Stormwater Needs Study: Paisley

Municipality of Arran-Elderslie

Project 21-007

September 4, 2025

Prepared By:

GSS Engineering Consultants Ltd.

Unit 230, 945 3rd Avenue East

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1 INTRODUCTION & PURPOSE OF STUDY

GSS Engineering Consultants Ltd. was retained by the Municipality of Arran-Elderslie to undertake a stormwater needs study for three communities: Chesley, Paisley and Tara. This report focuses on the evaluation of the Stormwater System for Paisley.

Paisley is located at the confluence of the Saugeen River and the Teeswater River, as well as junction of Bruce Roads 1, 11, and 3. Paisley has a population of approximately 1,061 and includes 526 dwellings (as per 2021 census). Paisley is spread over approximately 1.8 km^2 of land.

The Saugeen River winds through Paisley, entering from the south and travelling to the north end of the community where it turns and continues to the northwest. The majority of Paisley slopes toward the Saugeen River however southwest part of Paisley slopes towards Teeswater River.

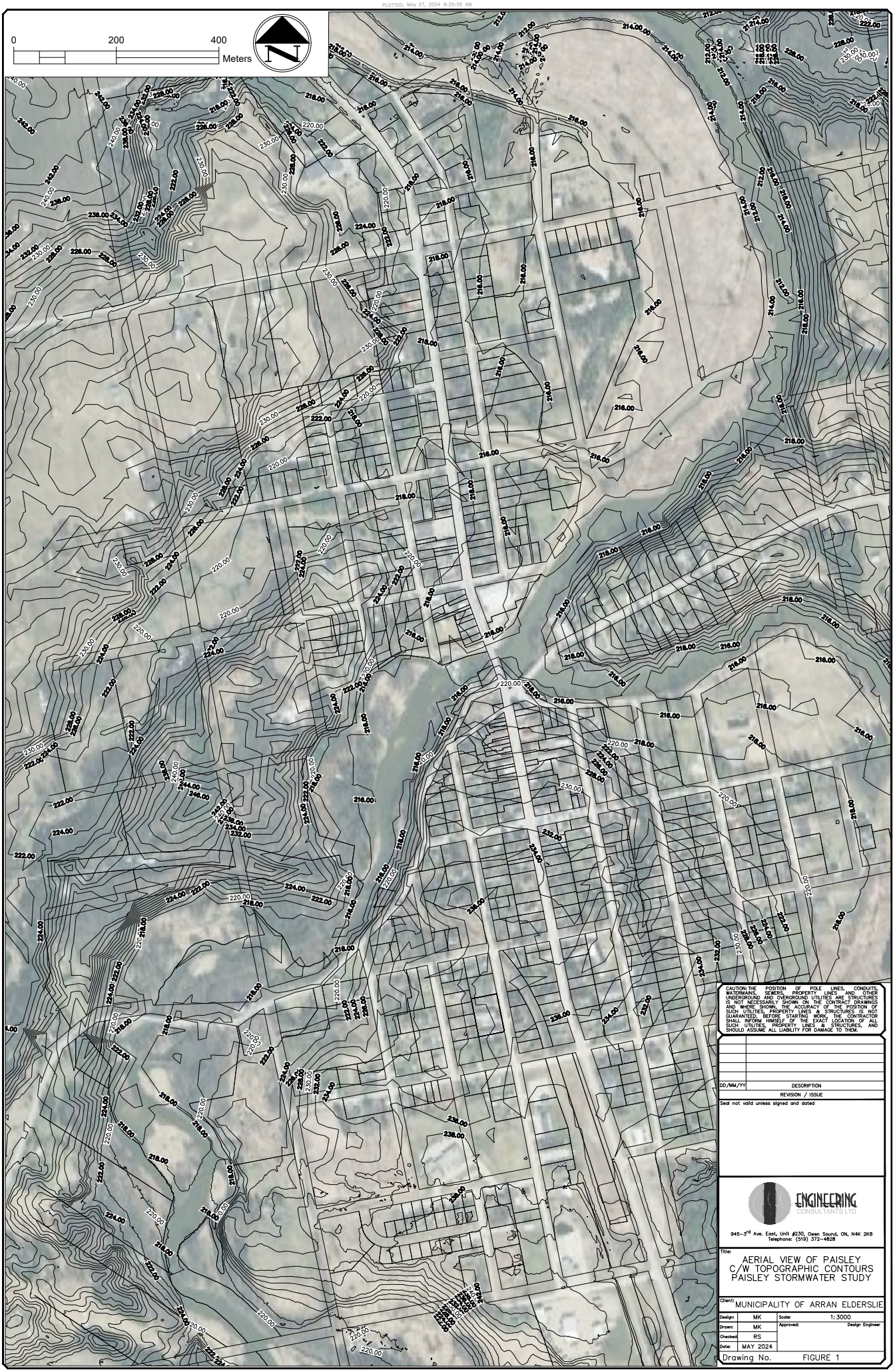
Figure 1 overleaf provides an aerial view of Paisley and the Saugeen River complete with 1.0 m contours as provided by Bruce County.

The aim of the stormwater needs study is to identify assets of the existing stormwater System (sewers, structures, overland flow paths, outlets, etc.) that are deficient in capacity, and propose upgrades to mitigate the identified deficiencies. The report further outlines priority of upgrades and preliminary cost estimates.

The report focuses on eliminating the flooding over the storm structures during 1:5 year storm, while permitting some surcharging within storm sewers and structures. The provincial guidelines recommend the design and construction of storm sewers without any hydraulic overloading. However, for Paisley's stormwater System, this effort may lead to the need for exceptionally large capital, which may not be very practical or affordable. Therefore, eliminating flooding was the primary focus of the study.

Due to the size of the storm water system, each figure in this report has been broken down into three segments for easy reading.

This report is intended to be a "living document" and is suggested to be updated as the storm sewer system is upgraded and/or when the new data is available.



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Title:

AERIAL VIEW OF PAISLEY C/W TOPOGRAPHIC CONTOURS PAISLEY STORMWATER STUDY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:3000
Drawn:	MK	Approved:	Design Engineer
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Drawing No. FIGURE 1

2 EXISTING STORMWATER SYSTEM

In general, catchbasins collect stormwater runoff, and carry it through storm sewers to a dedicated outlet. Such runoff transportation network is termed as *minor stormwater system*. The minor Stormwater System is generally intended to carry runoff from a 1:2-year or 1:5-year storm event. For larger storms, the excess stormwater runoff (that cannot be conveyed by the minor System) is carried overland (usually in road corridors and ditches) to a dedicated outlet. This is referred to as the *major stormwater system*.

The stormwater system in Paisley consists of storm structures, sewers, ditches and road corridors. As outlined in **Section 1**, the majority of Paisley naturally slopes toward the Saugeen River, therefore, the majority of the stormwater system outlets to the river.

The following sub-sections provide details regarding the minor and major stormwater systems in Paisley as well as general deficiencies affecting them. **Figure 2** overleaf provides a depiction of the existing stormwater system (all sewers and structures), with a few select attributes highlighted and described as follows:

- There are several existing storm sewers that have reverse slope. They are identified in "red."
- One storm structure was noted without any known outlets. It is identified in "orange."
- Some storm sewers and appurtenances are located on private properties with no easements. They are indicated in "blue."
- All roads without curb and gutter are highlighted in yellow. Absence of curb & gutter or roadside ditches could pose challenges related to carrying a major storm runoff.

2.1 Minor Stormwater System: Sewers and Structures

The Paisley stormwater system contains approximately 11.8 km of storm sewer with sizes ranging from 100 mm ø to 900 mm ø. **Table 2.1** outlines the approximate length of each sewer size.

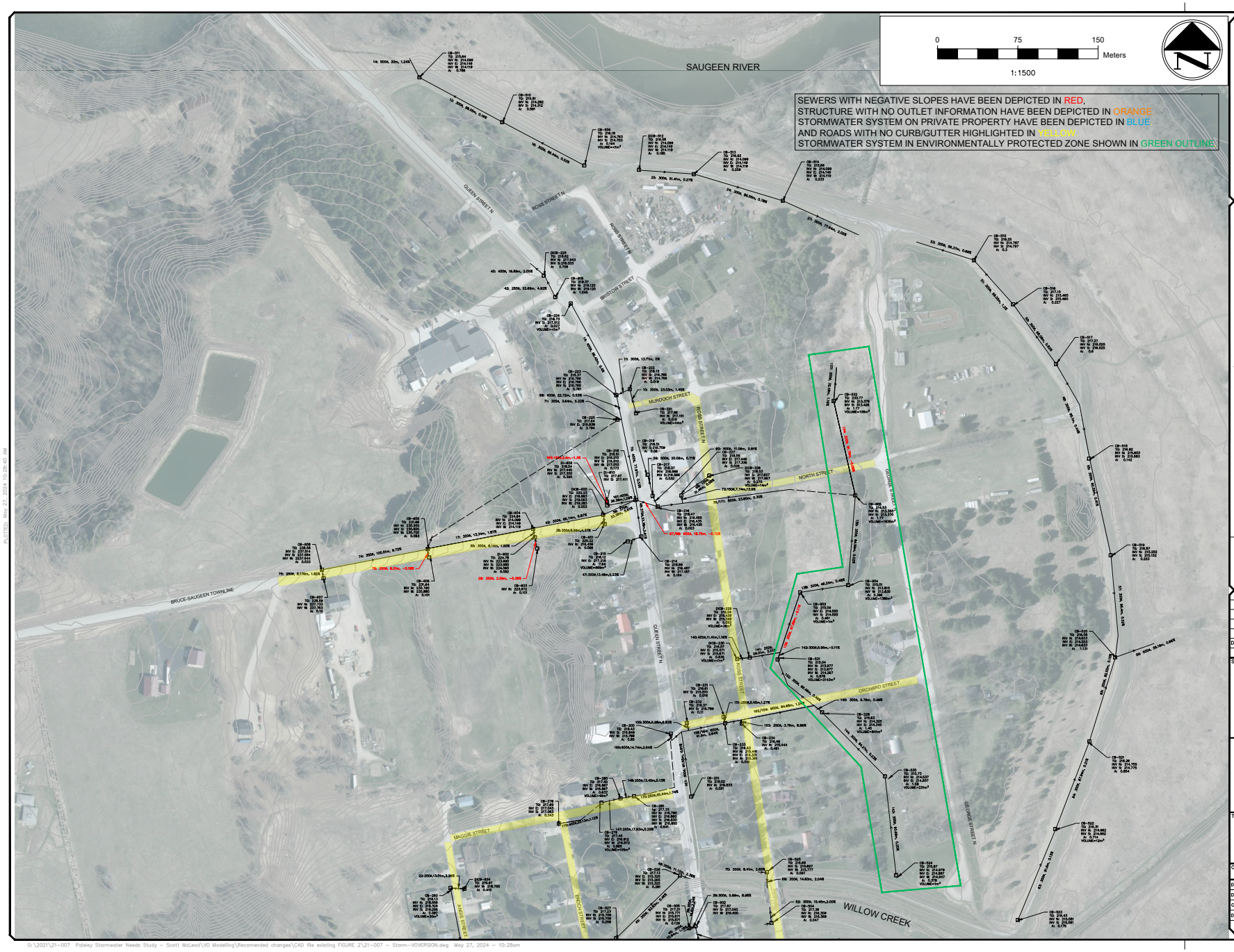
As per **Table 2.1,** 300 mm ø sewer is the most abundant and 67.4 % of all sewers are 300 mm ø or less. MECP Design Guidelines require that storm sewers should be minimum 200 mm ø in size.

As previously stated, the minor stormwater system is generally designed to convey the runoff from the 1:5-year (or sometime the 1:2-year) return storm.

As noted later in this report, most common causes of insufficient capacity of sewers appear to be small diameter pipes or not a large enough slope. At various locations, sewers possess a reverse slope, therefore, water will not flow by gravity and must back up in the System to develop enough head to flow through the sewer. Sewers that have a reverse slope are shown in red on **Figure 2**.

The stormwater system currently contains approximately 380 storm structures. **Table 2.2** provides a breakdown of the quantity of each structure type in the existing Stormwater System.

Storm structures denoted as a catchbasin (CB, CBMH, DICB, DCB) possess a grate cover and are intended to collect surface runoff for conveyance through connecting sewers. Remaining



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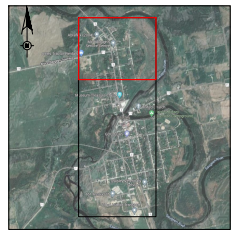

LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA CATCHMENT AREA
- CB CATCHBASIN
- CBMH CATCHBASIN MANHOLE
- STMMH STORM MANHOLE
- DICB DITCH INLET CATCHBASIN
- 251.00 CONTOUR (1.0m)
- DITCH CONNECTION

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Drawing No. FIGURE 2A

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ONTARIO

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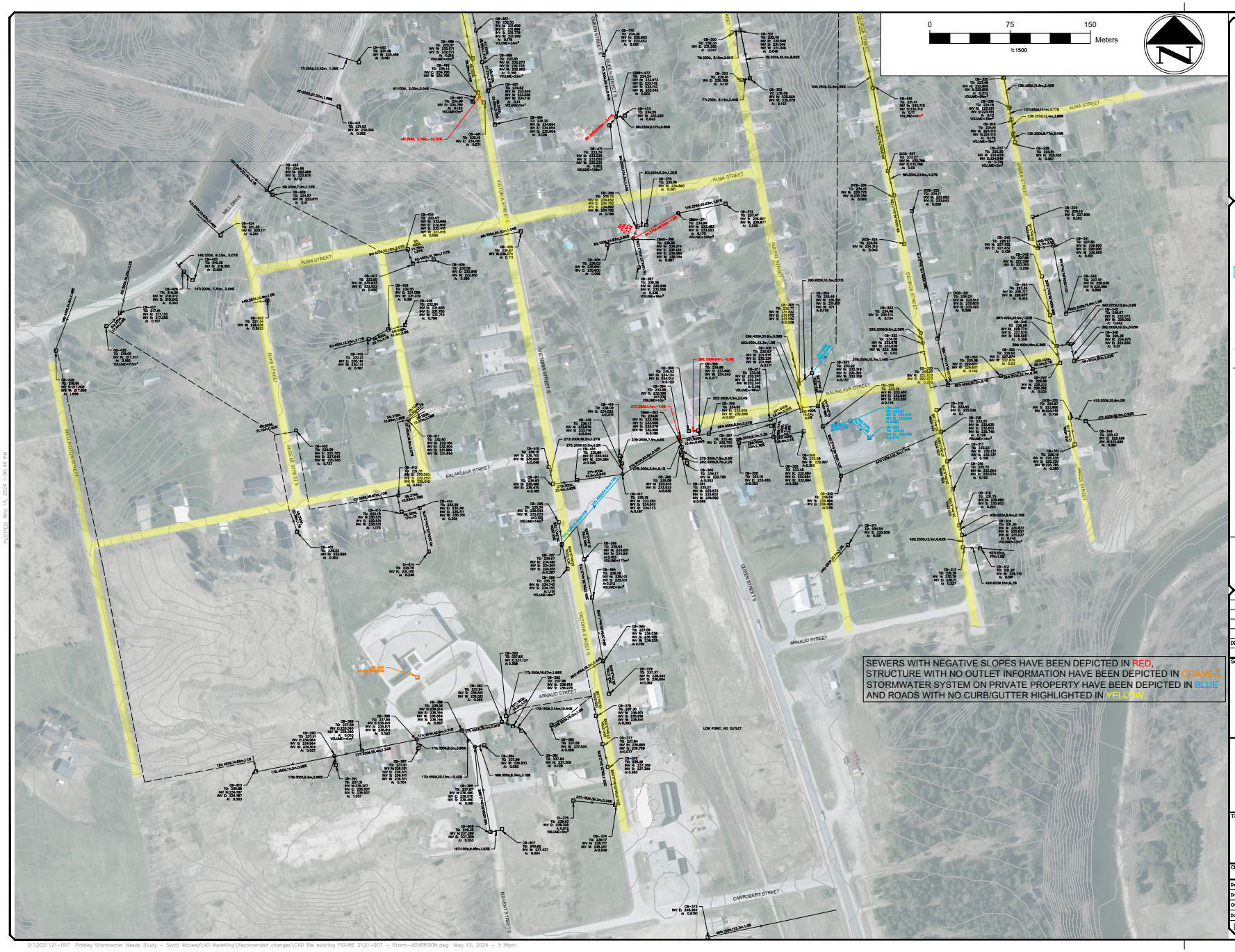
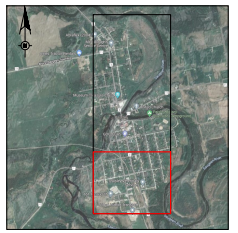


SEWERS WITH NEGATIVE SLOPES HAVE BEEN DEPICTED IN RED,
STRUCTURE WITH NO OUTLET INFORMATION HAVE BEEN DEPICTED IN ORANGE
STORMWATER SYSTEM ON PRIVATE PROPERTY HAVE BEEN DEPICTED IN BLUE
AND ROADS WITH NO CURB/GUTTER HIGHLIGHTED IN YELLOW.

KEY PLAN



LEGEND

- CB — CATCHBASIN
- STMH — STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
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Drawing No. FIGURE 2C

TABLE 2.1

Storm Sewer Sizes and Lengths
Paisley Stormwater System

Storm Sewer Diameter (mm)	Total Length of Sewer (m)
100	235
150	470
200	1,710
250	2,005
300	3,595
375	530
400	1,425
450	660
500	455
525	45
600	615
800	125
900	25
Total	11,895

TABLE 2.2

Storm Structures
Paisley Stormwater System

Storm Structure Type	Storm Structure Legend	Quantity
Catch Basin	CB	296
Catch Basin Manhole	CBMH	41
Ditch Inlet Catch Basin	DICB	37
Storm Manhole	STMMH	3
Double Catch Basin	DCB	3
Total		380

structures (STMMH) possess pick cover (or similar). These structures are not intended to collect runoff but rather provide a junction in which multiple sewers can be connected to converge.

There is one structure in the stormwater system with no discernible sewer outlet. Without a proper sewer outlet, all upstream structures will fill up during a rainfall event and eventually flood the surrounding area. The storm structures with no identified sewer outlet have been shown in orange on **Figure 2**.

2.2 Stormwater Ditch (Environmental Protection Zone)

Paisley has a natural channel/ditch **(See Figure 2)** in the northern part of town originating near Willow creek and moving along George Street with an outlet near north of North Street. This ditch also has a storm sewer underneath it. Low flows are carried within the storm sewer, and flows exceeding the capacity of storm sewers are to be carried within the natural channel. It may be noted that catchbasin grates are approximately at the channel invert elevation. During stormwater modelling any flow exceeding the sewer capacity is assumed to be conveyed by the ditch.

2.3 Major Stormwater System

When stormwater runoff exceeds the capacity of the minor stormwater system, the excess runoff must be conveyed overland to an appropriate outlet. The overland conveyance is considered as the major stormwater system. An inadequate major stormwater system can lead to flooding of buildings and streets and can be catastrophic in large rainfall events.

During larger rainfall events the flooding of catchbasins occurs, thereby leading to spilling of runoff onto road corridors. The road corridors are sloped to convey the floodwater to an appropriate outlet. However, this is only viable where the catchbasins are within the road corridor and the road corridor contains proper curb and gutter. On streets without curb and gutters the runoff is normally collected within roadside ditches and is carried to an outlet. However, like with storm structures if the roadside ditches do not have a proper outlet, the runoff can back up and cause flooding of adjacent lands and that may include residences.

The majority of existing roads in Paisley do not contain curbs and gutter or roadside ditches, or a proper outlet for the major stormwater event. At some locations, there are curbs with curb face sidewalk, but they are not deep enough and have been considered deficient. Such locations are highlighted in yellow on **Figure 2**. At other locations, existing ditches have been filled in by residents.

2.4 Stormwater System on Private Property

Municipal storm structures, sewers, minor system outlets, and major system outlets should all be located within property (roadway) owned by the municipality. However, there are various areas in the Paisley Stormwater System where stormwater assets are located on private property as highlighted in blue on **Figure 2**.

3 LIMITATIONS OF THE STUDY

The stormwater system was investigated to identify deficiencies as accurately as reasonably possible. However, there are limitations that somewhat hinder accuracy of this report. They are as follows:

- Insufficient or potentially incorrect information recorded in municipal database. Some of the information, wherever possible was verified in the field, however, all areas could not be verified. Suitable assumptions were made for such areas.

- There may be potential for blockages, collapsed sewers and plugged outlets that are currently not known but can be identified only with intensive CCTV inspection of the sewer system.

- The computer model prepared for this investigation was not checked for calibration to determine its accuracy. The only way to verify calibration of the model is by way of flow monitoring and local rainfall data collection. The flow monitoring is an expensive and time consuming exercise.

4 METHODOLOGY

4.1 Existing Stormwater System Information Collection

The existing storm sewer system attributes (storm structure top of grades, inverts, sewer slopes, diameter and lengths, etc.) were collected from various sources.

An overall map of the stormwater system prepared by Genivar in 2013 was used as the basis for the storm structure locations. An excel file with the storm sewer and storm structures information was provided by the municipality based on a previous field survey performed with a laser meter and a GPS survey unit.

Wherever necessary, GSS Engineering performed additional field surveys to confirm storm sewer inverts and collect missing information. In a few select locations, missing information could not be collected or verified in the field. Refer to **Figure 10 (Appendix D)** for such locations. In such areas reasonable assumptions were made regarding sewer slope, size, and length.

All of the stormwater system information provided by the municipality (maps, survey data, and record drawings) are provided in **Appendix A**.

By incorporating information from above-mentioned sources, stormwater system map was prepared as outlined in **Figure 2**.

4.2 Existing Stormwater Catchment Areas and Hydrology

For analyzing the stormwater system, the entire storm sewer system was divided into 46 drainage basin/catchment areas. These basins were labeled using two alphabetical series, “CA-A” to “CA-Z” and followed by “CA-AA” to “CA-TT”, starting in the north end of Paisley and ending in the south end. The basins were further delineated into catchment areas of storm structures (catchbasin, ditch inlets, etc.) as much as possible.

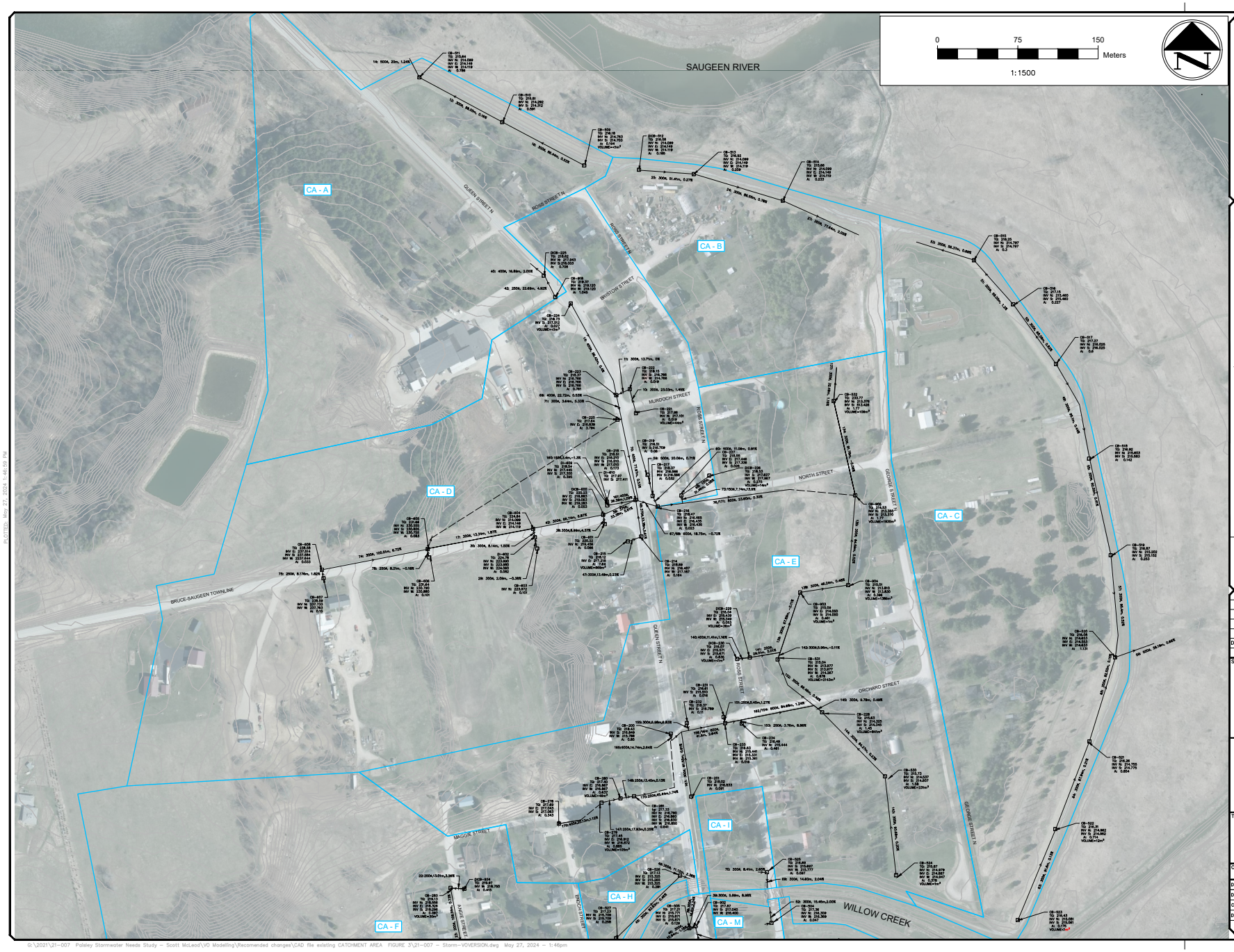
The catchment area for each storm structure was defined based on the surrounding area sloping to structure as per 1 m topography contours and accounting for any drainage block, such as a roadway with no culvert.

Figure 3 overleaf provides a layout of the various drainage basins utilized to breakdown the Paisley stormwater system for modelling. The overall drainage area of the Paisley stormwater system is approximately 136 ha.

The overland flow length and slope for each catchment area was determined from the contours. The percentage of impervious area for each catchment area was determined from aerial photography. **Appendix B** provides the attributes for each catchment area, which were utilized in the model.

From soil maps as shown on **Figure 4** (in **Appendix C**) it was determined that the soil in Paisley consists mainly of loam and silt loam, with good drainage. It was assumed that the Paisley drainage area belongs to soil group B. This soil group indicates a moderate infiltration rate with moderately well drained soils.

A runoff SCS curve number of 75 was utilized for the pervious area in Paisley, indicative of residential area in soil group B.



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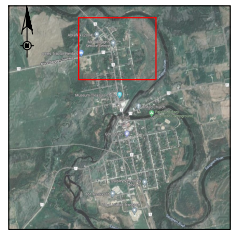

LEGEND

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- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 251.00 — CONTOUR (1.0m)
- DITCH CONNECTION

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Title:
DELINEATION OF CATCHMENT AREA OF STORM SYSTEM EXISTING CONDITIONS PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

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Date:	JAN. 2024		

Drawing No. FIGURE 3A

KEY PLAN

LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
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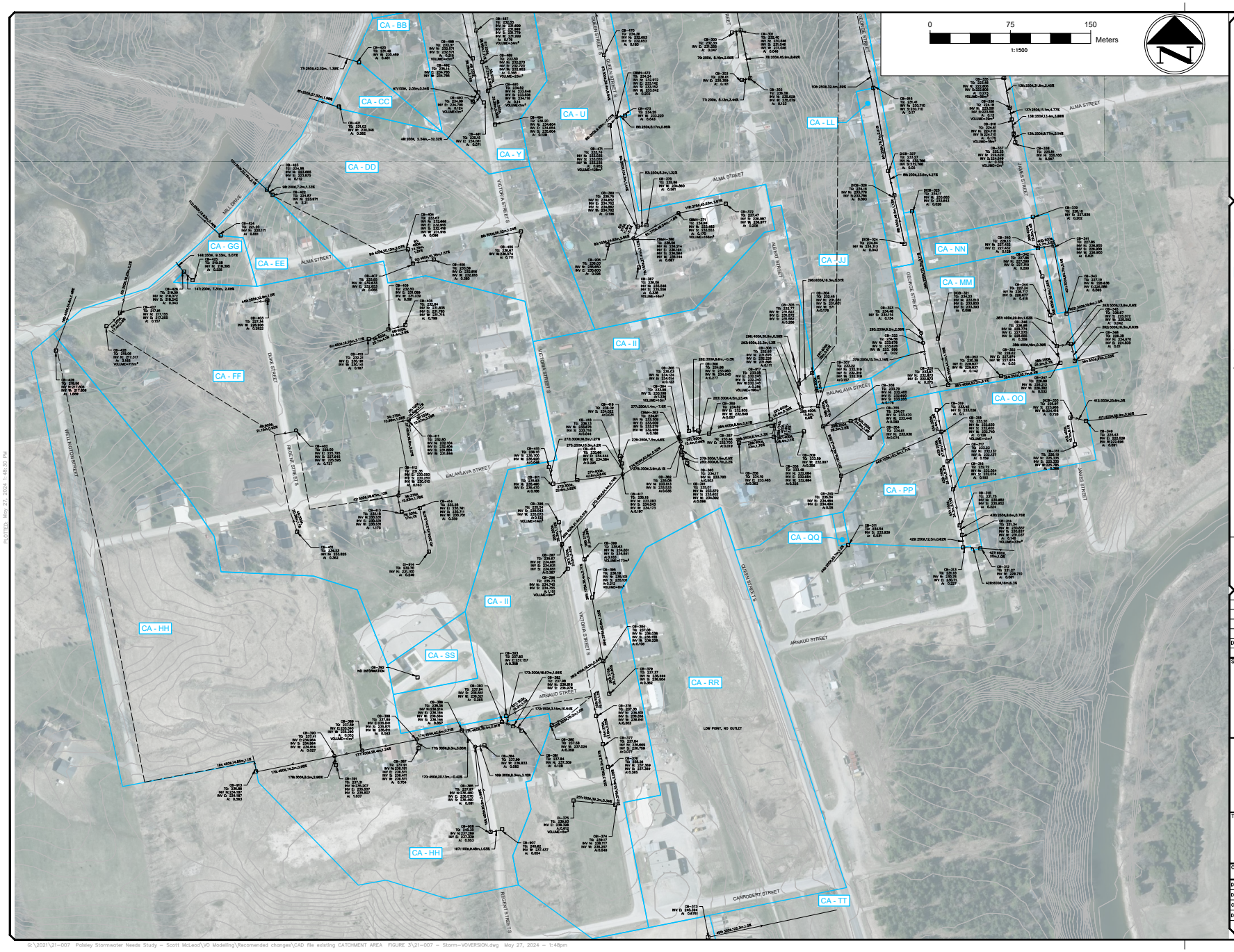
Drawing No. FIGURE 3B



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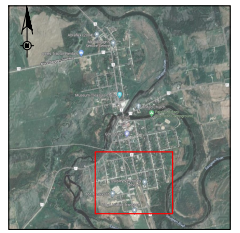

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DELINEATION OF CATCHMENT AREA OF STORM SYSTEM EXISTING CONDITIONS PAISLEY

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Drawing No. FIGURE 3C

4.3 Return Storms and Rainfall Data

As noted in **Section 2** the minor stormwater system (sewers and structures) should convey the 1:5-year storm. Accordingly, stormwater system was evaluated for 1:5-year storm to determine if the storm sewer system has adequate capacity. The system was also evaluated for the 1:100-year storm to determine areas that can be expected to experience large amounts of flooding during a severe storm event. Both storm events were modelled as 12-hour Chicago storms with the rainfall data obtained by the MTO's IDF Curve Lookup tool. **Table 4.1** summarizes the information from MTO's website.

The rainfall distribution was also derived using VO-SWMM 5.2 software for the 1:5-year return storm, which is indicated in **Table 4.2.**

The rainfall distribution was also derived using VO-SWMM 5.2 software for the 1:100-year return storm, which is indicated in **Table 4.3.**

4.4 Stormwater System Modelling

The stormwater system was modelled with VO-SWMM version 5.2 software. The model output helped in identifying storm sewers that surcharge and storm structures that surcharge or flood for the 1:5-year and the 1:100-year storms. The results of this analysis are discussed further in **Section 5.1**.

Storm sewer surcharge occurs when the maximum flow to be conveyed by the sewer exceeds the capacity of the sewer. The capacity of the sewer is influenced by inlet losses, outlet losses, water levels in upstream and downstream storm structures, pipe materials, etc.

Surcharging of a storm structure occurs when the water level in the structure exceeds the elevation of the sewer obvert. Flooding of a storm structure occurs when the water level exceeds the top of grate elevation of the structure. For structures that flood, the model estimates the total volume of flooding for the given rainfall event.

Based on the modelling results, stormwater system upgrades were identified to eliminate flooding of all storm structures during the 1:5-year storm. The stormwater system with the identified upgrades was re-modelled to verity the adequacy of the upgrades. The results of this analysis are discussed in **Section 5.3**.

TABLE 4.1

12-Hour Duration Rainfall Data
From MTO's IDF Curve Lookup

Storm Event Return Period	Average Rainfall Intensity (mm/hr.)
1:5-year	5.2
1:100-year	8.6

TABLE 4.2

1:5-year Return Storm, 12-hour Duration, Chicago

Rainfall Distribution

Time (hours)	Rainfall Intensity (mm/hr.)	Total Rainfall Depth (mm)
1	1.83	1.83
2	2.54	4.37
3	4.91	9.28
4	30.43	39.71
5	6.09	45.80
6	3.72	49.52
7	2.80	52.32
8	2.28	54.60
9	1.95	56.55
10	1.71	58.26
11	1.53	59.79
12	1.39	61.18

TABLE 4.3

1:100-year Return Storm, 12-hour Duration, Chicago

Rainfall Distribution

Time (hours)	Rainfall Intensity (mm/hr.)	Total Rainfall Depth (mm)
1	3.04	7.26
2	4.22	11.48
3	8.17	19.65
4	50.86	70.51
5	10.15	80.66
6	6.19	86.85
7	4.65	91.50
8	3.79	95.29
9	3.24	98.53
10	2.84	101.37
11	2.54	103.91
12	2.31	106.22

5 DISCUSSION OF RESULTS

The stormwater system was modelled as outlined in **Section 4 - Methodology**, of this report. The analysis results are discussed in **Section 5.1**.

Proposed upgrades to eliminate stormwater system flooding for the 1:5-year storm are discussed in **Section 5.2** and the results of modelling the upgraded systems are outlined in **Section 5.3**.

5.1 Existing Conditions Model Results

Figure 5 overleaf provides the 1:5-year storm modelling results for the entire system. The flooded structures are shown in red and surcharged structures and sewers are shown in orange.

The modelling results indicate that 64 out of 380 storm structures will flood during the 1:5-year storm and 177 structures will surcharge. The total estimated volume of flooding water is 12,230 m^3. The structures with a large flood volume are: DICB 329 (at Inkerman St./George St. intersection) with 5989 m^3; CB 296 (at Inkerman St./Albert St. intersection) with 791 m^3; CB 297 (at Inkerman St./Albert St. intersection.) with 808 m^3; and CB-215 (on Queen St./North St. intersection) with 869 m^3. These four (4) structures account for 69% of total flooding. The suggested upgrades to mitigate storm structure flooding during the 5-year flood are outlined in **Section 5.2**.

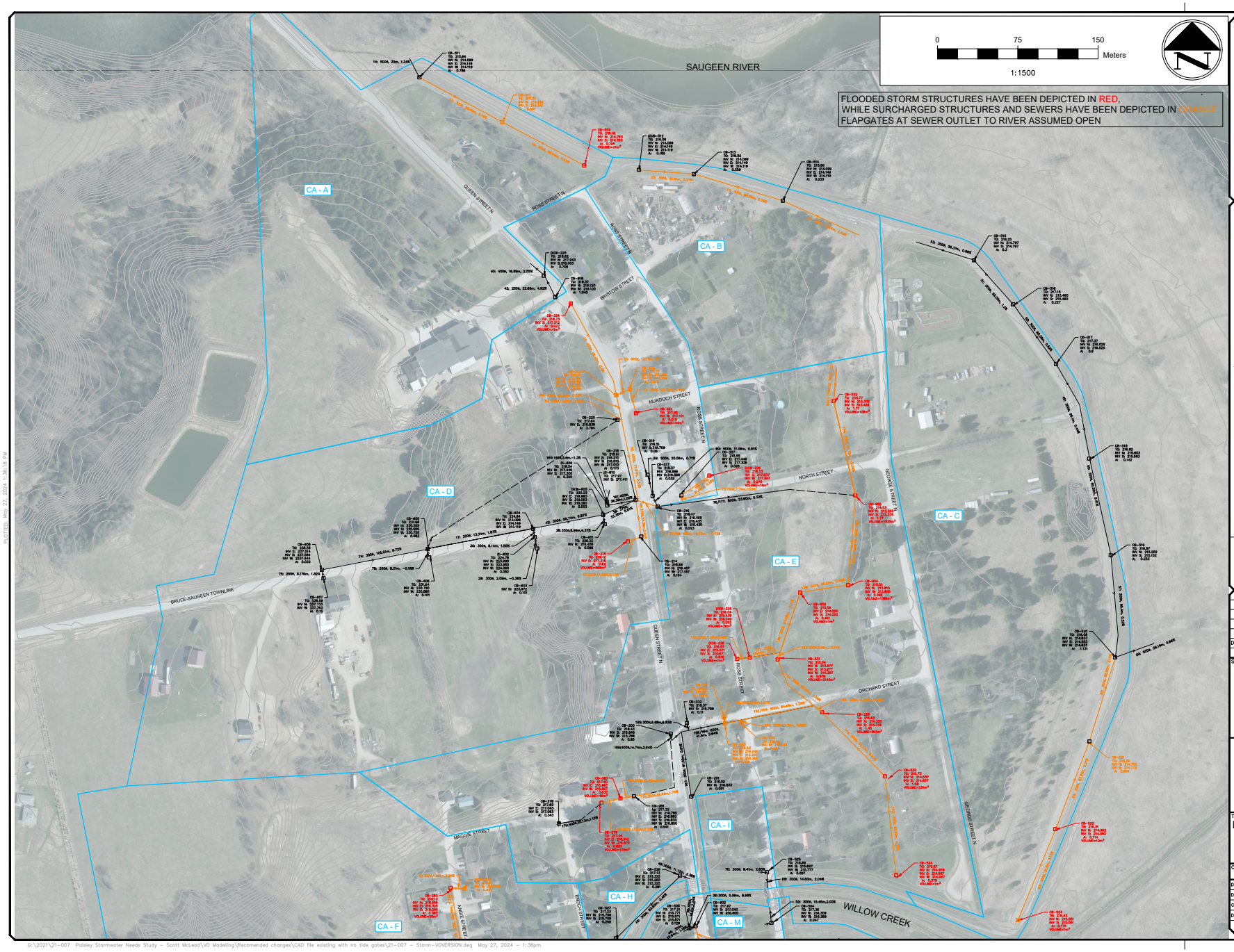
As indicated in **Figure 5**, Queen St., Victoria St., James St., Ross St., and Balaklava St. contain the majority of the surcharging sewers and structures.

Figure 6 depicts the modelling results for the 1:100-year storm.

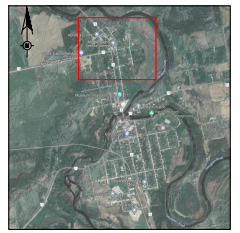
During the 1:100-year storm, 173 structures will flood and 231 structures will surcharge. The high proportion of flooding and surcharging is expected for the 1:100-year storm as the minor stormwater system is designed to convey 1:5-year storm only. The model indicates that 32,943 m^3 of flooding is expected for the 1:100-year storm. The four (4) (DICB 329, CB 296, CB 297, and CB 215) structures, as identified above, experience the largest amount of flooding. These four structures account for a total of 14,737 m^3 of flooding or 45% of total flooding.

During a severe storm, such as the 1:100-year storm, stormwater flooding from structures is to be conveyed overland, within the road corridor or roadside ditches to an appropriate outlet. Therefore, flooding in areas without proper curb & gutter or ditching is a major concern. In several areas, such as Ross St., Victoria St., Inkerman St., James St., Albert St., Balaklava St., Cambridge St., Arnaud St., North St., Maggie St., and Orchard St. significant flooding is expected during the 1:100-year storm, but no curb & gutter or sufficient ditches exist. This outlines the need for proper curb & gutter or roadside ditches, during any road reconstruction project. Furthermore, a survey of finished ground floor elevations or basement opening is required to confirm the flooding impact on residential properties, if any, during major storms.

The natural channel/ditch as discussed in Section 2.2, is expected to convey a flood water volume of 6680 m^3 during 1:5 year rainfall event and 13,347 m^3 volume during 1:100 year rainfall event. Note that the channel shall convey only the flood water spilling over the Catchbasins (catchbasin grate matching channel invert elevation). The channel combined with storm sewer capacity, per modelling, appear to be adequate to handle runoff from 1:100 year rainfall event. However, adequacy can be confirmed only by undertaking detailed topographic



KEY PLAN



LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 251.00 — CONTOUR (1.0m)
- DITCH CONNECTION

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

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ENGINEERING CONSULTANTS LTD
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:
DEPICTION OF MODELLING RESULT EXISTING NETWORK 5 YEAR STORM PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:1500
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	JAN. 2024		

Drawing No. FIGURE 5A

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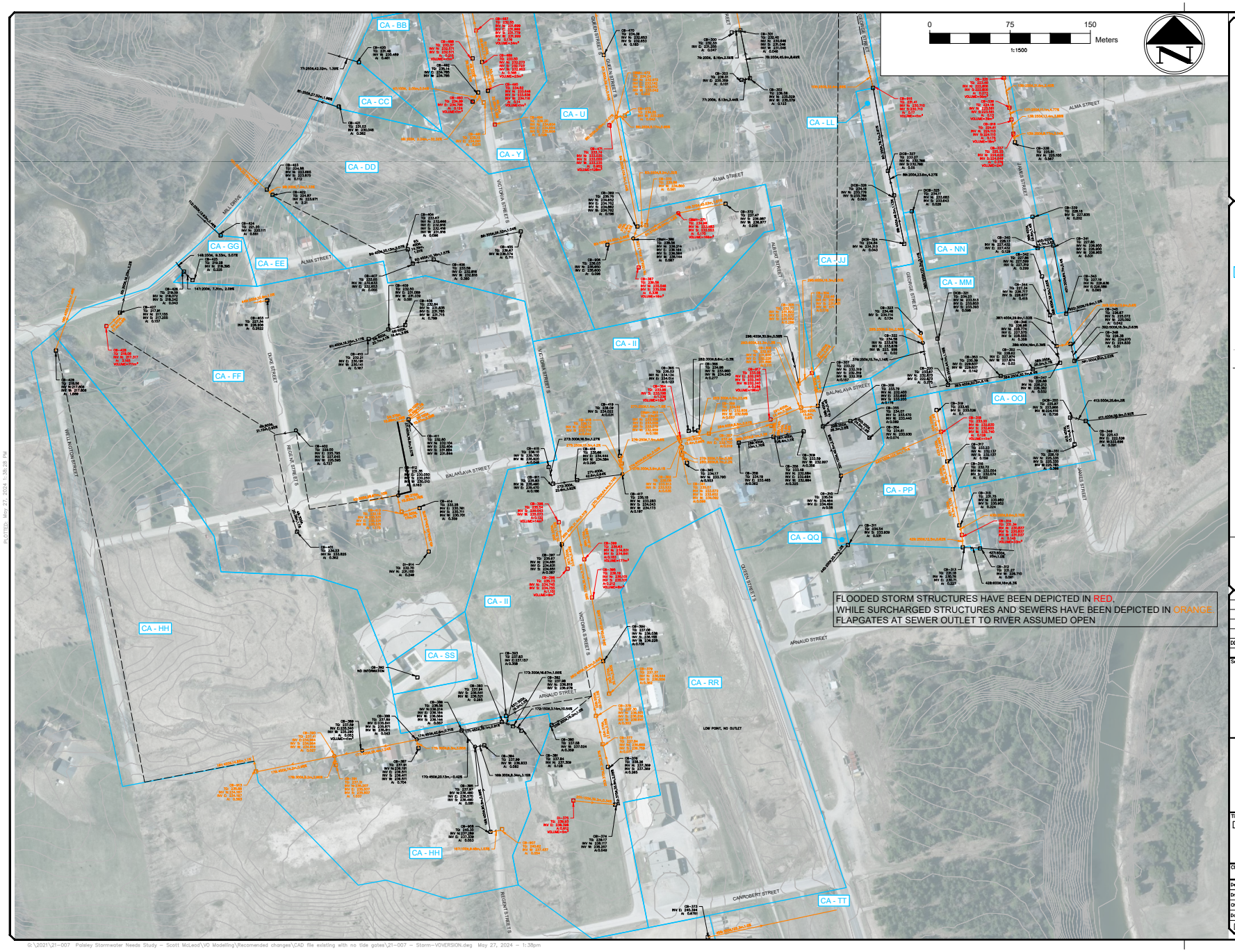

KEY PLAN

LEGEND

- CATCHBASIN
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Checked:	RS		
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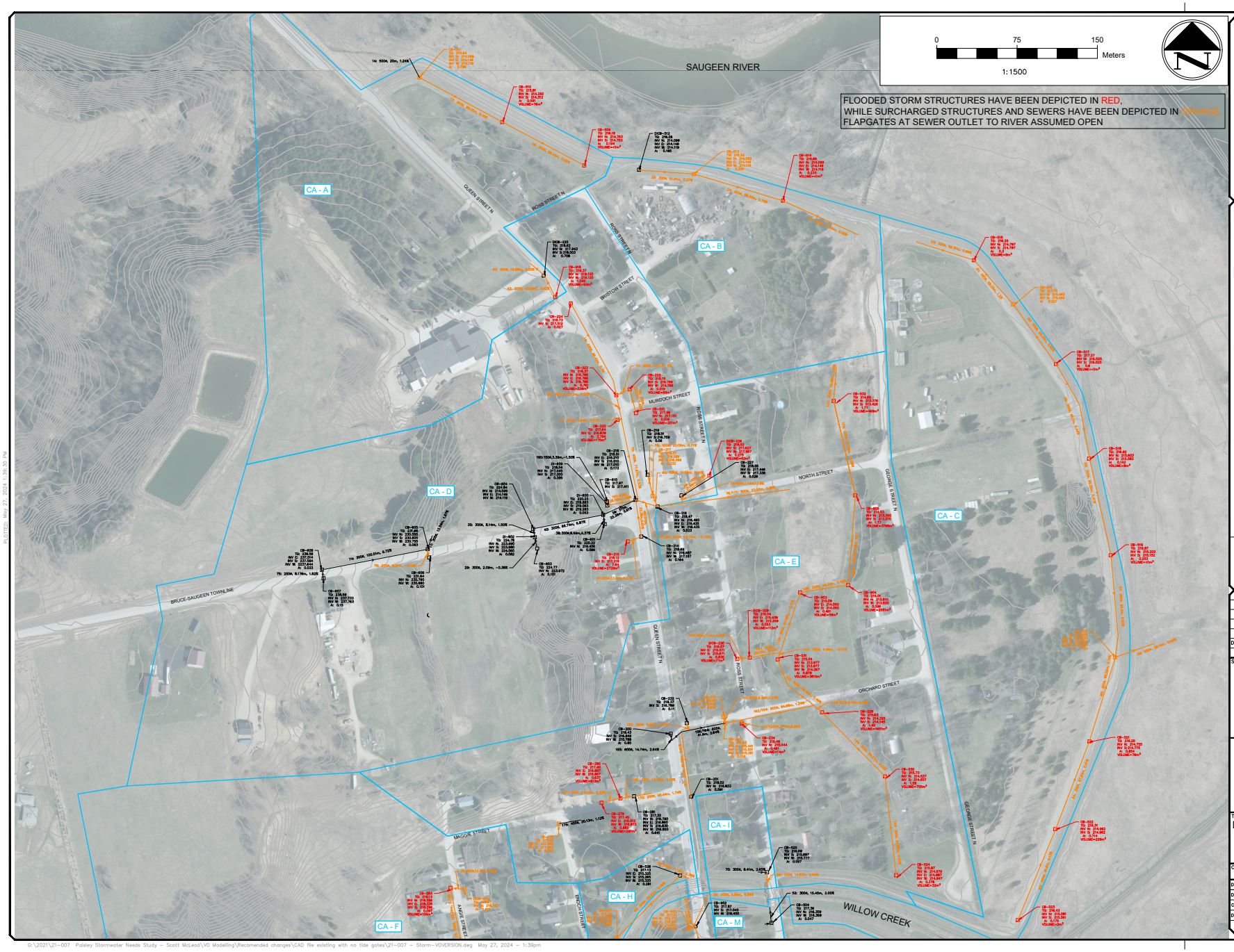
Drawing No. FIGURE 5C



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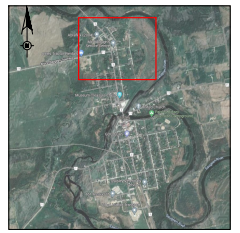

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Client: MUNICIPALITY OF ARRAN ELDERSLIE

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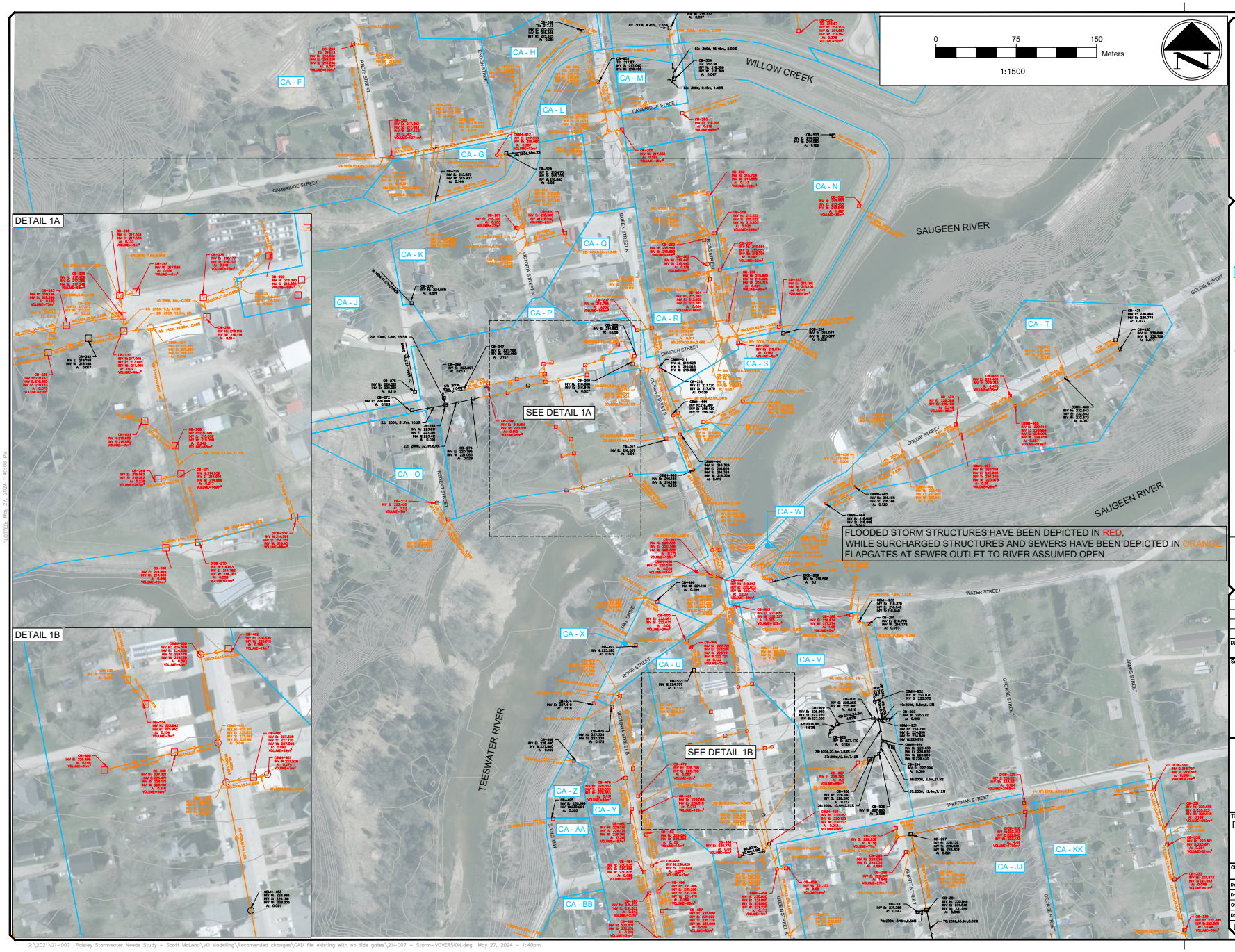
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 6A



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Date:	MAY 2024		

Drawing No. FIGURE 6B

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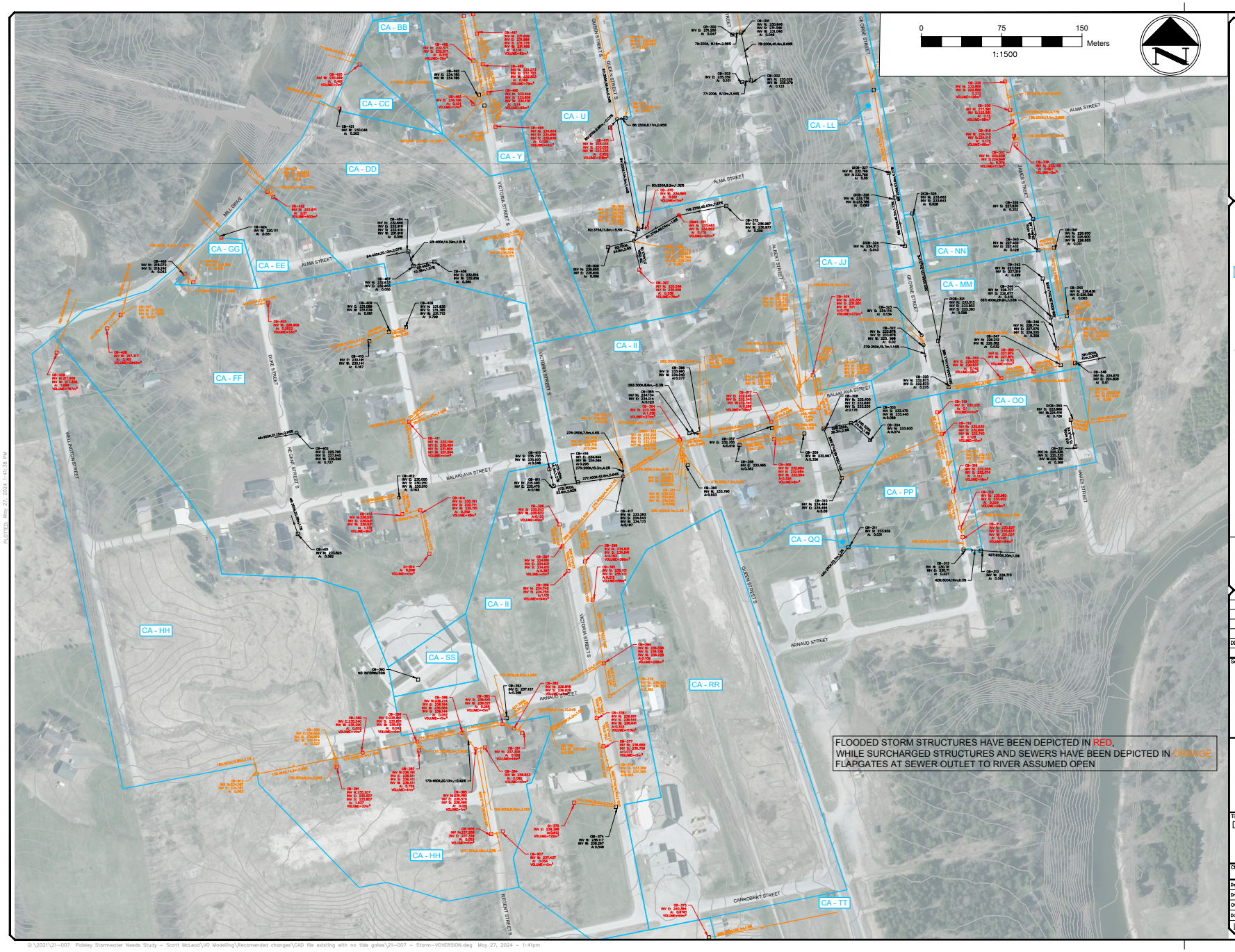

KEY PLAN

LEGEND

- CB — CATCHBASIN
- MH — STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
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- CB — CATCHBASIN
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Title:
DEPICTION OF MODELLING RESULT
EXISTING NETWORK
100 YEAR STORM
PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

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Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 6C

survey of the area and HEC-RAS modelling to determine the extent of flooding and whether flooding will affect private properties.

5.2 Proposed Upgrades

Based on the modelling results for the existing conditions of stormwater system and as discussed in **Section 5.1,** 15 system upgrades have been identified to mitigate flooding during the 1:5-year storm.

The Fifteen (15) identified system upgrades are depicted in green on **Figure 7**. **Table 5.1** provides a priority list of the 15 proposed upgrades, strictly based on the volume of flooding eliminated. Note that five (5) of the upgrades are on Bruce County and it is their responsibility to upgrade them. The table includes a brief description of each upgrade.

No upgrade has been proposed to eliminate the flooding in the storm system along the natural channel (Willow Creek up to North Street via George Street), as it is in an Environmentally Protected Zone. Furthermore, the natural channel and storm sewer underneath the channel appear to be adequate in capacity, as discussed in previous sub-section 5.1.

5.3 Upgraded System Model Results

Figure 8 overleaf depicts the modelling results for 1:5-year rainfall event with the proposed upgrades. The results indicate that with the proposed upgrades, no storm structure will experience flooding other than eight (8) storm structures that are located within the natural channel/ditch. 81 storm structures will surcharge, in the remainder of the storm network, which is reduced from 177 structures. The model indicates that the proposed upgrades will eliminate flooding of storm structures in Paisley for the 1:5-year rainfall event.

Figure 9 depicts the storm modelling results for the 1:100-year rainfall event with the proposed upgrades. The results indicate that 105 structures will experience flooding (down from 173) and 268 storm structures will surcharge (up from 231) during the 1:100-year storm. The increase in number of surcharging structures is due to reduction in the flooding volume, and more storage of runoff volume is in the large diameter sewers. This will lead to surcharging of increased number of structures.

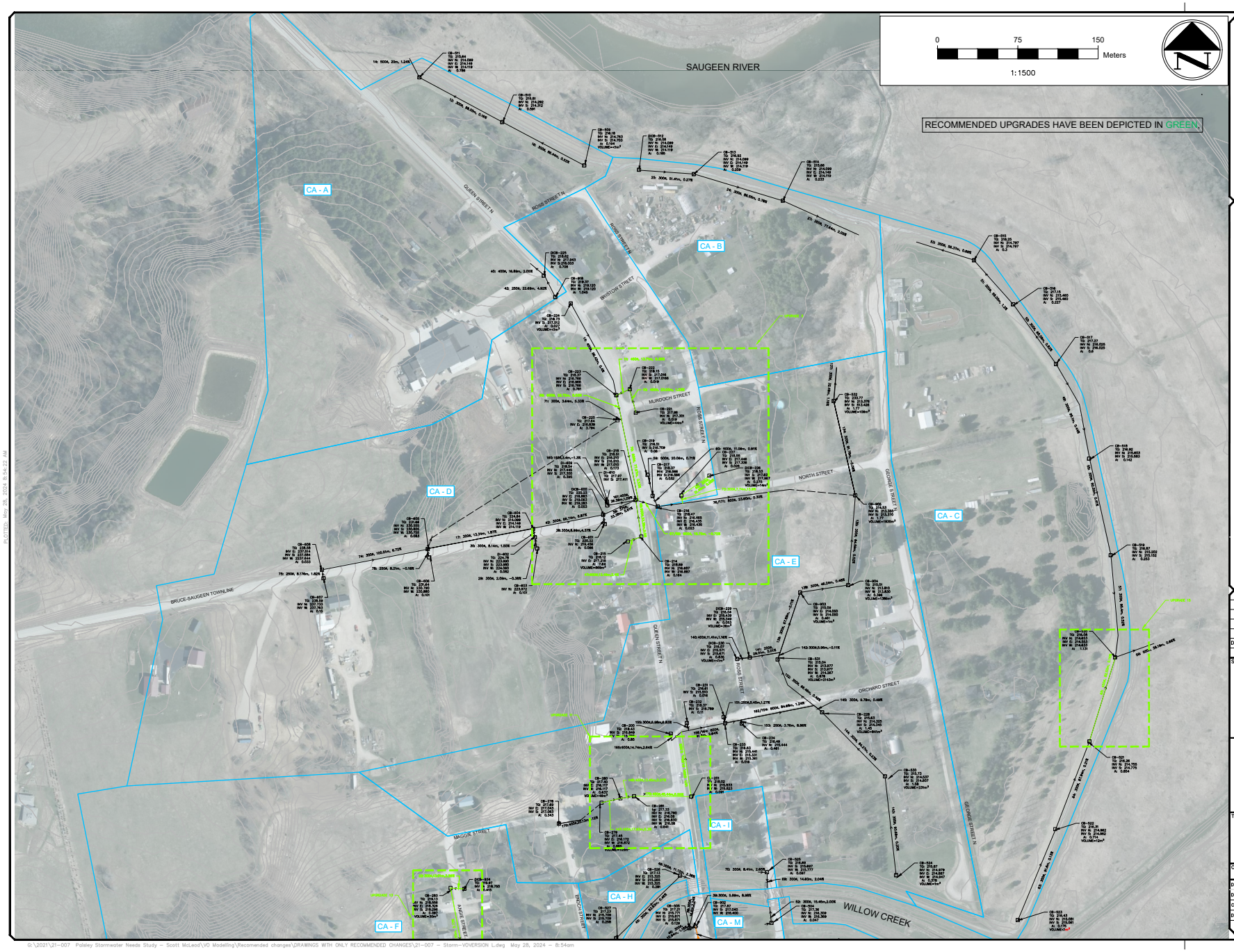
The total storm flooding volume is reduced from 32,943 m^3 to 9,371 m^3 for 1:100 year storm event. As noted earlier, the storm sewer system is not designed to convey the 1:100-year storm, however, the upgrades, if implemented, will greatly improve the conveyance of the 1:100-year storm and reduction in the flooding.

TABLE 5.1
Priority of Bruce County Stormwater System Upgrades
Paisley Stormwater Needs Study

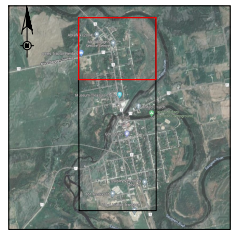
June, 2024 21-007

Priority Ranking*	Description of Upgrade	New Structures (#)	Length of New Sewers (m)							Catchment Area	Location	Reduction in Flooding Volume 1:5-year Storm (m^3)	Existing Structures Experiencing Flooding
			300 mm ø	375 mm ø	450 mm ø	600 mm ø	525 mm ø	750 mm ø	900 mm ø				
1	Reconstruction of James St.(from inkerman to Alma st.) and installation of storm sewer on Inkerman St.(DICB-328 to DICB-330)	10	-	184.7	15.5	138.7	-	-	-	CA-KK	James Street and Inkerman St.	6600	CB-335, CB-336, CB-916, CB-337, CB-331, CB-332, CB-334,CB-330, DICB-329
2	Storm sewer replacement at Albert /Inkerman intersection.	7	40.35	-	-	-	-	-	-	C-V C-JJ	Albert, Inkerman	1687	CB-296, CB-297, CB-298, CB-927
3	Reconstruction of Queen St. (from Murdoch to North St.) **(Bruce County)**	7	39.2	-	36.7	114.18	-	-	-	CA-D	Queen, North Murdoch	927	CB-215, DICB-226, CB-221
4	Storm sewer replacement(CB-428 to outlet at river) **(Bruce County)**	2	-	-	33.65	-	-	-	-	CA-FF	Mill Drive	711	CB-428
5	Storm sewer replacement(CB-237 to DICB-507 and to outlet to river)	8	-	39.25	56.01	34.5	103.7	-	-	CA-P	Victoria North	400	DICB-507, CB-506, CB-271, CB-269, CB-268, CB-238, CB-237, CB-243, CB-235, CB-922
6	Reconstruction of Queen St South(Alma st. to Mill Dr. and outlet) **(Bruce County)**	20	81.7	115.32	306.95	78	-	-	-	CA-U	Queen St South	381	CB-501, CB-463, CB-900, CB-400, CB-367, CB-371, CB-471
7	Reconstruction of Ross St. and Church St.(between Cambridge St. and Church St.)	9	48.87	36.8	220.73	-	-	-	-	CA-R CA-N	Ross, Church	318	CB-264, CB-256, CB-257, CB-258, CB-259
8	Reconstruction of Victoria St. south (CB-494 to outlet to river)	18	146.5	-	194.4	37.47	-	-	-	CA-Y	Victoria South	255	CB-478, CB-481, CB-480, CB-486, CB-487, CB-489
9	Storm sewer replacement(CB-395 to CB-417),(DI-375 to CB-374)	3	39.2	-	67.6	64.4	-	-	-	CA-II	Victoria S/Balaklava	213	CB-375, CB-395, CB-399, CB-396, CB-398
10	Storm Sewer replacement (CB-917 to CB-304)	4	-	-	-	-	-	-	98	CA-II	Balaklava/Albert	206	CB-917, CB-364
11	Storm Sewer replacement (CB-279 to joint near CB-200) **(Bruce County)**	4	-	-	76.79	-	61.55	-	-	CA-E	Queen/Maggie	151	CB-279, CB-280
12	Storm Sewer replacement (CB-314 to joint near CB-313)	2	-	-	12.5	-	-	-	-	CA-PP	George/Arnaud	33	CB-314
13	Storm Sewer replacement (CB-934 to joint near CB-282)	1	121.55	-	-	-	-	-	-	CA-F	Angie Street	30	CB-283
14	Storm Sewer replacement (CB-468 to joint near CB-465) **(Bruce County)**	4	168	-	-	-	-	-	-	CA-T	Goldie	22	CB-433, CB-434
15	Storm Sewer replacement (CB-521 to joint near CB-520)	2	-	-	82.5	-	-	-	-	CA-C		12	CB-522

* Priority ranking based solely on reduction in flooding during 1:5-year storm



KEY PLAN



LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
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- DITCH CONNECTION

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Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

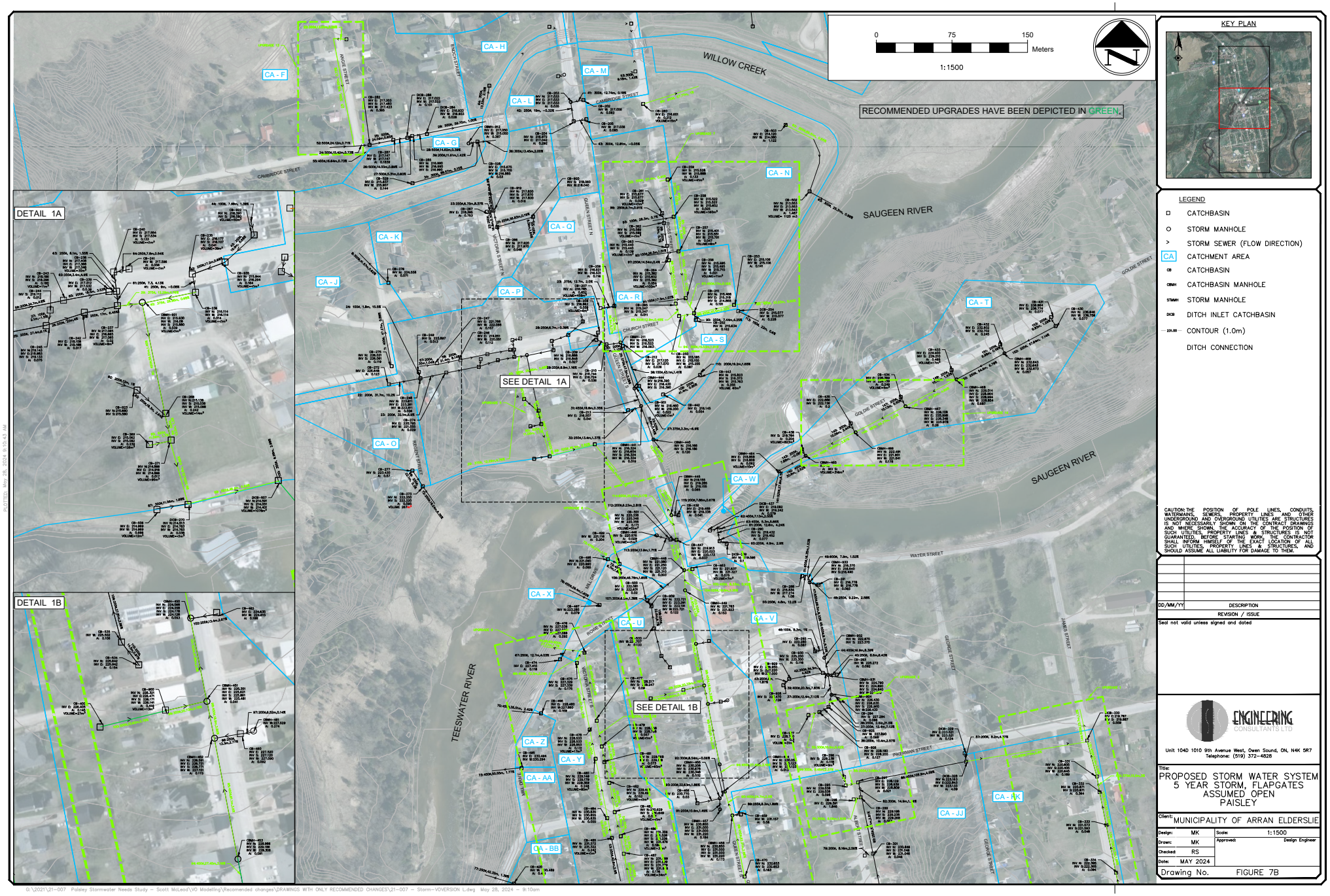
Title:

PROPOSED UPGRADES STORMWATER SYSTEM PAISLEY ONTARIO

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:1500
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 7A



KEY PLAN

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Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:
PROPOSED STORM WATER SYSTEM
5 YEAR STORM, FLAPGATES
ASSUMED OPEN
PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:1500
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
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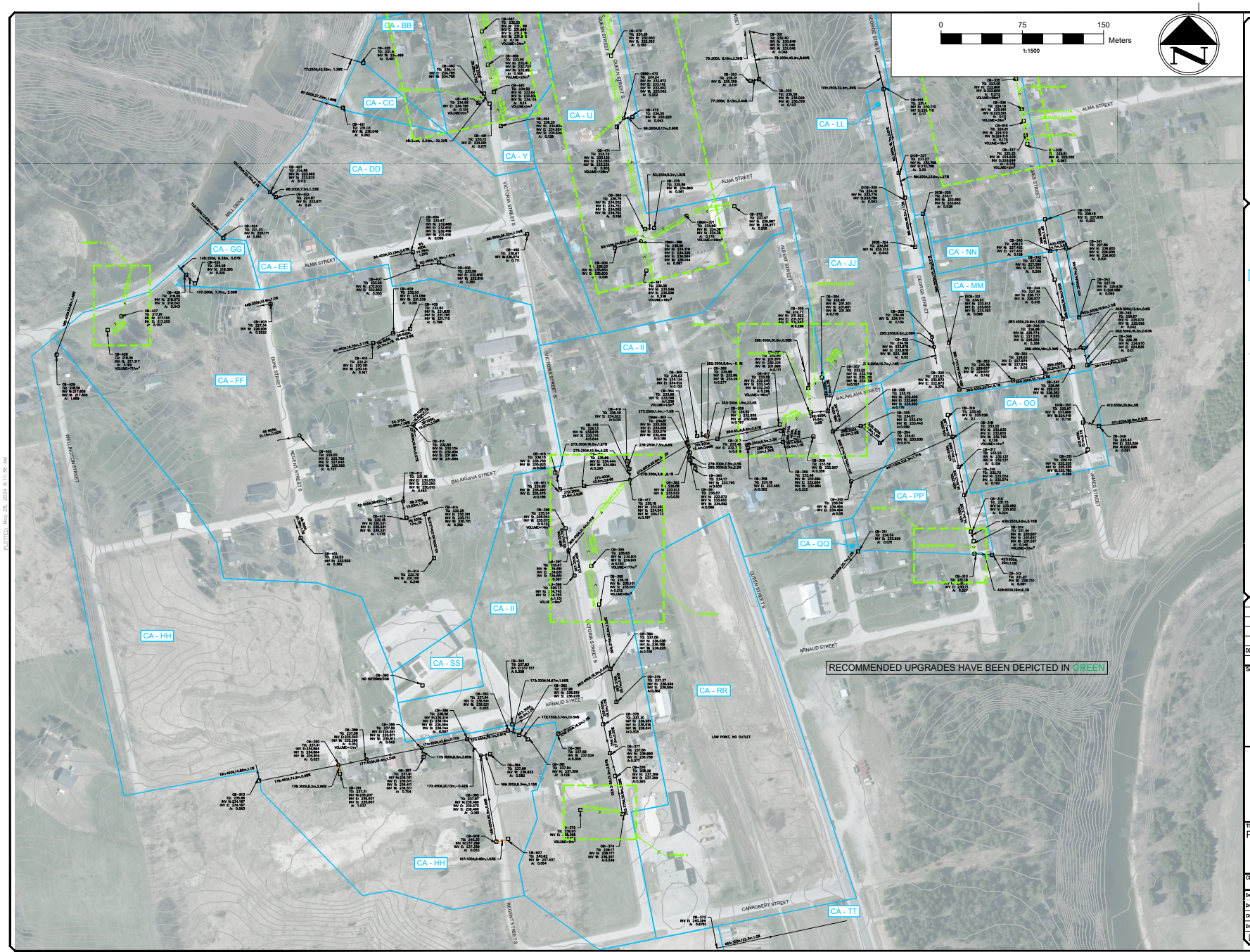
Drawing No. FIGURE 7B



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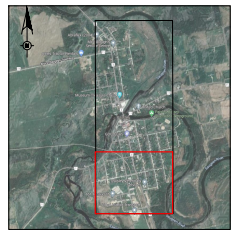

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Title:
PROPOSED STORM WATER SYSTEM
5 YEAR STORM, FLAPGATES
ASSUMED OPEN
PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

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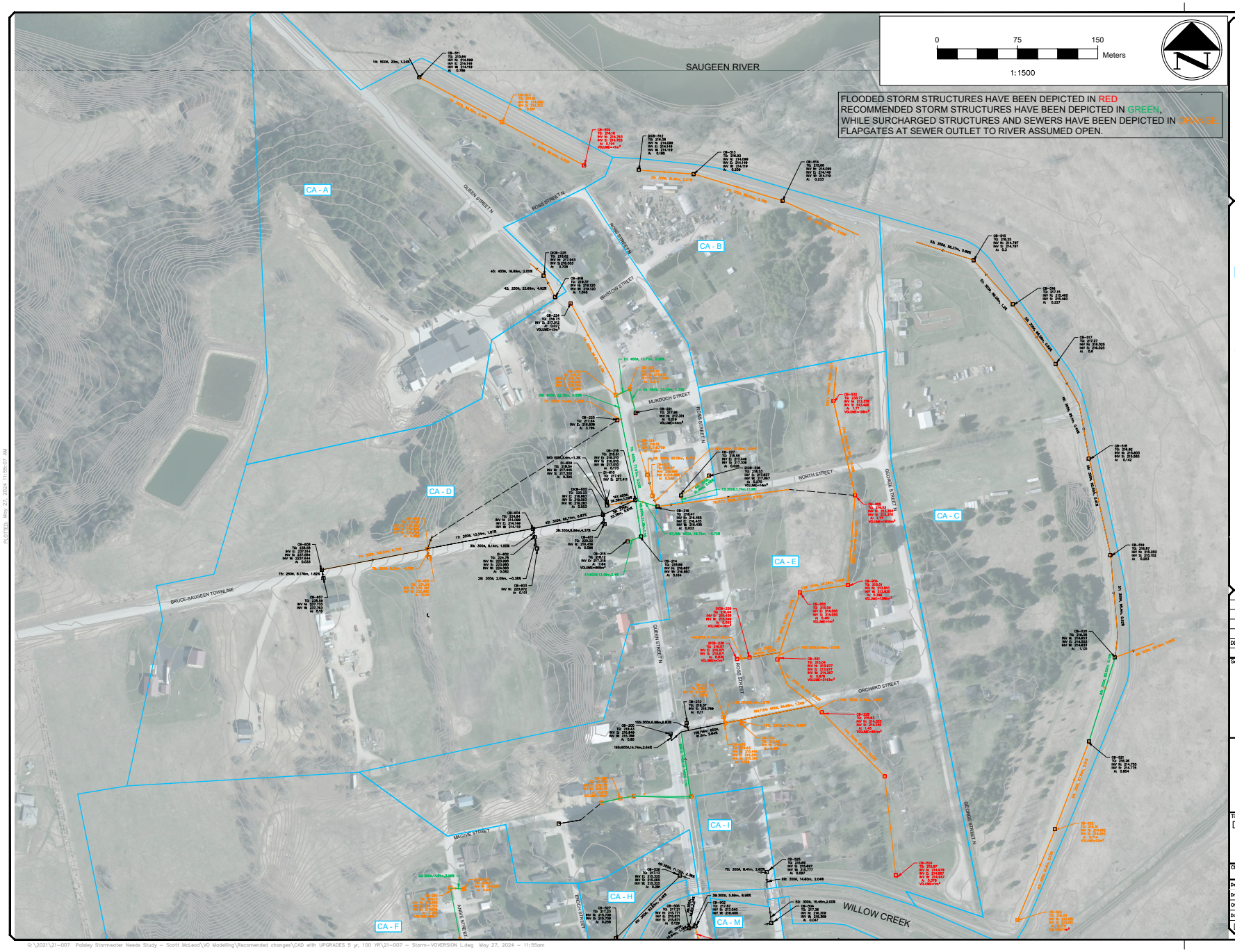
Drawing No. FIGURE 7C



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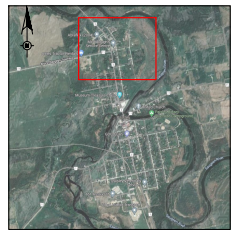

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- 251.00 — CONTOUR (1.0m)
- DITCH CONNECTION

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ENGINEERING CONSULTANTS LTD
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:
DEPICTION OF MODELLING RESULT WITH PROPOSED UPGRADES 5 YEAR STORM PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:1500
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 8A

KEY PLAN

LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 239.00 — CONTOUR (1.0m)
- DITCH CONNECTION

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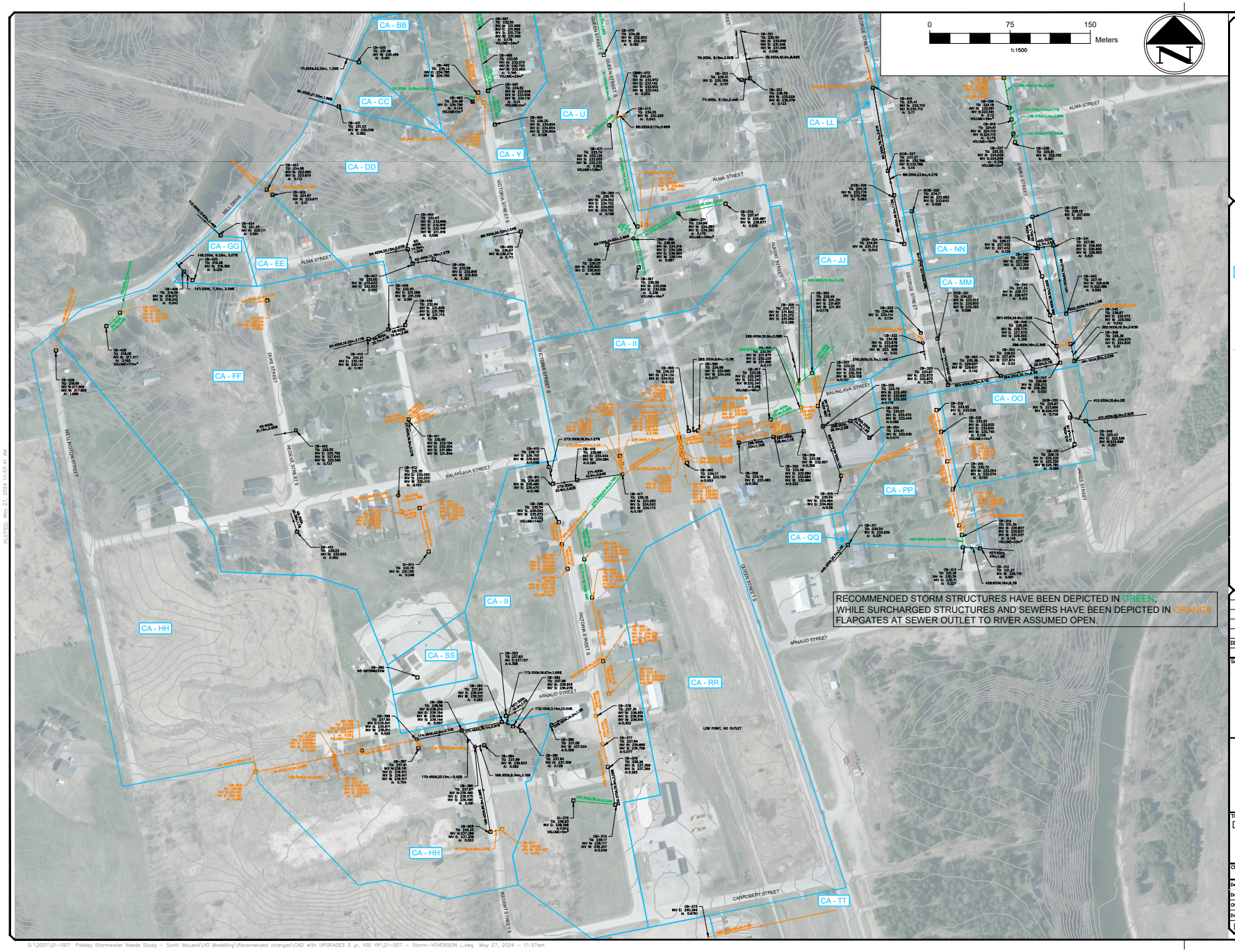
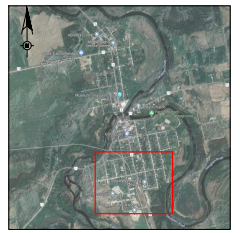
Date:	MAY 2024		

Drawing No. FIGURE 8B



KEY PLAN



LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 231.00 — CONTOUR (1.0m)
- DITCH CONNECTION

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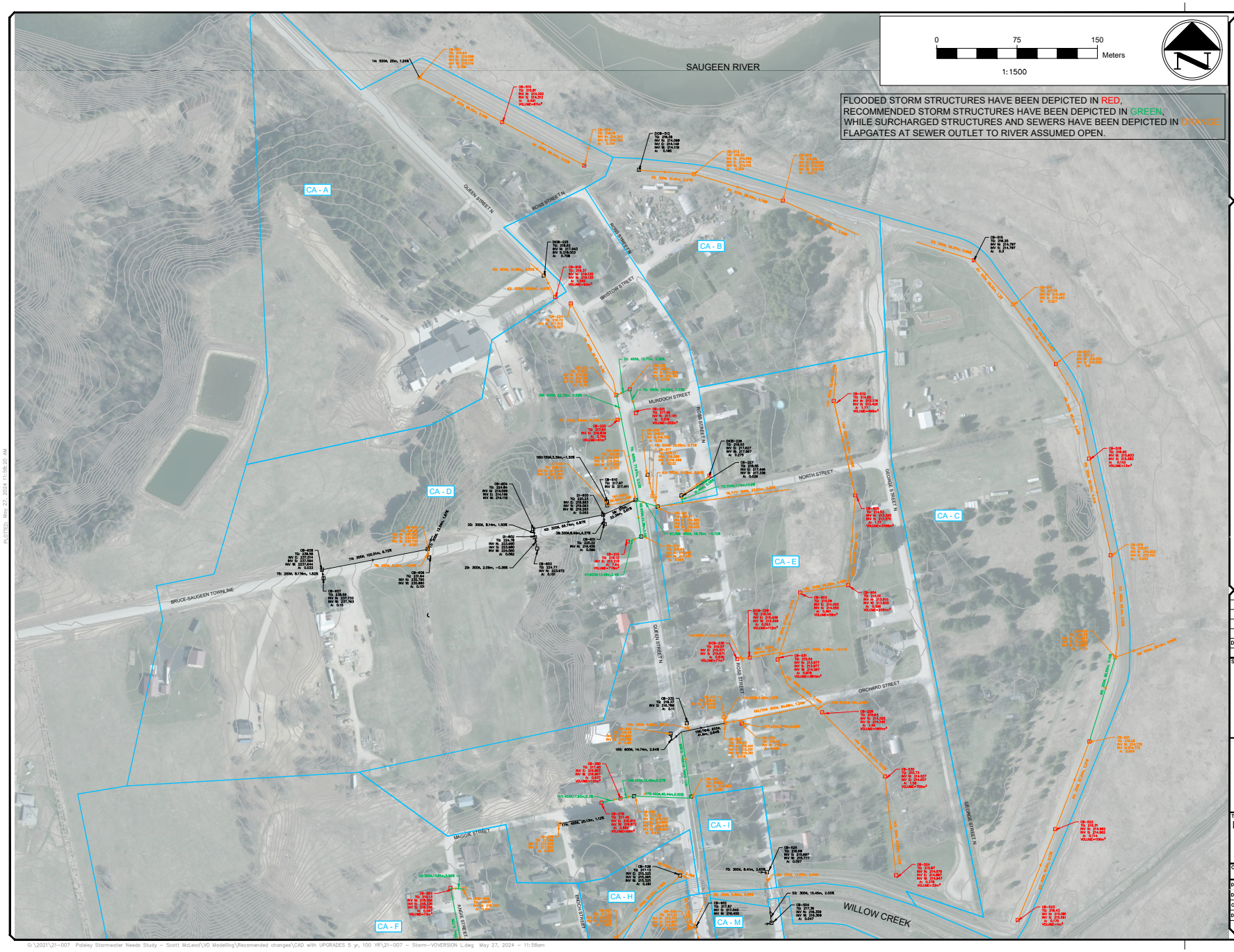
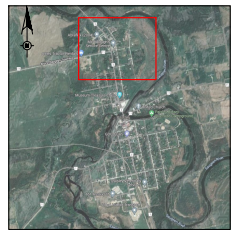
Date:	MAY 2024		

Drawing No. FIGURE 8C



KEY PLAN



LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 231.00 — CONTOUR (1.0m)

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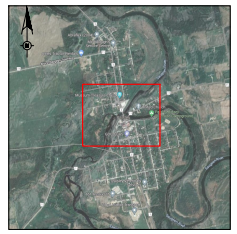
Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:1500
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 9A

FLOODED STORM STRUCTURES HAVE BEEN DEPICTED IN RED,
RECOMMENDED STORM STRUCTURES HAVE BEEN DEPICTED IN GREEN,
WHILE SURCHARGED STRUCTURES AND SEWERS HAVE BEEN DEPICTED IN ORANGE
FLAPGATES AT SEWER OUTLET TO RIVER ASSUMED OPEN.

KEY PLAN



LEGEND

- CB — CATCHBASIN
- STMMH — STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 229.00 — CONTOUR (1.0m)

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Design:	MK	Scale:	1:1500
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Checked:	RS		
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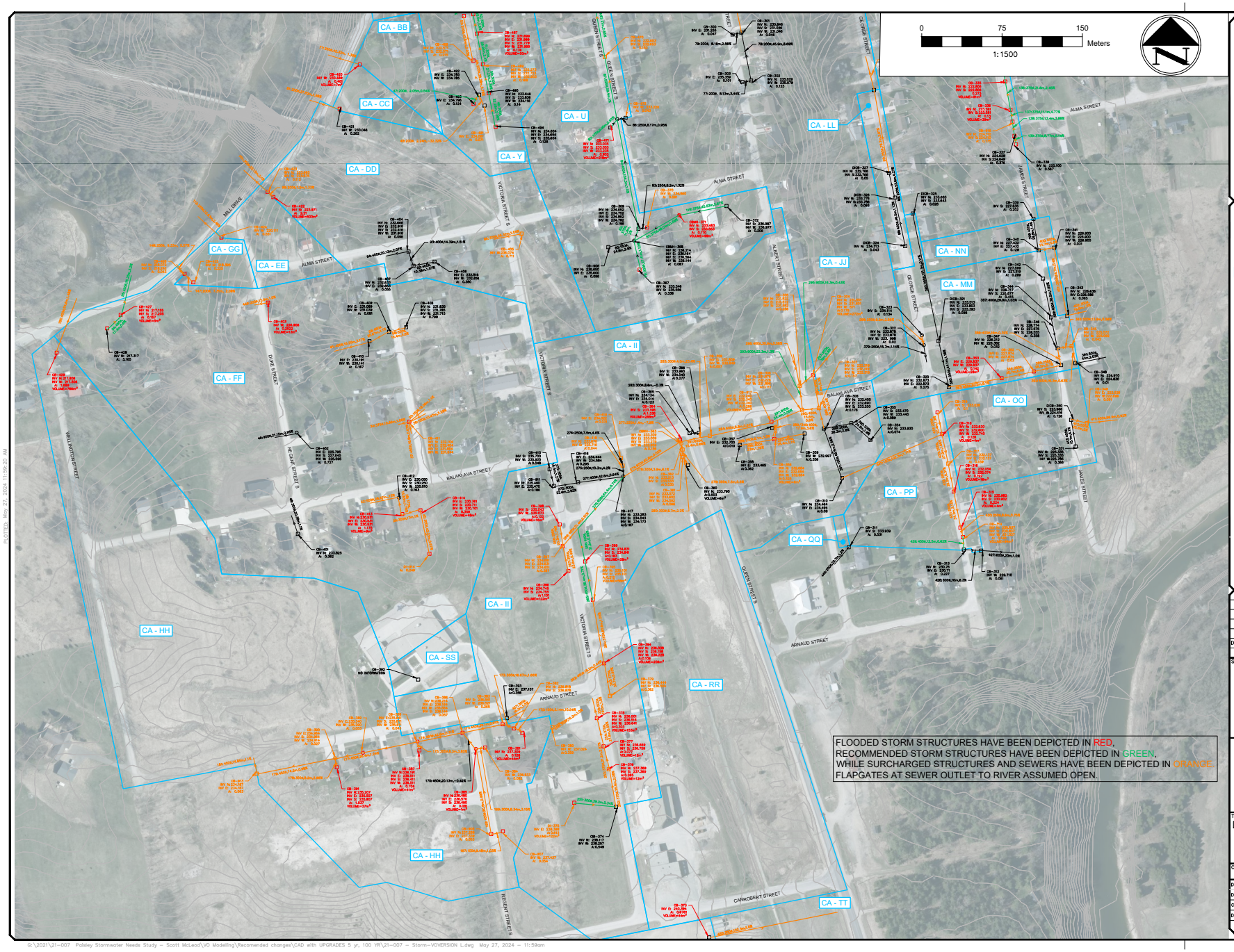
Drawing No. FIGURE 9B



KEY PLAN

LEGEND

- CB — CATCHBASIN
- MH — STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
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Date:	MAY 2024		

Drawing No. FIGRUE 9C

6 STORM INFRASTRUCTURE COST ESTIMATES

An approximate cost estimate of entire stormwater system was prepared by utilizing current replacement value of storm sewers, storm structures, curb & gutter, and culverts. An estimate of ditch construction cost was also included in the total asset cost. At various locations, the ditches have been filled in by residents. However, the cost estimate includes ditches, as the roads without curb & gutters and storm sewers, must have road ditches for proper handling of surface runoff.

Table 6.1 provides a street-wise breakdown of replacement cost of the existing storm infrastructure and excludes the cost of assets within Bruce County ROW. The unit prices included are based on the most recent prices in tendered project. The total asset value is estimated at $13.4 Million approximately including engineering and contingencies. Any future use of indicated prices, should be based price adjustments for construction inflation, which tend to be much higher than posted inflation rate by StatsCan. The County Assets cost is estimated at $3.58 million approximately (Refer to **Table 6.2)**.

Table 6.3 provides a cost estimate of ten (10) infrastructure improvements recommended in **Table 5.1** which are municipal assets. The table is self-explanatory. The total improvement cost based on 2023 dollar value is $1.9 million approximately, including engineering and contingencies, As noted above, the dollar amounts should be adjusted for construction inflation when used in future.

Considering that all ten (10) cannot be implemented simultaneously, the municipality can consider an annual fund contribution of $200,000 per year towards storm infrastructure improvements.

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Along dyke	George Street N. N.	George Street S. S.	300	91.60	$713,971.50	15	$75,000.00	0	$0.00	0	$0.00	$788,971.50
			300	87.94								
			300	82.52								
			300	95.40								
			300	92.55								
			300	95.10								
			300	98.58								
			300	58.05								
			300	56.37								
			500	38.19								
	George Street N. N.	Ross Street N. N.	300	77.64				0	$0.00	0	$0.00	
			300	86.55								
			300	51.41								
	Ross Street N. N.	Queen Street N. .N	300	86.44				0	$0.00	0	$0.00	
			300	88.05								
	George Street (south end)	Queen Street N. N. (outlet 1)	300	93.68				0	$0.00	0	$0.00	
			300	84.27								
			300	9.78								
			300	66.46								
			300	5.96								
			300	67.89								
			300	46.24								
			300	84.59								
			300	91.78								
			300	32.46								
			300	91.78								
			300	32.46								

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Ross St.	South end	Orchard St.	300	9.18	$36,089.40	6	$30,000.00	0	$0.00	342	$61,560.00	$360,785.40
			300	15.45								
			300	14.60								
			300	8.41								
			250	3.76								
	Orchard St.	North St.. E.	200	29.01				0	$0.00	435.6	$78,408.00	
			400	11.41								
	North St.	Murdock St.	150	31.46				0	$0.00	194.8	$35,064.00	
	Murdoch St.	Bristow St.						0	$0.00	210	$37,800.00	
	BriSt.ow St.	Queen St. N.						0	$0.00	454.8	$81,864.00	
George St. N	North End	North Street			$0.00	0	$0.00	0	$0.00	432	$77,760.00	$234,540.00
	North Street	Orchard St.						0	$0.00	422.6	$76,068.00	
	Orchard St.	South end						0	$0.00	448.4	$80,712.00	
Bristow St.	Queen St. N.	Ross St.			$0.00	0	$0.00	0	$0.00	123	$22,140.00	$45,180.00
	Ross St.	East. End						0	$0.00	128	$23,040.00	
Angie St.	South end	Maggie St.	200	108.55	$26,265.50	2	$10,000.00	0	$0.00	157.4	$28,332.00	$64,597.50
			250	13.01								
Murdoch St.	Bristow St.	North St.	300	23.30	$8,737.50	2	$10,000.00	0	$0.00	214	$38,520.00	$57,257.50
North St.	Queen St. N.	George St. N.	150	7.74	$137,798.70	15	$75,000.00	0	$0.00	434	$78,120.00	$460,668.70
			500	20.06								
			500	11.06								
			800	23.6								
	Queen St. N.	West end	150	3.4				1358	$169,750.00	0	$0.00	
			400	26.56								
			375	33.38								
			300	8.99								
			300	66.74								
			300	8.14								
			300	2.09								
			300	13.34								
			300	100.51								
			250	8.21								
			250	8.18								
Enoch St.	Angie St.	Queen St.	400	20.13	$8,555.25	1	$5,000.00	0	$0.00	151.6	$27,288.00	$40,843.25

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Maggie St.	Enoch St.	Queen St.	250	17.93	$17,284.50	3	$15,000.00	0	$0.00	212	$38,160.00	$143,884.50
			250	13.45								
			250	45.44								
	Enoch St.	Angie St.						0	$0.00	232	$41,760.00	
	Angie St.	West end						0	$0.00	176	$31,680.00	
Orchard St.	Queen St.	Ross Street	300	6.98	$73,297.75	3	$15,000.00	0	$0.00	440	$79,200.00	$167,497.75
			600	41.60								
			600	84.68								
			250	5.45								
Easement CA-E			300	32.49	$218,688.75	7	$35,000.00	0	$0.00	0	$0.00	$253,688.75
			300	91.78								
			300	84.59								
			300	46.24								
			300	67.89								
			300	5.96								
			300	66.49								
			300	9.78								
			300	84.27								
			300	93.68								
Easement CA-H			300	11.12	$48,892.50	4	$20,000.00	0	$0.00	0	$0.00	$68,892.50
			300	85.83								
			300	16.60								
			300	10.94								
			300	5.89								
James St.	South End	Inkerman St.	250	22.40	$40,366.75	5	$25,000.00	0	$0.00	230	$41,400.00	$173,726.75
			250	48.30								
			250	33.70								
			100	15.50								
			100	37.31								
			100	23.70								
			250	15.50								
	Water St	Inkerman St.						0	$0.00	372	$66,960.00	

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
George St.	South end	Inkerman St.	400	27.8	$13,578.00	2	$10,000.00	0	$0.00	242	$43,560.00	$132,910.00
			200	8.20								
	Water St.	Inkerman St.						0	$0.00	365.4	$65,772.00	
Albert St.	South end	Inkerman St.	200	8.06	$172,074.80	6	$30,000.00	236	$29,500.00	0	$0.00	$280,399.80
			250	57.10								
			250	8.45								
			250	13.08								
			300	14.90								
			400	108.09								
	Inkerman St.	Water St.	100	10.90				390.6	$48,825.00	0	$0.00	
			100	8.30								
			200	10.41								
			200	2.50								
			200	12.40								
			200	2.50								
			200	12.40								
			200	34.30								
			200	8.00								
			250	8.60								
			250	9.22								
			250	4.80								
			400	7.83								
			400	16.9								
			600	8.70								
			600	68.50								
			600	7.90								
			600	16.35								
			400	20.3								
Water St.	Albert St.	Queen St. S.	200	4.90	$9,045.25	2	$10,000.00	128	$16,000.00	128	$23,040.00	$331,289.25
			200	12.60								
			400	5.3								
			400	7.13								
	Albert St.	George St.						0	$0.00	1517.8	$273,204.00	
	George St.	James St.							$0.00			
	James St.	Dundas St.							$0.00			

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Mill drive	Queen St. S.	Rowe St.	450	6.70	$65,097.00	8	$40,000.00	64	$8,000.00	64	$11,520.00	$237,297.00
			300	27.00								
			450	29.40								
	Rowe St.	Mill Dr. (Bruce Road 1)	450	50.55				0	$0.00	626	$112,680.00	
			450	35.51								
Victoria St. S.	Rowe St.	South end	400	37.47	$136,427.30	16	$80,000.00	242	$30,250.00	0	$0.00	$292,427.30
			250	12.70								
			300	12.50								
			250	68.90								
			200	67.30								
			200	21.00								
			200	15.90								
			250	29.60								
			250	20.90								
			250	60.40								
			200	29.95								
			150	33.62								
			150	20.73								
	Inkerman St.	South end	200	24.36				366	$45,750.00	0	$0.00	
			250	19.80								
			200	18.50								
			200	42.60								
			200	28.96								
			250	16.60								
Rowe St.	Queen St. S.	Victoria St.	200	14.50	$27,146.90	5	$25,000.00	131	$16,375.00	131	$23,580.00	$92,101.90
			200	27.81								
			250	22.60								
			250	46.79								
			300	6.50								

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Church St.	Victoria St. N.	Regent St.	100	2.1	$77,457.50	25	$125,000.00	0	$0.00	236	$42,480.00	$347,957.50
			200	30.00								
			200	21.40								
			200	34.70								
			200	18.50								
			200	3.40								
			250	8.10								
			250	7.80								
			250	7.30								
			250	12.29								
			250	17.00								
			200	20.00								
			200	27.40								
			200	32.10								
			200	31.70								
			100	1.80								
	Victoria St. N.	Queen St. South	250	26.96				0	$0.00	188	$33,840.00	
			250	9.00								
			250	17.20								
			250	19.90								
			100	7.99								
	Regent St.	West End						0	$0.00	226	$40,680.00	
	Queen St. S.	Ross St.						134	$16,750.00	0	$0.00	
	Ross St.	East End						94	$11,750.00	0	$0.00	
Regent St.	Church St.	South End	250	19.20	$44,971.00	3	$15,000.00	0	$0.00	206	$37,080.00	$143,131.00
			250	22.10								
	Cambridge St.	Church St.	300	41.57				0	$0.00	256	$46,080.00	
			400	47.27								
Victoria St. N.	Cambridge St.	Victoria St. N.	250	26.40	$86,002.00	12	$60,000.00	0	$0.00	0	$0.00	$247,872.00
			250	6.75								
			250	36.83								
			100	8.56								
	Church St.	South End	250	18.30				0	$0.00	192	$34,560.00	
			250	56.01								
			300	11.06								
			300	32.80								
			300	13.50								
			300	11.06								
			300	46.40								
			300	6.99								
			200	12.00								
			250	16.80								
	Victoria St. N.	Church St.						262	$32,750.00	0	$0.00	
	Victoria St. N.	Queen St. S.						0	$0.00	192	$34,560.00	

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Unknown Road			300	85.51	$41,557.50	2	$10,000.00	0	$0.00	0	$0.00	$51,557.50
			300	25.31								
Ross St.	North End	Cambridge St.	300	8.41	$124,481.80	11	$55,000.00	0	$0.00	186	$33,480.00	$293,601.80
			300	14.60								
			300	9.18								
			300	15.45								
	Cambridge St.	Church St.	150	57.77				0	$0.00	448	$80,640.00	
			100	27.40								
			200	37.25								
			200	34.75								
			200	47.07								
			200	17.00								
			200	7.44								
			200	15.03								
			200	40.50								
			200	33.23								
			150	22.00								
			250	9.70								
			250	23.00								
			250	14.54								
			250	43.47								
			250	12.90								
			100	28.30								
			100	26.50								
			100	17.30								
Cambridge St.	Enoch St.	Angie St.	500	59.7	$122,522.00	8	$40,000.00	0	$0.00	234	$42,120.00	$352,962.00
			500	14.62								
			500	5.31								
			500	14								
			500	24.09								
			500	15.42								
			500	24.12								
			300	13.45								
			200	11.60								
			300	88.57								
			400	16.64								
	West End	Angie St.						0	$0.00	480	$86,400.00	
	Enoch St.	Queen St. N.						0	$0.00	206	$37,080.00	
	Queen St. N.	East End						0	$0.00	138	$24,840.00	
Angie St.	North End	Cambridge St.	200	108.55	$26,265.50	0	$0.00	0	$0.00	154	$27,720.00	$53,985.50
			250	13.01								
Enoch St.	North End	Cambridge St.	300	83.83	$36,423.75	0	$0.00	0	$0.00	154	$27,720.00	$64,143.75
			300	13.30								

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Nelson St.	Inkerman St.	South End				0	$0.00	0	$0.00	700.6	$126,108.00	$126,108.00
Dundas St.	Inkerman St.	South End				0	$0.00	0	$0.00	705.8	$127,044.00	$127,044.00
Inkerman St.	Mill Dr.	Victoria St. S.				0	$0.00	157.8	$19,725.00	0	$0.00	$212,375.00
	Victoria St. S.	Queen St. S.						239.2	$29,900.00	0	$0.00	
	Queen St. S.	Albert St.						230	$28,750.00	0	$0.00	
	Albert St.	George St.						244	$30,500.00	0	$0.00	
	George St.	James St.						0	$0.00	115	$20,700.00	
	James St.	Nelson St.						0	$0.00	460	$82,800.00	
	Nelson St.	Dundas St.						0	$0.00			
Mill Drive	North end	Duke St.	250	27.52	$16,083.75	3	$15,000.00	316.2	$39,525.00	0	$0.00	$70,608.75
			200	7.20								
			300	22.25								
Arnaud St.	West End	Victoria St. S.	450	74.20	$113,934.25	12	$60,000.00	286	$35,750.00	248	$44,640.00	$323,084.25
			450	14.85								
			300	8.20								
			450	26.40								
			300	8.30								
			450	42.60								
			450	39.10								
			300	16.20								
			300	16.67								
			150	3.14								
			300	16.20								
	Queen St. S.	East End						0	$0.00	382	$68,760.00	
Regent St. S.	Arnaud St.	Canrobert St.	450	20.13	$110,674.45	11	$55,000.00	0	$0.00	0	$0.00	$240,194.45
			300	8.34								
			450	80.80								
			100	9.48								
	Regent St. S.	West End						0	$0.00	0	$0.00	
	Alma St.	Balaklava St.	100	18.56				0	$0.00	414	$74,520.00	
			100	10.47								
			375	10.96								
			450	16.80								
			450	20.70								
			450	16.25								
			500	16.4								
			400	14.39								
			400	10.38								
			400	20.13								

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Victoria St.	Alma St.	North End	200	2.24	$300,766.75	25	$125,000.00	152.3	$19,037.50	152.3	$27,414.00	$705,878.25
			100	2.05								
			200	38.28								
			200	28.96								
			200	27.21								
			200	32.28								
	Balaklava St.	Arnaud St.	400	21.4				0	$0.00	432	$77,760.00	
			400	64.4								
			300	23.60								
			200	20.30								
			200	20.13								
			375	36.40								
			450	18.20								
			375	60.60								
			375	30.70								
			375	31.20								
			600	15.40								
			400	42.6								
			600	62.60								
			250	10.30								
			250	7.50								
			300	8.70								
			300	7.50								
			300	3.90								
			250	1.40								
			300	16.50								
			300	22.60								
	Arnaud St.	Canrobert St.	150	39.20				0	$0.00	454	$81,720.00	
			375	35.90								
			375	21.20								
			375	27.60								
			500	19								
	Alma St.	Balaklava St.	300	26.32				124	$15,500.00	326	$58,680.00	

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Duke St.	Alma St.	Balaklava St.	200	12.90	$26,278.50	3	$15,000.00	0	$0.00	458	$82,440.00	$160,798.50
			900	21.15								
	Balaklava St	South End	300	20.38				0	$0.00	96	$17,280.00	
	Mill Dr.	Alama St.						0	$0.00	110	$19,800.00	
Albert St.	North End	Alma St	200	8.13	$58,181.45	14	$70,000.00	0	$0.00	276	$49,680.00	$326,971.45
			200	45.90								
	Alma St.	Balaklava St						182	$22,750.00	262	$47,160.00	
	Balaklava St.	Arnaud St.	200	20.7				0	$0.00	440	$79,200.00	
			150	49.50								
			200	24.50								
			200	26.30								
			400	19.2								
			400	30.9								
George St.	Balaklava St.	Arnaud St.	200	20.40	$162,573.50	16	$80,000.00	0	$0.00	480	$86,400.00	$453,173.50
			200	27.90								
			250	26.50								
			250	34.30								
			250	8.60								
			250	12.50								
			600	16.00								
			600	20.00								
			150	102.30								
	North End	Balaklava St.	250	32.40				0	$0.00	690	$124,200.00	
			250	78.70								
			200	23.60								
			400	48.5								
			250	121.30								
			250	44.10								
			250	9.20								
			250	15.70								

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
James St.	Alma St.	Balaklava St.	400	16	$177,455.75	18	$90,000.00	0	$0.00	408	$73,440.00	$455,015.75
			500	13.9								
			500	16.3								
			500	41								
			400	29.9								
			400	36.5								
			300	19.60								
			300	64.70								
			500	14.7								
			400	29.8								
	North End	Alma St.	250	8.77				0	$0.00	248	$44,640.00	
			250	13.40								
			250	11.10								
			250	31.60								
	Balaklava St.	South End	400	15.1				0	$0.00	386	$69,480.00	
			500	25.6								
			400	56.9								
Balaklava St.	George St.	James St.	400	50.2	$195,007.35	12	$60,000.00	0	$0.00	250	$45,000.00	$572,517.35
			250	30.70								
			250	26.20								
	Albert St.	George St.						0	$0.00	212	$38,160.00	
	Queens St. S.	Albert St.	600	8.80				0	$0.00	218	$39,240.00	
			300	4.50								
			250	6.10								
			400	17.9								
			600	24.40								
			400	15.6								
			600	22.30								
			600	16.30								
			600	35.00								
			400	31.6								
			400	28.4								
			400	33								
			300	8.60								
	Victoria St. S.	Queen St. S.						262	$32,750.00	0	$0.00	
	Regent St. S.	Victoria St. S.						0	$0.00	284	$51,120.00	
	Duke St.	Regent St. S.	500	28.67				0	$0.00	218	$39,240.00	
			375	15.83								
			300	17.00								
			300	42.23								
	Wellington St.	Regent St. S.						0	$0.00	400	$72,000.00	

Table 6.1
Project Cost Estimate: Existing Conditions - Paisley
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Canrobert St.	Regent St. S.	Victoria St. S.			$45,862.50	1	$5,000.00	0	$0.00	256	$46,080.00	$219,702.50
	Victoria St. S.	Queen St. S.	300	122.30				0	$0.00	352	$63,360.00	
	Queen St. S.	East End						0	$0.00	330	$59,400.00	
Alma St.	Duke St.	Regent St. S.			$0.00	0	$0.00	0	$0.00	236	$42,480.00	$161,685.00
	Regent St. S.	Victoria St. S.						0	$0.00	240	$43,200.00	
	Victoria St. S.	Queen St. S.						117	$14,625.00	117	$21,060.00	
	Queen St. S.	Albert St.						0	$0.00	224	$40,320.00	
Wellingston St.	Mill Dr.	Balaklava St.	400	54.6	$23,205.00	1	$5,000.00	0	$0.00	414	$74,520.00	$179,045.00
	Balaklava St.	South End						0	$0.00	424	$76,320.00	
												$9,937,729.15
											2,526 m Culvert @ $310/m length	$783,060.00
											Asset Construction Cost	**$10,720,789.15**
											Engineering & Contingencies @ 25%	**$2,680,197.29**
											Total Cost Amount (excluding HST)	**$13,400,986.44**

Table 6.2
Project Cost Estimate: Existing Conditions - County Assets
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Queen St.	North End	North Street	250	22.69	$162,381.10	11	$55,000.00	0	$0.00	330	$59,400.00	$472,816.10
			300	13.71								
			400	77.97								
			400	22.72								
			400	96.42								
			400	16.89								
			600	18.75								
	North Street	South End	300	13.49				1083	$135,375.00	337	$60,660.00	
			375	33.38								
			300	61.55								
			600	14.74								
			300	3.84								
Goldie St.	East Side	Queen St. South	200	9.93	$128,210.05	14	$70,000.00	941.5	$117,687.50	0	$0.00	$315,897.55
			200	57.64								
			200	9.98								
			200	10.13								
			200	10.13								
			200	10.06								
			200	7.68								
			250	54.60								
			300	57.29								
			300	55.77								
			375	54.84								
			450	30.60								
			525	27.90								

Table 6.2
Project Cost Estimate: Existing Conditions - County Assets
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Queen St. S.	North end	Church St.	375	12.70	$292,356.80	32	$160,000.00	544.6	$68,075.00	0	$0.00	$674,106.80
			250	36.80								
			300	12.81								
			250	19.00								
			250	28.30								
			300	12.74								
			300	5.89								
			300	10.94								
			300	11.20								
	Church St.	Goldie St.	375	3.30				445.4	$55,675.00	0	$0.00	
			375	47.50								
			150	43.10								
			400	15.26								
			525	35.60								
			450	21.48								
			450	25.21								
			200	6.23								
			200	7.86								
			250	6.70								
			200	8.90								
	Goldie St.	South end	450	19.80				784	$98,000.00	0	$0.00	
			200	8.33								
			400	41.85								
			500	31.3								
			200	13.4								
			400	41.85								
			400	18.9								
			200	13.3								
			200	6.52								
			400	61.1								
			300	27.45								
			200	22.63								
			300	8.54								
			200	10.90								
			300	24.70								
			250	8.30								
			300	62.21								
			200	13.90								
			200	1.15								
			450	8.80								
			250	18.40								

Table 6.2
Project Cost Estimate: Existing Conditions - County Assets
Paisley Storm Sewer System

21-007

Street Name	Street		Storm Sewers			Storm Structures		Curb & Gutter		Ditches		Grand Total Cost ($)
	From	To	Pipe Size ø	Pipe Length (m)	Total Cost ($)	Number of	Total Cost ($)	Length	Cost	Length	Cost	
Mill Drive			250	12.63	$16,347.40	5	$25,000.00	0	$0.00	590.8	$106,344.00	$147,691.40
			200	7.31								
			250	9.33								
			300	16.25								
			200	17.40								
Queen St. South			300	59.40	$103,634.15	13	$65,000.00	732	$91,500.00	1174	$211,320.00	$471,454.15
			200	9.95								
			250	8.17								
			250	104.30								
			250	8.20								
			375	11.80								
			375	48.04								
			375	45.53								
			150	27.41								
			150	24.83								

	$2,081,966.00
2,526 m Culvert @ $310/m length	$ 783,060.00
Asset Construction Cost	**$ 2,865,026.00**
Engineering & Contingencies @ 25%	**$ 716,256.50**
Total Cost Amount	**$ 3,581,282.50**

TABLE 6.3

Priority of Stormwater System Upgrades

Paisley Stormwater Needs Study

June, 2024 21-007

Priority Ranking*	Upgrade as Identified in Table 5.1	Catchment Area	Location	Budget Project Cost (Includes Storm Sewers, Structures, Curb & Gutter Removal and Replacement)
1	Reconstruction of James St.(from inkerman to Alma st.) and installation of storm sewer on Inkerman St.(DICB-328 to DICB-330)	CA-KK	James Street and Inkerman St.	$292,256.50
2	Storm sewer replacement at Albert /Inkerman intersection.	C-V C-JJ	Albert, Inkerman	$35,000.00
3	Storm sewer replacement(CB-237 to DICB-507 and to outlet to river)	CA-P	Victoria North	$148,940.75
4	Reconstruction of Ross St. and Church St.(between Cambridge St. and Church St.)	CA-R CA-N	Ross, Church	$239,504.50
5	Reconstruction of Victoria St. south (CB-494 to outlet to river)	CA-Y	Victoria South	$554,200.00
6	Storm sewer replacement(CB-395 to CB-417),(DI-375 to CB-374)	CA-II	Victoria S/Balaklava	$80,840.00
7	Storm Sewer replacement (CB-917 to CB-304)	CA-II	Balaklava/Albert	$93,500.00
8	Storm Sewer replacement (CB-314 to joint near CB-313)	CA-PP	George/Arnaud	$15,625.00
9	Storm Sewer replacement (CB-934 to joint near CB-282)	CA-F	Angie Street	$5,000.00
10	Storm Sewer replacement (CB-521 to joint near CB-520)	CA-C	River St. (unnamed) east of George St. N.	$47,125.00
			Total Construction Cost	**$1,511,991.75**
			Engineering & Contingencies @ 25%	**$377,997.94**
			Total Project Cost (Excluding HST)	**$1,889,989.69**

* Priority ranking based solely on reduction in flooding during 1:5-year storm. Projects on Bruce County roads are excluded from this spreadsheet.

7 CONCLUSIONS

1) Paisley stormwater system database, which was utilized for the study has data gaps, some of which were eliminated during this study. However, there is a need to continue to reform the database.

2) Storm Sewer system has deficiencies related to reverse slopes of storm sewers, storm structures without outlet and storm infrastructure on private properties that require municipality's attention. Municipality can consider eliminating storm infrastructure from private properties.

3) Investigation Study was completed by undertaking computer modelling. No CCTV inspection of sewers or storm structures was completed as part of the investigation.

4) Storm Sewer System created in the VO-SWMM version 5.2 computer model could not be checked for calibration for reasons as outlined in section3.0 of this report.

5) The modelling results indicate that, in existing conditions, 64 storm structures experience flooding with a total volume of 12,230 m^3 during the 1:5-year storm. And 173 storm structures experience flooding with a total volume of 32,943 m^3 for the 1:100-year storm.

6) Ten (10) upgrades to the stormwater System are proposed totaling $1.9 Million as indicated in **Table 6.3**.

7) The proposed upgrades (including the Bruce County assets), if implemented, are anticipated to eliminate flooding of all storm structures during the 1:5-year storm and decrease flooding from 32,943 m^3 to 9,371 m^3 during the 1:100-year storm. The majority of flooding during 1:100 year storm remains on Inkerman Street.

8) The modelling results identified several areas that are anticipated to experience flooding during severe storms. Such streets do not have proper curb & gutter or ditches to convey flooding water. Those streets are Ross St., Victoria St., Inkerman St., James St., Albert St., Balaklava St., Cambridge St., Arnaud St., North St., Maggie St., and Orchard St. A survey of the finished ground elevations or basement opening can confirm flooding implications on private properties, if any, during major storm events.

8 RECOMMENDATIONS

The following recommendations are presented:

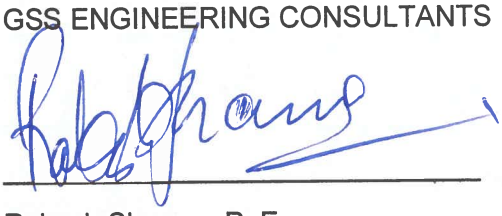
1) The ten (10) system upgrades identified in this report and summarized in **Table 6.3** are recommended to be prioritized to eliminate flooding during the 1:5-year storm. However, they should be combined with future road reconstructions, watermain and sanitary sewer projects. Proper curb & gutter or roadside ditches are recommended to be added to the project(s) ensure flooding during severe storms, is conveyed to a sufficient outlet.

2) Environmental Authorities should be notified to upgrade/maintain the natural channel in protected zone as per the analysis. The natural channel originates near Willow Creek and runs along George St. and outlets near north of North St.

3) Arran-Elderslie is advised to consider an annual fund amount of $200,000 towards storm sewer system upgrades, in order that deficiencies are eliminated by way of sustained effort to bring about improvements.

Prepared by:

GSS ENGINEERING CONSULTANTS LTD.



Rakesh Sharma, P. Eng.
Designated Consulting Engineer

RS/mg

APPENDIX A

Existing Stormwater System Information, Data,
and Record Drawings

LEGEND

STORMWATER STRUCTURES

- CATCH BASIN
- DOUBLE CATCH BASIN
- DITCH INLET CATCH BASIN
- DITCH INLET DOUBLE CATCHBASIN

- CATCH BASIN/STORM MANHOLE
- STORMWATER PIPE (DIRECTION OF FLOW)
- PROPERTY PARCEL
- WATERBODY
- STREAM

NOTE: This map should not be used for performing infrastructure locates. Please refer to “as-built” drawings. Genivar is not responsible for any errors, omissions or inaccuracies in the data. It is the responsibility of the user of this map to verify the accuracy of the data represented.

PAISLEY STORMWATER SYSTEM
MUNICIPALITY OF ARRAN-ELDERSLIE

PREPARED FOR

Municipality of Arran-Elderslie
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SCALE:	1:3,000	DATE:	AUG 2013
DRAWN:	JET	PROJECT:	111-22586-00
APPROVED:	RS	FIGURE:	PAISLEY STORMWATER

APPENDIX B

Catchment Area Information

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CA-A				
CB-509	0.194	153	2.89978	20
CB-510	0.591	79.33	3.0386	30
CB-511	0.786	90.29	2.16705	15
CB-918	1.045	32.63	6.37354	40
CA-B				
DICB-512	0.185	37.25	2.46225	30
CB-513	0.209	36.26	1.8737	50
CB-514	0.233	28.14	2.18573	30
CA-C				
CB-517	0.6	65.22	0.57	0
CB-516	0.227	72.92	1.54	0
DICB-515	0.3	54.44	2.86	0
CB-518	0.142	33.13	0.19	0
CB-519	0.253	29.81	12.01	0
CB-523	0.175	18.24	1.21602	10
CB-522	0.714	78.74	0.86781	10
CB-521	0.854	99.6	1.35051	0
CB-520	1.131	64.96	1.99086	0
CA-D				
DI-603	0.101	10.04	1.99	80
CB-602	0.082	8.17	6.72	80
CB-604	0.052	16.16	13.52	20
CB-601	0.066	9.91	10.52	80
DCB-600	0.052	7.96	6.71	80
DI-609	0.395	42.04	9.17	30
CB-215	7.64	459.63	5.75	20
CB-214	0.164	20.44	0.39	60
CB-221	0.019	9.92	0.97	80
CB-222	0.019	9.99	0.6	80
CB-224	0.027	16.23	5.99	50
CB-223	0.761	80.21	8.27	50
CB-607	0.15	9.75	4.02	80
CB-608	0.033	2.15	3.7	80
CB-606	0.101	10.06	9.79	80
CB-605	0.083	8.26	7.02	80
CB-220	3.288	360.96	7.75	10
CB-218	0.173	42.59	3.69	80

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-219	0.06	10.02	0.42	80
CB-217	0.032	14.75	1.52	80
CB-216	0.023	2.19	0.33	80
DICB-226	0.275	58.14	0.13	90
CB-227	0.026	10.07	0.74	80
CA-E				
CB-279	0.885	122.18	10.96	20
CB-280	0.637	91.68	8.43	30
CB-278	0.343	65.32	0.47	30
DICB-281	0.641	60.03	0.72	50
CB-200	0.85	55.37	0.77	20
CB-201	0.091	11.78	0.76	90
CB-232	0.11	10.91	1.3	90
CB-231	0.016	5.22	5.74	90
CB-233	0.016	5.22	5.67	90
CB-234	0.461	81.87	1.03	90
CB-524	0.378	33.69	1.01	10
CB-530	1.576	172.47	0.33	10
DICB-228	1.452	173.25	0.88	30
CB-531	0.878	136.06	4.92	20
DICB-230	0.835	55.84	2.11	40
DICB-229	0.053	10.07	2.13	90
CB-903	0.461	57.15	4.76	15
CB-904	0.396	65.23	5.72	30
CB-905	1.772	127.09	3.9	30
CB-532	1.765	122.82	2.78	30
CA-F				
DICB-934	0.415	84.5	9.1	0.5
CB-283	0.097	15.05	12.21	0.5
CB-282	0.365	34.55	1.2	0.5
DICB-287	0.1839	76.96	1.12	30
DICB-286	0.101	42.98	1.93	30
DICB-284	0.028	17.36	0.29	20
CA-G				
CB-529	0.144	37.52	1.56	20
CB-528	0.03	16.95	0.81	50
CA-H				
CB-527	0.258	54.43	1.33	0.6

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-526	0.281	66.2	1.32	0.6
CA-I				
CB-285	0.097	81.84	0.37	90
CA-J				
DICB-275	0.119	10.74	8.31	70
CB-276	0.071	17.07	9.19	80
CA-K				
CB-266	0.046	0.09	0.02	90
CB-267	0.753	100.24	7.51	30
CB-919	0.016	9.65	1.27	90
CA-L				
CB-205	0.085	11.84	1.75	90
CB-204	0.292	38.02	2.92	0.5
CB-202	0.062	10.21	1.16	90
CBMH-203	0.035	11.05	2.49	90
MH-902	0.207	62.46	0.28	20
CB-505	0.129	45.55	2.22	20
CA-M				
CB-504	0.047	10.29	2.62	90
CA-N				
CB-260	0.212	68.74	1.69	50
CB-503	1.122	86.25	0.71	15
CB-502	1.487	83.19	0.74	15
CA-O				
CB-277	0.57	66.33	7.93	30
CB-273	0.095	10.03	4	90
CA-P				
CB-272	0.123	11.34	7.37	90
CB-249	0.013	5.88	8.16	90
CB-248	0.026	11.86	11.13	90
CB-274	0.029	9.07	9.38	90
CB-249	0.012	27.03	6.4	90
CB-245	0.075	12.49	7.81	90
CB-242	0.017	8.64	5.41	90
CB-241	0.056	8.84	3.57	90
CB-240	0.133	23.26	4.32	70
CB-243	0.18	53.51	10.62	10
CB-246	0.112	53.06	12.25	20

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-239	0.026	11.96	3.54	90
CBMH-237	0.02	11.45	5.29	90
CB-935	0.164	38.07	3.56	60
CB-235	0.041	11.2	0.79	90
CBMH-236	0.014	8.48	7	90
CBMH-921	0.039	14.33	1.49	100
CB-268	0.242	47.38	3.87	90
CB-269	0.239	86.81	8.14	10
CB-271	0.017	12.54	1.99	90
CB-506	0.666	215.81	8.03	10
DICB-270	0.038	12.85	0.51	90
CA-Q				
CB-207	0.652	57.51	0.93	85
CB-206	0.116	10.17	0.96	100
CB-208	0.058	19.64	0.17	100
CB-209	0.027	9.14	0.17	100
CB-210	0.036	13.04	9.67	100
CB-212	0.036	14.01	12.77	100
CB-901	0.022	10.06	2.56	100
CB-213	0.041	10.01	3.78	100
CB-441	0.019	9.78	5.97	100
CBMH-440	0.12	26.02	2.69	90
CA-R				
CB-259	0.133	25.01	0.41	80
CB-258	0.025	4.33	0.8	90
CB-257	0.047	10.21	0.24	90
CB-256	0.021	10.33	0.84	90
CB-261	0.029	10.12	1.31	90
CB-263	0.139	63.47	4.25	50
CB-264	0.054	12.14	3.26	90
CB-265	0.011	13.41	2.56	90
CB-250	0.087	12.54	3.26	90
CB-252	0.162	22.88	5.96	100
CB-251	0.191	30.76	0.44	40
CB-253	0.141	66.95	0.39	50
CA-S				
CB-442	0.054	13.42	3.98	80
CB-443	0.255	62	6.62	80

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
DCB-254	0.228	37.01	4.39	80
CA-T				
CBMH-431	0.077	14.46	3.32	75
CB-430	0.077	14.65	6.3	75
CBMH-432	0.245	43.53	8.1	60
CBMH-469	0.057	9.99	7.12	75
CBMH-433	0.465	85.92	7.79	50
CBMH-468	0.687	61.61	3.32	50
CBMH-434	0.249	44.24	5.49	50
CBMH-467	0.26	46.2	7.67	40
CBMH-435	0.2	36	9.96	40
CBMH-466	0.178	32.04	8.25	40
CBMH-436	0.204	13.6	8.26	90
CBMH-465	0.138	24.28	7.16	50
CBMH-464	0.062	9.5	0.31	90
CA-U				
CB-367	0.338	69.99	0.56	40
CB-372	0.206	61.22	1.53	30
CB-371	0.17	38.38	4.74	70
CB-906	0.096	23.42	0.73	20
CBMH-368	0.087	36.43	0.44	40
CB-370	0.561	58.48	2.23	40
CBMH-369	0.196	28.54	1.51	50
CB-471	0.955	77.64	2.81	30
CBMH-473	0.043	9.9	1.24	90
CBMH-472	0.202	12.63	2.28	90
CB-470	0.183	60.66	2.25	50
CB-459	0.08	10.12	2.19	90
CBMH-458	0.173	35.84	3.6	60
CBMH-457	0.184	38.8	3.82	50
CBMH-456	0.03	12.16	1.74	90
CBMH-455	0.032	13.11	0.94	90
CBMH-454	0.013	8.22	2.84	100
CBMH-453	0.091	34.97	2.72	80
CB-461	0.274	30.42	3.96	70
CB-460	0.092	10.32	4.43	90
CBMH-452	0.173	28.37	4.73	80
CB-400	0.145	19.84	5.53	30

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-900	0.416	109.97	4.72	30
CBMH-451	0.041	21.38	0.27	90
CB-462	0.188	31.48	4.67	90
CBMH-450	0.093	22.02	4.55	90
CBMH-449	0.153	27.45	3.53	90
CB-534	0.154	24.75	2.18	50
CB-535	0.106	17.21	1.45	60
CB-533	0.133	28.81	1.34	80
CB-909	0.122	21.99	2.49	80
CB-500	0.02	4.55	1.57	90
CB-463	0.75	10.4	3.92	90
CBMH-448	0.003	0.64	2.66	90
CBMH-446	0.029	5.84	1.77	90
CB-501	0.171	30.4	2.14	80
CB-447	0.037	12.08	4.14	90
CB-439	0.041	14.79	3.61	90
CBMH-445	0.065	26.41	4.67	90
CA-V				
CB-927	0.3	61.68	2.35	40
CB-926	0.127	20.92	0.91	75
CB-925	0.068	10.71	1.81	90
CB-294	0.066	61.22	2.86	30
CB-928	0.126	31.96	2.52	40
CB-930	0.116	25.73	1.09	80
CB-293	0.092	42.16	2.54	80
CB-292	0.087	42.25	9.39	50
CB-291	0.093	10.23	9.38	60
CB-288	1.08	104.84	11.66	60
CA-W				
DICB-289	0.1	20.3	3.19	70
CB-290	0.077	11.44	4.4	90
CB-292	0.079	11.73	3.75	90
CA-X				
CB-499	0.204	46.44	5.3	80
CB-498	0.085	8.1	5.33	80
CB-497	0.079	16.4	7.18	30
CA-Y				
CB-494	0.128	29.65	0.84	20

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-490	0.41	46.3	2.37	30
CB-489	0.168	63.93	3.32	40
CB-487	0.176	61.69	3.6	30
CB-486	0.189	64.57	2.49	40
CB-483	0.077	12.91	1.21	90
CB-482	0.152	51.3	2.06	50
CB-481	0.073	37.32	3	50
CB-479	0.057	35.63	2.12	30
CB-477	0.09	34.05	1.88	30
CB-476	0.292	40.98	2.39	40
CB-491	0.071	10.05	1.18	80
CB-493	0.124	17.56	1.18	10
CB-488	0.215	58.33	4.42	20
CB-485	0.242	45.21	4.23	20
CB-484	0.055	13.67	3.24	80
CB-480	0.248	45.14	3.67	40
CB-478	0.131	46.11	3.82	40
CB-475	0.175	25.34	3.63	60
CB-474	0.118	19.75	1.84	60
CA-Z				
CB-496	0.169	29.37	3.49	60
CA-AA				
CB-495	0.305	45.93	2.92	50
CA-BB				
CB-420	0.461	59.1	2.92	25
CA-CC				
CB-421	0.262	59.18	5.97	20
CA-DD				
CB-405	0.711	62.63	0.29	20
CB-406	0.38	43.47	2.99	30
CB-407	0.055	19.18	1.29	50
CB-404	0.096	10.01	3.09	90
CB-422	2.21	102.07	4.91	10
CB-423	0.112	11.58	3.86	90
CA-EE				
CB-424	0.551	89.22	10.85	20
CA-FF				
DI-914	0.249	46.33	6.89	0

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-414	0.359	46.4	6.28	10
CB-413	1.175	119.07	4.7	30
CBMH-412	0.163	57.97	1.84	20
CBMH-402	0.727	95.82	1.96	30
CB-401	0.362	46.26	1.94	25
CB-428	3.165	56.83	5.94	10
CB-427	0.157	12.13	1.74	90
CB-408	0.799	103.71	3.33	20
CB-409	0.081	10.51	2.23	40
CB-410	0.167	29.35	2.67	30
CA-GG				
CB-425	0.225	45.69	11.66	20
CB-426	0.043	8.73	4.28	90
CA-HH				
CB-907	0.054	10.3	3.05	50
CB-908	0.053	10.05	3.58	50
CB-384	0.082	10.15	3.25	90
CBMH-385	0.081	10.03	2.88	90
CB-381	0.128	44.91	3.51	40
CB-383	0.265	109.82	2.44	30
CB-386	0.057	24.95	3.18	80
CB-387	0.704	48.14	2.46	50
CB-388	0.043	10.2	0.4	90
CBMH-389	0.053	10.29	0.58	90
CB-391	1.037	64.31	2.83	30
CBMH-390	0.027	10.48	0.7	90
CB-913	0.563	40.51	2.22	10
CB-429	1.689	82.07	7.09	10
CA-II				
CB-375	0.612	32.49	2.38	0
CB-374	0.549	29.19	1.87	20
CB-376	0.265	35.31	2.48	40
CB-377	0.077	38.16	3.52	20
CB-378	0.303	43.29	3.48	30
CB-393	0.358	6.96	0.87	70
CB-379	0.362	36.94	3.15	40
CB-394	0.106	35.06	1.81	30
CB-395	0.212	36.51	3.16	75

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-399	0.183	54.22	0.27	80
CB-398	0.122	79.95	1.6	75
CB-396	1.101	123.32	1.28	15
CB-397	0.387	95.46	1.16	25
CB-415	0.048	11.52	1.73	90
DICB-911	0.186	61.24	1.54	25
CB-416	0.295	35.09	0.23	60
CB-419	0.031	5.4	3708.82	100
CB-418	0.044	10.07	1.26	10
CBMH-417	0.197	29.9	0.83	80
CB-360	0.503	41.92	1.37	10
CB-361	0.066	11.65	0.76	10
CB-362	0.035	6.03	0.65	100
DICB-364	1.336	113.34	2.17	20
CBMH-363	0.186	61.24	1.54	25
CB-365	0.123	10.91	1.82	90
CB-366	0.277	24.27	1.96	40
CB-359	0.057	14.47	2.54	75
CB-917	0.286	61.9	3.37	25
DICB-309	0.356	32.66	2.6	30
CB-358	0.362	79.4	2.48	40
DICB-356	0.325	101.53	3.06	40
CB-357	0.019	6.12	1.74	90
DICB-306	0.111	27.07	2.1	50
CB-305	0.286	97.05	4.43	40
CB-310	0.08	24.15	0.66	75
CB-354	0.074	8.78	0.97	90
CB-355	0.089	13.71	1.57	90
CB-308	0.176	31.59	2.06	80
CB-307	0.157	29.16	2.9	60
CB-304	0.178	11.47	3.25	90
CA-JJ				
CB-303	0.101	10.28	3.05	90
CB-302	0.123	10.1	1.45	90
CB-300	0.047	10.28	8.06	90
CB-301	0.046	10.1	8.08	90
CB-298	1.846	40.31	2.19	30
CB-299	0.057	10.06	3.49	90

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

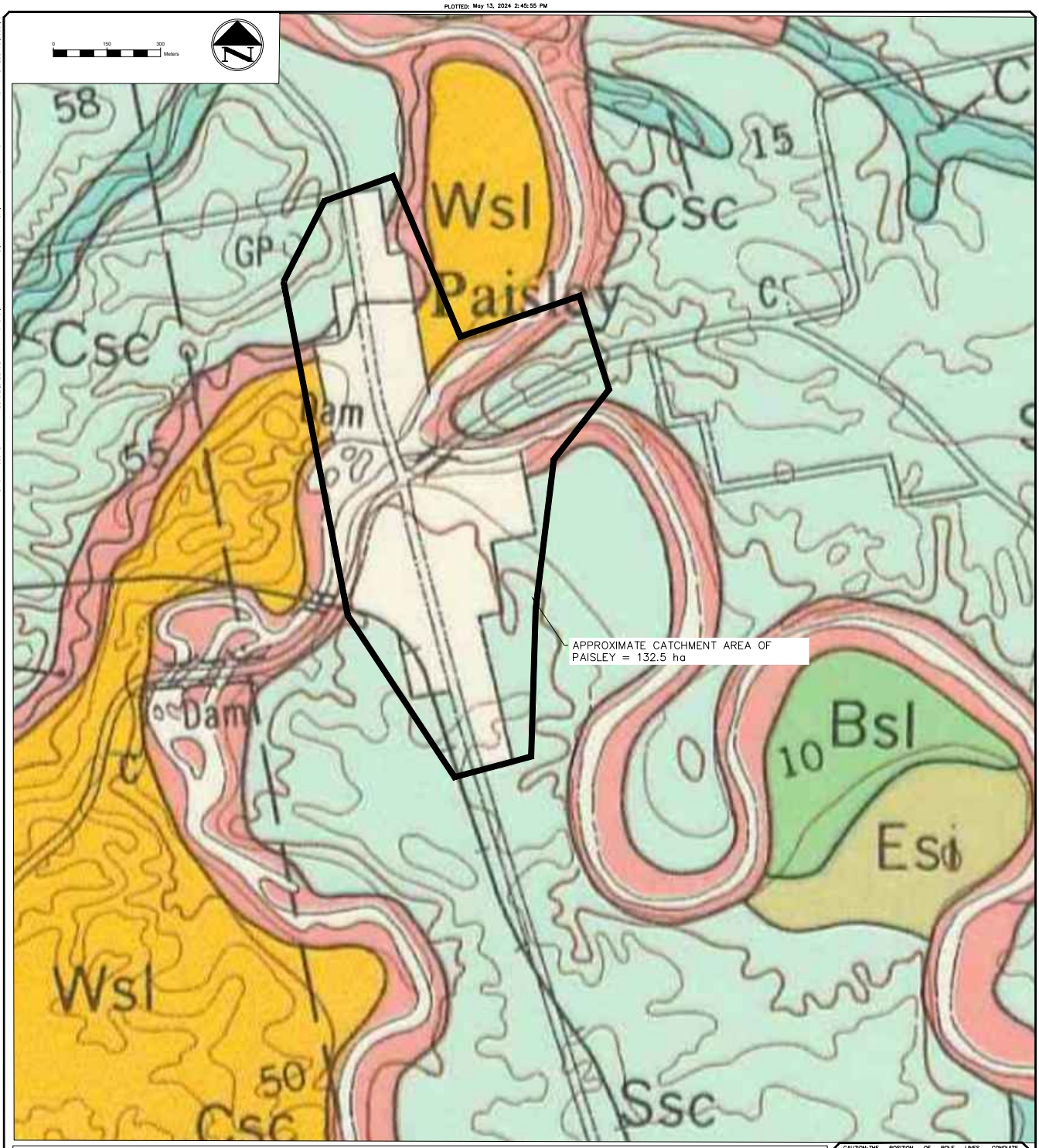
Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-296	0.118	10.92	1.64	90
CB-295	0.598	51.33	2.89	50
CB-297	0.021	14.87	2.55	90
CB-329	0.124	10.11	5.05	90
DICB-328	4.09	49.27	2.44	20
CA-KK				
CB-338	0.567	82.64	6.36	30
CB-337	0.376	34.02	6.14	30
CB-916	0.175	15.61	5.67	10
CB-336	0.13	11.59	6.25	20
CB-335	0.273	91	7.62	30
CB-334	0.094	43.18	5.66	50
CB-333	0.048	10.17	1.45	90
CB-332	0.364	111.35	5.28	30
CB-331	0.189	124.51	3.22	30
DICB-330	0.559	44.02	3.02	15
CA-LL				
DICB-324	0.043	22.79	0.85	80
CB-326	0.093	21.17	1.55	80
DICB-327	0.05	22.43	3.99	80
CB-915	0.17	21.96	2.4	80
CA-MM				
DICB-325	0.028	10.22	2.12	50
DICB-331	0.098	10.38	0.68	50
MH-323	0.134	21.17	0.82	50
MH-322	0.02	17.41	3.66	80
DICB-320	0.275	40.76	1.93	60
CB-353	0.142	28.97	5.49	60
CB-352	0.03	9.79	5.77	90
CB-347	0.032	10.76	5.85	90
CB-342	0.299	105.43	5.9	25
CB-344	0.415	115.92	6.58	25
CB-346	0.358	38.91	6.76	20
CB-345	0.042	14.2	1.76	80
CB-348	0.01	10.19	2.65	100
CA-NN				
CB-339	0.202	114.58	5.21	25
CB-340	0.129	104.79	5.59	30

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-341	0.031	10.01	0.94	20
CB-343	0.065	5.6	1.06	50
CA-OO				
CB-351	0.366	127.22	5.6	25
CB-350	0.726	60.71	5.95	40
CB-349	0.091	18.35	2.04	10
CA-PP				
DICB-319	0.1	18.14	2.03	20
CB-318	0.128	62.62	1.66	15
CB-317	0.159	59.55	2.17	25
CB-316	0.192	73.12	2.18	25
CB-315	0.224	65.75	2.1	25
CB-314	0.145	102.39	2	10
CB-313	0.227	98.2	2.24	15
DICB-312	0.061	10.38	0.24	50
CA-QQ				
CB-311	0.031	10.43	0.24	50
CA-TT				
CB-373	0.67	149	0.67	40

APPENDIX C

Figure 4 – Soil Map



SOIL LEGEND

COLOUR	SYMBOL	SOIL SERIES AND TYPE		GREAT GROUP	SOIL MATERIALS	DRAINAGE	TOPOGRAPHY AND SURFACE STONINESS	PROFILE DESCRIPTION
	Pal Pal-s Pas Pas-s	Parkhill	loam loam, stony phase silt loam silt loam, stony phase	Dark Grey Gleisolic	Medium textured till	Poor	Smooth, very gently sloping. Few to moderate stones	6 to 8 inches very dark brown to black loam or silt loam over poorly defined horizons. Mottling increases with depth. Pale yellow-brown to grey parent material calcareous, moderately stony.
	Pc Ps	Perth	clay loam silt loam	Grey-Brown Podzolic	Heavy textured limestone and shale till	Imperfect	Smooth, gently sloping. Few stones	6 inches very dark grey clay loam or silt loam surface soil; lower A_2 and B horizons mottled; gritty clay parent material; pale brown in colour.
	Pls	Plainfield	sand	Dry Sands	Well sorted sandy outwash	Excessive	Smooth, gently sloping. Stonefree	3 inches brown sand over well defined B horizon; A_2 horizon is usually missing; profile consists of loose sand throughout.
	Sc Ssc Ss	Saugeen	clay loam silty clay loam silt loam	Brown Forest (Grey-Brown Podzolic Intergrade)	Lacustrine	Good	Smooth, moderately sloping. Stonefree	4 inches grey silty clay loam, clay loam or silt loam over stonefree horizons; A_2 horizon is shallow; B horizon is shallow and well defined; parent material is stonefree clay material.

REFERENCE: Published by Agriculture Canada (1983)
Soil survey by the Department of Soils,
Ontario Agricultural College, Guelph, and
the Experimental Farm Service, Dominion
Department of Agriculture Ottawa
Soils of Bruce County South Sheet, Ontario,
Soil Survey Report No. 16

DD/MM/YY	
	TENDER ISSUE
	DESCRIPTION
	REVISION / ISSUE

Seal not valid unless signed and dated

ENGINEERING CONSULTANTS LTD
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title: DRAINAGE AREA AND SOIL CHARACTERISTICS PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:5000
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 4

APPENDIX D

Figure 10 – Information Missing in Storm Sewer System

PLOTTED: June 12, 2024 10:47:23 AM

G:\2021\21-007 Paisley Stormwater Needs Study - Scott McLeod\VO Modelling\Recomended changes\CAD file existing CATCHMENT AREA FIGURE 3\21-007 - Storm-VOVERSION.dwg Jun 12, 2024 - 10:47am

0 100 200 Meters

1: 3000

STORM STRUCTURES WITH MISSING INFORMATION HAVE BEEN DEPICTED IN RED,

SAUGEEN RIVER
QUEEN STREET N
ROSS STREET N
BRISTON STREET
MURDOCH STREET
NORTH STREET
GEORGE STREET N
BRUCE-SAUGEEN TOWNLINE
ORCHARD STREET
MAGGIE STREET
WILLOW CREEK
CAMBRIDGE STREET
CHURCH STREET
VICTORIA STREET N
GOLDIE STREET
WATER STREET
TEESWATER RIVER
IRONE STREET
INKERMAN STREET
JAMES STREET
ALMA STREET
BALAKLAVA STREET
ARNAUD STREET
CANROBERT STREET
QUEEN STREET S
VICTORIA STREET S
REGENT STREET S
DUNN STREET
HILL DRIVE
LOW POINT, NO OUTLET

KEY PLAN

LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 231.00 — CONTOUR (1.0m)
- DITCH CONNECTION

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
	TENDER ISSUE

REVISION / ISSUE

Seal not valid unless signed and dated

GSS ENGINEERING CONSULTANTS LTD

Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title:

MISSING INFORMATION EXISTING SYSTEM PAISLEY ONTARIO

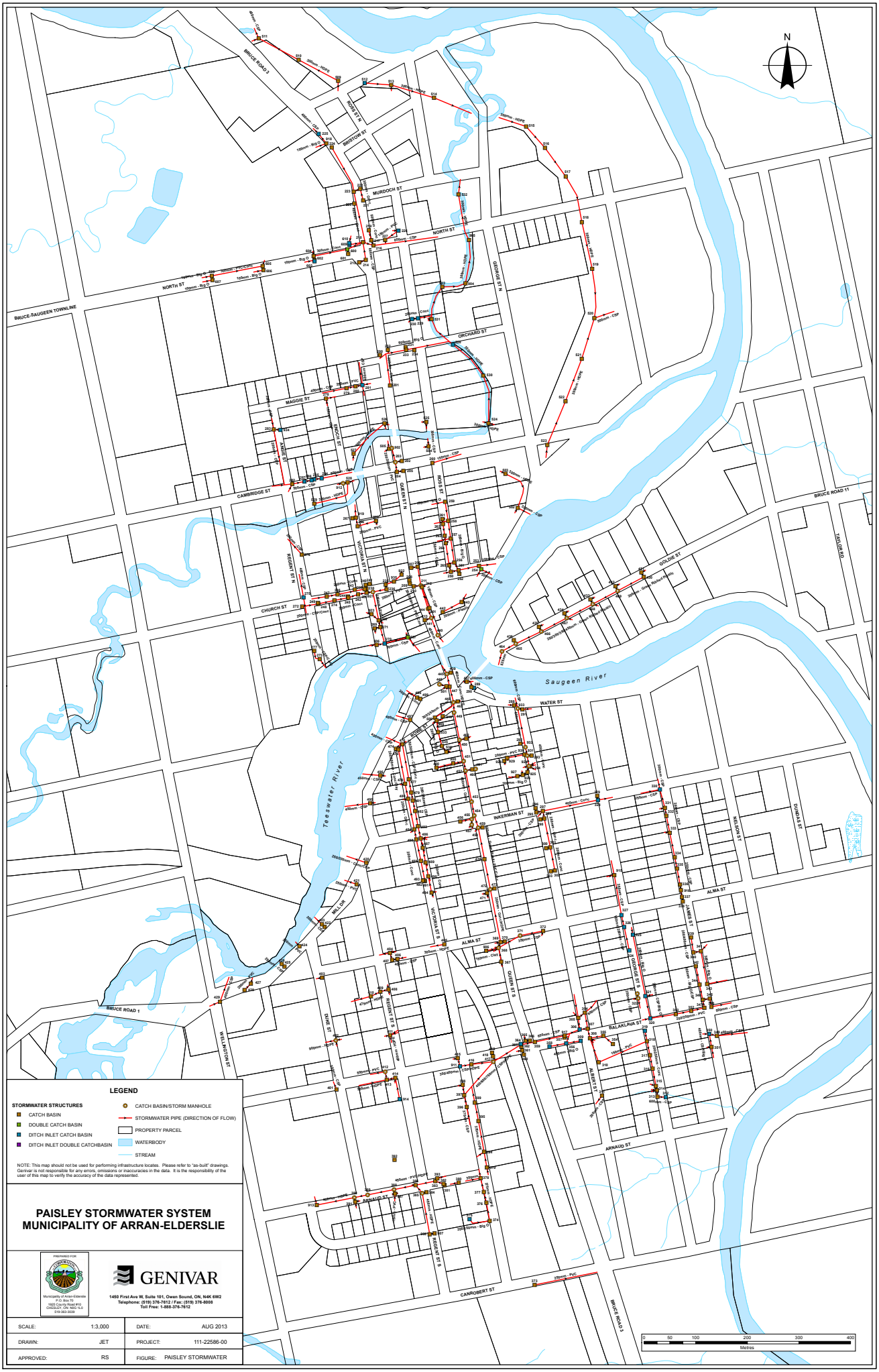
Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1: 3000
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	JUNE 2024		

Drawing No. FIGURE 10

APPENDIX A

Existing Stormwater System Information, Data,
and Record Drawings



LEGEND

STORMWATER STRUCTURES

- CATCH BASIN
- DOUBLE CATCH BASIN
- DITCH INLET CATCH BASIN
- DITCH INLET DOUBLE CATCHBASIN
- CATCH BASIN/STORM MANHOLE
- STORMWATER PIPE (DIRECTION OF FLOW)
- PROPERTY PARCEL
- WATERBODY
- STREAM

NOTE: This map should not be used for performing infrastructure locates. Please refer to "as-built" drawings. Genivar is not responsible for any errors, omissions or inaccuracies in the data. It is the responsibility of the user of this map to verify the accuracy of the data represented.

PAISLEY STORMWATER SYSTEM
MUNICIPALITY OF ARRAN-ELDERSLIE

PREPARED FOR
Municipality of Arran-Elderslie
Box 70, 1925 Concession Rd #10
CHESLEY, ON, N0G 1L0
519-363-3039

GENIVAR
1450 First Ave W, Suite 101, Owen Sound, ON, N4K 6W2
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Toll Free: 1-888-376-7612

SCALE:	1:3,000	DATE:	AUG 2013
DRAWN:	JET	PROJECT:	111-22586-00
APPROVED:	RS	FIGURE:	PAISLEY STORMWATER

APPENDIX B

Catchment Area Information

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CA-A				
CB-509	0.194	153	2.89978	20
CB-510	0.591	79.33	3.0386	30
CB-511	0.786	90.29	2.16705	15
CB-918	1.045	32.63	6.37354	40
CA-B				
DICB-512	0.185	37.25	2.46225	30
CB-513	0.209	36.26	1.8737	50
CB-514	0.233	28.14	2.18573	30
CA-C				
CB-517	0.6	65.22	0.57	0
CB-516	0.227	72.92	1.54	0
DICB-515	0.3	54.44	2.86	0
CB-518	0.142	33.13	0.19	0
CB-519	0.253	29.81	12.01	0
CB-523	0.175	18.24	1.21602	10
CB-522	0.714	78.74	0.86781	10
CB-521	0.854	99.6	1.35051	0
CB-520	1.131	64.96	1.99086	0
CA-D				
DI-603	0.101	10.04	1.99	80
CB-602	0.082	8.17	6.72	80
CB-604	0.052	16.16	13.52	20
CB-601	0.066	9.91	10.52	80
DCB-600	0.052	7.96	6.71	80
DI-609	0.395	42.04	9.17	30
CB-215	7.64	459.63	5.75	20
CB-214	0.164	20.44	0.39	60
CB-221	0.019	9.92	0.97	80
CB-222	0.019	9.99	0.6	80
CB-224	0.027	16.23	5.99	50
CB-223	0.761	80.21	8.27	50
CB-607	0.15	9.75	4.02	80
CB-608	0.033	2.15	3.7	80
CB-606	0.101	10.06	9.79	80
CB-605	0.083	8.26	7.02	80
CB-220	3.288	360.96	7.75	10
CB-218	0.173	42.59	3.69	80

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-219	0.06	10.02	0.42	80
CB-217	0.032	14.75	1.52	80
CB-216	0.023	2.19	0.33	80
DICB-226	0.275	58.14	0.13	90
CB-227	0.026	10.07	0.74	80
CA-E				
CB-279	0.885	122.18	10.96	20
CB-280	0.637	91.68	8.43	30
CB-278	0.343	65.32	0.47	30
DICB-281	0.641	60.03	0.72	50
CB-200	0.85	55.37	0.77	20
CB-201	0.091	11.78	0.76	90
CB-232	0.11	10.91	1.3	90
CB-231	0.016	5.22	5.74	90
CB-233	0.016	5.22	5.67	90
CB-234	0.461	81.87	1.03	90
CB-524	0.378	33.69	1.01	10
CB-530	1.576	172.47	0.33	10
DICB-228	1.452	173.25	0.88	30
CB-531	0.878	136.06	4.92	20
DICB-230	0.835	55.84	2.11	40
DICB-229	0.053	10.07	2.13	90
CB-903	0.461	57.15	4.76	15
CB-904	0.396	65.23	5.72	30
CB-905	1.772	127.09	3.9	30
CB-532	1.765	122.82	2.78	30
CA-F				
DICB-934	0.415	84.5	9.1	0.5
CB-283	0.097	15.05	12.21	0.5
CB-282	0.365	34.55	1.2	0.5
DICB-287	0.1839	76.96	1.12	30
DICB-286	0.101	42.98	1.93	30
DICB-284	0.028	17.36	0.29	20
CA-G				
CB-529	0.144	37.52	1.56	20
CB-528	0.03	16.95	0.81	50
CA-H				
CB-527	0.258	54.43	1.33	0.6

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-526	0.281	66.2	1.32	0.6
CA-I				
CB-285	0.097	81.84	0.37	90
CA-J				
DICB-275	0.119	10.74	8.31	70
CB-276	0.071	17.07	9.19	80
CA-K				
CB-266	0.046	0.09	0.02	90
CB-267	0.753	100.24	7.51	30
CB-919	0.016	9.65	1.27	90
CA-L				
CB-205	0.085	11.84	1.75	90
CB-204	0.292	38.02	2.92	0.5
CB-202	0.062	10.21	1.16	90
CBMH-203	0.035	11.05	2.49	90
MH-902	0.207	62.46	0.28	20
CB-505	0.129	45.55	2.22	20
CA-M				
CB-504	0.047	10.29	2.62	90
CA-N				
CB-260	0.212	68.74	1.69	50
CB-503	1.122	86.25	0.71	15
CB-502	1.487	83.19	0.74	15
CA-O				
CB-277	0.57	66.33	7.93	30
CB-273	0.095	10.03	4	90
CA-P				
CB-272	0.123	11.34	7.37	90
CB-249	0.013	5.88	8.16	90
CB-248	0.026	11.86	11.13	90
CB-274	0.029	9.07	9.38	90
CB-249	0.012	27.03	6.4	90
CB-245	0.075	12.49	7.81	90
CB-242	0.017	8.64	5.41	90
CB-241	0.056	8.84	3.57	90
CB-240	0.133	23.26	4.32	70
CB-243	0.18	53.51	10.62	10
CB-246	0.112	53.06	12.25	20

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-239	0.026	11.96	3.54	90
CBMH-237	0.02	11.45	5.29	90
CB-935	0.164	38.07	3.56	60
CB-235	0.041	11.2	0.79	90
CBMH-236	0.014	8.48	7	90
CBMH-921	0.039	14.33	1.49	100
CB-268	0.242	47.38	3.87	90
CB-269	0.239	86.81	8.14	10
CB-271	0.017	12.54	1.99	90
CB-506	0.666	215.81	8.03	10
DICB-270	0.038	12.85	0.51	90
CA-Q				
CB-207	0.652	57.51	0.93	85
CB-206	0.116	10.17	0.96	100
CB-208	0.058	19.64	0.17	100
CB-209	0.027	9.14	0.17	100
CB-210	0.036	13.04	9.67	100
CB-212	0.036	14.01	12.77	100
CB-901	0.022	10.06	2.56	100
CB-213	0.041	10.01	3.78	100
CB-441	0.019	9.78	5.97	100
CBMH-440	0.12	26.02	2.69	90
CA-R				
CB-259	0.133	25.01	0.41	80
CB-258	0.025	4.33	0.8	90
CB-257	0.047	10.21	0.24	90
CB-256	0.021	10.33	0.84	90
CB-261	0.029	10.12	1.31	90
CB-263	0.139	63.47	4.25	50
CB-264	0.054	12.14	3.26	90
CB-265	0.011	13.41	2.56	90
CB-250	0.087	12.54	3.26	90
CB-252	0.162	22.88	5.96	100
CB-251	0.191	30.76	0.44	40
CB-253	0.141	66.95	0.39	50
CA-S				
CB-442	0.054	13.42	3.98	80
CB-443	0.255	62	6.62	80

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
DCB-254	0.228	37.01	4.39	80
CA-T				
CBMH-431	0.077	14.46	3.32	75
CB-430	0.077	14.65	6.3	75
CBMH-432	0.245	43.53	8.1	60
CBMH-469	0.057	9.99	7.12	75
CBMH-433	0.465	85.92	7.79	50
CBMH-468	0.687	61.61	3.32	50
CBMH-434	0.249	44.24	5.49	50
CBMH-467	0.26	46.2	7.67	40
CBMH-435	0.2	36	9.96	40
CBMH-466	0.178	32.04	8.25	40
CBMH-436	0.204	13.6	8.26	90
CBMH-465	0.138	24.28	7.16	50
CBMH-464	0.062	9.5	0.31	90
CA-U				
CB-367	0.338	69.99	0.56	40
CB-372	0.206	61.22	1.53	30
CB-371	0.17	38.38	4.74	70
CB-906	0.096	23.42	0.73	20
CBMH-368	0.087	36.43	0.44	40
CB-370	0.561	58.48	2.23	40
CBMH-369	0.196	28.54	1.51	50
CB-471	0.955	77.64	2.81	30
CBMH-473	0.043	9.9	1.24	90
CBMH-472	0.202	12.63	2.28	90
CB-470	0.183	60.66	2.25	50
CB-459	0.08	10.12	2.19	90
CBMH-458	0.173	35.84	3.6	60
CBMH-457	0.184	38.8	3.82	50
CBMH-456	0.03	12.16	1.74	90
CBMH-455	0.032	13.11	0.94	90
CBMH-454	0.013	8.22	2.84	100
CBMH-453	0.091	34.97	2.72	80
CB-461	0.274	30.42	3.96	70
CB-460	0.092	10.32	4.43	90
CBMH-452	0.173	28.37	4.73	80
CB-400	0.145	19.84	5.53	30

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-900	0.416	109.97	4.72	30
CBMH-451	0.041	21.38	0.27	90
CB-462	0.188	31.48	4.67	90
CBMH-450	0.093	22.02	4.55	90
CBMH-449	0.153	27.45	3.53	90
CB-534	0.154	24.75	2.18	50
CB-535	0.106	17.21	1.45	60
CB-533	0.133	28.81	1.34	80
CB-909	0.122	21.99	2.49	80
CB-500	0.02	4.55	1.57	90
CB-463	0.75	10.4	3.92	90
CBMH-448	0.003	0.64	2.66	90
CBMH-446	0.029	5.84	1.77	90
CB-501	0.171	30.4	2.14	80
CB-447	0.037	12.08	4.14	90
CB-439	0.041	14.79	3.61	90
CBMH-445	0.065	26.41	4.67	90
CA-V				
CB-927	0.3	61.68	2.35	40
CB-926	0.127	20.92	0.91	75
CB-925	0.068	10.71	1.81	90
CB-294	0.066	61.22	2.86	30
CB-928	0.126	31.96	2.52	40
CB-930	0.116	25.73	1.09	80
CB-293	0.092	42.16	2.54	80
CB-292	0.087	42.25	9.39	50
CB-291	0.093	10.23	9.38	60
CB-288	1.08	104.84	11.66	60
CA-W				
DICB-289	0.1	20.3	3.19	70
CB-290	0.077	11.44	4.4	90
CB-292	0.079	11.73	3.75	90
CA-X				
CB-499	0.204	46.44	5.3	80
CB-498	0.085	8.1	5.33	80
CB-497	0.079	16.4	7.18	30
CA-Y				
CB-494	0.128	29.65	0.84	20

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-490	0.41	46.3	2.37	30
CB-489	0.168	63.93	3.32	40
CB-487	0.176	61.69	3.6	30
CB-486	0.189	64.57	2.49	40
CB-483	0.077	12.91	1.21	90
CB-482	0.152	51.3	2.06	50
CB-481	0.073	37.32	3	50
CB-479	0.057	35.63	2.12	30
CB-477	0.09	34.05	1.88	30
CB-476	0.292	40.98	2.39	40
CB-491	0.071	10.05	1.18	80
CB-493	0.124	17.56	1.18	10
CB-488	0.215	58.33	4.42	20
CB-485	0.242	45.21	4.23	20
CB-484	0.055	13.67	3.24	80
CB-480	0.248	45.14	3.67	40
CB-478	0.131	46.11	3.82	40
CB-475	0.175	25.34	3.63	60
CB-474	0.118	19.75	1.84	60
CA-Z				
CB-496	0.169	29.37	3.49	60
CA-AA				
CB-495	0.305	45.93	2.92	50
CA-BB				
CB-420	0.461	59.1	2.92	25
CA-CC				
CB-421	0.262	59.18	5.97	20
CA-DD				
CB-405	0.711	62.63	0.29	20
CB-406	0.38	43.47	2.99	30
CB-407	0.055	19.18	1.29	50
CB-404	0.096	10.01	3.09	90
CB-422	2.21	102.07	4.91	10
CB-423	0.112	11.58	3.86	90
CA-EE				
CB-424	0.551	89.22	10.85	20
CA-FF				
DI-914	0.249	46.33	6.89	0

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-414	0.359	46.4	6.28	10
CB-413	1.175	119.07	4.7	30
CBMH-412	0.163	57.97	1.84	20
CBMH-402	0.727	95.82	1.96	30
CB-401	0.362	46.26	1.94	25
CB-428	3.165	56.83	5.94	10
CB-427	0.157	12.13	1.74	90
CB-408	0.799	103.71	3.33	20
CB-409	0.081	10.51	2.23	40
CB-410	0.167	29.35	2.67	30
CA-GG				
CB-425	0.225	45.69	11.66	20
CB-426	0.043	8.73	4.28	90
CA-HH				
CB-907	0.054	10.3	3.05	50
CB-908	0.053	10.05	3.58	50
CB-384	0.082	10.15	3.25	90
CBMH-385	0.081	10.03	2.88	90
CB-381	0.128	44.91	3.51	40
CB-383	0.265	109.82	2.44	30
CB-386	0.057	24.95	3.18	80
CB-387	0.704	48.14	2.46	50
CB-388	0.043	10.2	0.4	90
CBMH-389	0.053	10.29	0.58	90
CB-391	1.037	64.31	2.83	30
CBMH-390	0.027	10.48	0.7	90
CB-913	0.563	40.51	2.22	10
CB-429	1.689	82.07	7.09	10
CA-II				
CB-375	0.612	32.49	2.38	0
CB-374	0.549	29.19	1.87	20
CB-376	0.265	35.31	2.48	40
CB-377	0.077	38.16	3.52	20
CB-378	0.303	43.29	3.48	30
CB-393	0.358	6.96	0.87	70
CB-379	0.362	36.94	3.15	40
CB-394	0.106	35.06	1.81	30
CB-395	0.212	36.51	3.16	75

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-399	0.183	54.22	0.27	80
CB-398	0.122	79.95	1.6	75
CB-396	1.101	123.32	1.28	15
CB-397	0.387	95.46	1.16	25
CB-415	0.048	11.52	1.73	90
DICB-911	0.186	61.24	1.54	25
CB-416	0.295	35.09	0.23	60
CB-419	0.031	5.4	3708.82	100
CB-418	0.044	10.07	1.26	10
CBMH-417	0.197	29.9	0.83	80
CB-360	0.503	41.92	1.37	10
CB-361	0.066	11.65	0.76	10
CB-362	0.035	6.03	0.65	100
DICB-364	1.336	113.34	2.17	20
CBMH-363	0.186	61.24	1.54	25
CB-365	0.123	10.91	1.82	90
CB-366	0.277	24.27	1.96	40
CB-359	0.057	14.47	2.54	75
CB-917	0.286	61.9	3.37	25
DICB-309	0.356	32.66	2.6	30
CB-358	0.362	79.4	2.48	40
DICB-356	0.325	101.53	3.06	40
CB-357	0.019	6.12	1.74	90
DICB-306	0.111	27.07	2.1	50
CB-305	0.286	97.05	4.43	40
CB-310	0.08	24.15	0.66	75
CB-354	0.074	8.78	0.97	90
CB-355	0.089	13.71	1.57	90
CB-308	0.176	31.59	2.06	80
CB-307	0.157	29.16	2.9	60
CB-304	0.178	11.47	3.25	90
CA-JJ				
CB-303	0.101	10.28	3.05	90
CB-302	0.123	10.1	1.45	90
CB-300	0.047	10.28	8.06	90
CB-301	0.046	10.1	8.08	90
CB-298	1.846	40.31	2.19	30
CB-299	0.057	10.06	3.49	90

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

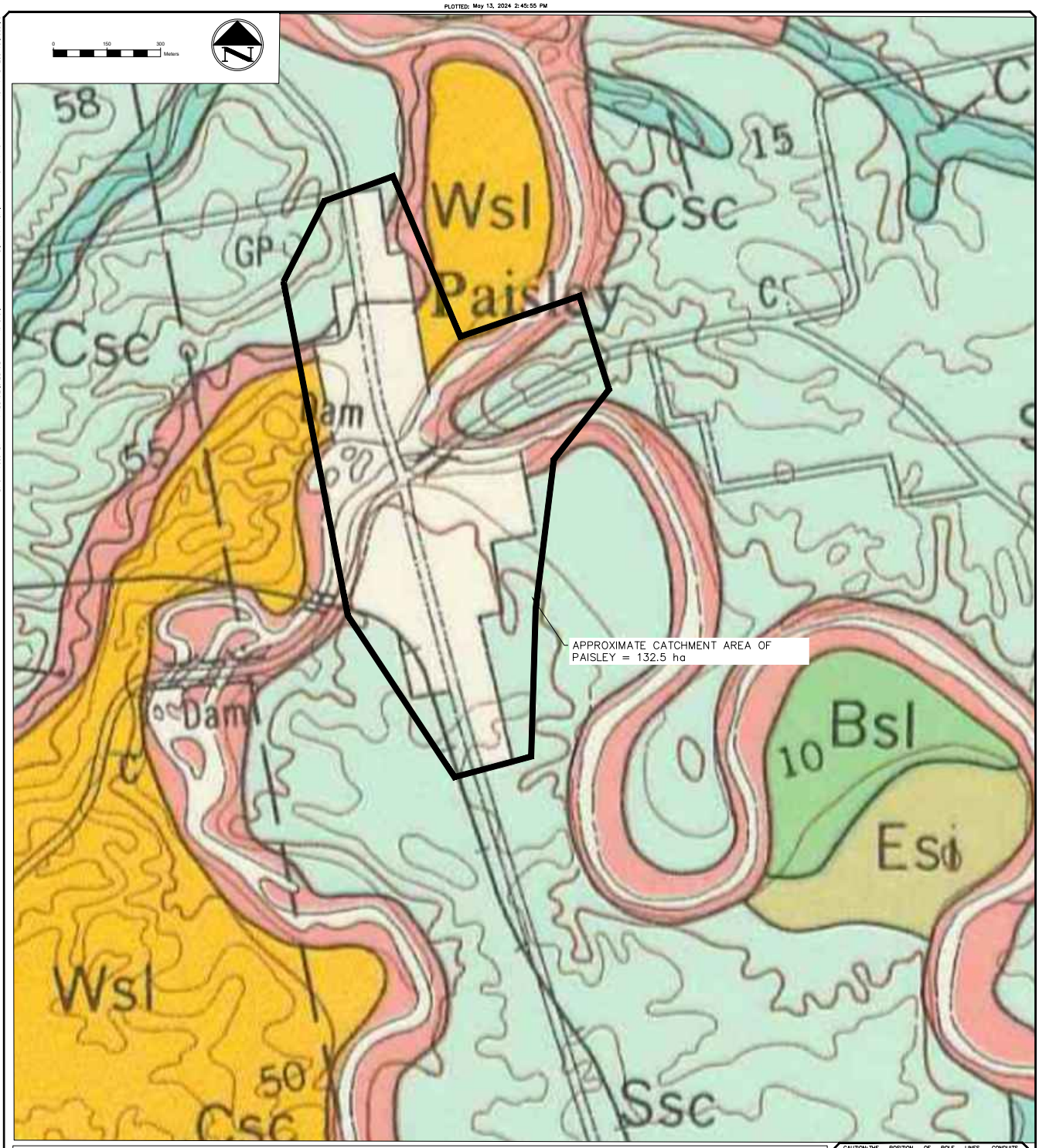
Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-296	0.118	10.92	1.64	90
CB-295	0.598	51.33	2.89	50
CB-297	0.021	14.87	2.55	90
CB-329	0.124	10.11	5.05	90
DICB-328	4.09	49.27	2.44	20
CA-KK				
CB-338	0.567	82.64	6.36	30
CB-337	0.376	34.02	6.14	30
CB-916	0.175	15.61	5.67	10
CB-336	0.13	11.59	6.25	20
CB-335	0.273	91	7.62	30
CB-334	0.094	43.18	5.66	50
CB-333	0.048	10.17	1.45	90
CB-332	0.364	111.35	5.28	30
CB-331	0.189	124.51	3.22	30
DICB-330	0.559	44.02	3.02	15
CA-LL				
DICB-324	0.043	22.79	0.85	80
CB-326	0.093	21.17	1.55	80
DICB-327	0.05	22.43	3.99	80
CB-915	0.17	21.96	2.4	80
CA-MM				
DICB-325	0.028	10.22	2.12	50
DICB-331	0.098	10.38	0.68	50
MH-323	0.134	21.17	0.82	50
MH-322	0.02	17.41	3.66	80
DICB-320	0.275	40.76	1.93	60
CB-353	0.142	28.97	5.49	60
CB-352	0.03	9.79	5.77	90
CB-347	0.032	10.76	5.85	90
CB-342	0.299	105.43	5.9	25
CB-344	0.415	115.92	6.58	25
CB-346	0.358	38.91	6.76	20
CB-345	0.042	14.2	1.76	80
CB-348	0.01	10.19	2.65	100
CA-NN				
CB-339	0.202	114.58	5.21	25
CB-340	0.129	104.79	5.59	30

TABLE B1
Catchment Area Information
June, 2024 **Paisley Stormwater Needs Study** 21-007

Catchbasin ID	Catchment Area (ha)	Overland Flow Length (m)	Catchment Slope (%)	% Impervious Area
CB-341	0.031	10.01	0.94	20
CB-343	0.065	5.6	1.06	50
CA-OO				
CB-351	0.366	127.22	5.6	25
CB-350	0.726	60.71	5.95	40
CB-349	0.091	18.35	2.04	10
CA-PP				
DICB-319	0.1	18.14	2.03	20
CB-318	0.128	62.62	1.66	15
CB-317	0.159	59.55	2.17	25
CB-316	0.192	73.12	2.18	25
CB-315	0.224	65.75	2.1	25
CB-314	0.145	102.39	2	10
CB-313	0.227	98.2	2.24	15
DICB-312	0.061	10.38	0.24	50
CA-QQ				
CB-311	0.031	10.43	0.24	50
CA-TT				
CB-373	0.67	149	0.67	40

APPENDIX C

Figure 4 – Soil Map



SOIL LEGEND

COLOUR	SYMBOL	SOIL SERIES AND TYPE		GREAT GROUP	SOIL MATERIALS	DRAINAGE	TOPOGRAPHY AND SURFACE STONINESS	PROFILE DESCRIPTION
	Pal Pal-s Pas Pas-s	Parkhill	loam loam, stony phase silt loam silt loam, stony phase	Dark Grey Gleisolic	Medium textured till	Poor	Smooth, very gently sloping. Few to moderate stones	6 to 8 inches very dark brown to black loam or silt loam over poorly defined horizons. Mottling increases with depth. Pale yellow-brown to grey parent material calcareous, moderately stony.
	Pc Ps	Perth	clay loam silt loam	Grey-Brown Podzolic	Heavy textured limestone and shale till	Imperfect	Smooth, gently sloping. Few stones	6 inches very dark grey clay loam or silt loam surface soil; lower A_2 and B horizons mottled; gritty clay parent material; pale brown in colour.
	Pls	Plainfield	sand	Dry Sands	Well sorted sandy outwash	Excessive	Smooth, gently sloping. Stonefree	3 inches brown sand over well defined B horizon; A_2 horizon is usually missing; profile consists of loose sand throughout.
	Sc Ssc Ss	Saugeen	clay loam silty clay loam silt loam	Brown Forest (Grey-Brown Podzolic Intergrade)	Lacustrine	Good	Smooth, moderately sloping. Stonefree	4 inches grey silty clay loam, clay loam or silt loam over stonefree horizons; A_2 horizon is shallow; B horizon is shallow and well defined; parent material is stonefree clay material.

REFERENCE: Published by Agriculture Canada (1983)
Soil survey by the Department of Soils,
Ontario Agricultural College, Guelph, and
the Experimental Farm Service, Dominion
Department of Agriculture Ottawa
Soils of Bruce County South Sheet, Ontario,
Soil Survey Report No. 16

DD/MM/YY	
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	DESCRIPTION
	REVISION / ISSUE

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ENGINEERING CONSULTANTS LTD
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title: DRAINAGE AREA AND SOIL CHARACTERISTICS PAISLEY

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1:5000
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	MAY 2024		

Drawing No. FIGURE 4

APPENDIX D

Figure 10 – Information Missing in Storm Sewer System

PLOTTED: June 12, 2024 10:47:23 AM

G:\2021\21-007 Paisley Stormwater Needs Study - Scott McLeod\VO Modelling\Recomended changes\CAD file existing CATCHMENT AREA FIGURE 3\21-007 - Storm-VOVERSION.dwg Jun 12, 2024 - 10:47am

0 100 200 Meters

1: 3000

STORM STRUCTURES WITH MISSING INFORMATION HAVE BEEN DEPICTED IN RED,

SAUGEEN RIVER
QUEEN STREET N
ROSS STREET N
BRISTON STREET
MURDOCH STREET
NORTH STREET
GEORGE STREET N
BRUCE-SAUGEEN TOWNLINE
ORCHARD STREET
MAGGIE STREET
WILLOW CREEK
CAMBRIDGE STREET
CHURCH STREET
VICTORIA STREET N
GOLDIE STREET
WATER STREET
TEESWATER RIVER
IRONE STREET
INKERMAN STREET
JAMES STREET
ALMA STREET
BALAKLAVA STREET
ARNAUD STREET
CANROBERT STREET
QUEEN STREET S
VICTORIA STREET S
REGENT STREET S
DUNN STREET
HILL DRIVE
LOW POINT, NO OUTLET

KEY PLAN

LEGEND

- CATCHBASIN
- STORM MANHOLE
- STORM SEWER (FLOW DIRECTION)
- CA — CATCHMENT AREA
- CB — CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- STMMH — STORM MANHOLE
- DICB — DITCH INLET CATCHBASIN
- 231.00 — CONTOUR (1.0m)
- DITCH CONNECTION

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

DD/MM/YY	DESCRIPTION
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Telephone: (519) 372-4828

Title:

MISSING INFORMATION EXISTING SYSTEM PAISLEY ONTARIO

Client: MUNICIPALITY OF ARRAN ELDERSLIE

Design:	MK	Scale:	1: 3000
Drawn:	MK	Approved:	Design Engineer
Checked:	RS		
Date:	JUNE 2024		

Drawing No. FIGURE 10