0
;38mm Ag runoff included in juction BDrainLine93
B_Drain_2        FakeStorm        BDrainLine93     14.786   4        1478.6   0.5      0
;38mm Ag runoff included in juction BDrainRd140
B_Drain_3        FakeStorm        BDrainRd140      17.7073  4.4      1770.73  0.5      0
B_Main           FakeStorm        Drain59CB        2.7715   25       277.15   0.5      0
;38mm Ag runoff included in juction NewCB
C_Drain_1        FakeStorm        NewCB            1.846    50       184.6    0.5      0
;38mm Ag runoff included in juction CDrain
C_Drain_2        FakeStorm        CDrain           20.2085  16       2020.85  0.5      0
;38mm Ag runoff included in juction MainJunction
Main_Upstream_1  FakeStorm        MainJunction     3.6378   23       363.78   0.5      0
;38mm Ag runoff included in juction MainLine93
Main_Upstream_2  FakeStorm        MainLine93       13.0064  24       1300.64  0.5      0
;38mm Ag runoff included in Junction MainUpper
Main_Upstream_3  FakeStorm        MainUpper        14.0856  7.3      1408.56  0.5      0
;38mm Ag runoff included in juction Drain59CB
NCatchment       FakeStorm        Drain59CB        23.2603  9        2326.03  0.5      0
;38mm Ag runoff included in juction TeviDrain
NWCatchment      FakeStorm        TeviDrain        14.1586  0        1415.86  0.5      0
;Development site
Site             Tevi_IDF_1%      NewPond          8.25     70       1100     2        0
;38mm Ag runoff included in juction TeviDrain
SWCatchment      FakeStorm        TeviDrain        35.7044  4        3570.44  0.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
B_Drain_1        0.015      0.25       1.5        5          0          PERVIOUS   100
```

```
B_Drain_2         0.015      0.25       1.5        5          0          PERVIOUS   100
B_Drain_3         0.015      0.25       1.5        5          0          PERVIOUS   100
B_Main            0.015      0.25       1.5        5          0          PERVIOUS   100
C_Drain_1         0.015      0.25       1.5        5          0          PERVIOUS   100
C_Drain_2         0.015      0.25       1.5        5          0          PERVIOUS   100
Main_Upstream_1   0.015      0.25       1.5        5          0          PERVIOUS   100
Main_Upstream_2   0.015      0.25       1.5        5          0          PERVIOUS   100
Main_Upstream_3   0.015      0.25       1.5        5          0          PERVIOUS   100
NCatchment        0.015      0.25       1.5        5          0          PERVIOUS   100
NWCatchment       0.015      0.25       1.5        5          0          PERVIOUS   100
Site              0.015      0.25       1.5        5          0          PERVIOUS   100
SWCatchment       0.015      0.25       1.5        5          0          PERVIOUS   100

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
B_Drain_1         76         12.7       4          7          0
B_Drain_2         76         12.7       4          7          0
B_Drain_3         76         12.7       4          7          0
B_Main            76         12.7       4          7          0
C_Drain_1         76         12.7       4          7          0
C_Drain_2         76         12.7       4          7          0
Main_Upstream_1   76         12.7       4          7          0
Main_Upstream_2   76         12.7       4          7          0
Main_Upstream_3   76         12.7       4          7          0
NCatchment        76         12.7       4          7          0
NWCatchment       76         12.7       4          7          0
Site              76         12.7       4          7          0
SWCatchment       76         12.7       4          7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
BDrain            415.53     2          0          0          200
BDrainLine93      416        2          0          0          200
BDrainRd140       417.78     1.42       0          0          200
CDrain            417.28     2.21       0          0          200
;Catch basin on Main Drain connection
Drain59CB         414.47     2.48       0          0          500
MainJunction      416.58     1.9        0          0          200
MainLine93        417.13     1.75       0          0          200
MainUpper         417.95     1.99       0          0          200
NewCB             417.1      1.9        0          0          200
TeviDrain         409.8      0.84       0          0          0
```

```
[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OpenDrainOutlet  408.68     FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params            SurDepth Fevap    Psi
;;-------------- -------- ---------- ---------- ----------- ---------------------------- -------- -------- --------
;SWM pond for Site
NewPond          416.25   1.3        0          TABULAR     NewPond                      0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
BDrainBottom     BDrain           Drain59CB        181.898    0.013      0          0.35       0          0
BDrainMiddle     BDrainLine93     BDrain           190        0.013      0          0          0          0
BDrainUpper      BDrainRd140      BDrainLine93     364        0.013      0          0          0          0
CDrainLower      NewCB            MainJunction     221.916    0.013      0          0          0          0
CDrainUpper      CDrain           NewCB            87.61      0.013      0          0          0          0
MainChalmers     MainLine93       MainJunction     300        0.013      0          0          0          0
;Improved section of Drain No. 59
MainDrain59      Drain59CB        TeviDrain        510        0.013      0          0          0          0
MainSouthPL      MainJunction     BDrain           226.154    0.013      0          0          0          0
MainTopEnd       MainUpper        MainLine93       186        0.013      0          0          0          0
;Pipe from pond to Drain CB
OutletPipe       NewPond          Drain59CB        25         0.013      0          1.655      0          0
TeviotdaleDrain  TeviDrain        OpenDrainOutlet  360        0.013      0          0          0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
;Low flow orifice
Orifice          NewPond          Drain59CB        SIDE         0          0.62       NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff
Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- -------- ---------- ----
------ ---------- ---------- ----------------
;Overflow weir
Overflow         NewPond          Drain59CB        TRAPEZOIDAL  1.05       1.82       NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
```

```
BDrainBottom     CIRCULAR     0.6              0          0          0          1
BDrainMiddle     CIRCULAR     0.45             0          0          0          1
BDrainUpper      CIRCULAR     0.4              0          0          0          1
CDrainLower      CIRCULAR     0.6              0          0          0          1
CDrainUpper      CIRCULAR     0.6              0          0          0          1
MainChalmers     CIRCULAR     0.6              0          0          0          1
MainDrain59      CIRCULAR     0.825            0          0          0          1
MainSouthPL      CIRCULAR     0.6              0          0          0          1
MainTopEnd       CIRCULAR     0.25             0          0          0          1
OutletPipe       CIRCULAR     0.6              0          0          0          1
TeviotdaleDrain  IRREGULAR    TeviotdaleDrain
Orifice          CIRCULAR     0.11             0          0          0
Overflow         TRAPEZOIDAL  0.25             3          5          5
```

[TRANSECTS]

```
;;Transect Data in HEC-2 format
;
NC 0.25     0.25     0.045
X1 TeviotdaleDrain   6        15.71    23.2     0.0      0.0      0.0      0.0      0.0
GR 410.85   0        411.03   5.61     410.82   15.71    409.72   20       410.61   23.2
GR 410.67   38.03
```

[CONTROLS]

```
Rule 1
If Node NewPond Depth < 0.55
Then Conduit OutletPipe Status = Closed
Rule 2
If Node NewPond Depth >= 0.55
Then Conduit OutletPipe Status = Open
```

[INFLOWS]

```
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
BDrainLine93     FLOW             ""               FLOW     1.0      1        0.065
BDrainRd140      FLOW             ""               FLOW     1.0      1        0.078
CDrain           FLOW             ""               FLOW     1.0      1        0.088
Drain59CB        FLOW             ""               FLOW     1.0      1        0.114
MainJunction     FLOW             ""               FLOW     1.0      1        0.016
MainLine93       FLOW             ""               FLOW     1.0      1        0.057
MainUpper        FLOW             ""               FLOW     1.0      1        0.062
NewCB            FLOW             ""               FLOW     1.0      1        0.008
TeviDrain        FLOW             ""               FLOW     1.0      1        0.219
```

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
NewPond          Storage    0          1598.79
NewPond                     0.05       1643.24
NewPond                     0.15       1734.16
NewPond                     0.25       1826.71
NewPond                     0.35       1920.84
NewPond                     0.45       2016.52
NewPond                     0.55       2113.75
NewPond                     0.65       2212.53
NewPond                     0.75       2312.88
NewPond                     0.85       2414.85
NewPond                     0.95       2518.35
NewPond                     1.05       2623.41
NewPond                     1.15       2730.04
NewPond                     1.25       2845.13
NewPond                     1.3        2903


[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;FakeStorm; Huff_(0-10_sq._mi.)_Second_quartile_1mm design storm, total rainfall = 1 mm, rain interval = 5 minutes,
rain units = mm/hr.
;Quality Storm; Huff_(0-10_sq._mi.)_Second_quartile_25mm design storm, total rainfall = 25 mm, rain interval = 5
minutes, rain units = mm/hr.
;Tevi_IDF_1%; Chicago design storm, a = 898.583, b = 0.06, c = 0.699, Duration = 180 minutes, r = 0.4, rain units =
mm/hr.
;Tevi_IDF_20%; Chicago design storm, a = 546.513, b = 0.096, c = 0.702, Duration = 180 minutes, r = 0.4, rain units =
mm/hr.


[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

POST-DEVELOPMENT 25mm QUALITY STORM OUTPUT

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)
------------------------------------------------------------

*************
Element Count
*************
Number of rain gages ...... 5
Number of subcatchments ... 13
Number of nodes ........... 12
Number of links ........... 13
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
----------------------------------------------------------------------
FakeStorm            FakeStorm                    INTENSITY    5 min.
Hazel                Hazel                        INTENSITY   60 min.
Huff_(0-10_sq._mi.)_Second_quartile_25mm Huff_(0-10_sq._mi.)_Second_quartile_25mm INTENSITY    5 min.
Tevi_IDF_1%          Tevi_IDF_1%                  INTENSITY    5 min.
Tevi_IDF_20%         Tevi_IDF_20%                 INTENSITY    5 min.


*******************
Subcatchment Summary
*******************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------
B_Drain_1                    6.67    666.50     38.00    0.5000 FakeStorm            BDrain
B_Drain_2                   14.79   1478.60      4.00    0.5000 FakeStorm            BDrainLine93
B_Drain_3                   17.71   1770.73      4.40    0.5000 FakeStorm            BDrainRd140
B_Main                       2.77    277.15     25.00    0.5000 FakeStorm            Drain59CB
C_Drain_1                    1.85    184.60     50.00    0.5000 FakeStorm            NewCB
C_Drain_2                   20.21   2020.85     16.00    0.5000 FakeStorm            CDrain
Main_Upstream_1              3.64    363.78     23.00    0.5000 FakeStorm            MainJunction
Main_Upstream_2             13.01   1300.64     24.00    0.5000 FakeStorm            MainLine93
Main_Upstream_3             14.09   1408.56      7.30    0.5000 FakeStorm            MainUpper
NCatchment                  23.26   2326.03      9.00    0.5000 FakeStorm            Drain59CB
```

NWCatchment	14.16	1415.86	0.00	0.5000	FakeStorm	TeviDrain
Site	8.25	1100.00	70.00	2.0000	Huff_(0-10_sq._mi.)_Second_quartile_25mm	NewPond
SWCatchment	35.70	3570.44	4.00	0.5000	FakeStorm	TeviDrain

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
BDrain	JUNCTION	415.53	2.00	200.0	
BDrainLine93	JUNCTION	416.00	2.00	200.0	Yes
BDrainRd140	JUNCTION	417.78	1.42	200.0	Yes
CDrain	JUNCTION	417.28	2.21	200.0	Yes
Drain59CB	JUNCTION	414.47	2.48	500.0	Yes
MainJunction	JUNCTION	416.58	1.90	200.0	Yes
MainLine93	JUNCTION	417.13	1.75	200.0	Yes
MainUpper	JUNCTION	417.95	1.99	200.0	Yes
NewCB	JUNCTION	417.10	1.90	200.0	Yes
TeviDrain	JUNCTION	409.80	1.31	0.0	Yes
OpenDrainOutlet	OUTFALL	408.68	1.31	0.0	
NewPond	STORAGE	416.25	1.30	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
BDrainBottom	BDrain	Drain59CB	CONDUIT	181.9	0.3903	0.0130
BDrainMiddle	BDrainLine93	BDrain	CONDUIT	190.0	0.2474	0.0130
BDrainUpper	BDrainRd140	BDrainLine93	CONDUIT	364.0	0.4890	0.0130
CDrainLower	NewCB	MainJunction	CONDUIT	221.9	0.2343	0.0130
CDrainUpper	CDrain	NewCB	CONDUIT	87.6	0.2055	0.0130
MainChalmers	MainLine93	MainJunction	CONDUIT	300.0	0.1833	0.0130
MainDrain59	Drain59CB	TeviDrain	CONDUIT	510.0	0.9157	0.0130
MainSouthPL	MainJunction	BDrain	CONDUIT	226.2	0.4643	0.0130
MainTopEnd	MainUpper	MainLine93	CONDUIT	186.0	0.4409	0.0130
OutletPipe	NewPond	Drain59CB	CONDUIT	25.0	0.5000	0.0130
TeviotdaleDrain	TeviDrain	OpenDrainOutlet	CONDUIT	360.0	0.3111	0.0450
Orifice	NewPond	Drain59CB	ORIFICE			
Overflow	NewPond	Drain59CB	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
BDrainBottom	CIRCULAR	0.60	0.28	0.15	0.60	1	0.38
BDrainMiddle	CIRCULAR	0.45	0.16	0.11	0.45	1	0.14
BDrainUpper	CIRCULAR	0.40	0.13	0.10	0.40	1	0.15
CDrainLower	CIRCULAR	0.60	0.28	0.15	0.60	1	0.30
CDrainUpper	CIRCULAR	0.60	0.28	0.15	0.60	1	0.28
MainChalmers	CIRCULAR	0.60	0.28	0.15	0.60	1	0.26
MainDrain59	CIRCULAR	0.82	0.53	0.21	0.82	1	1.37
MainSouthPL	CIRCULAR	0.60	0.28	0.15	0.60	1	0.42
MainTopEnd	CIRCULAR	0.25	0.05	0.06	0.25	1	0.04
OutletPipe	CIRCULAR	0.60	0.28	0.15	0.60	1	0.43
TeviotdaleDrain	TeviotdaleDrain	1.31	13.38	0.28	38.03	1	7.07

****
Transect Summary
****

Transect TeviotdaleDrain
Area:

0.0002	0.0008	0.0017	0.0031	0.0048
0.0069	0.0094	0.0123	0.0156	0.0192
0.0233	0.0277	0.0325	0.0377	0.0433
0.0492	0.0556	0.0623	0.0694	0.0769
0.0848	0.0931	0.1017	0.1108	0.1202
0.1300	0.1402	0.1508	0.1617	0.1731
0.1848	0.1969	0.2094	0.2223	0.2422
0.2750	0.3172	0.3600	0.4030	0.4462
0.4897	0.5333	0.5783	0.6263	0.6784
0.7346	0.7949	0.8592	0.9276	1.0000

Hrad:

0.0453	0.0907	0.1360	0.1813	0.2266
0.2720	0.3173	0.3626	0.4080	0.4533
0.4986	0.5440	0.5893	0.6346	0.6799
0.7253	0.7706	0.8159	0.8613	0.9066
0.9519	0.9972	1.0426	1.0879	1.1332
1.1786	1.2239	1.2692	1.3146	1.3599
1.4052	1.4505	1.4959	1.5418	1.5432
1.4478	1.3258	1.2413	1.1828	1.1420
1.1138	1.0950	1.0930	1.0878	1.0782
1.0654	1.0505	1.0342	1.0172	1.0000

Width:

0.0052	0.0103	0.0155	0.0207	0.0258
0.0310	0.0361	0.0413	0.0465	0.0516
0.0568	0.0620	0.0671	0.0723	0.0775
0.0826	0.0878	0.0929	0.0981	0.1033
0.1084	0.1136	0.1188	0.1239	0.1291
0.1343	0.1394	0.1446	0.1498	0.1549
0.1601	0.1652	0.1704	0.1807	0.3537
0.5266	0.5735	0.5762	0.5789	0.5816
0.5843	0.5874	0.6205	0.6724	0.7270
0.7816	0.8362	0.8908	0.9454	1.0000

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 10/25/2022 00:00:00
Ending Date 10/28/2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------
Total Precipitation	0.374	2.124
Evaporation Loss	0.000	0.000

```
Infiltration Loss ........          0.246          1.397
Surface Runoff ...........          0.105          0.596
Final Storage ............          0.026          0.147
Continuity Error (%) .....         -0.740

**************************        Volume         Volume
Flow Routing Continuity        hectare-m       10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......          0.000          0.000
Wet Weather Inflow .......          0.105          1.049
Groundwater Inflow .......          0.000          0.000
RDII Inflow ..............          0.000          0.000
External Inflow ..........         18.323        183.236
External Outflow .........         18.350        183.503
Flooding Loss ............          0.000          0.000
Evaporation Loss .........          0.000          0.000
Exfiltration Loss ........          0.000          0.000
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          0.091          0.912
Continuity Error (%) .....         -0.071

***************************
Time-Step Critical Elements
***************************
None

*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.

*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.

************************
Routing Time Step Summary
************************
Minimum Time Step           :     1.38 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
```

Time Step Frequencies :

5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
B_Drain_1	1.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_2	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_3	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Main	1.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_1	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_2	1.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_1	1.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_2	1.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_3	1.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.000
NCatchment	1.00	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.000
NWCatchment	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.000
Site	25.00	0.00	0.00	11.57	16.59	12.71	12.71	1.05	0.68	0.508
SWCatchment	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
BDrain	JUNCTION	0.49	0.49	416.02	1 23:21	0.49
BDrainLine93	JUNCTION	0.50	0.50	416.50	1 07:47	0.50
BDrainRd140	JUNCTION	0.21	0.21	417.99	0 00:52	0.21
CDrain	JUNCTION	0.23	0.23	417.51	0 00:04	0.23
Drain59CB	JUNCTION	0.34	0.35	414.82	0 01:22	0.35
MainJunction	JUNCTION	0.32	0.32	416.90	0 02:08	0.32
MainLine93	JUNCTION	0.28	0.30	417.43	0 00:08	0.30
MainUpper	JUNCTION	1.48	1.99	419.94	0 00:02	1.99
NewCB	JUNCTION	0.23	0.24	417.34	0 00:07	0.24
TeviDrain	JUNCTION	0.76	0.76	410.56	0 01:33	0.76

OpenDrainOutlet	OUTFALL	0.37	0.38	409.06	0	01:33	0.38	
NewPond	STORAGE	0.10	0.54	416.79	0	01:20	0.54	

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
BDrain	JUNCTION	0.000	0.374	1 23:24	0	96.8	0.094
BDrainLine93	JUNCTION	0.065	0.143	0 00:53	16.8	37	0.113
BDrainRd140	JUNCTION	0.078	0.078	0 00:00	20.2	20.2	0.059
CDrain	JUNCTION	0.088	0.088	0 00:00	22.8	22.8	0.018
Drain59CB	JUNCTION	0.114	0.506	0 01:20	29.5	127	0.043
MainJunction	JUNCTION	0.016	0.238	0 00:10	4.15	59.8	0.098
MainLine93	JUNCTION	0.057	0.123	0 00:02	14.8	30.8	0.075
MainUpper	JUNCTION	0.062	0.062	0 00:00	16.1	16.1	0.030
NewCB	JUNCTION	0.008	0.100	0 00:02	2.07	24.9	0.063
TeviDrain	JUNCTION	0.219	0.725	0 01:22	56.8	184	0.254
OpenDrainOutlet	OUTFALL	0.000	0.725	0 01:33	0	184	0.000
NewPond	STORAGE	0.676	0.676	0 00:35	1.05	1.05	0.001

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
NewPond	0.174	6.0	0.0	0.0	0.992	34.3	0 01:20	0.018

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OpenDrainOutlet	100.00	0.708	0.725	183.502

System 100.00 0.708 0.725 183.502

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
BDrainBottom	CONDUIT	0.374	0	13:24	1.66	0.97	0.74
BDrainMiddle	CONDUIT	0.143	1	21:53	1.32	1.01	1.00
BDrainUpper	CONDUIT	0.078	0	00:53	1.06	0.54	0.76
CDrainLower	CONDUIT	0.099	0	00:07	1.10	0.33	0.46
CDrainUpper	CONDUIT	0.092	0	00:02	1.41	0.33	0.39
MainChalmers	CONDUIT	0.125	0	00:10	0.98	0.47	0.50
MainDrain59	CONDUIT	0.506	0	01:22	1.45	0.37	0.67
MainSouthPL	CONDUIT	0.231	0	01:32	1.38	0.55	0.67
MainTopEnd	CONDUIT	0.066	0	00:02	1.54	1.68	1.00
OutletPipe	CONDUIT	0.000	0	00:00	0.00	0.00	0.45
TeviotdaleDrain	CHANNEL	0.725	0	01:33	0.60	0.10	0.43
Orifice	ORIFICE	0.018	0	01:20			1.00
Overflow	WEIR	0.000	0	00:00			0.00

Analysis begun on: Fri Jun 6 15:54:34 2025
Analysis ended on: Fri Jun 6 15:54:35 2025
Total elapsed time: 00:00:01

POST-DEVELOPMENT 20% AEP OUTPUT

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)
------------------------------------------------------------

*********************
Subcatchment Summary
*********************
```

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
B_Drain_1	6.67	666.50	38.00	0.5000	FakeStorm	BDrain
B_Drain_2	14.79	1478.60	4.00	0.5000	FakeStorm	BDrainLine93
B_Drain_3	17.71	1770.73	4.40	0.5000	FakeStorm	BDrainRd140
B_Main	2.77	277.15	25.00	0.5000	FakeStorm	Drain59CB
C_Drain_1	1.85	184.60	50.00	0.5000	FakeStorm	NewCB
C_Drain_2	20.21	2020.85	16.00	0.5000	FakeStorm	CDrain
Main_Upstream_1	3.64	363.78	23.00	0.5000	FakeStorm	MainJunction
Main_Upstream_2	13.01	1300.64	24.00	0.5000	FakeStorm	MainLine93
Main_Upstream_3	14.09	1408.56	7.30	0.5000	FakeStorm	MainUpper
NCatchment	23.26	2326.03	9.00	0.5000	FakeStorm	Drain59CB
NWCatchment	14.16	1415.86	0.00	0.5000	FakeStorm	TeviDrain
Site	8.25	1100.00	70.00	2.0000	Tevi_IDF_20%	NewPond
SWCatchment	35.70	3570.44	4.00	0.5000	FakeStorm	TeviDrain

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.521	2.958
Evaporation Loss	0.000	0.000
Infiltration Loss	0.286	1.623
Surface Runoff	0.217	1.234
Final Storage	0.026	0.147
Continuity Error (%)	-1.562	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.217	2.171
Groundwater Inflow	0.000	0.000

RDII Inflow	0.000	0.000
External Inflow	18.323	183.236
External Outflow	18.462	184.626
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.091	0.913
Continuity Error (%)	-0.071	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Most Frequent Nonconverging Nodes
****
Convergence obtained at all time steps.

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
B_Drain_1	1.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_2	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_3	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Main	1.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_1	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_2	1.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_1	1.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_2	1.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_3	1.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.000
NCatchment	1.00	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.000
NWCatchment	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.000
Site	42.79	0.00	0.00	16.40	29.35	26.33	26.33	2.17	2.06	0.615
SWCatchment	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
BDrain	JUNCTION	0.49	0.49	416.02	0 23:57	0.49
BDrainLine93	JUNCTION	0.50	0.50	416.50	2 06:26	0.50
BDrainRd140	JUNCTION	0.21	0.21	417.99	0 00:52	0.21
CDrain	JUNCTION	0.23	0.23	417.51	0 00:04	0.23
Drain59CB	JUNCTION	0.34	0.55	415.02	0 01:34	0.55
MainJunction	JUNCTION	0.32	0.32	416.90	0 02:03	0.32
MainLine93	JUNCTION	0.28	0.30	417.43	0 00:08	0.30
MainUpper	JUNCTION	1.48	1.99	419.94	0 00:02	1.99
NewCB	JUNCTION	0.23	0.24	417.34	0 00:07	0.24
TeviDrain	JUNCTION	0.76	0.92	410.72	0 01:44	0.92
OpenDrainOutlet	OUTFALL	0.37	0.47	409.15	0 01:44	0.47
NewPond	STORAGE	0.11	0.60	416.85	0 01:33	0.60

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
BDrain	JUNCTION	0.000	0.374	0 05:26	0	96.8	0.094
BDrainLine93	JUNCTION	0.065	0.143	0 00:53	16.8	37	0.113
BDrainRd140	JUNCTION	0.078	0.078	0 00:00	20.2	20.2	0.059
CDrain	JUNCTION	0.088	0.088	0 00:00	22.8	22.8	0.018
Drain59CB	JUNCTION	0.114	1.081	0 01:33	29.5	128	0.050
MainJunction	JUNCTION	0.016	0.238	0 00:10	4.15	59.8	0.098
MainLine93	JUNCTION	0.057	0.123	0 00:02	14.8	30.8	0.075
MainUpper	JUNCTION	0.062	0.062	0 00:00	16.1	16.1	0.030
NewCB	JUNCTION	0.008	0.100	0 00:02	2.07	24.9	0.063
TeviDrain	JUNCTION	0.219	1.299	0 01:34	56.8	185	0.252
OpenDrainOutlet	OUTFALL	0.000	1.253	0 01:44	0	185	0.000
NewPond	STORAGE	2.056	2.056	0 01:20	2.17	2.17	-0.365

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
NewPond	0.197	6.8	0.0	0.0	1.132	39.2	0 01:33	0.593

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OpenDrainOutlet	100.00	0.713	1.253	184.625
System	100.00	0.713	1.253	184.625

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
BDrainBottom	CONDUIT	0.374	1 17:47	1.66	0.97	0.74
BDrainMiddle	CONDUIT	0.143	0 05:26	1.32	1.01	1.00
BDrainUpper	CONDUIT	0.078	0 00:53	1.06	0.54	0.76
CDrainLower	CONDUIT	0.099	0 00:07	1.10	0.33	0.46
CDrainUpper	CONDUIT	0.092	0 00:02	1.41	0.33	0.39
MainChalmers	CONDUIT	0.125	0 00:10	0.98	0.47	0.50
MainDrain59	CONDUIT	1.080	0 01:34	2.27	0.79	0.83
MainSouthPL	CONDUIT	0.231	0 01:32	1.38	0.55	0.67
MainTopEnd	CONDUIT	0.066	0 00:02	1.54	1.68	1.00
OutletPipe	CONDUIT	0.573	0 01:33	2.13	1.32	0.91
TeviotdaleDrain	CHANNEL	1.253	0 01:44	0.69	0.18	0.53
Orifice	ORIFICE	0.019	0 01:33			1.00
Overflow	WEIR	0.000	0 00:00			0.00

```
Analysis begun on:  Fri Jun  6 15:59:58 2025
Analysis ended on:  Fri Jun  6 15:59:59 2025
Total elapsed time: 00:00:01
```

POST-DEVELOPMENT 1% AEP OUTPUT

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)
------------------------------------------------------------

*******************
Subcatchment Summary
*******************
```

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
B_Drain_1	6.67	666.50	38.00	0.5000	FakeStorm	BDrain
B_Drain_2	14.79	1478.60	4.00	0.5000	FakeStorm	BDrainLine93
B_Drain_3	17.71	1770.73	4.40	0.5000	FakeStorm	BDrainRd140
B_Main	2.77	277.15	25.00	0.5000	FakeStorm	Drain59CB
C_Drain_1	1.85	184.60	50.00	0.5000	FakeStorm	NewCB
C_Drain_2	20.21	2020.85	16.00	0.5000	FakeStorm	CDrain
Main_Upstream_1	3.64	363.78	23.00	0.5000	FakeStorm	MainJunction
Main_Upstream_2	13.01	1300.64	24.00	0.5000	FakeStorm	MainLine93
Main_Upstream_3	14.09	1408.56	7.30	0.5000	FakeStorm	MainUpper
NCatchment	23.26	2326.03	9.00	0.5000	FakeStorm	Drain59CB
NWCatchment	14.16	1415.86	0.00	0.5000	FakeStorm	TeviDrain
Site	8.25	1100.00	70.00	2.0000	Tevi_IDF_1%	NewPond
SWCatchment	35.70	3570.44	4.00	0.5000	FakeStorm	TeviDrain

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.757	4.302
Evaporation Loss	0.000	0.000
Infiltration Loss	0.298	1.693
Surface Runoff	0.445	2.524
Final Storage	0.026	0.147
Continuity Error (%)	-1.468	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.444	4.437
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	18.323	183.236
External Outflow	18.689	186.894

Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.091	0.913
Continuity Error (%)	-0.071	

****
Time-Step Critical Elements
****
Link OutletPipe (2.30%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Most Frequent Nonconverging Nodes
****
Convergence obtained at all time steps.

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
B_Drain_1	1.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_2	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_3	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Main	1.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_1	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_2	1.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_1	1.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_2	1.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_3	1.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.000
NCatchment	1.00	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.000
NWCatchment	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.000
Site	71.47	0.00	0.00	17.89	49.58	53.88	53.88	4.45	4.20	0.754
SWCatchment	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
BDrain	JUNCTION	0.49	0.52	416.05	0 01:50	0.52
BDrainLine93	JUNCTION	0.50	0.53	416.53	0 01:51	0.53
BDrainRd140	JUNCTION	0.21	0.21	417.99	0 00:52	0.21
CDrain	JUNCTION	0.23	0.23	417.51	0 00:04	0.23
Drain59CB	JUNCTION	0.35	1.04	415.51	0 01:46	1.04
MainJunction	JUNCTION	0.32	0.32	416.90	0 02:37	0.32
MainLine93	JUNCTION	0.28	0.30	417.43	0 00:08	0.30
MainUpper	JUNCTION	1.48	1.99	419.94	0 00:02	1.99
NewCB	JUNCTION	0.23	0.24	417.34	0 00:07	0.24
TeviDrain	JUNCTION	0.76	1.00	410.80	0 02:00	1.00
OpenDrainOutlet	OUTFALL	0.38	0.52	409.20	0 02:00	0.52
NewPond	STORAGE	0.12	1.04	417.29	0 01:32	1.04

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
BDrain	JUNCTION	0.000	0.375	0 01:56	0	96.8	0.094
BDrainLine93	JUNCTION	0.065	0.143	0 00:53	16.8	37	0.113
BDrainRd140	JUNCTION	0.078	0.078	0 00:00	20.2	20.2	0.059
CDrain	JUNCTION	0.088	0.088	0 00:00	22.8	22.8	0.018
Drain59CB	JUNCTION	0.114	1.467	0 01:35	29.5	131	0.049
MainJunction	JUNCTION	0.016	0.238	0 00:10	4.15	59.8	0.098
MainLine93	JUNCTION	0.057	0.123	0 00:02	14.8	30.8	0.075
MainUpper	JUNCTION	0.062	0.062	0 00:00	16.1	16.1	0.030
NewCB	JUNCTION	0.008	0.100	0 00:02	2.07	24.9	0.063
TeviDrain	JUNCTION	0.219	1.670	0 01:32	56.8	187	0.246
OpenDrainOutlet	OUTFALL	0.000	1.588	0 02:00	0	187	0.000
NewPond	STORAGE	4.202	4.202	0 01:20	4.44	4.44	-0.141

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
NewPond	0.223	7.7	0.0	0.0	2.184	75.5	0 01:32	0.978

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OpenDrainOutlet	100.00	0.728	1.588	186.893
System	100.00	0.728	1.588	186.893

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
BDrainBottom	CONDUIT	0.389	0 01:54	1.66	1.01	0.94
BDrainMiddle	CONDUIT	0.144	0 01:56	1.32	1.01	1.00
BDrainUpper	CONDUIT	0.078	0 00:53	1.06	0.54	0.76
CDrainLower	CONDUIT	0.099	0 00:07	1.10	0.33	0.46
CDrainUpper	CONDUIT	0.092	0 00:02	1.41	0.33	0.39
MainChalmers	CONDUIT	0.125	0 00:10	0.98	0.47	0.50
MainDrain59	CONDUIT	1.451	0 01:32	2.78	1.06	1.00
MainSouthPL	CONDUIT	0.231	0 01:32	1.38	0.55	0.70
MainTopEnd	CONDUIT	0.066	0 00:02	1.54	1.68	1.00
OutletPipe	CONDUIT	0.952	0 01:29	3.38	2.19	1.00
TeviotdaleDrain	CHANNEL	1.588	0 02:00	0.73	0.22	0.58
Orifice	ORIFICE	0.026	0 01:32			1.00
Overflow	WEIR	0.000	0 00:00			0.00

```
Analysis begun on:  Fri Jun  6 16:08:59 2025
Analysis ended on:  Fri Jun  6 16:09:00 2025
Total elapsed time: 00:00:01
```

POST-DEVELOPMENT REGIONAL STORM OUTPUT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
B_Drain_1	6.67	666.50	38.00	0.5000	FakeStorm	BDrain
B_Drain_2	14.79	1478.60	4.00	0.5000	FakeStorm	BDrainLine93
B_Drain_3	17.71	1770.73	4.40	0.5000	FakeStorm	BDrainRd140
B_Main	2.77	277.15	25.00	0.5000	FakeStorm	Drain59CB
C_Drain_1	1.85	184.60	50.00	0.5000	FakeStorm	NewCB
C_Drain_2	20.21	2020.85	16.00	0.5000	FakeStorm	CDrain
Main_Upstream_1	3.64	363.78	23.00	0.5000	FakeStorm	MainJunction
Main_Upstream_2	13.01	1300.64	24.00	0.5000	FakeStorm	MainLine93
Main_Upstream_3	14.09	1408.56	7.30	0.5000	FakeStorm	MainUpper
NCatchment	23.26	2326.03	9.00	0.5000	FakeStorm	Drain59CB
NWCatchment	14.16	1415.86	0.00	0.5000	FakeStorm	TeviDrain
Site	8.25	1100.00	70.00	2.0000	Hazel	NewPond
SWCatchment	35.70	3570.44	4.00	0.5000	FakeStorm	TeviDrain

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	2.519	14.306
Evaporation Loss	0.000	0.000
Infiltration Loss	1.148	6.521
Surface Runoff	1.347	7.649
Final Storage	0.026	0.147
Continuity Error (%)	-0.077	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.347	13.468
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	18.323	183.236
External Outflow	19.581	195.811
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000

Exfiltration Loss 0.000 0.000
Initial Stored Volume 0.000 0.000
Final Stored Volume 0.102 1.025
Continuity Error (%) ..... -0.067

****
Time-Step Critical Elements
****
Link OutletPipe (8.52%)

****
Highest Flow Instability Indexes
****
Link MainDrain59 (3)
Link OutletPipe (2)
Link TeviotdaleDrain (1)

****
Most Frequent Nonconverging Nodes
****
Convergence obtained at all time steps.

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
B_Drain_1	1.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_2	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Drain_3	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000
B_Main	1.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_1	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.000
C_Drain_2	1.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_1	1.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_2	1.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.000
Main_Upstream_3	1.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.000
NCatchment	1.00	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.000
NWCatchment	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.000
Site	285.00	0.00	0.00	120.92	198.58	163.26	163.26	13.47	1.13	0.573
SWCatchment	1.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.000

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
BDrain	JUNCTION	0.49	0.49	416.02	0 06:16	0.49
BDrainLine93	JUNCTION	0.50	0.50	416.50	1 07:47	0.50
BDrainRd140	JUNCTION	0.21	0.21	417.99	0 00:52	0.21
CDrain	JUNCTION	0.23	0.23	417.51	0 00:04	0.23
Drain59CB	JUNCTION	0.37	0.71	415.18	1 23:10	0.71
MainJunction	JUNCTION	0.32	0.32	416.90	1 19:17	0.32
MainLine93	JUNCTION	0.28	0.30	417.43	0 00:08	0.30
MainUpper	JUNCTION	1.48	1.99	419.94	0 00:02	1.99
NewCB	JUNCTION	0.23	0.24	417.34	0 00:07	0.24
TeviDrain	JUNCTION	0.77	1.01	410.81	1 23:21	1.01
OpenDrainOutlet	OUTFALL	0.38	0.52	409.20	1 23:21	0.52
NewPond	STORAGE	0.18	0.99	417.24	1 23:09	0.99

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
BDrain	JUNCTION	0.000	0.374	1 13:01	0	96.8	0.094
BDrainLine93	JUNCTION	0.065	0.143	0 00:53	16.8	37	0.113
BDrainRd140	JUNCTION	0.078	0.078	0 00:00	20.2	20.2	0.059
CDrain	JUNCTION	0.088	0.088	0 00:00	22.8	22.8	0.018
Drain59CB	JUNCTION	0.114	1.427	1 23:09	29.5	140	0.063
MainJunction	JUNCTION	0.016	0.238	0 00:10	4.15	59.8	0.098
MainLine93	JUNCTION	0.057	0.123	0 00:02	14.8	30.8	0.075
MainUpper	JUNCTION	0.062	0.062	0 00:00	16.1	16.1	0.030
NewCB	JUNCTION	0.008	0.100	0 00:02	2.07	24.9	0.063
TeviDrain	JUNCTION	0.219	1.646	1 23:10	56.8	196	0.237
OpenDrainOutlet	OUTFALL	0.000	1.631	1 23:21	0	196	0.000
NewPond	STORAGE	1.127	1.127	1 23:00	13.5	13.5	-0.229

****
Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
NewPond	0.328	11.3	0.0	0.0	2.039	70.5	1 23:09	0.939

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OpenDrainOutlet	100.00	0.774	1.631	195.810
System	100.00	0.774	1.631	195.810

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
BDrainBottom	CONDUIT	0.374	1 23:38	1.66	0.97	0.74
BDrainMiddle	CONDUIT	0.143	2 05:43	1.32	1.01	1.00
BDrainUpper	CONDUIT	0.078	0 00:53	1.06	0.54	0.76
CDrainLower	CONDUIT	0.099	0 00:07	1.10	0.33	0.46
CDrainUpper	CONDUIT	0.092	0 00:02	1.41	0.33	0.39
MainChalmers	CONDUIT	0.125	0 00:10	0.98	0.47	0.50
MainDrain59	CONDUIT	1.427	1 23:10	2.75	1.04	0.93
MainSouthPL	CONDUIT	0.231	0 01:32	1.38	0.55	0.67
MainTopEnd	CONDUIT	0.066	0 00:02	1.54	1.68	1.00
OutletPipe	CONDUIT	0.914	1 23:09	3.25	2.11	0.98
TeviotdaleDrain	CHANNEL	1.631	1 23:21	0.74	0.23	0.59
Orifice	ORIFICE	0.025	1 23:09			1.00
Overflow	WEIR	0.000	0 00:00			0.00

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Analysis begun on:  Fri Jun  6 16:11:22 2025
Analysis ended on:  Fri Jun  6 16:11:23 2025
Total elapsed time: 00:00:01
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