



Municipal Servicing Analysis – Final Addendum

# Richmond Hill Centre Secondary Plan

April 2023 | Contract # SS-2210273

Prepared for: Urban Strategies Inc. | City of Richmond Hill



**TYLin**

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# 1 INTRODUCTION

## 1.1 Richmond Hill Centre Overview

On April 10, 2019, the province of Ontario announced one of the largest subway expansions in Ontario's history. A commitment of \$28.5 billion was made towards the 'New Subway Transit Plan for the GTA'. Known as the Yonge North Subway Extension (YNSE), 8 kilometers of new subway transit will enable the Cities of Markham, Vaughan, and Richmond Hill to be connected. The proposed High Tech Station, located within Richmond Hill Centre (RHC) will act as a termination point of the subway corridor.

A portion of RHC surrounding the future High Tech Station will be a transit-oriented community (TOC) through the Province's TOC program. This has allowed for an increase of densities in the area which will need to accommodate increased servicing demands which the findings and recommendations of this report will address.

The RHC is an area of intensification as identified in a multitude of plans. This includes Richmond Hill's Official Plan, the Region's Official Plan, and Ontario's Growth Plan. In addition to the intensification designation, the Richmond Hill Official Plan has designated the Yonge Street corridor as an Urban Corridor. This will accommodate some of the City's provincially mandated intensification.

TYLin has been retained by Urban Strategies Inc., as part of a multidisciplinary consultant team undertaking the preparation of the Richmond Hill Centre Secondary Plan for the City of Richmond Hill, to conduct a servicing analysis to assess the existing sanitary sewer, storm sewer and watermain system in the study area and the capacity for potential redevelopment in the RHC area.

The latest draft of the RHC Secondary Plan was prepared in late 2021, based on the outcomes and recommendations of the overall secondary plan process, public engagement, and background studies undertaken by the consultant team between 2019 and 2021. This draft Secondary Plan was proposed to be finalized and brought forward for final Council approval in spring 2022. In April 2022, the Province of Ontario enacted an Enhanced Ministerial Zoning Order (EMZO) 'O. Regulation 344/22: Zoning Order – City of Richmond Hill, Regional Municipality of York', referred to in this report as the 'High Tech EMZO', over a substantial portion of the RHC Secondary Plan area, as part of the Province's Transit Oriented Communities (TOC) initiative. The High Tech EMZO enables a significant increase in development densities, beyond what was contemplated in the 2021 draft of the RHC Secondary Plan. The High Tech EMZO also makes modifications to the expected street and block network, open space network, and the quantum of planned people and jobs.

As a result of the High Tech EMZO, the technical background studies which informed the recommendations of the 2021 draft of the RHC Secondary Plan must be updated to reflect the now in-force High Tech EMZO-derived development permissions.

Capacity is based on servicing and demands with relation to the High Tech EMZO's specified gross floor areas, and the derived densities and population yields as of September 2022.

## 1.2 Planning History

In 2014, The Municipal Infrastructure Group (TMIG, now operating as TYLin) was consulted with regards to the Richmond Hill Master Environmental Servicing Plan [TMIG, 2014]. The residential population was estimated to be 34,000 with an employment population of 37,600, giving a people and jobs total to be serviced to be 71,600.

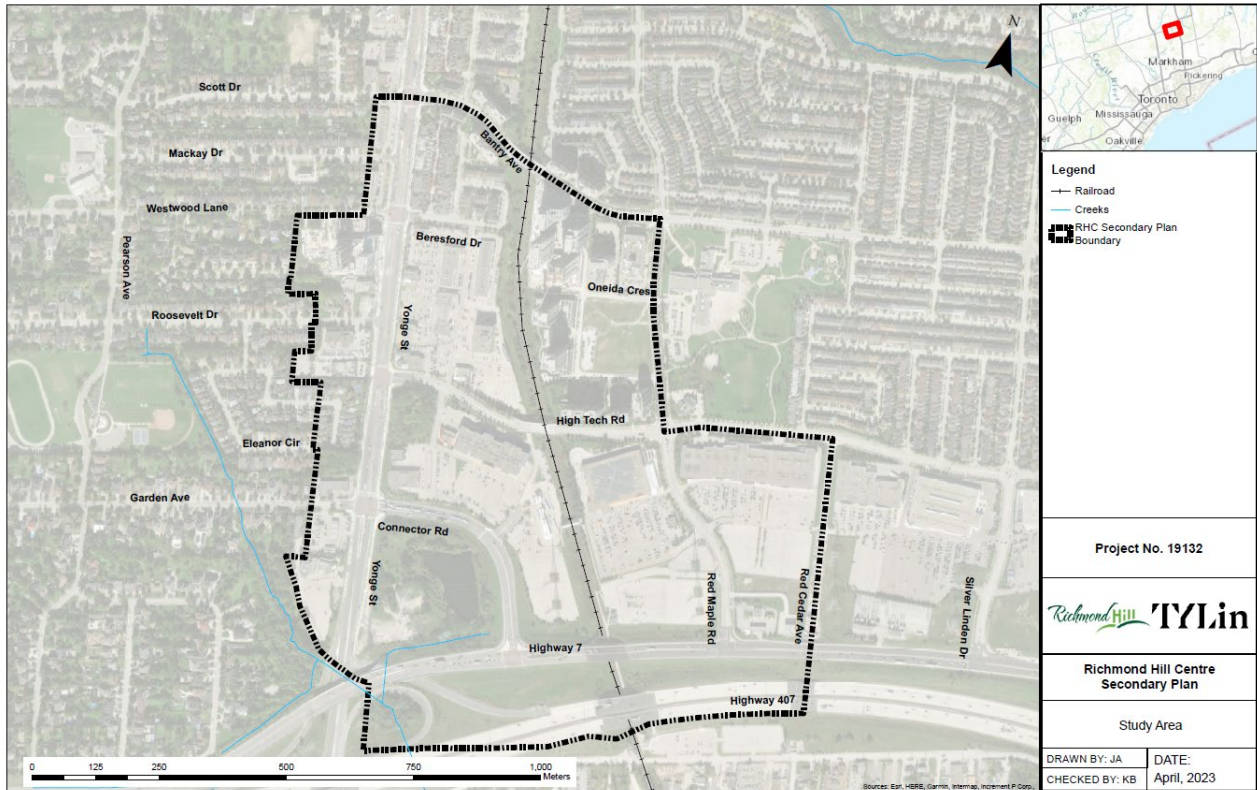
In 2015, TMIG was consulted with regards to the York Region Yonge/7 Water & Wastewater Servicing Class EA [TMIG, 2015]. The residential population was estimated to be 15,800 residents with an employment population of 15,700 employees, giving a total population to be serviced to be 31,500 people and jobs. It was contemplated that the Central Collector will have a capacity to accommodate for the flows of 15,900 people and jobs.

Currently, revised population yields provided were determined by Urban Strategies Inc., based on assumptions provided by and confirmed by the City of Richmond Hill and The Regional Municipality of York, for the RHC Secondary Plan update to reflect the High Tech EMZO permissions. The projected residential population (including existing population) at full build-out is approximately 51,000 residents with an employment population of approximately 10,000 jobs. This gives a total full build out population to be serviced to be approximately 61,000 people and jobs.

The assumptions (provided by York Region for use in the RHC Secondary Plan area) remain the same as those used for the 2021 draft of the RHC Secondary Plan, and are as follows (also outlined in Table 2):

- 2.15 persons per residential unit.
- 95 square metres of space per residential unit.
- 37 square metres of retail space per employee.
- 21 square metres of office space per employee.

Figure 1: Study Area



## 2 WATER SERVICING REVIEW

Water is supplied to the City of Richmond Hill by the Regional Municipality of York. The Region is responsible for bulk supply, treatment, and storage of water to its nine local municipalities – including the City of Richmond Hill.

In general, water is treated and pumped by the Region, and transferred to the local municipalities through a series of large-diameter transmission mains. The City then distributes the water through smaller-diameter mains to the local customers.

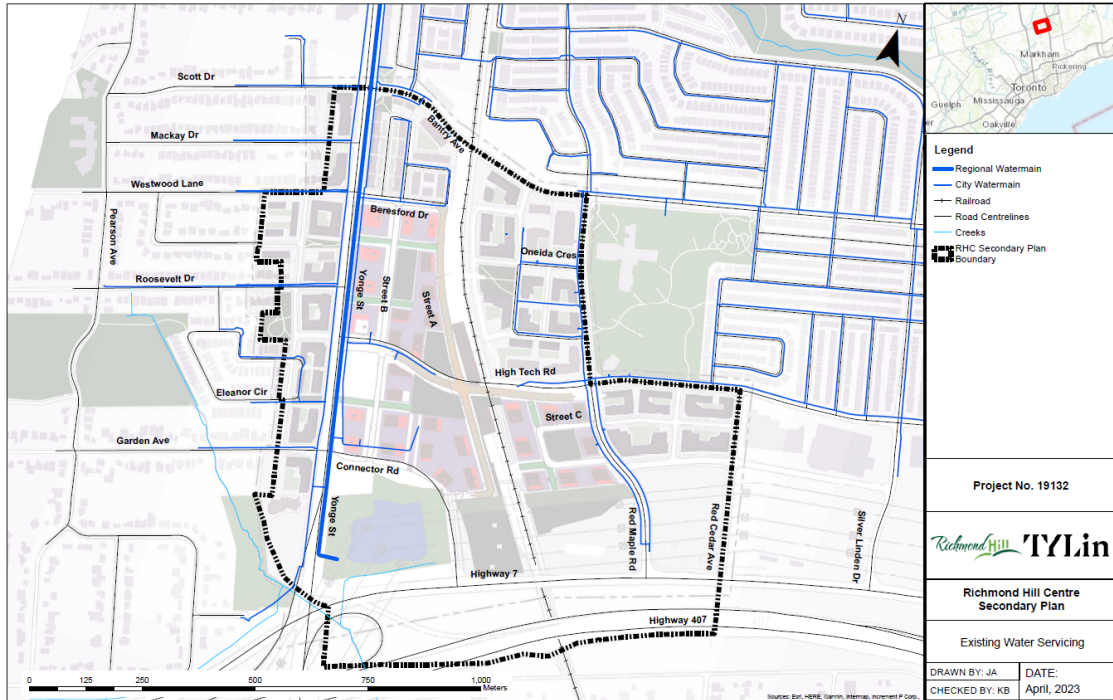
The water analysis is based on the Richmond Hill’s Urban Master Environmental Servicing Plan (UMESP) Update Study. The Water Model was provided by the City’s consultant for the UMESP Update Study.

### 2.1 Existing Water Distribution System

The Richmond Hill Centre is located within the southern limit of York Pressure District 6 (PD6). PD6 water supply is provided via three PD6 booster pumping stations within York Region plus PD6 feeds from Peel Region along with water from PD5, originating in the City of Toronto. The

main supply for the RHC area is from the regional watermain along Yonge Street.

**Figure 2: Existing Water Distribution**



## 2.2 City Design Standards

The City of Richmond Hill *Standards and Specifications Manual* (last updated November 2022) was used to outline the design criteria to be utilized in any proposed infrastructure. Table 1 outlines the design criteria to be used for watermains within the City of Richmond Hill.

**Table 1: Watermain Design Criteria**

Average Daily Demand	265 L/person/day (The City is considering the use of alternative design standards for high density applications)
Peak Daily Demand	398 Lpcd
Peak Hourly Demand	663 Lpcd
Minimum Pressure during Maximum Day and Peak Hourly Demand	275 kPa (40 psi)
Maximum Pressure during Minimum Hour Demand	690 kPa (100 psi)
Minimum Fire Flow Pressure under Fire Flow plus Maximum Daily Demand	150 kPa (22 psi)
Fire Flow Requirements for Commercial	185 L/s – 480 L/s

## 2.3 Updated Water Demands for RHC Intensification

**Table 2: Projected Water Demands**

Component	Design Basis	Value
Residential Units <sup>(1)</sup>		23,826
Residential Population	2.15 persons/unit	51,226
Residential Average Day Demand	265 Lpcd	157 L/s
Residential Maximum Day Demand	1.5 Max Day Factor	235 L/s
Residential Peak Hour Demand	2.5 Peak Hour Factor	392 L/s
Total Employment Floor Area		226,443 m <sup>2</sup>
Employment Average Day Demand	Retail: 37 m <sup>2</sup> /job. Office: 21 m <sup>2</sup> /job	10.5 L/s
Employment Maximum Day Demand	1.4 Max Day Factor	15 L/s
Total Average Demand		168 L/s
Total Max Day Demand		250 L/s

*Note 1: Residential Units include 2,737 units for 5,884 existing residents in SP and Bantry Sub-Character Areas.*

## 2.4 Servicing Recommendations from Recent Studies

### 2.4.1 York Region – Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Class EA

The Class EA (TMIG, 2015) considered required improvements to the Region’s water facilities to supply the projected population projections within Richmond Hill Centre and Langstaff Gateway (Markham) area. The RHC population and employment projections considered at the time were 15,800 residents and 15,700 jobs, as identified in the Region’s June 23, 2011, Planning and Economic Development Committee Council Report.

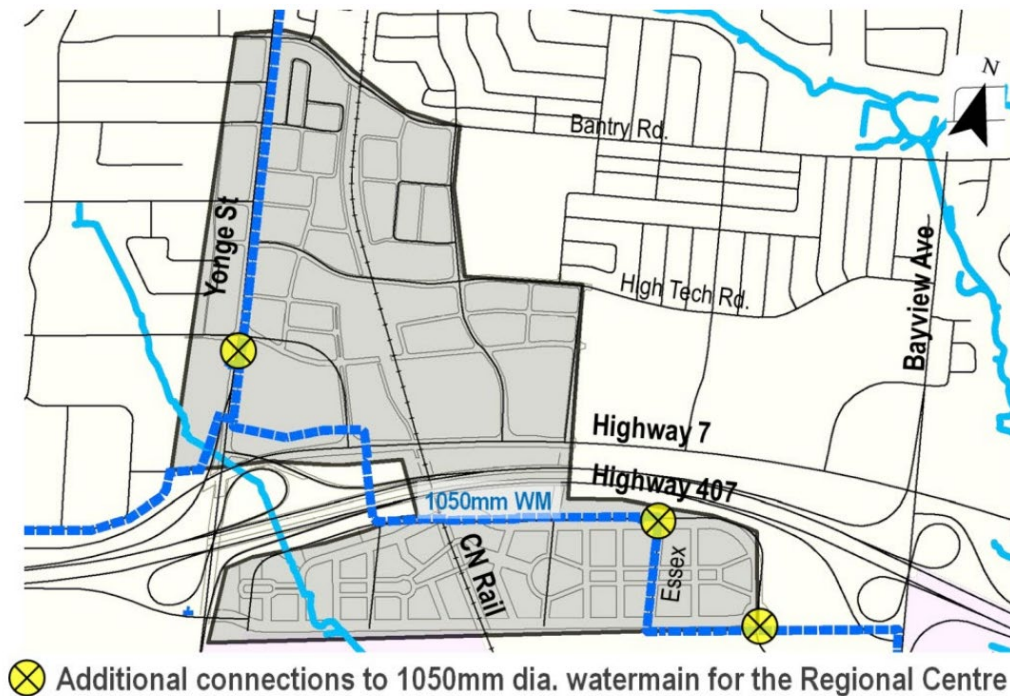
The Class EA Process identified a new connection to the Regional 1,050 mm watermain near Highway 7 and Yonge Street. The other proposed improvements from the Class EA study were related with the realignment of the watermain on Langstaff Road and two connections within the Langstaff Gateway lands (both within the City of Markham). The following is an excerpt from the Region’s Class EA Report:

“The Preferred Regional Centre improvements identified as Alternative 4 in the Class EA include the following improvements that are shown in:

- Upgrade the existing connection to a 1050 x 400 connection at the intersection of the existing watermain easement and Langstaff Road within the City of Markham;
- New 1050 x 400 connection at the southern end of Essex Avenue within the City of Markham; and,
- New 1050 x 400 connection within the City of Richmond Hill.

Although 300 mm branch connections would be adequate, we are proposing to oversize the connections to provide flexibility in the future to provide the required water servicing requirements for the Regional Centre as per the short term and long term residential/employment demand criteria established by City of Markham/City of Richmond Hill and Regional fire flow requirements identified in the Class EA study. It is expected that the branching watermains from these three connections will be smaller than 400 mm, and reducers will be required outside the chambers. The proposed chambers will be operated by York Region, however the watermain outside the chambers will be operated by the local municipality.”

**Figure 3: Regional Water Servicing Plan (from Class EA)**



## 2.5 Updated Water Servicing Recommendations

The RHC lands are currently serviced from York Region Pressure District 6 (PD-6), and the existing proposed elevations of the lands are suitable for servicing from this pressure district.

It is anticipated that some existing watermains will need to be replaced as they are in locations that do not suit the proposed streets and blocks layout. New watermains are anticipated within new rights-of-way to provide looping as can be seen on Figure 4.

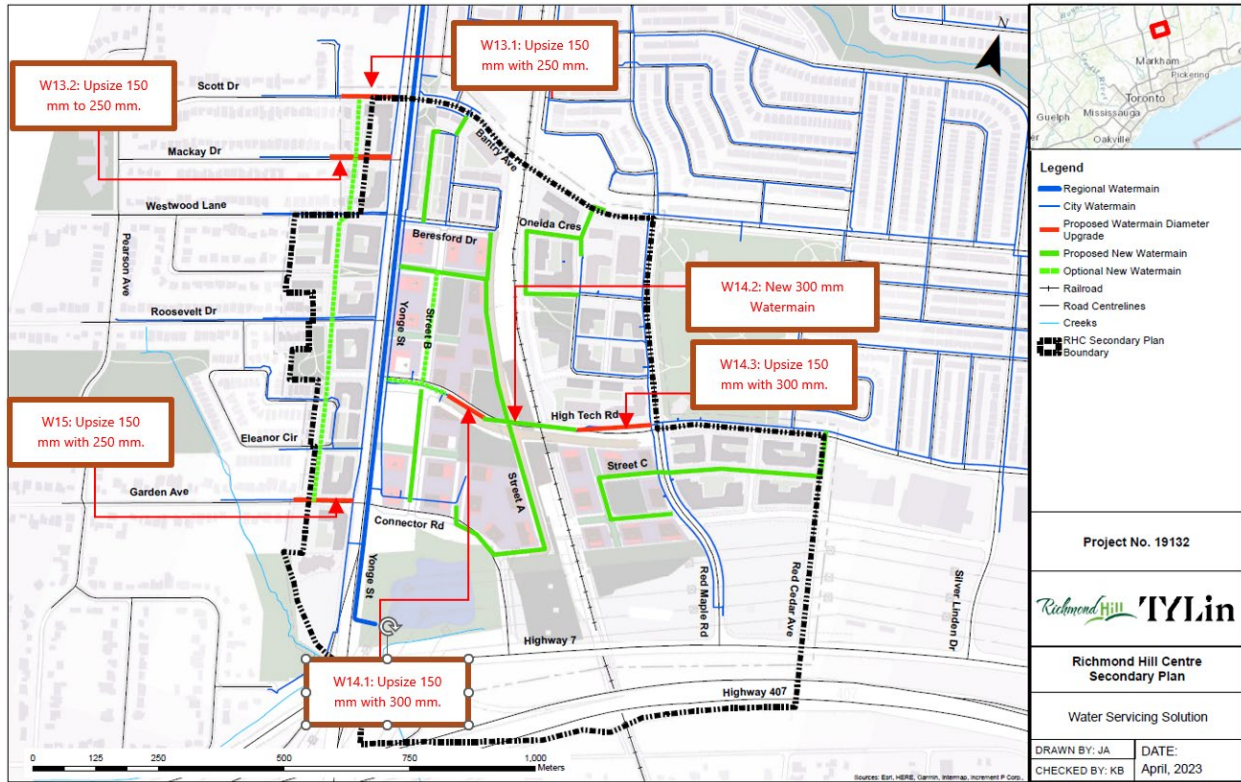
The existing fire servicing to the large-format employment areas is anticipated to be in the order of what will be required for the proposed built form. Fire flows in the order of 300-350 L/s are anticipated. These are available through a network of 300 mm watermains.

It is anticipated that all new development will need to have an adjacent 300 mm watermain to achieve the required residual pressures under peak hour demands (275 kPa) and under maximum day plus fire flow scenario (140 kPa). Buildings greater than 85m in height (typically approximately 28 storeys) will require two fire service connections, to watermains on adjacent streets which can be isolated through line valves in the network. The ultimate water distribution network has watermains on all streets and most blocks are adjacent to two streets. Where a block fronts a single street, two fire services are recommended with a line valve between them.

Utilizing the ultimate water model from the City's consultant for Richmond Hill's Urban Master Environmental Servicing Plan (UMESP) Update, the following proposed watermain diameter upgrades have been outlined:

- 150mm to 250mm on Scott Drive (Identified as UMESP Project W13.1)
- 150mm to 250mm on Mackay Drive (Identified as UMESP Project W13.2)
- 150mm to 300mm on High Tech Road (Identified as UMESP Project W14.1)
- New 300mm on High Tech Road (Identified as UMESP Project W14.2)
- 150mm to 300mm on High Tech Road ((Identified as UMESP Project W14.3)
- 150mm to 250mm on Garden Avenue (Identified as UMESP Project W15)

Figure 4: Water Servicing Solution



### 3 WASTEWATER SERVICING REVIEW

Wastewater flows are collected through the sewer system within local roads and directed to trunk sewers. The trunk sewers are maintained by York Region and convey sewage to a variety of sewage treatment plants and pumping stations. The Region is responsible for collection, and treatment of wastewater in its nine local municipalities – including the City of Richmond Hill.

In general, wastewater is collected and conveyed southbound towards treatment plants and discharge locations through large trunk sewers. The City is responsible for maintaining local sewers that discharge to the trunk sewers.

#### 3.1 Existing Wastewater Collection System

##### 3.1.1 Local City System

The Study Area is generally divided into three sewersheds:

1. Lands West of Yonge Street, where wastewater drains west through local sewers which are then connected to the 450 mm sanitary sewer along the watercourse.

2. Lands Between Yonge Street and the Railway, where wastewater is directed to an existing 600 mm sanitary sewer on Yonge Street; and,
3. Lands East of the Railway Corridor, where wastewater is directed south connecting to the Regional Manhole on Red Maple Road.

Wastewater from the Study Area is currently conveyed to both the Central Collector (which begins near Yonge Street and Highway 7) and the new Region Highway 7 Trunk sewer (where City’s system connects at Region Manhole on Red Maple Road).

### 3.1.2 Regional Facilities

The west side of the Richmond Hill Centre is currently within the existing Central Collector drainage area. The Central Collector connects to the Bayview Collector, which eventually discharges to the Leslie Street Sanitary Pumping Station. The Central Collector cannot accommodate the proposed Richmond Hill Centre/Langstaff Gateway Urban Growth Centre buildout flows.

The east side of The Richmond Hill Centre is serviced by the Highway 7 Trunk Sewer.

The Region studied alternatives for servicing the long-term intensification of the Centre through their Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Class EA, completed in 2015 by TMIG. The Region’s Class EA identified a downstream capacity constraint, limiting the additional population increase to a population of 15,900 (People and Jobs).

## 3.2 City Design Standards

The City of Richmond Hill *Standards and Specification Manual* (last updated November 2022) was used to outline the design criteria to be utilized in any proposed infrastructure.

Table 3 outlines the design criteria to be used for sanitary sewers within the City of Richmond Hill.

**Table 3: Wastewater Design Criteria**

Average Flow	265 L/person/day (City is considering the use of alternative design standards for high density applications)
Peaking Factor	Harmon
Commercial Average Flow	180,000 L/floor hectare/day (including I/I and peaking)
Industrial Average Flow	180,000 L/floor hectare/day (including I/I and peaking)
Cover (to obvert)	2.5 m (residential and industrial areas)

### 3.3 Updated Wastewater Loading for RHC Intensification

The High Tech EMZO development permissions allow a total residential population of approximately 51,000 along with an employment eMZO floor area of 177,478 m<sup>2</sup>, and a total employment floor area of 226,443 m<sup>2</sup> (including West of Yonge, South of High Tech, and Red Maple), which is equivalent to a total combined population and jobs of approximately 61,000.

The total equivalent population west of the CNR is approximately 45,000 people, while the total equivalent population east of CNR is approximately 16,000 people.

Table 4 provides the projected wastewater design flows.

**Table 4: Projected Wastewater Design Flows**

Component	Design Basis	West of CNR	East of CNR	Total
<b>Residential Units <sup>(1)</sup></b>		17,008	6,832	23,826
<b>Residential Population</b>	2.15 persons/unit	36,567	14,658	51,226
<b>Residential Average Flow</b>	265 Lpcd	112 L/s	45 L/s	157 L/s
<b>Employment Floor Area</b>	m <sup>2</sup>	197,752	28,691	226,443
<b>Employment Average Flow</b>	18 L/m <sup>2</sup> /d	41 L/s	6 L/s	47 L/s
<b>Employment – Jobs</b>	Convert Employment Average flow to equivalent residential population	8,821	1,158	9,979
<b>Total People + Jobs</b>	Residential Pop + Employment Equivalent Population	45,388	15,817	61,205
<b>Total Average Flow</b>		153 L/s	51 L/s	204 L/s
<b>Total Peak Flow</b>	Harmon Factor	372 L/s	149 L/s	521 L/s
<b>Total Design Flow</b>	Extraneous Allowance 0.26 L/ha/s	379 L/s	151 L/s	530 L/s

*Note 1: Residential Units include 2,737 units for 5,884 existing residents in SP and Brantley Sub-Character Area.*

### 3.4 Servicing Recommendations from Recent Studies

#### 3.4.1 York Region – Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Class EA

The Class EA Study (TMIG, 2015) preferred wastewater solution includes the existing Central Collector remaining in place and a new wastewater sewer that connects to the Richmond Hill Collector. The existing Central Collector is required to remain in operation. From the Class EA Study, there is remaining capacity within the Central Collector. To optimize the remaining capacity of the Central Collector, the wastewater drainage areas will need to be revised and the CN Rail

Tracks serve as a drainage divide, with the west portion remaining within Central Collector and the east side will be diverted from the Central Collector to the Richmond Hill Collector.

**Figure 5: Regional Wastewater Servicing Plan (from Class EA)**



The Region’s Class EA was based on a previous development plan concept which would have added 31,500 people plus jobs to the RHC Area, with a maximum of 15,900 people and jobs contributing flows to the Central Collector due to downstream capacity constraints. The current planning considerations identify approximately 61,200 people and jobs within the RHC area, with approximately 45,400 people and jobs identified on the west side of the CNR. As such, wastewater from a combined 29,500 people plus jobs (at a minimum) would need to be directed from the west side of the tracks to the east, in order to limit the flows to the Central Collector to approximately what was planned through the Region’s Class EA. This is shown in Table 5.

**Table 5: Required West to East Diversion**

West-East Split	Resident Population + Jobs	West (to Central Collector)	East (to Hwy 7)
Region’s Class EA	31,500	15,900	15,600
RHC – MZO Update	61,205	45,388	15,816
West -East Diversion		-29,488	45,304
<b>Net</b>		<b>15,900</b>	<b>29,488</b>

The City sewer on Red Maple Road has been connected to the new Region Manhole on Red Maple Road.

*Note Regarding the East-to-West Transfer:* Based on coordination with York Region through this Planning Process, it has been communicated that there have been and will continue to be intensification pressures throughout the Region's Central Collector drainage area. As such, the value of 15,900 serviceable residents to the Central Collector (from the 2015 Regional Study) is perhaps no longer the appropriate limit for what population from Richmond Hill Centre can be accommodated through the Central Collector. The Region has requested that the City of Richmond Hill "divert as much population as possible" from Richmond Hill Centre away from the Central Collector, and towards the Highway 7 Trunk Sewer. This will be addressed in Section 3.5.2.

### 3.5 Updated Wastewater Servicing Recommendations

It is anticipated that some existing sewers will need to be replaced as they are in locations that do not suit the proposed streets and blocks layout. New sewers are anticipated within new rights-of-way.

In order to facilitate establishing a new west-east drainage boundary to ensure that a manageable amount of wastewater is generated within the RHC is directed east to the new Regional Trunk Sewer, a new sewer along the north-south roadway immediately west of Railway is proposed. This new sewer would convey the wastewater south towards the lower elevation within the Study Area. From this location, there are two alternatives to conveying the flows to the proposed Regional trunk sewer on the east side of the CNR:

1. The preferred option would be a gravity sewer under the railway to the western limit of the existing Regional trunk sewer on Red Maple Road.
2. A secondary option could be to pump the wastewater under the railway, from a new sewage pumping station (SPS) to the Regional Highway 7 Trunk sewer.

Utilizing the ultimate wastewater model from the City's consultant for Richmond Hill's Urban Master Environmental Servicing Plan (UMESP) Update, the following proposed sanitary pipes have been outlined:

- 250 mm on Yonge Street Near Westwood Lane (Identified as UMESP Project WW-19)
- 300 mm on Yonge Street Near Roosevelt Drive and Garden Avenue (Identified as UMESP Project WW-19)
- Gravity Sewer on Street B, High Tech Road, Street A and Red Maple Road. Refer to Figure 9 and Figure 10 for Length and Diameter. (Identified as UMESP Project WW-19)

### 3.5.1 Proposed Option – Gravity Sewer

Through a preliminary review of the sewer grades for the new Regional Trunk Sewer, a gravity sewer solution was developed, thus delineating two sewersheds. Figure 6 shows the sewersheds that drain east to the Region’s Highway 7 Trunk Sewer and that drain to the Central Collector Trunk Sewer at Yonge and Highway 7.

Based on the sewershed delineation in Figure 6, approximately 15,700 people and jobs would be conveyed to the Central Collector Trunk Sewer and 45,000 people and jobs to the Highway 7 Trunk Sewer. Table 6 provides the projected wastewater design flows for this gravity sewer option. This sewershed delineation limits the populations draining to the Central Collector to a number lower than what was contemplated in the Region’s Class EA.

Figure 6: Sanitary Sewersheds



**Table 6: Proposed Wastewater Design Flows with Gravity Sewer**

Component	Design Basis	West of CNR	East of CNR	Total
<b>Residential Units <sup>(1)</sup>\</b> (Including Bantry)		6,801	17,025	23,826
<b>Residential Population</b>	2.15 persons/unit	14,622	36,604	51,226
<b>Residential Average Flow</b>	265 Lpcd	45 L/s	112 L/s	157 L/s
<b>Total Employment Floor Area</b>	m <sup>2</sup>	28,610	197,833	226,443
<b>Employment Average Flow</b>	18 L/m <sup>2</sup> /d	6 L/s	41 L/s	47 L/s
<b>Employment – Jobs</b>	Convert Employment Average flow to equivalent residential population	1,067	8,912	9,979
<b>Total People + Jobs</b>	Residential Pop + Employment Equivalent Population	<b>15,689</b>	<b>45,516</b>	<b>61,205</b>
<b>Total Average Flow</b>		51 L/s	153 L/s	204 L/s
<b>Total Peak Flow</b>	Harmon Factor	152 L/s	380 L/s	532 L/s
<b>Total Design Flow</b>	Extraneous Allowance 0.26 L/ha/s	156 L/s	385 L/s	541 L/s

*Note 1: Residential Units include 2,737 units for 5,884 existing residents in SP and Bantry Sub-Character Areas.*

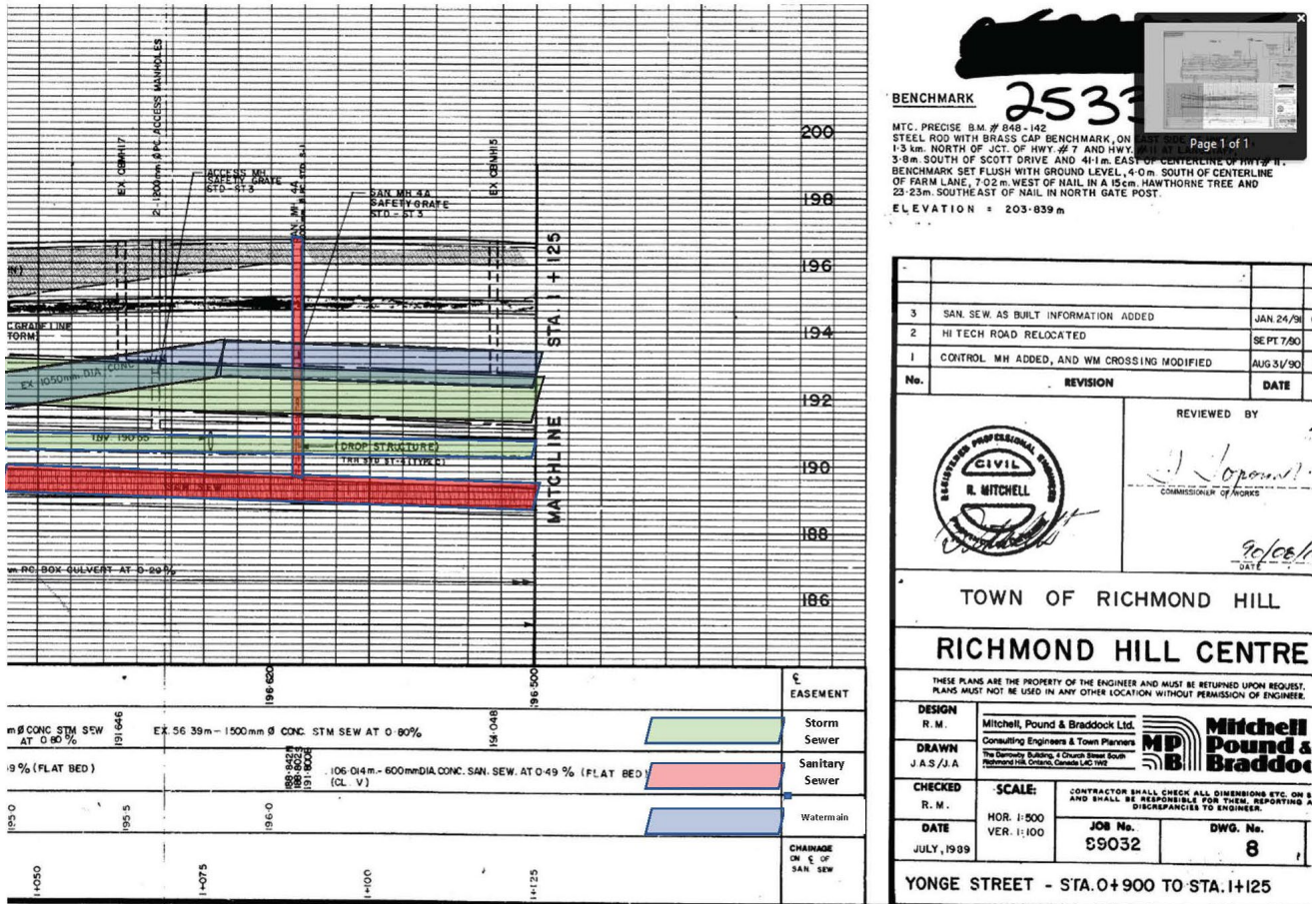
### 3.5.2 Comment Regarding West-to-East Diversion Away from Central Collector

As discussed in Section 3.5.1, the preferred servicing solution is to install gravity sewers through the Richmond Hill Centre area, diverting most of the proposed RHC development to the east side of the railway line into the Region’s Highway 7 Trunk Sewer. The contemplated RHC allocation into the Central Collector – in 2015 – was identified as 15,900 persons, and the calculation provided in Table 6 demonstrates that it is proposed that only 15,689 would be connected to the Central Collector.

While this indicates compliance with the former servicing strategy, the City of Richmond Hill acknowledges that there are advantages to the Region if additional RHC development could be connected to the Highway 7 Trunk Sewer.

Since the largest portion of the 15,689 persons that are identified as being serviced via the Central Collector under the Preferred Servicing Strategy would be located on the west side on Yonge Street, there are limited opportunities to divert these new units to the east. There are several utilities within the Yonge Street corridor (storm sewers, local and Regional sanitary sewers) which make this impossible. Figure 7 demonstrates this through showing the relative elevations of existing infrastructure along Yonge Street at Garden Avenue. This demonstrates that it is impossible to locate a new sewer crossing Yonge Street at an elevation above 194.5 m, which is the elevation of the connection to the Highway 7 Trunk Sewer.

Figure 7: Cross-Section Along Yonge Street, at Garden Avenue



As an alternative, the City is presently planning to divert the sanitary servicing from the lands north of the RHC area (specifically: east of Yonge Street and north of Beresford Drive) into the sewer which is presently recommended along Street 'B'. This existing drainage area – which ultimately connects to the Central Collector – presently services approximately 9,900 persons, and has a design flow of 121 L/s under the City's ultimate growth projections. Diverting these lands away would effectively reduce the increase in residents serviced to the Central Collector from 15,689 to 5,517. Figure 8 and Table 7 shows the updated transfer.

Figure 8: Preferred Gravity Solution with UMESP Proposal

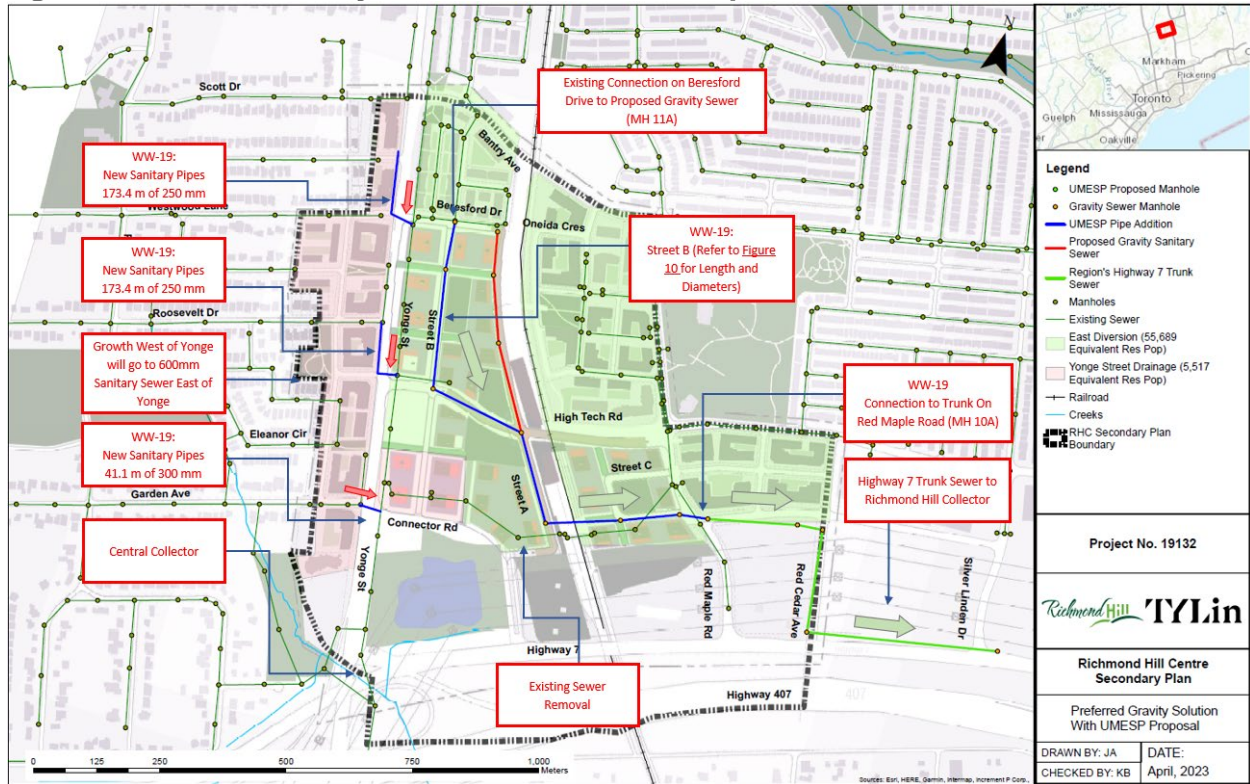


Table 7: Preferred Wastewater Design Flows with Gravity Sewer

Component	Design Basis	West of Yonge	East of Yonge	Total
<b>Residential Units <sup>(1)</sup></b> (Including Bantry)		2,166	21,660	23,826
<b>Residential Population</b>	2.15 persons/unit	4,657	46,569	51,226
<b>Residential Average Flow</b>	265 Lpcd	14 L/s	143 L/s	157 L/s
<b>Total Employment Floor Area</b>	m <sup>2</sup>	23,000	203,443	226,443
<b>Employment Average Flow</b>	18 L/m <sup>2</sup> /d	5 L/s	42 L/s	47 L/s
<b>Employment – Jobs</b>	Convert Employment Average flow to equivalent residential population	860	9,120	9,979
<b>Total People + Jobs</b>	Residential Pop + Employment Equivalent Population	<b>5,517</b>	<b>55,689</b>	<b>61,205</b>
<b>Total Average Flow</b>		19 L/s	185 L/s	204 L/s
<b>Total Peak Flow</b>	Harmon Factor	52 L/s	469 L/s	521 L/s
<b>Total Design Flow</b>	Extraneous Allowance 0.26 L/ha/s	54 L/s	476 L/s	530 L/s

In order to review constructability of the preferred solution, a conceptual design of the Gravity Sewer using a grade of 0.35% was developed to connect to the Red Maple Road sewer at an invert of 193.23 m. As per an external consultant’s analysis, the Red Maple Road sewer will have a capacity of 498 L/s. The total design flow of the east side of CNR is estimated to be 476 L/s, giving a capacity allocation of 95%. This capacity constraint will have to be reviewed at the preliminary design and functional servicing stage.

The proposed gravity sewer solution includes local sewers along new right of way which drain to the main collector sewer running along Street B. The Street B sewer runs south, which then crosses east below the CNR corridor to then connect to the Red Maple Road sewer. The alignments are shown in Figure 8 with preliminary profiles containing diameters and lengths shown in Figure 9 and Figure 10.

A large 1800 mm x 2400 mm concrete box storm sewer flowing from north to south on the west side of the railway is recommended to be realigned within Street A road allowance to the west of its current location. This is to ensure that a future conflict with the subway station is avoided. The proposed sanitary sewer will cross the storm culvert at the Railway crossing. Assuming the storm culvert will follow the same slope at the new alignment, at the crossing of the sanitary sewer, the obvert of the storm sewer will be at 193.95 m and the invert of the sanitary sewer will be at 194.26 m. This provides a clear separation of 0.31 m, which exceeds the 0.30 m separation requirement between Storm Sewer and Sanitary Sewer. This will need to be reviewed and confirmed during detailed design.

**Figure 9: Street "A" Gravity Sewer to Red Maple Road Connection**

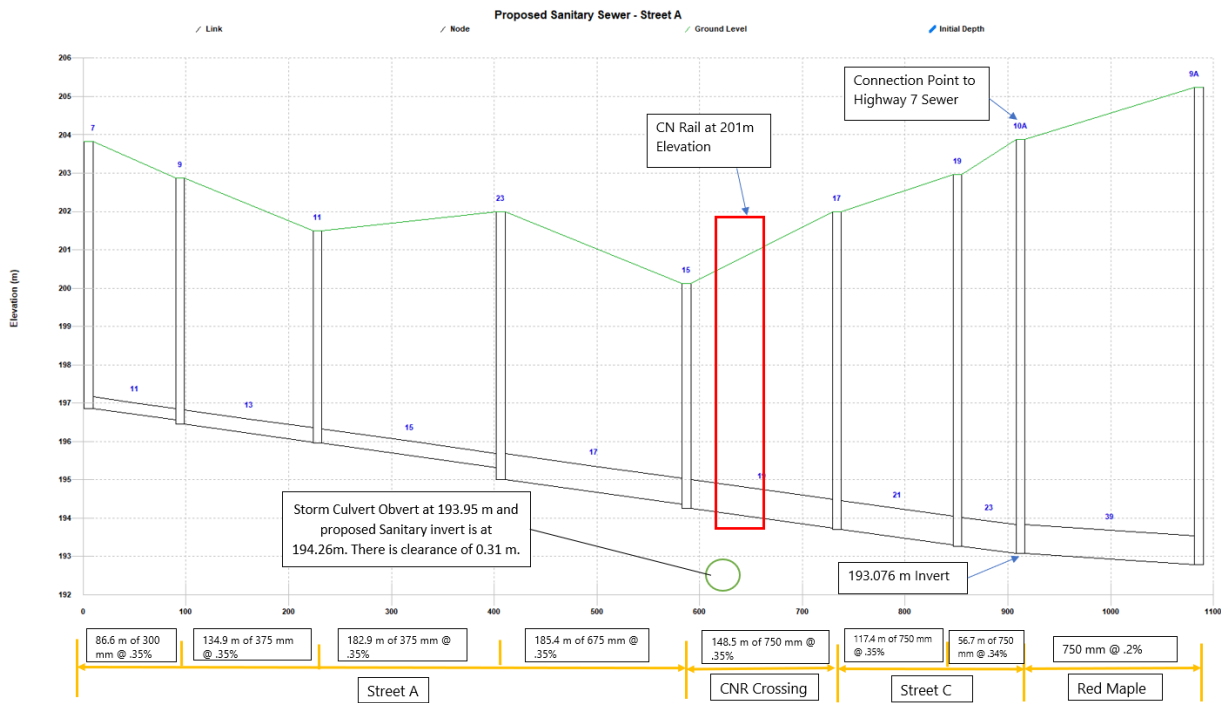
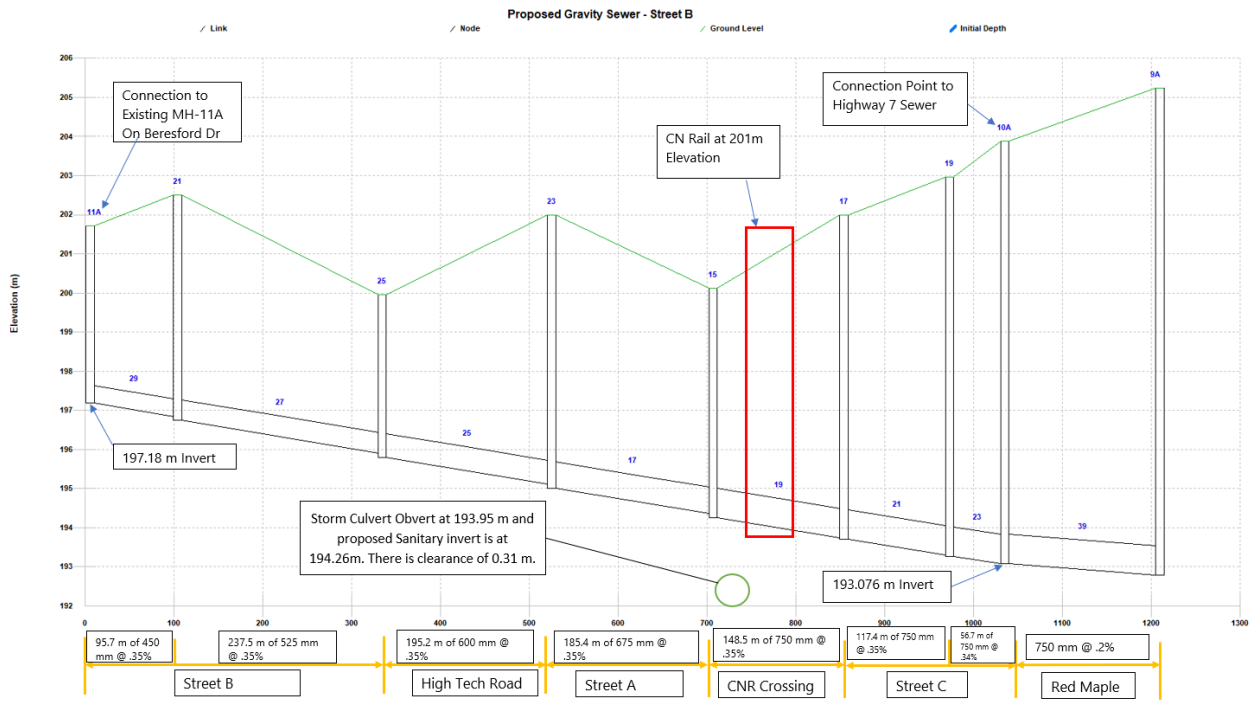


Figure 10: Street “B” Gravity Sewer to CNR Crossing



## 4 STORMWATER MANAGEMENT REVIEW

### 4.1 Existing Stormwater System

The study area is within the Don River watershed. An existing SWM pond is located at the northeast corner of Yonge Street and Highway 7. The approximate tributary area to the facility is 120 ha which includes the portion of the Study Area east of Yonge Street. The storm pipe that conveys the flows from Yonge Street is a 1500 mm diameter pipe and the storm pipe that conveys the flows from the study area to the pond consists of two 2400 mm x 3000 mm box pipes. This SWM pond discharges into a crossing under Highway 7 and Highway 407. This SWM pond is currently within TRCA’s regulated limit.

Based on the Langstaff Centre Community Design Brief Stormwater Management Pond Western Drainage Area dated April 1994 prepared by Marshall Macklin Monaghan, this pond has a tributary area of approximately 120 ha with an imperviousness of 75% and provides the following water quality and water quantity treatment levels:

- Water quality
  - Retention of runoff from 25mm storm for 24 hours and storage for 25mm storm event
  - 75% Suspended Particulates (TSS) removal
- Water quantity
  - control post to pre-development flows for the 2 through 100-year storm events

The pond storage volumes are documented in Table 8:

**Table 8: Existing Stormwater Pond Storage Volumes**

	<b>Elevation (m)</b>	<b>Volume Required (m<sup>3</sup>)</b>	<b>Volume Provided (m<sup>3</sup>)</b>
Permanent Pool	186.0 - 188.0	8,000	9,500
Water Quality Active Storage	188.0 - 189.85	21,880	22,600
Water Quantity	189.85 - 192.0	51,350	56,700
Additional Regional Freeboard	192.0 – 192.75	69,740	70,700

A 375 mm diameter orifice was designed to control the runoff from the 25 mm storm and retain it for 24 hours. A weir 1.8 m wide set at an elevation of 189.85 m was designed to control the 2- through 100-year storm events. The outfall is a 3.0 m x 1.5 m culvert that connects to the crossing under Highway 7 and Highway 407.

The outflows from the design report are provided below in Table 9:

**Table 9: Stormwater Pond Design Outflows**

Storm Frequency	Outflow (m <sup>3</sup> /s)
2yr	0.65
5yr	1.89
25yr	4.40
100yr	6.68

## 4.2 Stormwater Design Criteria

Future developments are to be designed according to the policies set out by the City, Toronto and Region Conservation Authority (TRCA), and Ministry of Environment, Conservation and Parks (MECP) using the following documents:

- The City of Richmond Hill *Standards and Specifications Manual* (last updated November 2022)
- MECP, *Stormwater Management Planning and Design Manual*, dated March 2003
- TRCA, *Stormwater Management Criteria*, dated August 2012

The general criteria for stormwater management are as follows:

- Volume / Erosion Control: Minimum volume control criterion is on-site retention of the first 5 mm of precipitation. If the site requires a pond, then the retention of the 25 mm storm for 48 hours is required.
- Water Balance: City sustainability metrics require on-site retention of the first 5 mm of precipitation, for all new Site Plan development.
- Water Quantity Control: Minimum water quantity criterion is to control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm. If the site is 5 ha. or more and drains to the Don River watershed, the quantity requirement is unit flow relationships as shown in Table 10.

**Table 10: Don River Watershed Sub-Basin Unit Peak Flows (TRCA)**

Sub-basin	Unit Peak Flows (m3/s/ha)					
	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
22	0.0046	0.0092	0.0132	0.0172	0.0209	0.0252
26	0.0038	0.0074	0.0107	0.0137	0.0166	0.02
29	0.0035	0.0069	0.0102	0.0133	0.0161	0.0196
30	0.0033	0.0053	0.0076	0.0097	0.0117	0.0143

- Water Quality Control: Minimum Level 1 (enhanced) water quality control required.

Generally, the design criteria, as set out in The City of Richmond Hill *Standards and Specifications Manual* (last updated November 2022), the storm sewers are to be designed to convey the 5 year frequency storm event using the Intensity Duration Frequency (IDF) curves provided in the City’s Manual (Table 11) unless otherwise directed by the City.

**Table 11: IDF for 2-to-100-year events**

Return Frequency	Intensity
2 year	$i = 737.15(T+4)^{-0.7821}$
5 year	$i = 1139.65(T+4)^{-0.8080}$
10 year	$i = 1298.35(T+4)^{-0.8191}$
25 year	$i = 1759.5(T+4)^{-0.8287}$
50 year	$i = 2014.8(T+4)^{-0.8337}$
100 year	$i = 2273.55(T+4)^{-0.8382}$

Source: City of Richmond Hill *Standards and Specifications Manual*

## 4.3 Servicing Recommendations from Recent Studies

### 4.3.1 2014 Urban Master Environmental Servicing Plan

The Richmond Hill Urban Master Environment Servicing Plan (UMESP) was completed in May 2014. A new updated UMESP is currently underway but is not available currently. Based on the MESP completed in 2014, the study area has no capacity issues. The study involved using InfoSewer to replicate the existing storm drainage network. The study concluded that current stormwater management requirements (water quality, volume, and peak flow control) continue to be appropriate within the context of the urban structure framework defined by the Official Plan,

and in fact will constitute a net improvement over existing conditions with respect to the quality, rate and volume of runoff delivered to the municipal drainage systems and ultimately receiving watercourses.

Based on the Richmond Hill UMESP completed in May 2014, some potential storm sewer capacity issues are anticipated upon full buildout of the RHC. Potential constraints were identified along Eleanor Circle, Mackay Drive, High Tech Road, and Red Maple Road. All local sewers were reviewed for adequate storm sewer capacity as part of the 2014 UMESP Study.

The following ‘Secondary Plan Scale’ and ‘Development Scale’ recommendations were identified in the UMESP, and are repeated here for reference and consideration – as appropriate – in the Secondary Plan Study:

- Secondary Plan Scale: [...] The Richmond Hill Centre Secondary Plan area includes an existing SWM facility at northeast corner of Yonge Street and Highway 7. This Secondary Plan should include provisions to maintain this land use and the function of this existing SWM facility which provides treatment for a portion of the Richmond Hill Centre.
- All of the Secondary Plans should have policies to require the submission of a Functional Servicing Report (FSR) with development applications to demonstrate conformity to the Urban MESP and more specifically a minor and major drainage system assessment to confirm adequate outlets and capacity are available and to demonstrate conformity to the MESP stormwater management plan. The FSR should provide details of the proposed on-site measures for quality and quantity control, and volume control through the use of feasible LID measures. The Secondary Plans should require that the FSR storm drainage and SWM analysis be completed in accordance with City and TRCA standards. All of the Secondary Plans should include policies to encourage or support the use of LID measures and more specifically the use of enhanced on-site volume control in accordance with the Urban MESP and the City’s Sustainable Design Criteria (Section 7.4.3).
- Development Scale: Development applications within the study area should be required to submit a Functional Servicing Report (FSR) to demonstrate conformity to the Urban MESP and more specifically a minor and major drainage system assessment to confirm adequate outlets and capacity are available and to demonstrate conformity to the MESP stormwater management plan. The FSR should provide details of the proposed on-site measures for quality and quantity control, and volume control through the use of feasible LID measures. The FSR storm drainage and SWM analysis should be completed in accordance with City and TRCA standards. Minor system drainage design sheets in accordance with City standards shall be submitted at the detailed site plan design stage to verify system capacity.

## 4.4 Updated Stormwater Servicing Recommendations

Overall, the redevelopment of the RHC presents an opportunity to reduce the runoff to existing city sewers, as the overall imperviousness of the RHC lands is anticipated to decrease, through the inclusion of new parks and open spaces. Any new buildings will be designed to the current SWM standards, including the addition of site-controls to limit the release rate of stormwater to the municipal network. Any new streets incorporated into the RHC will represent “uncontrolled” sources for stormwater runoff, but many of these will be located within existing built areas or parking lots, which are effectively close to 100% impervious in their current conditions.

Because the proposed street network and densities of the High Tech TOC and implementing High Tech EMZO represent a net reduction in the total runoff from the RHC, it is anticipated that no modifications to the existing SWM (configuration or volume) are required.

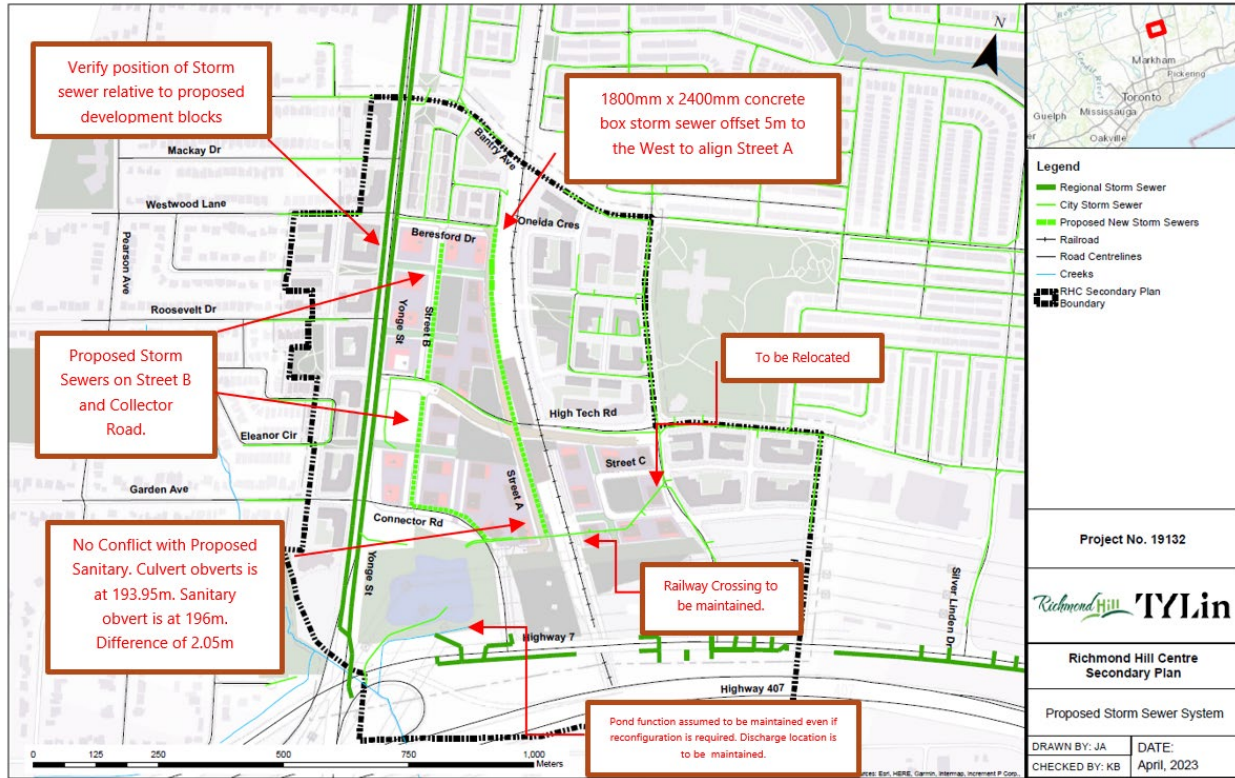
The existing local storm sewer system appears to generally line-up with the proposed road network. There are some instances where existing storm sewers will need to be relocated to accommodate proposed new development blocks. Based on the development plan, we anticipate that all relocations can be accommodated within existing or future roads.

The Viva Next BRT project on Yonge Street will likely introduce restrictions on the feasibility of Yonge Street service connections for properties along Yonge Street. Service connections may have to be focused on local or new City side streets or on easements abutting Yonge Street.

A large 1800mm x 2400mm concrete box storm sewer flowing from north to south on the west side of the railway is recommended to be realigned within Street A road allowance to the west of its current location. This is to ensure that a future conflict with the subway station is to be avoided. This can be seen on Figure 11.

With new street alignments accommodating new development blocks, two storm sewer alignments are recommended on Street B. The first proposed Storm Sewer on Street B between Beresford Drive and High Tech Road will flow south to High Tech Road. The second proposed Storm Sewer on Street B between High Tech Road and Connector Road will flow south until Connector Rd. It will then flow east alongside Connector Road until it reaches the Storm Sewer that connects to the Pond.

**Figure 11: Proposed Storm Sewer System**



## 5 CONCLUSIONS

TYLin conducted a servicing analysis to assess the existing sanitary sewer, storm sewer and watermain system in the study area and the capacity for potential redevelopment in the RHC area. Population yields were provided by Urban Strategies Inc., for the RHC Secondary Plan update to reflect the High Tech EMZO permissions. The projected residential population (including existing population) at full build-out is approximately 51,000 residents with an employment population of approximately 10,000 jobs. This gives a total population (of people and jobs) to be serviced to be approximately 61,000 people.

For the water servicing, the study area is currently serviced from York Region Pressure District 6 (PD-6). It is anticipated that some existing watermains will need to be replaced as they are in locations that do not suit the proposed streets and blocks layout. New watermains are anticipated within new rights-of-way to provide looping and redundancy. It is anticipated that all new development will need to have an adjacent 300 mm watermain to achieve the required residual pressures under peak hour demands (275 kPa) and under maximum day plus fire flow scenario (140 kPa). Buildings greater than 85m in height (typically approximately 28 storeys) will require two fire service connections, to watermains on adjacent streets which can be isolated through line

valves in the network. The ultimate water distribution network has watermains on all streets and most blocks are adjacent to two streets. Where a block fronts a single street, two fire services are recommended with a line valve between them.

For the wastewater servicing, there is a need to establish a new west-east drainage boundary. This is to ensure that a manageable amount of wastewater is generated within the RHC and is directed east to the new Regional Trunk Sewer. This is achieved through a new sewer along the north-south roadway immediately west of Railway is proposed. This new sewer would convey the wastewater south towards the lower elevation within the Study Area.

From this location, the preferred option would be a gravity sewer under the railway to the western limit of the existing trunk sewer on Red Maple Road. Through a preliminary review of the sewer grades for the Highway 7 Regional Trunk Sewer, a gravity sewer solution was developed, thus delineating two sewersheds. Based on the sewershed delineation in Figure 8, approximately 5,517 people and jobs will be conveyed to the Central Collector Trunk Sewer and 55,689 people and jobs to the Region's Highway 7 Trunk Sewer in the east. Table 7 provides the projected wastewater design flows with Gravity Sewer. This sewershed delineation limits the populations draining to the Central Collector to a number lower than what was contemplated in the Region's Class EA. By diverting the existing serviced lands north of Beresford Drive into the proposed new RHC sewer along Street B. This would offset most of the increase in design flows to the Central Collector resulting from RHC development east of Yonge Street.

A secondary option would be to pump the wastewater under the railway, from a new sewage pumping station. This could be evaluated at a later stage.

For the stormwater servicing, the redevelopment of the RHC presents an opportunity to reduce the runoff to existing city sewers, as the overall imperviousness of the RHC lands is anticipated to decrease, through the inclusion of new parks and open spaces. Any new buildings will be designed to the current SWM standards, including the addition of site-controls to limit the release rate of stormwater to the municipal network. Any new streets incorporated into the RHC will represent "uncontrolled" sources for stormwater runoff, but many of these will be located within existing built areas or parking lots, which are effectively close to 100% impervious in their current conditions. Because the proposed street network and densities of the High Tech TOC and implementing High Tech EMZO represent a net reduction in the total runoff from the RHC, it is anticipated that no modifications to the existing SWM (configuration or volume) are required.

The existing local storm sewer system appears to generally line-up with the proposed road network. There are some instances where existing storm sewers will need to be relocated to accommodate proposed new development blocks. The Viva Next BRT project on Yonge Street will likely introduce restrictions on the feasibility of Yonge Street service connections for properties along Yonge Street. Service connections may have to be focused on local or new City side streets

or on easements abutting Yonge Street. A large 1800mm x 2400mm concrete box storm sewer flowing from north to south on the west side of the railway is recommended to be realigned within Street A road allowance to the west of its current location. This is to ensure that a future conflict with the subway station is to be avoided. With new street alignments accommodating new development blocks, two storm sewer alignments are recommended on Street B.