



Enhancing our communities



Linksview Subdivision

FUNCTIONAL SERVICING REPORT

Rayville Developments (Legacy) Inc.

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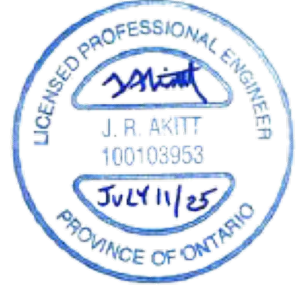
July
11, 2025

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Issue	Date	Description
1	July 11, 2025	Draft Plan Amendment



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1 Introduction

Tatham Engineering Limited (Tatham) has been retained by Rayville Developments (Legacy) Inc. to complete a Functional Servicing Report to support revisions to the draft plan approved Linksview Subdivision located in the Town of Collingwood.

1.1 PURPOSE

An application for zoning by-law amendment and revisions to the draft plan approved Linksview subdivision was submitted in April 2024. The purpose of this report is to provide an update to the Functional Servicing & Stormwater Management Report (Croizer, 2022) and address agency comments received November 2024 including coordination with the revised draft Plan dated June 3, 2025. Refer to Section 2.5 of this report.

1.2 GUIDELINES AND BACKGROUND INFORMATION

This report was prepared recognizing the previous engineering studies completed to date and applicable Municipal and Provincial guidelines, including the following:

- C.F. Croizer & Associates, Functional Servicing & Stormwater Management Report, Linksview Subdivision, Town of Collingwood, Simcoe County (April 2022);
- Ainley Group, Town of Collingwood Stewart Road Reservoir and 10th Line Watermain Design Brief (November 6, 2020);
- Corporation of the Town of Collingwood Development Standards, (July 2007, including amendment August 5, 2022);
- Town of Collingwood Staff Report IN2025-03, 2024 Year End: Water and Wastewater Uncommitted Hydraulic Reserve Capacity Updated (March 10, 2025);
- Design Guidelines for Drinking-Water Systems, Ministry of Environment (2008);
- Design Criteria for Sanitary Sewers, Storm Sewers, and Forcemains for Alterations under Environmental Compliance Approval, Ministry of Environment, Conservation, and Parks, (V.2.0, March 31, 2023);
- Stormwater Management Planning and Design Manual, Ministry of the Environment (March 2003); and
- Water Supply for Public Fire Protection, Fire Underwriters Survey (FUS), (2020).



2 Proposed Site Development

2.1 SITE LOCATION AND ACCESS

The subject property consists of 40.66 ha of land with frontage along the west side of Tenth Line situated north of Sixth Street and south of Mountain Road. The legal description of the site refers to the North Half of Lot 43 Concession 11, Geographic Township of Nottawasaga, Town of Collingwood, County of Simcoe. The municipal address for the site is 780 Tenth Line, Collingwood. Figure 1 (enclosed) is a Site Location Plan showing the location of the subject property.

Access to the proposed development will be provided as summarized below:

- Street A via connection to Tenth Line;
- emergency access (Block 321) to Tenth Line on the northern limit of the proposed development; and
- emergency access via Fisher Field along the southern boundary of the proposed development to Street K.

To accommodate future development on neighbouring properties, right-of-ways have been extended to the property limits as follows:

- a 20 m right-of-way extended at the northern limit of Streets F and K;
- 26 m right-of-way extended to the property boundary at the western limit of Street A; and
- 20 m right-of-way extended to the property boundary at the southern limit of Streets B and K.

The proposed development is illustrated on the Draft Plan of Subdivision prepared by MHBC, dated May 26, 2025 with a revision date of June 3, 2025 enclosed.

2.2 EXISTING SITE CONDITIONS

The development lands are currently vacant and being utilized primarily for agricultural purposes. A detailed topographic survey was completed by Zubek, Emo, Patten, Thomsen Limited March 24, 2005. The topographic survey indicates that drainage sheet flows in a northeasterly direction to Taylor's Creek located on the Blue Mountain Golf and Country Club lands immediately to the north.

Geotechnical investigations and reports have been completed for the Linksview Subdivision and are listed in Section 2.4 of this report. The investigations generally describe upper soils as



consisting of 70 mm to 120 mm of topsoil underlain by a native subgrade soil of silt, sandy silt, silty sand, and sand over a glacial till deposit.

2.3 LAND USES

The development lands are currently zoned predominantly as Residential with portions zoned as Recreational, Environmental Protection and Commercial. The land uses surrounding the site are summarized below:

- Blue Mountain Golf and Country Club to the north (Recreational Zoning);
- Tenth Line and the existing Georgian meadows Subdivision to the east (Residential Zoning); and,
- Agricultural lands to the south and west (Rural Zoning).

2.4 SITE GEOLOGY AND HYDROGEOLOGY

Geotechnical and hydrological investigations have been completed on the development lands. At the time of preparation of this report, the following reports were available:

Peto MacCallum Ltd. Consulting Engineers, Geotechnical investigation, Proposed Linksview Subdivision, 780 and 788 Tenth Line, Collingwood, Ontario, October 2024; and

C.F. Crozier & Associates Inc., Hydrogeological Report, Linksview Development, Town of Collingwood, Simcoe County, March 2022.

Design and construction of the proposed development will be completed in conformance with the findings and recommendations detailed in these reports.

2.5 PROPOSED DEVELOPMENT PLAN

It is proposed to develop the 40.66 ha property with 277 single family units, 184 townhouse units, 2.13 ha school block, and a 2.10 ha apartment block estimated to yield between 116 to 189 units. An additional 5.70 ha are allocated to provide park blocks, a 10 m buffer, an emergency exit, walkway blocks, and an environmental protection block, including a 2.13 ha SWM block. It is expected that the subdivision will be serviced in 3 phases in conjunction with market demands.

The development layout is shown on the Draft Plan of Subdivision (MHBC, May 26, 2025, revised June 3, 2025) enclosed. Engineering details including conceptual grading and servicing strategies are illustrated on Drawings CGP.1 and CSP.1 enclosed.

A summary of the plan amendments and strategies to address recent agency/authority comments is as follows:



- A conceptual grading plan (Drawing CGP.1) is enclosed to illustrate the anticipated key grading strategies for the proposed development. Proposed grades have been established recognizing measured seasonal high groundwater levels and surface drainage patterns. Grade differentials between the proposed and adjacent properties will range from approximately 0.3 m to 3.7 m above existing grade. House product-type and siting strategies involving walkout style lots and rear yard catchbasins are shown on the Drawing CGP.1, all of which will be incorporated further during the detailed design for the development;
- Street A has been revised to a 26.0 m wide right-of-way as illustrated on the Draft Plan of Subdivision (MHBC, May 26, 2025, revised June 3, 2025). The cross section will be in accordance with the current Town of Collingwood standard STD.205 as identified on Drawing CSP.1 enclosed. The 26.0 m wide right-of-way includes 7.5 m wide lanes which are considered adequate to accommodate cycling lanes along the future Street A right-of-way;
- Wastewater generation and water demand rates for the future school (Block 314) have been obtained from Section 3 of the MECP Design Guidelines for Drinking Water systems. A flow basis of 105 L/Student/Day has been applied to the future school block. A student population of 490 students has been derived based on a comparison of existing community schools in the Town of Collingwood;
- A 10.0 m wide emergency access block has been provided adjacent to the SWM block to accommodate a 6.0 m access road and is identified as Block 321 on the enclosed Draft Plan of Subdivision (MHBC, May 26, 2025, revised June 3, 2025);
- Potable water demand generated by the proposed development has been updated to reflect current Town of Collingwood Standards and are summarized in Section 3.1 of this report;
- Wastewater flows generated by the proposed development have been updated to reflect current Town of Collingwood Standards and are summarized in Section 4.1 of this report; and
- The sanitary servicing strategy involves the extension of future sanitary sewer along Tenth Line from the Mountain Road/Panorama South Subdivision to the Linksview development, as illustrated on Drawing CSP.1 enclosed and as summarized in Section 4.3 of this report.



3 Water Network

3.1 WATER DEMAND

Water demand for the proposed development has been calculated based on and *Town of Collingwood Development Standards (2007, amended August 5, 2022)*, *MECP Design Guidelines for Drinking-Water Systems (2008)*, and *Fire Underwriters Survey (2000)*. The following design criteria have been utilized:

- Average Daily Flow (Residential) = 260 L/cap/day;
- Average Daily Flow (School) = 105 L/student/day¹ (51.45 m³/day);
- Maximum Daily Demand Factor = 1.77;
- Peak Hourly Demand (Domestic) = 2.70;
- Peak Hourly Demand (School) = 1.5; and
- Population Density = 2.9 (Single detached), 2.4 (Townhouse), and 1.9 (Apartment).

The future water demands based on the criteria identified above are summarized as follows:

- | | |
|---|---|
| ▪ Design Population (Domestic) | 1,604 people |
| ▪ Design Population (School) | 490 students |
| ▪ Average Day Demand (ADD)
(Domestic & School) | 468.50 m ³ /day (5.42 L/s) |
| ▪ Maximum Day Demand (MDD)
(Domestic & School) | 815.35 m ³ /day (9.44 L/s) |
| ▪ Peak Hour Demand (PHD)
(Domestic & School) | 1,203.55 m ³ /day (13.93 L/s) |
| ▪ Fire Flow Demand | 133 L/s |
| ▪ Maximum Day Plus Fire Flow | 142.44 L/s (9.44 L/s + 133 L/s) for 2 hours |

A detailed water demand calculation summary is enclosed in Appendix A.

¹MECP Design Guidelines for Drinking-Water Systems (2008) average of 70-140 L/student/day

3.2 EXTERNAL WATER TREATMENT PLANT

Upon review of the *Town of Collingwood Staff Report IN2025-03 (March 10, 2025)* the rated capacity of the Town of Collingwood water treatment plant is 31,140 m³/day and is currently



operating at 85% of its rated capacity. The capacity assessment indicates that there are 1,676 m³/day (1,260 SDUs) committed to development with a remaining uncommitted hydraulic reserve capacity (including a 5% factor of safety) of 1,379 m³/day (1,037 SDUs).

Upgrades to the municipal water treatment plant are currently underway with an anticipated completion date of 2029/2030. Upon completion, the rated capacity will be increased to 59,000 m³/day (78,470 SDUs). An interim solution is being implemented to provide approximately 5,000 m³/day (Collingwood portion is 1,850 m³/day (2,461 SDUs) in advance of the full build out of the treatment plant and is anticipated to be complete in 2026.

The proposed development will generate an average daily flow of 468.50 m³/day (352 SDUs), which equates to 1.3% of the rated capacity after 2026 and 0.6% of the rated capacity in 2030. Based on the current uncommitted capacity of the water treatment plant and recognizing the upgrades currently underway, capacity is available to service the proposed development.

3.3 EXTERNAL WATER DISTRIBUTION

The Linksview Subdivision will require the construction of external upgrades to the municipal water distribution network to service the proposed development. The specific projects per the Town of Collingwood Development Charge Background Study (February 2, 2024) and anticipated timelines are as follows:

- Phase 1 Stewart Road Booster Pumping Station (DC Project 40), anticipated construction duration is +/- 18 months;
- Installation of a 400 mm diameter trunk watermain along Sixth Street (DC Projects 16), anticipated construction duration is 1 season;
- Installation of a 400 mm diameter trunk watermain along Tenth Line (DC Project 15) anticipated construction duration is 1 season; and
- Other notable water network projects on the periphery involve a trunk watermain on Sixth Street from Hurontario Street to the Stewart Road BPS (DC Project 29) and decommissioning the Georgian meadows BPS (DC Project 43).

The detailed design for these projects has been completed recognizing the potential future development in the Town's west end. These trunk mains will be further looped via an oversized watermain that will run through the proposed development (DC Project 17). A conceptual servicing plan (Drawing CSP.1) is enclosed to illustrate the proposed servicing strategy.

3.4 INTERNAL WATER DISTRIBUTION

Water supply for the development will be provided by connection to the future trunk watermain on Tenth Line described in Section 3.3 (DC Project 15).



The distribution system is proposed to consist of a 350 mm diameter trunk watermain (DC Project 17) through the future Street A right-of-way capped at the western limit of the development for future connection. The remainder of the internal distribution network will consist of minimum 150 mm diameter watermain with individual water services provided to each dwelling unit, apartment block and the school block per Town of Collingwood Standards. Fire hydrants will be installed as per Town of Collingwood Standards Section 4.4.4.

3.5 FIRE PROTECTION FLOW

The required fire protection flow was determined based on the most conservative scenario and reference source across the Town of Collingwood (preferred values of 76 L/s Residential, 114 L/s Institutional) and as determined using the Fire Underwriters Survey, Water Supply for Fire Protection (2020) (FUS).

Applying the FUS guidelines to the proposed building types (Single Detached and Townhouse) the following fire protection flow rates were determined:

- Single Detached = 67 L/s; and
- Townhouse = 83 – 133 L/s.

The maximum fire flow for the proposed development will range from 76 L/s to 133 L/s pending unit type and construction methods and materials.

The development is subject to the construction of Phase 1 of the Stewart Road Booster Pumping Station and trunk watermain extensions (Tenth Line and Sixth Street) to the proposed development. The future flow provisions are detailed in the design brief in Appendix A entitled:

Town of Collingwood Stewart Road Reservoirs and 10th Line Watermain, Ainley Group, November 6, 2020

Section 3 of the Ainley design brief confirms that the available fire flow will be 135 L/s upon completion of Phase 1 Stewart Road Booster Pump Station and 195 L/s upon completion of Phase 2. Sufficient fire flows will be available to service the development.



4 Sanitary Sewer Network

4.1 WASTEWATER GENERATION

Wastewater generation associated with the proposed development has been calculated based on criteria established within *Town of Collingwood Development Standards (2007, amended August 5, 2022)*, and *MECP Design Criteria for Sanitary Sewers, Storm Sewers, and Force mains (2024)*. The following key design parameters have been utilized:

- Average Daily Flow (Residential) = 260 L/cap/day;
- Average Daily Flow (School) = 105 L/student/day¹ (51.45 m³/day);
- Peaking Factor (Residential) = 3.76 (Harmon);
- Peaking Factor (School) = 1.50;
- Infiltration = 0.23 L/ha/s; and
- Population Density = 2.9 (Single detached), 2.4 (Townhouse), and 1.9 (Apartment).

The future sanitary demands based on the criteria identified above are summarized as follows:

- | | |
|--------------------------------|--|
| ▪ Design Population (Domestic) | 1,604 people |
| ▪ Design Population (School) | 490 students |
| ▪ Average Day Flow | 468.50 m ³ /day (5.42 L/s) |
| ▪ Peak Flow | 2,452.90 m ³ /day (28.39 L/s) |

A detailed sanitary wastewater demand calculation summary is enclosed in Appendix B.

¹MECP Design Guidelines for Drinking-Water Systems (2008) average of 70-140 L/student/day

4.2 EXTERNAL WASTEWATER TREATMENT PLANT

Upon review of the *Town of Collingwood Staff Report IN2025-03*, the rated capacity of the Town of Collingwood wastewater treatment plant is 24,548 m³/day and is currently operating at 70% of its rated capacity.

The reserve capacity update notes the uncommitted hydraulic reserve capacity (including a 5% factor of safety) is 4,522 m³/day (4,455 SDUs). The proposed development will generate an average daily flow of 468.50 m³/day (462 SDUs), which equates to 1.9% of the rated capacity; thus, can service the subject development.



4.3 EXTERNAL SEWER NETWORK

The Linksview Subdivision will require the construction of external upgrades to the municipal sanitary sewer network to service the proposed development. The specific projects and anticipated timeline per the Town of Collingwood Development Charge Background Study (February 2, 2024) are as follows:

- Mountain Road reconstruction (DC Project 57), anticipated construction 2026; and
- Extension of a local sanitary sewer along Tenth Line from Mountain Road/Panorama South to Linksview.

The sewer has been sized to accommodate approximately 4,454 units from the future development in the catchment as detailed in the design brief (Appendix B) entitled:

Mountain Road Widening and Reconstruction, Sanitary Sewer Sizing Analysis, Ainley File No. 116110, Ainley Group, November 16, 2023

It is understood that confirmatory modelling will be completed by the Town's consultant to confirm downstream capacity. It is requested that the estimated wastewater generation parameters outlined in Section 4.1 of this report be incorporated into the current version of the Town's model for assessment.

4.4 INTERNAL SEWER NETWORK

The internal sanitary sewers will include minimum 200 mm diameter pipes and maintenance holes located within the proposed right-of-way. Each dwelling unit, apartment block and school block will have its own sanitary service connection per the Town of Collingwood Development Standards.



5 Stormwater Management

A document to assess stormwater management has been prepared and under separate cover entitled:

Linksview Subdivision, Stormwater Management Report, Tatham, July 11, 2025

Key findings/conclusions of the SWM report are provided below:

- The stormwater management plan developed for the subject lands is in accordance with the criteria set forth by the *Corporation of the Town of Collingwood Development Standards, (as amended 2022)*, the *Ministry of the Environment Stormwater Management Planning and Design Manual (March 2003)* and the *Nottawasaga Valley Conservation Authority Stormwater Technical Guide (2013)*;
- When implemented, the stormwater management plan will allow the development to proceed without negatively impacting the local drainage systems;
- Post development flows will not exceed the target unit flow rates identified in the Regional Stormwater Management report (C.F. Crozier & Associates, 2014) and Taylor's Creek design peak flow rates (C.C. Tatham & Associates, 2016);
- Level 1 "Enhanced" water quality treatment in the form of 80% Total Suspended Solids (TSS) removal for site effluent will be provided;
- The primary SWM facility (end-of-pipe wet pond) will collect, store and control the release of flows, including the Regional (Timmins) event. The SWM facility will outlet to a proposed storm sewer along Tenth Line and ultimately to Taylor's Creek;
- Erosion protection at Taylor's Creek will be provided by controlling post development 25 mm storm runoff to a detention time between 24-48 hours at the SWM facility; and
- Temporary siltation and erosion controls will be implemented for all constructions activities, including topsoil stripping, material stockpiling, road construction and grading operations.

5.1 STORM SEWER NETWORK

An internal storm sewer network will service the proposed development. The storm sewer network will be sized to collect and convey the 1:5-year event with no ponding per the Town of Collingwood Engineering Development Standards. Individual 100 mm diameter storm service connections will be provided for each unit, as well as appropriately sized services for Block 313 and Block 314, within the proposed development.



6 Transportation Network

A document to assess traffic and transportation related to the proposed development has been prepared and under separate cover entitled:

Linksview Subdivision, Traffic Impact Study, Tatham, July 10, 2025

Key findings/conclusions of the Traffic Impact Study report are provided below:

- In addressing the study area traffic operations, the intersections of Tenth Line with Mountain Road, Georgian Meadows and Sixth Street were analyzed under existing (2025) and future (2030, 2035 and 2040) horizon periods;
- Under existing conditions, no improvements are recommended;
- Under the 2030 Horizon background conditions (without the development), implementation of planned roundabouts at Tenth Line/Mountain Road and at Tenth Line/Sixth Street are required;
- Under the 2040 Horizon background conditions (without the development), construction of a southbound left turn lane (15-metre storage) is required at the Tenth Line/Georgian Meadows Drive/Linksview Access;
- Under the 2030 Horizon Total conditions (with the development), construction of a southbound right turn lane is required at the Tenth Line/Georgian Meadows Drive/Linksview Access;
- Under the 2035 Horizon Total conditions (with the development), construction of a southbound left turn lane (15-metre storage), construction of a northbound left turn lane (30-metre storage), implementation of a traffic signal (including northbound advance green phase) and construction of left turn lanes on the minor approaches are required at the Tenth Line/Georgian Meadows Drive/Linksview Access; and
- The available sight lines along Tenth Line at the proposed site access were reviewed and determined to exceed the TAC design guidelines for minimum stopping and intersection sight distances.

6.1 INTERNAL ROAD NETWORK

A 20.0m wide urban road cross-section (STD. No. 201) is proposed for the development with the exception of the Street A 26.0 m wide urban collector (STD. No.205). The right-of-way would be municipally owned. Daylighting triangles will be incorporated, and minimum sightline



requirements are satisfied for major entrances and intersections associated with the development. Additional details are illustrated on the included Draft Plan (Appendix A).



7 Utility Network

The servicing of utilities for the proposed development will be installed in accordance with the Town and the respective utility authority standards. Utility servicing design will be provided during the detailed engineering stage. The following sections outline our preliminary assessment of the existing utility networks associated with the subject property.

7.1 NATURAL GAS

There is an existing gas main located along the east side of Tenth Line, south of Mountain Road. It is expected that a connection will be made to the existing main to service the proposed development. Connection and servicing strategies will be provided during the detailed design phase.

7.2 HYDRO

A new hydro substation will be required to service the Linksview Development. The detailed design for this project is anticipated to be completed in 2027/2028. Connection and servicing strategies will be provided during the detailed design phase.

7.3 COMMUNICATIONS

Bell and Rogers have existing infrastructure in the vicinity of the proposed development. It is anticipated that the communication utility service providers will connect and/or extend their existing infrastructure from Tenth Line to service the proposed development. Connection and servicing strategies will be provided during the detailed design phase.



8 Summary

Based on the preceding analysis, the proposed development can be appropriately serviced. A summary of the findings and recommendations are as follows:

1. The Linksview Subdivision will require the construction of external upgrades to the municipal water distribution network to service the proposed development. These upgrades include the Stewart Street Booster Pumping Station and installation of trunk watermain along Tenth Line and Sixth Street. Based on the review of the current uncommitted capacity of the water treatment plant and recognizing upgrades currently underway, there exists capacity to service the proposed development.
2. An internal water distribution network can be constructed to service the proposed development. The network will include the installation of an oversized trunk watermain within the Street A right-of-way, local mains, services to each lot/block, valves and fire hydrants.
3. The Linksview Subdivision will require the construction of external upgrades to the municipal sanitary sewer network to service the proposed development. These upgrades include the construction of a trunk sanitary sewer along Mountain Road and extension of a local sanitary sewer along Tenth Line. Based on the review of the current uncommitted capacity of the wastewater treatment plant, there exists capacity to service the proposed development.
4. An internal sanitary sewer system consisting of minimum 200 mm diameter pipes and maintenance holes will be constructed through the internal streets.
5. An internal storm sewer system to collect and convey surface water runoff for the development up to the 5-year storm event will be constructed and discharge to the proposed end-of-pipe wet pond stormwater management facility (SWMF). The overland flow routes, consisting primarily of the internal road allowance, will convey flows exceeding the capacity of the storm sewer system to the SWMF. The proposed SWMF will provide quality treatment and extended detention for erosion control.
6. The development is expected to generate 728 trips during the AM peak hour and 542 trips during the PM peak hour. Upon full build out of the Linksview development, implementation of a traffic signal, a northbound left turn lane with 30-metre storage and a southbound left turn lane with 15-metre storage are improvements required at the Tenth Line and Georgian Meadows Drive/Linksview access intersection.



7. The available sight lines along Tenth Line at Street A were reviewed and are considered acceptable in consideration of TAC design guidelines for minimum stopping and intersection sight distances.
8. Most of the proposed internal roadway network will consist of Town standard 20 m wide urban right-of-ways. The internal collector road (Street A) will consist of a Town standard 26 m wide urban right-of-way.
9. Existing utilities are available in the immediate vicinity and provide feasible connection opportunities for the proposed development. Connection and servicing strategies will be provided during the detailed design phase.





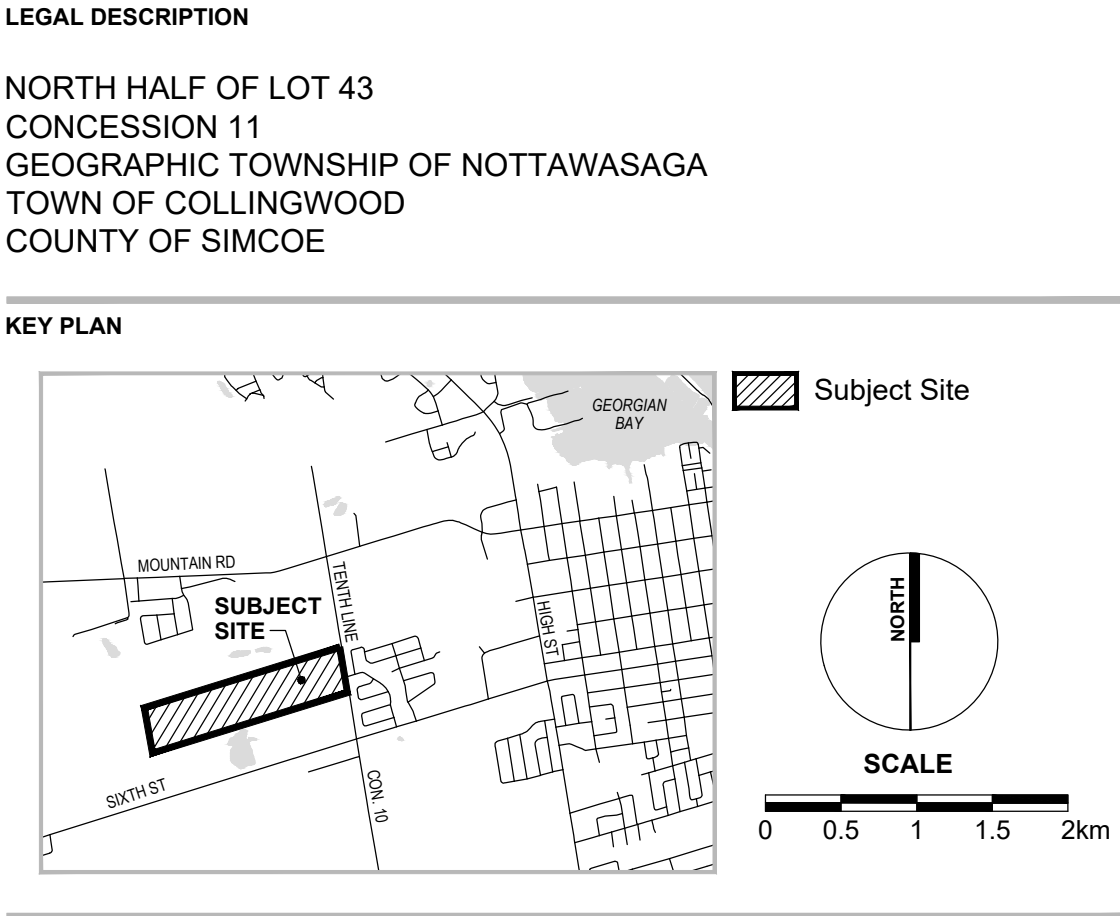
LINKSVIEW SUBDIVISION - TOWN OF COLLINGWOOD

Figure 1: Site Location Plan





LAND USE	LOT / BLOCK #	UNITS	AREA
SINGLE DETACHED - 40R / 12.2m LOTS	015-020, 033, 034, 050-052, 072-074, 076-078, 082-087, 089-091, 094-102, 105-113, 116, 117, 120, 121, 123-136, 138, 139, 142, 143, 145-154, 156, 157, 159-168, 188, 189, 191-196, 201-221, 224-232, 235-277	187	7.939ha
SINGLE DETACHED - 50R / 15.24m LOTS	001-014, 021-032, 035-049, 053-071, 075, 079-081, 088, 092, 093, 103, 104, 114, 115, 118, 119, 122, 137, 140, 141, 144, 155, 158, 187, 190, 197-200, 222, 223, 233, 234, 257	90	5.139ha
TOWNHOUSE - 24.5R / 7.5m UNITS	278-312	184	5.438ha
APARTMENT (MIN. 55 UPH / MAX. 90 UPH)	313	(MIN. 116) (MAX. 189)	2.094ha
SCHOOL	314		2.128ha
PARK (5%)	315-317		1.905ha
10m BUFFER	318-320		0.858ha
EMERGENCY EXIT	321-322		0.292ha
WALKWAY	323-326		0.085ha
ENVIRONMENTAL PROTECTION	327		2.557ha
STORMWATER MANAGEMENT AREA	328		2.125ha
FUTURE RIGHT OF WAY	329-332		0.303ha
0.3m RESERVE	333-335		0.004ha
ROAD WIDENING	336		0.091ha
RIGHT OF WAY	A, B, C, D, E, F, G, H, I, J, K		9.704ha
TOTALS		481 (MIN. 577) (MAX. 650)	40.680ha



OWNER'S CERTIFICATE

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

DATE: _____

SURVEYOR'S CERTIFICATE

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

DATE: _____

No. 1 JUN. 3, 2025 REDLINE DRAFT PLAN REVISION M.M.

REVISION No. DATE ISSUED / REVISION BY

LEGEND

- SUBDIVISION BOUNDARY
- ROW LINE
- BLOCK LINE
- LOT LINE
- UNIT LINE
- PARCEL FABRIC

113 COLLIER STREET
BARRIE, ON, L4M 1H2
P: 705.728.0045 F: 705.728.2010
WWW.MHBCPLAN.COM

PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE
MHBC PLANNING

STAMP

DATE MAY 26, 2025

FILE No. 18138B

SCALE 1:1,800 (ARCH D)

DRAWN BY M.M.

CHECKED BY K.C.

OTHER

PROJECT

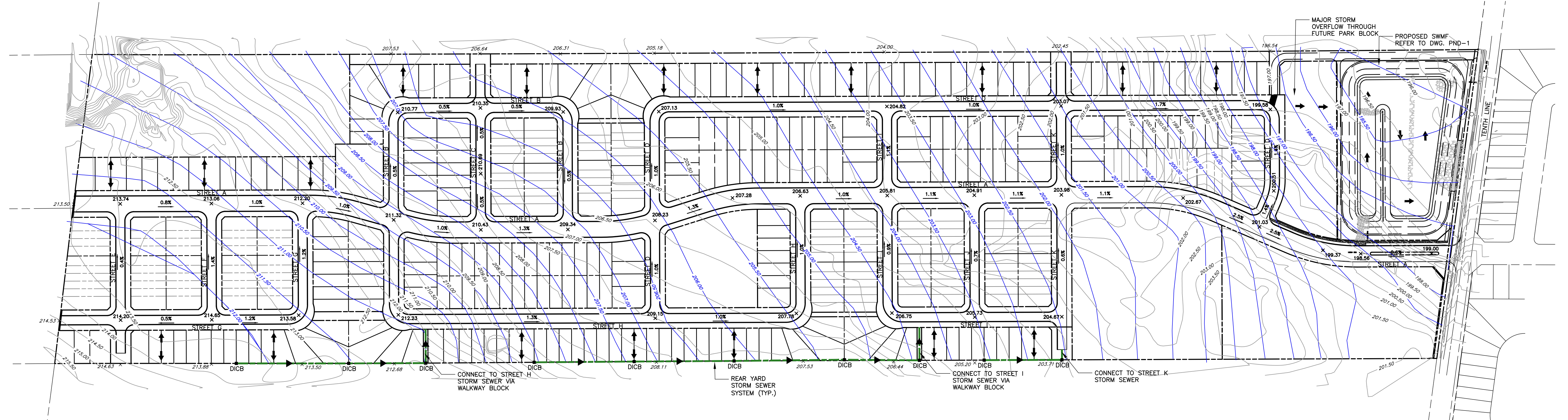
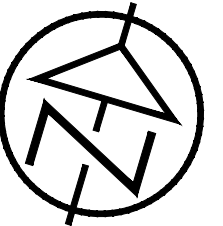
LINKSVIEW SUBDIVISION
RAYVILLE DEVELOPMENTS (LEGACY) INC.

FILE NAME DRAFT PLAN OF SUBDIVISION DWG No. 1 of 1

SCALE BAR 0 8 16 24 32 40 60 80 120 160m

MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

N:\Collingwood\Linksvew -Devonleigh Homes - Draft Plan Due Diligence - 23367B\Drawings\Draft Plan\CAD\23367B - Draft Plan Redline - 2025-06-03.dwg



- LEGEND**
- EXISTING CONTOURS — 100.00
 - HIGH GROUNDWATER CONTOURS — 100.00
 - EXISTING SPOT ELEVATION + 100.00
 - PROPOSED SPOT ELEVATION x 100.00
 - PROPOSED SLOPE AND DIRECTION — 1.0%
 - PROPOSED STORM SEWER —

DRAWING REFERENCES

TOPOGRAPHIC SURVEY COMPLETED BY ZUBEK, EMO, PATTEN, THOMSEN MARCH 24, 2005

SEASONAL HIGH GROUNDWATER CONTOURS BASED ON HYDROGEOLOGICAL REPORT, LINKSVIEW DEVELOPMENT, TOWN OF COLLINGWOOD, C.F. CROIZER & ASSOCIATES, MARCH 2022

LEGAL FABRIC BASED ON DRAFT PLAN OF SUBDIVISION, MHBC, MAY 26, 2025

DISCLAIMER AND COPYRIGHT CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED. TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.			No.	REVISION DESCRIPTION	DATE	ENGINEER STAMP FOR AMENDED DRAFT PLAN APPROVAL JULY 11, 2025	LINKSVIEW SUBDIVISION TOWN OF COLLINGWOOD			
							CONCEPT GRADING PLAN	DESIGN: FILE: 125027 DRAWN: EL DATE: JUNE 2025 CHECK: SCALE: 1:2,000	CGP.1	



- LEGEND**
- | | |
|------------------------------------|--|
| SUBJECT LINKSVIEW DEVELOPMENT | |
| EXISTING TRUNK WATERMAIN | |
| PROPOSED TRUNK WATERMAIN | |
| FUTURE TRUNK WATERMAIN | |
| EXISTING SANITARY SEWER | |
| PROPOSED SANITARY SEWER | |
| FUTURE SANITARY SEWER | |
| FUTURE ROAD IMPROVEMENT | |
| PROPOSED STORM SEWER | |
| EXISTING CREEK & DIRECTION OF FLOW | |

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DRAWING REFERENCES

1. SURROUNDING BACKGROUND PARCEL FABRIC BASED ON SIMCOE COUNTY GIS.
2. LINKSVIEW DEVELOPMENT LAYOUT PER DRAFT PLAN OF SUBDIVISION (MHBC, MAY 26, 2025).
3. EXISTING SERVING PROJECTS BASED ON TOWN OF COLLINGWOOD DEVELOPMENT CHARGE BACKGROUND STUDY (HENSON, 2024).
4. PANORAMA SOUTH SUBDIVISION, RIGHT-OF-WAY AND LOT FABRIC SHOWN ON THIS PLAN HAVE BEEN TAKEN FROM PANORAMA SUBDIVISION UPDATED FIRST SUBMISSION BY TATHAM ENGINEERING DATED MARCH 4, 2025.

5. MAIR MILLS SUBDIVISION RIGHT-OF-WAY AND LOT FABRIC SHOWN ON THIS PLAN HAVE BEEN TAKEN FROM WELLINGTON GLEN PROPERTIES, MAIR MILLS ESTATES BY TATHAM ENGINEERING DATED DECEMBER 2003.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

**FOR AMENDED DRAFT PLAN
APPROVAL**
JULY 11, 2025

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

CONCEPT SERVICING PLAN



DESIGN: EL	FILE: 125027	DWG: CSP.1
DRAWN: KB	DATE: JUNE 2025	
CHECK: JRA	SCALE: 1:4,000	

Appendix A: Water Supply

Project Details

Linksview Subdivision	125027
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Prepared By

KB	June 2025
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Municipality

Town of Collingwood

Checked By

EL	June 2025
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Residential Flow

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
Number of Units	277		184	189	650
Pop Density (cap/unit) ¹	2.9		2.4	1.9	-
Design Population	803.3		441.6	359.1	1604
Average Demand (L/day/cap) ²	260		260	260	-
Ave Day Demand (m ³ /day)	208.86		114.82	93.37	417.05
Reference	1	Town of Collingwood Development Standards Section 4.3.3.1			
	2	Town of Collingwood Development Standards Section 4.3.3.1			

Commercial/Industrial/ Institutional Flow

Land Use	Commercial	Industrial	Institutional	Total
Student Population			490	490.00
Average Demand (L/student/day) ³			105	-
Average Day Demand (m ³ /day)			51.45	51.45
Reference	3	MECP Drinking Water Standards, 3.4.3 Commercial and Institutional Water Demands		

Fire Demand

Max Required Fire Demand (L/s)	133
--------------------------------	------------

Fire Underwriter's Survey (2020)

Peaking Factors

Land Use	Residential ⁴	Commercial	Industrial	Institutional ⁵
Maximum Day (m ³ /day)	1.77			1.50
Peak Hour (L/s)	2.7			1.50
Reference	4	Town of Collingwood Development Standards		
	5	MECP Drinking Water Standards, Chapter 3: Table 3-1: Peaking Factors		

Total Design Flows

Average Day Demand (m ³ /day)	468.50	Peak Hour Demand (L/s)	13.93
Maximum Day Demand (m ³ /day)	815.35	Maximum Day + Fire Demand (L/s)	142.44

Additional Notes

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	Project: Linksview Subdivisions	Date: June 10, 2025
	File No.: 125027	Designed: KB
	Subject: Fire Flow Calculations - Single Unit	Checked: EL
	Revisions:	

Fire Underwriters Survey Fire Flow Calculations

Calculation Based on 2020 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)		
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Framing Material				1.0	%	N/A	
			Type V - Wood Frame Construction	1.5	Ordinary Construction					
			Type IVA - Mass Timber Construction	0.8						
			Type IVB - Mass Timber Construction	0.9						
			Type IVC - Mass Timber Construction	1.0						
			Type IVD - Mass Timber Construction	1.5						
			Ordinary Construction	1.0						
			Non-combustible Construction	0.8						
			Fire Resistive Construction	0.6						
2	Total Effective Area	Total Floor Area (200m² per unit)				200	m²	N/A		
		Percentage of the Total Area of the Other Floors for Coefficient 1.0 to 1.5				100%				0
		Percentage of the Total Area of the Other Floors for Coefficient below 1.0:								
		a) If any vertical opening in the building are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight, or				50%				
		b) If all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.				25%				
		Total Effective Area				200				
3	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS: (RFF= 220 x C x A ^{0.5})						3,000		
4	Factors Affecting Burning	Reductions / Increases Due to Factors Affecting Burning								
4.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	%	(450)	2,550	
			Limited combustible	-0.15						
			Combustible	0.00						
			Free burning	0.15						
			Rapid burning	0.25						
4.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	For a fully supervised system the conditions a), b) and c) below must be met.			0	%	-	2,550	
			a) Automatic sprinkler protection designed and installed in accordance with NFPA 13	-0.3	No					
			b) Water supply is standard for both the system and the Fire Department hose lines	-0.1	No					
			c) Fully supervised system	-0.1	No					
			None	0.0	No					
4.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	Greater than 30.0 m	0.00	0.5	%	1,275	3,825	
			East Side	0 to 3.0 m	0.25					
			South Side	10.1 to 20.0 m	0.00					
			West Side	0 to 3.0 m	0.25					
4.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	3,825	
			Low risk of fire spread	2000						
			Moderate risk of fire spread	3000						
			High risk of fire spread	4000						
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								4,000		
5	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						67		
		Required Duration of Fire Flow of 4,000 L/min (hrs):						1.5		
		Required volume for Fire Flow of 4,000 L/min (m³):						360		

	Project: Linksview Subdivisions	Date: June 10, 2025
	File No.: 125027	Designed: KB
	Subject: Fire Flow Calculations - 4 units	Checked: EL
	Revisions:	

Fire Underwriters Survey Fire Flow Calculations

Calculation Based on 2020 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)		
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Framing Material			Ordinary Construction	1.0	%	N/A	
			Type V - Wood Frame Construction	1.5						
			Type IVA - Mass Timber Construction	0.8						
			Type IVB - Mass Timber Construction	0.9						
			Type IVC - Mass Timber Construction	1.0						
			Type IVD - Mass Timber Construction	1.5						
			Ordinary Construction	1.0						
			Non-combustible Construction	0.8						
Fire Resistive Construction	0.6									
2	Total Effective Area	Total Floor Area (4 units, 2 Floors, 65m2 per unit)					520	m²	N/A	
		Percentage of the Total Area of the Other Floors for Coefficient 1.0 to 1.5				100%	0			
		Percentage of the Total Area of the Other Floors for Coefficient below 1.0:								
		a) If any vertical opening in the building are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight, or				50%				
		b) If all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.				25%				
		Total Effective Area					520			
3	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (RFF= 220 x C x A ^{0.5})							5,000	
4	Factors Affecting Burning	Reductions / Increases Due to Factors Affecting Burning								
4.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	%	(750)	4,250	
			Limited combustible	-0.15						
			Combustible	0.00						
			Free burning	0.15						
			Rapid burning	0.25						
4.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	For a fully supervised system the conditions a), b) and c) below must be met.			0	%	-	4,250	
			a) Automatic sprinkler protection designed and installed in accordance	-0.3	No					
			b) water supply is standard for both the system and the Fire Department hose lines	-0.1	No					
			c) Fully supervised system	-0.1	No					
			None	0.0	No					
4.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	10.1 to 20.0 m	0.15	0.55	%	2,338	6,588	
			East Side	10.1 to 20.0 m	0.15					
			South Side	Greater than 30.0 m	0.00					
			West Side	0 to 3.0 m	0.25					
4.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	6,588	
			Low risk of fire spread	2000						
			Moderate risk of fire spread	3000						
			High risk of fire spread	4000						
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:									7,000	
5	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:							117	
		Required Duration of Fire Flow of					7,000 L/min (hrs):	2		
		Required volume for Fire Flow of					7,000 L/min (m³):	840		

Project: Linksview Subdivisions

Date: June 10, 2025

File No.: 125027

Designed: KB

Subject: Fire Flow Calculations - 6 units

Checked: EL

Revisions:

Fire Underwriters Survey Fire Flow Calculations

Calculation Based on 2020 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)		
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Framing Material			Ordinary Construction	1.0	%	N/A	
			Type V - Wood Frame Construction	1.5						
			Type IVA - Mass Timber Construction	0.8						
			Type IVB - Mass Timber Construction	0.9						
			Type IVC - Mass Timber Construction	1.0						
			Type IVD - Mass Timber Construction	1.5						
			Ordinary Construction	1.0						
			Non-combustible Construction	0.8						
Fire Resistive Construction	0.6									
2	Total Effective Area	Total Floor Area (130 m ² per unit)				780	m ²	N/A		
		Percentage of the Total Area of the Other Floors for Coefficient 1.0 to 1.5				100%				0
		Percentage of the Total Area of the Other Floors for Coefficient below 1.0:								
		a) If any vertical opening in the building are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight, or				50%				
		b) If all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.				25%				
		Total Effective Area				780				
3	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (RFF= 220 x C x A ^{0.5})						6,000		
4	Factors Affecting Burning	Reductions / Increases Due to Factors Affecting Burning								
4.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	%	(900)	5,100	
			Limited combustible	-0.15						
			Combustible	0.00						
			Free burning	0.15						
			Rapid burning	0.25						
4.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	For a fully supervised system the conditions a), b) and c) below must be met.			0	%	-	5,100	
			a) Automatic sprinkler protection designed and installed in accordance	-0.3	No					
			b) water supply is standard for both the system and the Fire Department hose lines	-0.1	No					
			c) Fully supervised system	-0.1	No					
			None	0.0	No					
4.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	10.1 to 20.0 m	0.15	0.65	%	3,315	8,415	
			East Side	0 to 3.0 m	0.25					
			South Side	Greater than 30.0 m	0.00					
			West Side	0 to 3.0 m	0.25					
4.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	8,415	
			Low risk of fire spread	2000						
			Moderate risk of fire spread	3000						
			High risk of fire spread	4000						
Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:								8,000		
5	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:						133		
		Required Duration of Fire Flow of 8,000 L/min (hrs):						2		
		Required volume for Fire Flow of 8,000 L/min (m ³):						960		

TOWN OF COLLINGWOOD STEWART ROAD RESERVOIR AND 10th LINE WATERMAIN

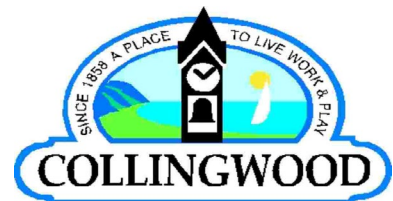
DESIGN BRIEF



PREPARED FOR:
TOWN OF COLLINGWOOD

November 6, 2020

PROJECT NO. 119071



DESIGN BRIEF

Project No. 119071

Prepared For:

Town of Collingwood

Prepared By:



Heidi Ferris, P.Eng.

Checked By:



Mike Ainley, P.Eng., PMP

Ainley & Associates Ltd.

280 Pretty River Parkway
Collingwood, ON L9Y 4J5

Phone: (705) 445-3451

Email: collingwood@ainleygroup.com

EXECUTIVE SUMMARY

The purpose of this Design Brief is to present the design for the proposed Stewart Road reservoir and water booster pump station. The proposed water booster pump station is required to allow further development in the central section of Pressure Zone 2 (West End) in the Town of Collingwood. Currently, there is some development within the central section of Pressure Zone 2 (West End) service area, however further development cannot take place without augmenting pressures and adding water storage for the area.

1. Introduction

The Town of Collingwood is undergoing the design of the Stewart Road reservoir and water booster pumping station and also the 10th Line watermain. The proposed water booster pumping station is required to allow further development in the central section of Pressure Zone 2 (West End) in the Town of Collingwood. Currently, there is some development within the central section of Pressure Zone 2 (West End) service area, however further development cannot take place without augmenting pressures and adding water storage for the area.

Ainley Group previously completed a Schedule B Class Environmental Assessment in 2012 to determine water servicing requirements to meet planned growth in the proposed Mair Mills Village subdivision. A total of five alternatives were considered. The Phase 2 Recommended Solution was to construct a new in-ground or grade level reservoir and booster station on Town of Collingwood owned property on the North West corner of Sixth Street and Stewart Road and to construct a 400 mm diameter watermain on Sixth Street from Georgian Meadows Drive to the 10th Line and along the 10th Line from Sixth Street to Mountain Road (Mair Mills).

The Town of Collingwood Water and Wastewater Master Servicing Plan was completed by Cole Engineering, with C3 Water Inc. (C3 Water) preparing hydraulic watermodelling as part of the review and analysis supporting the document preparation. The recommendations of the Master Plan are incorporated into the design of the Stewart Road reservoir and water booster pumping station presented in this design brief.

The proposed facility will provide existing and Phase I water demands and pressures, servicing existing and new developments in the central section of Pressure Zone 2 (West End) service area. It will be designed such that it can be expanded in the future to service the central section of Pressure Zone 2 (West End) Phase II population.

The facility will include the following:

- A buried concrete reservoir
- An above grade booster pump station to house pumps and controls
- A diesel driven stand-by generator set
- Vertical turbine pumps equipped with variable frequency drives
- Gas chlorination system for top up chlorination
- Bulk water loading facility
- Station Control and Data Acquisition System compatible with the Town's existing SCADA system
- A 400mm diameter watermain on Sixth Street from Georgian Meadows Drive to the 10th Line and along the 10th Line from Sixth Street will connect the proposed booster pump station to proposed and existing developments that will be serviced as part of the expanded central section of the Pressure Zone 2 (West End) service area.
- A temporary booster pump station that currently services the existing Georgian Meadows subdivision will be decommissioned when the proposed Stewart Road reservoir and booster pump station is commissioned and operational.

2. Collingwood Water Supply and Distribution System

2.1 Water Supply

Collingwood's drinking water is produced at the Raymond A. Barker Ultrafiltration Water Treatment Plant (WTP), which treats Georgian Bay water by ultrafiltration and disinfection. The WTP also supplies water to the Town of The Blue Mountains and to the Town of New Tecumseth.

2.2 Pressure Zones

Currently the majority of Collingwood's water distribution system is within one pressure zone, Zone 1. The service limit for Pressure Zone 1 is elevation contour 192m. The majority of proposed future development is

outside of Pressure Zone 1, and as such developing new water booster pump facilities is necessary to allow for future development. The proposed Stewart Road reservoir and booster pump station is required to provide adequate pressures and flows to proposed development in the central section of Pressure Zone 2 service area of Collingwood.

The R.A. (Bob) Davey South End Reservoir and booster station services Pressure Zone 2 development in the south end of Collingwood. The Carmichael reservoir and booster station serves Zone 1 and Zone 1 west.

2.3 Reservoirs and Trunk Watermains

Collingwood operates three water storage reservoirs:

1. 2,250m³ multi legged elevated storage tank, located off of Hume Street, between St. Peter Street and Minnesota Street
2. 6,800m³ in-ground reservoir and booster pump station, located in the west end of the system (A.R. (Ted) Carmichael West End Reservoir)
3. 2,500m³ in-ground reservoir and booster pump station, located at the south end of the system (R.A. (Bob) Davey South End Reservoir)

A.R. (Ted) Carmichael Reservoir can be expanded to 11,365m³. R.A. (Bob) Davey South End Reservoir can be expanded to a volume of 5,000m³.

A network of 300mm and 450mm diameter trunk watermains supply the Town's Distribution system. The watermain on Stewart Road, the proposed inlet side of the reservoir, is 300mm diameter. The watermain on Sixth Street, west of Stewart Road, the proposed discharge side of the reservoir, is 400mm diameter. There is also a 600mm diameter transmission main from the WTP to New Tecumseth, with a branch to supply the R.A. Davey South End Reservoir.

3. Zone 2 West Development and Demand Summary

The demands for the Stewart Road Reservoir and Booster Pumping Station are based on a technical memorandum prepared by C3 Water entitled Town of Collingwood Stewart Road Design Review dated October 16, 2019 (copy included in Appendix A). C3 Water prepared hydraulic water modelling for Cole Engineering as part of the Town of Collingwood Water and Wastewater Master Servicing Plan and the demands in their technical memorandum form part of that report. Note that C3 Water's technical memorandum includes:

- Table 2.2 Development and Demand Summary – Zone 2 West. This table includes Average Day Demand (ADD) for some but not all developments and Maximum Day Demand (MDD) for each development that is to be included in the zone to be serviced by Stewart Road Reservoir per the Master Plan / model
- Table 2.3 Demand Requirements – Zone 2 West. This table includes a summary of the projected Maximum Day Demand (MDD) for 2032 and 2044, the Fire Flow requirement and a summary of the total required flow from the station for 2032 and 2044 (Maximum Day Demand Plus Fire Flow).

The target fire flow of 189L/s is the preferred fire flow requirement for downtown commercial per the Town of Collingwood Development Standards dated July 2007. Preliminary pump selection was completed using this as the target fire flow for all development periods; however, this pump selection required much larger pumps for current requirements than will be ultimately required once future system upgrades improve the distribution system efficiency. Refined pump selection was completed that allows for lower initial fire flow for existing and Phase 1 conditions (135 L/s) and takes into consideration capital cost, operation, maintenance, power requirements and evaluating available fire flow against pump / pump motor size. The refined pump selection will provide 195 L/s fire flow for Phase II conditions once future upgrades are incorporated into the distribution system.

The C3 Water technical memorandum does not include ADD for all developments. For the developments that both ADD and MDD are included the maximum day factor (MDF) is 1.77. This factor was applied to derive ADD for developments where it was not listed.

The C3 Water technical memorandum does not include a minimum hour demand (Min Hour). In Tables 1 and 2 a minimum rate factor of 0.65 is applied to calculate minimum hour demands. This is the minimum rate factor that corresponds to a Maximum Day Factor of 1.75 in the Ministry of the Environment Conservation and Parks (MECP) Design Guidelines (MOE Design Guidelines for Drinking Water Systems 2008). The Maximum Day Factor used in C3 Water's Development and Demand Summary – Zone 2 West is 1.77. In order to project the lowest possible flows that will need to be efficiently met it was assumed that under minimum hour conditions there would be no flow to Town of the Blue Mountains (TOBM).

The C3 Water technical memorandum does not include a Peak Hour (PH) demand based on the Master Servicing Plan / model. Peak hour demands are based on the MDD multiplied by 1.5 per the MECP Design Guidelines.

The ADD and PH Demands were derived for the Town of the Blue Mountains using the same methodology as the developments.

The demand summary included in C3 Water's technical memorandum does not include Phase II Average Day Demand or Peak Hour Demand. In the summaries below these are derived by applying the maximum day factor used by C3 Water for the development demands.

3.1 Zone 2 West Demand Summary

The following is a summary demand conditions to be met by the Zone-2 West reservoir:

Table 1: ZONE 2 WEST DEMAND SUMMARY

	Min Hour (L/s)	ADD (L/s)	MDD (L/s)	PH (L/s)	Fire Flow (L/s)	MDD+FF (L/s)
Existing	3.08	12.91	22.86	34.29	135	169
Phase I (2032)	9.37	22.60	40.00	60.00	135	195
Phase II (2044)	14.46	30.42	53.84	80.76	189	269.76

3.2 Storage Requirements

The Town of Collingwood Water and Wastewater Master Servicing Plan identified the Phase III Stewart Road reservoir volume at 4,770 m³ and Phase I requires one-third of that volume. The Master Plan notes that If there is opportunity to increase the storage by 938 m³ this would meet the full build out requirements for the Town.

Initial construction will include reservoir 1, which consists of two cells, 1A and 1B. The volume of reservoir 1 is 1,860m³.

The site has been designed to accommodate two future reservoir cells, reservoir 2 and reservoir 3, each with a volume of 2,065m³, for an ultimate storage potential of 5,990m³, which exceeds the full build out requirements for the Town.

4. Site Location

The proposed site is a Town owned site located on the North West Corner of Sixth Street and Stewart Road. The property is identified as 43 Stewart Road. Legally, the property consists of Part Lot 43, Concession 10, Parts 6 & 7, RP51R2745, in the Town of Collingwood. This is the preferred location in the Class EA recommended solution. The Town of Collingwood Environmental Services currently have their offices on this site. There is also an existing electrical sub-station. This site has enough land to construct the reservoir between the Town of Collingwood offices and the electrical sub-station. This is in line with the 2005 Provincial Policy Statement Section 1.6.3 which states that facilities should be co-located to promote cost-effectiveness.

The site of the booster pump station and reservoir will be accessed from Stewart Road, through an existing driveway and parking area for Town offices and an existing electrical sub-station. The driveway will be widened and the turning radius increased.

Appendix A

C3 Technical Memorandums



TECHNICAL MEMORANDUM

To: **Ken Kaden, P.Eng.**
Project Coordinator

Company: **Town of Collingwood**

From: **Sam Ziemann, P.Eng.**

Project Ref. #: **75-41-171235**

Copy:

Date: **October 16, 2019**

Subject: **Stewart Road PS Recommendations**

The contents of this memorandum are intended only for the recipient. Any other use and/or reproduction without prior consent of C3 Water Inc. is strictly prohibited.

TOWN OF COLLINGWOOD

Stewart Road PS Design Review

C3 WATER INC.

October 16, 2019



TECHNICAL MEMORANDUM

VERSION	DATE	DESCRIPTION OF REVISIONS	REVISED BY	REVIEWED BY
1	March 4, 2019	Draft 1	Emma Thompson, M.A.Sc.	Sam Ziemann., P.Eng. Ken Kaden, P.Eng.
2	September 19, 2019	Draft 2	Emma Thompson, M.A.Sc.	Sam Ziemann., P.Eng. Ken Kaden, P.Eng.
3	October 16, 2019	Final	Emma Thompson, M.A.Sc.	Sam Ziemann., P.Eng. Ken Kaden, P.Eng.



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1.0 INTRODUCTION

The Town of Collingwood (Town) is undergoing the design of the Stewart Road Pumping Station (PS) and Reservoir. The purpose of the PS and reservoir is to provide pumping capacity and storage to Zone 2 where significant development is happening and is expected to continue.

C3 Water (C3W) is currently working with the Town on the Water Master Plan and provides hydraulic review of development applications. Through the work completed for the Town, C3W has provided comments on the adequacy of the water system's ability to handle additional demands. Some of these comments included the proposed Stewart PS and Reservoir.

The Town has asked C3W to consolidate their previous comments and thoughts in regard to the design of the Stewart Road PS and Reservoir and its adequacy to supply Zone 2 demand requirements under various demand considerations.

The information source for the design of the Stewart Road PS was the Stewart Road Reservoir and 10th Line Trunk Watermain Design Brief Draft (Design Brief) prepared by Ainley Group in September 2016.

2.0 DESIGN CONSIDERATIONS

2.1 Pump Station Capacity

- Capacity of pump station does not satisfy fire flows in Zone 2. Red Maple development has a fire flow requirement of 117 L/s while the pump station Phase 1 firm capacity is 105 L/s (1 - 15L/s pump and 4 – 30L/s pumps). Consider increasing the capacity to supply MDD plus a reasonable Fire Flow. This recommendation is also provided in the conclusions of the Red Maple hydraulic assessment (Appendix A).
- Long term PS capacity should also be considered so that station capacity can be easily increased, potentially to ICI fire flows of 189 L/s (Table 2.1). Consider increasing station capacity (ie piping, layout) to increase firm capacity to MDD + 189L/s for 2032 and 2044(see Table 2.2). The MSP is proposing a Zone 2 ET beyond 2044 which reduces the need for the fire pumps.
- For the closed zone, system curves should be used to demonstrate how pumps are proposed to operate and perform under each demand scenario including Min Flows, ADD, MDD and MDD+FF. This analysis should show how individual pumps on VFDs would meet low demands and how combined pump curves would meet high demands.
 - C3W agrees with a small duty pump being installed as the Zone 2 demands will be relatively small initially.
- Consider adding pumping capacity in the form of inline pumps. Inline pumps would raise the existing Zone 1 water pressure directly to Zone 2 without dropping pressure through the reservoir. This should be considered due to increasing hydro rates as this is a more efficient method of supplying a portion of Zone 2 demands. The pumps utilizing the reservoir would still be needed to ensure reservoir turnover and to provide fire flows, but the inline pumps would reduce the use of energy utilized by the system. The Town has decided to not pursue the option of inline booster pumps at this time, but allowances for the future addition of inline boosters could be included in the design.
- Updated demands for proposed developments have been included in the Master Plan. Some demand values differ from the Design Brief, and some developments were not included. These

areas are summarized in Table 2.2 and shown in Figure 2-1. It should be noted that the development files use 450 L/cap/d which is a very conservative MOE guideline. Realistic residential demands were applied through the master plan. The existing demands from the model represent meter records from 2016.

- One of the areas not considered in the Design Brief is the 580 & 590 Sixth Street Development which was recommended to be serviced by the Stewart Road PS based on the hydraulic assessment (Appendix B).
- Existing areas south of Sixth Street may also be considered for servicing from Stewart Rd PS before the connection to portion of Zone 2 supplied by Bob Davey PS is made along High Street. If this increases pressure on the Stewart Road PS, there is the option to maintain zone boundary at edge of Sixth street development until connection is made.
- Other areas to consider as part of the servicing requirements for the Stewart Road PS are:
 - Increased TOBM demands.
 - Zone 3 supply and Built Boundary demands
 - Emergency supply if Bob Davey PS fails.

Table 2.1 Town Standards for Fire Flows

	Minimum	Preferred
Fire Flow Requirements		
Single-Family Residential	57 L/s	76 L/s
Industrial/Commercial Subdivisions	136 L/s	154 L/s
Downtown Commercial	136 L/s	189 L/s
Pressure Requirements		
Maximum Day Demands + Fire Flows	20 psi	
Standard Operating Conditions	40 psi (Peak Hour)	50 - 80 psi

Table 2.2 Development and Demand Summary – Zone 2 West

Information Source:		Design Brief				Master Plan Draft / Model				Development Files	
	Development Area	# Units	ADD (L/s)	MDD (L/s)	PHD (L/s)	# Units	ADD (L/s)	MDD (L/s)	Timeline	MDD (L/s)	Fire Flow (L/s)
Areas included in Design Brief	Georgian Meadows - Existing	426	2.89	5.28	7.92			4.96	Existing		
	Mair Mills - Existing	130	0.88	1.61	2.42			3.43	Existing		
	Red Maple	278	1.88	3.45	5.17	278	2.22	3.93	2032	11.5	117
	Mair Mills Village	302	2.05	3.74	5.62	319	2.27	4.01	2032		
	Linksvew	591	4	7.33	10.99	637	5.02	8.89	2032		
Areas not considered	TOBM	-	-	-	-			14.47	Existing		
	Georgian Meadows	-	-	-	-	25	0.17	0.30	2032		
	Mair Mills North	-	-	-	-	901	5.45	9.64	2044		
	580 & 590 Sixth Street	-	-	-	-	308	2.38	4.21	2044	23.39	76
TOTAL:		1727		21.4		2468		53.8			

Table 2.3 Demand Requirements – Zone 2 West

Demand Type (L/s)	MDD 2032	MDD 2044	Fire Flow	Total 2032	Total 2044
Design Brief	21.4		76	97.4	97.4
Master Plan Draft / Model	40.0	53.8	189	229.0	242.8

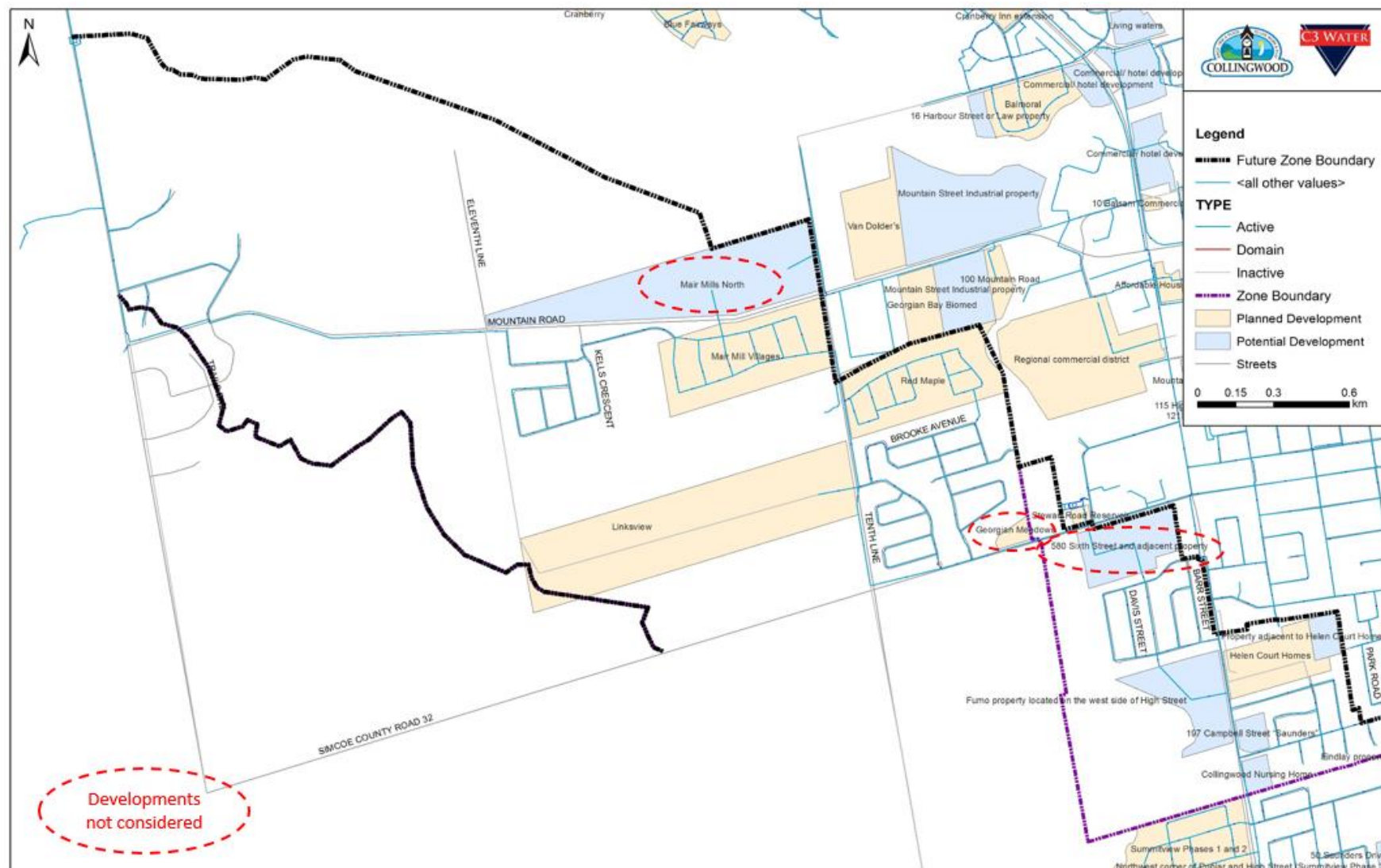


Figure 2-1 Development Areas surrounding Stewart Road PS

2.2 *Transient Mitigation*

- Variable Frequency Drives on all pumps are recommended if not already considered. Working into a closed pressure zone (no elevated tank) can create significant pressure events using fixed speed pumps. VFDs would help reduce pressure variations.
- Surge anticipator valves should be included to reduce high pressure transient events.
- Pressure relief pipe and valve should be considered so water can be recycled into reservoir during low demand periods to alleviate high pressures.
- Surge tanks should be considered to reduce the impacts of low-pressure transient events during normal pump shutdown and power failure.
- A detailed Surge analysis is recommended if not already part of the design.

2.3 *Other Design Considerations*

- An emergency valve to supply back to Zone 1 could be provided in case emergency supply is needed in Zone 1.
- A check valve to bypass the pump station and service Zone 2 with Zone 1 pressures should be considered in case of pump station failure.
- Zone 1 watermain into the reservoir should be sized to handle ultimate demands. The MSP addressed this from the distribution system, and it should also be looked at from the PS level. A new 400mm watermain is proposed north of the inlet on Stewart Rd. The inlet would connect to form tee with the new 400mm and the existing 300mm from the south. The pump station design should confirm that the size of the inlet pipe does not cause restrictions to station capacity once the Stewart Rd watermain is upgraded to 400 mm.

3.0 LIMITATIONS

The noted design considerations should not be considered a comprehensive review of the Stewart Road PS and Reservoir design as C3W was not involved in the design process or have all available documentation. It is intended to provide the Town with considerations in their review of the design.

Appendix B: Wastewater

Project Details

Linksview Subdivision	125027
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Prepared By

KB	June 2025
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Municipality

Town of Collingwood

Checked By

EL	June 2025
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Residential Flow

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
Number of Units	277		184	189	650
Pop Density (cap/unit) ¹	2.9		2.4	1.9	-
Design population	803.3		441.6	359.1	1604
Average Flow (L/day/cap) ²	260		260	260	-
Ave Day Flow (m ³ /day)	208.86		114.82	93.37	417.05
Reference	1	Town of Collingwood Development Standards Section 4.3.3.1			
	2	Town of Collingwood Development Standards Section 4.3.3.1			

Commercial/Industrial/ Institutional Flow

Land Use	Commercial	Industrial	Institutional	Total
Student Population			490	490
Average Demand (L/student/day) ³			105	-
Average Day Demand (m ³ /day)			51.45	51.45
Reference	3	MECP Drinking Water Standards, 3.4.3 Commercial and Institutional Water Demands		

Peaking Factors

Land Use	Residential (Harmon) ⁴	Commercial	Industrial	Institutional ⁵
Peaking Factor	3.76			1.50
Reference	4	Town of Collingwood Development Standards		
	5	MECP Drinking Water Standards, Chapter 3: Table 3-1: Peaking Factors		

Infiltration

Serviced Area (ha)	40.66	Infiltration(L/s/ha)	0.23	Infiltration (L/s)	9.35
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Total Design Flows

Average Day Flow (m ³ /day)	468.50	Peak Flow (L/s)	28.39
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Additional Notes

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Memorandum

To: Mike Latimer, Town of Collingwood
Copies To: Stuart West, Town of Collingwood
From: Tammy Kalimootoo
Date: November 16, 2023
Reference: Mountain Road Widening and Reconstruction
 Sanitary Sewer Sizing Analysis
 Ainley File No. 116110

Purpose

With the planned reconstruction and widening of Mountain Road from Tenth Line to Cambridge Street, the Town requested that an updated analysis be completed for the existing sanitary sewer to determine if any upsizing is required to accommodate the additional flows anticipated from the various proposed developments along the corridor. This memo summarizes the analysis and results completed in this regard.

Existing Conditions

As part of the Town's Water and Sanitary Systems Master Plan, completed in December 2019 by another engineering firm, a PCSWMM model for the entire sanitary sewer network was developed and provided to the Town.

Table 1, below, shows the existing pipe sizes based on the PCSWMM model. It is noted that the pipe sizes shown as 500 mm diameter are assumed to be asbestos cement. It is further noted that the manhole numbering is as per our engineering drawings and do not necessarily match the Town's numbering system, if any. Only the sections of pipe from EX SAN MH 01 through EX SAN MH 18 are within the limits of construction of the Mountain Road project. EX SAN MH 19 through EX SAN MH 23 are between the project limit and Balsam Street.

Table 1 – Existing Sanitary Sewer Sizes

Manhole		Existing Size Based on PCSWMM Model
From	To	
EX SAN MH 01	EX SAN MH 02	450
EX SAN MH 02	EX SAN MH 03	450
EX SAN MH 03	EX SAN MH 04	375

Manhole		Existing Size Based on PCSWMM Model
From	To	
EX SAN MH 04	EX SAN MH 05	375
EX SAN MH 05	EX SAN MH 06	375
EX SAN MH 06	EX SAN MH 07	375
EX SAN MH 07	EX SAN MH 08	375
EX SAN MH 08	EX SAN MH 09	375
EX SAN MH 09	EX SAN MH 10	375
EX SAN MH 10	EX SAN MH 11	375
EX SAN MH 11	EX SAN MH 12	525
EX SAN MH 12	EX SAN MH 13	525
EX SAN MH 13	EX SAN MH 14	525
EX SAN MH 14	EX SAN MH 15	500
EX SAN MH 15	EX SAN MH 16	500
EX SAN MH 16	EX SAN MH 17	500
EX SAN MH 17	EX SAN MH 18	500
EX SAN MH 18	EX SAN MH 19	500
EX SAN MH 19	EX SAN MH 20	500
EX SAN MH 20	EX SAN MH 21	500
EX SAN MH 21	EX SAN MH 22	500
EX SAN MH 22	EX SAN MH 23	450
EX SAN MH 23	EX SAN MH 24	750

For the purposes of this analysis, the existing pipe sizes contained within the PCSWMM model have been assumed to be correct.

Proposed Developments

Table 2, below, provides a list of known proposed developments along the corridor and summarizes the estimated peak flows for each. The peak flow values were taken from various development reports prepared by other engineering firms in support of development applications, as provided by the Town. It should be noted that the flows for the Mair Mills Village (260 Mountain Road) and Panorama North Development (295 Mountain Road) were recalculated to reflect recent changes in the Town's Development Standards, including a reduction in the average daily domestic flow from 450 L/cap/d to 260 L/cap/d for residential development.

The Functional Servicing Report for the Panorama North Development identifies a total of 929 residential units for the development itself, but also considers a 70.5 hectare external area that is designated for future residential development, which would amount to an additional 3,525 units. As a result, this development was split into two options for consideration: Option A includes the first 929 units for the development only (total Daily Maximum Flow of 49.20 L/s), while Option B includes the first 929 units as well as the external area units for a total of 4,454 units (total Daily Maximum Flow of 131.50 L/s).

Table 2 - Proposed Development Sites

Address	Peak Flow
100 Mountain Road (additional structures proposed on existing commercial site)	3.77 L/s
101 Mountain Road	9.81 L/s
120 Mountain Road	2.81 L/s
140 Mountain Road	3.11 L/s
180 Mountain Road	2.17 L/s
185 Mountain Road (2&3 Greco Court)	10.84 L/s
200 Mountain Road	0.10 L/s
260 Mountain Road (Mair Mills Village)	15.09 L/s*
295 Mountain Road (Panorama North)	Option A – 49.20 L/s* Option B – 131.50 L/s*

Analysis

Some of the proposed developments listed above were not considered in the 2019 PCSWMM model. Further, some are very large and the timeline for when they will be constructed is still undetermined. As these large developments will have a significant impact on the performance of

the sewers, we have modeled a total of eight (8) scenarios with some under the existing pipe size condition to see the impacts and some with the pipes being upsized.

The following assumptions were made when performing the analysis:

- The PCSWMM model provided by the Town is correct and provides an accurate representation of the sewer network and flow rates in the system;
- The estimated development sanitary flows are correct and provide an accurate representation of what will ultimately be constructed; and
- The analysis was conducted using the Pre vs. Post method under wet weather conditions for the June 17, 2017 storm event. In this analysis, June 17, 2017 storm event is assumed to be an extreme event.

The analyzed sewers are marked in **Figure 1**, attached in Appendix A.

Scenario 1: Pre-Development Extreme Conditions with Current Capacity of the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, under the existing development conditions considered at the time of the Master Servicing Plan (2019) analysis with the extreme June 17, 2017 storm event conditions. It is assumed that the WWTP is operating at its current capacity.

Scenario 2: Post-Development (with Panorama Option A) Extreme Conditions with Current Capacity of the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, but after construction of the development sites presented in **Table 1** (assuming Option A for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. It is assumed that the WWTP is operating at its current capacity.

Scenario 3: Post-Development (with Panorama Option B) Extreme Conditions with Current Capacity of the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, after construction of the development sites presented in Table 1 (assuming Option B for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. It is assumed that the WWTP is operating at its current capacity.

The results of scenarios 1, 2, and 3 are presented in **Figure 2**, attached in Appendix A.

As can be seen, under Scenario 2, within the Mountain Road projects limits, surcharging of the system occurs from approximately EX SAN MH 15 to the limit of construction at EX SAN MH 18; however, there are additional sewers downstream (beyond the limits of this project) that are also surcharging.

Under Scenario 3, the degree of surcharging increases and impacts almost the full sanitary sewer within the project limits.

In order to determine how much of the impact on the system is a result of the limited plant capacity and not the pipe sizes, the same scenarios were repeated but with a free outfall at the plant (i.e. unlimited plant capacity).

Scenario 4: Pre-Development Extreme Conditions with Free Outfall at the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, under the existing development conditions at the time of the Master Servicing Plan (2019) analysis with the extreme June 17, 2017 storm event conditions. It is assumed that there is a free outfall (or unlimited capacity) at the WWTP.

Scenario 5: Post-Development (with Panorama Option A) Extreme Conditions with Free Outfall at the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, after construction of the development sites presented in **Table 1** (assuming Option A for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. It is assumed that there is a free outfall (or unlimited capacity) at the WWTP.

Scenario 6: Post-Development (with Panorama Option B) Extreme Conditions with Free Outfall at the WWTP

This scenario evaluates the Mountain Road sewer capacity, based on existing pipe sizes, after construction of the development sites presented in **Table 1** (assuming Option B for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. It is assumed that there is a free outfall (or unlimited capacity) at the WWTP.

The results of scenarios 4, 5, and 6 are presented in **Figure 3**, attached in Appendix A.

As can be seen, surcharging of the system occurs within the same limits of the system in Scenario 5 as it did in Scenario 2. Similarly, surcharging conditions are also seen between Scenario 6 and 3, meaning that the pipes are undersized.

Therefore, additional scenarios were modeled to determine the pipe sizes that would be needed to accommodate the flows and eliminate the surcharging within the system.

Scenario 7: Post-Development (with Panorama Option A) Extreme Conditions with Free Outfall at the WWTP – Minimum Sewer Size Required

This scenario evaluates the Mountain Road sewer capacity after construction of the development sites presented in **Table 1** (assuming Option A for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. In this scenario, the model has been updated to include the minimum size of sanitary sewers that would be required to mitigate all of the surcharges in the analyzed segment.

The results of this scenario are presented in **Figure 4**, attached in Appendix A.

Scenario 8 – Post-Development (with Panorama Option B) Extreme Conditions with Free Outfall at the WWTP – Minimum Sewer Size Required

This scenario evaluates the Mountain Road sewer capacity after construction of the development sites presented in **Table 1** (assuming Option B for the Panorama North Development), with the extreme June 17, 2017 storm event conditions. In this scenario, the model has been updated to include the minimum size of sanitary sewers that would be required to mitigate all of the surcharges in the analyzed segment.

The results of this scenario are presented in **Figure 5**, attached in Appendix A.

Summary and Conclusion

Based upon the analysis completed, **Table 3**, shows the minimum pipe sizes that would be required to mitigate surcharging within the analyzed system. It is noted that the sizing of the sanitary sewer is very much dependent upon whether the Town approves full build out of the external area associated with the Panorama North Development. If the full build out, represented by Scenario 8 (Option B) is approved, all sanitary sewers from the intersection of Tenth Line to the east project limits (and beyond) would need to be upsized. However, in the event that the Town only wishes to consider the initial build out of Panorama North, represented by Scenario 7 (Option A), the existing pipe sizes would be sufficient up to EX SAN MH 14.

Table 3 – Proposed Sanitary Sewer Sizes

Manhole		Ex. Pipe Size Based on PCSWMM Model (mm)	Proposed Size Scenario 7 with Panorama Option A (mm)	Proposed Size Scenario 8 with Panorama Option B (mm)
From	To			
EX SAN MH 01	EX SAN MH 02	450	450	450
EX SAN MH 02	EX SAN MH 03	450	450	450
EX SAN MH 03	EX SAN MH 04	375	375	450
EX SAN MH 04	EX SAN MH 05	375	375	450
EX SAN MH 05	EX SAN MH 06	375	375	450
EX SAN MH 06	EX SAN MH 07	375	375	450
EX SAN MH 07	EX SAN MH 08	375	375	450
EX SAN MH 08	EX SAN MH 09	375	375	450
EX SAN MH 09	EX SAN MH 10	375	375	450
EX SAN MH 10	EX SAN MH 11	375	375	450
EX SAN MH 11	EX SAN MH 12	525	525	600

Manhole		Ex. Pipe Size Based on PCSWMM Model (mm)	Proposed Size With Panorama Option A (mm)	Proposed Size With Panorama Option B (mm)
From	To			
EX SAN MH 12	EX SAN MH 13	525	525	600
EX SAN MH 13	EX SAN MH 14	525	525	600
EX SAN MH 14	EX SAN MH 15	500	525	600
EX SAN MH 15	EX SAN MH 16	500	525	600
EX SAN MH 16	EX SAN MH 17	500	525	600
EX SAN MH 17	EX SAN MH 18	500	525	600
EX SAN MH 18	EX SAN MH 19	500	525	600
EX SAN MH 19	EX SAN MH 20	500	525	750
EX SAN MH 20	EX SAN MH 21	500	525	750
EX SAN MH 21	EX SAN MH 22	500	525	750
EX SAN MH 22	EX SAN MH 23	450	525	750
EX SAN MH 23	EX SAN MH 24	750	750	750

If the Town had sufficient funds readily available, it would make the most sense to replace the entire sanitary system from EX SAN MH 3 to EX SAN MH 18 within the project limits. In doing this, the Town could consider a new alignment within the reconstructed roadway, thereby moving the system away from the multi-use path and all of the utilities. A new alignment would also provide an opportunity to construct the majority of the new sewer while the old sewer remains in operation.

Understanding that the status and timing of the various developments remains somewhat unknown and is also dependent upon other factors such as addressing capacity at the treatment plant, the interim solution and our recommendation would be for the Town to at least replace the existing 500 mm diameter asbestos cement sanitary sewer from EX SAN MH14 to EX SAN MH 18 with the ultimate 600 mm diameter size pipe. The timing and details for the replacement of the remaining upstream and downstream sewers would then need to be addressed separately.

Disclaimers

This analysis has been completed using projected development peak flows from various sources as well as the Town's PCSWMM model, which was developed by another party. We make no guarantees as to the accuracy of the development peak flow values and we note that we have expressed concerns in the past with the Town's PCSWMM model. Please see the model review memo previously completed for the Town, attached in Appendix B for reference.

Finally, the proposed sewer sizes in Table 3 represent the minimum sewer size required to mitigate all the surcharges in the study area. A decision on any sanitary network upsizing may also depend on other factors that may not have been considered in this analysis.

\\ag-barrie\ins1\Engineering\Collingwood\116110\Reports\Mountain Rd Sanitary Sewer Hydraulic Analysis\Report\116110 - Mountain Road Sanitary Sewer Analysis (Nov-17-2023).docx

APPENDIX A FIGURES

Figure 1: Analyzed Sewers

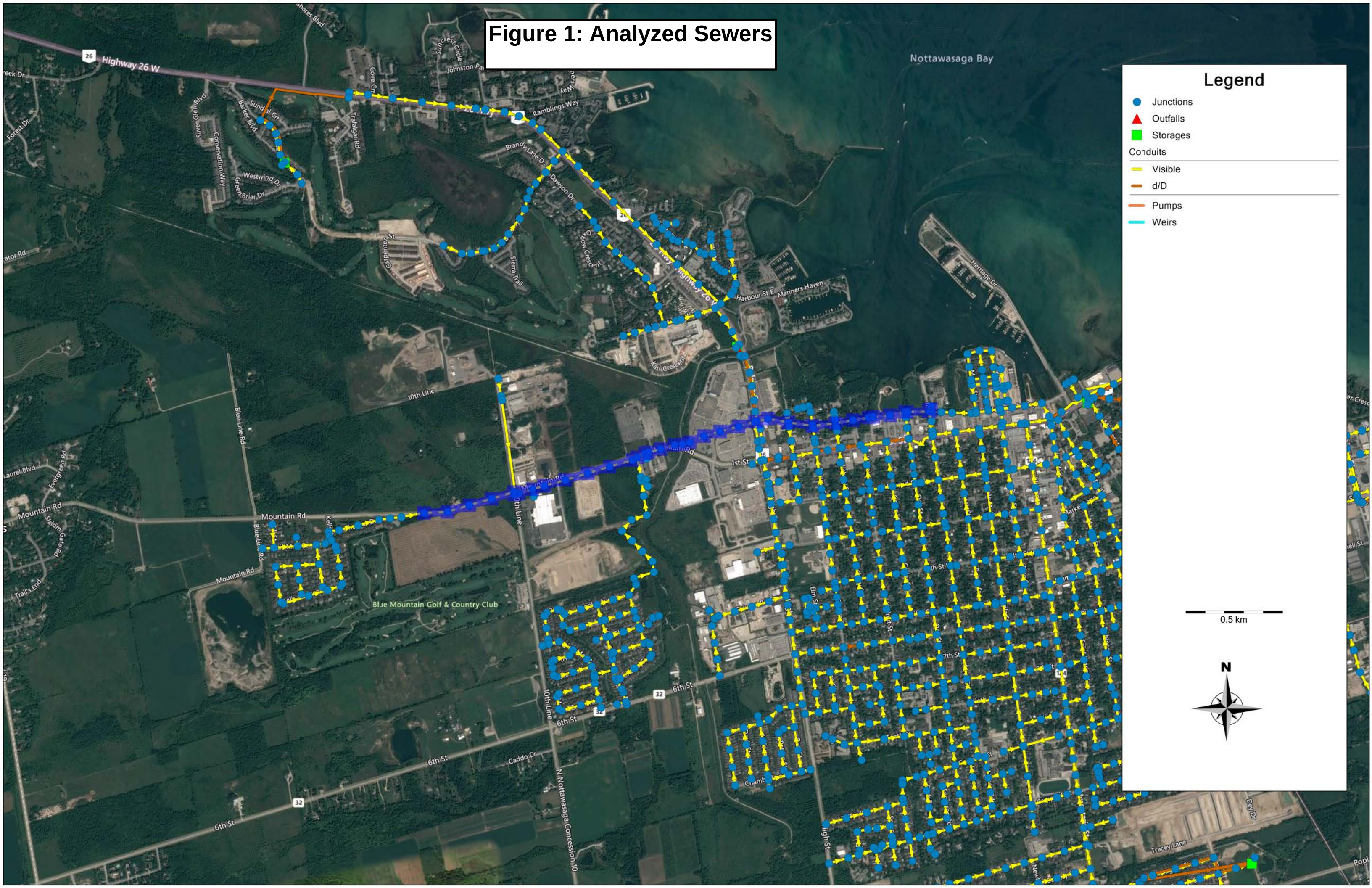


Figure 2: Scenarios 1 vs. 2 vs. 3

June 17, 2017 Storm Event - Existing WWTP Capacity

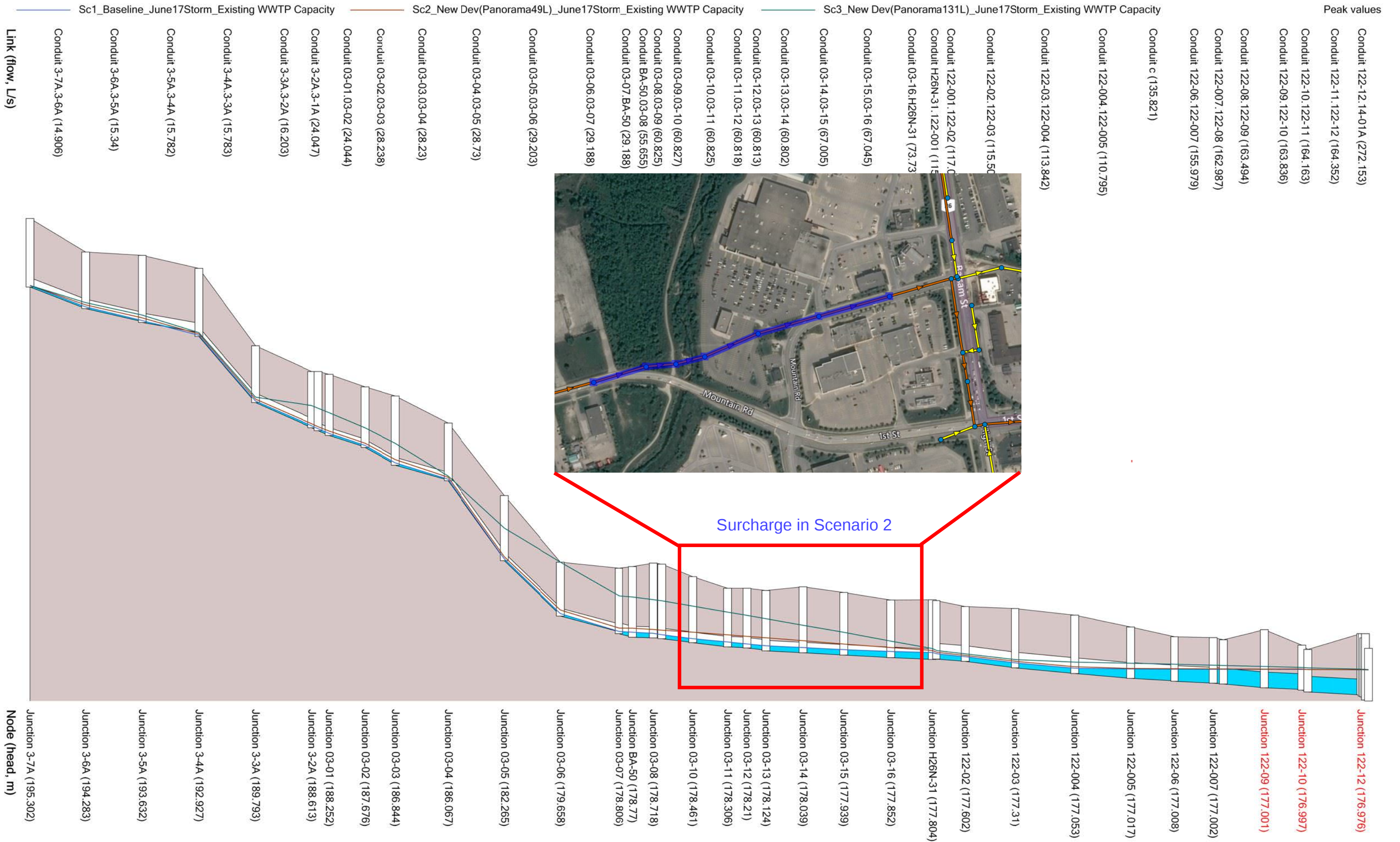


Figure 3: Scenarios 4 vs. 5 vs. 6

June 17, 2017 Storm Event - Free Outfall at WWTP

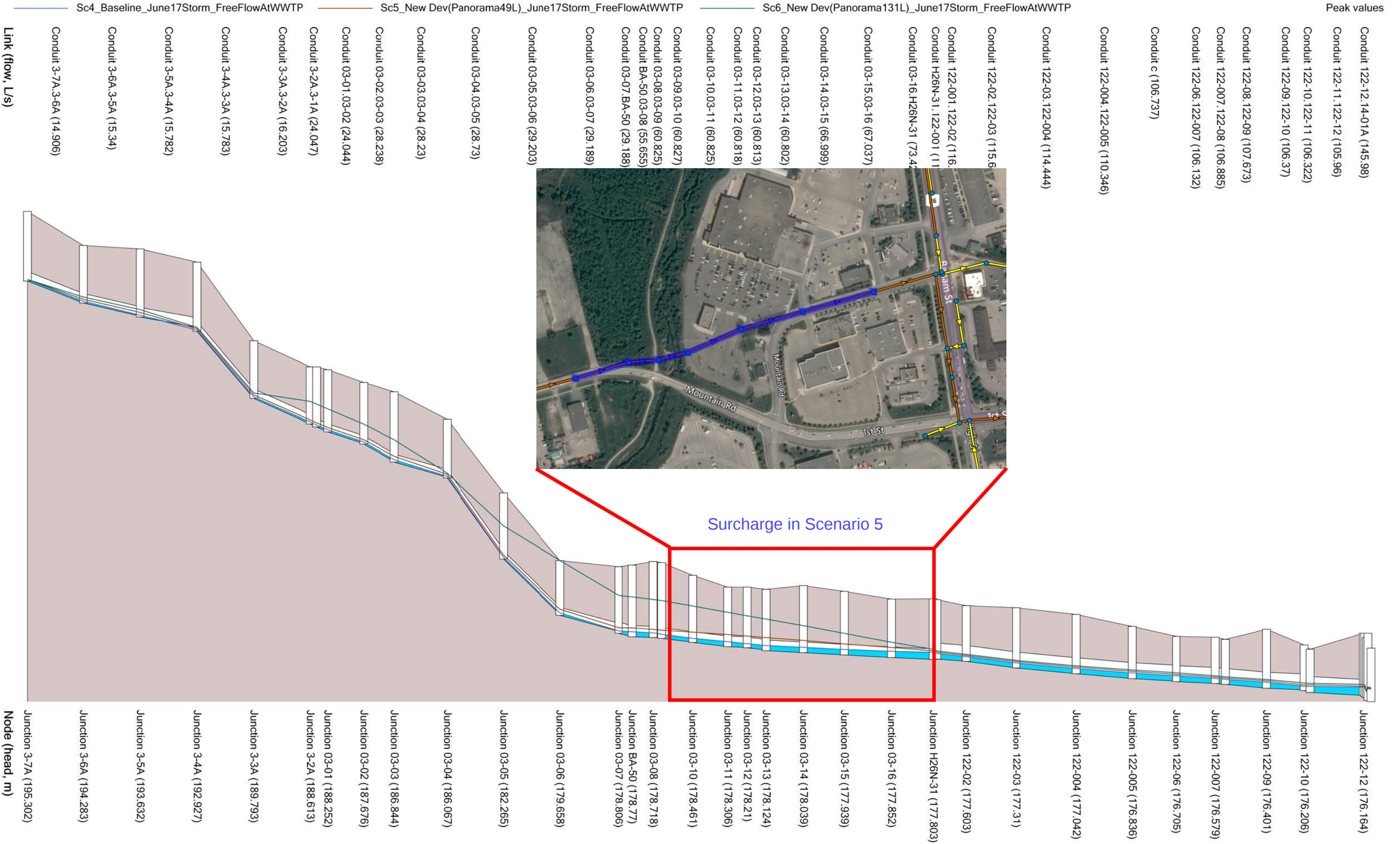


Figure 4: Scenario 7

June 17, 2017 Storm Event - Free Outfall at WWTP - Minimum Sewer Size Required with Option A

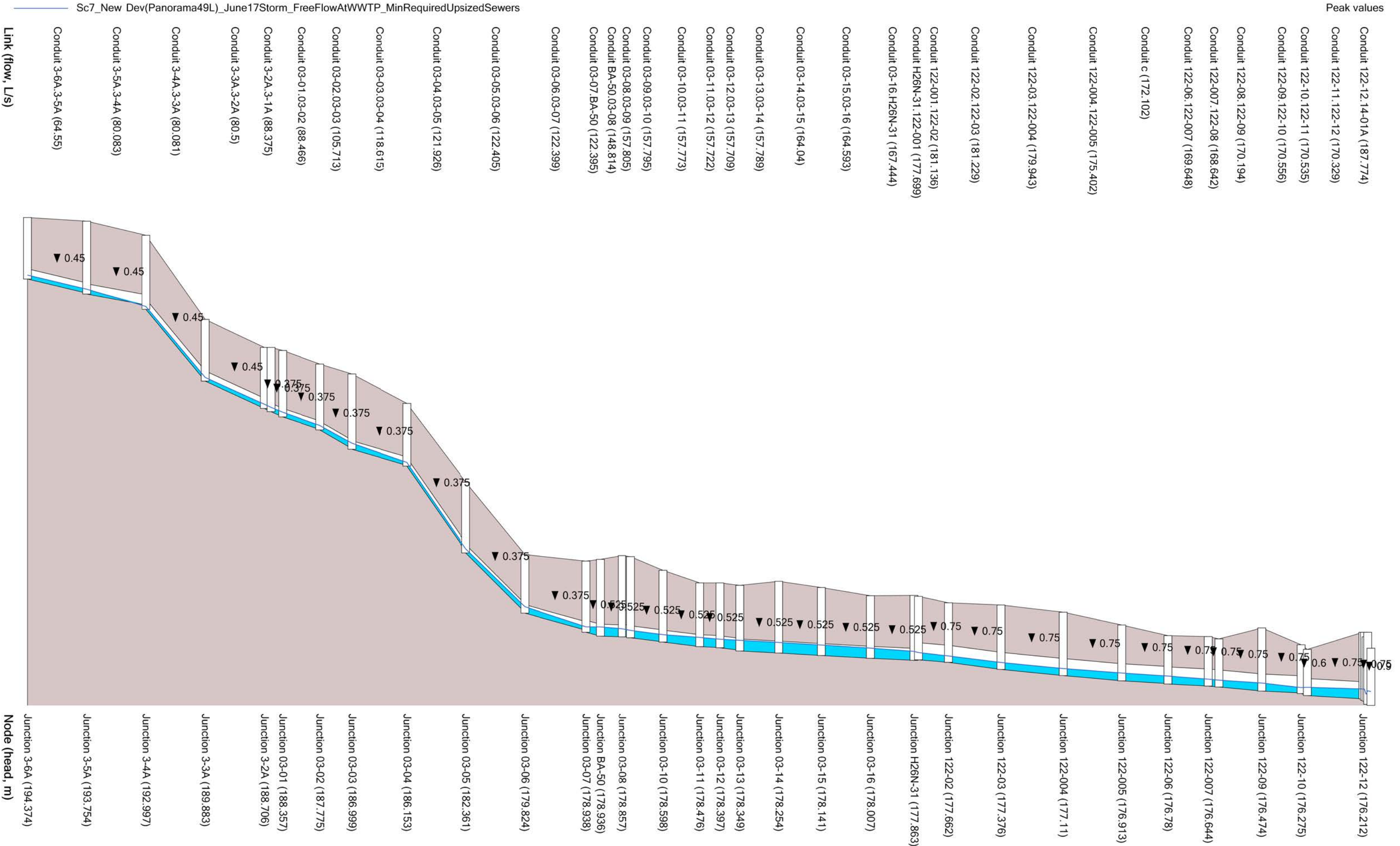
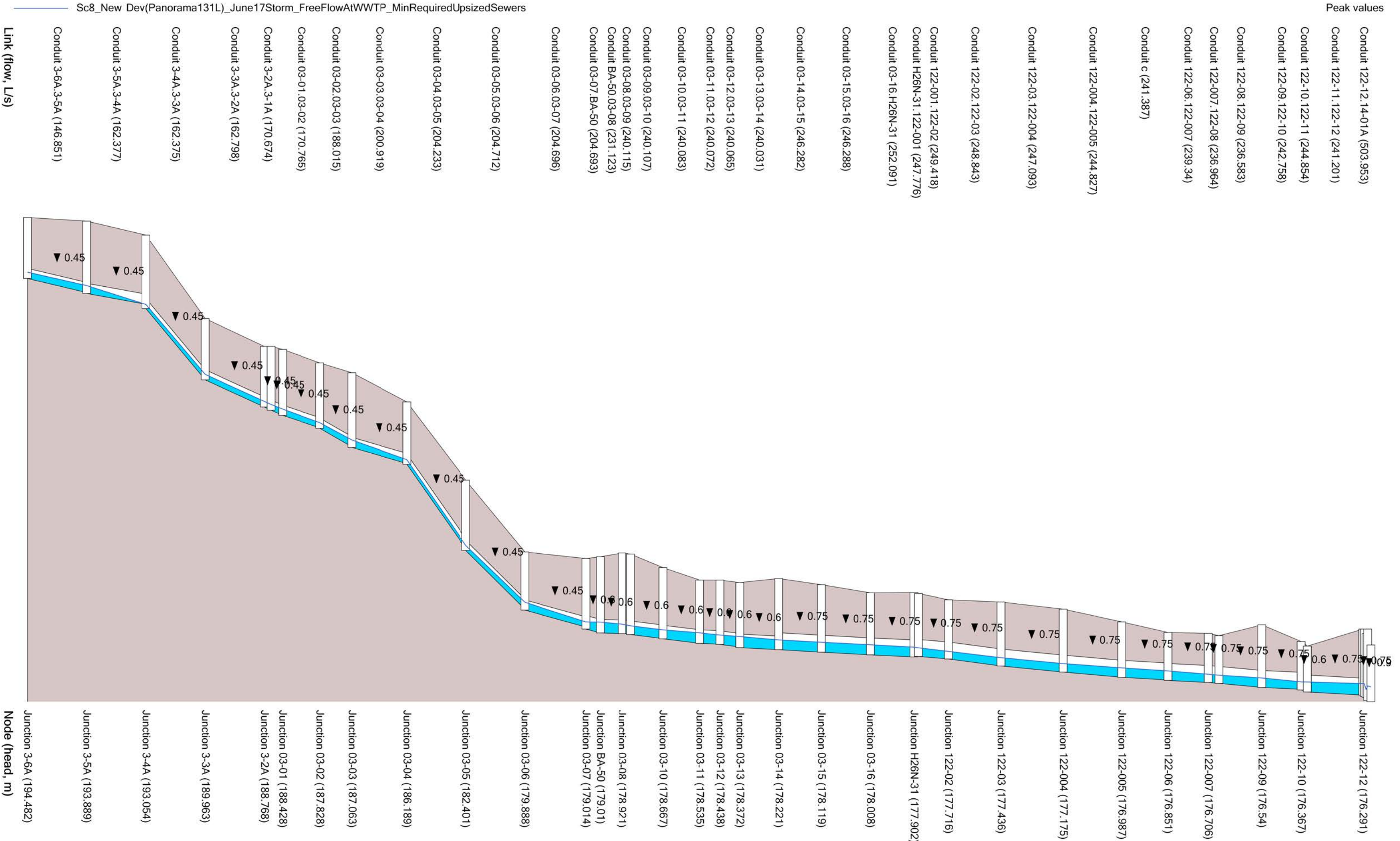


Figure 5: Scenario 8

June 17, 2017 Storm Event - Free Outfall at WWTP - Minimum Sewer Size Required with Option B



APPENDIX B MODEL REVIEW MEMO

MEMORANDUM

Ainley & Associates Limited
195 County Court Boulevard, Brampton, ON
L6W 4P7
Tel: (705) 726-3371 email: ewen@ainleygroup.com

To: Mr. John Velick, Town of Collingwood
From: Kamran Rahnama
Chris Ewen
Date: October 9, 2020 File: 220027
Ref: Collingwood Sanitary Sewer Systems – PCSWMM Model Review

Background

A PCSWMM model was provided to the Town as part of Master Servicing Plan (MSP). The purpose of the town-wide sanitary system model is to assess the capacity of the existing system, evaluate system performance, determine future needs, and to develop an infrastructure upgrade plan to service future growth. The model was calibrated with five (5) storm events and validated with one (1) storm event during 2017.

The Town retained Ainley Group to complete an initial review of the model and to become familiar with it for future as-needed modelling assignments.

Analysis

Upon reviewing the model, Ainley found the followings:

Model Selection Evaluation:

PCSWMM had been previously selected to model the sanitary system of the Town. PCSWMM is a well-known dynamic hydraulic modelling software which is used by municipalities and governmental organizations to model stormwater and wastewater networks. The software is very user friendly, highly supported, and can handle a wide variety of networks.

InfoWorks, is also a very good hydraulic modelling software, which is also widely used in bigger municipalities for larger networks (e.g. City of Toronto, York, Peel, and Halton Regions, etc.). Although there has been a tendency in the industry to switch to InfoWorks during the last few years, this software is more expensive, and works best for modelling larger and more complex networks.

Other software is available and used by other local municipalities such as SewerGEMS and Hydra. In the case of SewerGEMS, it would be an ideal software, comparable to PCSWMM, with similar costs. Hydra, used locally by Orillia, is not user friendly, error prone and not well supported by the supplier and not recommended.

Considering the size of the Town's sanitary network, performance and the price of the software; and that considerable effort has been put into the PCSWMM model, Ainley believes PCSWMM is a good option for the Town.

Design Criteria:

The criteria used in the model and analysis were developed from several reliable sources including the Collingwood Development Standards (2007) and the Design Guidelines for Sewage Works (MECP, 2008). These criteria include d/D ratio, Inflow and Infiltration (I/I) factor, critical Hydraulic Grade Line (HGL), design storm events, unit sanitary rate flow generation, and peaking factors. Also, the model was used with different design storms of 2, 5, 10, and 25 years, and a historic flood event of June 17, 2017.

Ainley confirms that the model has been design based on the valid industry standards.

Flow Generation:

The flow production in the model is done through receiving nodes only. The direct flow from residential and ICI population (inflow) is modelled with use of dry weather sanitary pattern obtained from flow monitors. Also, infiltration is discharged directly to the nodes with related hydrograph for different storm events. Although, subcatchments were used for identifying areas and population, they are not used directly in the model for the sake of flow generation. Instead, the inflow and infiltration calculations were done outside of the model (based on the information from the subcatchments) and were imported to the model as inflow for nodes.

A better practice would be to use the subcatchments directly for flow generation in the model. However, using the nodes for flow generation in the model does not reduce the accuracy of the model, using subcatchments to generate the inflow and infiltration in the model would make it easier for the users to update the model based on the new development in the future.

Model Calibration:

The model was calibrated for dry and wet weather conditions using the flow monitoring data collected during the year of 2017. The calibration criteria are explained in Section 3 - Appendix D3 of the MSP. The dry weather calibration results are presented in Table 3.3 and wet weather calibration results are presented in Table 3.5 of the same document.

There are lots of deviations from the criteria for both dry weather and wet weather calibration. FM-07 and FM-11 show the major deviation in dry weather flow and FM-05, FM-10, and FM-11 show the worst wet weather flow calibration results.

Figure 1 and *Figure 2* below, show some good examples of acceptable dry and wet weather calibration from the report.

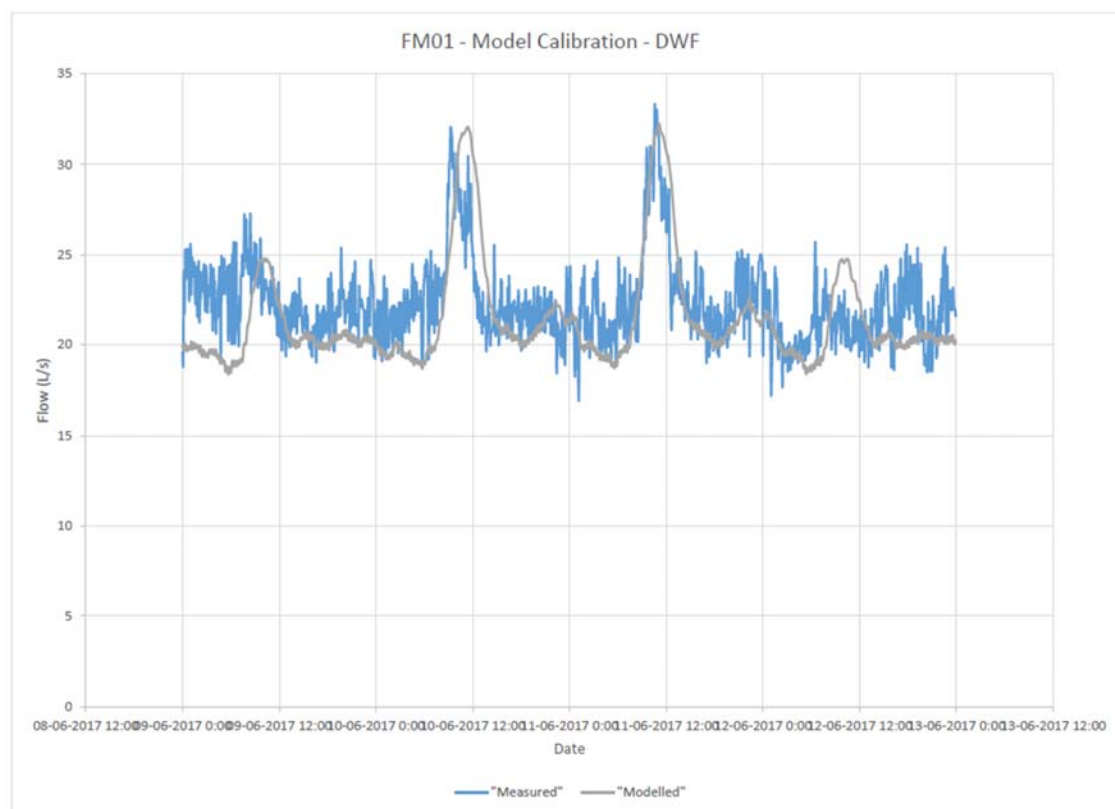


Figure 1 - Valid Dry Weather Calibration

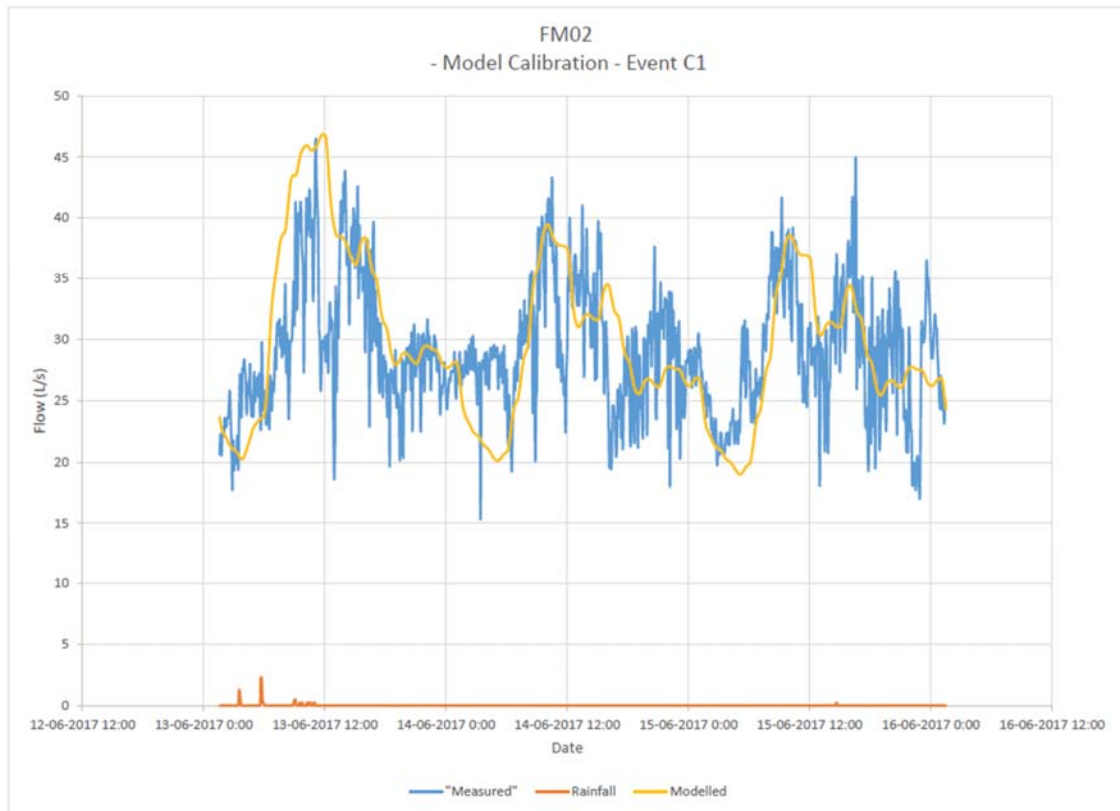


Figure 2 - Valid Wet Weather Calibration

However, there are many unacceptable calibrations as shown below, which the model either underpredicted or overpredicted the measured events.

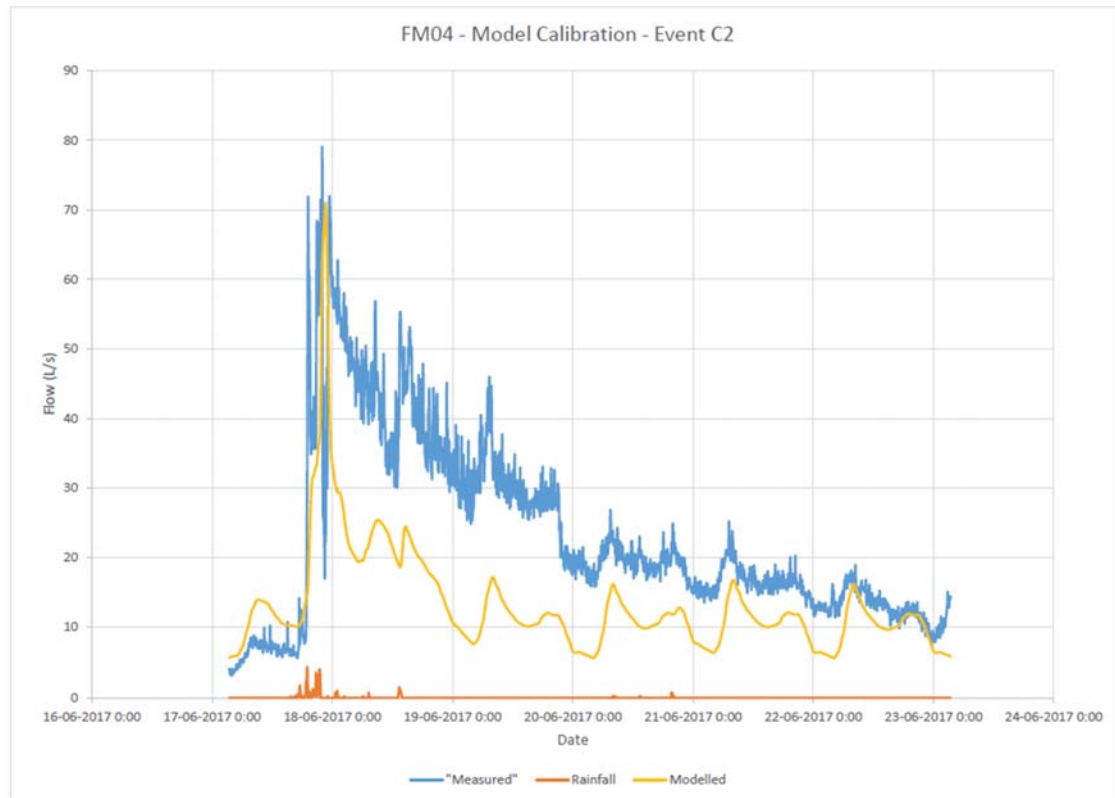


Figure 3 – Invalid Underprediction Calibration Example – June 17 Wet Weather Event

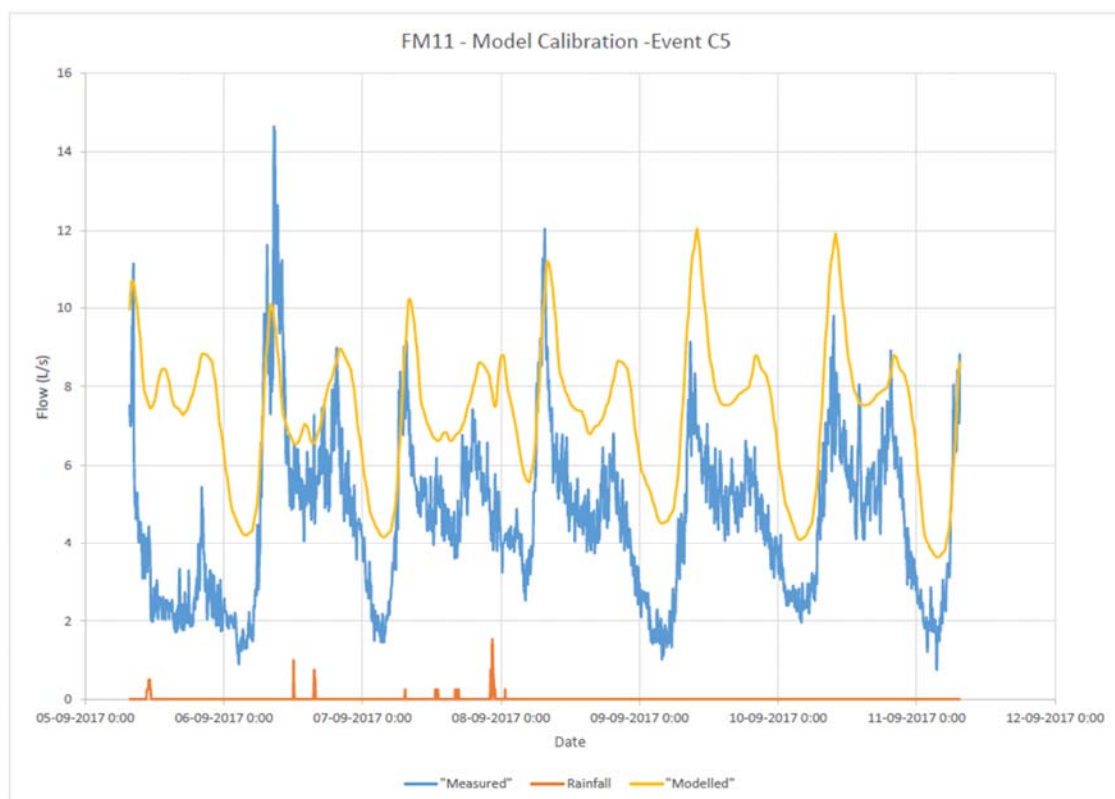


Figure 4 - Invalid Overprediction Calibration Example – Wet Weather and Dry Weather Events – September 2017

Although some cases of variation from the criteria is expected, Ainley believes there are many invalid

calibration instances for this model.

Having a properly calibrated model is very important as the town is going to decide about the future development and infrastructure upgrade based on the results of the model. *Figure 5* below is a profile of a sample pipe segment from the area associated with FM-05 under a 10-yr storm. The calibration accuracy of the model for FM-05 area varies from -221% to -14% for peak flow and from -3% to +63% for total flow. With the level of potential inaccuracy expressed by the calibration results, there is low confidence in the predictive validity of the model outputs. Available pipe capacity for new development cannot be accurately predicted with such a large calibration error.

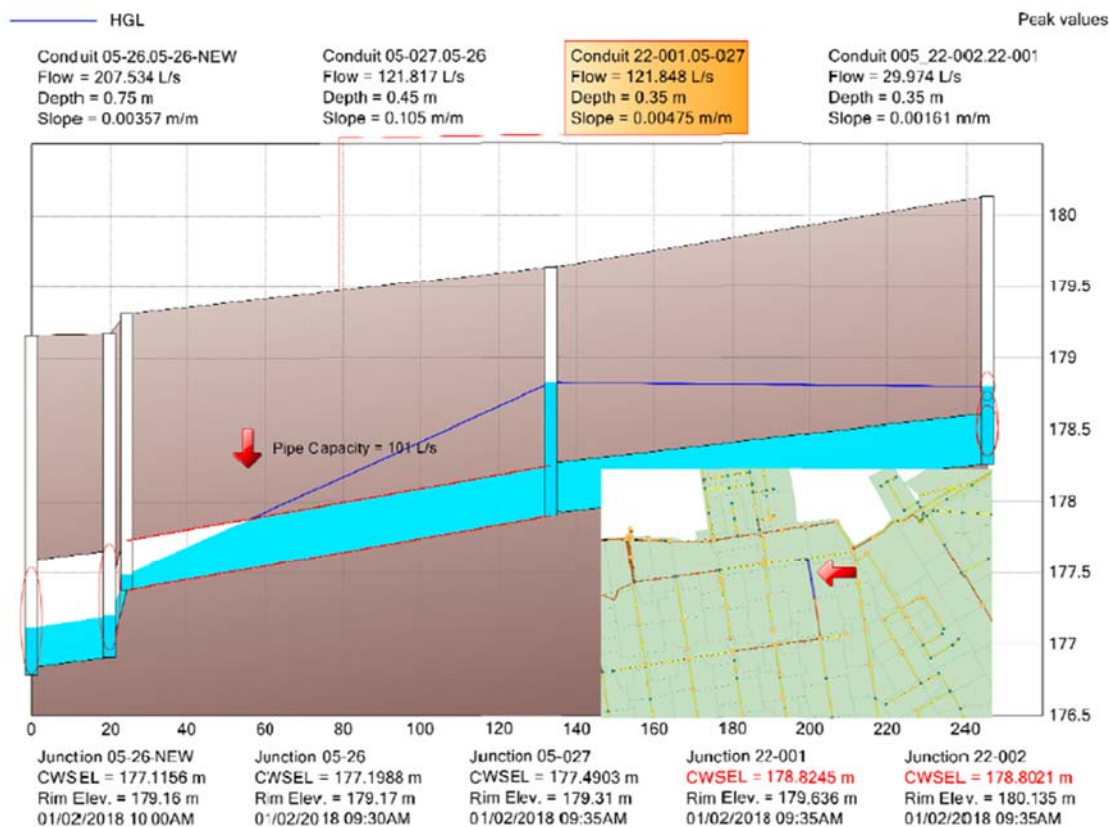


Figure 5 – FM-05 Area Sample Pipe During a 10-yr Storm Event

Similarly, *Figure 6* shows a profile for a segment in FM-11 area, where there are instances of -12% to +37% accuracy for the peak flow and -62% to +41% accuracy for the total flow. Considering the substantial inaccuracy, any modelling conclusion for the performance of the network is not reliable.

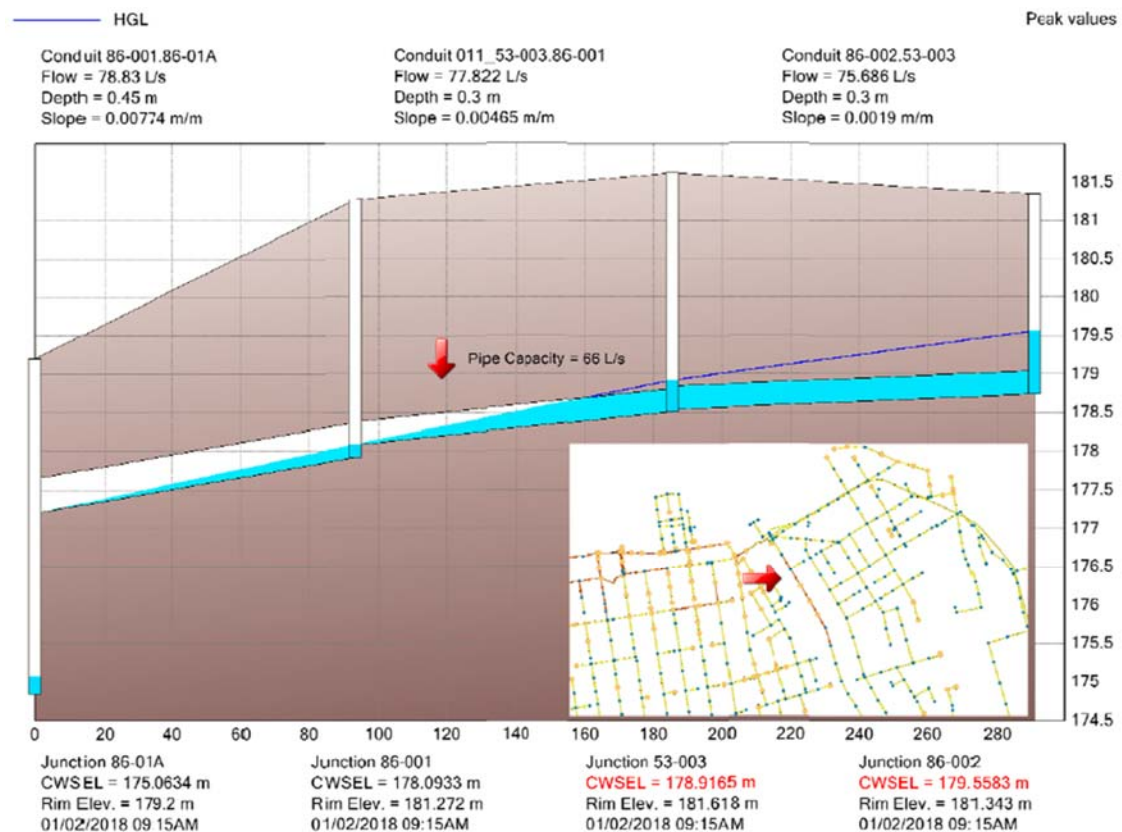


Figure 6 - FM-11 Area Sample Pipe During a 10-yr Storm Event

Also, reviewing the validation results in Table 3.6 - Appendix D3 of the MSP shows the model's ability to predict the flow within the acceptable criteria during the validation storm event for only half of the cases, which is below industry standard for sanitary model calibration.

Model Performance:

The model was used to assess the capacity of sanitary network pumping station, and forcemains under several conditions including dry weather flow (DWF), 2, 5, 10, and 25 years storm and historical June 17th, 2017 storm event. The study identified sanitary legs where d/D ratio exceeded 85% under several storm events scenarios, therefore, identified upgrades needed in the system (for sanitary network and sewer pumping stations).

Recommendation:

- 1- The model needs to be re-calibrated: The re-calibration effort needs to focus on achieving high accuracy for peak-flow events. The peak flow days are design events and an accurate understanding of these events is very important in assessing the capacity of the system and evaluating the system performance.
- 2- The results of FM-12 need to be presented: The results from FM12 is not shown in the report.
- 3- The characteristics of storm event C5 is needed: Table 3.1 in Appendix D3 is missing storm event C5 characteristics.