Appendix F Sanitary Sewer Calculations

SCS consulting group ltd

Appendix F.1 PEC Correspondance Re: Lalor SPS Capacity

SCS consulting group ltd

Costa, Cosimo

From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 16, 2025 11:43 AM
To: Costa, Cosimo
Cc: Schaefer, Steve; 'sobrien dlwengineering.ca'; Christopher Marchese; Alexandra De Gasperis; David MacPherson; Tyler Lasko
Subject: FW: Picton - Metting Re: Sani HGL & Monitoring
Attachments: RevisedModel_Lalor.png; RVAModel_Lalor.png

Hi Cosimo.

Further to your inquiry and our in person meeting Tuesday, June 10, CIMA+ has provided some context to the sanitary modelling work to date below and attached.

Please see the attached profiles. The model the County received from RVA had strange conditions around the pump station. CIMA+ surveying team went and scoped the manholes and revised the model. The two profiles are attached - we're not sure which one that the Base 31 team is using; please review.

The pumps are in the model to turn on and off with the max flow for each pump irrespective of water depth. This isn't exactly correct, however, we don't have the specific curves and with the static head and the way the model is created it's not a huge concern from our perspective. The issue you may be having is the peak flows in the existing conditions model from RVA is 364 L/s to Lalor Street PS; however, the station can only accommodate 350 L/s (2 large pumps in the model to represent firm capacity) so it shows a flooded system. The model that was created by the RVA team is most probably conservative as it combines Harmon Peaking Factors across sub catchments. This leads to a PIF of > 9 at the last point in the system which is Lalor Street. Noting this, the MSP process has acknowledged a need to complete further flow monitoring and updating the model to be more dynamic and calibrated to the actual conditions present. Note that this is an expensive effort and was not included in the original scope of work for the Picton MSP. As such, it is a recommendation within the Picton MSP to undertake this work in future, subject to final approvals and budget.

That being said, we know that the Lalor SPS has conveyed 313 L/s over a sustained hour in 2017 and did require all three pumps to run at a period. The 2017 data was captured in the MSP background data review. Subsequent years were more moderate and it is well understood that 2017 was a wet year across the region. Although the model is conservative, the actual data does not support an additional 60 L/s into Lalor without upgrades and/or reducing I&I within the network. If Lalor is upgraded to have three large pumps run, this is expected to trigger headworks upgrades at the WWTP as it is only designed to take two large pumps. The SPS and Screens are to be designed for PIF, hence without reducing inflows additional capacity at Lalor in excess of 350 L/s requires large capital works at the WWTP.

As you can see, this becomes somewhat of a risk management exercise. This could include ways to mitigate this risk with a lift station at the WWTP.

Please review and see me direct for further conversation and I can coordinate parties as needed.

Tyler

Tyler Lasko, P.Eng.
Lead Engineer – Heights Development Area, Development Services
The Corporation of the County of Prince Edward
T: 613.476.2148 ext. 2039
tlasko@pecounty.on.ca

Please be aware that I will be away from the office from Friday, June 27 to Friday, July 4, 2025

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From: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Sent: June 6, 2025 6:59 PM
To: Tyler Lasko <tlasko@pecounty.on.ca>
Cc: Schaefer, Steve <sschaefer@scsconsultinggroup.com>
Subject: RE: Picton - Metting Re: Sani HGL & Monitoring

Tyler,

Further to our meeting this morning, we provide the following outline of our findings with respect to the PCSWMM Sanitary HGL upstream of the Lalor BS.

In essence, the model is illustrating a significant surcharge at the station in both the existing and proposed conditions. The surcharge is approximately 1 metre above the inlet pipe's obvert (the proposed condition is only 12 cm higher than existing), with an elevation of 77. Another concern is that the HGL calculated by the model is about 75 cm higher than the emergency spill elevation which outlets to Picton Bay (the emergency spill elevation is 76.25). This would mean that sanitary effluent discharges to Picton Bay regularly which you confirmed is fortunately, not the case. Based on this reality, we are providing the following information for the County's review:

- Profile of Sanitary Sewer Upstream of Lalor Station – Existing Condition
- Profile of Sanitary Sewer Upstream of Lalor Station – Proposed Condition
- Plan View of Sanitary Sewer Upstream of Lalor Station – Proposed Condition
- PCSWMM Model Data of Existing Condition
- PCSWMM Model Data of Proposed Condition
- Pump Curve Data

To access this information, please use the following link:
https://filesafecloud.scsconsultinggroup.com/url/kwjxxv4tdsvyguzt

Please click on the link and download all files from this location.
This file transfer link will expire on September 05, 2025.

If you have any questions during your review, please feel free to call.

Regards,

Cosimo Costa, P.Eng.
Associate

SCS consulting group ltd
Land Development Consultants

905 475 1900 *x2359*
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30 Centurian Drive, Suite 100,
Markham, ON, L3R 8B8
ccosta@scsconsultinggroup.com

CELEBRATING 20 YEARS

From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 6, 2025 8:49 AM
To: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Subject: RE: Picton - Metting Re: Sani HGL & Monitoring

yes please - see you then

From: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Sent: June 6, 2025 8:49 AM
To: Tyler Lasko <tlasko@pecounty.on.ca>
Subject: RE: Picton - Metting Re: Sani HGL & Monitoring

10 am works for me. If that works for you as well, I'll send an invite. LMK.

Thanks

Cosimo Costa, P.Eng.
Associate

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30 Centurian Drive, Suite 100,
Markham, ON, L3R 8B8
ccosta@scsconsultinggroup.com

CELEBRATING 20 YEARS

From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 6, 2025 8:39 AM
To: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Subject: RE: Picton - Metting Re: Sani HGL & Monitoring

what time this am good for you - lets discuss via teams or zoom Tyler

---

From: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Sent: June 5, 2025 3:13 PM
To: Tyler Lasko <tlasko@pecounty.on.ca>
Subject: Picton - Metting Re: Sani HGL & Monitoring

Tyler,

There are two issues related to the sanitary sewer that I would like to discuss with you, preferably before this week's end if your schedule permits. The two issues are:

- The starting HGL at the Laylor Station
- Flow monitoring upstream of the Laylor Station

I'm free anytime during the remainder of today and have a meeting tomorrow between 3 and 4, but can meet any time outside of that.

Thanks

Cosimo Costa, P.Eng.
Associate

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ccosta@scsconsultinggroup.com

CELEBRATING 25 YEARS

Costa, Cosimo

From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 26, 2025 4:32 PM
To: Costa, Cosimo
Subject: RE: Picton - June 10th Meeting Minutes & Cross Sections

WWW Operations is reminding me that the Lalor SPS max min levels are 2.4m and 1.4m respectively if you need to adjust this in the modeling. Other than that they advise it doesn't surcharge because it stays within these limits under the current flow rates. Tyler

---

From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 25, 2025 10:37 AM
To: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Cc: Alexandra De Gasperis <alexandra@decocommunities.ca>; Christopher Marchese <cmarchese@decocommunities.ca>; 'sobrien dlwengineering.ca' <sobrien@dlwengineering.ca>; Schaefer, Steve <sschaefer@scsconsultinggroup.com>; David MacPherson <dmacpherson@pecounty.on.ca>; Tyler Lasko <tlasko@pecounty.on.ca>
Subject: FW: Picton - June 10th Meeting Minutes & Cross Sections

Hi Cosimo.

Thanks for the discussion yesterday on project items. Here's my brief summary with actions.

June 10 meeting minutes

- find attached proposed edits for the June 10 meeting minutes - this is my quick review to provide PEC perspective
- following update, please circulate to all parties in attendance with direction to provide any final comments by a specified date (one week should be fine)

- Flow Testing Protocol - SCS/DLW to advise if any needed edits, additions or questions to finalize this before testing
- Flow Testing Date - Julia R SCS and I discussed this am and she noted there would be correspondence today confirming July 8 at 10:00am

- 2.4 - emergency spill overflow elevation confirm - CIMA+ is checking how the overflow is surveyed on their end and should get back to me shortly - PEC to advise
    - CIMA+ noted that the way the model was constructed previously as steady state, the pump station either keeps up or it doesn't so over the simulation period its either at an operating level or flooded
    - in the meantime, IM not sure is you can correlate the elevations for the overflow and an adjacent MH between the as built and your model info will help?

- 2.6 - Lalor SPS water level data - PEC to provide max/min/mean date daily for the last couple years in the next day

- 2.7 - CLI ECA is attached for your reference

- Sanitary - as you are working on preparing updated sanitary info, please include reply to the CIMA+ commentary dated 18 March 2025 as part of comprehensive sanitary review - sorry I missed discussing this one yesterday but I wanted to get it on the list here

- 3.0 SWM - SCS to submit summary package for wetland proposal for PEC review; we have had some preliminary discussion and reviewed the MECP design guide and suggest the following be covered in the summary as these will likely be questions to be answered
    - confirm wetland meets same requirements as a wet pond pre to post for quality and quantity
    - specify if wetland has same performance for large weather events and quantity management
    - confirm suitable area for this feature within the most current block plan - wetland design requires more area than wet pond
    - discuss any implications due to winter conditions - wetland is shallow (150mm to 300mm deep) and will be frozen solid in winter - how does this affect performance?
    - consider that this outlet is the same as was overloaded earlier this year to our neighbours at the cemetery - we should be prepared to receive inquiry about how this SWM feature maintains or improves current conditions and provides for suitable outflow in consideration of the downstream flow path to the creek and the related sensitivities

ISA and Site Works

- Discussed with Julia R this am and she is sending a follow up email today with summary of next steps and timing

As Builts

- PEC input provided and documents to be revised by SCS and redistributed

Pre Servicing

- for PEC review - PEC in receipt of standard pre servicing agreement with Base31 input and proposed revisions
- SCS requested some further details on pre servicing submission requirements (drawings required, securities, etc.) - PEC to advise

Operations Contract with Aquatech

- provided to PEC for reference; PEC noted the DLW Operating Manual Schedule has numerous references to County responsibilities - PEC to review and provide suggested edits to Base31 direct for awareness

Private Sanitary ECA

- PEC review comments and signature provided to SCS
- application to be submitted to MECP by SCS

Water NMYRR registration

- application to be submitted to PEC for review and signature once completed by SCS

Let me know if I've missed anything.

Tyler

Tyler Lasko, P.Eng.
Lead Engineer – Heights Development Area, Development Services
The Corporation of the County of Prince Edward
T: 613.476.2148 ext. 2039
tlasko@pecounty.on.ca

Please be aware that I will be away from the office from Friday, June 27 to Friday, July 4, 2025

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From: Tyler Lasko <tlasko@pecounty.on.ca>
Sent: June 23, 2025 11:01 AM
To: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Cc: Alexandra De Gasperis <alexandra@dececommunities.ca>; Christopher Marchese <cmarchese@dececommunities.ca>; 'sobrien dlwengineering.ca' <sobrien@dlwengineering.ca>; Schaefer, Steve <sschaefer@scsconsultinggroup.com>; David MacPherson <dmacpherson@pecounty.on.ca>; Tyler Lasko <tlasko@pecounty.on.ca>
Subject: FW: Picton - June 10th Meeting Minutes & Cross Sections

Hi Cosimo.

Thanks for this. Please send me a Teams meeting invite for Tuesday (tomorrow) as you requested to review the attached. I am available all day except between 11:00 and 1:00. Thanks. Tyler

---

From: Costa, Cosimo <ccosta@scsconsultinggroup.com>
Sent: June 20, 2025 5:01 PM
To: Tyler Lasko <tlasko@pecounty.on.ca>
Cc: Alexandra De Gasperis <alexandra@dececommunities.ca>; Christopher Marchese <cmarchese@dececommunities.ca>; sobrien dlwengineering.ca <sobrien@dlwengineering.ca>; Schaefer, Steve <sschaefer@scsconsultinggroup.com>
Subject: Picton - June 10th Meeting Minutes & Cross Sections

Tyler,

Please find attached minutes from our June 10th meeting. Please note the following:

- Action items are highlighted in bold
- Action items which have been addressed post meeting have been updated with "POST MEETING NOTES"
- We have only sent the minutes to you in case there are any comments from the County before we circulate to the rest of County staff, or alternatively, you can distribute if you are satisfied with them

The cross sections which we presented and discussed can be accessed by following this link:

https://filesafecloud.scsconsultinggroup.com/url/yhzavqpzgijiz7uc
Please click on the link and download all files from this location.
This file transfer link will expire on September 19th, 2025.

We would like to meet early next week to discuss the remaining action items and their timing, as well as your June 16 email regarding the sanitary HGL. I'm free anytime on Tuesday. Let me know if that works for you.

Thanks and have a great weekend.

Regards,

Cosimo Costa, P.Eng.
Associate

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CELEBRATING 20 YEARS

Appendix F.2 RVA Report

R.V. Anderson Associates Limited
2001 Sheppard Avenue East, Suite 300
Toronto ON M2J 4Z8 Canada
T 416 497 8600 F 855 833 4022
rvanderson.com

TECHNICAL MEMORANDUM

To:	County of Prince Edward	**RVA:**	153239
From:	Rika Law, P.Eng., PMP		
Date:	March 9, 2023		
Subject:	Picton Sanitary Model - VineRidge Boutique Towns		

1.0 Introduction

R.V. Anderson Associates Limited (RVA) was retained by the County of Prince Edward (County) to conduct a preliminary analysis and technical review of the sanitary collection system proposed by VineRidge Boutique Towns subdivision (VineRidge subdivision) and advise of the impacts to the current sanitary collection system. The proposed development intends to demolish and replace the existing eastern portion of the Macaulay Village development.

An original assignment was undertaken by RVA in late 2020 to early 2021, when the VineRidge subdivision proposed 560 townhouse units with 1188 people in their September 2020 Functional Servicing Report. The County retained RVA to conduct a technical review of the functional servicing report for sanitary servicing and its impacts to the current sanitary collection system. RVA used the Picton sanitary model provided by the County, which was originally developed by TSH (now Aecom) in 2006. The original model had 30.3 L/s as the peak flow assigned to the model. The County provided flume flow data from 2020 during this assignment. RVA provided a technical memorandum in March 26, 2021 to document the findings from the technical review.

In 2022, the VineRidge subdivision proposed changes to the phasing, number of units and population for the subdivision and submitted an updated plan, dated May 2022, to the County. The updated number of units was 432, with an estimated population of 1175 people. Subsequent to the May 2022 report, the developer's consultant (John Towle Associates Limited) updated the desired units to 394 as per his email of Dec 13, 2022 (refer to appendix 4). In December 2022, the County retained RVA to undertake a technical review of the updated subdivision plans to advise of the impacts to the current sanitary collection system. In addition, the County provided four (4) years of flume data, from 2019-2022, so that RVA could recalibrate the sanitary model. This technical memorandum is an update to the March 2021 technical memorandum and documents our assessment of the revised subdivision plans and the new flume data.

2.0 Background and Existing Macaulay Village Sanitary Collection

The Macaulay Village has municipal wastewater servicing via a series of sanitary sewers throughout the development that combines in a central sanitary sewer that is installed beneath County Road 22. There is sanitary flow measurement through a flume upstream of the County Road 22 crossing. The topography in the immediate Macaulay Village area is fairly flat, and slopes down towards County Road 22. The topography around County Road 22 and towards the Picton Wastewater Treatment Plant includes a series of steep slopes and gentler slopes. As such, the sanitary sewer follows the terrain with a wide range of sewer slopes. The sanitary sewers drain to the Lalor Sewage Pumping Station (SPS) which collects all the sewage from Picton and pumps it to the Picton Wastewater Treatment Plant (WWTP) for processing.

Consideration for the capacity of the Lalor SPS and Picton WWTP were not part of the scope of this assignment. However, their capacities should be checked to confirm if additional upgrades are needed at these facilities as well, as a result of the proposed flows from the VineRidge subdivision. During the time of this assignment, the County is also undertaking a Picton Master Servicing Plan with another consultant. It is recommended that the findings from this assignment be considered in the Picton Master Servicing Plan.

3.0 Flow Monitoring Data

A flume was installed by the County in 2019, downstream of the sanitary collection network at MH893_London. The flume recorded the water level (head) which is used to calculate flow from a formula tailored to the geometry of the flume. The received data, provided by the County on (DATE), included the water level and corresponding flow, recorded at 5 minute intervals, for the period of 2019 to 2022. Section 6.1 describes the existing condition and shows the flume location (refer to Figure 5).

3.1 Flow Data Analysis

During the data review, a number of outliers were identified, and further analysis was conducted to give a better understanding of the flow monitoring data. There are specific dates when the flume recorded negative values for water level (e.g., -40 mm). It should be noted that the sensor could experience instability due to unstable flow conditions (e.g., foam build-up, debris, surcharging, etc.). To remove the outliers, all water levels within 2 hours before and after these negative values are removed from the data source. The following list presents the dates when the flume recorded negative values for water level. It should be noted that on some of these dates, the sensor recorded a negative water level for only 5 minutes (e.g., June 4, 2021).

1. October 31, 2019
2. November 1, 2019
3. December 10, 2019
4. January 11, 2020
5. January 12, 2020
6. January 13, 2020
7. March 3, 2020
8. March 4, 2020
9. March 5, 2020
10. March 10, 2020
11. August 2, 2020
12. December 25, 2020
13. January 27, 2021
14. March 11, 2021
15. March 12, 2021
16. June 4, 2021

Also during the data review, RVA noticed that there were two days that showed a significant increase in the recorded water level (e.g., 400 mm), and the corresponding flow increased dramatically (e.g., 200 L/s). Since the 250mm pipe was not capable of conveying high flows of around 200 L/s, therefore, this data has been identified as outliers, and removed from consideration in the analysis of flows. The following list presents the dates that the flume recorded unrealistic water levels:

1. December 23, 2022
2. December 31, 2022

However, it should be noted that a meteorological station at Point Petre (one of the few available stations in the County) reported high precipitation amounts during these dates. As such, it is possible that there were wet weather events occurring during this period and the flume was recording higher than normal amounts of flow. The exact amount of flow cannot be determined as result of the limitation of the measuring device. It is likely that flows in excess of 20 L/s were experienced in the system.

3.2 Conversion of the 5-minute data to average hourly data

Ignoring the outliers identified above, the 5-minute data readings were converted to the average hourly data and plotted in the graph. Figures 1 to 4 illustrate the flow monitoring data (after removing the outliers) for the years 2019 to 2022, respectively.

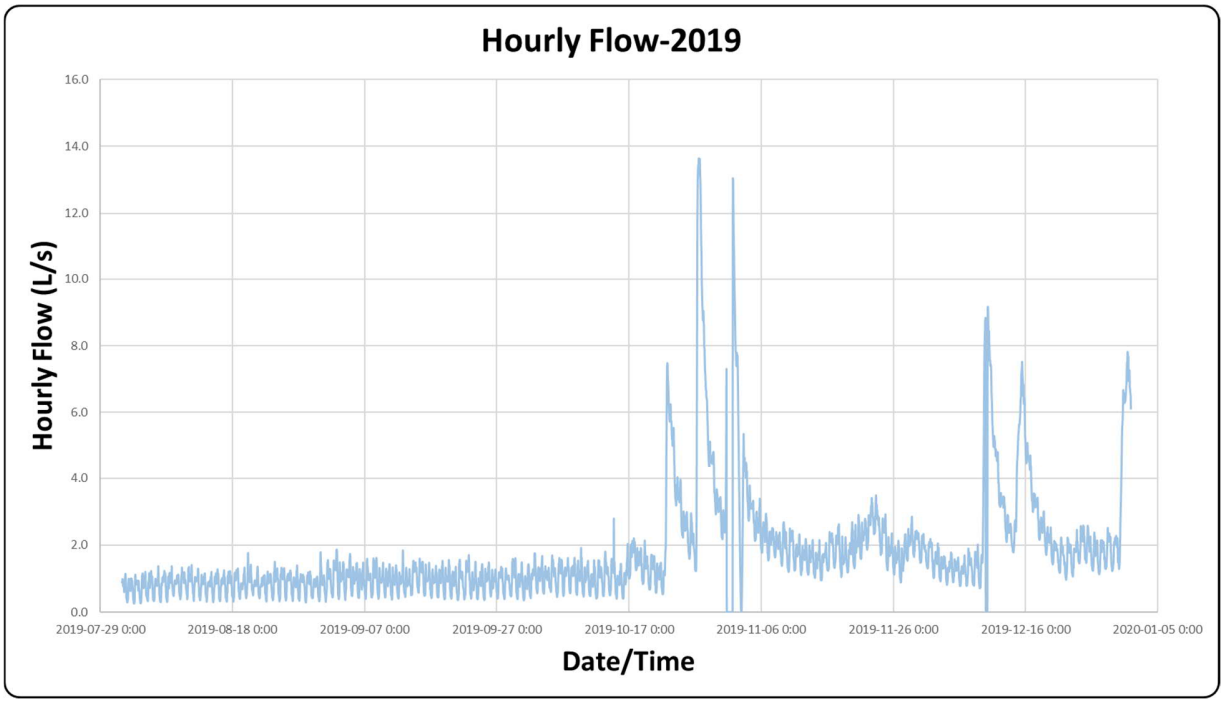


Figure 1- Hourly Flow in 2019

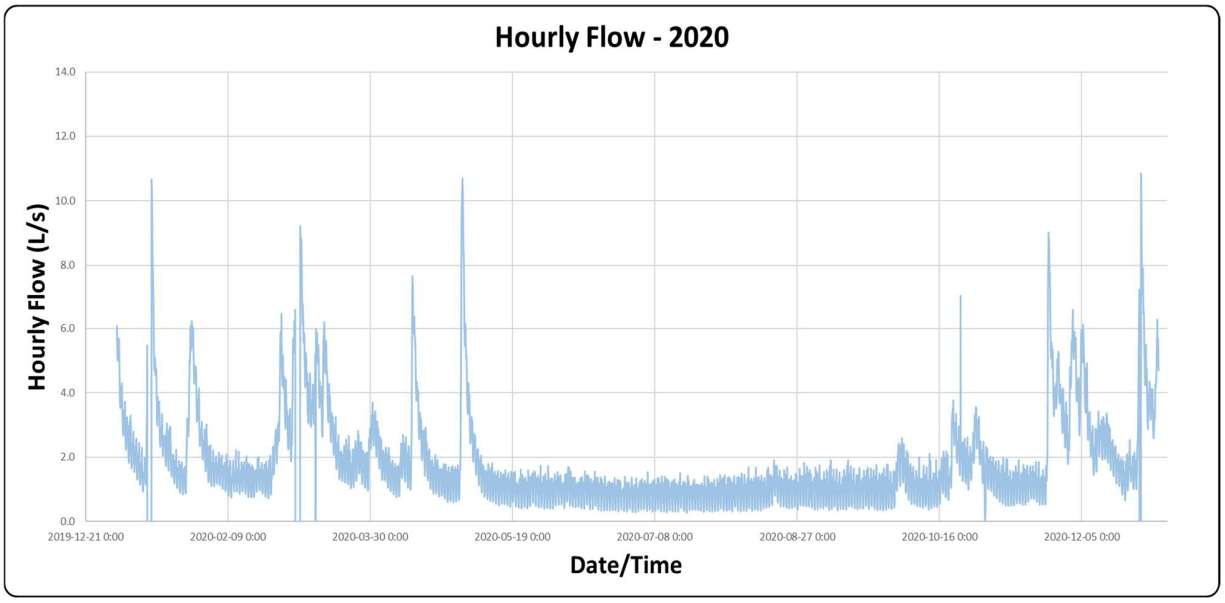


Figure 2- Hourly Flow in 2020

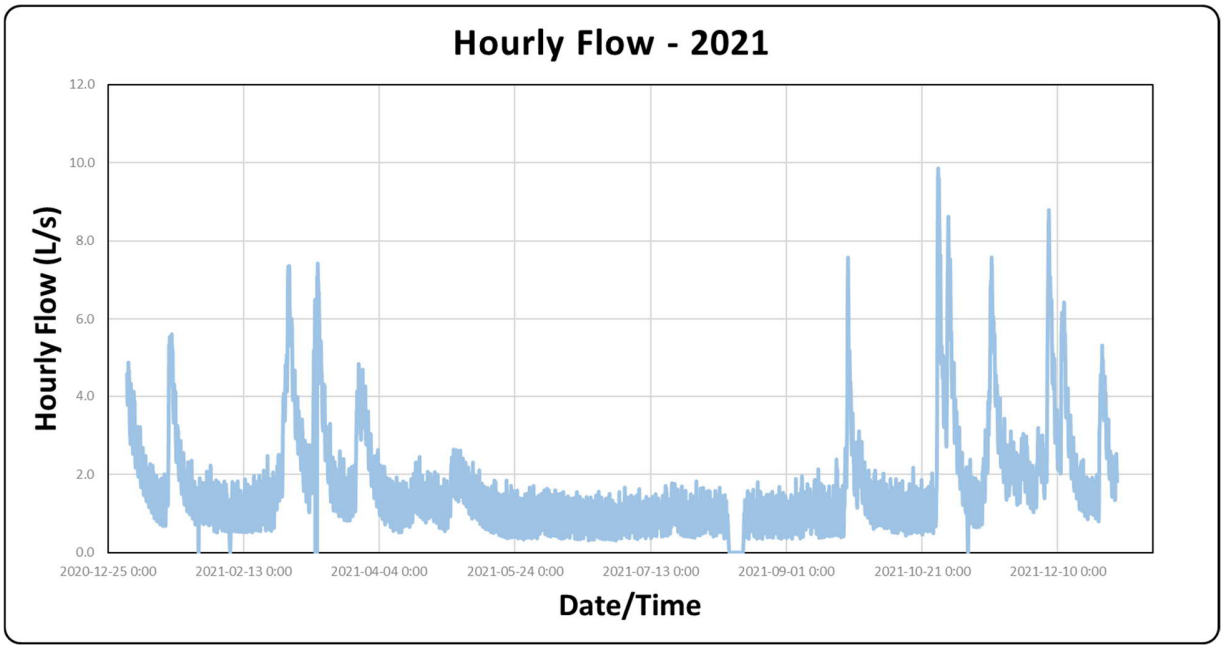


Figure 3- Hourly Flow in 2021

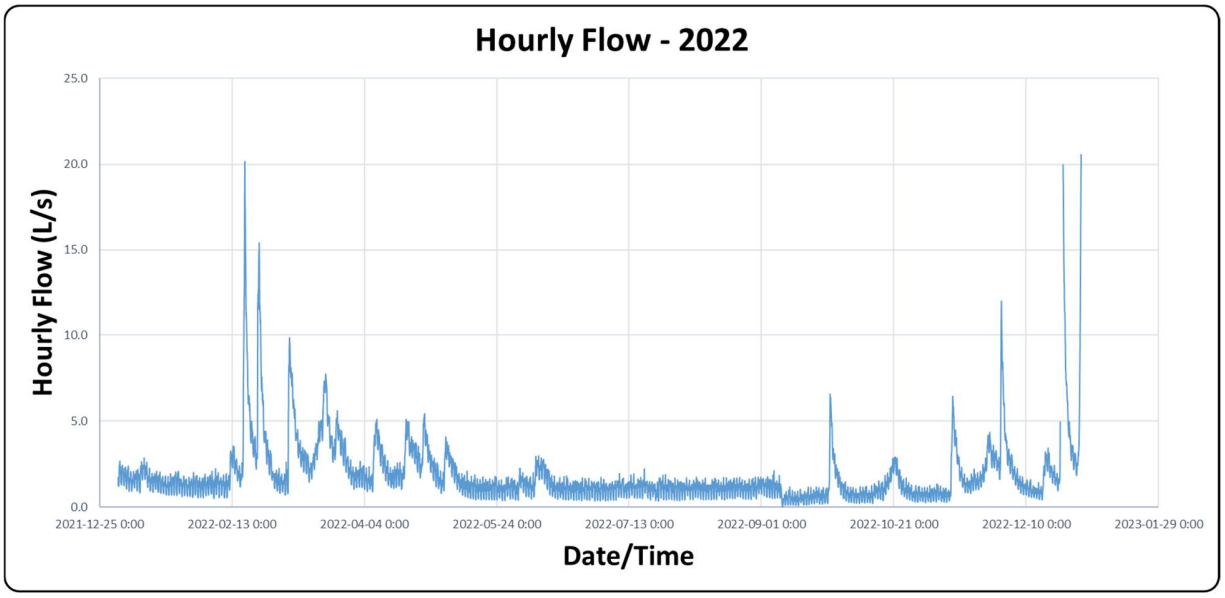


Figure 4- Hourly Flow in 2022

4.0 Existing Flow

Analysis of the flow data indicated that during these 4 years the average daily flow was approximately 1 L/s. However, there were 10 days with recorded peak flows greater than 10 L/s. The system experienced more events with peak flow above 15 L/s in 2022 than compared to other years (i.e., 2019-2021). Also, the flow monitoring data showed that in 2022, three events with a peak flow equal to or above 20 L/s were recorded. Accordingly, 20 L/s was selected as the existing peak flow experienced in the sanitary model based on the number of occurrences and values recorded. It should be noted that a comparison of the average day flow of approximately 1 L/s to a peak flow of 15 to 20 L/s indicates that the existing system is subject to significant influence from inflow and infiltration.

Table 1 presents the number of days with a peak flow of more than 15 L/s, between 15 L/s to 20 L/s, and equal to or above 20 L/s.

Table 1- Flow Monitoring Data Summary

Year	Number of days with Peak flow between 10 to 15 (l/s)	Number of days with Peak flow between 15 to 20 (l/s)	Number of days with Peak flow equal or above 20 (l/s)
2019	2	-	-
2020	3	-	-
2021	-	-	-
2022	1	1	3*

*Note that the maximum recorded peak flow between 2019-2022 (not counting the outliers) is 20.6 L/s.

It should be noted that flows higher than 20 L/s could have been experienced, or will be experienced, in the system. Since the available flume data was only for the period of 2019-2022, this may not have covered a 10-year or 20-year storm event. Therefore, the flows that were used in the original Picton sanitary model should not be disregarded. In addition, due to climate change, more frequent and more severe weather events could be expected in the future. The two December 2022 days with outlier data reporting high levels and high flow values are indicative of peak flow events that exceed the 20 L/s demonstrated in the selected data. It should be noted that with the limited data, the absence of calibration reports and the inability to check if statistically relevant weather events were experienced at the Macaulay Village location during 2019-2022 period, caution should be used when relying on the data.

5.0 Future Flow

According to the May 2022 Functional Servicing Report, the new development is proposed to be constructed in two phases: Phase 1 and Phase 2. As mentioned in Section 1.0, the desired number of units was updated to 394 by the developer's consultant. This information was used to calculate the future flow that could be expected from the VineRidge Boutique Towns Development (VineRidge). Table 2 and Table 3 present population and flow generating parameters for phase 1 and phase 2, respectively.

Table 2 – Parameters and Corresponding Values to Calculate the Phase 1 Flow

Parameter	Values
Number of Units	209
Person Per Unit (PPU)	2.5[1]
Average Daily Domestic Flow (L/cap/day)	350[1]
Area (ha)	6.6[1]
Infiltration Rate (L/s/ha)	0.26
Total Population	523
Harmon Peaking Factor	4.0

1- These values were provided by the developer for VineRidge Boutique Towns.

Table 3-Parameters and Corresponding Values to Calculate the Phase 2 Flow

Parameter	Values
Number of Units	185
Person Per Unit (PPU)	2.5[1]
Average Daily Domestic Flow (L/cap/day)	450[1]
Area (ha)	5.9[1]
Infiltration Rate (L/s/ha)	0.26
Total Population	463
Harmon Peaking Factor	4.0

1-These values were provided by the developer for VineRidge Boutique Towns.

5.1 Future Development Flow - Phase 1

Based on Table 2, the average dry weather flow (ADWF) and inflow and infiltration (I&I) rate in Phase 1 were calculated to be 2.12 L/s and 1.72 L/s, respectively. The following equation was used to calculate the peak flow under the wet weather flow (WWF):

$$Peak\ Flow\ under\ WWF\ = (ADWF * Harmon\ Peaking\ Factor) + I\ \&\ I$$

$$Peak\ Flow\ under\ WWF\ = \left(2.12\frac{L}{s} * 4\right) + 1.72\frac{L}{s} = 10.2\frac{L}{s}$$

The result of the above calculation indicated that the peak flow under WWF conditions in Phase 1 would be equal to 10.2 L/s.

The peak flow expected from the Phase 1 VineRidge development in addition to the existing peak flows that the Macaulay Village may be currently experiencing (minus the existing flows from the area replaced by the VineRidge development) would be approximately 22.8 L/s.

5.2 Future Development Flow - Phase 2

Based on Table 3, the average dry weather flow (ADWF) and inflow and infiltration (I&I) rate in Phase 2 were 2.41 L/s and 1.53 L/s, respectively. The following equation was used to calculate the peak flow under the wet weather flow (WWF):

$$Peak\ Flow\ under\ WWF\ = (ADWF * Harmon\ Peaking\ Factor) + I\ \&\ I$$

$$Peak\ Flow\ under\ WWF\ = \left(2.41\frac{L}{s} * 4\right) + 1.53\frac{L}{s} = 11.2\frac{L}{s}$$

The result of the above calculation indicates that the peak flow under WWF condition in Phase 2 would be equal to 11.2 L/s. It should be noted that this number only reflects the generated flow from Phase 2 alone. To calculate the ultimate peak flow in the future would be a combination of Phase 1 and Phase 2 flows of 10.2 L/s plus 11.2 L/s. Therefore, the ultimate peak flows anticipated from the VineRidge subdivision would be 21.4 L/s.

The peak flow expected from the Phase 1 & 2 VineRidge development in addition to the existing peak flows that the Macaulay Village may be currently experiencing (minus the existing flows from the area replaced by the VineRidge development) would be approximately 34 L/s.

6.0 Results of Hydraulic Analysis

To simulate the existing and future conditions, RVA used the original Picton sanitary model which was developed by TSH/AECOM in 2006. The sanitary model software is PCSWMM. Upgrades were made to the model based on local flow monitoring in certain areas within Picton to calibrate the model. Node elevation data, flows and pipe sizes in the model were obtained from the original TSH/AECOM model and remained as is unless the information was provided by the County or developers for specific areas. It should be noted that the original model did not provide information on the basis for the 30.3 L/s peak flow used in the existing Macaulay Village area.

6.1 Existing Condition

The PCSWMM model was used to simulate the existing flow condition and the results indicated that the sewer system had sufficient capacity to pass flows up to 20 L/s, but some locations would be at full pipe capacity and on the point of surcharging. Figure 5 illustrates the existing plan view and the color coding indicates the pipe capacity of the sanitary sewer network under peak flow conditions of 20 L/s.

A green coloured pipe would represent a pipe with substantial capacity available. A red coloured pipe would represent a pipe with little or no capacity available. The label of pipe

capacity of '1' would mean that the pipe was under full flow conditions and on the verge of surcharging. A pipe capacity greater than '1' would mean that the water level is above the pipe crown and is surcharging at an adjacent manhole (MH).

Larger versions of Figure 5 and other figures are available in the Appendices.

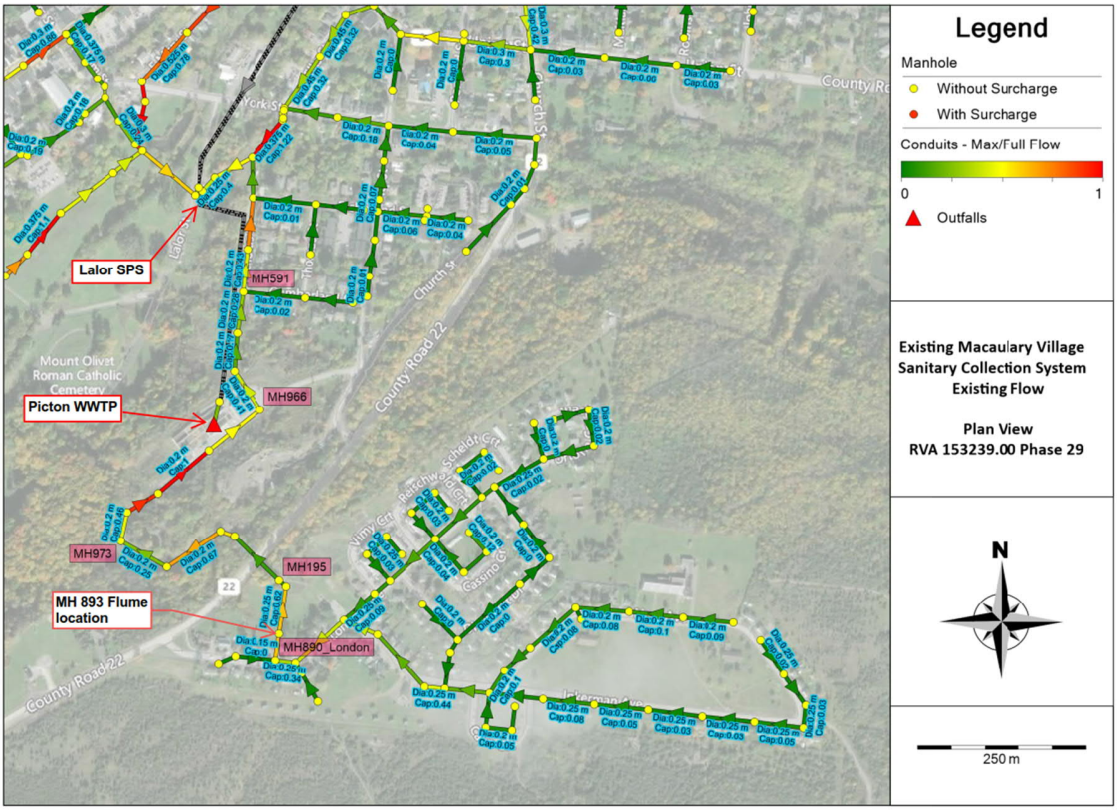


Figure 5 - Existing Condition - Plan View

Figure 6 illustrates the profile view from manhole 973 (Junction 973) to manhole 966 (Junction 966).

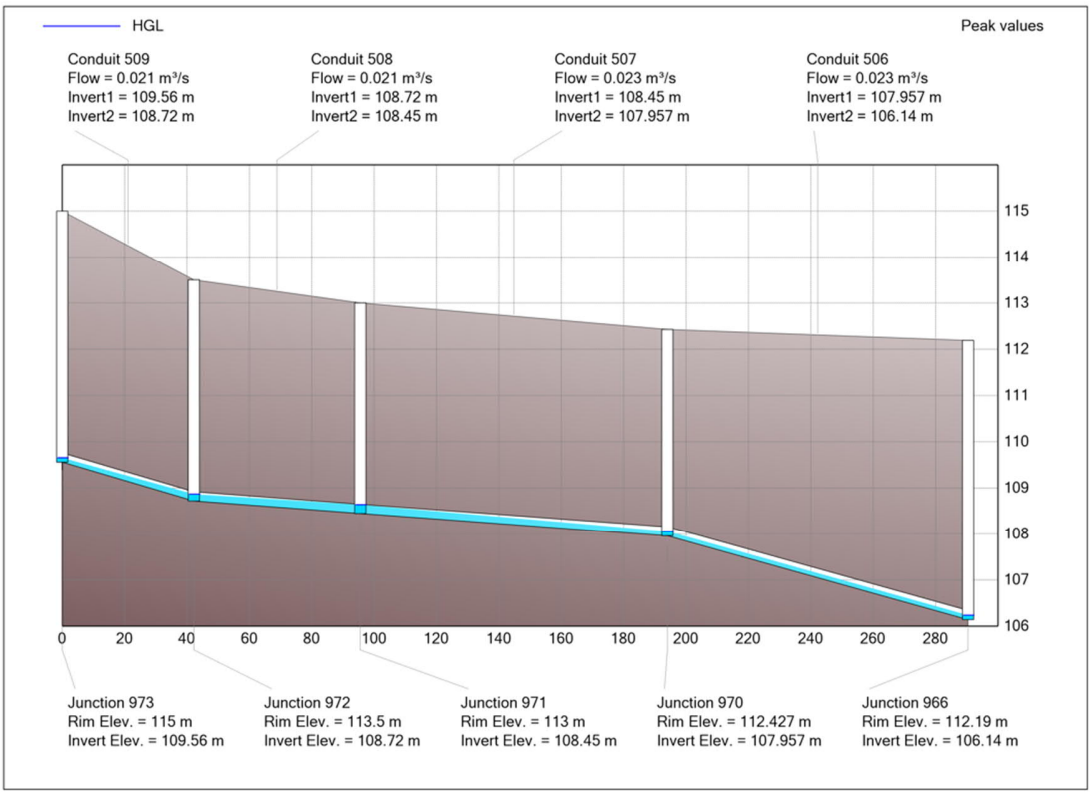


Figure 6 - Profile View from Manhole 973 to Manhole 966-Existing Condition.

6.2 Future Condition

The new sanitary sewer network (e.g., lengths, depths and MH inverts) were not provided as part of the Functional Servicing Report for VineRidge Subdivision, as such the total future peak flow was added as a new contributing node to the existing Macaulay Village sanitary collection system. Once the VineRidge subdivision provides additional data on the proposed sanitary sewer network, the sanitary model can be updated to suit.

6.2.1 Future Condition-Phase 1

The PCSWMM model was used to simulate the maximum hydraulic grade line (HGL) of the existing sanitary sewer system with the addition of Phase 1 VineRidge subdivision. The model result indicated that some pipes and manholes would experience surcharging conditions. Figure 7 and Figure 8 present the plan view and profile view from manhole 973 (Junction 973) to manhole 966 (Junction 966), respectively.

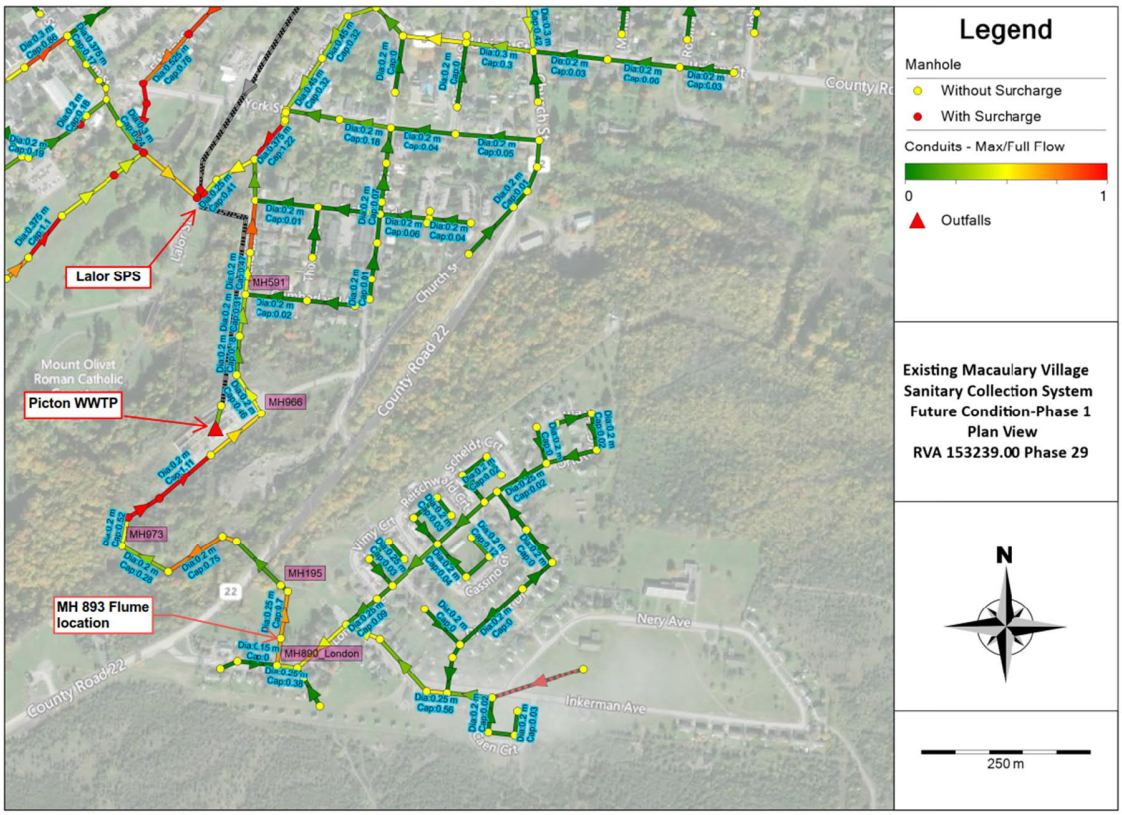


Figure 7- Future Condition- VineRidge Phase 1 - Plan View

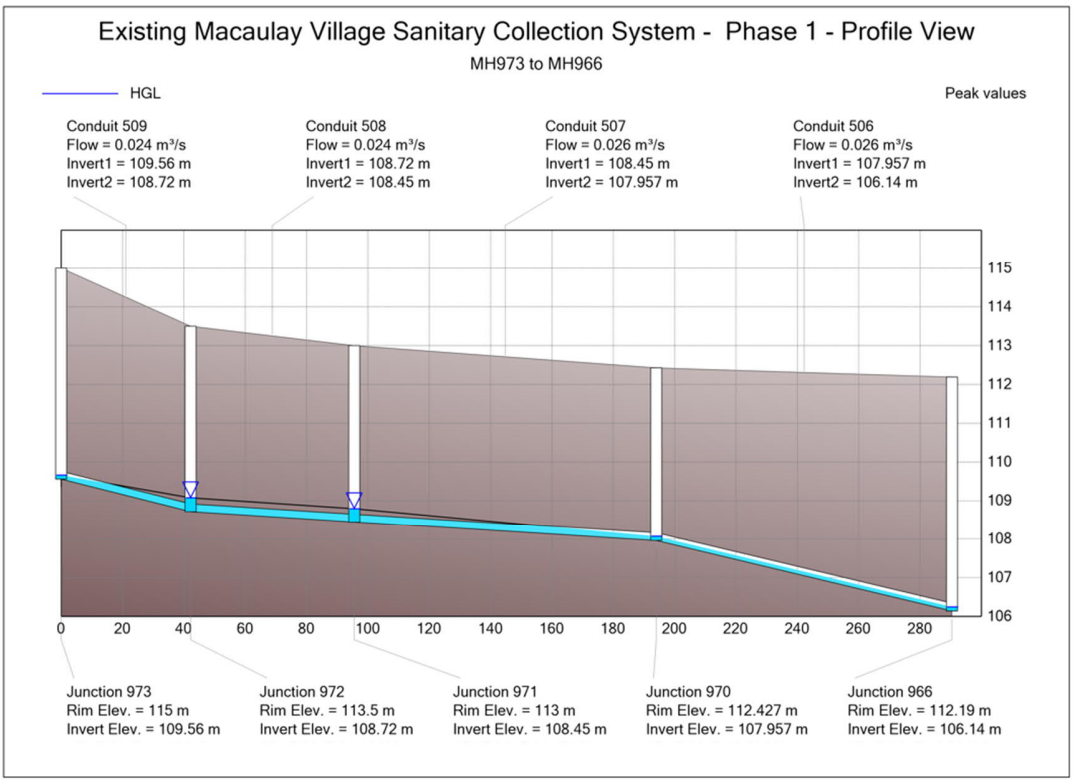


Figure 8 - Profile View from Manhole 973 to Manhole 966-Future Condition – VineRidge Phase 1

6.2.2 Future Condition-Phase 1 & 2

The PCSWMM model was used to simulate the maximum hydraulic grade line (HGL) of the existing sanitary sewer system with the addition of the Phase 1 & Phase 2 VineRidge subdivision. Adding more flow in the system resulted in more pipes and manholes experiencing surcharging conditions in comparison to when only Phase 1 was added. Figure 9 presents the plan view under the Phase 1 & 2 condition.

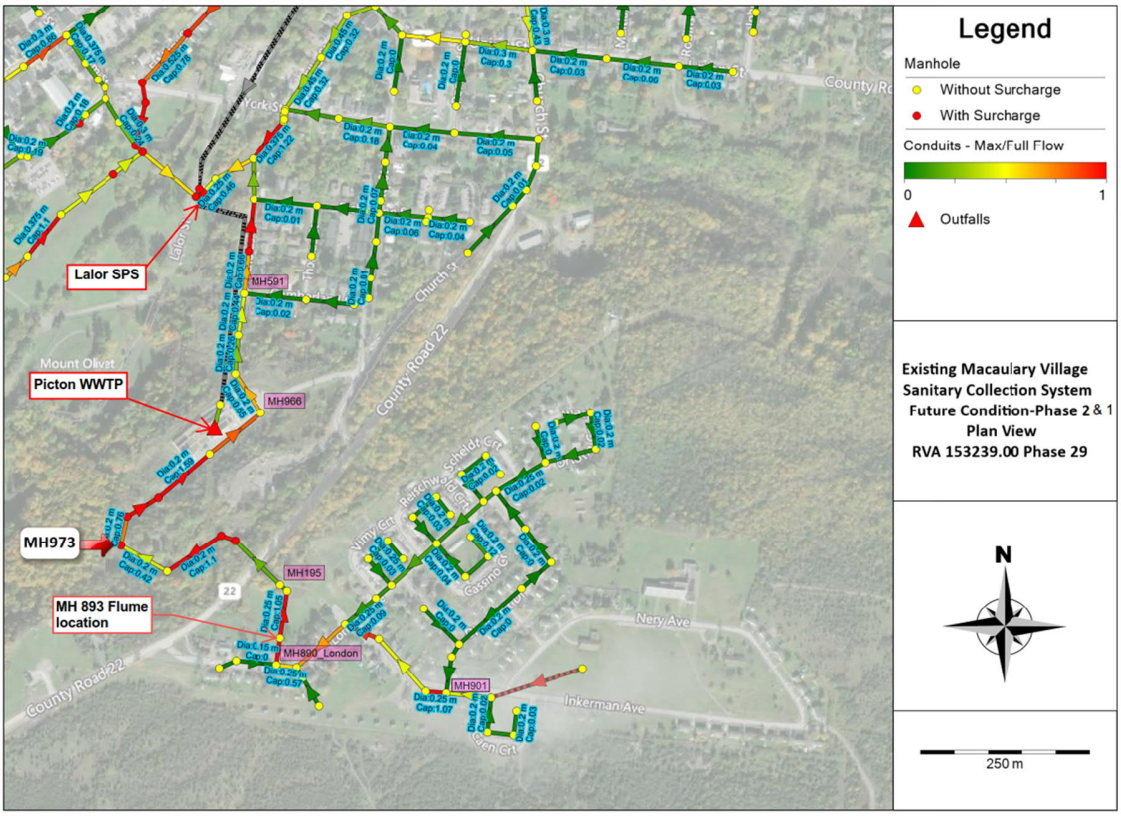


Figure 9 - Future Condition-VineRidge Phase 1 & 2 - Plan View

Figure 10 and Figure 11 illustrate the profile view from manhole MH195 to MH973 and MH973 to MH966, respectively.

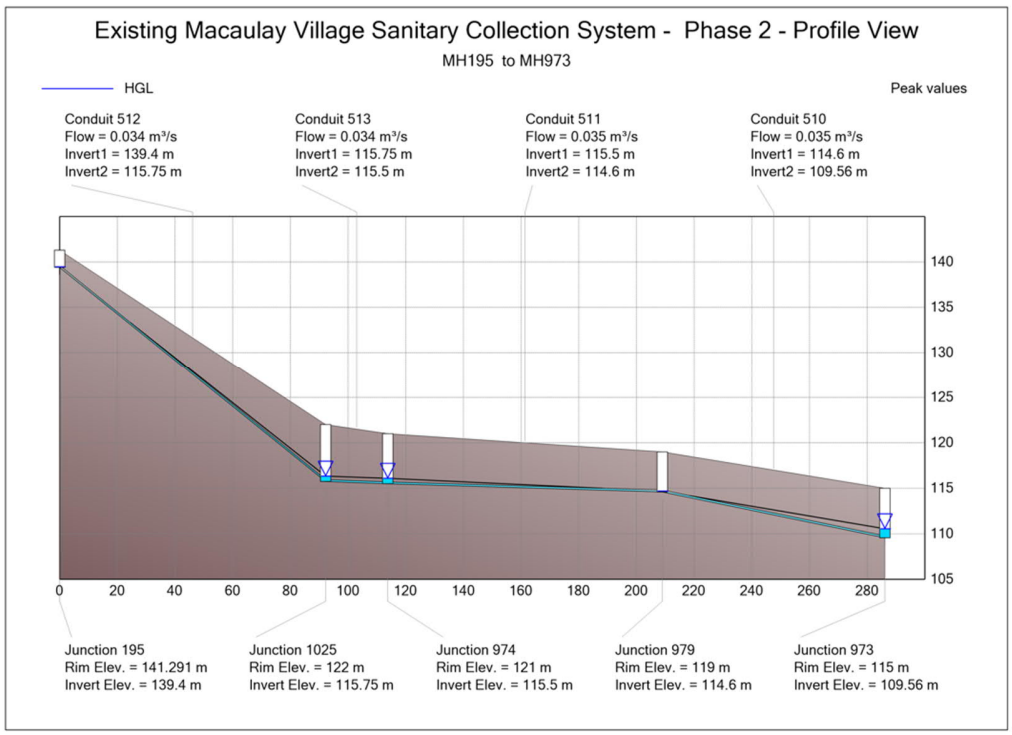


Figure 10 - Profile View from Manhole 195 to Manhole 973 - Future Condition - VineRidge Phase 1 & 2

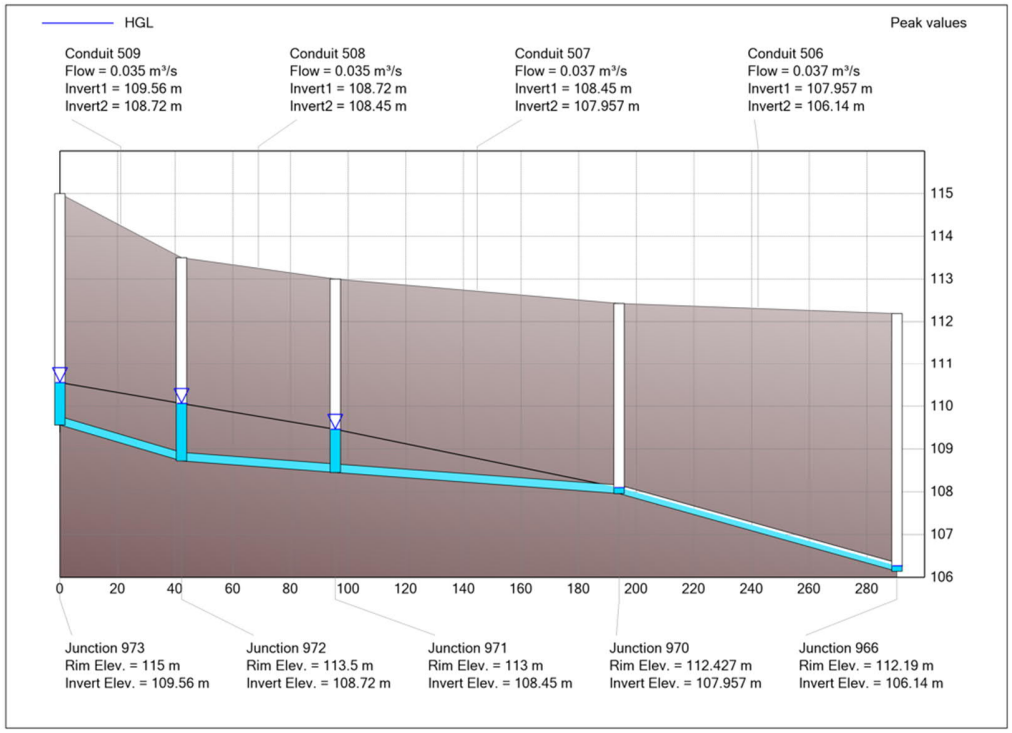


Figure 11-Profile View from Manhole 973 to Manhole 966 - Future Condition - VineRidge Phase 1 & 2

The impacts of the addition of VineRidge Phase 1, and Phase 1 & 2 to the existing sanitary sewer system are summarized in Table 4. Table 4 shows the length of pipes experiencing

capacity above 80%, or experiencing full flow and number of manholes surcharging during peak flows. It should be noted that the existing condition is based on the historical flow data as mentioned in Sections 3.0 and 4.0 and may not be a full representation of what the existing system has experienced in past wet weather events and will experience in the future.

Table 4-Length of Pipes and Manholes Experiencing Surcharging Under Various Conditions

Condition	Length of Pipe Above 80% Capacity[1]	Length of Pipe Surcharging	Number of Manholes Surcharging
Existing Condition	152 m	0 m	0
Existing with VineRidge Phase 1	228 m	194 m	2
Existing with VineRidge Phase 1 & 2	633 m	620 m	6

1 - 80% is the optimum hydraulic capacity of a sanitary sewer

7.0 Conclusion and Recommendations

As discussed in the technical memorandum, the historical flume data from 2019-2022 was used to determine the peak flows experienced by the existing Macaulay Village sanitary sewer system. Upon review and removal of the outlier data, a peak flow of 20 L/s was determined. However, based on several incidents, there were indications from the data that flows higher than 20 L/s could have been experienced in the system. The exact flow measurement was not available due to the limitations of the flume device to measure such high flows.

The PCSWMM model result, with the flume data from 2019-2022 taken into consideration, indicated that the existing Macaulay Village sanitary collection system is currently near surcharging conditions. It is quite possible that the existing system has experienced surcharging in the past and will likely experience surcharging in the future in light of climate change and the increasing number of extreme weather events. The available flume data was only for 2019-2022 and any extreme events that occurred may have exceeded the capacity of the flume to provide meaningful data. The flume and sensor should be regularly maintained and confirmation on the accuracy of the flume recorded data should be made by an experienced flume technician.

The existing sanitary sewer system does not have sufficient capacity to handle the proposed VineRidge subdivision peak flows and requires upgrades to address surcharging issues. Any additional flows (be it from more severe weather events or new development) would exacerbate issues with the existing sanitary sewer system and could result in progressive consequences of further surcharging, leaks, and potential failures.

It should be noted that the optimum hydraulic condition is when the pipe is 80% full (not at 100% full) so any improvements to the system should consider having flows at no more than 80% of the pipe capacity, at peak conditions.

Prior to the implementation of any changes to the system (including further development), it is recommended that a full condition assessment, complete with CCTV inspection of the joints, pipe barrel and manholes of the entire existing Macaulay Village sanitary system be completed to confirm the condition and identify if any immediate repairs or replacements need to be undertaken.

In addition, the historical data appears to indicate that the existing sanitary system is subject to significant impact by inflow and infiltration. An inflow and infiltration (I&I) study could be undertaken to find if there are specific areas where breaks or joints in the system are allowing the I&I to significantly impact the system.

An assessment on the Lalor SPS, associated forcemain and Picton WWTP's capacities should also be undertaken to confirm if additional upgrades are needed at these facilities. Further recommendations from the ongoing Picton Master Servicing Plan should also be considered.

Appendices:

Appendix 1 – PCSWMM Model Results Under Existing Flow
Appendix 2 – PCSWMM Model Results Under Future Flow – Phase 1
Appendix 3 – PCSWMM Model Results Under Future Flow – Phase 1
Appendix 4 – Email From John Towle Associates Limited on Updated Unit Numbers

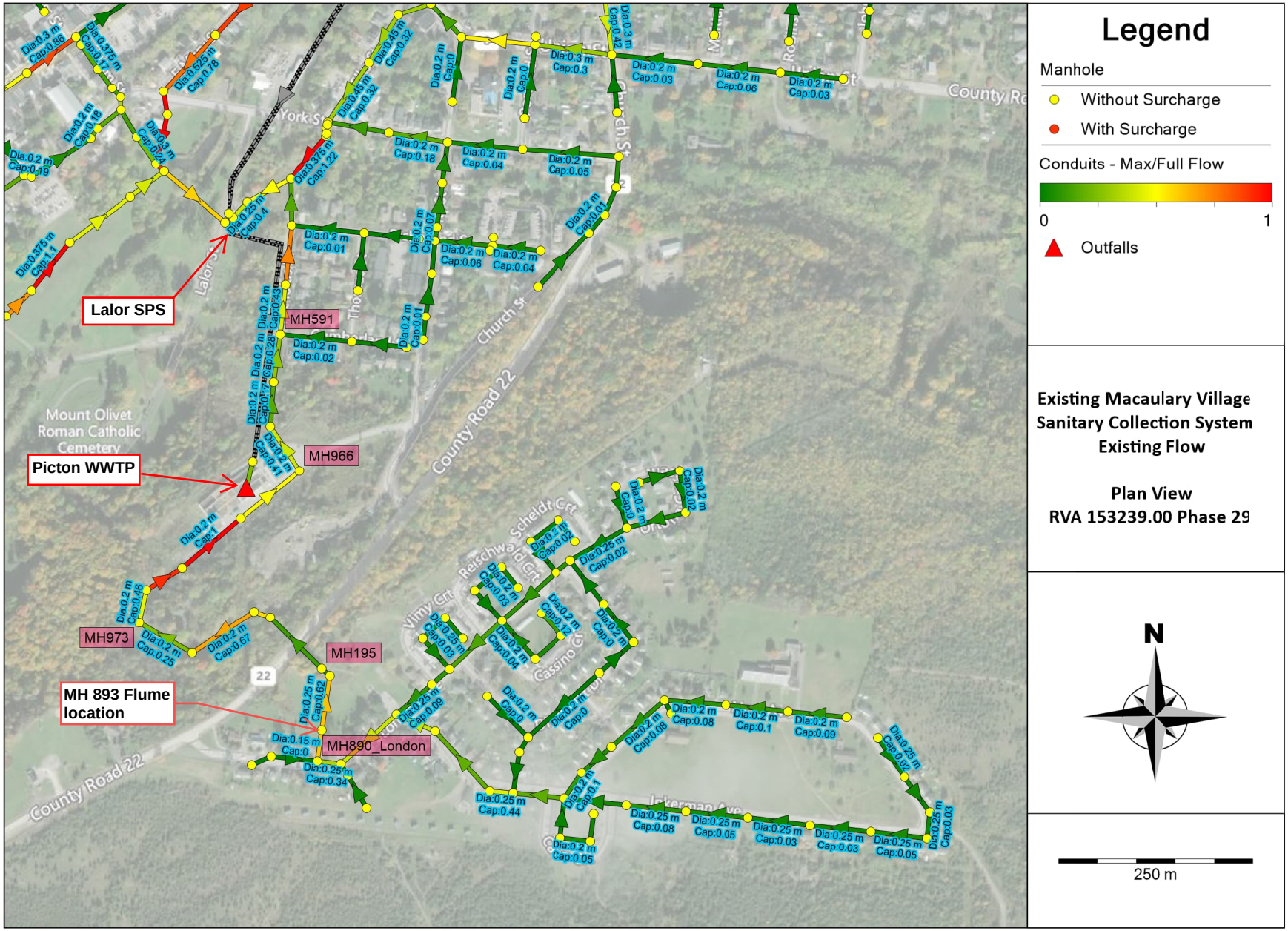
REVISIONS AND PUBLICATION REGISTER			
Revision #	**Date**	**Details**	**Distribution**
00	2023-03-09	Tech Review Memo Issued via email.	County of Prince Edward FLC Heller Group John Towle Associates Limited lee@assegaiautomotive.com

Yours sincerely,
R.V. Anderson Associates Limited

Rika Law, P.Eng., PMP
Project Manager

APPENDIX 1

PCSWMM Model Results under Existing Flow



*Profile views available between the MHs labelled in pink tags

Existing Macaulay Village Sanitary Collection System - Profile View

MH890_London to MH195

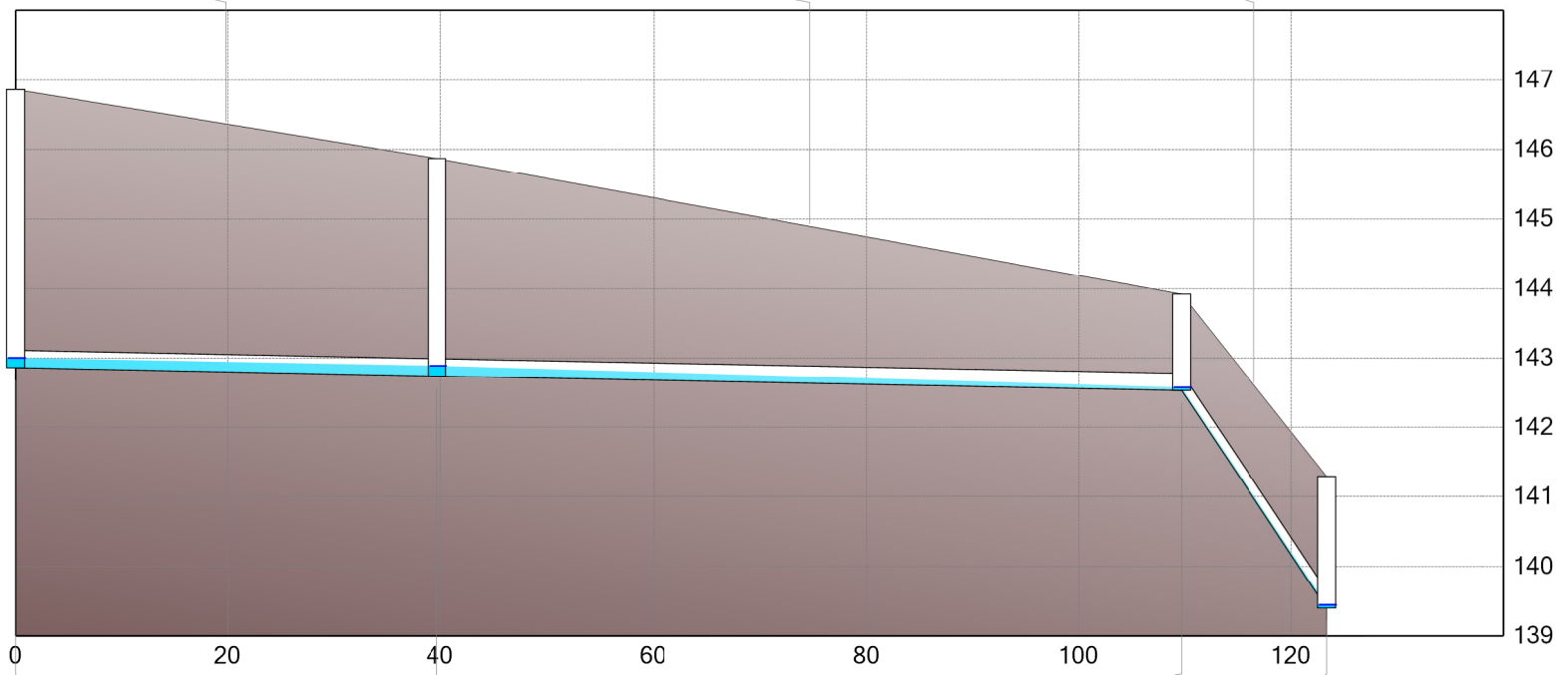
HGL

Peak values

Conduit 434
Flow = 0.02 m³/s
Invert1 = 142.862 m
Invert2 = 142.74 m

Conduit 431
Flow = 0.02 m³/s
Invert1 = 142.74 m
Invert2 = 142.53 m

Conduit 432
Flow = 0.02 m³/s
Invert1 = 142.53 m
Invert2 = 139.4 m



Junction 890_London
Rim Elev. = 146.862 m
Invert Elev. = 142.862 m

Junction 893_London
Rim Elev. = 145.869 m
Invert Elev. = 142.74 m

Junction 194
Rim Elev. = 143.92 m
Invert Elev. = 142.53 m

Junction 195
Rim Elev. = 141.291 m
Invert Elev. = 139.4 m

Existing Macaulay Village Sanitary Collection System - Profile View

MH195 to MH973

HGL

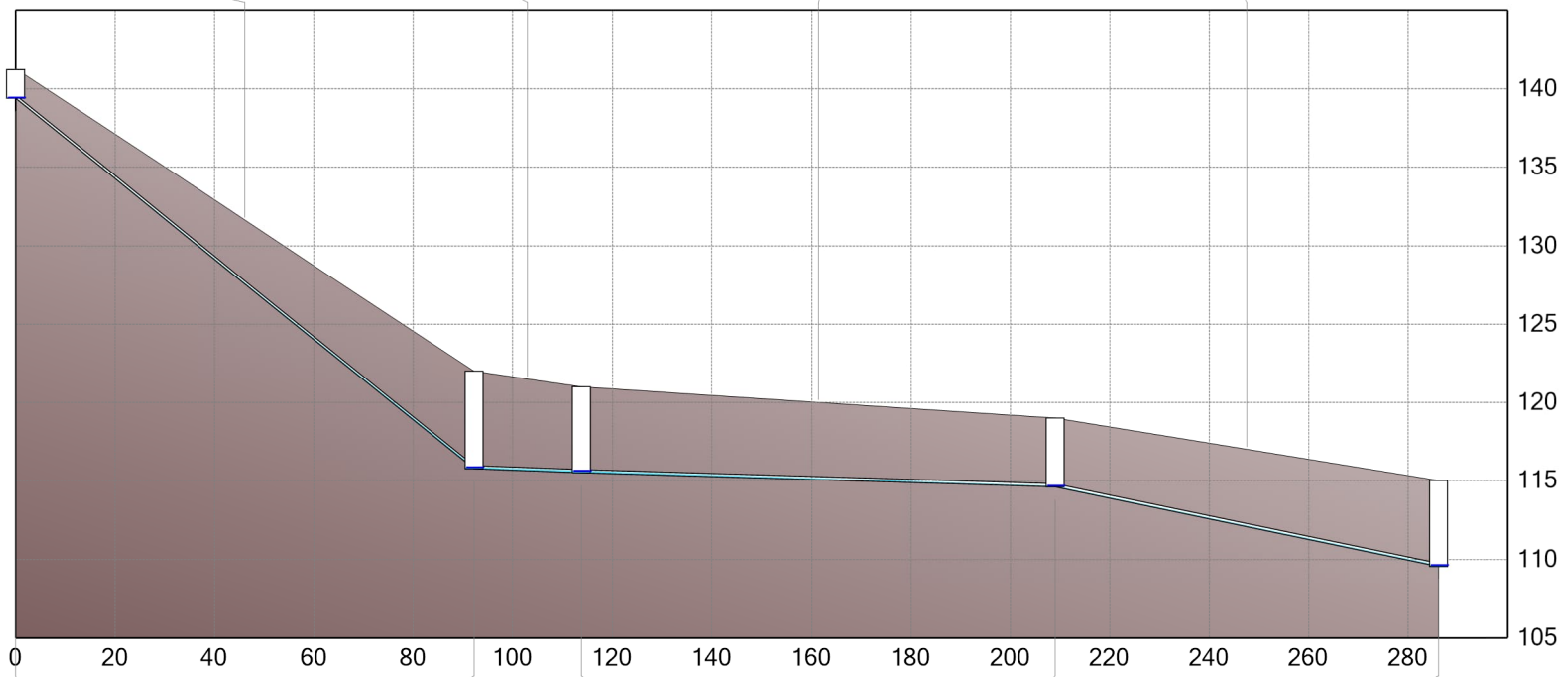
Peak values

Conduit 512
Flow = 0.02 m³/s
Invert1 = 139.4 m
Invert2 = 115.75 m

Conduit 513
Flow = 0.02 m³/s
Invert1 = 115.75 m
Invert2 = 115.5 m

Conduit 511
Flow = 0.021 m³/s
Invert1 = 115.5 m
Invert2 = 114.6 m

Conduit 510
Flow = 0.021 m³/s
Invert1 = 114.6 m
Invert2 = 109.56 m



Junction 195
Rim Elev. = 141.291 m
Invert Elev. = 139.4 m

Junction 1025
Rim Elev. = 122 m
Invert Elev. = 115.75 m

Junction 974
Rim Elev. = 121 m
Invert Elev. = 115.5 m

Junction 979
Rim Elev. = 119 m
Invert Elev. = 114.6 m

Junction 973
Rim Elev. = 115 m
Invert Elev. = 109.56 m

Existing Macaulay Village Sanitary Collection System - Profile View

MH973 to MH966

HGL

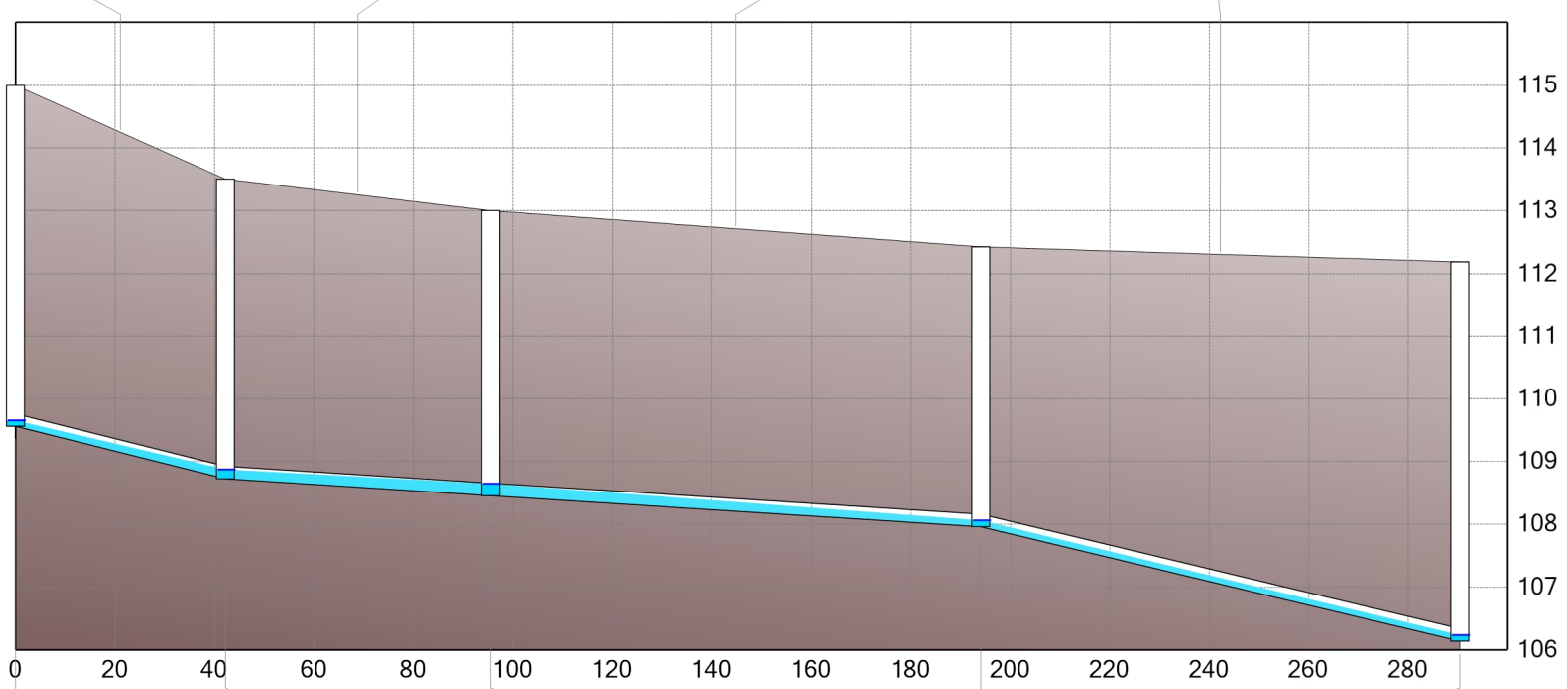
Peak values

Conduit 509
Flow = 0.021 m³/s
Invert1 = 109.56 m
Invert2 = 108.72 m

Conduit 508
Flow = 0.021 m³/s
Invert1 = 108.72 m
Invert2 = 108.45 m

Conduit 507
Flow = 0.023 m³/s
Invert1 = 108.45 m
Invert2 = 107.957 m

Conduit 506
Flow = 0.023 m³/s
Invert1 = 107.957 m
Invert2 = 106.14 m



Junction 973
Rim Elev. = 115 m
Invert Elev. = 109.56 m

Junction 972
Rim Elev. = 113.5 m
Invert Elev. = 108.72 m

Junction 971
Rim Elev. = 113 m
Invert Elev. = 108.45 m

Junction 970
Rim Elev. = 112.427 m
Invert Elev. = 107.957 m

Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

Existing Macaulay Village Sanitary Collection System - Profile View

MH966 to MH591

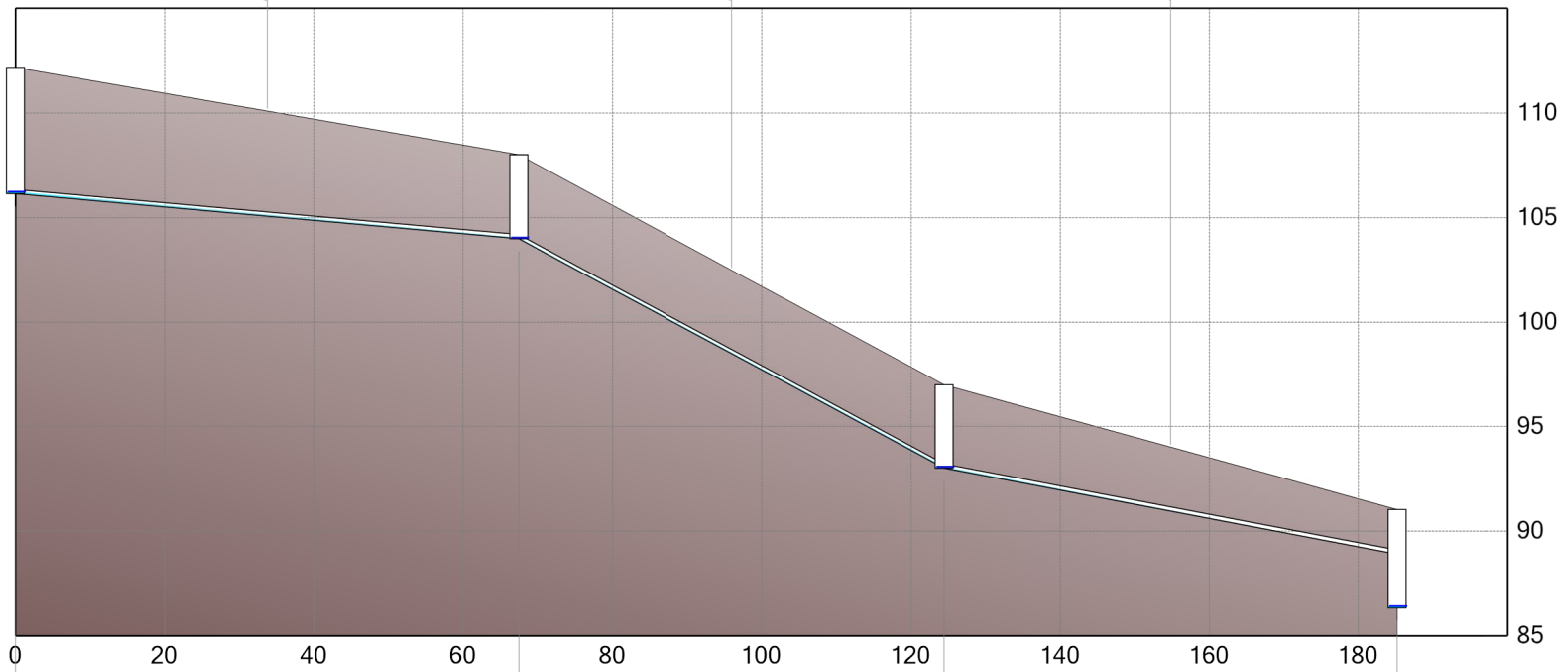
HGL

Peak values

Conduit 502
Flow = 0.024 m³/s
Invert1 = 106.14 m
Invert2 = 104 m

Conduit 501
Flow = 0.024 m³/s
Invert1 = 104 m
Invert2 = 93 m

Conduit 500
Flow = 0.024 m³/s
Invert1 = 93 m
Invert2 = 88.904 m



Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

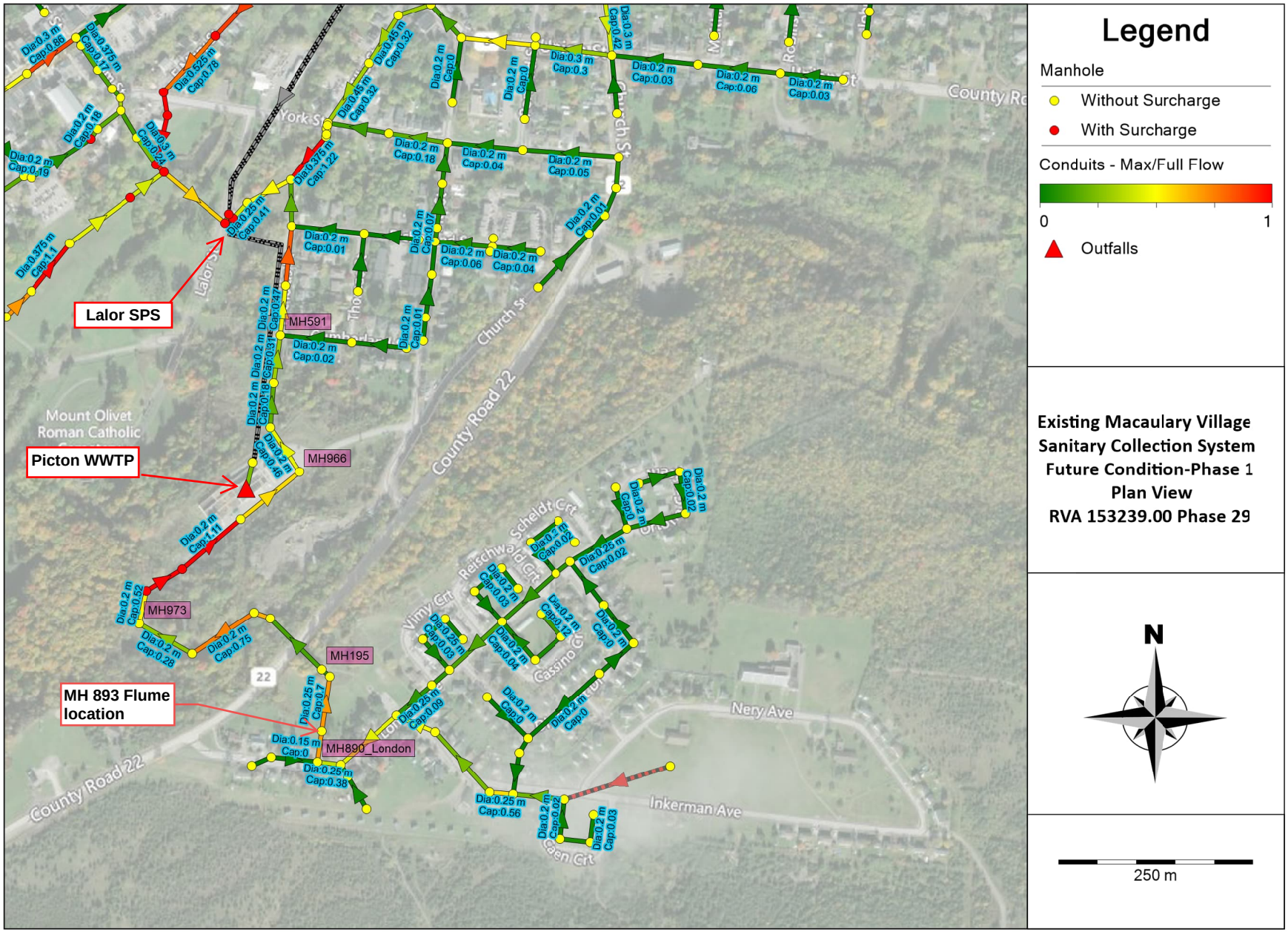
Junction 965
Rim Elev. = 108 m
Invert Elev. = 104 m

Junction 964
Rim Elev. = 97 m
Invert Elev. = 93 m

Junction 591
Rim Elev. = 91.024 m
Invert Elev. = 86.334 m

APPENDIX 2

PCSWMM Model Results under Future Flow – Phase 1



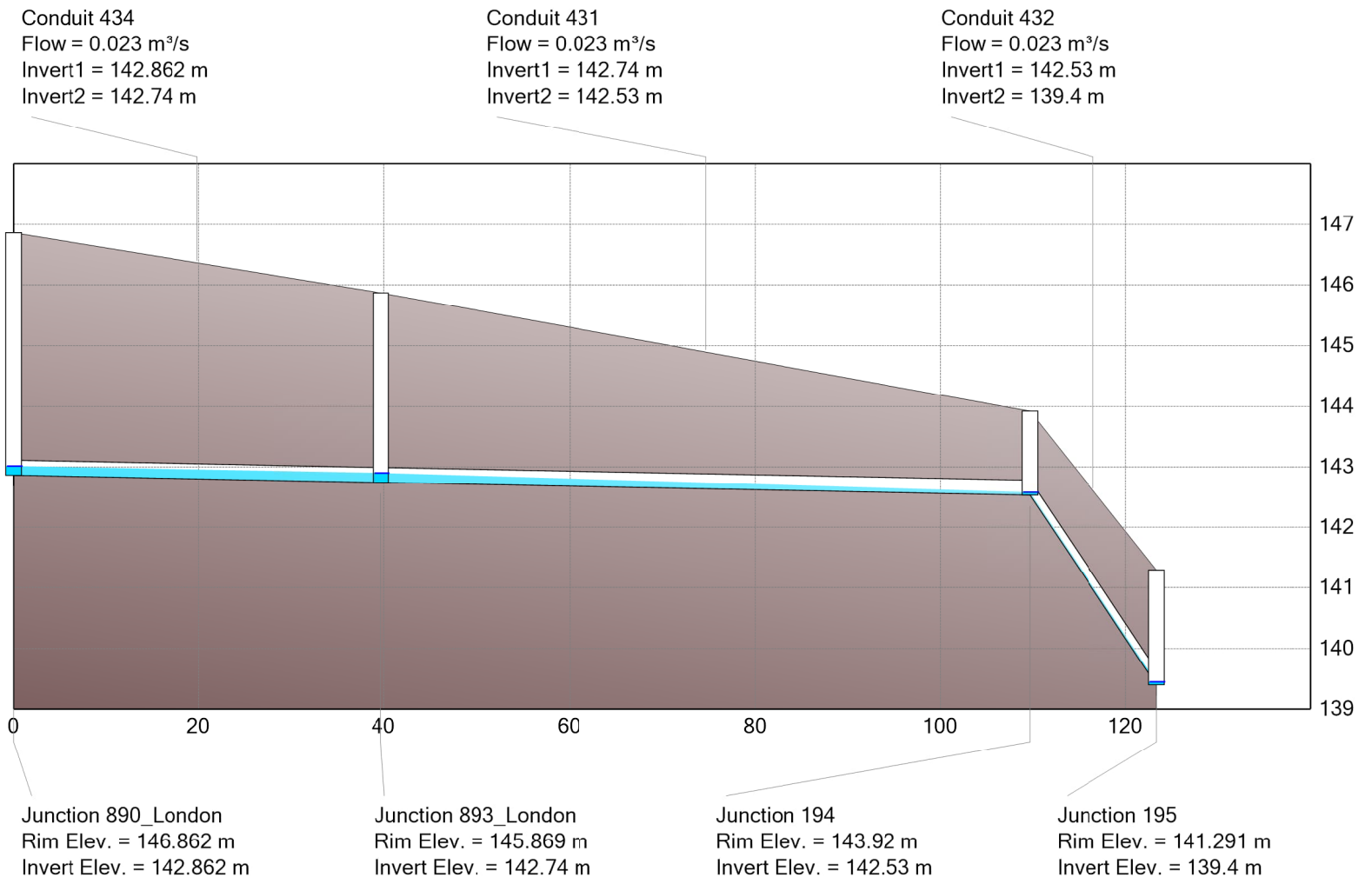
*Profile views available between the MHs labelled in pink tags

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 1

MH890_London to MH195

HGL

Peak values

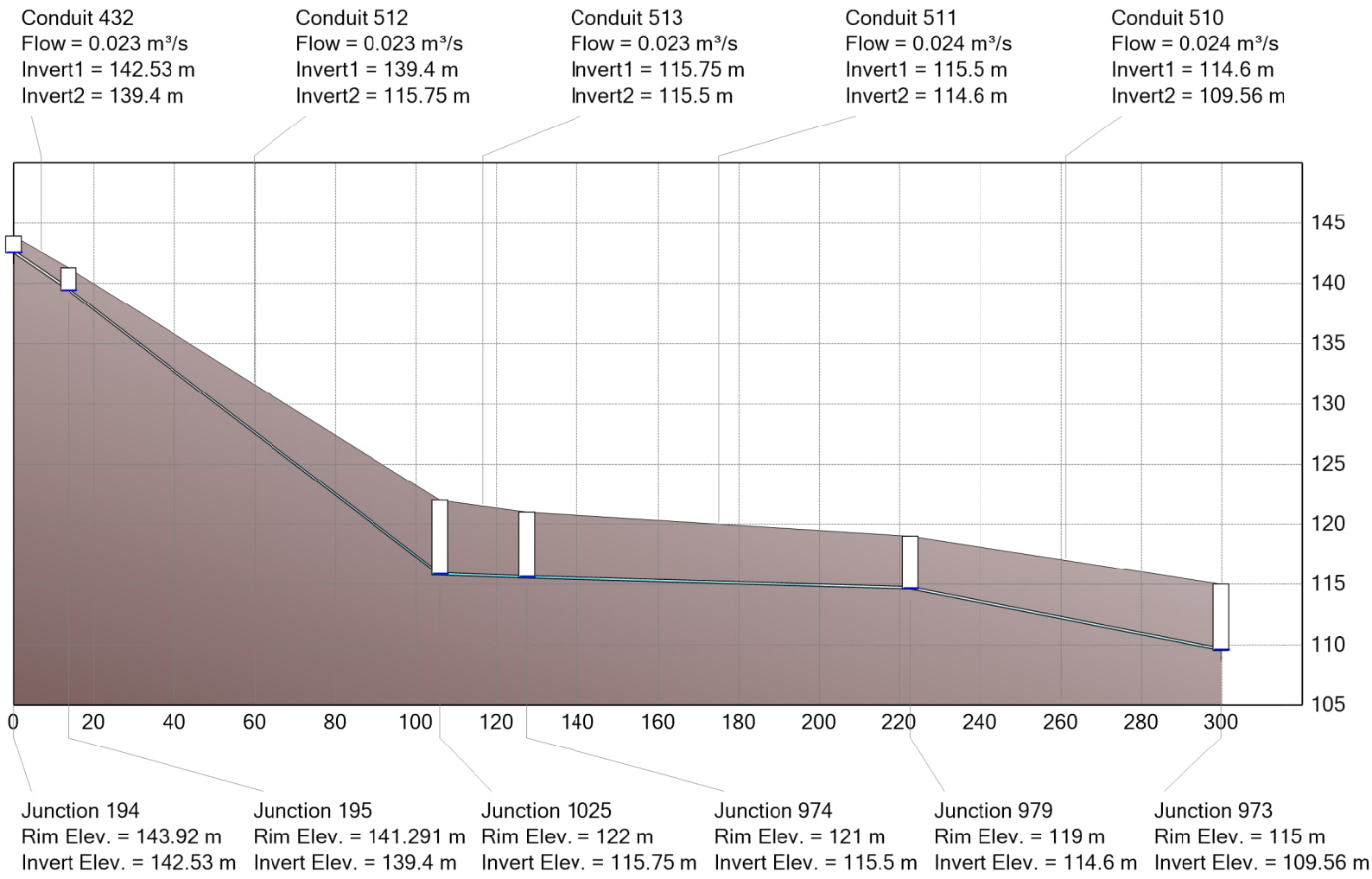


Existing Macaulay Village Sanitary Collection System - Profile View -Phase 1

MH195 to MH973

HGL

Peak values



Existing Macaulay Village Sanitary Collection System - Profile View -Phase 1

MH973 to MH966

HGL

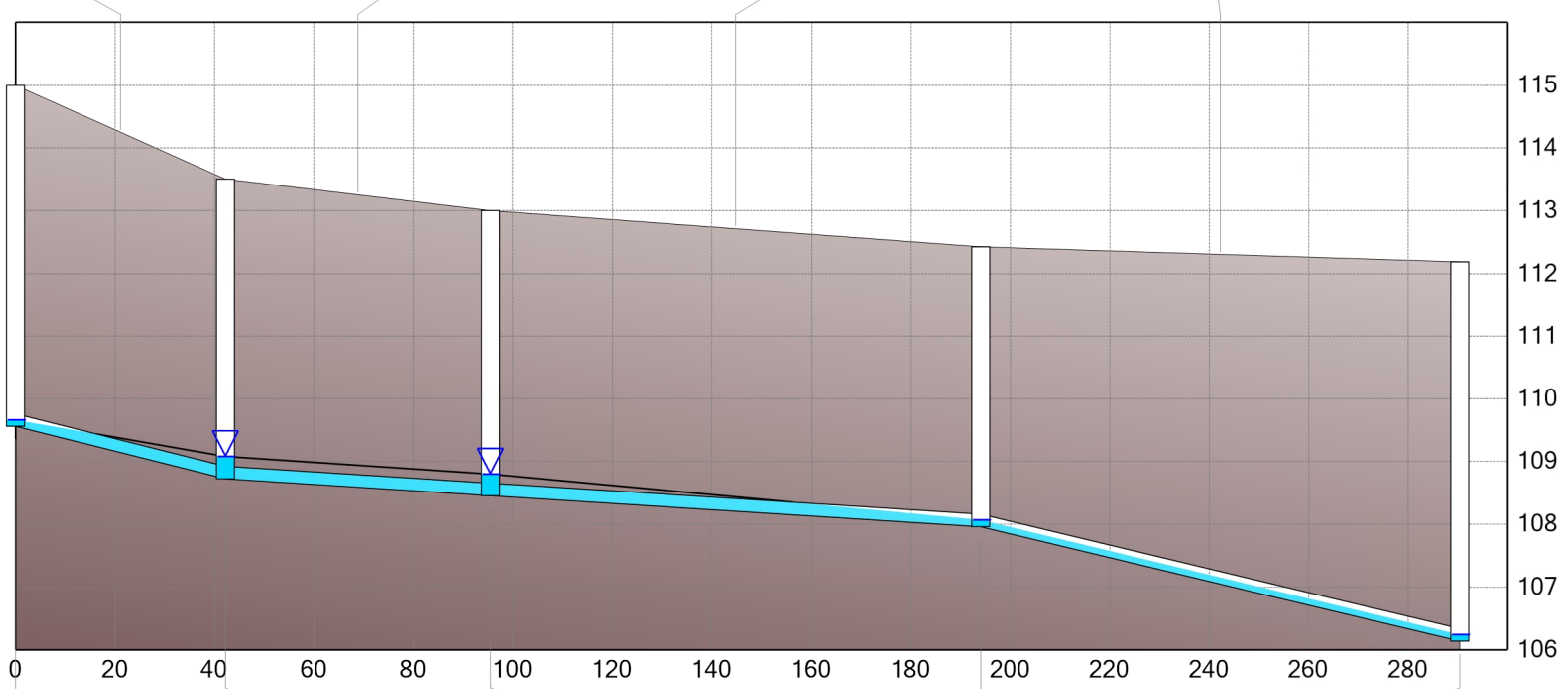
Peak values

Conduit 509
Flow = 0.024 m³/s
Invert1 = 109.56 m
Invert2 = 108.72 m

Conduit 508
Flow = 0.024 m³/s
Invert1 = 108.72 m
Invert2 = 108.45 m

Conduit 507
Flow = 0.026 m³/s
Invert1 = 108.45 m
Invert2 = 107.957 m

Conduit 506
Flow = 0.026 m³/s
Invert1 = 107.957 m
Invert2 = 106.14 m



Junction 973
Rim Elev. = 115 m
Invert Elev. = 109.56 m

Junction 972
Rim Elev. = 113.5 m
Invert Elev. = 108.72 m

Junction 971
Rim Elev. = 113 m
Invert Elev. = 108.45 m

Junction 970
Rim Elev. = 112.427 m
Invert Elev. = 107.957 m

Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 1

MH966 to MH591

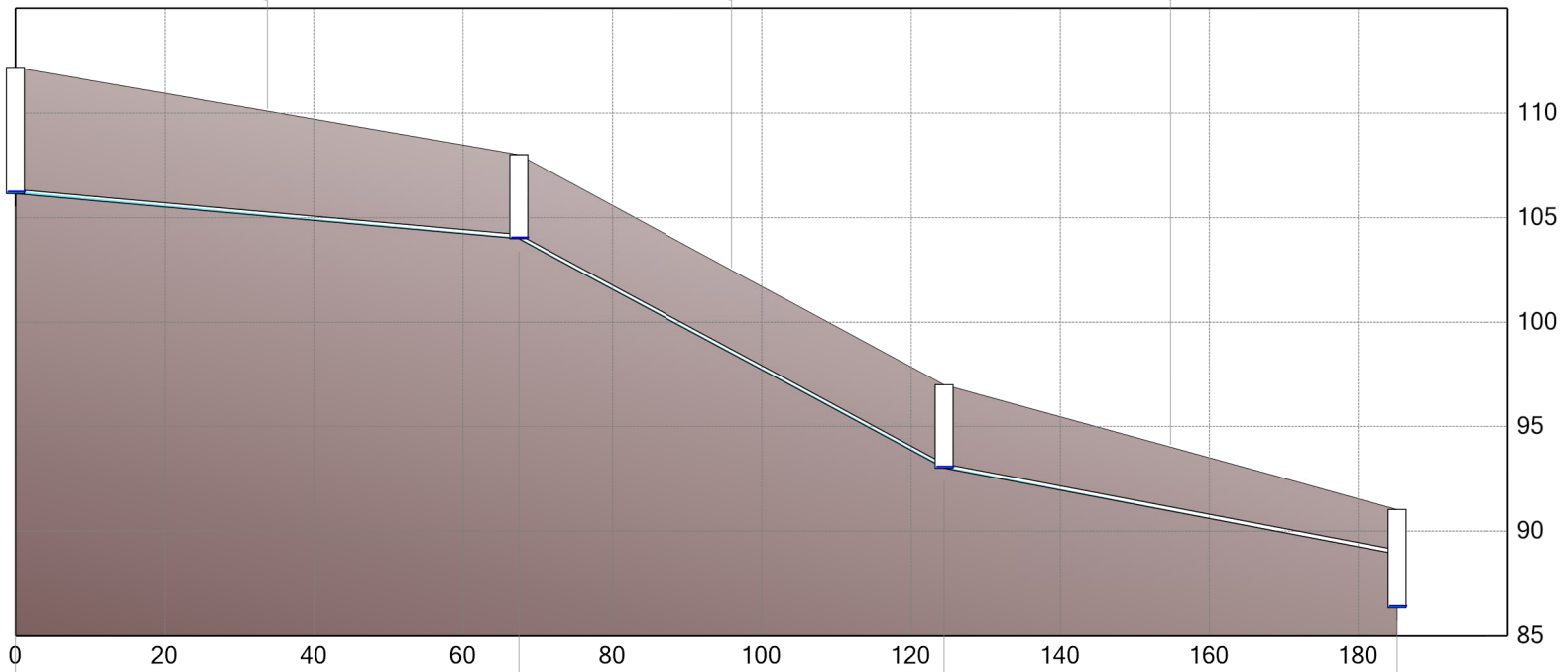
HGL

Peak values

Conduit 502
Flow = 0.027 m³/s
Invert1 = 106.14 m
Invert2 = 104 m

Conduit 501
Flow = 0.027 m³/s
Invert1 = 104 m
Invert2 = 93 m

Conduit 500
Flow = 0.027 m³/s
Invert1 = 93 m
Invert2 = 88.904 m



Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

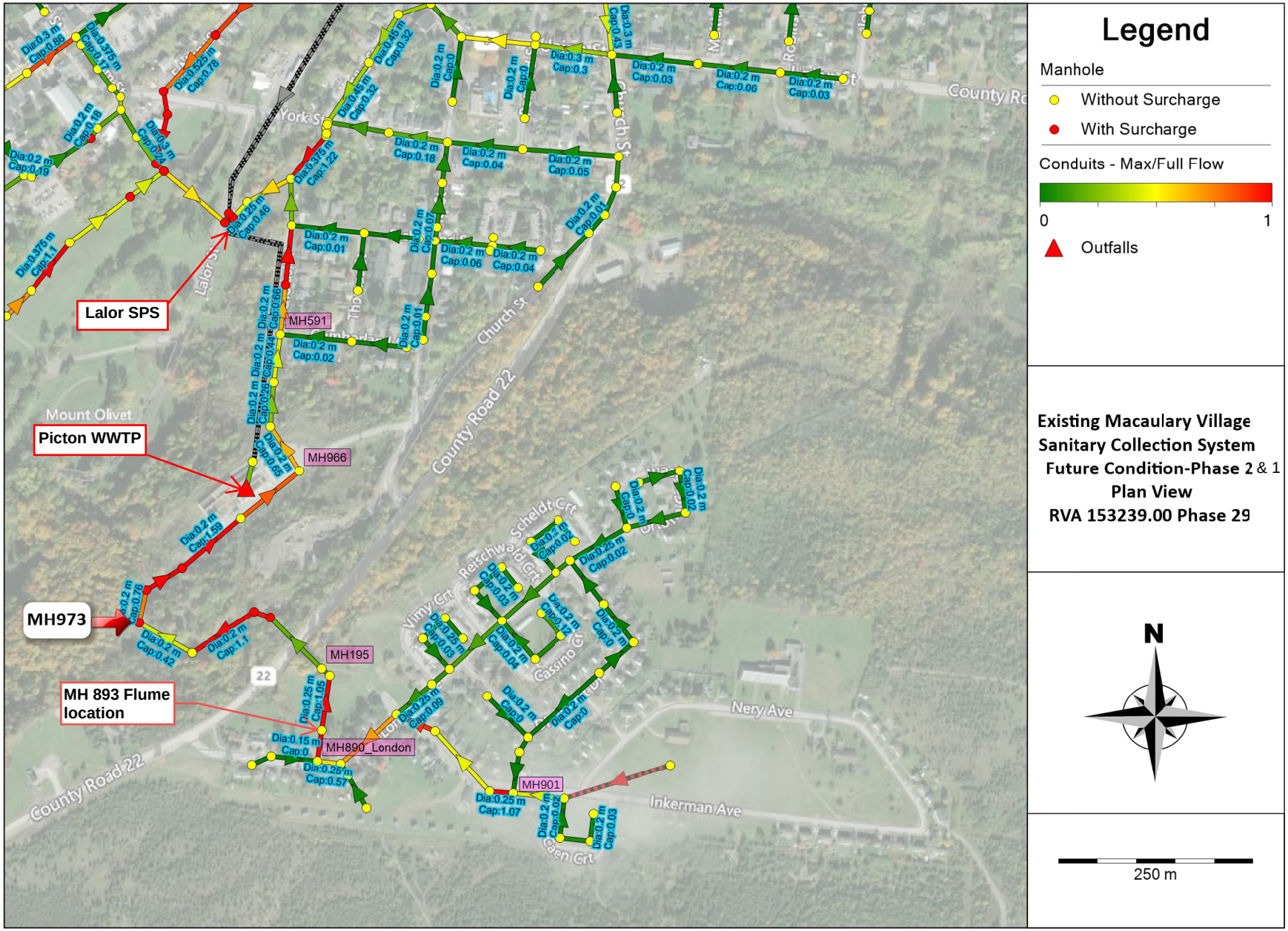
Junction 965
Rim Elev. = 108 m
Invert Elev. = 104 m

Junction 964
Rim Elev. = 97 m
Invert Elev. = 93 m

Junction 591
Rim Elev. = 91.024 m
Invert Elev. = 86.334 m

APPENDIX 3

PCSWMM Model Results under Future Flow – Phase 1 & 2



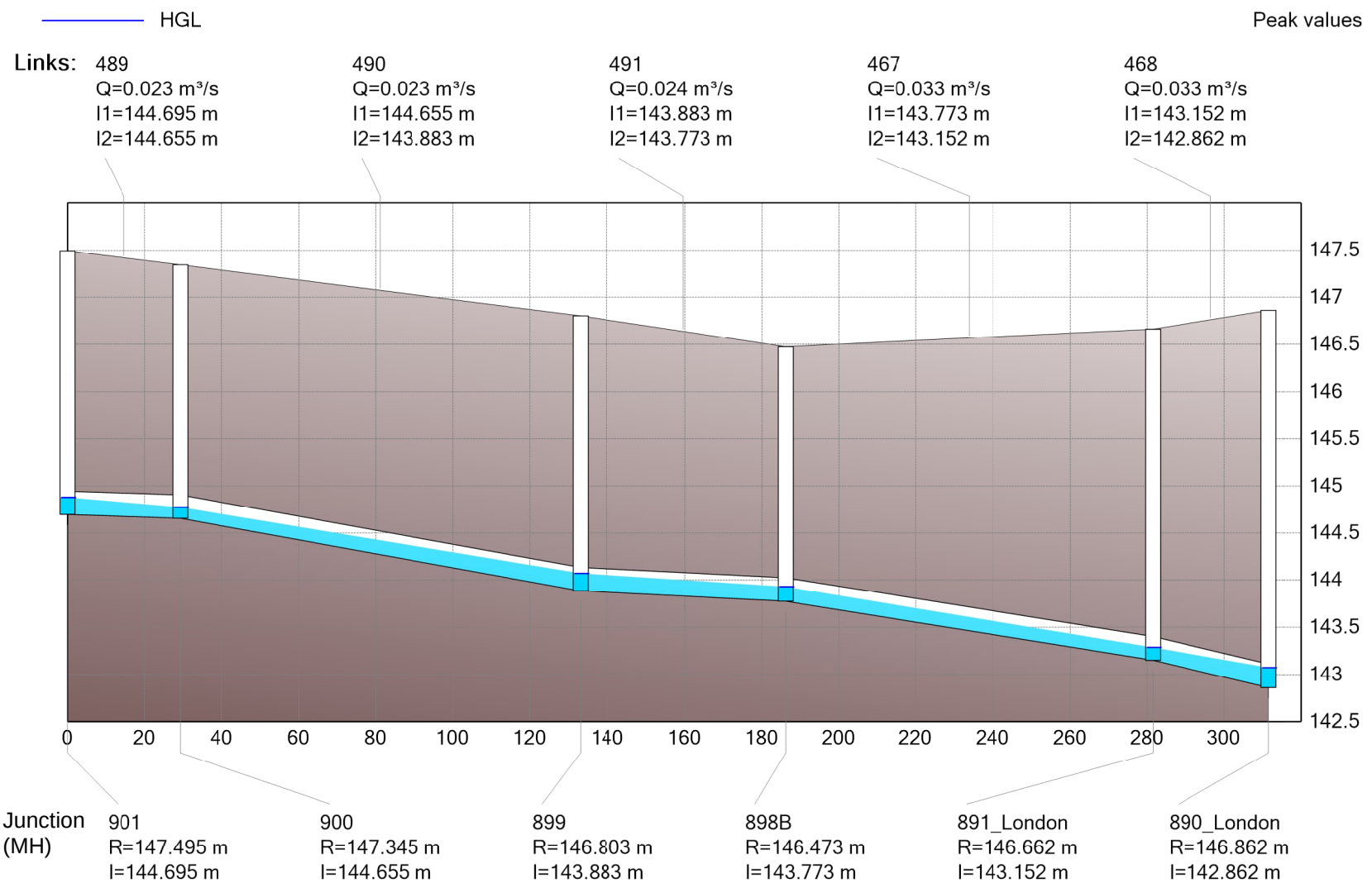
*Profile views available between the MHs labelled in pink tags

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 2& 1

MH901 to MH890_London

HGL

Peak values



Existing Macaulay Village Sanitary Collection System - Profile View -Phase 2& 1

MH890_London to MH195

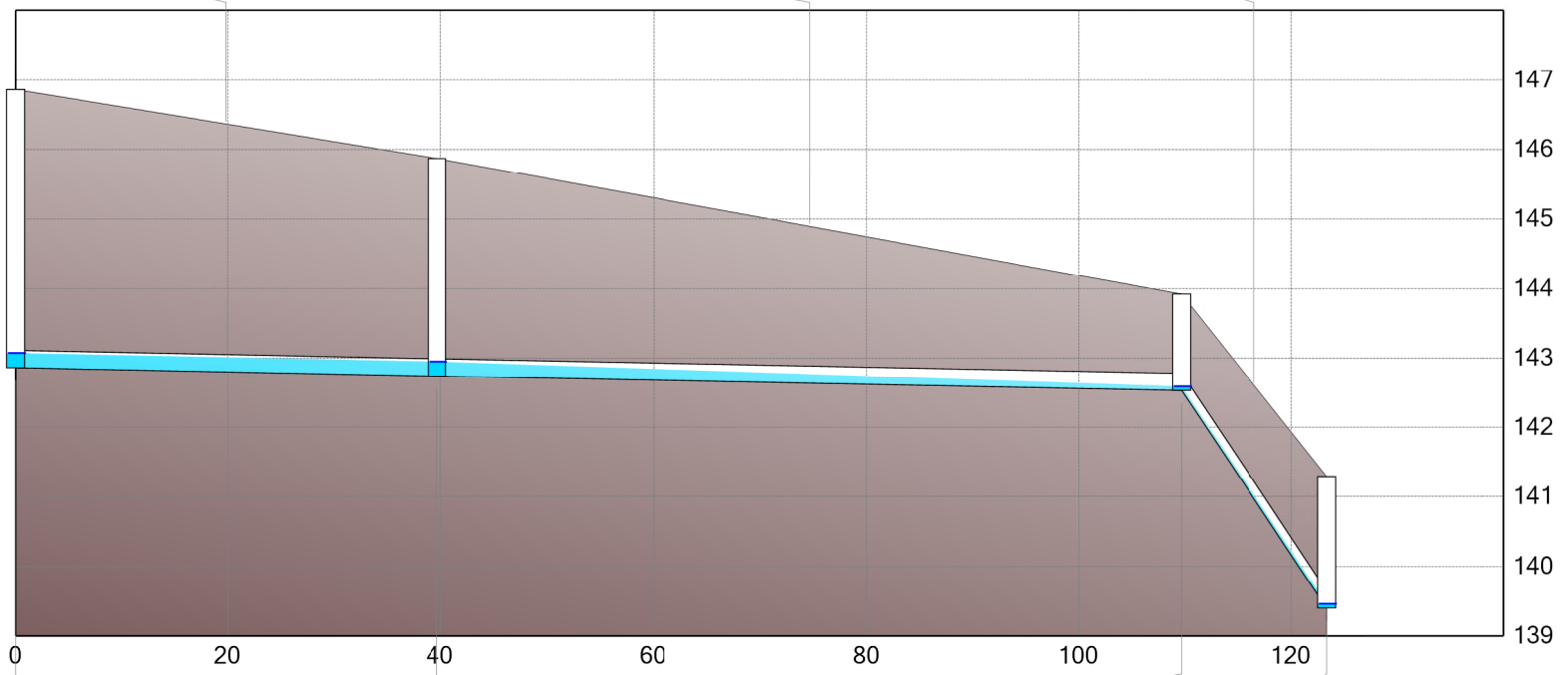
HGL

Peak values

Conduit 434
Flow = 0.034 m³/s
Invert1 = 142.862 m
Invert2 = 142.74 m

Conduit 431
Flow = 0.034 m³/s
Invert1 = 142.74 m
Invert2 = 142.53 m

Conduit 432
Flow = 0.034 m³/s
Invert1 = 142.53 m
Invert2 = 139.4 m



Junction 890_London
Rim Elev. = 146.862 m
Invert Elev. = 142.862 m

Junction 893_London
Rim Elev. = 145.869 m
Invert Elev. = 142.74 m

Junction 194
Rim Elev. = 143.92 m
Invert Elev. = 142.53 m

Junction 195
Rim Elev. = 141.291 m
Invert Elev. = 139.4 m

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 2& 1

MH195 to MH973

HGL

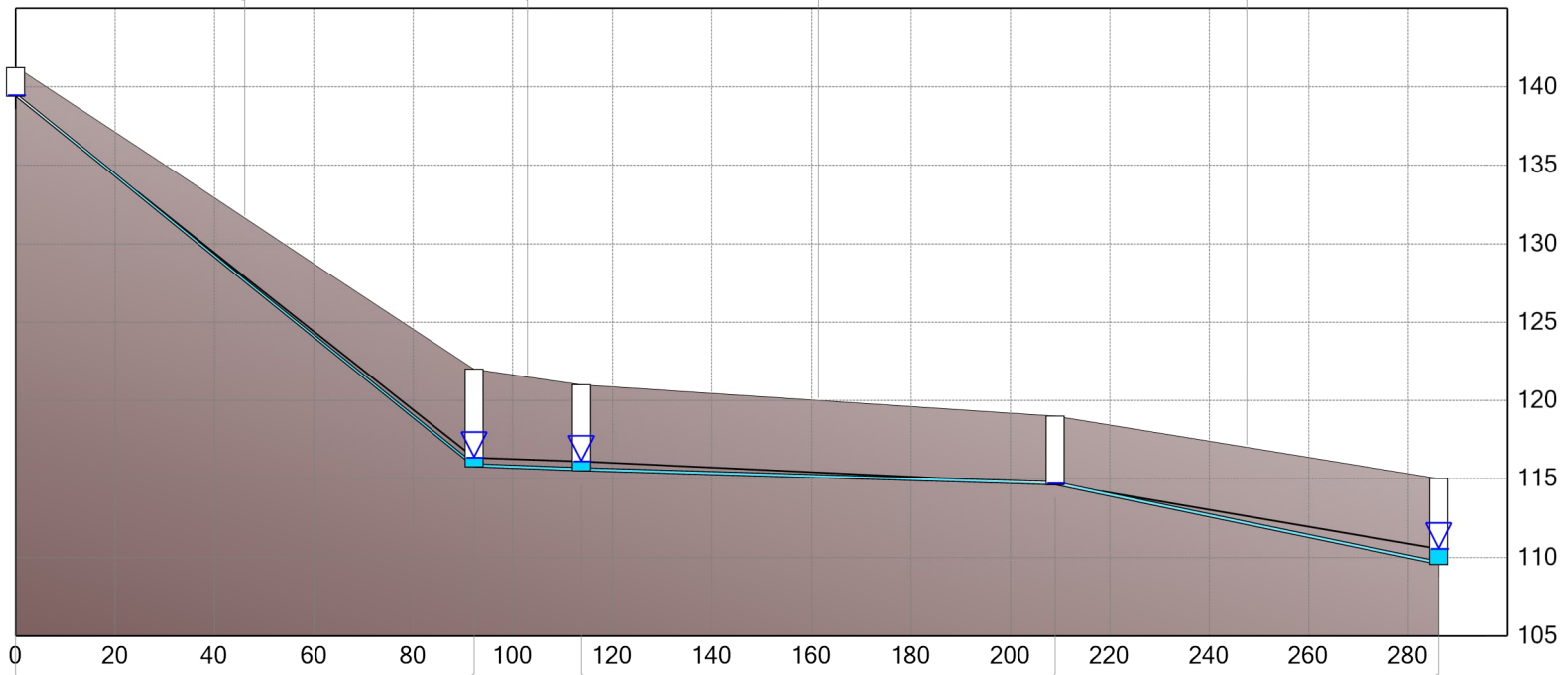
Peak values

Conduit 512
Flow = 0.034 m³/s
Invert1 = 139.4 m
Invert2 = 115.75 m

Conduit 513
Flow = 0.034 m³/s
Invert1 = 115.75 m
Invert2 = 115.5 m

Conduit 511
Flow = 0.035 m³/s
Invert1 = 115.5 m
Invert2 = 114.6 m

Conduit 510
Flow = 0.035 m³/s
Invert1 = 114.6 m
Invert2 = 109.56 m



Junction 195
Rim Elev. = 141.291 m
Invert Elev. = 139.4 m

Junction 1025
Rim Elev. = 122 m
Invert Elev. = 115.75 m

Junction 974
Rim Elev. = 121 m
Invert Elev. = 115.5 m

Junction 979
Rim Elev. = 119 m
Invert Elev. = 114.6 m

Junction 973
Rim Elev. = 115 m
Invert Elev. = 109.56 m

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 2 & 1

MH973 to MH966

HGL

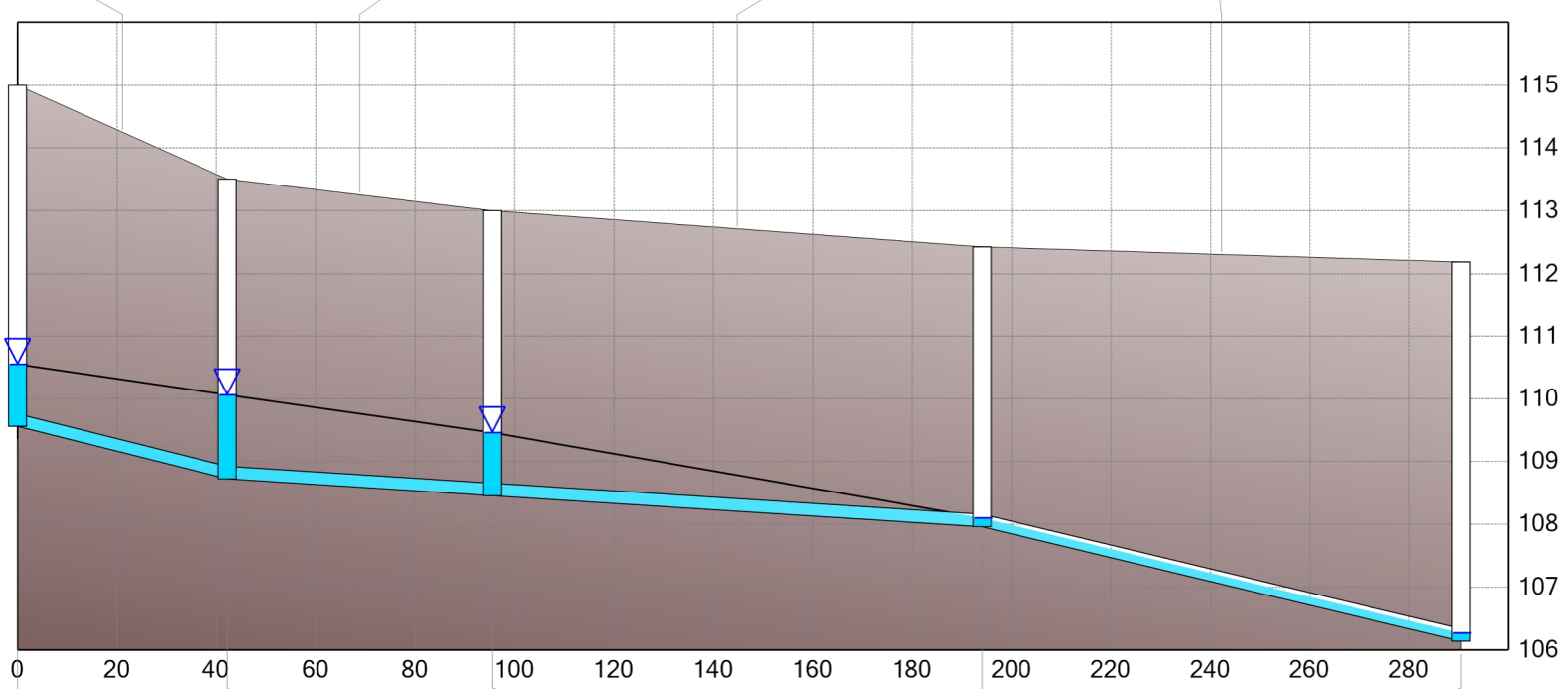
Peak values

Conduit 509
Flow = 0.035 m³/s
Invert1 = 109.56 m
Invert2 = 108.72 m

Conduit 508
Flow = 0.035 m³/s
Invert1 = 108.72 m
Invert2 = 108.45 m

Conduit 507
Flow = 0.037 m³/s
Invert1 = 108.45 m
Invert2 = 107.957 m

Conduit 506
Flow = 0.037 m³/s
Invert1 = 107.957 m
Invert2 = 106.14 m



Junction 973
Rim Elev. = 115 m
Invert Elev. = 109.56 m

Junction 972
Rim Elev. = 113.5 m
Invert Elev. = 108.72 m

Junction 971
Rim Elev. = 113 m
Invert Elev. = 108.45 m

Junction 970
Rim Elev. = 112.427 m
Invert Elev. = 107.957 m

Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

Existing Macaulay Village Sanitary Collection System - Profile View -Phase 2& 1

MH966 to MH591

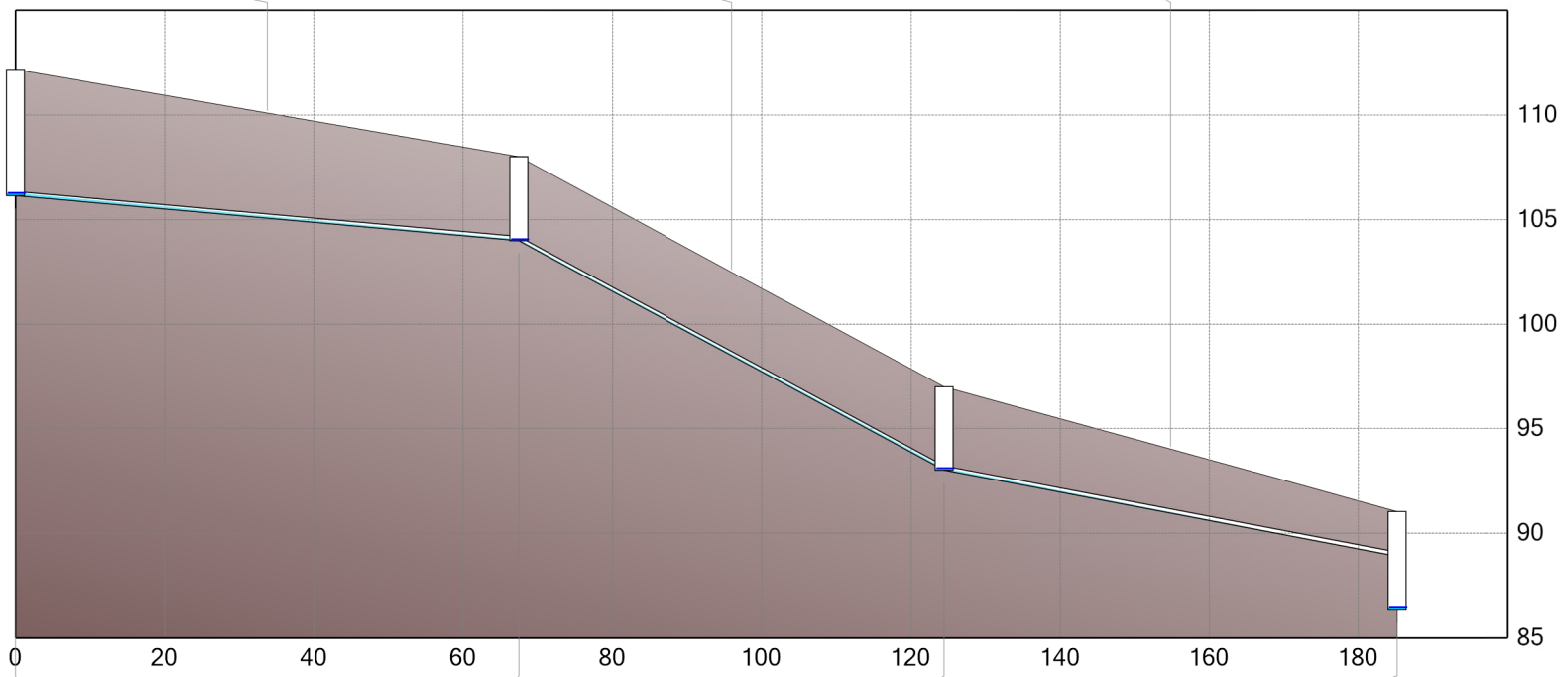
HGL

Peak values

Conduit 502
Flow = 0.038 m³/s
Invert1 = 106.14 m
Invert2 = 104 m

Conduit 501
Flow = 0.038 m³/s
Invert1 = 104 m
Invert2 = 93 m

Conduit 500
Flow = 0.038 m³/s
Invert1 = 93 m
Invert2 = 88.904 m



Junction 966
Rim Elev. = 112.19 m
Invert Elev. = 106.14 m

Junction 965
Rim Elev. = 108 m
Invert Elev. = 104 m

Junction 964
Rim Elev. = 97 m
Invert Elev. = 93 m

Junction 591
Rim Elev. = 91.024 m
Invert Elev. = 86.334 m

APPENDIX 4

Email From John Towle Associates Limited on Updated Unit Numbers

From: John Towle <john.towle.associates@gmail.com>
Sent: December 13, 2022 12:44 PM
To: Rika Law <rlaw@rvanderson.com>; Fred Heller <fredheller@flcgroup.ca>; lee_assegaiautomotive.com <lee@assegaiautomotive.com>; Robert MacDonald <rmacdonald@pecounty.on.ca>; David MacPherson <dmacpherson@pecounty.on.ca>
Subject: VineRidge Boutique Towns - Additional Sanitary Sewer Capacity Analysis

Hi Rika

Further to our recent virtual meeting with Rob, David and Fred last week, I would like to establish the Terms of Reference for additional sanitary sewer modeling of the sanitary sewer system.

1. Model the sewer system using VineRidge's 209 units for Phase 1 using your recent 2020/2021 flow monitoring data for existing houses and a flow rate of 350 L/c/d based on the people/house type estimates found in our Functional Servicing Report dated May 2022 for the Phase 1 units. An infiltration rate of 0.26 L/s/ha should also be used. PEC agreed that no additional flow monitoring was necessary.

The 209 units of Phase 1 represent the net total as we subtracted 19 existing houses that will no longer exist with the development of Phase 1.

2. Model the sewer system for full development using VineRidge's remaining 185 units for Phase 2. The same design criteria should be used as in Item 1. with the exception that a flow rate of 450 L/c/d should be used for the Phase 2 units.

The 185 units of Phase 2 represent the net total as we subtracted the remaining 19 existing houses that will no longer exist with full development of the site.

Consequently, VineRidge's full development total of 432 units is reduced to a net additional number of units from the site of 394. (432 - 38 existing houses)

Please review and let us know when it is reasonable to expect this work to be completed.

Regards,

John Towle, P.Eng.

Appendix F.3 Phase 1 Sanitary Flow Calculations

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Sanitary Flow Summary
Village A - Phase 1

Existing McCauley Village Statistics

Total Area (ha)*	40

Residential Breakdown	Unit Count**	Population Density	Population
Low Density Units	117	3	351
Medium Density Units	130	2.5	325
Total	247		**676**

Instiutional Breakdown	Area (ha)**
School	2

Village A Phase 1 Statistics

Total Area (ha)	14.45
Total Units	212.0
Total Population	580.0

Residential Breakdown	Unit Count	Population Density	Population
Low Density Units	100	3	300
Medium Density Units	112	2.5	280
Total	212		580

Scenario #1 - Existing McCauley Village + RD + Village A Phase 1

	Population (persons)	Area (ha)	Harmon Peaking Factor	Total I&I Flow (L/s)	ICI Flows (L/s)	Avg. Daily Per Capita Flow (320 L/p/day)	Peaked Sanitary Total Flow (L/s) + I&I	Notes
Existing McCauley Village	676.00	40.00	3.90	11.20	1.30	0.00	34.0	34.0 L/s taken from PEC PCSWMM Model
Revitalization District Phase 2 - Interim Flow	N/A	N/A	N/A	N/A	5.78	5.78	5.78	Flow from Private SPS pump within RD
Village A - Phase 1	580.00	14.45	3.73	4.05	0.00	2.15	12.07	Flow based on Harmon's Peaking Factor
Total	**1256.00**	**54.45**		**15.25**			**51.85**	

Appendix F.4 All Village A Sanitary Flow Calculations

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Sanitary Demands Scenarios

All Village A (Phase 1, 2A & 2B)

Existing McCauley Village Statistics

Total Area (ha)*	40

Residential Breakdown	Unit Count**	Population Density	Population
Low Density Units	117	3	351
Medium Density Units	130	3	325
Total	247		**676**

Instiutional Breakdown	Area (ha)**
School	2

Village A Phase 1 Statistics

Total Area (ha)	14.45
Total Units	212.0
Total Population	580.0

Residential Breakdown	Unit Count	Population Density	Population
Low Density Units	100	3	300
Medium Density Units	112	2.5	280
Total	212		580

Village A Phase 2A Statistics

Total Area (ha)	5.79
Total Units	135.0
Total Population	366.0

Residential Breakdown	Unit Count	Population Density	Population
Low Density Units	57	3	171
Medium Density Units	78	2.5	195
Total	135		366

Village A Phase 2B Statistics

Total Area (ha)	6.47
Total Units	108.0
Total Population	324.0

Residential Breakdown	Unit Count	Population Density	Population
Low Density Units	108	3	324
Medium Density Units	0	2.5	0
Total	108		324

Scenario #2 - Existing McCauley Village + RD + Village A Phase 1, 2A & 2B

	Population (persons)	Area (ha)	Harmon Peaking Factor	Total I&I Flow (L/s)	ICI Flows (L/s)	Peaked Sanitary Total Flow (L/s)	Notes
Existing McCauley Village	676.00	40.00	3.59	11.20	1.30	34.00	34.0 L/s taken from PEC PCSWMM Model
Revitalization District Phase 2 - Ultimate Flow	N/A	N/A	N/A	N/A	10.00	10.00	Flow from Private SPS pump within RD
Village A - Phase 1	580.00	14.45	3.59	4.05	0.00	11.77	Flow based on Harmon's Peaking Factor
Village A - Phase 2a	366.00	5.79	3.59	1.62	0.00	6.49	Flow based on Harmon's Peaking Factor
Village A - Phase 2b	324.00	6.47	3.59	1.81	0.00	6.13	Flow based on Harmon's Peaking Factor
Total	**1946.00**	**66.71**		**18.68**		**68.39**	