

DIRECTOR INDUSTRIAL HOLDINGS LIMITED

603-643, 645-699 KINGSTON ROAD FUNCTIONAL SERVICING REPORT

APRIL 15, 2020





**603-643, 645-699
KINGSTON ROAD
FUNCTIONAL SERVICING
REPORT**

DIRECTOR INDUSTRIAL HOLDINGS LIMITED

FUNCTIONAL SERVICING REPORT

PROJECT NO.: 19M-00841

DATE: APRIL 15 2020

WSP CANADA GROUP LIMITED

SUITE 201

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1 INTRODUCTION

1.1 INTRODUCTION

This report has been prepared for the Director Industrial Holdings Limited Lands located at 603-643, 645-699 Kingston Road (hereinafter referred to as the “Site”) in the City of Pickering, to identify any servicing or grading issues and to identify how these lands may be developed. The current development concept, as represented in the conceptual site plan drawings and development statistics prepared by Graziani + Corazza Architects, dated April 6, 2020, enclosed with this submission, is preliminary in nature and is subject to change. The development is bordered by Kingston Road to the north, Whites Road to the east, Highway 401 to the south and existing commercial lands to the west. The location of the development block is identified on **Figure No. 1**. The existing site conditions is shown on **Figure No. 2**, and details the Site Limits and the neighboring properties.

The current development concept, which represents a high-level master plan for a new mixed-use community, is primarily intended to form the basis of the proposed Draft Official Plan Amendment, which is required to facilitate the proposed density and Floor Space Index on the subject lands, as well as the proposed Draft Zoning By-law Amendment which is required to establish a new site-specific zoning framework that will implement the City’s current land use vision for the subject lands.

This proposed official plan and zoning by-law amendment framework is intended to provide flexibility to ensure that the development of the lands responds to market conditions and can result in implementation of plans and alternative plans to achieve principles of intensification based on good planning and urban design principles. As such, it is anticipated that the development concept as presented be considered conceptual and will be revised, as necessary, to account for new and/or evolving considerations related to the master-planned community.

The purpose of this report is to describe the existing services in the vicinity of the Site in order to determine how these lands will be serviced by storm, sanitary and water. The report also reviews the site grading at a preliminary level to determine drainage boundaries and grading constraints. A separate Stormwater Management, also prepared by WSP, speaks to the Storm Water Management strategies including Low Impact Development (LIDs), Water Quality, and potential outfalls for this site.

1.2 SITE DESCRIPTION

The total Site area is 4.85 ha (11.98 acres). The Site generally fairly flat with existing localized low points to collect drainage. The existing overland flow route is to the south towards Highway 401. There is an existing retaining wall along the northeast portion of the site, adjacent to Kingston Road. The retaining wall is on the public right-of-way however it is understood from the projects pre-consultation that the City and Region would prefer for this wall to be removed as part of the development. Therefore, there will be a high point in the northwest corner of the site after development of the site. Existing Site grading is shown on the Topographic Survey, **Figure No 2**. The existing grades were established by field survey on November 12th, 2018 by R. Avis Surveying Inc. (Project No. 3230-0).

There are two existing active easements on the property. There is a sanitary sewer easement running parallel to Kingston Rd along the NE portion of the site (Inst No. D133028). Record drawings received from the Region of Durham indicate that this easement contains an active 300mm sanitary sewer. The second easement is a storm sewer easement that bisects the property and runs north-south from Kingston Rd to Highway 401 (Inst No. D245949). Neither the Region of Durham or the City of Pickering were able to provide drawings for the sewer in this easement, however based on the pre-consultation meeting minutes and surveyed at grade structures we believe that this easement contains a trunk storm sewer which conveys flow from the Kingston Rd Right-of-Way to a headwall which outlets to Highway 401.

1.3 DEVELOPMENT CONCEPT

The current concept development will consist of 6 high-rise towers, 2 mid-rise towers, and 4 townhouse blocks.

Four (4) of the proposed building are townhouse blocks in the northern portion of the site closest to Kingston Road (called Block 1 through Block 4). The townhouse blocks each contain 36 units, for a total of 144 residential townhouse units.

In addition to the townhouse blocks there are 5 proposed podiums containing a total of 8 residential towers. Podium 1 is a 4-storey podium in the southwest portion of the site and contains one 29-storey residential tower (Tower 1), one 32-storey residential tower (Tower 2), and one 36 storey residential tower (Tower 3) with 250 units, 280 units, and 320 units respectively. Podium 2 is a 6-storey residential podium in the northern portion of the site and contains one 18-storey residential tower with 360 units (Tower 4). Podium 2 contains 170 units. Podium 3 is a 6-storey residential podium in the northern portion of the site which contains an 18-storey residential tower with 360 units (Tower 5). Podium 3 contains 170 units. Podium 4 is a 4-storey residential podium in the southeast portion of the site and contains one 29-storey residential tower (Tower 6) and one 42-storey residential (Tower 7) with 250 units and 380 units respectively. Podium 5 is a 4-storey podium in the northeast corner of the site which contains 4-storeys of commercial and office space and a 24-storey residential tower (Tower 8) containing 200 units. In total between the 8 towers, 5 podiums, and the four townhouse blocks a total of 2884 residential units are proposed.

There are 4 separate below grade parking structures proposed on the site. Townhouse Block 1 and 2, and Podium 2 will share one below grade parking structure. Similarly, Townhouse Block 3 and 4, Podium 3, and Podium 5 will share one below grade parking structure. Podium 1 and Podium 2 will each have their own below grade parking structure.

The proposed development also includes three parks, one west of Podium 5 (0.14ha), one between Podium 1 and Podium 4 (0.14ha), and one at the west edge of the site (0.11ha), which is proposed to be a part of larger future park. In addition to the parks there is other proposed soft landscaped areas as shown on the architectural drawings.

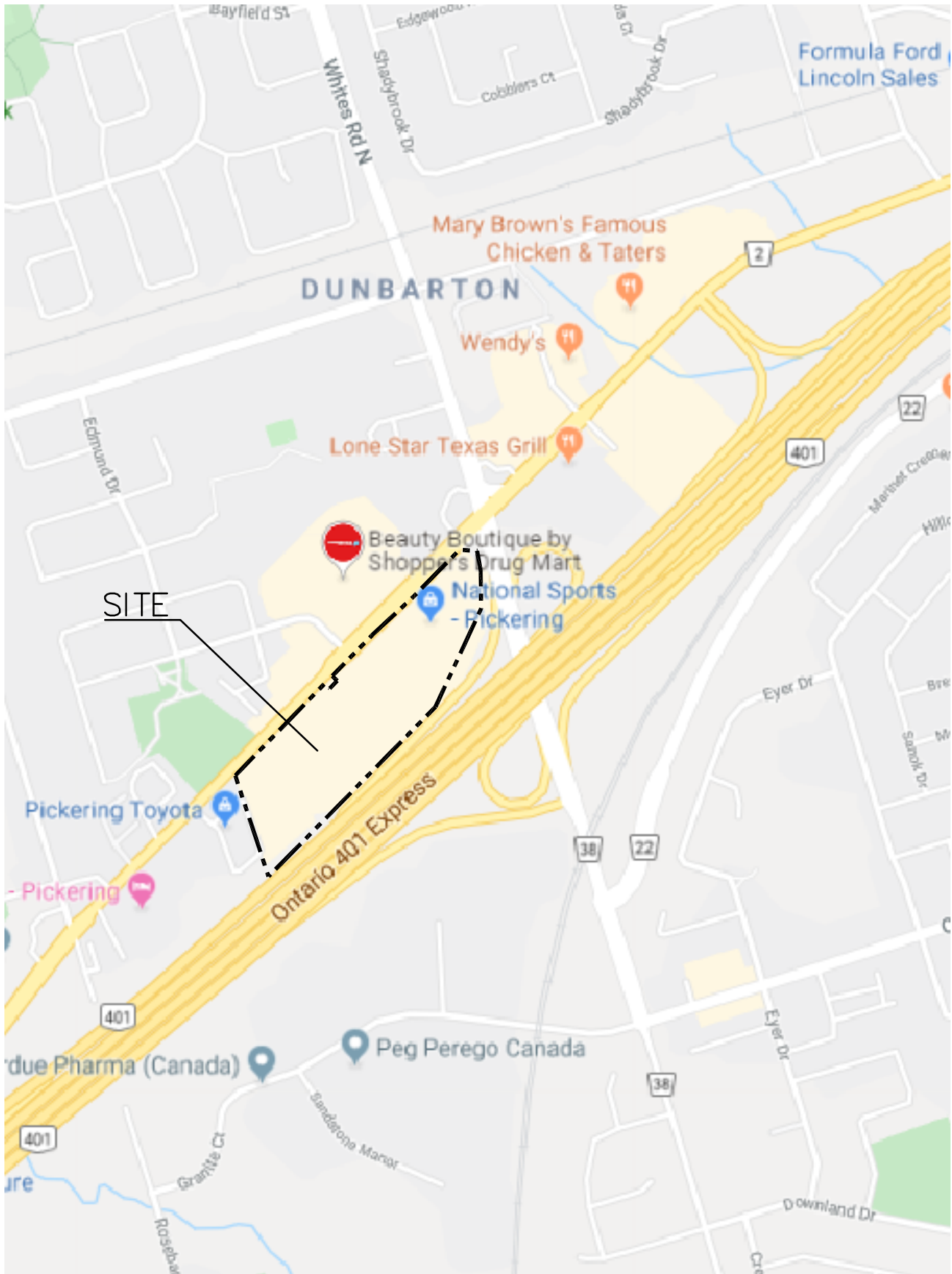
The proposed development plan is shown on **Figure No's. 3a** (above grade) and **3b** (below grade).

1.4 PHASING

The Site Plan is expected to be developed in multiple phases. The phasing of the site plan is to be determined at a later date.

1.5 REPORT OUTLINE

For the purpose of this report a number of preliminary figures have been prepared to clarify the servicing and grading issues and potential solutions. The Site limits are identified in **Figure No. 1** and discussed in Section 1.2 of this report. The development block is identified by the Topographic Survey in **Figure No. 2**. The Conceptual Site Plan is shown in both **Figure No's. 3a** and **3b**, each outlining the conceptual layout for both the surface Site Plan and the underground parking Site Plan respectively. The Preliminary Site Grading section of this report outlines the issues encountered with the existing grade and solutions to control the major and minor overland flow, as shown in **Figure No. 4**. The Preliminary Site Servicing outlines the proposed watermain, sanitary, and storm connections for the Site, and schematically lays out the proposed on-site servicing, and can be seen in **Figure No. 5**.



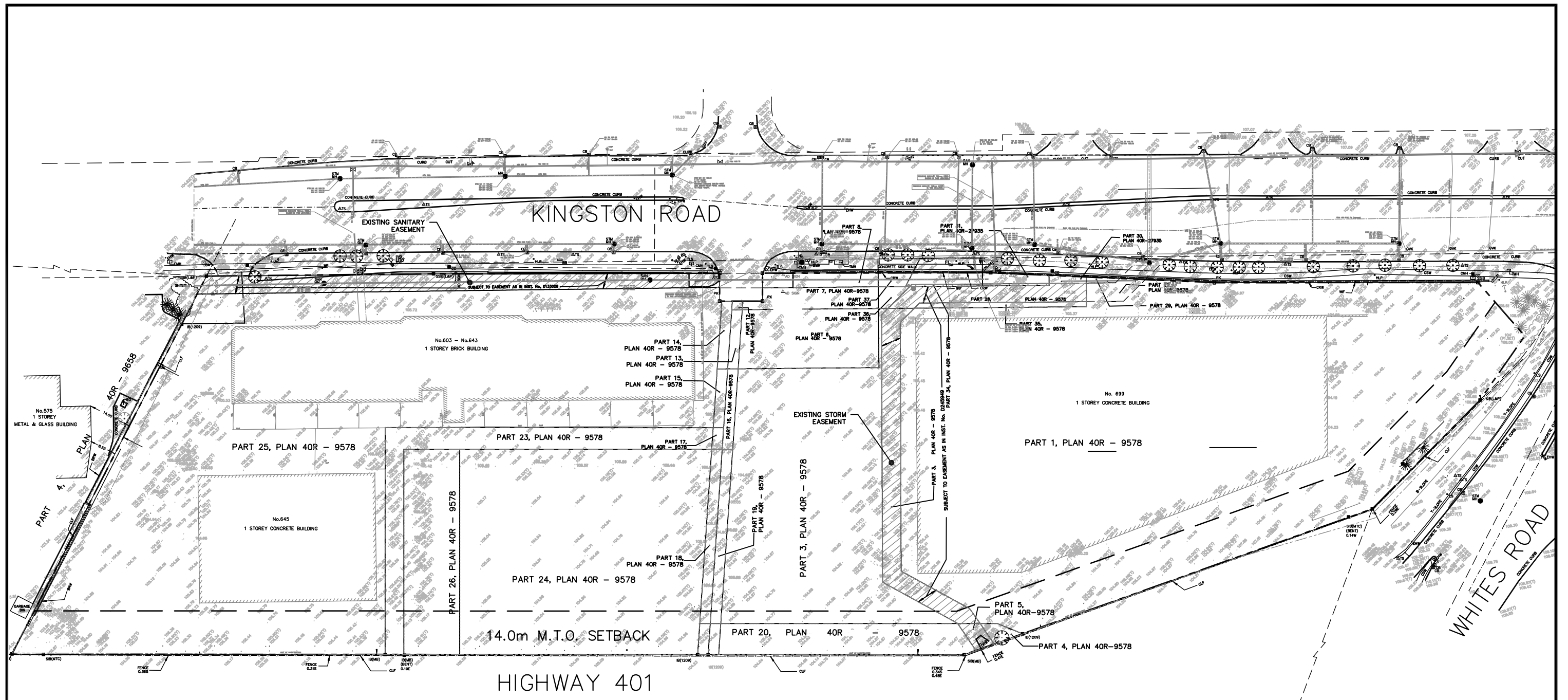
CLIENT
 DIRECTOR INDUSTRIAL HOLDINGS LIMITED

TITLE
 603-643, 645-699 KINGSTON ROAD,
 PICKERING, ONTARIO
 SITE LOCATION PLAN

wsp
 Suite 201 - 701 Rossland Road East
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 www.wsp-pb.com


Checked AK
 Date FEB 2020
 Scale NTS

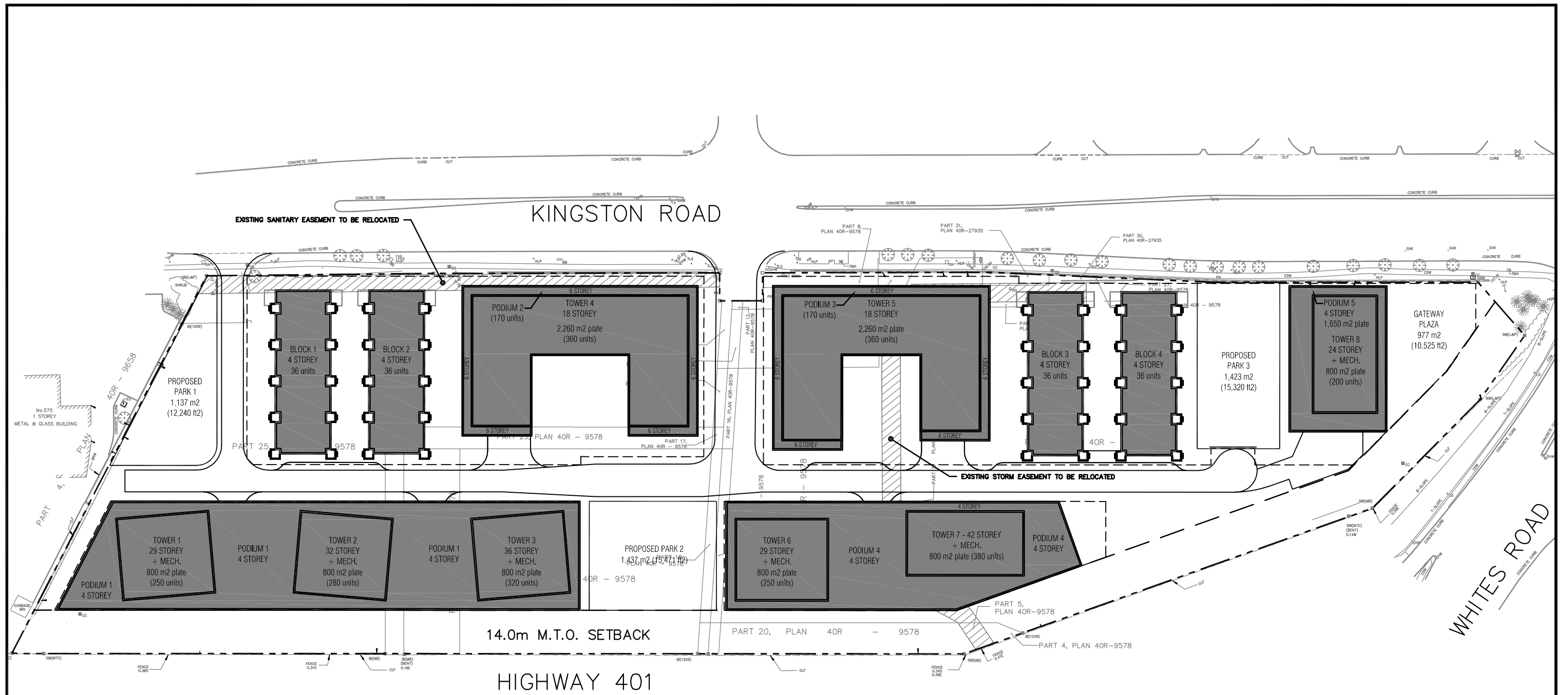
Drawn LL
 Proj. No. 19M-00841
 Figure No. 1



LEGEND


- — — — — PROPERTY LINE
- — — — — MTO SETBACK

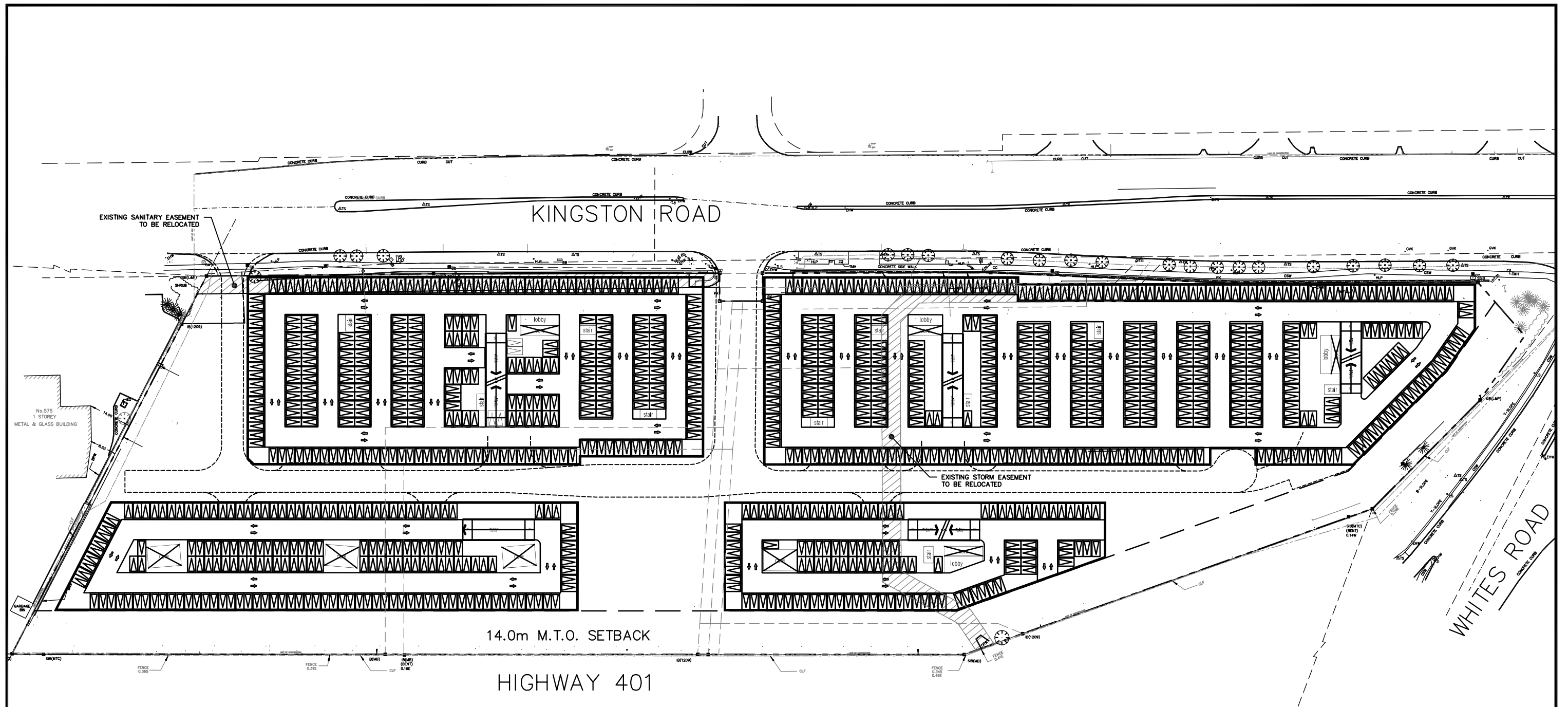
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|---|---------------|
| CLIENT | |
| DIRECTOR INDUSTRIAL HOLDINGS LIMITED | |
| TITLE | |
| 603-643, 645-699 KINGSTON ROAD PICKERING, ONTARIO | |
| PRE-DEVELOPMENT TOPOGRAPHIC SURVEY | |
|  Suite 201 - 701 Rosstand Road East Whitby, ON L1N 8Y9 t. 905.668.3022 f. 905.668.9443 www.wsp.com | |
| Checked | AK |
| Drawn | SAW |
| Date | FEBRUARY 2020 |
| Proj. No. | 19M-00841 |
| Scale | 1:1250 |
| Figure No. | 2 |



LEGEND


- — — — — PROPERTY LINE
- — — — — MTO SETBACK
- — — — — UNDERGROUND BUILDING ENVELOPE

| | |
|--|---------------|
| CLIENT | |
| DIRECTOR INDUSTRIAL HOLDINGS LIMITED | |
| TITLE | |
| 603-643, 645-699 KINGSTON ROAD PICKERING, ONTARIO | |
| POST-DEVELOPMENT PRELIMINARY SITE PLAN | |
|  Suite 201 - 701 Rosland Road East Whitby, ON L1N 8Y9 t. 905.668.3022 f. 905.668.9443 www.wsp.com | |
| Checked | AK |
| Drawn | SAW |
| Date | FEBRUARY 2020 |
| Proj. No. | 19M-00841 |
| Scale | 1:1250 |
| Figure No. | 3a |



LEGEND

- — — — — PROPERTY LINE
- — — — — MTO SETBACK

| | |
|--|---------------|
| CLIENT | |
| DIRECTOR INDUSTRIAL HOLDINGS LIMITED | |
| TITLE | |
| 603-643, 645-699 KINGSTON ROAD PICKERING, ONTARIO POST-DEVELOPMENT PRELIMINARY UNDERGROUND SITE PLAN | |
|  Suite 201 - 701 Rosland Road East Whitby, ON L1N 8Y9 t. 905.668.3022 f. 905.668.9443 www.wsp.com | |
| Checked | AK |
| Drawn | SAW |
| Date | FEBRUARY 2020 |
| Proj. No. | 19M-00841 |
| Scale | 1:1250 |
| Figure No. | 3b |

2 SITE GRADING

2.1 SITE GRADING

Site grading will be designed in accordance with the City of Pickering's Storm Sewer Servicing and Roads grading criteria with respect to minimum and maximum grades. The Site's predevelopment overland flow is directed south towards Highway 401. Minor storm flows are collected in various on-site drains and directed towards a headwall on the southeast edge of the site where it is discharged south towards Highway 401.

The proposed development will be graded to direct all storm drainage to localized on-site drains, and the overland flow route to Highway 401 will be maintained.

Preliminary internal road elevations are shown on **Figure 4** (Preliminary Grading Plan). Access to the site will be provided by two entrance off of Kingston Road, both southwest of the Kingston Rd and Whites Rd intersection. Based on the existing and preliminary proposed elevations, road grades will generally vary between 0.5% and 2.5%. The minor flow will be captured in drains and directed to a stormwater detention and retention facility located under the proposed park between Podium 1 and Podium 4. The major flow in excess of the 100-year storm will be directed to a proposed low point between Podium 1 and Podium 4, which would then flow south through the park to Highway 401, matching the existing pre-development overland flow route. All storm water will ultimately flow into Petticoat Creek to the west of the site.

The proposed site grading would eliminate the need for a retaining wall adjacent to Kingston Rd, as requested in the pre-consultation meeting minutes.

3 STORMWATER MANAGEMENT

3.1 MINOR STORM SYSTEM

The on-site storm drains and sewers will be designed to convey the 100-year flow from the development. These storm flows are to be directed to an stormwater management system located beneath the park between Podiums 1 and 4. The schematic location of the stormwater management facility is shown in **Figure No. 5** (Preliminary Site Servicing Plan). The stormwater management facility will provide water quantity, water quality, erosion and sediment control and water balance requirements set out by the City of Pickering. Please see Stormwater Management Report, also prepared by WSP, for details of the proposed Stormwater Management System.

3.2 MAJOR STORM SYSTEM

The on-site storm drainage system will be designed to capture and convey to 100-year storm event. Any overland flows from storm events greater than the 100-year event will be directed to a low point on the south edge of the site, adjacent to the proposed park between Podium 1 and Podium 4. Overland flow from the Site, similar to the existing predevelopment flow, will continue to be directed southerly towards Highway 401, which ultimately conveys the flows to Petticoat Creek.

3.3 EXISTING EASEMENT

The proposed development site contains a storm sewer easement which runs north to south through the site. It is presumed that this easement contains a trunk storm sewer that conveys flows from Kingston Rd to High 401. The easement is in conflict with the proposed re-development of the site. As such the developer proposes that the existing storm sewer and easement be relocated to avoid the proposed structures. Detailed design of the relocated storm sewer will be completed at a later stage of the project. A preliminary schematic illustration of the proposed relocation is shown on **Figure 5**.

4 SANITARY DRAINAGE

4.1 INTRODUCTION

Based on the record drawings received from the Region of Durham there are a number of existing sanitary sewers in the vicinity of the site:

- A 300mm diameter sanitary sewer on the north side of Kingston Road
- A 150mm diameter sanitary forcemain on the south side of Kingston Road
- A 300mm diameter sanitary sewer in the easement in the north-west corner of the site.

The 300mm sanitary sewer on the north side of Kingston Road flows from east to west and crosses Kingston Road at approximately the mid-point of the site prior to entering the easement across the subject property. The 150mm sanitary force main discharges into the 300mm gravity sewer just prior to entering the easement. The 300mm sewer in the easement flows to the west ultimately draining off the site and continuing west parallel to Kingston Road.

4.2 EXISTING EASEMENT

The proposed development site contains a sanitary sewer easement in the northwest portion of the site. This easement contains a sanitary sewer that flows from east to west parallel to Kingston Rd. The easement is in conflict with the proposed re-development of the site. As such the developer proposes that the existing sanitary sewer be relocated into the Kingston Road right-of-way. Detailed design of the relocated sanitary sewer will be completed at a later stage of the project. A preliminary schematic illustration of the proposed relocation is shown on **Figure 5**.

4.3 PRE- AND POST-DEVELOPMENT FLOWS

The estimated pre- and post-development sanitary sewage flows are estimated based on the Region of Durham Sanitary design criteria.

In the pre-development condition the property contains 3 single storey commercial buildings with a combined GFA of approximately 15,250m². Based on an average flow rate of 180m³/ha/d (including infiltration and peaking factor) the peak sanitary flow from the site in the existing condition is 3.18 L/s.

In the post-development condition the development is proposed to contain 144 townhouse units, 2,740 apartment units, 2,232m² of commercial space and 4,448m² of office space. The apartment units are broken down into approximately 30% one bedroom occupancy and 70% two bedroom occupancy. Based on these unit counts and floor areas and the Region of

Durham Design Criteria the peak post-development sanitary flow from the site, including infiltration is 75.34/s. Therefore the development of the site will increase the sanitary flow by approximately 72.2L/s.

For a detailed breakdown of the pre- and post-development flow calculations see **Appendix A**.

4.4 PROPOSED SANITARY CONNECTION

The proposed development will have one 300mm diameter connection to the existing 300mm diameter gravity sanitary sewer on Kingston Road northeast of the site's existing control manhole and westernmost entrance. This connection will have a control manhole immediately inside the property line and will be designed per the Region of Durham design criteria. Within the private site the individual buildings will have sanitary service connections to a common element sewer which is proposed to flow to the control manhole and ultimately the municipal sanitary sewer system. The proposed sanitary servicing for the site is shown on **Figure 5**.

4.5 DOWNSTREAM SANITARY SEWER ANALYSIS

At the project's pre-consultation meeting the Region advised that a sanitary sewer analysis is required to support this development proposal. WSP has previously completed a downstream sewer capacity analysis for the receiving sewers, which was previously presented to the Region. The receiving sanitary sewer on Whites Road flows to the west to Rosebank Road where it then flows south under Highway 401. From there the flow continues south in a sanitary sewer that flows south, parallel to Petticoat Creek. Prior to reaching Lake Ontario the sewer turns east and connects with a number of other sewers, including a force main from the west, at the intersection of Cliffview Rd and Park Cr. This forms the endpoint of our analysis.

Under the existing conditions there are 28 legs of sewer which are currently operating over capacity, including all the legs of sewer running underneath Highway 401 and parallel to Petticoat Creek. In the post-development condition, after the addition of the proposed development flows, the surcharging in the existing sewers is maintained. In order for this development to proceed there will need to be downstream sewer improvements which alleviate existing capacity issues and provide capacity to support proposed and future developments.

5 WATER SUPPLY

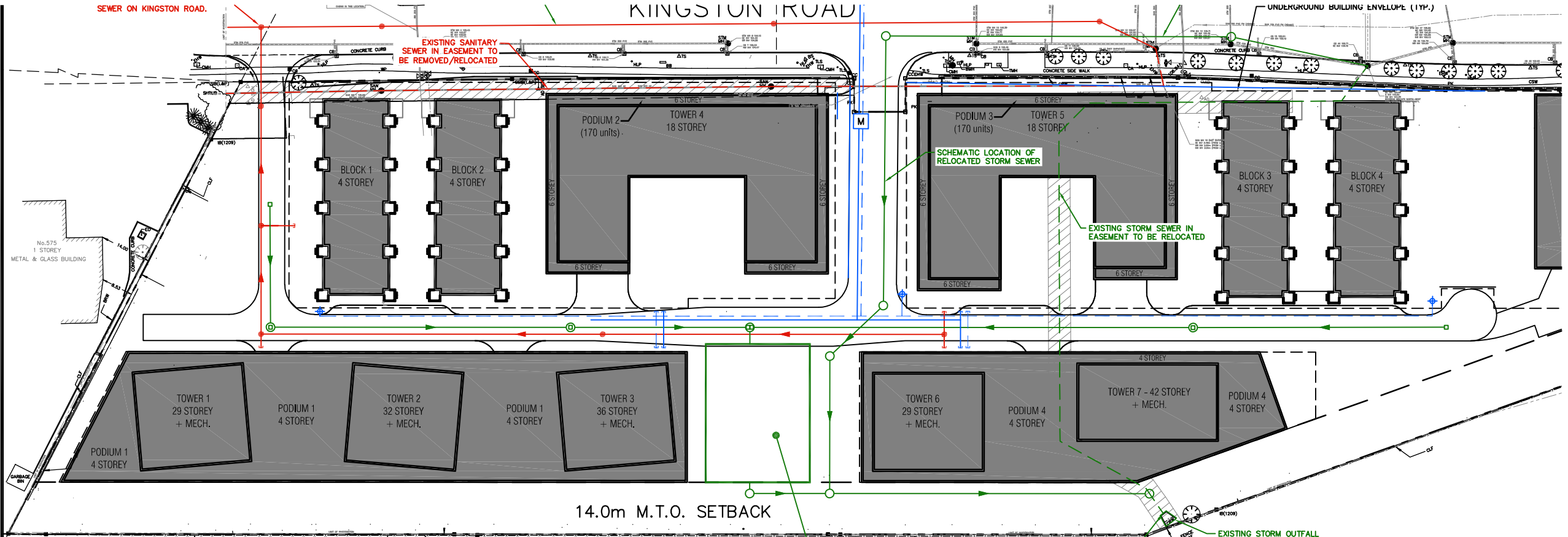
5.1 WATER SUPPLY

The proposed development is located within pressure district Zone A1. There is an existing 400mm feeder watermain on the north side of Kingston Road. There are no other watermains available adjacent to the site. The proposed development will have one 300mm diameter domestic connection and one 300mm diameter fire connection to the existing 400mm watermain on Kingston Road. The domestic line will connect to a chamber on the private property complete with a backflow preventer and flow meter per Region of Durham Standards. The fire line will connect to a separate chamber containing a double check valve assembly per Region of Durham standards.

Within the site the domestic line will be extended to provide a dedicated domestic service to each of the five Podiums (and associated towers) as well as all the townhome blocks. The fire line will form a 'T' along the new private road and provide dedicated fire service to each of the five Podiums (and associated towers) as well as all the townhome blocks. In addition the fire line will have 3 proposed hydrants to provide fire protection for the development. The domestic and fire servicing within the individual buildings is to be designed by the mechanical consultant.

The proposed water servicing layout for the site is shown in **Figure 5**.

KINGSTON ROAD



LEGEND

- | | | | |
|-----------|---|-----------|--|
| — — — — — | PROPERTY LINE | — — — — — | PROPOSED DOMESTIC WATERMAIN |
| — — — — — | MTO SETBACK | — — — — — | PROPOSED FIRE WATERMAIN |
| - - - - - | UNDERGROUND BUILDING ENVELOPE | — ● — | PROPOSED SANITARY STRUCTURES AND SEWER |
| — — — — — | EXISTING WATERMAIN | — ○ — | PROPOSED STORM STRUCTURES AND SEWER |
| - - - - - | EXISTING SANITARY SEWER | □ ⊕ | PROPOSED CATCHBASINS AND CATCHBASIN MANHOLES |
| - - - - - | EXISTING STORM SEWER | □ | EXISTING STORM OUTFALL |
| - - - - - | EXISTING SANITARY SEWER TO BE REMOVED/RELOCATED | ⊕ | PROPOSED FIRE HYDRANT |
| - - - - - | EXISTING STORM SEWER TO BE REMOVED/RELOCATED | □ M | WATER METER CHAMBER |

6 CONCLUSIONS

The following point form list summarizes the opportunities for the servicing and grading of the proposed development at 603-643, 645-699 Kingston Road in Pickering, Ontario.

- Boundary grades will generally be matched.
- Road grades will generally range between 0.5% and 2.5%.
- Storm flows from the site will be directed to on-site drains and directed to a stormwater management facility under the proposed park between Podium 1 and Podium 4. The stormwater management facility will provide quantity, quality, erosion and water balance requirements.
- The overland flows for up to the 4 hour 25mm storm event will be detained internally on site using the various water retention methods described in the SWM report. All overland flows over this regulated volume will continue to approximately follow the existing travelled path to the south of the site flowing and discharging adjacent to Highway 401, ultimately contributing to Petticoat Creek.
- There is an existing storm sewer in an easement on site that will need to be relocated to facilitate the proposed development.
- Sanitary Flows from the site will be discharged through a new connection into the relocated sanitary sewer which is currently located within an on-site easement.
- The development is located in Region of Durham pressure district Zone 1A. There is an existing 400mm watermain of the north side of Kingston Road. Domestic and Fire Lines will be extended from this existing watermain to provide water service for the site. The water system within the underground parking structure will be designed by the mechanical consultant to meet the Ontario Building Code.

APPENDIX

A PRE- AND POST-DEVELOPMENT SANITARY FLOWS

White's Road & Hwy 401 Pre-Development Condition

ESTIMATED SANITARY FLOWS

Commercial Flows

| Unit Type | GFA (m ²) | GFA (ha) | Per Capita Flow (m ³ /ha/day) | Average Daily Flow (m ³ /day) | Average Daily Flow (L/s) | Peaking Factor | Peak Flow (L/s) |
|------------|--------------------------|-------------|--|--|--------------------------------|-------------------|--------------------|
| Commercial | 15248 | 1.525 | 180 | 274.464 | 3.18 | Incl. | 3.18 |

Summary Table

| Land Use | Average Daily Flow (L/s) | Peak Flow (L/s) |
|--------------|--------------------------------|--------------------|
| Commercial | 3.18 | 3.18 |
| TOTAL | 3.18 | 3.18 |

Notes:

- Occupancy rates, per capita flows and peaking factor are as per the Durham Region Sanitary Sewer Design Criteria

White's Road & Hwy 401 Post-Development Condition

ESTIMATED SANITARY FLOWS

Residential Flow

| Unit Type | Unit Count | Occupancy Rate (ppu) | Equivalent Population | Per Capita Flow (L/cap/day) | Average Daily Flow (L/s) | Peaking Factor | Peak Flow (L/s) |
|------------------------------|--------------|----------------------|-----------------------|-----------------------------|--------------------------|----------------|-----------------|
| Single Family/Semis | 0 | 3.5 | 0 | | | | |
| Towns/Stacked Towns | 144 | 3.0 | 432 | | | | |
| 1 Bedroom | 1,918 | 1.5 | 2,877 | | | | |
| 2 Bedroom | 822 | 2.5 | 2,055 | | | | |
| 3 Bedroom | 0 | 3.5 | 0 | | | | |
| 4 Bedroom | 0 | 4.5 | 0 | | | | |
| Sub-total Residential | 2,884 | | 5,364 | 364 | 22.60 | 3.22 | 72.69 |

Infiltration (Residential Areas Only)

| | Residential Area (ha) | Foundation Drains to Sani? (Y/N) | Infiltration Rate (L/s/ha) | Average Daily Flow (L/s) | Peak Flow (L/s) |
|--------------|-----------------------|----------------------------------|----------------------------|--------------------------|-----------------|
| Infiltration | 4.850 | N | 0.26 | 1.26 | 1.26 |

Commercial Flows

| Unit Type | GFA (m ²) | GFA (ha) | Per Capita Flow (m ³ /ha/day) | Average Daily Flow (L/s) | Peaking Factor | Peak Flow (L/s) |
|---------------------|-----------------------|----------|--|--------------------------|----------------|-----------------|
| Commercial + Office | 6680 | 0.668 | 180 | 120.24 | Incl. | 1.39 |

Summary Table

| Land Use | Average Daily Flow (L/s) | Peak Flow (L/s) |
|--------------|--------------------------|-----------------|
| Residential | 22.60 | 72.69 |
| Infiltration | 1.26 | 1.26 |
| Commercial | 1.39 | 1.39 |
| TOTAL | 25.25 | 75.34 |

Notes:

- Occupancy rates, per capita flows and peaking factor are as per the Durham Region Sanitary Sewer Design Criteria
- Assumed 30% 1-bedroom units and 70% 2-bedroom units

APPENDIX

B

DOWNSTREAM SANITARY SEWER CAPACITY ANALYSIS

WSP CANADA GROUP LTD. THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING

DESIGNED BY: SB Residential Infiltration with Foundation Drain Connection
CHECKED BY: SW/CAR 0.52
DATE: 29/01/2020

PROJECT: SORBARA - KINGSTON RD
JOB No.: 19M-00841
FROM:

| MH. No. | Residential | | | Commercial | | Industrial Lot area (ha) | Institutional Lot (ha) | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | |
|-----------|-----------------|--------------------|------------|------------------|---------------|--------------------------|------------------------|------------------------|-----------------|---------------|----------------|-----------|------------|------------|----------|-----------|----------------|---------------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | | | Floor space Index (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | | | Inst. L/S | Total flow L/s | Actual Pipe size mm |
| Area 'A' | 0.73 | 276 | | | | | 10.63 | | | | | | | | | | | |
| | 1.42 | 728 | | | | | | | | | | | | | | | | |
| 045 | 2.15 | 1004 | 3.7989 | | | | 10.63 | | | | | | 32.04 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 059 | 2.15 | 1004 | 3.80 | | | | 10.63 | | | | | | 32.04 | 299.4 | 0.49 | 67.60 | 0.96 | 47% |
| | | | | | | | | | | | | | | | | | | |
| 059 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 060 | 2.15 | 1004 | 3.80 | | | | 10.63 | | | | | | 32.04 | 299.4 | 0.50 | 68.08 | 0.97 | 47% |
| Ex Site | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 060 | | | | | | | | | | | | | 3.18 | 299.4 | 1.50 | 117.80 | 1.67 | 3% |
| Area 'B' | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | 0.25 | | | | | |
| Area 'C1' | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 060-061 | | | | | | | | | | | | | 0.38 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 061 | 2.15 | 1004 | 3.80 | | | | 10.63 | | | | | | 35.84 | 299.4 | 1.71 | 125.60 | 1.78 | 29% |
| | | | | | | | | | | | | | | | | | | |
| 061 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 062 | 2.15 | 1004 | 3.80 | | | | 10.63 | | | | | | 35.84 | 299.4 | 2.83 | 161.75 | 2.30 | 22% |
| Area 'C2' | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 062 | | | | | | | | | | | | | 0.38 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 062 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 063 | 2.15 | 1004 | 3.80 | | | | 10.63 | | | | | | 36.21 | 299.4 | 0.54 | 70.62 | 1.00 | 51% |
| Area 'C3' | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 063 | | | | | | | 0.35 | | | | | | 0.45 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 063 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 103 | 2.15 | 1004 | 3.80 | | | | 10.98 | | | | | | 36.67 | 299.4 | 0.47 | 65.59 | 0.93 | 56% |

WSP CANADA GROUP LTD.
THE REGIONAL MUNICIPALITY OF DURHAM
 SANITARY SEWER DESIGN SHEET - EXISTING

PROJECT : SORBARA - KINGSTON RD
 JOB No. : 19M-00841
 FROM :

DESIGNED BY: SB
 CHECKED BY: SW/CAR
 DATE: 29/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | | Industrial | | Institutional | | Flow in L/s | | | | Proposed Sewer | | | Capacity % | Comments | | |
|------------------|-----------------|--------------------|------------|------------------|---------------|-----------------------|-----------------|---------------|---------------|-----------------|---------------|------------|-----------|-----------|----------------|----------------|---------------------|------------|----------|---------|---|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space area (ha) | Floor area (ha) | Lot area (ha) | Lot (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Incl. L/S | Inst. L/S | Total flow L/s | Actual Pipe size mm | | | Slope % | Capacity in L/s |
| Area 'C4' | 1.06 | | | | | | | | | | | | 0.46 | | | 1.01 | | | | | Hotel - Assumed 2 washing machines @ 2500L/day and 150 rooms at 250L/room |
| 103 | 1.06 | | | | | 0.13 | | | | 0.28 | 0.00 | 0.00 | 0.73 | 0.00 | 0.00 | | | | | | |
| 103 | | | | | | | | | | | | | | | | | | | | | |
| 107 | 3.21 | | 1004 | 3.80 | | 2.92 | | 10.98 | | 0.83 | 16.07 | 6.54 | 6.54 | 0.00 | 14.24 | 37.67 | 299.4 | 1.04 | 98.14 | 1.39 | 38% |
| Area 'D' | 63.26 | 1782 | | | | 0.28 | | 0.64 | | | | | | | | | | | | | Foundation Drains connected to sanitary sewer. Infiltration rate of 0.52L/s used. |
| 107 | 63.26 | 255 | 2037 | 3.58 | | 0.28 | | 0.64 | | 32.89 | 30.72 | 30.72 | 0.58 | 0.00 | 0.83 | 65.01 | | | | | |
| 107 | | | | | | | | | | | | | | | | | | | | | |
| 108 | 66.47 | | 3041 | 3.44 | | 3.19 | | 11.62 | | 33.73 | 44.04 | 44.04 | 7.11 | 0.00 | 15.06 | 99.94 | 299.4 | 0.96 | 94.24 | 1.34 | 106% |
| Area 'E' | | | | | | | | | | | | | | | | | | | | | |
| 108 | 279.52 | | 11903 | 2.88 | | 1.41 | | 10.99 | | 145.35 | 144.38 | 144.38 | 2.94 | 0.00 | 14.25 | 306.91 | | | | | |
| 108 | | | | | | | | | | | | | | | | | | | | | |
| 064 | 345.98 | | 14944 | 2.78 | | 4.60 | | 22.61 | | 179.08 | 175.02 | 175.02 | 10.05 | 0.00 | 29.31 | 393.45 | 609.6 | 0.19 | 279.21 | 0.96 | 141% |
| 064 | | | | | | | | | | | | | | | | | | | | | |
| 010 | 345.98 | | 14944 | 2.78 | | 4.60 | | 22.61 | | 179.08 | 175.02 | 175.02 | 10.05 | 0.00 | 29.31 | 393.45 | 609.6 | 0.17 | 264.11 | 0.90 | 149% |
| 010 | | | | | | | | | | | | | | | | | | | | | |
| 009 | 345.98 | | 14944 | 2.78 | | 4.60 | | 22.61 | | 179.08 | 175.02 | 175.02 | 10.05 | 0.00 | 29.31 | 393.45 | 609.6 | 0.20 | 286.47 | 0.98 | 137% |
| Area 'F1' | | | | | | | | | | | | | | | | | | | | | |
| 009 | | | | | | | | | 0.308 | 0.00 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.32 | | | | | |
| 009 | | | | | | | | | | | | | | | | | | | | | |
| 008 | 345.98 | | 14944 | 2.78 | | 4.60 | | 22.61 | | 179.08 | 175.02 | 175.02 | 10.05 | 0.32 | 29.31 | 393.77 | 609.6 | 0.16 | 256.22 | 0.88 | 154% |
| 008 | | | | | | | | | | | | | | | | | | | | | |

WSP CANADA GROUP LTD.
THE REGIONAL MUNICIPALITY OF DURHAM
 SANITARY SEWER DESIGN SHEET - EXISTING

PROJECT : SORBARA - KINGSTON RD
 JOB No. : 19M-00841
 FROM :

DESIGNED BY: SB
 CHECKED BY : SW/CAR
 DATE : 29/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | | Industrial | | Institutional | | Flow in L/s | | | | Proposed Sewer | | | Capacity % | Comments | | | |
|------------------|-----------------|--------------------|------------|------------------|---------------|-------------------|-----------------|---------------|---------------|-----------------|---------------|------------|-----------|------------|----------------|----------------|---------------------|------------|----------|---------|-----------------|-----------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space Index | Floor area (ha) | Lot area (ha) | Lot (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | Inst. L/S | Total flow L/s | Actual Pipe size mm | | | Slope % | Capacity in L/s | Velocity in L/s |
| 008 | | | | | | | | | | | | | | | | | | | | | | |
| 007 | 345.98 | | 14944 | 2.78 | | | 4.60 | 0.308 | 22.61 | | | 175.02 | 10.05 | 0.32 | 29.31 | 393.77 | 609.6 | 0.32 | 362.36 | 1.24 | | 109% |
| 007 | | | | | | | | | | | | | | | | | | | | | | |
| 006 | 345.98 | | 14944 | 2.78 | | | 4.60 | 0.308 | 22.61 | | | 175.02 | 10.05 | 0.32 | 29.31 | 393.77 | 609.6 | 0.27 | 332.84 | 1.14 | | 118% |
| Area 'F2' | | | | | | | | | | | | | | | | | | | | | | |
| 006 | | | | | | | | 2.963 | | | | 0.00 | 0.00 | 3.08 | 0.00 | 3.08 | | | | | | |
| 006 | | | | | | | | | | | | | | | | | | | | | | |
| 027 | 345.98 | | 14944 | 2.78 | | | 4.60 | 3.271 | 22.61 | | | 175.02 | 10.05 | 3.40 | 29.31 | 396.85 | 685.8 | 0.14 | 328.12 | 0.89 | | 121% |
| Area 'F3' | | | | | | | | | | | | | | | | | | | | | | |
| 027 | | | | | | | | 16.538 | | | | 0.00 | 0.00 | 17.20 | 0.00 | 17.20 | | | | | | |
| 027 | | | | | | | | | | | | | | | | | | | | | | |
| 026 | 345.98 | | 14944 | 2.78 | | | 4.60 | 19.809 | 22.61 | | | 175.02 | 10.05 | 20.60 | 29.31 | 414.05 | 685.8 | 0.12 | 303.78 | 0.82 | | 136% |
| 026 | | | | | | | | | | | | | | | | | | | | | | |
| 025 | 345.98 | | 14944 | 2.78 | | | 4.60 | 19.809 | 22.61 | | | 175.02 | 10.05 | 20.60 | 29.31 | 414.05 | 685.8 | 0.08 | 248.03 | 0.67 | | 167% |
| 025 | | | | | | | | | | | | | | | | | | | | | | |
| 024 | 345.98 | | 14944 | 2.78 | | | 4.60 | 19.809 | 22.61 | | | 175.02 | 10.05 | 20.60 | 29.31 | 414.05 | 685.8 | 0.19 | 382.25 | 1.03 | | 108% |
| Area 'F4' | | | | | | | | | | | | | | | | | | | | | | |
| 024 | | | | | | | | 7.987 | | | | 0.00 | 0.00 | 8.31 | 0.00 | 8.31 | | | | | | |
| 024 | | | | | | | | | | | | | | | | | | | | | | |
| 018 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | | | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.15 | 339.63 | 0.92 | | 124% |
| 018 | | | | | | | | | | | | | | | | | | | | | | |
| 019 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | | | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.15 | 339.63 | 0.92 | | 124% |
| 019 | | | | | | | | | | | | | | | | | | | | | | |
| 020 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | | | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.16 | 350.77 | 0.95 | | 120% |
| 020 | | | | | | | | | | | | | | | | | | | | | | |
| 003 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | | | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.17 | 361.57 | 0.98 | | 117% |
| 003 | | | | | | | | | | | | | | | | | | | | | | |
| 097 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | | | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.16 | 350.77 | 0.95 | | 120% |

WSP CANADA GROUP LTD.
THE REGIONAL MUNICIPALITY OF DURHAM
 SANITARY SEWER DESIGN SHEET - EXISTING

PROJECT : SORBARA - KINGSTON RD
 JOB No. : 19M-00841
 FROM :

DESIGNED BY: SB
 CHECKED BY: SW/CAR
 DATE: 29/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial | Institutional | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | | | |
|------------------|-----------------|--------------------|------------|------------------|---------------|-------------------|-----------------|---------------|-----------------|---------------|----------------|-----------|-----------|------------|----------|----------------|---------------------|---------|-----------------|-----------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space Index | Floor area (ha) | Lot area (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Inst. L/S | | | Total flow L/s | Actual Pipe size mm | Slope % | Capacity in L/s | Velocity in L/s |
| 097 | | | | | | | | | | | | | | | | | | | | |
| 161 | 345.98 | | 14944 | 2.78 | | | 4.60 | 27.796 | 22.61 | 179.08 | 175.02 | 10.05 | 28.91 | 29.31 | 422.36 | 685.8 | 0.15 | 339.63 | 0.92 | 124% |
| Area 'F5' | 10.29 | | 536 | 3.80 | | | | | | 2.67 | 8.58 | 0.00 | 0.00 | 0.00 | 11.26 | | | | | |
| 161 | | | | | | | | | | | | | | | | | | | | |
| 005 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.12 | 303.78 | 0.82 | 142% |
| 005 | | | | | | | | | | | | | | | | | | | | |
| 004 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.19 | 382.25 | 1.03 | 113% |
| 004 | | | | | | | | | | | | | | | | | | | | |
| 160 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.15 | 339.63 | 0.92 | 127% |
| 160 | | | | | | | | | | | | | | | | | | | | |
| 159 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.16 | 350.77 | 0.95 | 123% |
| 159 | | | | | | | | | | | | | | | | | | | | |
| 158 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.10 | 277.31 | 0.75 | 155% |
| 158 | | | | | | | | | | | | | | | | | | | | |
| 075 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.16 | 350.77 | 0.95 | 123% |
| 075 | | | | | | | | | | | | | | | | | | | | |
| 074 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.15 | 339.63 | 0.92 | 127% |
| 074 | | | | | | | | | | | | | | | | | | | | |
| 073 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.18 | 372.05 | 1.01 | 116% |
| 073 | | | | | | | | | | | | | | | | | | | | |
| 072 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.13 | 316.18 | 0.86 | 136% |
| 072 | | | | | | | | | | | | | | | | | | | | |
| 071 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 0.14 | 328.12 | 0.89 | 131% |
| 071 | | | | | | | | | | | | | | | | | | | | |
| 180 | 356.27 | | 15480 | 2.76 | | | 4.60 | 27.796 | 22.61 | 181.75 | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 1.30 | 999.86 | 2.71 | 43% |

WSP CANADA GROUP LTD.
THE REGIONAL MUNICIPALITY OF DURHAM
 SANITARY SEWER DESIGN SHEET - EXISTING

PROJECT : SORBARA - KINGSTON RD
 JOB No. : 19M-00841
 FROM :

DESIGNED BY: SB
 CHECKED BY : SW/CAR
 DATE : 29/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial | | Institutional | | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | | | |
|-----------------|-----------------|--------------------|------------|------------------|---------------|-----------------------|---------------|---------------|-----------------|---------------|------------|-----------|----------------|-----------|----------------|------------|----------|---------------------|---------|-----------------|-----------------|---|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space area (ha) | Lot area (ha) | Lot (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | Inst. L/S | Total flow L/s | | | Actual Pipe size mm | Slope % | Capacity in L/s | Velocity in L/s | |
| 180 | | | | | | | | | | | | | | | | | | | | | | |
| 052 | 356.27 | | 15480 | 2.76 | | 4.60 | 27.796 | 22.61 | | | | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 1.30 | 999.86 | 2.71 | 43% | |
| 052 | | | | | | | | | | | | | | | | | | | | | | |
| 049 | 356.27 | | 15480 | 2.76 | | 4.60 | 27.796 | 22.61 | | | | 180.29 | 10.05 | 28.91 | 29.31 | 430.30 | 685.8 | 1.33 | 1011.33 | 2.74 | 43% | |
| Area 'G' | 115.83 | | 3472 | | | | | 2.95 | | | | | | | | | | | | | | Foundation Drains connected to sanitary sewer. Infiltration rate of 0.52L/s used. |
| 050 | 115.83 | | 3751 | 3.36 | | | | 2.95 | | | | 53.07 | 0.00 | 0.00 | 3.82 | 117.12 | | | | | | |
| Area 'H' | 27.81 | | 1418 | | | | | | | | | | | | | | | | | | | |
| 050 | 27.81 | | 1751 | 3.63 | | | | | | | | 26.78 | 0.00 | 0.00 | 0.00 | 34.01 | | | | | | |
| 050 | | | | | | | | | | | | | | | | | | | | | | |
| 049 | 143.64 | | 5502 | 3.21 | | | | 2.95 | | | | 74.32 | 0.00 | 0.00 | 3.82 | 145.60 | | | | | | |
| 049 | | | | | | | | | | | | | | | | | | | | | | |
| 043 | 499.91 | | 20982 | 2.63 | | 4.60 | 27.796 | 25.55 | | | | 232.62 | 10.05 | 28.91 | 33.13 | 553.92 | 685.8 | 0.32 | 496.07 | 1.34 | 112% | |

WSP CANADA GROUP LTD.

THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING + PROP. DEVELOPMENT

PROJECT : SORBARA - KINGSTON RD
JOB No. : 19M-00841
FROM :

DESIGNED BY : SB
CHECKED BY : SW/CAR
DATE : 30/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial Lot area | Institutional Lot (ha) | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | | |
|-----------|-----------------|--------------------|------------|------------------|---------------|---------------------|------------------------|-------------------|-----------------|-----------------|----------------|------------|-----------|------------|----------|------------|-----------|----------------|---------------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | | | Floor space Index | Floor area (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | | | Indus. L/S | Inst. L/S | Total flow L/s | Actual Pipe size mm |
| Area 'A' | 0.73 | 276 | | | | 0.78 | 10.63 | | | | | | | | | | | | |
| | 1.42 | 728 | | | | | | | | | | | | | | | | | |
| 045 | 2.15 | 1004 | 3.80 | | | 0.78 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 059 | 2.15 | 1004 | 3.80 | | | 0.78 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 059 | 2.15 | 1004 | 3.80 | | | 0.78 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Prop Site | 4.85 | 2877 | | | | 0.30 | | | | | | | | | | | | | |
| | | 2055 | | | | | | | | | | | | | | | | | |
| | | 432 | | | | | | | | | | | | | | | | | |
| 060 | 4.85 | 5364 | 3.22 | | | 0.30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Area 'B' | | | | | | 0.12 | | | | | | | | | | | | | |
| | | | | | | 0.12 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | | | | | |
| Area 'C1' | | | | | | 0.18 | | | | | | | | | | | | | |
| | | | | | | 0.18 | | | | | | | | | | | | | |
| 060-061 | | | | | | | | | | | | | | | | | | | |
| 060 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 061 | 7.00 | 6368 | 3.15 | | | 1.38 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 062 | 7.00 | 6368 | 3.15 | | | 1.38 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Area 'C2' | | | | | | 0.18 | | | | | | | | | | | | | |
| | | | | | | 0.18 | | | | | | | | | | | | | |
| 062 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 062 | 7.00 | 6368 | 3.15 | | | 1.56 | 10.63 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Area 'C3' | | | | | | 0.35 | | | | | | | | | | | | | |
| | | | | | | 0.35 | | | | | | | | | | | | | |
| 063 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 103 | 7.00 | 6368 | 3.15 | | | 1.56 | 10.98 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

WSP CANADA GROUP LTD.

THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING + PROP. DEVELOPMENT

PROJECT : SORBARA - KINGSTON RD
JOB No. : 19M-00841
FROM :

DESIGNED BY : SB
CHECKED BY : SW/CAR
DATE : 30/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial | | Institutional | | Flow in L/s | | | | Proposed Sewer | | | Capacity % | Comments | | | |
|-----------|-----------------|--------------------|------------|------------------|---------------|-----------------------|---------------|---------------|-----------------|---------------|------------|-----------|-----------|----------------|----------------|---------------------|------------|----------|---------|-----------------|--|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space area (ha) | Lot area (ha) | Lot area (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Incl. L/S | Inst. L/S | Total flow L/s | Actual Pipe size mm | | | Slope % | Capacity in L/s | Velocity in L/s |
| Area 'C4' | 1.06 | | | | | | | | | | | 0.46 | | | | | | | | | Hotel - Assumed 2 washing machines @ 2500L/day and 150 rooms at 250L/room |
| 103 | 1.06 | | | | | 0.13 | | | | | | 0.28 | 0.00 | 0.00 | 1.01 | | | | | | |
| 107 | 8.06 | | 6368 | 3.15 | | 1.69 | | 10.98 | | | 84.40 | 3.98 | 0.00 | 14.24 | 104.72 | 299.4 | 1.04 | 98.14 | 1.39 | | 107% |
| Area 'D' | 63.26 | | 1782 | | | 0.28 | 0.64 | | | | 30.72 | 0.58 | 0.00 | 0.83 | 65.01 | | | | | | Foundation drains connected to sanitary sewer. Infiltration rate of 0.52L/s used |
| 107 | 63.26 | | 2037 | 3.58 | | 0.28 | | 0.64 | | | | | | | | | | | | | |
| 108 | 71.32 | | 8405 | 3.03 | | 1.97 | | 11.62 | | | 107.27 | 4.56 | 0.00 | 15.06 | 161.87 | 299.4 | 0.96 | 94.24 | 1.34 | | 172% |
| Area 'E' | 279.52 | | 39 | | | 1.41 | 10.99 | | | | 144.38 | 2.94 | 0.00 | 14.25 | 306.91 | | | | | | Foundation drains connected to sanitary sewer. Infiltration rate of 0.52L/s used |
| 108 | 279.52 | | 11903 | 2.88 | | 1.41 | 10.99 | | | | | | | | | | | | | | |
| 064 | 350.83 | | 20308 | 2.65 | | 3.38 | 22.61 | | | | 226.37 | 7.50 | 0.00 | 29.31 | 443.51 | 609.6 | 0.19 | 279.21 | 0.96 | | 159% |
| 010 | 350.83 | | 20308 | 2.65 | | 3.38 | 22.61 | | | | 226.37 | 7.50 | 0.00 | 29.31 | 443.51 | 609.6 | 0.17 | 264.11 | 0.90 | | 166% |
| 009 | 350.83 | | 20308 | 2.65 | | 3.38 | 22.61 | | | | 226.37 | 7.50 | 0.00 | 29.31 | 443.51 | 609.6 | 0.20 | 286.47 | 0.98 | | 155% |
| Area 'F1' | | | | | | | | | | | 0.00 | 0.00 | 0.32 | 0.00 | 0.32 | | | | | | |
| 009 | | | | | | | | | | 0.308 | | | | | | | | | | | |
| 008 | 350.83 | | 20308 | 2.65 | | 3.38 | 22.61 | | | | 226.37 | 7.50 | 0.32 | 29.31 | 443.83 | 609.6 | 0.16 | 256.22 | 0.88 | | 173% |

WSP CANADA GROUP LTD.

THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING + PROP. DEVELOPMENT

PROJECT : SORBARA - KINGSTON RD
JOB No. : 19M-00841
FROM :

DESIGNED BY : SB
CHECKED BY : SW/CAR
DATE : 30/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | | Industrial | | Institutional | | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | |
|-----------|-----------------|--------------------|------------|------------------|---------------|-------------------|-----------------|----------|---------------|-----------------|---------------|------------|-----------|----------------|-----------|----------------|------------|----------|---------------------|---------|-----------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space Index | Floor area (ha) | Lot area | Lot (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | Inst. L/S | Total flow L/s | | | Actual Pipe size mm | Slope % | Capacity in L/s |
| 008 | | | | | | | | | | | | | | | | | | | | | |
| 007 | 350.83 | 20308 | 2.65 | | 3.38 | 0.308 | 22.61 | | | 180.34 | 226.37 | 7.50 | 0.32 | 29.31 | 443.83 | 609.6 | 0.32 | 362.36 | 1.24 | 122% | |
| 006 | 350.83 | 20308 | 2.65 | | 3.38 | 0.308 | 22.61 | | | 180.34 | 226.37 | 7.50 | 0.32 | 29.31 | 443.83 | 609.6 | 0.27 | 332.84 | 1.14 | 133% | |
| Area 'F2' | | | | | | 2.963 | | | | 0.00 | 0.00 | 0.00 | 3.08 | 0.00 | 3.08 | | | | | | |
| 006 | | | | | | 2.963 | | | | | | | | | | | | | | | |
| 027 | 350.83 | 20308 | 2.65 | | 3.38 | 3.271 | 22.61 | | | 180.34 | 226.37 | 7.50 | 3.40 | 29.31 | 446.91 | 685.8 | 0.14 | 328.12 | 0.89 | 136% | |
| Area 'F3' | | | | | | 16.538 | | | | 0.00 | 0.00 | 0.00 | 17.20 | 0.00 | 17.20 | | | | | | |
| 027 | | | | | | 16.538 | 0.00 | | | | | | | | | | | | | | |
| 026 | 350.83 | 20308 | 2.65 | | 3.38 | 19.809 | 22.61 | | | 180.34 | 226.37 | 7.50 | 20.60 | 29.31 | 464.11 | 685.8 | 0.12 | 303.78 | 0.82 | 153% | |
| 025 | 350.83 | 20308 | 2.65 | | 3.38 | 19.809 | 22.61 | | | 180.34 | 226.37 | 7.50 | 20.60 | 29.31 | 464.11 | 685.8 | 0.08 | 248.03 | 0.67 | 187% | |
| 024 | 350.83 | 20308 | 2.65 | | 3.38 | 19.809 | 22.61 | | | 180.34 | 226.37 | 7.50 | 20.60 | 29.31 | 464.11 | 685.8 | 0.19 | 382.25 | 1.03 | 121% | |
| Area 'F4' | | | | | | 7.987 | | | | 0.00 | 0.00 | 0.00 | 8.31 | 0.00 | 8.31 | | | | | | |
| 024 | | | | | | 7.987 | 0.00 | | | | | | | | | | | | | | |
| 018 | 350.83 | 20308 | 2.65 | | 3.38 | 27.796 | 22.61 | | | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.15 | 339.63 | 0.92 | 139% | |
| 019 | 350.83 | 20308 | 2.65 | | 3.38 | 27.796 | 22.61 | | | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.15 | 339.63 | 0.92 | 139% | |
| 019 | | | | | | | | | | | | | | | | | | | | | |
| 020 | 350.83 | 20308 | 2.65 | | 3.38 | 27.796 | 22.61 | | | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.16 | 350.77 | 0.95 | 135% | |
| 020 | | | | | | | | | | | | | | | | | | | | | |
| 003 | 350.83 | 20308 | 2.65 | | 3.38 | 27.796 | 22.61 | | | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.17 | 361.57 | 0.98 | 131% | |
| 003 | | | | | | | | | | | | | | | | | | | | | |
| 097 | 350.83 | 20308 | 2.65 | | 3.38 | 27.796 | 22.61 | | | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.16 | 350.77 | 0.95 | 135% | |

WSP CANADA GROUP LTD.

THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING + PROP. DEVELOPMENT

PROJECT : SORBARA - KINGSTON RD
JOB No. : 19M-00841
FROM :

DESIGNED BY : SB
CHECKED BY : SW/CAR
DATE : 30/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial | | Institutional | | Flow in L/s | | | | Proposed Sewer | | | Capacity % | Comments | | | | |
|-----------|-----------------|--------------------|------------|------------------|---------------|-------------------|---------------|---------------|----------|----------------|---------------|------------|-----------|----------------|-----------|----------------|------------|----------|---------------------|---------|-----------------|-----------------|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space Index | Lot area (ha) | Lot area (ha) | Lot (ha) | Res. Infil L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | Inst. L/S | Total flow L/s | | | Actual Pipe size mm | Slope % | Capacity in L/s | Velocity in L/s |
| 097 | | | | | | | | | | | | | | | | | | | | | | |
| 161 | 350.83 | | 20308 | 2.65 | | | | | 22.61 | 180.34 | 226.37 | 7.50 | 28.91 | 29.31 | 472.42 | 685.8 | 0.15 | 339.63 | 0.92 | 139% | | |
| Area 'F5' | 10.29 | | 536 | 3.80 | | | | | | 2.67 | 8.58 | 0.00 | 0.00 | 0.00 | 11.26 | | | | | | | |
| 161 | 10.29 | | | | | | | | | | | | | | | | | | | | | |
| 005 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.12 | 303.78 | 0.82 | 158% | | |
| 004 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.19 | 382.25 | 1.03 | 126% | | |
| 004 | | | | | | | | | | | | | | | | | | | | | | |
| 160 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.15 | 339.63 | 0.92 | 141% | | |
| 159 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.16 | 350.77 | 0.95 | 137% | | |
| 159 | | | | | | | | | | | | | | | | | | | | | | |
| 158 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.10 | 277.31 | 0.75 | 173% | | |
| 158 | | | | | | | | | | | | | | | | | | | | | | |
| 075 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.16 | 350.77 | 0.95 | 137% | | |
| 075 | | | | | | | | | | | | | | | | | | | | | | |
| 074 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.15 | 339.63 | 0.92 | 141% | | |
| 074 | | | | | | | | | | | | | | | | | | | | | | |
| 073 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.18 | 372.05 | 1.01 | 129% | | |
| 073 | | | | | | | | | | | | | | | | | | | | | | |
| 072 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.13 | 316.18 | 0.86 | 152% | | |
| 072 | | | | | | | | | | | | | | | | | | | | | | |
| 071 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 0.14 | 328.12 | 0.89 | 146% | | |
| 071 | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 361.12 | | 20844 | 2.63 | | | | 22.61 | | 183.01 | 231.35 | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 1.30 | 999.86 | 2.71 | 48% | | |

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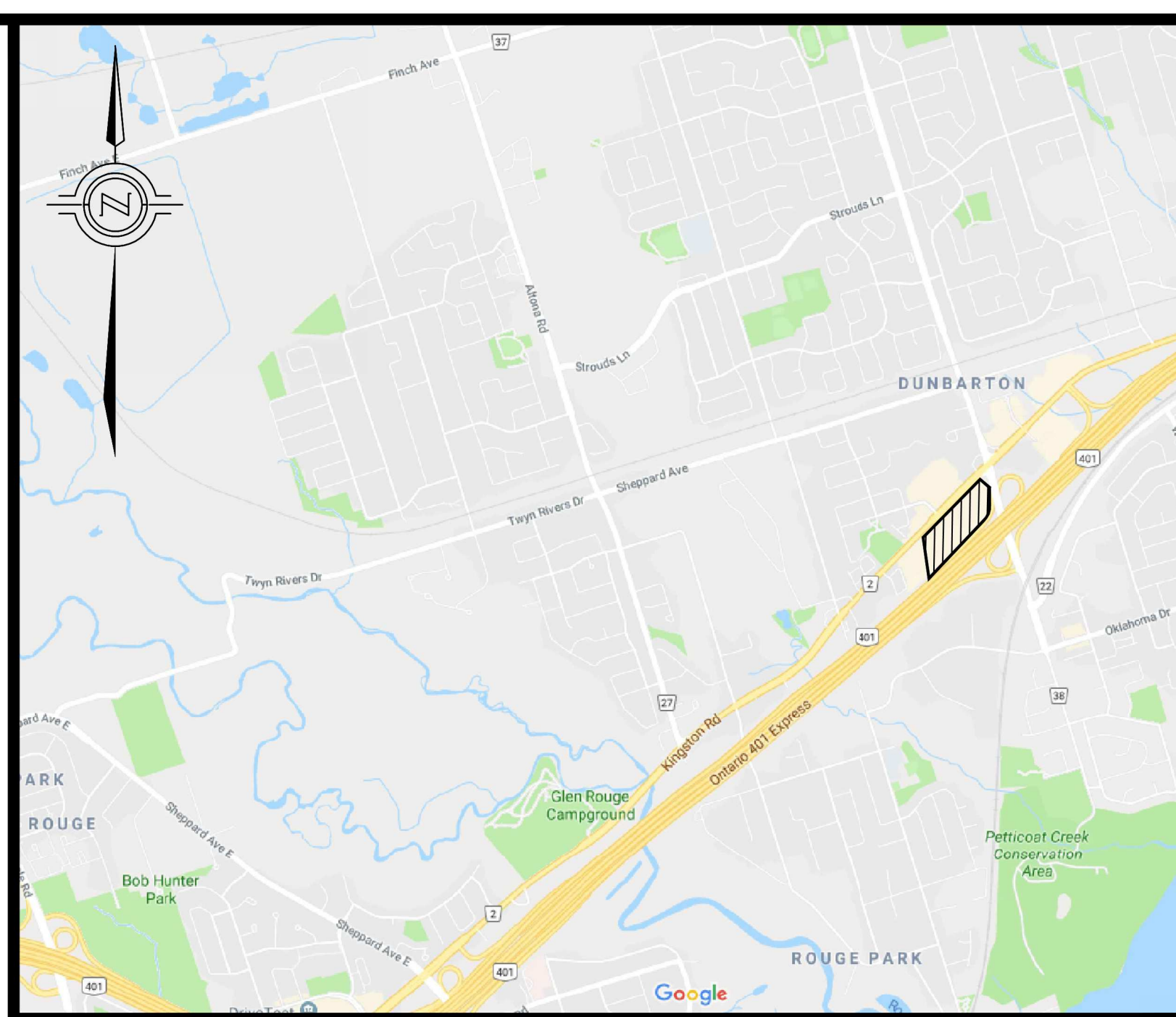
THE REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET - EXISTING + PROP. DEVELOPMENT

PROJECT : SORBARA - KINGSTON RD
JOB No. : 19M-00841
FROM :

DESIGNED BY: SB
CHECKED BY : SW/CAR
DATE : 30/01/2020

Residential Infiltration with Foundation Drain Connection
0.52

| MH. No. | Residential | | | Commercial | | Industrial | | Institutional | | Flow in L/s | | | Proposed Sewer | | | Capacity % | Comments | | | | |
|----------|-----------------|--------------------|------------|------------------|---------------|-----------------------|---------------|---------------|-----------------|---------------|------------|-----------|----------------|-----------|----------------|------------|----------|---------------------|---------|-----------------|---|
| | Gross area (ha) | Population density | Population | Peak flow factor | Lot area (ha) | Floor space area (ha) | Lot area (ha) | Lot area (ha) | Res. Infil* L/S | Res. flow L/S | Sewage L/S | Comm. L/S | Indus. L/S | Inst. L/S | Total flow L/s | | | Actual Pipe size mm | Slope % | Capacity in L/s | Velocity in L/s |
| 180 | | | | | | | | | | | | | | | | | | | | | |
| 052 | 361.12 | | 20844 | 2.63 | | 3.38 | 27.796 | 22.61 | | | | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 1.30 | 999.86 | 2.71 | 48% | |
| 049 | 361.12 | | 20844 | 2.63 | | 3.38 | 27.796 | 22.61 | | | | 7.50 | 28.91 | 29.31 | 480.07 | 685.8 | 1.33 | 1011.33 | 2.74 | 47% | |
| Area 'G' | 115.83 | | 3472 | | | | | 2.945 | | | | | | | | | | | | | Foundation Drains connected to sanitary sewer. Infiltration rate of 0.52L/s used. |
| 050 | 115.83 | | 3751 | 3.36 | | | | 2.945 | | | | 0.00 | 0.00 | 3.82 | 117.12 | | | | | | |
| Area 'H' | 27.81 | | 1418 | | | | | | | | | | | | | | | | | | |
| 050 | 27.81 | | 1751 | 3.63 | | | | | | | | 0.00 | 0.00 | 0.00 | 34.01 | | | | | | |
| 049 | 143.64 | | 5502 | 3.21 | | | | 2.95 | | | | 0.00 | 0.00 | 3.82 | 145.60 | | | | | | |
| 043 | 504.76 | | 26346 | 2.53 | | 3.38 | 27.796 | 25.55 | | | | 7.50 | 28.91 | 33.13 | 601.14 | 685.8 | 0.32 | 496.07 | 1.34 | 121% | |

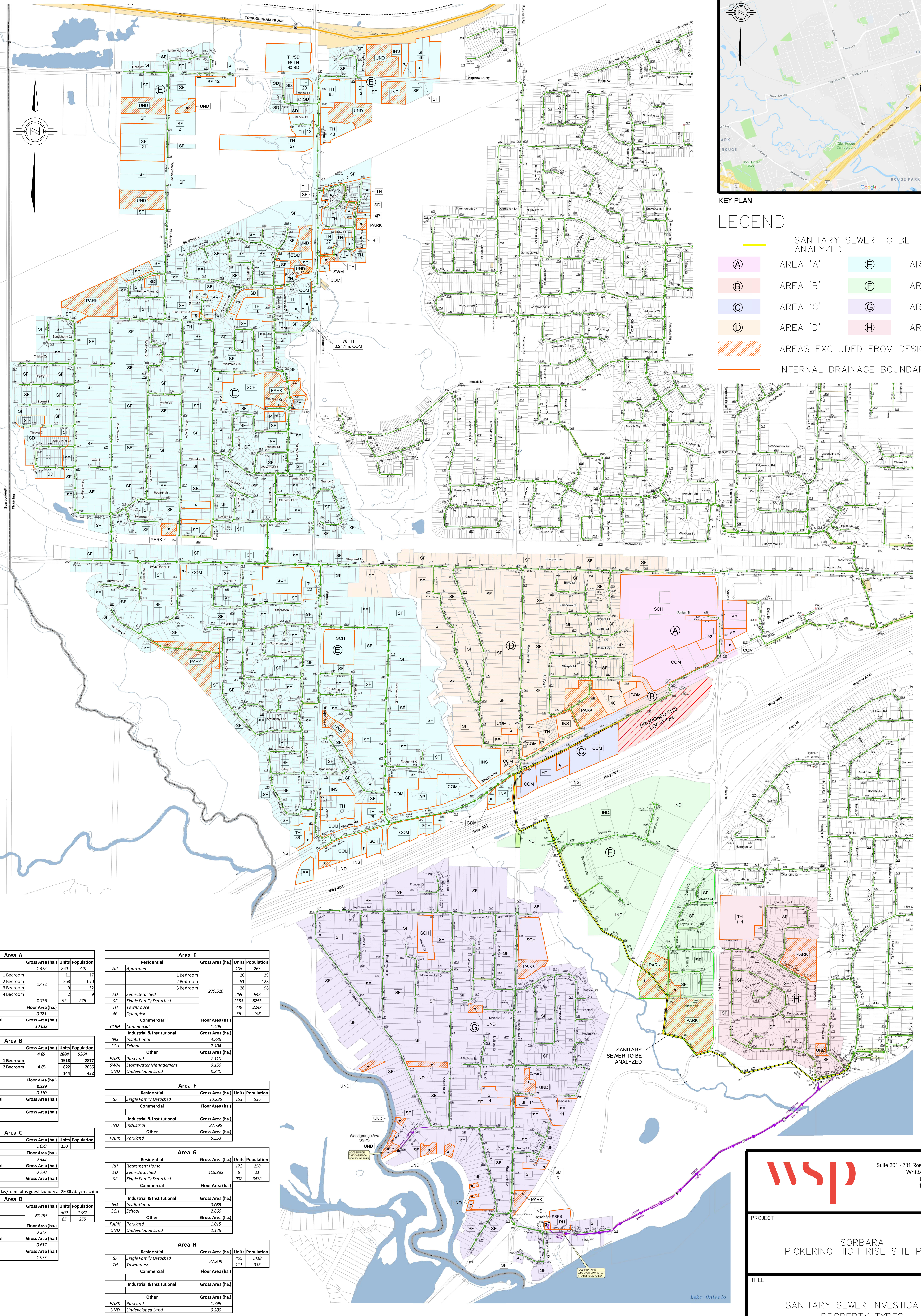


KEY PLAN

NTS

LEGEND

- SANITARY SEWER TO BE ANALYZED
- AREA 'A'
- AREA 'E'
- AREA 'B'
- AREA 'F'
- AREA 'C'
- AREA 'G'
- AREA 'D'
- AREA 'H'
- AREAS EXCLUDED FROM DESIGN SHEET
- INTERNAL DRAINAGE BOUNDARY



| Area A | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| AP Apartment | 1.422 | 290 | 728 |
| | | | |
| | | | |
| | | | |
| TH Townhouse | 0.776 | 92 | 276 |
| Commercial | Floor Area (ha) | | |
| COM Commercial | 0.781 | | |
| Industrial & Institutional | Gross Area (ha) | | |
| SCH School | 10.612 | | |

| Area B | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| PROP High Rise | 4.85 | 2884 | 5364 |
| | | | |
| | | | |
| | | | |
| TH Townhouse | 4.85 | 1918 | 2877 |
| Commercial | Floor Area (ha) | | |
| COM Proposed Commercial | 0.299 | | |
| COM Existing Commercial | 0.120 | | |
| Industrial & Institutional | Gross Area (ha) | | |
| Other | Gross Area (ha) | | |

| Area C | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| HOT* Hotel | 1.059 | 150 | |
| Commercial | Floor Area (ha) | | |
| COM Commercial | 0.483 | | |
| Industrial & Institutional | Gross Area (ha) | | |
| INS Institutional | 0.350 | | |
| Other | Gross Area (ha) | | |

| Area D | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| SF Single Family Detached | 63.255 | 509 | 1782 |
| TH Townhouse | 0.85 | 85 | 255 |
| Commercial | Floor Area (ha) | | |
| COM Commercial | 0.277 | | |
| Industrial & Institutional | Gross Area (ha) | | |
| INS Institutional | 0.637 | | |
| Other | Gross Area (ha) | | |
| PARK Parkland | 1.973 | | |

| Area E | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| AP Apartment | 105 | 265 | 35 |
| | | | |
| | | | |
| | | | |
| SD Semi-Detached | 279.516 | 269 | 942 |
| SF Single Family Detached | | 2358 | 4253 |
| TH Townhouse | | 749 | 2247 |
| AP Quadplex | | 56 | 196 |
| Commercial | Floor Area (ha) | | |
| COM Commercial | 7.406 | | |
| Industrial & Institutional | Gross Area (ha) | | |
| INS Institutional | 3.886 | | |
| SCH School | 7.104 | | |
| Other | Gross Area (ha) | | |
| PARK Parkland | 7.110 | | |
| SWM Stormwater Management | 0.150 | | |
| UND Undeveloped Land | 8.840 | | |

| Area F | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| SF Single Family Detached | 10.286 | 153 | 536 |
| Commercial | Floor Area (ha) | | |
| Industrial & Institutional | Gross Area (ha) | | |
| IND Industrial | 27.796 | | |
| Other | Gross Area (ha) | | |
| PARK Parkland | 5.553 | | |

| Area G | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| BH Retirement Home | 115.832 | 172 | 238 |
| SD Semi-Detached | 6 | 6 | 21 |
| SF Single Family Detached | 992 | 992 | 3472 |
| Commercial | Floor Area (ha) | | |
| Industrial & Institutional | Gross Area (ha) | | |
| INS Institutional | 2.085 | | |
| SCH School | 2.860 | | |
| Other | Gross Area (ha) | | |
| PARK Parkland | 1.015 | | |
| UND Undeveloped Land | 2.170 | | |

| Area H | | | |
|----------------------------|-----------------|-------|------------|
| Residential | Gross Area (ha) | Units | Population |
| SF Single Family Detached | 27.808 | 405 | 1418 |
| TH Townhouse | 111 | 111 | 333 |
| Commercial | Floor Area (ha) | | |
| Industrial & Institutional | Gross Area (ha) | | |
| Other | Gross Area (ha) | | |
| PARK Parkland | 2.795 | | |
| UND Undeveloped Land | 0.200 | | |

Suite 201 - 701 Roseland Road East
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PROJECT

SORBARA
PICKERING HIGH RISE SITE PLAN

TITLE

SANITARY SEWER INVESTIGATION
PROPERTY TYPES

| | | | |
|---------|-----------|------------|-----------|
| Checked | S.W./K.K. | Drawn | S.B. |
| Date | JULY 2019 | Proj. No. | 19M-00841 |
| Scale | 1:5000 | Figure No. | SAN-2 |