NOTTING HILL SUBDIVISION
2128 TRIM ROAD
OTTAWA, ONTARIO

SITE SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF

Prepared for:

Notting Hill Realty Investment Inc
c/o Regional Group of Companies

Prepared by:

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Issued: June 29, 2018

Ref: R-2018-095
Novatech File No. 117155

NOVATECH
Engineers, Planners & Landscape Architects

June 29, 2018

Planning and Growth Management Department
City of Ottawa
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Will Curry

Dear Sir:

Re: Notting Hill Subdivision (formerly Legault Lands)
Site Serving, Stormwater Management, Noise, Erosion and Sediment Control Brief
Our File No.: 117155

Please find enclosed three (3) copies of the report entitled, "Notting Hill Subdivision – 2128 Trim Road – Site Serving and Stormwater Management Design Brief" dated June 29, 2018. The report is submitted in support of the Draft Plan submission for the subject property.

If you have any questions, please contact the undersigned.

Sincerely,

NOVATECH

Melanie Riddell, P.Eng.
Senior Project Manager | Land Development

Justin Gauthier, B.A.Sc.
Project Manager | Land Development Engineering

CC: David Kardish, Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

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1.0 INTRODUCTION

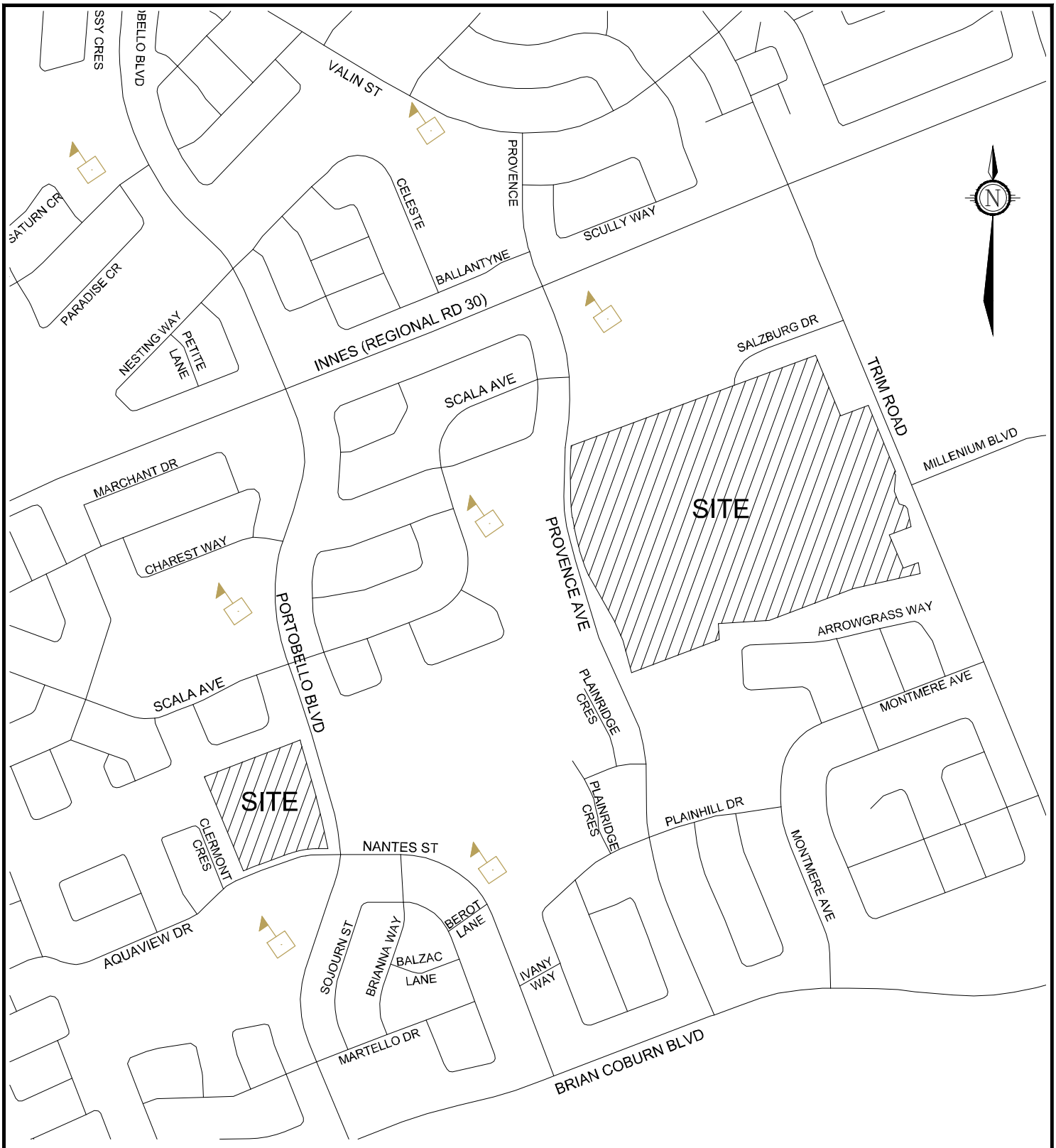
A Draft Plan of Subdivision Application is being submitted to the City of Ottawa for the lands located at 2128 Trim Road (the "Subject Site"). The development will consist of a mix of residential and open space uses, including 495 residential lots, 1 medium density residential block, 1 park block and 1 partial school block.

This Servicing Brief has been prepared in support of the Draft Plan of Subdivision application submission for the proposed development and is consistent with the Master Servicing Study (*Gloucester and Cumberland East Urban Community Expansion Area and Bilberry Creek Industrial Park Master Servicing Update* by Stantec dated July 2006).

The proposed Notting Hill Subdivision (formerly Legault lands) development at 2128 Trim Road, owned by Notting Hill Realty Investments Inc c/o Regional Group of Companies, consists of a 27.7ha site located in the City of Ottawa. The Notting Hill Subdivision development is located between Trim Road and Provence Avenue, as well as west of Portobello Boulevard as shown on **Figure 1** – Key Plan.

The Notting Hill Subdivision development will consist of approximately 296 singles and 199 row townhouses and 40 back-to-backs in five phases, as shown on **Figure 2** – Concept Plan / Phasing Plan.

The parcel of land consists mostly of farmed fields, as shown on **Figure 3** – Existing Conditions Plan. The grades are relatively flat in both the east and west portions. The land is currently farmed and tile drained and the stormwater sheet drains across the site towards Aquaview Drive for the western portion and towards Trim Road for the eastern portion.



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N.T.S

CITY of OTTAWA
NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

KEY PLAN

DATE	JOB	FIGURE
JUNE 2018	117155	FIG-1

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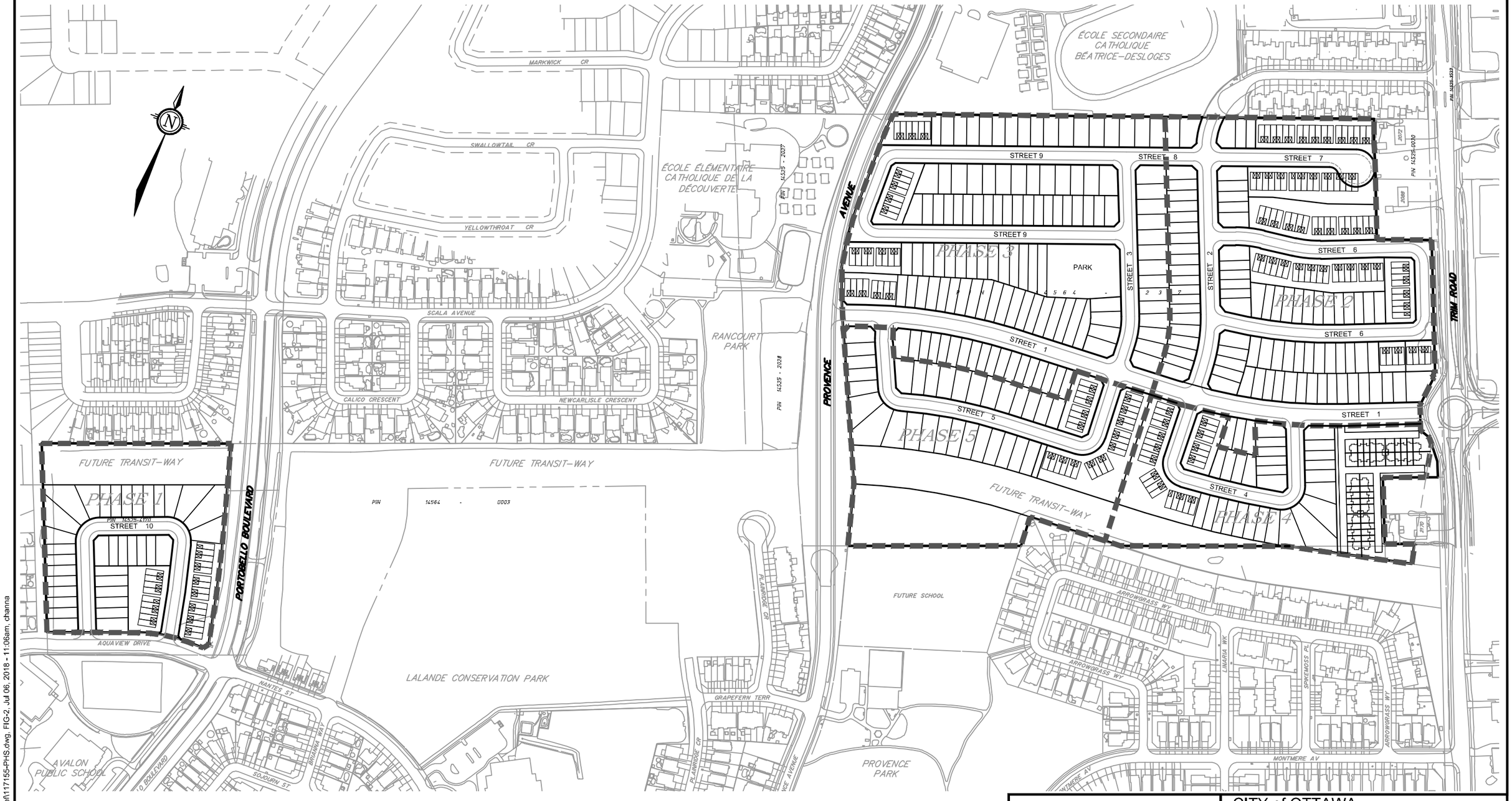

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NOTTING HILL SUBDIVISION
(2128 TRIM ROAD)

CONCEPT PLAN /
PHASING PLAN

SCALE 1 : 3750 (0 30 60 90 120 150)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-2

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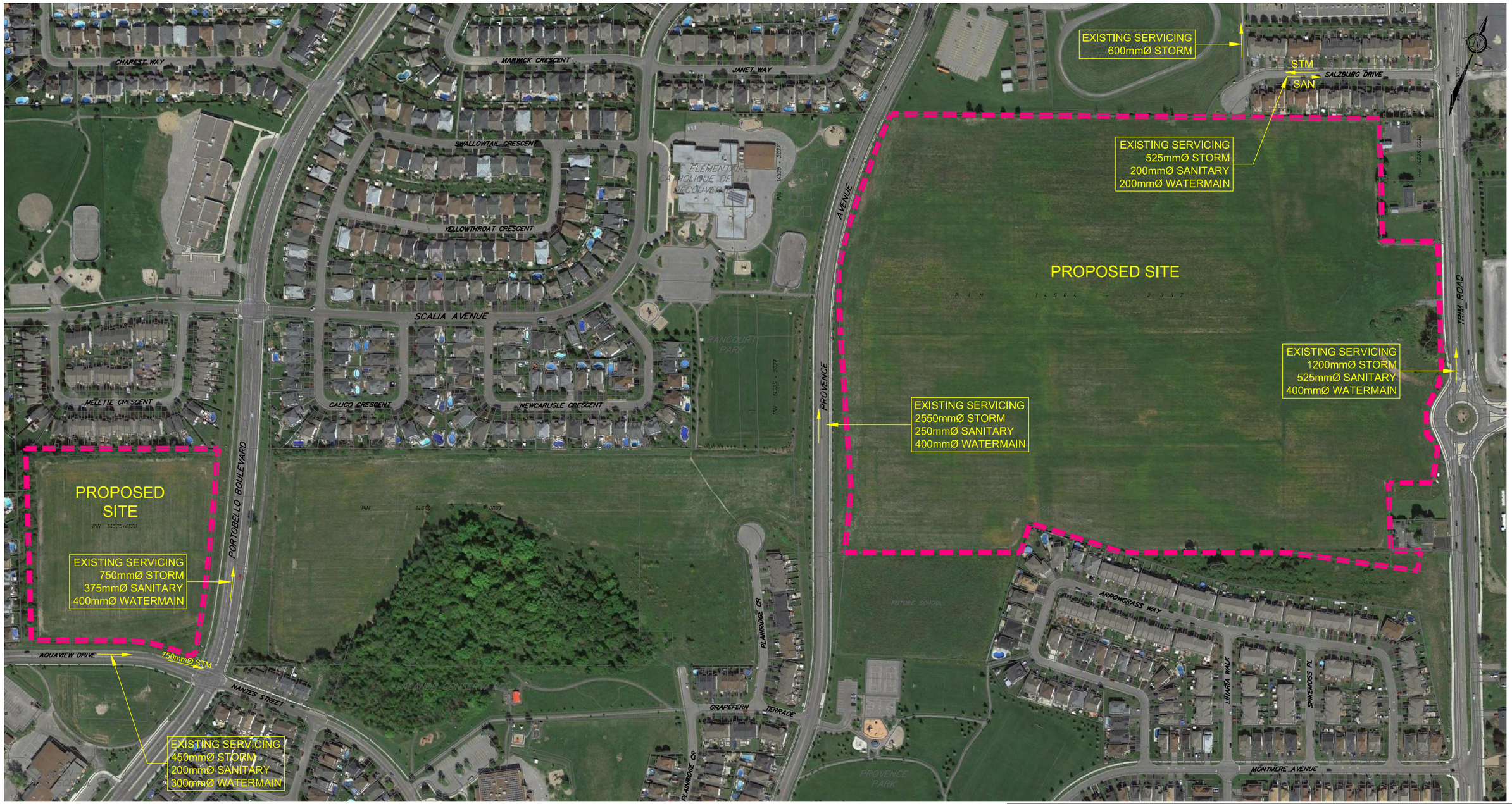

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CITY of OTTAWA
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(2128 TRIM ROAD)

EXISTING CONDITIONS PLAN

SCALE 1 : 3750 (0 30 60 90 120 150)
DATE JUN 2018 | JOB 117155 | FIGURE FIG-3

SHT11X17.DWG - 279mmX432mm

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2.0 GEOTECHNICAL INVESTIGATION

Paterson Group Inc. conducted a geotechnical investigation in support of the proposed residential development on the Legault lands.

The field investigation was performed November 22 to 24, 2017; January 8, 2018; as well as February 5 to 7, 2018 and consisted of the following:

First Stage

- Seven (7) boreholes advanced across the site to a maximum depth of 9.8m below existing ground surface.
- Groundwater monitoring devices were installed throughout the site.

Second Stage

- Two (2) boreholes advanced at various locations to a maximum depth of 9.5m below existing ground surface.
- Groundwater monitoring devices were installed throughout the site.

Third Stage

- Twelve (12) boreholes advanced across the site to a maximum depth of 6.4m below existing ground surface.

The principal findings of this investigation determined that the soil profile generally consists of 0.2 to 0.3m of topsoil overlying a hard to soft, brown to grey silty clay layer with trace of sand.

Groundwater measured in a range from about 3m to 5m below ground surface.

Furthermore, this development is subject to various permissible grade raises. Phase 1 grade raise is set at up to 1.5m, whereas phases 2 to 5 grade raises are set at up to 0.7m for the center section (east to west), up to 1.2m directly north and south and up to 1.5m to the boundaries to the north and south.

Due to the above restrictions, it anticipated lightweight fill will be used in various locations in the garages, porches, and around the units throughout the development to achieve the grades required to accommodate the overland stormwater flows.

From a geotechnical perspective, the subject site is suitable for the proposed residential development. Refer to *Geotechnical Investigation – Proposed Residential Development – Legault Lands – Trim Road - Ottawa, prepared by Paterson Group Inc. dated July 5, 2018* for the complete report.

3.0 WATER SUPPLY

A preliminary hydraulic analysis was performed for the Notting Hill Subdivision, Phases 1-5. It is proposed to service all phases with a combination of 300mm, 250mm, 200mm PVC and 50mm copper pipe from five (5) separate connection points to the existing watermain, refer to **Figure 4A/4B** for Conceptual Watermain Alignment and Watermain Node Locations. The watermain analysis confirms the proposed watermain can adequately service the overall development. Analysis of the watermain was completed using EPANET v2.0 and watermain boundary conditions provided by the City of Ottawa, included in **Appendix A**.

The fire flow for the overall subdivision was calculated using the Fire Underwriter's Survey (FUS) and adjusted as per the City of Ottawa's design guidelines. The calculated FUS minimum required fire flow for Notting Hill Subdivision singles and townhouses are 167L/s and 217L/s, respectively. However as per the City's technical bulletin ISDTB-2014-02, dated May 27, 2014, the fire flow requirement is capped at 10,000L/min (166.7L/s) for singles because the back of the units are separated by more than 10m and for towns because the units include a minimum two hour fire resistance rating, a maximum area of 600m^2, and the back of the units are separated by more than 10m. For reference, FUS fire flow calculations are included in **Appendix A**.

The following design criteria, per City of Ottawa Design Guidelines Water Distribution, Section 4.2, were used to determine the watermain performance on-site. Fire flow calculations are based on the Fire Underwriters Survey (FUS) and are as follows:

Demands:

- Average Daily Demand 350L/day/person
- Single Home Density 3.4 people/unit
- Townhouse Density 1.8 people/unit
- Apartment/Condo Density 1.8 people/unit
- Maximum Daily Demand 2.5 Average Daily Demand
- Peak Hour Demand 2.2 Maximum Daily Demand
- Fire Flow FUS/City of Ottawa

System Requirements:

- Maximum System Pressure (ROW) 690 Kpa (100psi)
- Maximum System Pressure (Services) 552 Kpa (80psi)
- Minimum System Pressure 275 Kpa (40psi) excluding fire flows
- Minimum System Pressure 140 Kpa (20psi) including fire flows
- Maximum Age 24 Hours (onsite)

Friction Factors:

- 50mm Copper 100
- 200mm-250mm PVC 110
- 300-400mm PVC 120

LEGEND

- 3 — PROPOSED 200mmØ WATERMAIN PIPE
- 2 — PROPOSED WATERMAIN NODE
- 101 — RESERVOIR
- F — MAX DAY DEMAND PLUS FIRE FLOW

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CITY of OTTAWA

NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

CONCEPTUAL WATERMAIN LAYOUT / WATERMAIN NODE LOCATIONS

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE	JOB	FIGURE
JUN 2018	117155	FIG-4A

SHT8X11.DWG - 216mmx279mm

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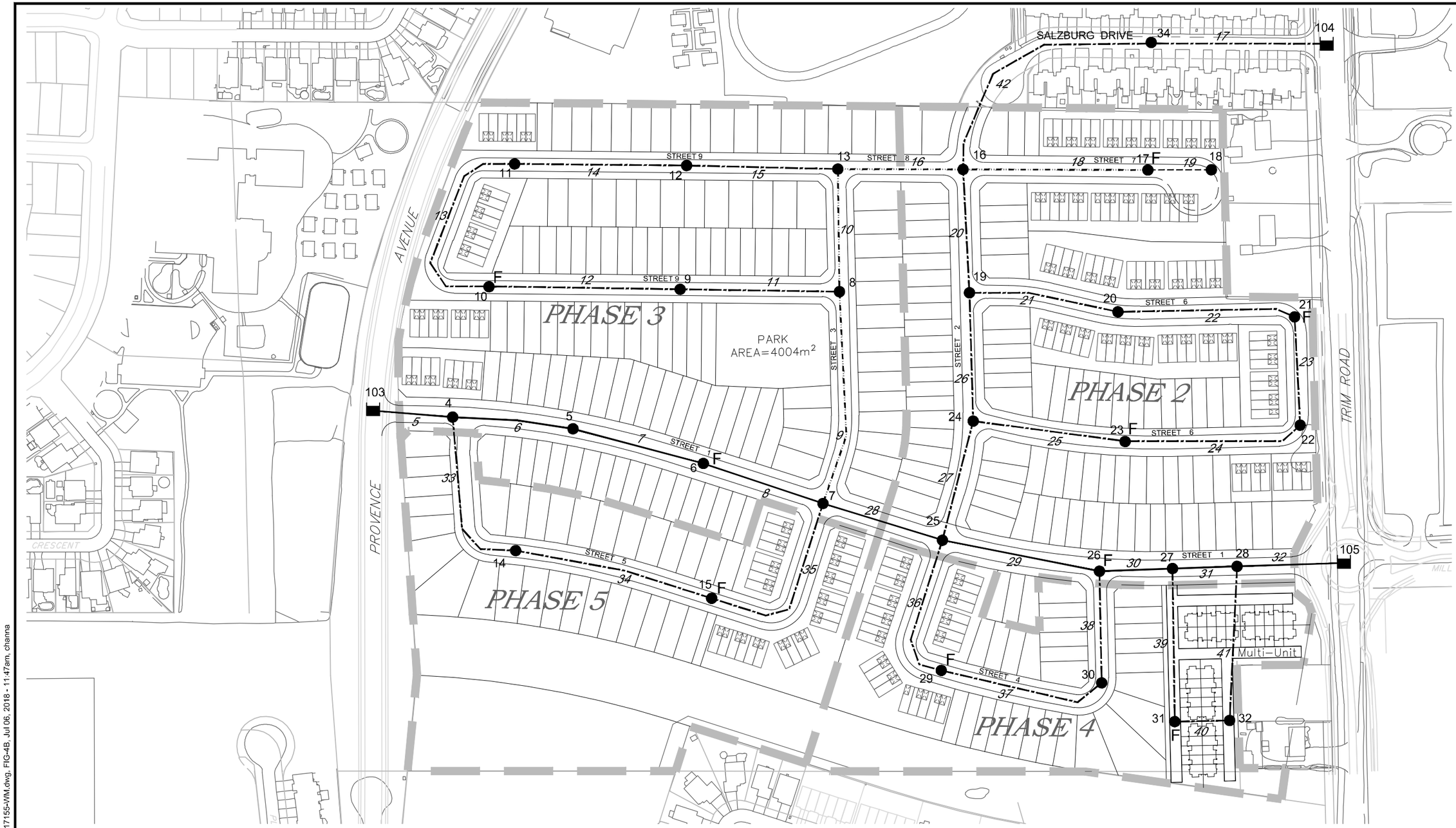

LEGEND

- 19 — PROPOSED 50mmØ WATERMAIN PIPE
- 33 — PROPOSED 200mmØ WATERMAIN PIPE
- 10 — PROPOSED 250mmØ WATERMAIN PIPE
- 29 — PROPOSED 300mmØ WATERMAIN PIPE
- 12 ● — PROPOSED WATERMAIN NODE
- 103 ■ — RESERVOIR
- F — MAX DAY DEMAND PLUS FIRE FLOW

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CITY of OTTAWA
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(2128 TRIM ROAD)

CONCEPTUAL WATERMAIN LAYOUT / WATERMAIN NODE LOCATIONS

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE	JOB	FIGURE
JUN 2018	117155	FIG-4B

SHT11X17.DWG - 279mmX432mm

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Tables 3.1 summarizes the watermain operating conditions during the high pressure, maximum daily demand and fire flow, and peak hour demands for all phases of development.

Table 3.1: Phase 1 Water Operating Conditions

Condition	Phase	Demand (L/s)	Minimum/Maximum Allowable Pressure (kPa/psi)	Operating Pressure (kPa/psi)
High Pressure	1	0.75	552/80 (Max)	392/56.9
	2	2.16		401/58.2
	3	1.98		396/57.5
	4	1.11		402/58.3
	5	0.72		401/58.1
Maximum Daily Demand (c/w Fire Flow)	1	1.87	140/20.0 (Min)	314/45.5
	2	5.41		143/20.7
	3	4.96		149/21.6
	4	2.77		212/30.8
	5	1.80		231/33.5
Peak Hour	1	4.12	276/40.0 (Min)	330/47.9
	2	11.90		339/49.1
	3	10.92		333/48.3
	4	6.10		331/48.0
	5	3.97		401/58.1

Based on the proposed Concept Plan and this hydraulic analysis, all phase of the Notting Hill Subdivision can be serviced through a combination of 300mm, 250mm, 200mm and 50mm watermain and five (5) connections to the existing watermain. A detailed hydraulic analysis will be required during the detailed engineering design of each phase. Refer to **Appendix A** for complete hydraulic analysis results.

4.0 SANITARY SEWER SYSTEM

4.1 Proposed Sanitary Sewer System

It is proposed that the majority of the development area will be serviced by 200mm gravity sewers, except for a small portion of 250mm gravity sewers as required closer to the outlets. The development areas will ultimately outlet via various connections to the existing infrastructure on Aquaview Drive before outletting to the existing 375mm sewer on Portobello Boulevard for the lands west of Portobello Boulevard and to the existing 525mm sewer on Trim Road for the lands between Provence Avenue and Trim Road, refer to **Figures 5A/5B** – Conceptual Sanitary and Storm Alignment and **Figures 6A/6B** – Conceptual Post-Development Sanitary Drainage Area Plan for details.

4.2 Design Parameters

Population estimates and sanitary flows from the sites for the proposed developments are calculated using design criteria from the City of Ottawa Sewer Design Guidelines.

- Design Flow, Residential 350 L/c/day
- Residential Peaking Factor Harmon Equation
- Peak Correction Factor 4.0

LEGEND

PROPOSED STORM SEWER

PROPOSED SANITARY SEWER

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CITY of OTTAWA
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(2128 TRIM ROAD)

CONCEPTUAL SANITARY AND STORM ALIGNMENT

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-5A

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ÉCOLE ÉLÉMENTAIRE CATHOLIQUE DE LA DÉCOUVERTE

PIN 14525 - 0027

RANCOURT PARK

PIN 14525 - 0026

CRESCENT

PROVENCE AVENUE

CONNECT TO EXISTING STORM SEWER

STREET 9

STREET 8+050

8+000

8+081

STREET 7

STREET 9

PARK
AREA=4004m²

STREET 3

STREET 2

STREET 6

STREET 6

STREET 1

STREET 5

STREET 1

STREET 4

2072

PIN 14525-0030

2088

TRIM ROAD

MILLENNIUM BLVD

CONNECT TO EXISTING SANITARY SEWER

Multi-Unit

2170

FUTURE TRANSIT-WAY

PLAINRIDGE

FUTURE SCHOOL

ARROW

LEGEND

PROPOSED STORM SEWER

PROPOSED SANITARY SEWER

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CONCEPTUAL SANITARY AND STORM ALIGNMENT

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-5B

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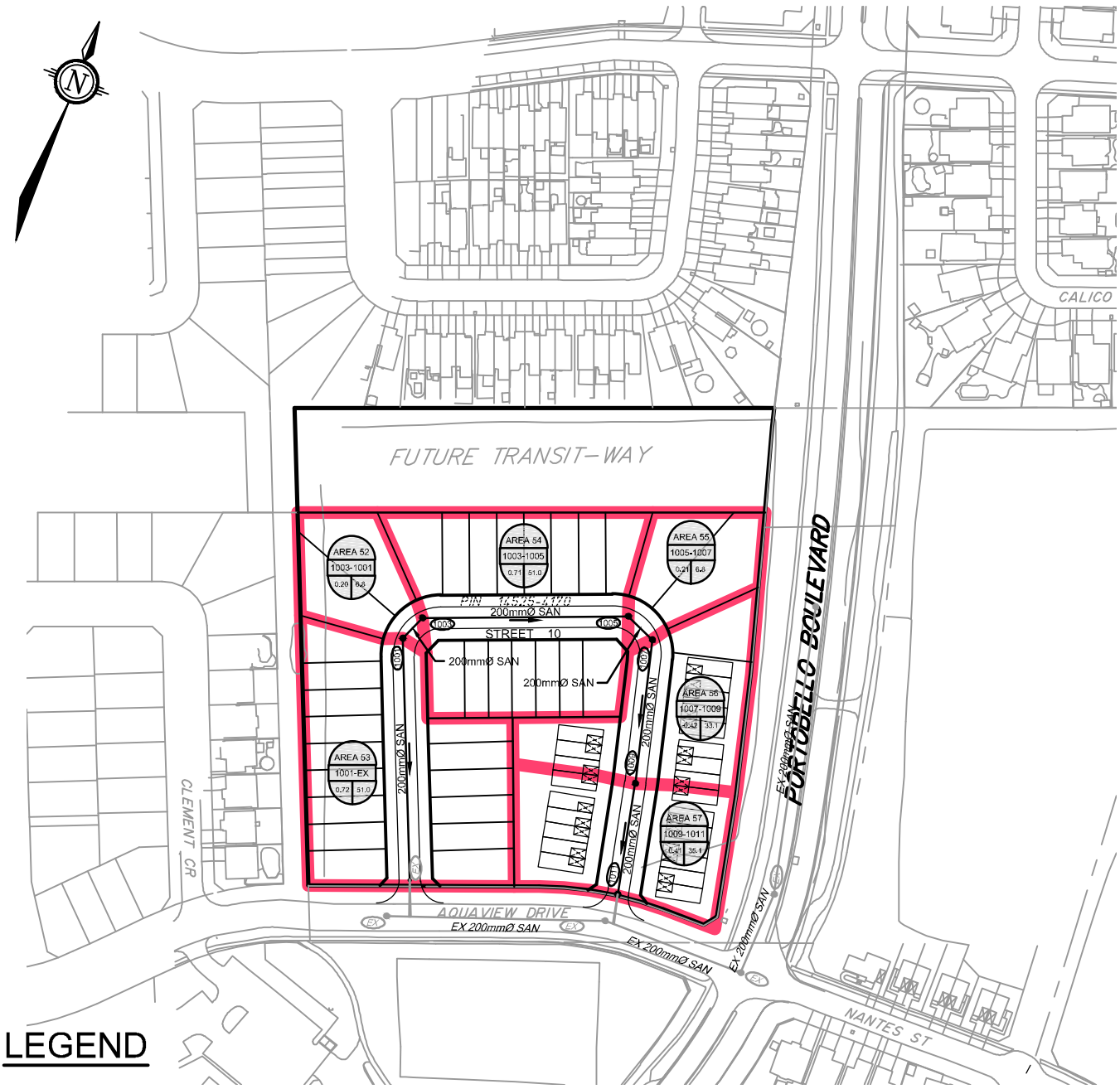

LEGEND

AREA NUMBER
MANHOLE TO MANHOLE
POPULATION
AREA (ha)

PROPOSED SANITARY DRAINAGE AREA

PROPOSED SANITARY MH & SEWER

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CITY of OTTAWA

NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

CONCEPTUAL POST - DEVELOPMENT SANITARY DRAINAGE AREA PLAN

SCALE 1 : 2500 (0 25 50 75 100)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-6A

SHT8X11.DWG - 216mmx279mm

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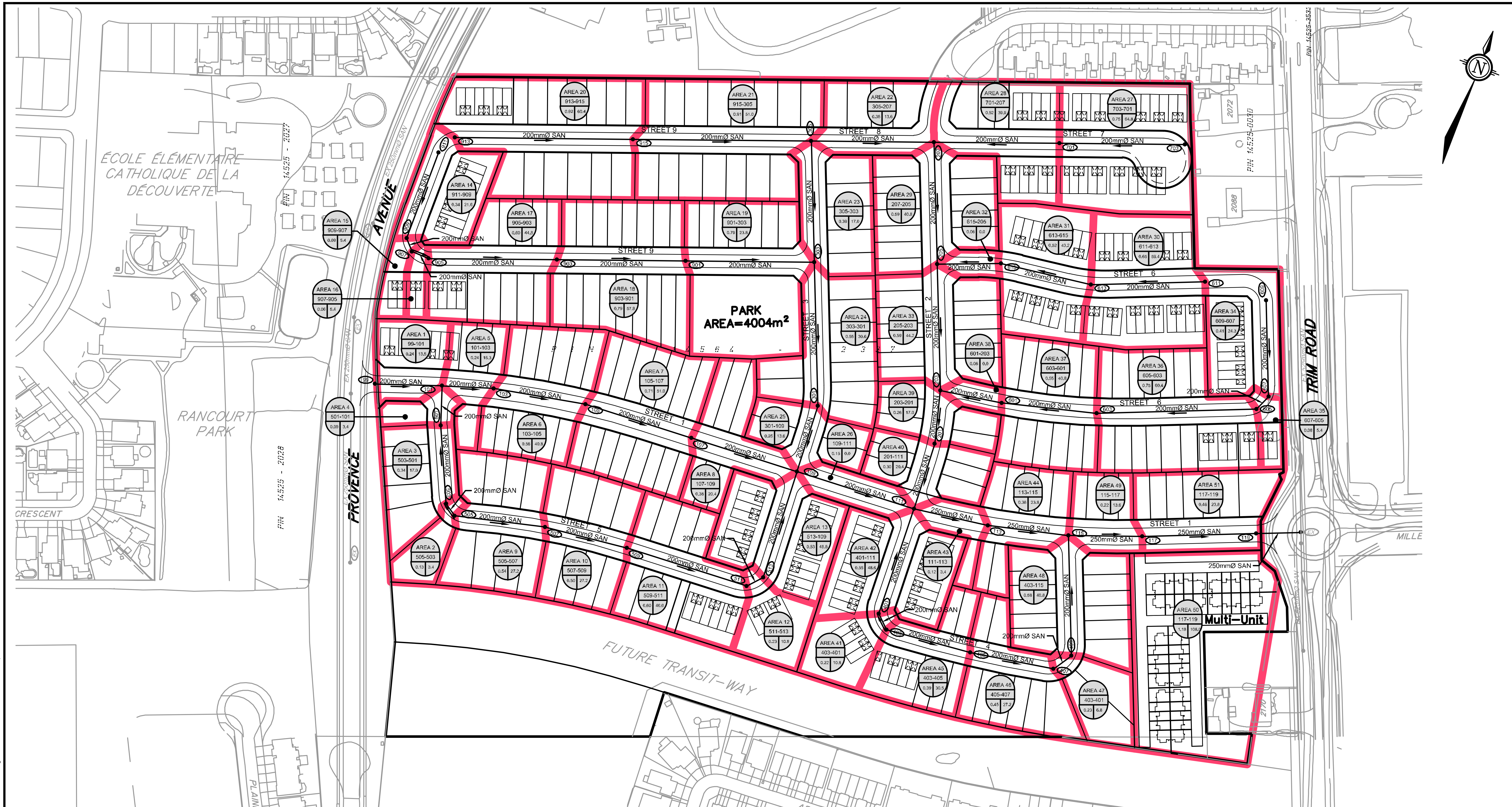

LEGEND

AREA NUMBER

MANHOLE TO MANHOLE

POPULATION

AREA (ha)

PROPOSED SANITARY DRAINAGE AREA

PROPOSED SANITARY MH & SEWER

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(2128 TRIM ROAD)

CONCEPTUAL POST - DEVELOPMENT SANITARY DRAINAGE AREA PLAN

SCALE			
1 : 2500			
DATE	JOB	FIGURE	
JUN 2018	117155	FIG-6B	

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- Infiltration Allowance 0.28 L/s/ha
- Single Family Residential Dwelling 3.4 people/unit
- Multiple Family Residential Dwelling 2.7 people/unit
- Apartment Residential Dwelling 2.1 people/unit
- School Residential Dwelling 2.0 people/unit
- Retirement Residential Dwelling 1.4 people/unit

Using the above criteria, the theoretical peak sanitary flows are summarized below in **Table 4.1**.

Table 4.1: Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Aquaview	184	2.98	0.75	3.73
Trim	1359	20.43	5.73	26.16

There flows are generally in line with anticipated sanitary flows in the master servicing report from these areas to the existing sanitary systems.

5.0 STORMWATER MANAGEMENT

5.1 Existing Conditions

Under existing conditions, the site consists of former agricultural land which has been fallow since approximately 2002 (Paterson Group, 2018), with some mature trees and existing residential development around the periphery. Phase 1 is bounded by Aquaview Drive to the south, Portobello Boulevard to the east, and existing residential development to the north and west. Access to Phase 1 will be provided via Aquaview Drive. Phases 2-5 are bounded by Provence Avenue to the west, Trim Road to the east, École secondaire catholique Béatrice-Desloges to the north and existing residential development to the south. Access to Phases 2-5 will be provided via Provence Avenue and Trim Road. Refer to **Figure 3** – Existing Conditions.

Topography and Drainage

The site is generally flat, with an average slope of 0.30% along the Phase 1 lands from south to north, and an average slope of 0.25% along the Phase 2-5 lands from south to north. Neighbouring properties are generally at-grade with the site.

Stormwater runoff from the site either infiltrates, or is conveyed overland towards existing catchbasins which convey runoff to the existing storm sewer systems. Aerial imagery and sewer data from geoOttawa shows a DICB grate in the south-western corner of the Phase 1 lands, and rear-yard catchbasins along the boundaries of the existing residential developments surrounding the entire site.

5.2 Stormwater Management Criteria

The stormwater management criteria used in the design of the Notting Hill Subdivision were developed based on the *Update to Master Drainage Plan East Urban Community Expansion Area* (Cumming Cockburn Ltd., September 11, 2000) and have been adapted through discussions with the City.

Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method for the 1:5-year return period;
- On an average basis, inflows to the storm sewer system are to be limited to 70 L/s/ha;
- Inlet control devices (ICDs) will be installed in road and rearyard catchbasins to control inflows to the storm sewers;
    - Catchbasins are not to be interconnected, with the exception of locations where a flow rate of less than 6 L/s is required;
- The 100-year hydraulic grade line in the storm sewer shall be at least 0.3 m below the underside of footing (USF) elevations for the proposed development;
    - The HGL will be analyzed at the detailed design stage, when detailed grading and USF elevations have been determined.

Major System (Overland Flow)

- Minimum on-site detention storage provided by the major system is 150 m^3/ha;
- Maximum depth of flow (static + dynamic) on local and collector streets shall not exceed 0.35 m. The depth of flow may extend adjacent to the right-of-way, provided that the water level does not touch any part of the building envelope and remains below the lowest building opening during the stress test event (100-year+20%);
    - There must be at least 0.15m of vertical clearance between the spill elevation on the street and the ground elevation at the building envelope in the proximity of a flow route or ponding area;
- Storm runoff that exceeds the capacity of the minor system is to be stored within road sags and conveyed overland along defined major system flow routes;
- Surface water accumulation at street low points, during a 2-year event, shall not be present by the end of the rainfall event;
- Major system storage in backyards is not to be included/ accounted for in design computations;
- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60;
- ICD flow rates are to be calculated for each drainage area to ensure that the following criteria are satisfied.

Water Quality & Quantity Control

- Water quality control is not required on-site. Stormwater runoff from the site will be directed to the existing Cardinal Creek stormwater management facility, where water quantity control will be provided;

- Lot level and conveyance Best Management Practices should be implemented to promote infiltration and treatment of storm runoff;

Erosion and Sediment Control

- Erosion and the amount of sediment should be minimized during construction and on a permanent basis;
- Erosion and sediment control measures are to be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987);
- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.

Low Impact Development

- Where feasible, low impact stormwater management design techniques should be considered for implementation in suitable areas through detailed design/site plan stage.

5.3 Proposed Storm Drainage System

Storm servicing for the Notting Hill Subdivision will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from large storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). The Cardinal Creek stormwater management facility is the ultimate outlet for both the major and minor systems.

5.3.1 Storm Sewer Design (Minor System)

The minor system has been conceptually designed using the Rational Method to convey peak flows associated with the 5-year storm event. The conceptual storm sewer design sheets are provided in **Appendix B**. Refer to **Figure 5** – Conceptual Sanitary and Storm Alignment for details. The criteria used to size the storm sewers are summarized in **Table** 5.1.

Table 5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local & Collector Roads	5-year Return Period
Storm Sewer Design	Rational Method/Modeling
IDF Rainfall Data	Ottawa Sewer Design Guidelines (Oct. 2012)
Initial Time of Concentration (T_c)	10 minutes
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Inlet Control Devices

Inflows to the minor system will be controlled using inlet control devices (ICDs) designed to control inflows to the storm sewer system 70L/s/ha for all storm events up to and including the 100-year event. Each road catchbasin will have an individual connection to the storm sewer. CB pairs will not be interconnected unless flow restrictions for individual CBs are less than 6 L/s per catchbasin.

Rear yard catchbasins will be connected in series with an ICD at the outlet of the downstream structure. ICDs for rear-yard catchbasins will be sized at the detailed design stage.

ICDs will be either round orifice plates or vortex-type inlets. The required ICD sizes will be confirmed at the detailed design stage.

5.3.2 Overland Flow Path (Major System)

The site will be graded to provide an engineered overland flow route (major system) for large, infrequent storms, or in the event that the storm sewer system becomes obstructed. A minimum 150 m^3/ha on-site detention storage will be provided within the right-of-way (ROW). Major system flows will be conveyed overland along defined major system flow routes as shown on **Figure 7A** and **7B** – Conceptual Post-Development Storm Drainage Area Plan. The design of the major system conforms to the design standards outlined in Section 5.5 of the *Ottawa Sewer Design Guidelines*.

5.4 Hydrologic & Hydraulic Modeling

The *Ottawa Sewer Design Guidelines* state that hydrologic modeling is required for all dual drainage systems. A PCSWMM model for Phase 1 of the development has been developed to account for both minor and major system flows from the development, and ensure no adverse impacts on the downstream drainage system. The results of the analysis were used to:

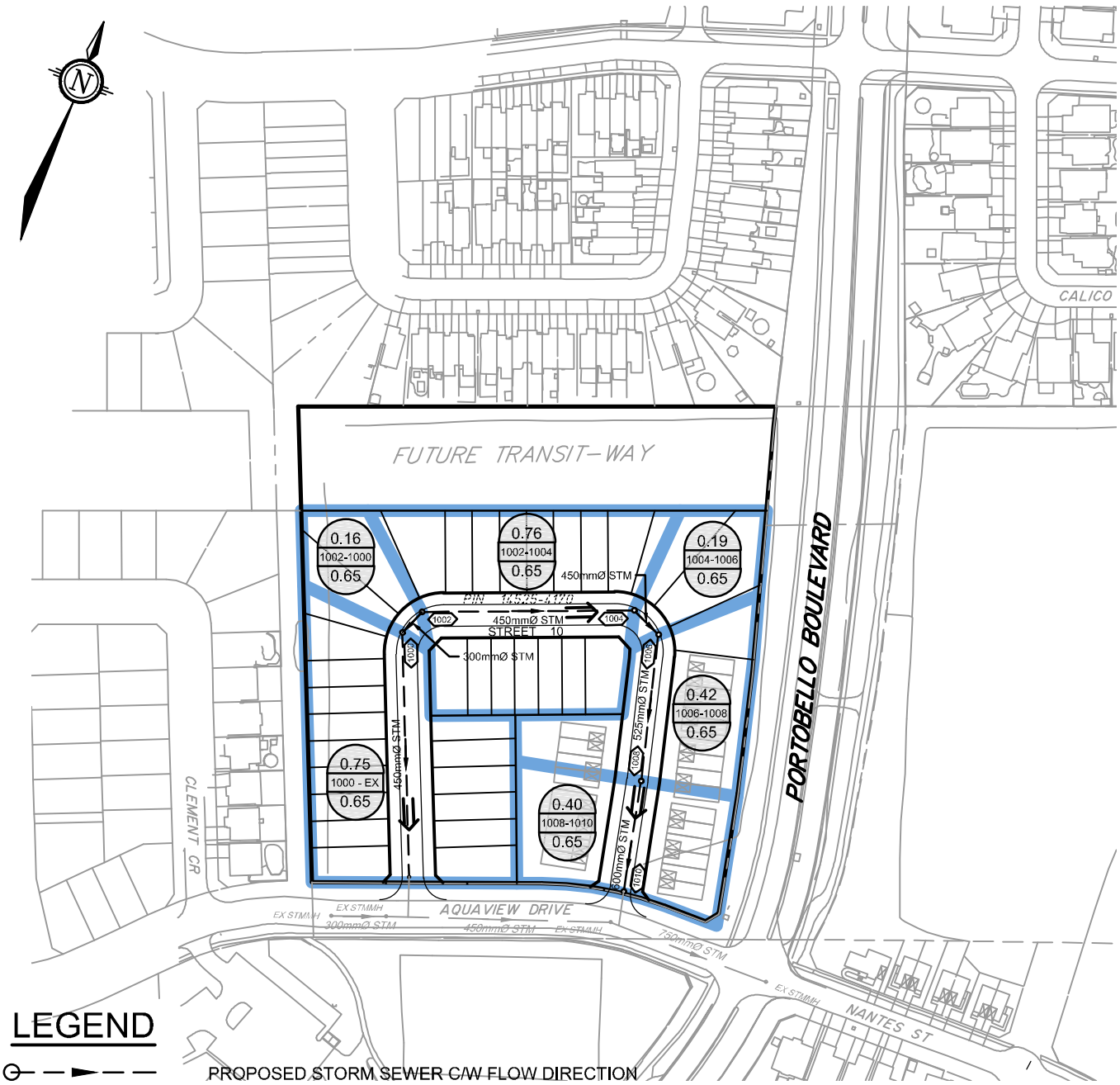
- Determine the total major and minor system runoff from the site.
- Calculate the storm sewer hydraulic grade line for the 100-year storm event; and
- Evaluate ponding volumes during the 100-year event.

Rational method calculations have been performed for Phases 2-5 to determine the approximate amount of storage required for each phase. The Phase 1 PCSWMM model demonstrates the feasibility of the proposed SWM strategy for each of the remaining phases, which will be modeled at the detailed design stage. Supporting calculations are included in **Appendix C**.

5.4.1 Design Storms

The hydrologic analysis was completed using the following synthetic design storm events. The IDF parameters used to generate the design storms were taken from the *City of Ottawa Sewer Design Guidelines* (October 2012).

4 Hour Chicago Storms:	*12 Hour SCS Type II Storms:*
25mm 4hr Chicago storm	2-year 12-hour SCS Type II Storm
2-year 4hr Chicago storm	5-year 12-hour SCS Type II Storm
5-year 4hr Chicago storm	100-year 12-hour SCS Type II Storm
100-year 4hr Chicago storm	



LEGEND

PROPOSED STORM SEWER C/W FLOW DIRECTION

DRAINAGE AREA BOUNDARY

0.24 / 100-102 / 0.43 — CATCHMENT AREA (ha) / MANHOLE - MANHOLE / RUNOFF COEFFICIENT

MAJOR OVERLAND FLOW DIRECTION

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CITY of OTTAWA

NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

CONCEPTUAL POST - DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE 1 : 2500 (0 25 50 75 100)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-7A

SHT8X11.DWG - 216mmx279mm

M:\2017\117155\CAD\Design\Figures\Design Brief\117155-STM.dwg, FIG-7A, Jul 06, 2018 - 12:28pm, channa

ÉCOLE ÉLÉMENTAIRE CATHOLIQUE DE LA DÉCOUVERTE

RANCOURT PARK

AVENUE

PROVENCE CRESCENT

TRIM ROAD

FUTURE TRANSIT-WAY

PARK AREA=4004m²

Multi-Unit

STREET 1 · STREET 2 · STREET 3 · STREET 4 · STREET 5 · STREET 6 · STREET 7 · STREET 8 · STREET 9

LEGEND

- PROPOSED STORM SEWER C/W FLOW DIRECTION
- DRAINAGE AREA BOUNDARY
- 0.24 / 100-102 / 0.43 — CATCHMENT AREA (ha) / MANHOLE - MANHOLE / RUNOFF COEFFICIENT
- MAJOR OVERLAND FLOW DIRECTION

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NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

CONCEPTUAL POST - DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE 1 : 2500 (0 25 50 75 100)

DATE JUN 2018 | JOB 117155 | FIGURE FIG-7B

SHT11X17.DWG - 279mmX432mm

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The 4-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 4-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

Storm Drainage Areas

The catchment areas used to develop the Storm Sewer Design Sheets (**Appendix C**) are based on the contributing drainage area to each segment of storm sewer from one manhole to another. The catchment areas are shown on the Conceptual Storm Drainage Area Plans (**Figures 7A** and **7B**).

Subcatchment Model Parameters

For the Phase 1 PCSWMM model, the catchment areas shown on the Drainage Area Plans have been combined to represent the total area tributary to each of the three proposed catchbasin pairs. For Phases 2-5, the subcatchment areas are based on the phasing boundaries.

The hydrologic parameters for each subcatchment were developed based on the Concept Plan (**Figure 2**) and the Conceptual Storm Drainage Area Plans (**Figures 7A** and **7B**). An overview of the drainage area parameters for each phase is provided in

Table 5.2. Modeling parameters for the Phase 1 PCSWMM model are outlined in **Table** 5.3.

Table 5.2: Drainage Area Parameters (Phases 1-5)

Area ID	Catchment Area (ha)	Weighted Runoff Coefficient (C)	Percent Impervious (%)
Phase 1	2.70	0.55	50%
Phase 2	8.11	0.53	48%
Phase 3	7.80	0.50	43%
Phase 4	3.58	0.58	54%
Phase 5	2.68	0.54	48%

Table 5.3: PCSWMM Model Parameters (Phase 1)

Area ID	Catchment Area (ha)	Weighted Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Equivalent Width (m)	Average Slope (%)
PH1-1	0.90	0.51	44%	50%	54	0.25%
PH1-2	0.77	0.60	57%	50%	47	0.25%
PH1-3	1.03	0.60	57%	50%	58	0.25%

Infiltration

Infiltration losses for all catchment areas were modeled using Horton's infiltration equation, which defines the infiltration capacity of the soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the City of Ottawa were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Residential rooftops are assumed to provide no depression storage and all rainfall is converted to runoff.

Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the *Ottawa Sewer Design Guidelines*.

Impervious Values

Runoff coefficients were determined for the each of the proposed land uses shown on the concept plan (**Figure 2**). Single-family residential dwellings were assigned a runoff coefficient of 0.50. Multi-unit attached residential dwellings were assigned a runoff coefficient of 0.60.

Impervious (%IMP) values for each subcatchment area were calculated using the equation:

$$\%IMP = \frac{C - 0.2}{0.7}$$

Major System

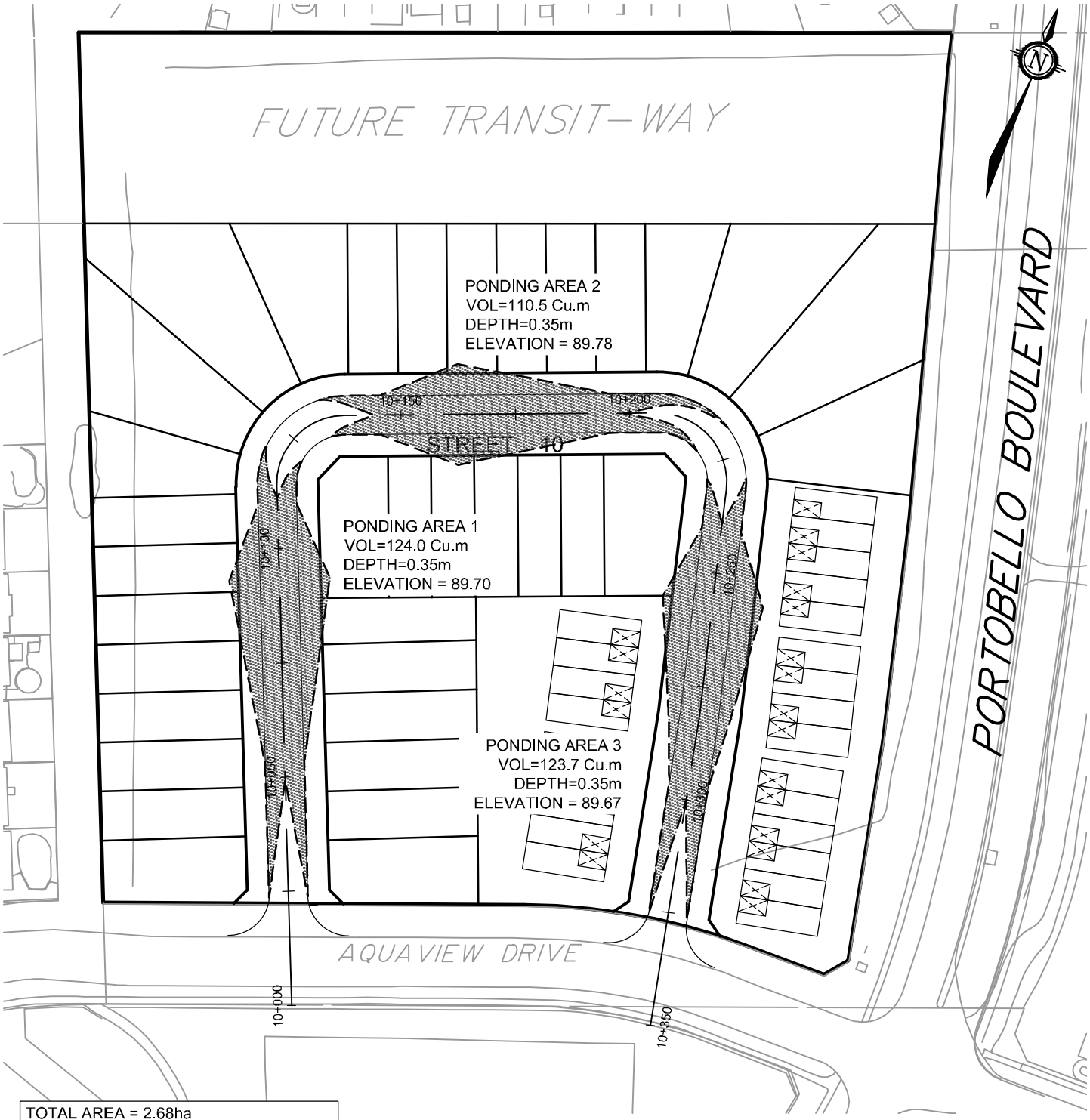
Since the major system has not yet been fully designed, the subcatchment areas are not based on a detailed grading plan. Major system storage is represented in the PCSWMM model using storage nodes, with the storage volumes based on the conceptual ponding plan (**Figure 8**).

Modeling Files / Schematic

The PCSWMM model schematics and 100-year model output are provided in **Appendix C**. Digital copies of the modeling files and model output for all storm events are provided on the enclosed CD.

5.4.2 Allowable Release Rates & Required Storage

Table 5.4 outlines the required storage and allowable release rate for each phase of the proposed development.



TOTAL AREA = 2.68ha
TOTAL PONDING = 358.2 cu.m

PONDING PROVIDED = 133.7 cu.m/ha

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CITY of OTTAWA
NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

CONCEPTUAL PONDING PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE	JOB	FIGURE
JUN 2018	117155	FIG-8

SHT8X11.DWG - 216mmx279mm

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- On an average basis, inflows to the storm sewer system are to be limited to 70 L/s/ha;
- Minimum on-site detention storage provided by the major system is 150 m^3/ha.

Table 5.4: Release Rate & Storage Requirements

Phase	Area (ha)	Required Storage (m^3)	Allowable Release Rate (L/s)
Phase 1	2.70	405	189
Phase 2	8.11	1217	568
Phase 3	7.80	1170	546
Phase 4	3.58	537	251
Phase 5	2.68	402	188

Preliminary grading for Phase 1 has been completed (refer to **Figure 9A/9B** - Preliminary Macro Grading Plan) to determine the maximum available storage. These storage volumes have been used in the Phase 1 PCSWMM model.

5.4.3 PCSWMM Model Results (Phase 1)

The results of the PCSWMM model are summarized in the following sections.

Inlet Control Devices & Peak Flows

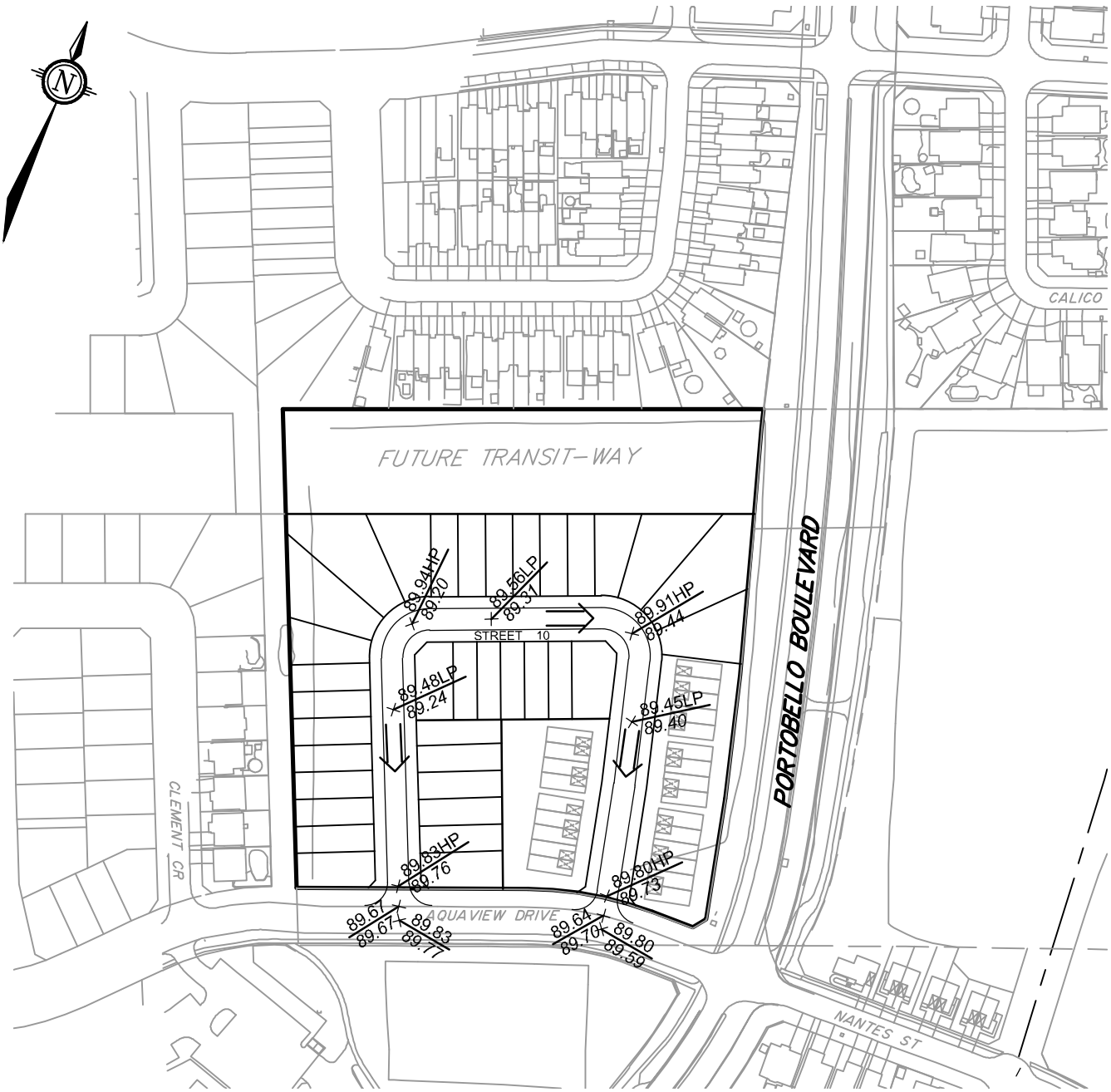
The inlets to the storm sewer system have been sized based on the allowable release rate of 70 L/s/ha, averaged across the entire system. **Table 5.5** outlines the ICD sizes, with the peak flows for each storm event.

Table 5.5: ICD Sizes & Peak Flows

Area ID	Area (ha)	Structure ID	ICD Size & Capture Rate			
			Diameter (mm)	2-year (L/s)	5-year (L/s)	100-year (L/s)
PH1-1	0.90	CB-01	83	43	44	46
		CB-02	94			
PH1-2	0.77	CB-03	83	50	52	55
		CB-04	108			
PH1-3	1.03	CB-05	83	80	83	88
		CB-06	152			
TOTAL	2.70	-	-	173	179	189

Major System Storage

As outlined on the conceptual ponding plan (**Figure 8**), approximately 358 m^3 (or 133 m^3/ha) of ponding is available within Phase 1. While this is below the required 150 m^3 outlined in the criteria, it does provide sufficient storage to contain all runoff from the 100-year storm event with no overland flow leaving the site. **Table 5.6** outlines the storage volumes during the 100-year storm event. Details for all storm events have been included in **Appendix C**.



LEGEND

89.24 / 88.59	PRELIMINARY GRADE (HP= HIGHPOINT, LP= LOWPOINT) EXISTING GRADE
⇐	MAJOR OVERLAND FLOW DIRECTION

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CITY of OTTAWA
NOTTING HILL SUBDIVISION
(2128 TRIM ROAD)

PRELIMINARY
MACRO GRADING PLAN

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE	JOB	FIGURE
JUN 2018	117155	FIG-9A

SHT8X11.DWG - 216mmx279mm

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OVERLAND FLOW FROM PROVENCE AVENUE TO BE DIRECTED THROUGH NOTTING HILL SUBDIVISION

ÉCOLE ÉLÉMENTAIRE CATHOLIQUE DE LA DÉCOUVERTE

RANCOURT PARK

PROVENCE AVENUE

TRIM ROAD

FUTURE TRANSIT-WAY

PARK
AREA=4004m²

Multi-Unit

STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9

LEGEND

89.24 / 88.59 — PRELIMINARY GRADE / EXISTING GRADE

MAJOR OVERLAND FLOW DIRECTION

NOTE: SAWTOOTHING TO BE ADDED DURING DETAIL DESIGN OF ROAD GRADES

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CITY of OTTAWA
NOTTING HILL SUBDIVISION
(2128 TRIM ROAD)

PRELIMINARY
MACRO GRADING PLAN

SCALE 1 : 2500 (0 25 50 75 100)

DATE	JOB	FIGURE
JUN 2018	117155	FIG-9B

SHT11X17.DWG - 279mmX432mm

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Table 5.6: 100-year Ponding Depths & Volumes

Structure	T/G	Max. Static Ponding (Spill Depth)			100-yr Event		
		Elev.	Depth	Volume	Elev.	Depth	Volume
	(m)	(m)	(m)	(m^3)	(m)	(m)	(m^3)
CB01-02	89.70	90.05	0.35	124.0	90.03	0.33	113.0
CB03-04	89.78	90.13	0.35	110.5	90.13	0.35	109.8
CB05-06	89.67	90.02	0.35	123.7	90.02	0.35	120.5
			TOTAL:	358.2	-	-	295.6

5.4.4 Results of Rational Method Calculations

Since the proposed design for Phases 2-5 follows the same concept as for Phase 1, a PCSWMM model for these phases was not completed for the draft plan stage. To determine the approximate runoff and storage required for Phases 2-5, Rational Method calculations were done for the 5-year and 100-year storm events. **Table 5.7** outlines the results. Further details and supporting calculations have been included in **Appendix C**. Phase 1 was also analyzed using the Rational Method to compare against results from the PCSWMM model.

Table 5.7: Rational Method Results

Phase	Area (ha)	Uncontrolled 5-year Flow (L/s)	Uncontrolled 100-year Flow (L/s)	Allowable Release Rate (L/s)	Calculated Required Storage (m^3)	Minimum Storage Required (m^3)
Phase 1	2.70	430	911	189	433	405
Phase 2	8.11	1254	2687	568	1271	1217
Phase 3	7.80	1140	2442	546	1137	1170
Phase 4	3.58	598	1280	251	618	537
Phase 5	2.68	418	894	188	424	402

As shown in the table, the calculated required storage for each phase is higher than the minimum required storage (150 m^3/ha). However, the PCSWMM model demonstrated that the required storage was less than the minimum required storage outlined in the criteria. During the detailed design stage, grading for all phases will be done to ensure that the available ponding volume in the ROW is maximized. Phases 2-5 will be modeled in detail at the detailed design stage, where appropriated ICDs will be sized to limit the peak flows and the available ponding volume will be assessed to ensure it is sufficient.

Based on the model of Phase 1, it can be assumed that Phases 2-5 will function in a similar manner, and the criteria of a 70 L/s/ha release rate and 150 m^3/ha storage can be achieved.

6.0 PHASING

The proposed subdivision will be split into five (5) phases of development, as shown on **Figure 2** - Concept Plan / Phasing Plan. Emergency vehicle access will be from Aquaview Drive, Provence Avenue and Trim Road for all phases of the development. The following details how each will be serviced.

6.1 Phase 1

Phase 1, which has approximately 59 units, will be serviced by Aquaview Drive before outletting to the storm and sanitary outlet on Portobello Boulevard. It will also be serviced by the watermain loop from Aquaview Drive to Aquaview Drive (two connections to the existing 305mm on Aquaview Drive).

6.2 Phase 2 - 5

Phase 2, which has approximately 175 units, will be serviced by the storm outlet on Provence Avenue and the sanitary outlet on Trim Road. It will also be serviced by the watermain loop from Provence Avenue to Trim Road (one connection to the existing 406mm on Trim Road and one connection to the existing 203mm on Salzburg Drive).

Phase 3, which has approximately 149 units, will be serviced by the storm outlet on Provence Avenue and the sanitary outlet on Trim Road. It will also be serviced by the watermain loop from Provence Avenue to Trim Road (one connection to the existing 406mm on Provence Avenue and possible second to be confirmed).

Phase 4, which has approximately 54 units, will be serviced by the storm outlet on Provence Avenue and the sanitary outlet on Trim Road. It will also be serviced by the watermain loop from Provence Avenue to Trim Road (internal connections).
In addition, the multi-unit blocks (approximately 40 units) along Trim Road/Street 1 will be serviced by the storm/sanitary sewers and watermain located on the internal street.

Phase 5, which has approximately 58 units, will be serviced by the storm outlet on Provence Avenue and the sanitary outlet on Trim Road. It will also be serviced by the watermain loop from Provence Avenue to Trim Road (internal connections).

7.0 OTHER REPORTS

7.1 Noise Control

A Noise Control analysis was prepared as a preliminary assessment of the environmental impact of noise and to outline any possible noise attenuation requirements on the proposed residential development. Details can be found in the report entitled: *Notting Hill Subdivision – 2128 Trim Road – Noise Impact Feasibility Report by Novatech dated June 29, 2018* and is submitted under a separate cover.

7.2 Transportation Impact Assessment

An analysis of the effect from the proposed Notting Hill Subdivision development on the existing traffic patterns has been performed and detailed in the report entitled: *Notting Hill Subdivision – Transportation Impact Assessment by Novatech dated June 29, 2018* and is submitted under a separate cover. Please refer to this report for more details.

7.3 Environmental

Details can be found in the report entitled: *Notting Hill Subdivision, Phases 1 - 5 – Tree Conservation Report and Environmental Impact Statement by Muncaster Environmental Planning Inc.* and will be submitted under separate cover.

8.0 UTILITIES

The development will be serviced by hydro, gas, phone and cable, which will be constructed as per the City and utility standard right-of-way cross-sections. Refer to **Figures ROW-18**, **ROW-20A** and **ROW-22** for various road allowances.

Canada Post will service the site with community mailboxes.

Site lighting will be provided along roadways, sidewalks and walkways as per City standards.

9.0 ROADWAY GRADING

Grading throughout the proposed subdivision will be in general accordance with the macro grading plan in the master servicing report for the area and tie-in to the surrounding existing roads (Aquaview Drive, Provence Avenue and Trim Road). See **Figure 9A/9B** – Preliminary Macro Grading Plan for details.

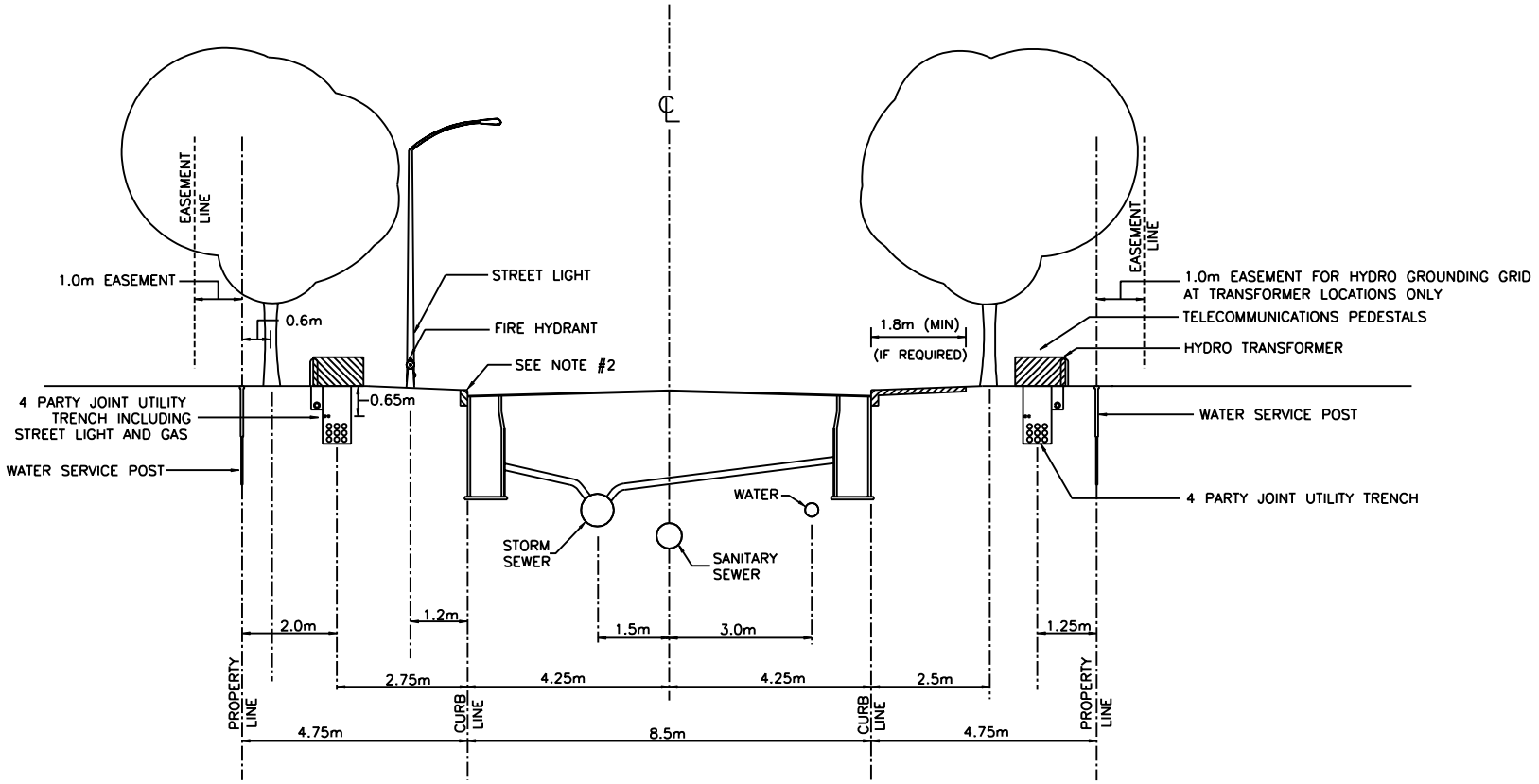
Furthermore, the grading will be as such to maximize the ponding within the ROW and an overland flow route will also be generated for all phases of the development.

Additionally, lightweight fill is anticipated to be required in various locations throughout the development to meet the macro grading plan and also deal with the grade raise restrictions for the area.

10.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987).

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), filter fabric or inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), turbidity curtain (OPSD 219.260), dewatering trap (OPSD 219.240), temporary water passage system (OPSD 221.030), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.



SECTION

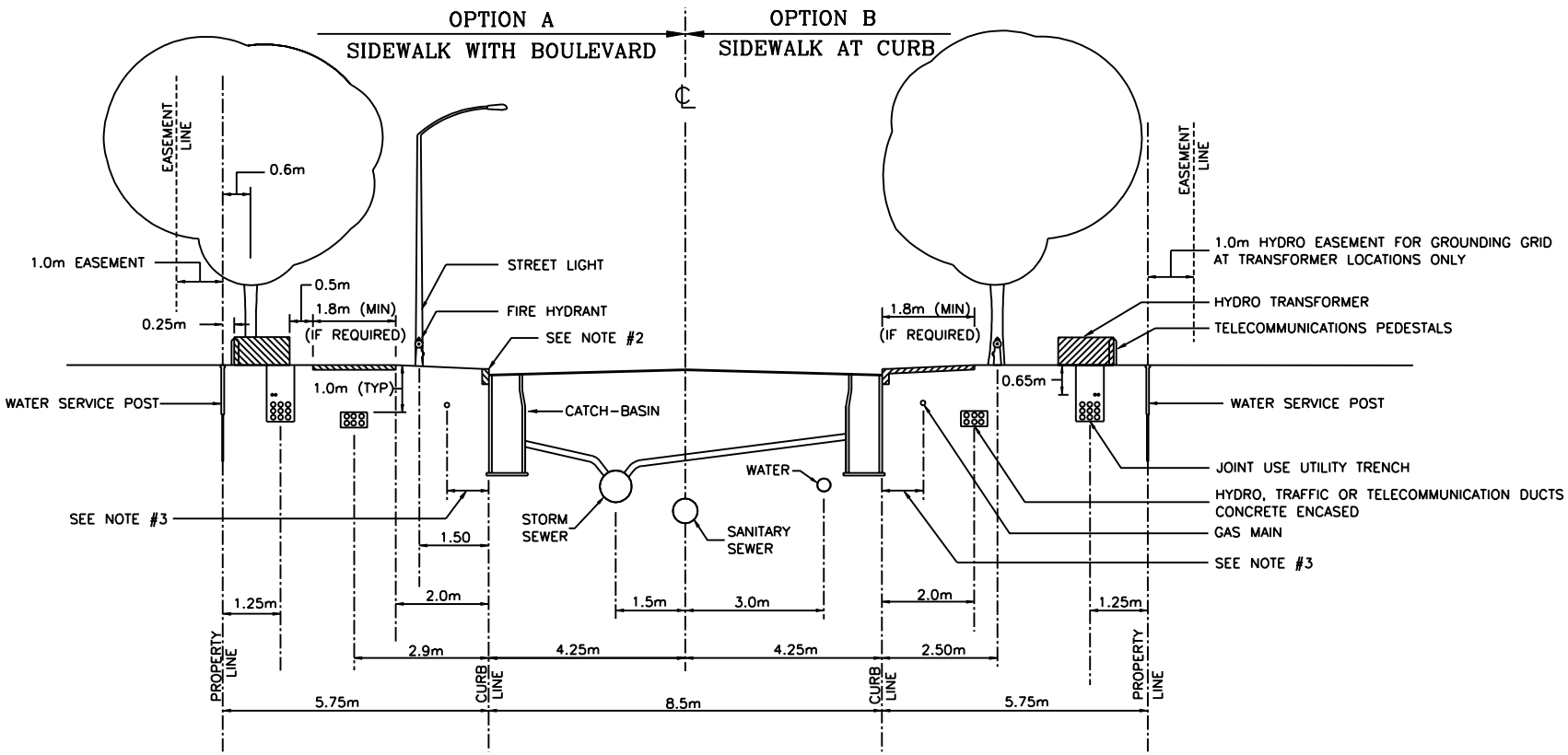
NOTES:

1. REFERENCE STANDARD NOTES ROAD ALLOWANCE (DGN:ROW-NOTES)
2. CONCRETE CURBS MAY BE BARRIER TYPE OR MOUNTABLE TYPE, CATCH BASIN TYPE WILL SUIT CURB DESIGN. SEE SEWER DESIGN GUIDELINES FOR CATCH BASIN PREFERENCE.
3. AT CATCH BASIN AND HYDRANT LOCATIONS THE GAS MAIN SHALL HAVE A MINIMUM 0.6m CLEARANCE FROM STRUCTURES.
4. HYDRO TRANSFORMERS AND SIDEWALKS ARE TO BE LOCATED ON OPPOSITE SIDE OF THE ROW WHENEVER POSSIBLE. REQUIREMENT FOR PROTECTIVE BOLLARDS AT TRANSFORMERS SHALL BE DETERMINED BY HYDRO ON A CASE BY CASE BASIS.
5. STREET LIGHTS AND SIDEWALKS ARE TO BE LOCATED ON OPPOSITE SIDES OF THE ROW.

Ottawa

RESIDENTIAL ROAD
18.0m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH

DATE:	-
REV. DATE:	MARCH 2009
DWG. No.:	ROW-18JT



SECTION

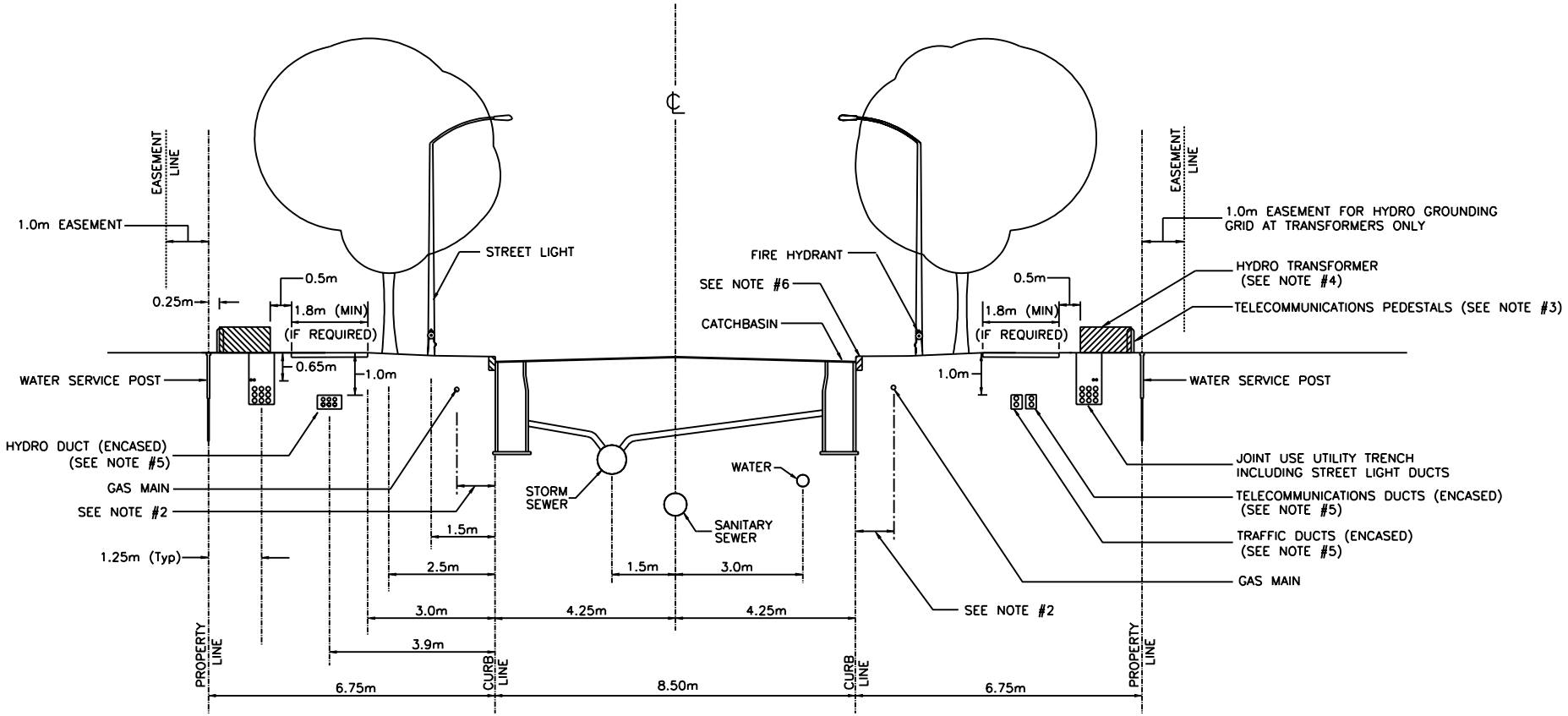
NOTES:

1. REFERENCE STANDARD NOTES ROAD ALLOWANCE (DGN:ROW-NOTES).
2. CONCRETE CURBS MAY BE BARRIER TYPE OR MOUNTABLE TYPE, CATCH BASIN TYPE WILL SUIT CURB DESIGN. SEE SEWER DESIGN GUIDELINES FOR CATCH BASIN PREFERENCE.
3. AT CATCH BASIN AND HYDRANT LOCATIONS THE GAS MAIN SHALL HAVE A MINIMUM 0.6m CLEARANCE FROM STRUCTURES.
4. HYDRO TRANSFORMERS AND SIDEWALKS ARE TO BE LOCATED ON OPPOSITE SIDE OF THE ROW WHENEVER POSSIBLE.
5. PRIMARY HYDRO DUCTS & COMMUNICATION DUCTS (ENCASED) TYPICALLY REQUIRED ON ONE SIDE OF ROW ONLY. PROVIDE 1.0m COVER ON ALL CONCRETE ENCASED DUCTS.
6. STREET LIGHTS AND SIDEWALKS ARE TO BE LOCATED ON OPPOSITE SIDES OF THE ROW FOR THE OPTION WITH SIDEWALK AT CURB.

Ottawa

RESIDENTIAL ROAD 20.0m ROAD ALLOWANCE SIDEWALK OPTIONS

DATE:	-
REV. DATE:	MARCH 2009
DWG. No.:	ROW-20A



SECTION

NOTES:

1. REFERENCE STANDARD NOTES ROAD ALLOWANCE (DGN:ROW-NOTES).
2. AT CATCH BASIN LOCATIONS THE GAS MAIN SHALL HAVE A MINIMUM 0.6m CLEARANCE FROM STRUCTURES.
3. ALL PEDESTALS TO BE INSTALLED IN LINE WITH HYDRO TRANSFORMERS OR ON SIDE OF TRENCH AWAY FROM ROAD.
4. REQUIREMENT FOR PROTECTIVE BOLLARDS AT TRANSFORMERS SHALL BE DETERMINED BY HYDRO ON A CASE BY CASE BASIS.
5. HYDRO DUCTS & COMMUNICATION DUCTS (ENCASED) TYPICALLY REQUIRED ON ONE SIDE OF ROW ONLY. PROVIDE 1.0m COVER ON ALL CONCRETE ENCASED DUCTS.
6. CONCRETE CURBS MAY BE BARRIER TYPE OR MOUNTABLE TYPE, CATCH BASIN TYPE WILL SUIT CURB DESIGN. SEE SEWER DESIGN GUIDELINES FOR CATCH BASIN PREFERENCE.

RESIDENTIAL ROAD
22.0m ROAD ALLOWANCE
SIDEWALK OPTIONS

DATE:	-
REV. DATE:	MARCH 2009
DWG. No.:	ROW-22

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. A copy of the City of Ottawa Special Provision F-1004 is included in the Appendix which will become part of any contract and which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
    - Straw bale barriers are to be installed in drainage ditches that will remain open as part of the development.
    - Inserts are to be placed under the grates of all proposed and existing catchbasins and structures.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The report demonstrates that the servicing strategy for the watermain servicing, the sanitary servicing as well as the stormwater management is achievable and is feasible in support of Draft Plan. The downstream and existing systems have sufficient capacity to service the proposed development.

- The watermain flows will be supplied by the on-site loop connecting to the 300mm dia. watermain on Aquaview Drive for Phase 1 and to the 400mm dia. watermain on Trim Road, 200mm dia. on Salzburg Drive and 400mm dia. on Provence Avenue for Phases 2-5.
- The sanitary flows will be collected by the on-site sanitary sewer system and directed to either Aquaview Drive for Phase 1 or Trim Road for Phases 2-5.
- The stormwater flows will be collected by the on-site storm sewer system and directed to either Aquaview Drive for Phase 1 or Provence Avenue for Phases 2-5.

In closing, Novatech respectfully requests the City of Ottawa accept the findings of this Site Servicing and Stormwater Design Brief and provide draft plan approval for Notting Hill Subdivision at 2128 Trim Road, Ottawa, Ontario.

Respectfully issued,

NOVATECH

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Prepared By:

Kallie Auld, P.Eng.
Project Coordinator | Water Resources

Prepared By:

Mark Bowen, B.Eng.
Project Manager | Land Development Engineering

Reviewed/Approved by:

Melanie Riddell, P.Eng.
Senior Project Manager | Land Development

FOR REVIEW ONLY

APPENDIX A
Water Calculations

Notting Hill Subdivision
Watermain Demand Calculations

Phase	Node		Units			Pop.	Demand (L/s)		
	No.	Elev (m)	Single	Town	Apt.		High Pres.	Max Daily	Peak Hour
Phase 3	4	89.9	2	8	0	29	0.12	0.29	0.65
	5	89.5	16	0	0	55	0.22	0.56	1.23
	6	89.2	19	0	0	65	0.26	0.66	1.45
	7	89.1	9	0	0	31	0.13	0.31	0.69
	8	89.0	11	0	0	38	0.15	0.38	0.85
	9	89.1	21	0	0	72	0.29	0.73	1.60
	10	89.2	11	12	0	70	0.28	0.71	1.56
	11	89.3	10	10	0	61	0.25	0.62	1.36
	12	89.2	13	0	0	45	0.18	0.46	1.00
	13	89.1	7	0	0	24	0.10	0.24	0.53
			119	30		**Phase 3 Subtotal**	**1.98**	**4.96**	**10.92**
Phase 5	14	89.5	17	0	0	58	0.23	0.59	1.29
	15	89.2	13	28	0	120	0.49	1.22	2.67
			30	28		**Phase 5 Subtotal**	**0.72**	**1.80**	**3.97**
Phase 2	16	88.8	10	0	0	34	0.14	0.34	0.76
	17	88.9	0	23	0	63	0.26	0.64	1.40
	18	89.0	0	12	0	33	0.13	0.33	0.74
	19	88.9	15	0	0	51	0.21	0.52	1.14
	20	89.0	0	24	0	65	0.26	0.66	1.45
	21	89.1	0	18	0	49	0.20	0.50	1.09
	22	89.2	7	13	0	59	0.24	0.60	1.31
	23	89.1	18	0	0	62	0.25	0.63	1.38
	24	88.9	9	0	0	31	0.13	0.31	0.69
	25	89.0	6	0	0	21	0.09	0.21	0.47
	26	89.1	11	0	0	38	0.15	0.38	0.85
	27	89.2	8	0	0	28	0.11	0.28	0.62
	28	89.3	0	0	0	0	0.00	0.00	0.00
			84	90		**Phase 2 Subtotal**	**2.16**	**5.41**	**11.90**

Phase 4	29	89.1	9	27	0	104	0.42	1.05	2.32
	30	89.2	18	0	0	62	0.25	0.63	1.38
	31	89.2	0	10	0	27	0.11	0.27	0.60
	32	89.2	0	10	0	27	0.11	0.27	0.60
	33	89.2	0	20	0	54	0.22	0.55	1.20
			27	67		**Phase 4 Subtotal**	**1.11**	**2.77**	**6.10**
Phase 1	1	90.1	12	0	0	41	0.17	0.42	0.91
	2	90.3	23	0	0	79	0.32	0.80	1.76
	3	90.1	0	24	0	65	0.26	0.66	1.45
			35	24		**Phase 1 Subtotal**	**0.75**	**1.87**	**4.12**
Existing	34	88.6	0	50	0	135	0.55	1.37	3.01
			35	98		**Existing Subtotal**	**0.55**	**1.37**	**3.01**
						Total	**7.28**	**18.19**	**40.02**

1. Population density: 3.4 people/single, 2.7 people/town, & 1.8 people/apartment
2. High Pressure demand = 350L/s/p/d
3. Maximum Daily demand = 2.5 x High Pressure Demand
4. Peak Hour Demand = 2.2 x Maximum Daily Demand

Notting Hill Subdivision
High Pressure Condition

Phase	Node		Demand (LPS)	Head (m)	Pressure		Age
	No.	Elev (m)			(m)	(PSI)	(hrs)
Phase 1	1	90.1	0.17	130.1	40.0	57.1	2.9
	2	90.3	0.32	130.1	39.8	56.9	10.7
	3	90.1	0.26	130.1	40.0	57.1	1.8
Phase 2	16	88.8	0.14	130.1	41.3	59.0	1.5
	17	88.9	0.26	130.1	41.2	58.8	5.0
	18	89.0	0.13	130.1	41.1	58.7	5.3
	19	88.9	0.21	130.1	41.2	58.8	1.8
	20	89.0	0.26	130.1	41.1	58.7	2.5
	21	89.1	0.20	130.1	41.0	58.5	3.7
	22	89.2	0.24	130.1	40.9	58.4	4.8
	23	89.1	0.25	130.1	41.0	58.5	7.2
	24	88.9	0.13	130.1	41.2	58.8	3.0
	25	89.0	0.09	130.1	41.1	58.7	0.8
	26	89.1	0.15	130.1	41.0	58.5	1.1
	27	89.2	0.11	130.0	40.8	58.3	1.2
	28	89.3	0.00	130.0	40.7	58.2	1.2
Phase 3	4	89.9	0.12	130.2	40.3	57.5	0.1
	5	89.5	0.22	130.2	40.7	58.1	0.2
	6	89.2	0.26	130.1	40.9	58.5	0.3
	7	89.1	0.13	130.1	41.0	58.6	0.5
	8	89.0	0.15	130.1	41.1	58.7	1.0
	9	89.1	0.29	130.1	41.0	58.6	1.7
	10	89.2	0.28	130.1	40.9	58.4	3.5
	11	89.3	0.25	130.1	40.8	58.3	7.8
	12	89.2	0.18	130.1	40.9	58.4	15.0
	13	89.1	0.10	130.1	41.0	58.6	1.4
Phase 4	29	89.1	0.42	130.1	41.0	58.5	1.1
	30	89.2	0.25	130.1	40.9	58.4	1.4
	31	89.2	0.11	130.0	40.8	58.3	2.1
	32	89.2	0.11	130.0	40.8	58.3	2.5
	33	89.2	0.22	130.0	40.8	58.3	2.3
Phase 5	14	89.5	0.23	130.1	40.6	58.1	0.3
	15	89.2	0.49	130.1	40.9	58.5	0.6
Existing	34	88.6	0.55	130.1	41.5	59.3	0.4
Boundry Conditions	101	90.1	-	130.1	-	-	-
	102	90.3	-	130.1	-	-	-
	103	90.1	-	130.2	-	-	-
	104	90.3	-	130.0	-	-	-
	105	90.1	-	130.1	-	-	-

Notting Hill Subdivision
Peak Hour Condition

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.91	123.8	33.7	48.1
	2	90.3	1.76	123.8	33.5	47.9
	3	90.1	1.45	123.8	33.7	48.1
Phase 2	16	88.8	0.76	123.7	34.9	49.8
	17	88.9	1.40	123.7	34.8	49.7
	18	89.0	0.74	123.3	34.3	49.0
	19	88.9	1.14	123.7	34.8	49.7
	20	89.0	1.45	123.7	34.7	49.5
	21	89.1	1.09	123.7	34.6	49.4
	22	89.2	1.31	123.7	34.5	49.2
	23	89.1	1.38	123.7	34.6	49.4
	24	88.9	0.69	123.7	34.8	49.7
	25	89.0	0.47	123.7	34.7	49.5
	26	89.1	0.85	123.7	34.6	49.4
	27	89.2	0.62	123.7	34.5	49.3
	28	89.3	0.00	123.7	34.4	49.1
Phase 3	4	89.9	0.65	123.7	33.8	48.3
	5	89.5	1.23	123.7	34.2	48.8
	6	89.2	1.45	123.7	34.5	49.3
	7	89.1	0.69	123.7	34.6	49.4
	8	89.0	0.85	123.7	34.7	49.5
	9	89.1	1.60	123.7	34.6	49.4
	10	89.2	1.56	123.7	34.5	49.2
	11	89.3	1.36	123.7	34.4	49.1
	12	89.2	1.00	123.7	34.5	49.2
	13	89.1	0.53	123.7	34.6	49.4
Phase 4	29	89.1	2.32	123.7	34.6	49.4
	30	89.2	1.38	123.7	34.5	49.2
	31	89.2	0.60	123.7	34.5	49.3
	32	89.2	0.60	123.3	34.1	48.7
	33	89.2	1.20	122.8	33.6	48.0
Phase 5	14	89.5	0.23	130.1	40.6	58.1
	15	89.2	0.49	130.1	40.9	58.5
Existing	34	88.6	3.01	123.7	35.1	50.2
Boundry Conditions	101	90.1	-	123.8	-	-
	102	90.3	-	123.8	-	-
	103	90.1	-	123.7	-	-
	104	90.3	-	123.7	-	-
	105	90.1	-	123.8	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 2

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	123.3	33.2	47.4
	2	90.3	167.47	122.1	31.8	45.5
	3	90.1	0.66	123.9	33.8	48.3
Phase 2	16	88.8	0.34	120.3	31.5	44.9
	17	88.9	0.64	120.3	31.4	44.8
	18	89.0	0.33	120.2	31.2	44.5
	19	88.9	0.52	120.2	31.3	44.8
	20	89.0	0.66	120.2	31.2	44.6
	21	89.1	0.50	120.2	31.1	44.5
	22	89.2	0.60	120.2	31.0	44.3
	23	89.1	0.63	120.2	31.1	44.5
	24	88.9	0.31	120.2	31.3	44.8
	25	89.0	0.21	120.2	31.2	44.6
	26	89.1	0.38	120.3	31.2	44.5
	27	89.2	0.28	120.3	31.1	44.4
	28	89.3	0.00	120.3	31.0	44.3
Phase 3	4	89.9	0.29	120.0	30.1	42.9
	5	89.5	0.56	120.0	30.5	43.6
	6	89.2	0.66	120.1	30.9	44.1
	7	89.1	0.31	120.2	31.1	44.4
	8	89.0	0.38	120.2	31.2	44.6
	9	89.1	0.73	120.2	31.1	44.4
	10	89.2	0.71	120.2	31.0	44.3
	11	89.3	0.62	120.2	30.9	44.2
	12	89.2	0.46	120.2	31.0	44.3
	13	89.1	0.24	120.2	31.1	44.5
Phase 4	29	89.1	1.05	120.2	31.1	44.5
	30	89.2	0.63	120.3	31.1	44.4
	31	89.2	0.27	120.3	31.1	44.4
	32	89.2	0.27	120.2	31.0	44.3
	33	89.2	0.55	120.1	30.9	44.1
Phase 5	14	89.5	0.59	120.0	30.5	43.6
	15	89.2	1.22	120.1	30.9	44.1
Existing	34	88.6	1.37	120.6	32.0	45.7
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 6

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	119.7	30.9	44.1
	17	88.9	0.64	119.7	30.8	43.9
	18	89.0	0.33	119.6	30.6	43.7
	19	88.9	0.52	119.6	30.7	43.9
	20	89.0	0.66	119.6	30.6	43.7
	21	89.1	0.50	119.6	30.5	43.6
	22	89.2	0.60	119.6	30.4	43.5
	23	89.1	0.63	119.6	30.5	43.6
	24	88.9	0.31	119.6	30.7	43.9
	25	89.0	0.21	119.6	30.6	43.7
	26	89.1	0.38	119.9	30.8	44.0
	27	89.2	0.28	120.0	30.8	44.0
	28	89.3	0.00	120.1	30.8	44.1
Phase 3	4	89.9	0.29	119.6	29.7	42.4
	5	89.5	0.56	119.2	29.7	42.4
	6	89.2	168.13	118.8	29.6	42.3
	7	89.1	0.31	119.3	30.2	43.2
	8	89.0	0.38	119.5	30.5	43.5
	9	89.1	0.73	119.5	30.4	43.4
	10	89.2	0.71	119.5	30.3	43.3
	11	89.3	0.62	119.5	30.2	43.2
	12	89.2	0.46	119.5	30.3	43.3
	13	89.1	0.24	119.6	30.5	43.5
Phase 4	29	89.1	1.05	119.7	30.6	43.7
	30	89.2	0.63	119.8	30.6	43.7
	31	89.2	0.27	120.0	30.8	44.0
	32	89.2	0.27	120.0	30.8	43.9
	33	89.2	0.55	119.8	30.6	43.7
Phase 5	14	89.5	0.59	119.5	30.0	42.8
	15	89.2	1.22	119.4	30.2	43.2
Existing	34	88.6	1.37	120.3	31.7	45.3
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 10

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	117.7	28.9	41.3
	17	88.9	0.64	117.7	28.8	41.2
	18	89.0	0.33	117.6	28.6	40.9
	19	88.9	0.52	118.3	29.4	42.0
	20	89.0	0.66	118.4	29.4	41.9
	21	89.1	0.50	118.4	29.3	41.9
	22	89.2	0.60	118.5	29.3	41.9
	23	89.1	0.63	118.6	29.5	42.1
	24	88.9	0.31	118.7	29.8	42.6
	25	89.0	0.21	119.4	30.4	43.4
	26	89.1	0.38	119.7	30.6	43.8
	27	89.2	0.28	119.9	30.7	43.9
	28	89.3	0.00	120.1	30.8	44.0
Phase 3	4	89.9	0.29	119.7	29.8	42.6
	5	89.5	0.56	119.6	30.1	43.0
	6	89.2	0.66	119.5	30.3	43.2
	7	89.1	0.31	119.3	30.2	43.2
	8	89.0	0.38	116.8	27.8	39.7
	9	89.1	0.73	112.0	22.9	32.8
	10	89.2	167.38	104.3	15.1	21.6
	11	89.3	0.62	110.0	20.7	29.5
	12	89.2	0.46	113.3	24.1	34.4
	13	89.1	0.24	116.8	27.7	39.6
Phase 4	29	89.1	1.05	119.5	30.4	43.4
	30	89.2	0.63	119.6	30.4	43.4
	31	89.2	0.27	119.9	30.7	43.9
	32	89.2	0.27	119.9	30.7	43.8
	33	89.2	0.55	119.7	30.5	43.6
Phase 5	14	89.5	0.59	119.6	30.1	43.0
	15	89.2	1.22	119.5	30.3	43.2
Existing	34	88.6	1.37	119.3	30.7	43.9
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0		-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 15

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	119.7	30.9	44.2
	17	88.9	0.64	119.7	30.8	44.1
	18	89.0	0.33	119.7	30.7	43.8
	19	88.9	0.52	119.72	30.82	44.0
	20	89.0	0.66	119.71	30.71	43.9
	21	89.1	0.5	119.71	30.61	43.7
	22	89.2	0.6	119.71	30.51	43.6
	23	89.1	0.63	119.71	30.61	43.7
	24	88.9	0.31	119.71	30.81	44.0
	25	89.0	0.21	119.7	30.7	43.9
	26	89.1	0.38	119.93	30.83	44.0
	27	89.2	0.28	120.1	30.9	44.1
	28	89.3	0.00	120.2	30.9	44.1
Phase 3	4	89.9	0.29	119.6	29.7	42.4
	5	89.5	0.56	119.5	30.0	42.9
	6	89.2	0.66	119.5	30.3	43.3
	7	89.1	0.31	119.5	30.4	43.4
	8	89.0	0.38	119.6	30.6	43.7
	9	89.1	0.73	119.6	30.5	43.6
	10	89.2	0.71	119.6	30.4	43.4
	11	89.3	0.62	119.6	30.3	43.3
	12	89.2	0.46	119.6	30.4	43.5
	13	89.1	0.24	119.7	30.6	43.7
Phase 4	29	89.1	1.05	119.8	30.7	43.8
	30	89.2	0.63	119.8	30.6	43.8
	31	89.2	0.27	120.1	30.9	44.1
	32	89.2	0.27	120.0	30.8	44.0
	33	89.2	0.55	119.9	30.7	43.8
Phase 5	14	89.5	0.59	115.5	26.0	37.1
	15	89.2	167.89	112.6	23.4	33.5
Existing	34	88.6	1.37	120.3	31.7	45.3
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0		-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 17

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	116.5	27.7	39.6
	17	88.9	167.31	111.0	22.1	31.5
	18	89.0	0.33	110.9	21.9	31.2
	19	88.9	0.52	117.6	28.7	41.0
	20	89.0	0.66	117.7	28.7	41.0
	21	89.1	0.50	117.8	28.7	41.0
	22	89.2	0.60	117.9	28.7	41.0
	23	89.1	0.63	118.1	29.0	41.4
	24	88.9	0.31	118.2	29.3	41.9
	25	89.0	0.21	119.5	30.5	43.5
	26	89.1	0.38	119.8	30.7	43.8
	27	89.2	0.28	120.0	30.8	44.0
	28	89.3	0.00	120.1	30.8	44.0
Phase 3	4	89.9	0.29	119.8	29.9	42.7
	5	89.5	0.56	119.7	30.2	43.1
	6	89.2	0.66	119.5	30.3	43.3
	7	89.1	0.31	119.4	30.3	43.3
	8	89.0	0.38	117.9	28.9	41.2
	9	89.1	0.73	117.8	28.7	40.9
	10	89.2	0.71	117.6	28.4	40.6
	11	89.3	0.62	117.4	28.1	40.1
	12	89.2	0.46	117.3	28.1	40.1
	13	89.1	0.24	117.2	28.1	40.2
Phase 4	29	89.1	1.05	119.6	30.5	43.5
	30	89.2	0.63	119.7	30.5	43.5
	31	89.2	0.27	120.0	30.8	44.0
	32	89.2	0.27	119.9	30.7	43.8
	33	89.2	0.55	119.8	30.6	43.7
Phase 5	14	89.5	0.59	119.6	30.1	43.0
	15	89.2	1.22	119.5	30.3	43.3
Existing	34	88.6	1.37	118.7	30.1	43.0
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 21

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	118.3	29.5	42.1
	17	88.9	0.64	118.3	29.4	42.0
	18	89.0	0.33	118.2	29.2	41.7
	19	88.9	0.52	114.9	26.0	37.1
	20	89.0	0.66	109.7	20.7	29.6
	21	89.1	167.17	103.6	14.5	20.7
	22	89.2	0.60	106.8	17.6	25.1
	23	89.1	0.63	111.1	22.0	31.4
	24	88.9	0.31	115.0	26.1	37.3
	25	89.0	0.21	119.3	30.3	43.3
	26	89.1	0.38	119.7	30.6	43.7
	27	89.2	0.28	119.9	30.7	43.8
	28	89.3	0.00	120.0	30.7	43.9
Phase 3	4	89.9	0.29	119.7	29.8	42.6
	5	89.5	0.56	119.6	30.1	43.0
	6	89.2	0.66	119.5	30.3	43.2
	7	89.1	0.31	119.3	30.2	43.2
	8	89.0	0.38	118.8	29.8	42.5
	9	89.1	0.73	118.7	29.6	42.3
	10	89.2	0.71	118.7	29.5	42.1
	11	89.3	0.62	118.6	29.3	41.8
	12	89.2	0.46	118.6	29.4	41.9
	13	89.1	0.24	118.5	29.4	42.0
Phase 4	29	89.1	1.05	119.4	30.3	43.3
	30	89.2	0.63	119.5	30.3	43.3
	31	89.2	0.27	119.9	30.7	43.8
	32	89.2	0.27	119.8	30.6	43.7
	33	89.2	0.55	119.7	30.5	43.5
Phase 5	14	89.5	0.59	119.6	30.1	42.9
	15	89.2	1.22	119.5	30.3	43.2
Existing	34	88.6	1.37	119.6	31.0	44.3
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 23

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	118.4	29.6	42.2
	17	88.9	0.64	118.4	29.5	42.1
	18	89.0	0.33	118.3	29.3	41.8
	19	88.9	0.52	115.1	26.2	37.5
	20	89.0	0.66	113.1	24.1	34.5
	21	89.1	0.50	110.7	21.6	30.9
	22	89.2	0.60	109.0	19.8	28.3
	23	89.1	167.30	106.7	17.6	25.1
	24	88.9	0.31	114.8	25.9	37.0
	25	89.0	0.21	119.3	30.3	43.3
	26	89.1	0.38	119.7	30.6	43.6
	27	89.2	0.28	119.9	30.7	43.8
	28	89.3	0.00	120.0	30.7	43.9
Phase 3	4	89.9	0.29	119.7	29.8	42.6
	5	89.5	0.56	119.6	30.1	43.0
	6	89.2	0.66	119.5	30.3	43.2
	7	89.1	0.31	119.3	30.2	43.2
	8	89.0	0.38	118.8	29.8	42.5
	9	89.1	0.73	118.7	29.6	42.3
	10	89.2	0.71	118.7	29.5	42.1
	11	89.3	0.62	118.6	29.3	41.9
	12	89.2	0.46	118.6	29.4	42.0
	13	89.1	0.24	118.6	29.5	42.1
Phase 4	29	89.1	1.05	119.4	30.3	43.3
	30	89.2	0.63	119.5	30.3	43.3
	31	89.2	0.27	119.9	30.7	43.8
	32	89.2	0.27	119.8	30.6	43.7
	33	89.2	0.55	119.7	30.5	43.5
Phase 5	14	89.5	0.59	119.6	30.1	42.9
	15	89.2	1.22	119.4	30.2	43.2
Existing	34	88.6	1.37	119.6	31.0	44.3
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 26

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	119.7	30.9	44.1
	17	88.9	0.64	119.7	30.8	43.9
	18	89.0	0.33	119.6	30.6	43.7
	19	88.9	0.52	119.5	30.6	43.7
	20	89.0	0.66	119.5	30.5	43.6
	21	89.1	0.50	119.5	30.4	43.4
	22	89.2	0.60	119.5	30.3	43.2
	23	89.1	0.63	119.5	30.4	43.4
	24	88.9	0.31	119.4	30.5	43.6
	25	89.0	0.21	119.4	30.4	43.4
	26	89.1	167.05	119.1	30.0	42.9
	27	89.2	0.28	119.5	30.3	43.3
	28	89.3	0.00	119.8	30.5	43.5
Phase 3	4	89.9	0.29	119.8	29.9	42.7
	5	89.5	0.56	119.7	30.2	43.2
	6	89.2	0.66	119.6	30.4	43.5
	7	89.1	0.31	119.5	30.4	43.5
	8	89.0	0.38	119.6	30.6	43.7
	9	89.1	0.73	119.6	30.5	43.6
	10	89.2	0.71	119.6	30.4	43.4
	11	89.3	0.62	119.6	30.3	43.3
	12	89.2	0.46	119.6	30.4	43.4
	13	89.1	0.24	119.6	30.5	43.6
Phase 4	29	89.1	1.05	119.3	30.2	43.1
	30	89.2	0.63	119.2	30.0	42.8
	31	89.2	0.27	119.5	30.3	43.3
	32	89.2	0.27	119.4	30.2	43.2
	33	89.2	0.55	119.3	30.1	43.0
Phase 5	14	89.5	0.59	119.7	30.2	43.1
	15	89.2	1.22	119.6	30.4	43.5
Existing	34	88.6	1.37	120.3	31.7	45.3
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0	-	-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 29

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	119.5	30.7	43.9
	17	88.9	0.64	119.5	30.6	43.8
	18	89.0	0.33	119.5	30.5	43.5
	19	88.9	0.52	119.38	30.48	43.5
	20	89.0	0.66	119.36	30.36	43.4
	21	89.1	0.5	119.34	30.24	43.2
	22	89.2	0.6	119.33	30.13	43.0
	23	89.1	0.63	119.31	30.21	43.2
	24	88.9	0.31	119.31	30.41	43.4
	25	89.0	0.21	119.2	30.2	43.1
	26	89.1	0.38	119.28	30.18	43.1
	27	89.2	0.28	119.6	30.4	43.5
	28	89.3	0.00	119.9	30.6	43.6
Phase 3	4	89.9	0.29	119.8	29.9	42.7
	5	89.5	0.56	119.7	30.2	43.1
	6	89.2	0.66	119.5	30.3	43.3
	7	89.1	0.31	119.4	30.3	43.3
	8	89.0	0.38	119.5	30.5	43.5
	9	89.1	0.73	119.5	30.4	43.4
	10	89.2	0.71	119.5	30.3	43.3
	11	89.3	0.62	119.5	30.2	43.1
	12	89.2	0.46	119.5	30.3	43.3
	13	89.1	0.24	119.5	30.4	43.4
Phase 4	29	89.1	167.72	112.8	23.7	33.8
	30	89.2	0.63	115.7	26.5	37.9
	31	89.2	0.27	119.6	30.4	43.5
	32	89.2	0.27	119.6	30.4	43.4
	33	89.2	0.55	119.4	30.2	43.2
Phase 5	14	89.5	0.59	119.6	30.1	43.0
	15	89.2	1.22	119.5	30.3	43.3
Existing	34	88.6	1.37	120.2	31.6	45.2
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0		-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Maximum Daily Demand and Fire Flow at Node 31

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 1	1	90.1	0.42	124.5	34.4	49.1
	2	90.3	0.80	124.6	34.3	49.0
	3	90.1	0.66	124.7	34.6	49.5
Phase 2	16	88.8	0.34	119.8	31.0	44.3
	17	88.9	0.64	119.8	30.9	44.1
	18	89.0	0.33	119.7	30.7	43.9
	19	88.9	0.52	119.68	30.78	44.0
	20	89.0	0.66	119.66	30.66	43.8
	21	89.1	0.5	119.65	30.55	43.6
	22	89.2	0.6	119.64	30.44	43.5
	23	89.1	0.63	119.63	30.53	43.6
	24	88.9	0.31	119.63	30.73	43.9
	25	89.0	0.21	119.56	30.56	43.7
	26	89.1	0.38	119.4	30.3	43.3
	27	89.2	0.28	119.3	30.1	43.0
	28	89.3	0.00	119.6	30.3	43.3
Phase 3	4	89.9	0.29	119.8	29.9	42.8
	5	89.5	0.56	119.8	30.3	43.3
	6	89.2	0.66	119.7	30.5	43.6
	7	89.1	0.31	119.7	30.6	43.7
	8	89.0	0.38	119.7	30.7	43.9
	9	89.1	0.73	119.7	30.6	43.8
	10	89.2	0.71	119.7	30.5	43.6
	11	89.3	0.62	119.7	30.4	43.5
	12	89.2	0.46	119.7	30.5	43.6
	13	89.1	0.24	119.8	30.7	43.8
Phase 4	29	89.1	1.05	119.5	30.4	43.4
	30	89.2	0.63	119.5	30.3	43.2
	31	89.2	167.94	111.0	21.8	31.1
	32	89.2	0.27	110.9	21.7	31.0
	33	89.2	0.55	110.8	21.6	30.8
Phase 5	14	89.5	0.59	119.8	30.3	43.2
	15	89.2	1.22	119.7	30.5	43.6
Existing	34	88.6	1.37	120.4	31.8	45.4
Boundry Conditions	101	90.1	-	124.4	-	-
	102	90.3	-	124.8	-	-
	103	90.1	-	119.9	-	-
	104	90.3	-	121.0		-
	105	90.1	-	120.4	-	-

Notting Hill Subdivision
Pipe Data

Phase	Pipe	Length (m)	Diameter (mm)	Roughness
Phase 1	1	74	250	110
	2	80	250	110
	3	113	250	110
	4	54	250	110
Phase 2	18	100	250	110
	19	50	50	100
	20	82	200	110
	21	94	200	110
	22	114	200	110
	23	86	200	110
	24	114	200	110
	25	102	200	110
	26	85	200	110
	27	82	200	110
	29	107	300	120
	30	50	300	120
	31	30	300	120
	32	76	300	120
Phase 3	5	55	300	120
	6	87	300	120
	7	80	300	120
	8	81	300	120
	9	138	250	110
	10	82	250	110
	11	78	200	110
	12	128	200	110
	13	173	200	110
	14	101	200	110
	15	105	200	110
	16	68	250	110
	28	82	300	120
Phase 4	36	102	200	110
	37	97	200	110
	38	115	200	110
	39	50	200	110
	40	75	50	100
	41	50	50	100
Phase 5	33	119	200	110
	34	136	220	110
	35	115	200	110
Existing	17	100	200	110
	42	100	200	110

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech #: 117155
Project Name: Notting Hill Subdivision
Date: 29-Jun-18
Input By: Mark Bowen

Legend: Input by User; No Information or Input Required

Building Description: Singles

Step			Choose	Multiplier Options	Value Used	Total Fire Flow (L/min)
	Required Fire Flow					
1	**Construction Material**					
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Fire resistive construction (< 3 hrs)		0.7		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	235			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**470**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 C (A)$^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**					
	(1)	Non-combustible		-25%	-15%	**5,950**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**					
	(2)	Adequately Designed System (NFPA 13)	No	-30%		***0***
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	***Exposure surcharge (cumulative (%))***					
	(3)	North Side	0 - 3 m		25%	**4,463**
		East Side	20.1 - 30 m		10%	
		South Side	0 - 3 m		25%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**75%**	
	(1) + (2) + (3)	**Total Required fire Flow, rounded to nearest 1000L/min**			**L/min**	***10,000***
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**167**
				or	USGPM	2,642
		Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1200

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech #: 117155
Project Name: Notting Hill Subdivision
Date: 29-Jun-18
Input By: Mark Bowen

Legend: Input by User; No Information or Input Required

Building Description: Townhouse Blocks

Step			Choose	Multiplier Options	Value Used	Total Fire Flow (L/min)
	Required Fire Flow					
1	**Construction Material**					
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Fire resistive construction (< 3 hrs)		0.7		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	556			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**1,112**	
	F	**Base fire flow without reductions**				**11,000**
		F = 220 C $(A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**					
	(1)	Non-combustible		-25%	-15%	**9,350**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**					
	(2)	Adequately Designed System (NFPA 13)	No	-30%		***0***
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	***Exposure surcharge (cumulative (%))***					
	(3)	North Side	Fire Wall		10%	**3,273**
		East Side	> 45.1m		0%	
		South Side	Fire Wall		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**35%**	
	(1) + (2) + (3)	**Total Required fire Flow, rounded to nearest 1000L/min**			**L/min**	***13,000***
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**217**
				or	USGPM	3,435
		Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1950

APPENDIX B
Storm and Sanitary Design Sheets

SANITARY SEWER DESIGN SHEET
Notting Hill Subdivision - 2128 Trim Road
Developer: Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 117155
DESIGNED BY : JAG
CHECKED BY :
DATE PREPARED : 18-Jun-18

LOCATION				INDIVIDUAL						CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
STREET 10	1003	1001	52	2				0.0068	0.20	0.007	0.200	4.0	0.11	0.06	0.17	11.3	200	203.20	DR 35	0.65	27.6	0.85	1%
STREET 10	1001	999	53	15				0.0510	0.71	0.058	0.910	4.0	0.94	0.25	1.19	96.2	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 10	1003	1005	54	15				0.0510	0.73	0.051	0.730	4.0	0.83	0.20	1.03	82.2	200	203.20	DR 35	0.65	27.6	0.85	4%
STREET 10	1005	1007	55	2				0.0068	0.21	0.058	0.940	4.0	0.94	0.26	1.20	13.3	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 10	1007	1009	56	1	11			0.0331	0.43	0.091	1.370	4.0	1.47	0.38	1.86	57.7	200	203.20	DR 35	0.50	24.2	0.75	8%
STREET 10	1009	1011	57		13			0.0351	0.41	0.126	1.780	4.0	2.04	0.50	2.54	44.8	200	203.20	DR 35	0.50	24.2	0.75	10%
STREET 9	913	915	20	13	6			0.0604	0.92	0.060	0.920	4.0	0.98	0.26	1.24	117.6	200	203.20	DR 35	0.65	27.6	0.85	4%
STREET 9	915	305	21	15				0.0510	0.90	0.111	1.820	4.0	1.81	0.51	2.31	117.6	200	203.20	DR 35	0.50	24.2	0.75	10%
STREET 3	305	303	23	5				0.0170	0.39	0.128	2.210	4.0	2.08	0.62	2.70	80.0	200	203.20	DR 35	0.50	24.2	0.75	11%
STREET 9	911	909	14		8			0.0216	0.34	0.022	0.340	4.0	0.35	0.10	0.45	60.4	200	203.20	DR 35	0.65	27.6	0.85	2%
STREET 9	909	907	15		2			0.0054	0.09	0.027	0.430	4.0	0.44	0.12	0.56	9.5	200	203.20	DR 35	0.50	24.2	0.75	2%
STREET 9	907	905	16		2			0.0054	0.06	0.032	0.490	4.0	0.53	0.14	0.66	11.8	200	203.20	DR 35	0.50	24.2	0.75	3%
STREET 9	905	903	17	10	4			0.0448	0.60	0.077	1.090	4.0	1.25	0.31	1.56	84.8	200	203.20	DR 35	0.50	24.2	0.75	6%
STREET 9	903	901	18	17				0.0578	0.79	0.135	1.880	4.0	2.19	0.53	2.71	84.8	200	203.20	DR 35	0.50	24.2	0.75	11%
STREET 9	901	303	19	7				0.0238	0.79	0.159	2.670	4.0	2.57	0.75	3.32	84.8	200	203.20	DR 35	0.50	24.2	0.75	14%
STREET 3	303	301	24	9				0.0306	0.55	0.318	5.43	4.0	5.15	1.52	6.67	94.8	200	203.20	DR 35	0.50	24.2	0.75	28%
STREET 3	301	109	25	4				0.0136	0.26	0.331	5.690	4.0	5.37	1.59	6.96	45.6	200	203.20	DR 35	0.50	24.2	0.75	29%
STREET 8	305	207	22	4				0.0136	0.36	0.014	0.360	4.0	0.22	0.10	0.32	81.0	200	203.20	DR 35	0.65	27.6	0.85	1%
STREET 7	703	701	27		24			0.0648	0.74	0.065	0.740	4.0	1.05	0.21	1.26	82.8	200	203.20	DR 35	0.65	27.6	0.85	5%
STREET 7	701	207	28	2	11			0.0365	0.52	0.101	1.260	4.0	1.64	0.35	1.99	82.8	200	203.20	DR 35	0.50	24.2	0.75	8%
STREET 2	207	205	29	12				0.0408	0.59	0.156	2.21	4.0	2.52	0.62	3.14	80.5	200	203.20	DR 35	0.50	24.2	0.75	13%
STREET 6	611	613	30		22			0.0594	0.65	0.059	0.650	4.0	0.96	0.18	1.14	75.2	200	203.20	DR 35	0.65	27.6	0.85	4%
STREET 6	613	615	31		16			0.0432	0.52	0.103	1.170	4.0	1.66	0.33	1.99	61.0	200	203.20	DR 35	0.50	24.2	0.75	8%
STREET 6	615	205	32					0.0000	0.06	0.103	1.230	4.0	1.66	0.34	2.01	42.1	200	203.20	DR 35	0.50	24.2	0.75	8%
STREET 2	205	203	33	13				0.0442	0.50	0.303	3.94	4.0	4.90	1.10	6.00	83.5	200	203.20	DR 35	0.50	24.2	0.75	25%
STREET 6	609	607	34		9			0.0243	0.41	0.024	0.410	4.0	0.39	0.11	0.51	62.0	200	203.20	DR 35	0.65	27.6	0.85	2%
STREET 6	607	605	35		2			0.0054	0.08	0.030	0.490	4.0	0.48	0.14	0.62	11.5	200	203.20	DR 35	0.50	24.2	0.75	3%
STREET 6	605	603	36	13	6			0.0604	0.75	0.090	1.240	4.0	1.46	0.35	1.81	105.5	200	203.20	DR 35	0.50	24.2	0.75	7%
STREET 6	603	601	37	12				0.0408	0.55	0.131	1.790	4.0	2.12	0.50	2.62	63.0	200	203.20	DR 35	0.50	24.2	0.75	11%
STREET 6	601	203	38					0.0000	0.06	0.131	1.850	4.0	2.12	0.52	2.64	41.3	200	203.20	DR 35	0.50	24.2	0.75	11%
STREET 2	203	201	39	5				0.0170	0.26	0.450	6.05	4.0	7.29	1.69	8.99	35.4	200	203.20	DR 35	0.50	24.2	0.75	37%
STREET 2	201	111	40	6				0.0204	0.30	0.471	6.350	4.0	7.60	1.78	9.38	45.0	200	203.20	DR 35	0.50	24.2	0.75	39%
STREET 5	505	503	2	1				0.0034	0.13	0.003	0.130	4.0	0.06	0.04	0.09	10.5	200	203.20	DR 35	0.65	27.6	0.85	0%
STREET 5	503	501	3	5				0.0170	0.32	0.020	0.450	4.0	0.33	0.13	0.46	53.5	200	203.20	DR 35	0.50	24.2	0.75	2%
STREET 5	501	101	4	1				0.0034	0.09	0.024	0.540	4.0	0.39	0.15	0.54	27.0	200	203.20	DR 35	0.50	24.2	0.75	2%
STREET 5	505	507	9	8				0.0272	0.57	0.027	0.570	4.0	0.44	0.16	0.60	60.1	200	203.20	DR 35	0.65	27.6	0.85	2%

SANITARY SEWER DESIGN SHEET
Notting Hill Subdivision - 2128 Trim Road
Developer: Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 117155
DESIGNED BY : JAG
CHECKED BY :
DATE PREPARED : 18-Jun-18

LOCATION				INDIVIDUAL						CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
STREET 5	507	509	10	8				0.0272	0.52	0.054	1.090	4.0	0.88	0.31	1.19	55.6	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 5	509	511	11	7	6			0.0400	0.60	0.094	1.690	4.0	1.53	0.47	2.00	83.1	200	203.20	DR 35	0.50	24.2	0.75	8%
STREET 5	511	513	12		4			0.0108	0.23	0.105	1.920	4.0	1.70	0.54	2.24	12.2	200	203.20	DR 35	0.50	24.2	0.75	9%
STREET 5	513	109	13		18			0.0486	0.53	0.154	2.450	4.0	2.49	0.69	3.18	73.4	200	203.20	DR 35	0.50	24.2	0.75	13%
STREET 4	403	401	41		4			0.0108	0.22	0.011	0.220	4.0	0.18	0.06	0.24	11.7	200	203.20	DR 35	0.65	27.6	0.85	1%
STREET 4	401	111	42		18			0.0486	0.55	0.059	0.770	4.0	0.96	0.22	1.18	73.1	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 4	403	405	45	5	5			0.0305	0.39	0.031	0.390	4.0	0.49	0.11	0.60	57.2	200	203.20	DR 35	0.65	27.6	0.85	2%
STREET 4	405	407	46	8				0.0272	0.45	0.058	0.840	4.0	0.93	0.24	1.17	55.9	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 4	407	409	47	2				0.0068	0.23	0.065	1.070	4.0	1.05	0.30	1.34	14.7	200	203.20	DR 35	0.50	24.2	0.75	6%
STREET 4	409	115	48	12				0.0408	0.58	0.105	1.650	4.0	1.71	0.46	2.17	79.4	200	203.20	DR 35	0.50	24.2	0.75	9%
STREET 1	99	101	1		5			0.0135	0.20	0.014	0.200	4.0	0.22	0.06	0.27	36.2	200	203.20	DR 35	0.65	27.6	0.85	1%
STREET 1	101	103	5	5	3			0.0251	0.33	0.062	1.07	4.0	1.01	0.30	1.31	42.1	200	203.20	DR 35	0.50	24.2	0.75	5%
STREET 1	103	105	6	12				0.0408	0.56	0.103	1.630	4.0	1.67	0.46	2.13	61.6	200	203.20	DR 35	0.50	24.2	0.75	9%
STREET 1	105	107	7	14				0.0476	0.69	0.151	2.320	4.0	2.44	0.65	3.09	73.1	200	203.20	DR 35	0.50	24.2	0.75	13%
STREET 1	107	109	8	6				0.0204	0.39	0.171	2.710	4.0	2.77	0.76	3.53	73.1	200	203.20	DR 35	0.50	24.2	0.75	15%
STREET 1	109	111	26					0.0000	0.15	0.656	11.000	3.9	10.40	3.08	13.48	81.0	200	203.20	DR 35	0.50	24.2	0.75	56%
STREET 1	111	113	43	1				0.0034	0.12	1.190	18.24	3.8	18.08	5.11	23.18	49.9	250	254.00	DR 35	0.50	43.9	0.87	53%
STREET 1	113	115	44	7				0.0238	0.36	1.214	18.600	3.7	18.41	5.21	23.62	53.6	250	254.00	DR 35	0.50	43.9	0.87	54%
STREET 1	115	117	49	4				0.0136	0.22	1.227	18.820	3.7	18.60	5.27	23.87	48.7	250	254.00	DR 35	0.50	43.9	0.87	54%
STREET 1	117	119	50/51	7	40			0.1318	1.64	1.359	20.460	3.7	20.43	5.73	26.16	75.1	250	254.00	DR 35	0.50	43.9	0.87	60%

Notes:
1. Q(d) = Q(p) + Q(i)
2. Q(i) = 0.28 L/sec/ha
3. Q(p) = (PxqxM/86,400)

Definitions:
Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

Population = 75 Persons/acre
Institutional Peaking factor = 1.5

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 2.1 persons/apartment, 1.4 persons/retirement residence)
q = Average per capita flow = 350 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow = 50000 L/gross ha/day - Commercial/Mixed use
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)

Notting Hill Subdivision - 2128 Trim Road

Developer: Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 117155
DESIGNED BY : JAG
CHECKED BY :
DATE PREPARED : 18-Jun-18

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
STREET 10	1002	1000		0.16	0.65	0.29	0.29	10.00	104	**30.1**	DR 35	300	305	0.65	11.6	81.3	1.11	0.17	37%
STREET 10	1000	998		0.74	0.65	1.34	1.63	10.17	103	**168.0**	CONC	450	457	0.50	97.5	210.3	1.28	1.27	80%
								11.44											
STREET 10	1002	1004		0.77	0.65	1.39	1.39	10.00	104	**145.0**	CONC	450	457	0.65	84.9	239.8	1.46	0.97	60%
STREET 10	1004	1006		0.20	0.65	0.36	1.75	10.97	99	**174.1**	CONC	450	457	0.50	13.8	210.3	1.28	0.18	83%
STREET 10	1006	1008		0.43	0.65	0.78	2.53	11.15	98	**249.2**	CONC	525	533	0.50	59.1	317.2	1.42	0.69	79%
STREET 10	1008	1010		0.40	0.65	0.72	3.25	11.84	95	**310.2**	CONC	600	610	0.50	44.8	452.9	1.55	0.48	68%
								12.32											
STREET 9	912	914		0.75	0.65	1.36	1.36	10.00	104	**141.2**	CONC	450	457	0.65	117.6	239.8	1.46	1.34	59%
STREET 9	914	304		0.73	0.65	1.32	2.67	11.34	98	**261.0**	CONC	525	533	0.50	117.5	317.2	1.42	1.38	82%
								12.72											
STREET 7	702	700		0.57	0.65	1.03	1.03	10.00	104	**107.3**	DR 35	375	381	0.65	80.9	147.5	1.29	1.04	73%
STREET 7	700	206		0.44	0.65	0.80	1.83	11.04	99	**180.7**	CONC	450	457	0.50	82.5	210.3	1.28	1.07	86%
								12.12											
STREET 8	206	304		0.38	0.65	0.69	2.51	12.12	94	**236.6**	CONC	525	533	0.50	78.0	317.2	1.42	0.92	75%
								13.03											
STREET 3	304	302		0.25	0.65	0.45	5.64	13.03	91	**510.3**	CONC	675	686	0.50	83.1	620.1	1.68	0.83	82%
								13.86											
STREET 9	910	908		0.34	0.65	0.61	0.61	10.00	104	**64.0**	DR 35	375	381	0.65	62.1	147.5	1.29	0.80	43%
STREET 9	908	906		0.06	0.65	0.11	0.72	10.80	100	**72.4**	DR 35	375	381	0.50	10.4	129.3	1.13	0.15	56%
STREET 9	906	904		0.04	0.65	0.07	0.80	10.95	99	**79.0**	DR 35	375	381	0.50	11.7	129.3	1.13	0.17	61%
STREET 9	904	902		0.54	0.65	0.98	1.77	11.12	99	**174.6**	CONC	450	457	0.50	87.9	210.3	1.28	1.14	83%
STREET 9	902	900		0.69	0.65	1.25	3.02	12.27	94	**282.3**	CONC	600	610	0.50	84.8	452.9	1.55	0.91	62%
STREET 9	900	302		0.89	0.65	1.61	4.63	13.18	90	**416.1**	CONC	675	686	0.50	84.9	620.1	1.68	0.84	67%
								14.02											

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)

Notting Hill Subdivision - 2128 Trim Road

Developer: Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 117155
DESIGNED BY : JAG
CHECKED BY :
DATE PREPARED : 18-Jun-18

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
STREET 3	302	300		0.40	0.65	0.72	10.99	14.02	87	**954.2**	CONC	1050	1067	0.15	93.5	1103.3	1.23	1.26	86%
STREET 3	300	108		0.23	0.65	0.42	11.40	15.28	83	**942.4**	CONC	1050	1067	0.15	44.4	1103.3	1.23	0.60	85%
								15.88											
STREET 2	206	204		0.67	0.65	1.21	1.21	10.00	104	**126.1**	CONC	450	457	0.65	80.0	239.8	1.46	0.91	53%
								10.91											
STREET 6	610	612		0.66	0.65	1.19	1.19	10.00	104	**124.3**	DR 35	375	381	0.65	73.6	147.5	1.29	0.95	84%
STREET 6	612	614		0.55	0.65	0.99	2.19	10.95	99	**217.4**	CONC	525	533	0.50	63.1	317.2	1.42	0.74	69%
STREET 6	614	204		0.06	0.65	0.11	2.29	11.69	96	**220.4**	CONC	525	533	0.50	41.8	317.2	1.42	0.49	69%
								12.18											
STREET 2	204	202		0.78	0.65	1.41	4.92	12.18	94	**461.7**	CONC	675	686	0.50	86.7	620.1	1.68	0.86	74%
								13.04											
STREET 6	608	606		0.41	0.65	0.74	0.74	10.00	104	**77.2**	DR 35	375	381	0.65	62.6	147.5	1.29	0.81	52%
STREET 6	606	604		0.06	0.65	0.11	0.85	10.81	100	**85.0**	DR 35	375	381	0.50	12.7	129.3	1.13	0.19	66%
STREET 6	604	602		0.70	0.65	1.26	2.11	10.99	99	**209.8**	CONC	525	533	0.50	106.2	317.2	1.42	1.25	66%
STREET 6	602	600		0.55	0.65	0.99	3.11	12.24	94	**291.2**	CONC	525	533	0.50	63.2	317.2	1.42	0.74	92%
STREET 6	600	202		0.06	0.65	0.11	3.22	12.98	91	**291.7**	CONC	525	533	0.50	42.7	317.2	1.42	0.50	92%
								13.48											
STREET 2	202	200		0.30	0.65	0.54	8.67	13.48	89	**770.2**	CONC	825	838	0.50	36.2	1058.9	1.92	0.31	73%
STREET 2	200	110		0.31	0.65	0.56	9.23	13.80	88	**809.4**	CONC	825	838	0.50	41.0	1058.9	1.92	0.36	76%
								14.15											
STREET 4	406	408		0.22	0.65	0.40	0.40	10.00	104	**41.4**	DR 35	300	305	0.65	15.4	81.3	1.11	0.23	51%
STREET 4	408	114		0.61	0.65	1.10	1.50	10.23	103	**154.5**	CONC	450	457	0.50	82.1	210.3	1.28	1.07	73%
								11.30											
STREET 4	406	404		0.41	0.65	0.74	0.74	10.00	104	**77.2**	DR 35	375	381	0.65	57.3	147.5	1.29	0.74	52%
STREET 4	404	402		0.40	0.65	0.72	1.46	10.74	100	**147.0**	CONC	450	457	0.50	58.6	210.3	1.28	0.76	70%
STREET 4	402	400		0.21	0.65	0.38	1.84	11.50	97	**178.6**	CONC	450	457	0.50	12.0	210.3	1.28	0.16	85%
STREET 4	400	110		0.55	0.65	0.99	2.84	11.66	96	**272.9**	CONC	525	533	0.50	75.9	317.2	1.42	0.89	86%
								12.55											
STREET 5	510	512		0.23	0.65	0.42	0.42	10.00	104	**43.3**	DR 35	300	305	0.65	12.4	81.3	1.11	0.19	53%
STREET 5	512	108		0.52	0.65	0.94	1.36	10.19	103	**139.9**	CONC	450	457	0.50	76.2	210.3	1.28	0.99	67%
								11.18											

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)

Notting Hill Subdivision - 2128 Trim Road

Developer: Notting Hill Realty Investment Inc c/o Regional Group of Compagnies

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 117155
DESIGNED BY : JAG
CHECKED BY :
DATE PREPARED : 18-Jun-18

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
STREET 5	510	508		0.53	0.65	0.96	0.96	10.00	104	**99.8**	DR 35	375	381	0.65	84.3	147.5	1.29	1.09	68%
STREET 5	508	506		0.39	0.65	0.70	1.66	11.09	99	**164.2**	CONC	450	457	0.50	55.5	210.3	1.28	0.72	78%
STREET 5	506	504		0.47	0.65	0.85	2.51	11.81	96	**239.9**	CONC	525	533	0.50	61.4	317.2	1.42	0.72	76%
STREET 5	504	502		0.12	0.65	0.22	2.73	12.53	92	**252.4**	CONC	525	533	0.50	10.2	317.2	1.42	0.12	80%
STREET 5	502	500		0.32	0.65	0.58	3.31	12.65	92	**304.3**	CONC	600	610	0.50	55.0	452.9	1.55	0.59	67%
STREET 5	500	100		0.10	0.65	0.18	3.49	13.24	90	**312.9**	CONC	600	610	0.50	28.6	452.9	1.55	0.31	69%
								13.55											
STREET 1	118	116		1.77	0.65	3.20	3.20	10.00	104	**333.2**	CONC	600	610	0.65	73.6	516.4	1.77	0.69	65%
STREET 1	116	114		0.30	0.65	0.54	3.74	10.69	101	**376.5**	CONC	600	610	0.50	47.2	452.9	1.55	0.51	83%
								11.20											
STREET 1	114	112		0.41	0.65	0.74	5.98	11.30	98	**585.0**	CONC	750	762	0.50	49.7	821.2	1.80	0.46	71%
STREET 1	112	110		0.17	0.65	0.31	6.29	11.76	96	**602.0**	CONC	750	762	0.50	56.3	821.2	1.80	0.52	73%
								12.28											
STREET 1	110	108		0.14	0.65	0.25	18.61	14.15	86	**1608.0**	CONC	1350	1372	0.15	78.0	2156.5	1.46	0.89	75%
								15.04											
STREET 1	108	106		0.47	0.65	0.85	32.22	15.88	81	**2603.5**	CONC	1650	1676	0.15	76.1	3682.6	1.67	0.76	71%
STREET 1	106	104		0.99	0.65	1.79	34.01	16.64	79	**2672.9**	CONC	1650	1676	0.15	75.4	3682.6	1.67	0.75	73%
STREET 1	104	102		0.68	0.65	1.23	35.24	17.40	77	**2696.8**	CONC	1650	1676	0.15	54.0	3682.6	1.67	0.54	73%
STREET 1	102	100		0.49	0.65	0.89	36.12	17.94	75	**2713.9**	CONC	1650	1676	0.15	47.9	3682.6	1.67	0.48	74%
								18.42											
STREET 1	100	98		0.25	0.65	0.45	40.06	18.42	74	**2961.8**	CONC	1650	1676	0.15	60.3	3682.6	1.67	0.60	80%
								19.02											

Definitions:

Q = Peak Flow in Litres per Second (L/s)
Q = 2.78 AIR, where
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:

1) Rainfall Intensity Curves are City of Ottawa IDF Curves I(5-year) = 998.071/ [(Tc(min)+6.053)]^0.814
2) Minumum Tc is 10min as per the Ottawa Design Guidelines.
3) Roughness Coefficient 'n' in Manning's formula shall be 0.13 for Concrete & PVC pipes as per the Ottawa Guidelines.
4) Minlmum diameter for on street sewer is 250mm.

APPENDIX C
Stormwater Management Calculations

Notting Hill Subdivision
Phase 1 Flow and Storage Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Post Development Parameters

Area	Weighted Runoff Coeff. (5-year)	Weighted Runoff Coeff. (100-year)*	Allowable Flow	Required Storage
2.7	0.55	0.68	189	405

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

QUANTITY STORAGE REQUIREMENT - 5 YEAR

2.70 =Area (ha)
0.55 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230	951	189	762	0
	5	141	583	189	394	118
	10	**104**	**430**	**189**	**241**	**145**
	15	84	345	189	156	140
	20	70	290	189	101	121

QUANTITY STORAGE REQUIREMENT - 100 YEAR

2.70 =Area (ha)
0.68 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	399	2035	189	1846	0
	5	243	1239	189	1050	315
	10	**179**	**911**	**189**	**722**	**433**
	15	143	729	189	540	486
	20	120	612	189	423	508

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

Notting Hill Subdivision
Phase 2 Flow and Storage Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Post Development Parameters

Area	Weighted Runoff Coeff. (5-year)	Weighted Runoff Coeff. (100-year)*	Allowable Flow	Required Storage
8.11	0.53	0.67	568	1217

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

QUANTITY STORAGE REQUIREMENT - 5 YEAR

8.11 =Area (ha)
0.53 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230	2774	568	2207	0
	5	141	1699	568	1132	340
	10	**104**	**1254**	**568**	**687**	**412**
	15	84	1006	568	438	394
	20	70	846	568	278	334

QUANTITY STORAGE REQUIREMENT - 100 YEAR

8.11 =Area (ha)
0.67 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	399	5998	568	5430	0
	5	243	3652	568	3084	925
	10	**179**	**2687**	**568**	**2119**	**1271**
	15	143	2150	568	1582	1424
	20	120	1805	568	1237	1485

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

Notting Hill Subdivision
Phase 3 Flow and Storage Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Post Development Parameters

Area	Weighted Runoff Coeff. (5-year)	Weighted Runoff Coeff. (100-year)*	Allowable Flow	Required Storage
7.8	0.50	0.63	546	1170

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

QUANTITY STORAGE REQUIREMENT - 5 YEAR

7.80 =Area (ha)
0.50 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230	2521	546	1975	0
	5	141	1544	546	998	300
	10	**104**	**1140**	**546**	**594**	**356**
	15	84	914	546	368	331
	20	70	768	546	222	267

QUANTITY STORAGE REQUIREMENT - 100 YEAR

7.80 =Area (ha)
0.63 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	399	5451	546	4905	0
	5	243	3319	546	2773	832
	10	**179**	**2442**	**546**	**1896**	**1137**
	15	143	1954	546	1408	1267
	20	120	1640	546	1094	1313

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

Notting Hill Subdivision
Phase 4 Flow and Storage Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Post Development Parameters

Area	Weighted Runoff Coeff. (5-year)	Weighted Runoff Coeff. (100-year)*	Allowable Flow	Required Storage
3.58	0.58	0.72	251	537

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

QUANTITY STORAGE REQUIREMENT - 5 YEAR

3.58 =Area (ha)
0.58 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230	1322	251	1071	0
	5	141	810	251	559	168
	10	**104**	**598**	**251**	**347**	**208**
	15	84	479	251	229	206
	20	70	403	251	152	183

QUANTITY STORAGE REQUIREMENT - 100 YEAR

3.58 =Area (ha)
0.72 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	399	2858	251	2607	0
	5	243	1740	251	1489	447
	10	**179**	**1280**	**251**	**1029**	**618**
	15	143	1024	251	774	696
	20	120	860	251	609	731

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

Notting Hill Subdivision
Phase 5 Flow and Storage Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Post Development Parameters

Area	Weighted Runoff Coeff. (5-year)	Weighted Runoff Coeff. (100-year)*	Allowable Flow	Required Storage
2.68	0.54	0.67	188	402

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

QUANTITY STORAGE REQUIREMENT - 5 YEAR

2.68 =Area (ha)
0.54 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230	924	188	736	0
	5	141	566	188	378	113
	10	**104**	**418**	**188**	**230**	**138**
	15	84	335	188	147	133
	20	70	282	188	94	113

QUANTITY STORAGE REQUIREMENT - 100 YEAR

2.68 =Area (ha)
0.67 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	399	1997	188	1809	0
	5	243	1216	188	1028	308
	10	**179**	**894**	**188**	**707**	**424**
	15	143	716	188	528	475
	20	120	601	188	413	496

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

Notting Hill Subdivision
Overall Model Schematic - Phase 1

NOVATECH
Engineers, Planners & Landscape Architects

Notting Hill Subdivision
Post-Development Model Parameters

NOVATECH
Engineers, Planners & Landscape Architects

Area ID	Catchment Area (ha)	Runoff Coefficient (c)	Percent Impervious (%)
1000-998	0.740	0.50	43%
1002-1000	0.160	0.55	50%
1002-1004	0.770	0.60	57%
1004-1006	0.200	0.50	43%
1006-1008	0.430	0.50	43%
1008-1010	0.400	0.60	57%
912-914	0.750	0.50	43%
914-304	0.730	0.50	43%
910-908	0.340	0.50	43%
908-906	0.060	0.60	57%
906-904	0.040	0.60	57%
904-902	0.540	0.50	43%
902-900	0.690	0.50	43%
900-302	0.890	0.50	43%
702-700	0.570	0.60	57%
700-304	0.440	0.60	57%
614-204	0.060	0.60	57%
612-614	0.550	0.60	57%
610-612	0.660	0.60	57%
608-606	0.410	0.60	57%
606-604	0.060	0.60	57%
604-602	0.700	0.50	43%
602-600	0.550	0.50	43%
600-202	0.060	0.50	43%
512-108	0.520	0.60	57%
510-512	0.230	0.60	57%
510-508	0.530	0.55	50%
508-506	0.390	0.50	43%
506-504	0.470	0.50	43%
504-502	0.120	0.50	43%
502-500	0.320	0.50	43%
500-100	0.100	0.50	43%
408-116	0.610	0.50	43%
406-408	0.220	0.50	43%
406-404	0.410	0.50	43%

Phase 1 **2.700**

1000-998	0.740	0.50
1002-1000	0.160	0.55
1002-1004	0.770	0.60
1004-1006	0.200	0.50
1006-1008	0.430	0.50
1008-1010	0.400	0.60

Phase 2 **8.110**

702-700	0.570	0.60
700-304	0.440	0.60
614-204	0.060	0.60
612-614	0.550	0.60
610-612	0.660	0.60
608-606	0.410	0.60
606-604	0.060	0.60
604-602	0.700	0.50
602-600	0.550	0.50
600-202	0.060	0.50
206-304	0.380	0.50
206-204	0.670	0.50
204-202	0.780	0.50
202-200	0.300	0.50
200-110	0.310	0.50
118-116b	0.590	0.50
116-114	0.300	0.50
114-112	0.410	0.50
112-110	0.170	0.50
110-108	0.140	0.50

Phase 3 **7.800**

912-914	0.750	0.50
914-304	0.730	0.50
910-908	0.340	0.50
908-906	0.060	0.60
906-904	0.040	0.60
904-902	0.540	0.50
902-900	0.690	0.50
900-302	0.890	0.50

Notting Hill Subdivision
Post-Development Model Parameters

NOVATECH
Engineers, Planners & Landscape Architects

Area ID	Catchment Area (ha)	Runoff Coefficient (c)	Percent Impervious (%)
404-402	0.400	0.55	50%
402-400	0.210	0.60	57%
400-110	0.550	0.60	57%
300-108	0.230	0.50	43%
302-300	0.400	0.50	43%
304-302	0.250	0.50	43%
			-29%
206-304	0.380	0.50	43%
206-204	0.670	0.50	43%
204-202	0.780	0.50	43%
202-200	0.300	0.50	43%
200-110	0.310	0.50	43%
118-116	1.180	0.65	64%
118-116b	0.590	0.50	43%
116-114	0.300	0.50	43%
114-112	0.410	0.50	43%
112-110	0.170	0.50	43%
110-108	0.140	0.50	43%
108-106	0.470	0.50	43%
106-104	0.990	0.50	43%
104-102	0.680	0.50	43%
102-100	0.490	0.50	43%
100-98	0.250	0.60	57%
TOTAL:	**24.87**		

300-108	0.230	0.50
302-300	0.400	0.50
304-302	0.250	0.50
108-106	0.470	0.50
106-104	0.990	0.50
104-102	0.680	0.50
102-100	0.490	0.50
100-98	0.250	0.60

Phase 4 **3.580**

408-116	0.610	0.50
406-408	0.220	0.50
406-404	0.410	0.50
404-402	0.400	0.55
402-400	0.210	0.60
400-110	0.550	0.60
118-116	1.180	0.65

Phase 5 **2.680**

512-108	0.520	0.60
510-512	0.230	0.60
510-508	0.530	0.55
508-506	0.390	0.50
506-504	0.470	0.50
504-502	0.120	0.50
502-500	0.320	0.50
500-100	0.100	0.50

Notting Hill Subdivison

Ponding in Road Calculations

Structure	T/G	Max. Static Ponding (Spill Depth)			2-yr Event			5-yr Event			100-yr Event		
	(m)	Elev. (m)	Depth (m)	Volume (m^3)	Elev. (m)	Depth (m)	Volume (m^3)	Elev. (m)	Depth (m)	Volume (m^3)	Elev. (m)	Depth (m)	Volume (m^3)
CB01-02	89.70	90.05	0.35	124.0	89.80	0.10	11.5	89.88	0.18	31.8	90.03	0.33	113.0
CB03-04	89.78	90.13	0.35	110.5	89.87	0.09	8.6	89.96	0.18	28.5	90.13	0.35	109.8
CB05-06	89.67	90.02	0.35	123.7	89.73	0.06	4.2	89.82	0.15	24.3	90.02	0.35	120.5
			TOTALS:	358.2	-	-	24.3	-	-	84.6	-	-	343.3

Notting Hill Subdivision
Design Storm Time Series Data
4-hour Chicago Design Storms

NOVATECH
Engineers, Planners & Landscape Architects

C25mm-4.stm		C2-4.stm		C5-4.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0	0:00	0	0:00	0
0:10	1.34	0:10	1.98	0:10	2.49
0:20	1.49	0:20	2.23	0:20	2.77
0:30	1.69	0:30	2.58	0:30	3.14
0:40	1.96	0:40	3.06	0:40	3.62
0:50	2.33	0:50	3.81	0:50	4.31
1:00	2.91	1:00	5.1	1:00	5.37
1:10	3.91	1:10	7.91	1:10	7.19
1:20	6.1	1:20	19.04	1:20	11.14
1:30	14.53	1:30	76.81	1:30	26.25
1:40	58.72	1:40	23.64	1:40	104.19
1:50	17.11	1:50	11.91	1:50	30.86
2:00	8.32	2:00	7.98	2:00	15.15
2:10	5.5	2:10	6.03	2:10	10.07
2:20	4.13	2:20	4.87	2:20	7.58
2:30	3.32	2:30	4.1	2:30	6.11
2:40	2.79	2:40	3.55	2:40	5.14
2:50	2.41	2:50	3.14	2:50	4.45
3:00	2.12	3:00	2.82	3:00	3.93
3:10	1.9	3:10	2.57	3:10	3.53
3:20	1.73	3:20	2.35	3:20	3.21
3:30	1.58	3:30	2.18	3:30	2.94
3:40	1.46	3:40	2.03	3:40	2.72
3:50	1.36	3:50	1.9	3:50	2.53
4:00	1.27	4:00	1.79	4:00	2.37

Notting Hill Subdivision
Design Storm Time Series Data
4-hour Chicago Design Storms

Engineers, Planners & Landscape Architects

C100-4.stm		C100-4+20%.stm	
Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr
0:00	0	0:00	0
0:10	4.07	0:10	4.88
0:20	4.54	0:20	5.45
0:30	5.14	0:40	7.14
0:40	5.95	0:50	8.51
0:50	7.09	1:00	10.62
1:00	8.85	1:10	14.28
1:10	11.9	1:20	22.25
1:20	18.54	1:30	53.03
1:30	44.19	1:40	214.27
1:40	178.56	1:50	62.45
1:50	52.04	2:00	30.37
2:00	25.31	2:10	20.08
2:10	16.73	2:20	15.07
2:20	12.56	2:30	12.11
2:30	10.09	2:40	10.16
2:40	8.47	2:50	8.78
2:50	7.32	3:00	7.75
3:00	6.46	3:10	6.95
3:10	5.79	3:20	6.3
3:20	5.25	3:30	5.78
3:30	4.82	3:40	5.34
3:40	4.45	3:50	4.97
3:50	4.14	4:00	4.66
4:00	3.88		

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
  --------------------------------------------------------------

  Phase 1 Draft Plan model for Notting Hill subdivision

  WARNING 04: minimum elevation drop used for Conduit 21_(2)_(STM)

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 3
  Number of nodes ........... 10
  Number of links ........... 12
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                  Data       Recording
  Name                 Data Source                Type       Interval
  ----------------------------------------------------------------------
  Raingage             04-C100yr-4hr              INTENSITY   10 min.


  ********************
  Subcatchment Summary
  ********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
  ------------------------------------------------------------------------------------------
--------
  PH1-1                       0.90     54.08     44.00    0.2500 Raingage             CB01-02
  PH1-2                       0.77     46.99     57.00    0.2500 Raingage             CB03-04
  PH1-3                       1.03     58.11     57.00    0.2500 Raingage             CB05-06


  ************
  Node Summary
  ************
                                       Invert      Max.    Ponded    External
  Name                 Type             Elev.     Depth      Area    Inflow
  ----------------------------------------------------------------------------
  1000_(STM)           JUNCTION          87.35      2.37       0.0
  1002_(STM)           JUNCTION          87.52      2.31       0.0
  1004_(STM)           JUNCTION          86.94      2.83       0.0
  1006_(STM)           JUNCTION          86.79      2.96       0.0
  1008_(STM)           JUNCTION          86.42      3.11       0.0
  1010_(STM)           OUTFALL           86.20      0.90       0.0
  998_(STM)            OUTFALL           86.86      0.75       0.0
  CB01-02              STORAGE           88.30      1.75       0.0
  CB03-04              STORAGE           88.38      1.75       0.0
  CB05-06              STORAGE           88.27      1.75       0.0


  ************
  Link Summary
  ************
  Name             From Node        To Node          Type            Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------
  21_(1)_(STM)     1000_(STM)       998_(STM)        CONDUIT           97.5    0.5023    0.0100
  21_(2)_(STM)     1002_(STM)       1000_(STM)       CONDUIT           11.6    0.0026    0.0100
  21_(3)_(STM)     1002_(STM)       1004_(STM)       CONDUIT           84.9    0.6480    0.0100
  21_(4)_(STM)     1004_(STM)       1006_(STM)       CONDUIT           13.8    0.5077    0.0100
  21_(5)_(STM)     1006_(STM)       1008_(STM)       CONDUIT           59.1    0.4908    0.0100
  21_(6)_(STM)     1008_(STM)       1010_(STM)       CONDUIT           44.8    0.4915    0.0100
  OCB01            CB01-02          1000_(STM)       ORIFICE
  OCB02            CB01-02          1000_(STM)       ORIFICE
  OCB03            CB03-04          1004_(STM)       ORIFICE
  OCB04            CB03-04          1004_(STM)       ORIFICE
  OCB05            CB05-06          1008_(STM)       ORIFICE
  OCB06            CB05-06          1008_(STM)       ORIFICE


  *********************
  Cross Section Summary
  *********************
                                          Full      Full      Hyd.      Max.   No. of      Full
  Conduit          Shape                  Depth      Area      Rad.     Width  Barrels      Flow
  ---------------------------------------------------------------------------------------------
  21_(1)_(STM)     CIRCULAR               0.45      0.16      0.11      0.45        1    262.71
  21_(2)_(STM)     CIRCULAR               0.30      0.07      0.07      0.30        1      6.46
  21_(3)_(STM)     CIRCULAR               0.45      0.16      0.11      0.45        1    298.38
  21_(4)_(STM)     CIRCULAR               0.45      0.16      0.11      0.45        1    264.11
  21_(5)_(STM)     CIRCULAR               0.53      0.22      0.13      0.53        1    391.72
  21_(6)_(STM)     CIRCULAR               0.60      0.28      0.15      0.60        1    559.64


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... LPS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Starting Date ............ 07/03/2018 00:00:00
  Ending Date .............. 07/04/2018 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 5.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
  Number of Threads ........ 1
  Head Tolerance ........... 0.001500 m


  **************************        Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation ......         0.205        76.002
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         0.075        27.779
  Surface Runoff ...........         0.129        47.820
  Final Storage ............         0.001         0.419
  Continuity Error (%) .....        -0.021


  **************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  **************************     ---------      ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         0.129         1.291
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........         0.129         1.289
  Flooding Loss ............         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.001
  Continuity Error (%) .....         0.041


  ***************************
  Time-Step Critical Elements
  ***************************
  Link 21_(4)_(STM) (7.56%)
```

```
  ********************************
  Highest Flow Instability Indexes
  ********************************
  All links are stable.

  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     3.33 sec
  Average Time Step           :     4.96 sec
  Maximum Time Step           :     5.00 sec
  Percent in Steady State     :    -0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.03

  ****************************
  Subcatchment Runoff Summary
  ****************************

  ---------------------------------------------------------------------------------------------
-----
                             Total      Total      Total      Total      Total      Total     Peak
Runoff
                            Precip     Runon       Evap      Infil     Runoff     Runoff    Runoff
Coeff
  Subcatchment                  mm         mm         mm         mm         mm    10^6 ltr      LPS
  ---------------------------------------------------------------------------------------------
-----
  PH1-1                      76.00       0.00       0.00      33.36      42.30       0.38   194.41
0.557
  PH1-2                      76.00       0.00       0.00      24.87      50.70       0.39   206.49
0.667
  PH1-3                      76.00       0.00       0.00      25.07      50.49       0.52   272.03
0.664

  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max     Reported
                                  Depth    Depth      HGL   Occurrence    Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min       Meters
  ---------------------------------------------------------------------------
  1000_(STM)           JUNCTION    0.32     0.43    87.78     0  01:55         0.43
  1002_(STM)           JUNCTION    0.00     0.00    87.52     0  00:00         0.00
  1004_(STM)           JUNCTION    0.31     0.44    87.38     0  01:51         0.44
  1006_(STM)           JUNCTION    0.31     0.43    87.22     0  01:52         0.43
  1008_(STM)           JUNCTION    0.32     0.50    86.93     0  01:48         0.50
  1010_(STM)           OUTFALL     0.00     0.00    86.20     0  00:00         0.00
  998_(STM)            OUTFALL     0.00     0.00    86.86     0  00:00         0.00
  CB01-02              STORAGE     0.16     1.73    90.03     0  01:55         1.73
  CB03-04              STORAGE     0.14     1.75    90.13     0  01:51         1.75
  CB05-06              STORAGE     0.11     1.75    90.02     0  01:46         1.75

  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max     Inflow      Inflow      Inflow
                                 Inflow   Inflow   Occurrence     Volume      Volume     Balance
  Node                 Type       LPS      LPS  days hr:min   10^6 ltr    10^6 ltr       Error
  ---------------------------------------------------------------------------------------------
  1000_(STM)           JUNCTION    0.00    46.23     0  01:55          0        0.38       0.090
  1002_(STM)           JUNCTION    0.00     0.00     0  00:00          0           0       0.000
ltr
  1004_(STM)           JUNCTION    0.00    54.70     0  01:51          0        0.39       0.090
  1006_(STM)           JUNCTION    0.00    54.70     0  01:51          0        0.39       0.088
  1008_(STM)           JUNCTION    0.00   142.50     0  01:47          0       0.909       0.037
  1010_(STM)           OUTFALL     0.00   142.50     0  01:48          0       0.909       0.000
  998_(STM)            OUTFALL     0.00    46.23     0  01:56          0        0.38       0.000
  CB01-02              STORAGE   194.41   194.41     0  01:30      0.381       0.381       0.063
  CB03-04              STORAGE   206.49   206.49     0  01:30       0.39        0.39       0.073
  CB05-06              STORAGE   272.03   272.03     0  01:30       0.52        0.52       0.006

  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.

  *********************
  Node Flooding Summary
  *********************

  No nodes were flooded.

  **********************
  Storage Volume Summary
  **********************

  ---------------------------------------------------------------------------------------------
                             Average     Avg  Evap Exfil        Maximum     Max    Time of Max     Maximum
                              Volume    Pcnt  Pcnt  Pcnt         Volume    Pcnt     Occurrence     Outflow
  Storage Unit             1000 m3    Full  Loss  Loss        1000 m3    Full  days hr:min         LPS
  ---------------------------------------------------------------------------------------------
  CB01-02                    0.006       5     0     0          0.113      91     0  01:55       46.23
  CB03-04                    0.005       5     0     0          0.110      99     0  01:51       54.70
  CB05-06                    0.004       3     0     0          0.121      97     0  01:46       87.85

  ***********************
  Outfall Loading Summary
  ***********************

  ---------------------------------------------------
                             Flow      Avg      Max    Total
                             Freq     Flow     Flow   Volume
  Outfall Node               Pcnt      LPS      LPS 10^6 ltr
  ---------------------------------------------------
  1010_(STM)                45.77    24.75   142.50    0.909
  998_(STM)                 32.75    14.31    46.23    0.380
  ---------------------------------------------------
  System                    39.26    39.06   188.68    1.289

  *********************
  Link Flow Summary
  *********************

  ---------------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/    Max/
                                |Flow|   Occurrence   |Veloc|    Full    Full
  Link                 Type       LPS  days hr:min     m/sec    Flow   Depth
  ---------------------------------------------------------------------------------------
  21_(1)_(STM)         CONDUIT   46.23     0  01:56      1.24    0.18    0.28
  21_(2)_(STM)         CONDUIT    0.00     0  00:00      0.00    0.00    0.00
  21_(3)_(STM)         CONDUIT    0.00     0  00:00      0.00    0.00    0.12
  21_(4)_(STM)         CONDUIT   54.70     0  01:51      1.31    0.21    0.31
  21_(5)_(STM)         CONDUIT   54.70     0  01:52      1.27    0.14    0.25
  21_(6)_(STM)         CONDUIT  142.50     0  01:48      1.65    0.25    0.34
  OCB01                ORIFICE   20.27     0  01:55                      1.00
  OCB02                ORIFICE   25.96     0  01:55                      1.00
  OCB03                ORIFICE   20.36     0  01:51                      1.00
  OCB04                ORIFICE   34.34     0  01:51                      1.00
  OCB05                ORIFICE   20.34     0  01:46                      1.00
  OCB06                ORIFICE   67.51     0  01:46                      1.00

  ***************************
  Flow Classification Summary
  ***************************

  -------------------------------------------------------------------------------
                   Adjusted    ---------- Fraction of Time in Flow Class ----------
```

Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
21_(1)_(STM)	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
21_(2)_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21_(3)_(STM)	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21_(4)_(STM)	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
21_(5)_(STM)	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
21_(6)_(STM)	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jul 06 13:52:19 2018
Analysis ended on: Fri Jul 06 13:52:20 2018
Total elapsed time: 00:00:01

APPENDIX D
Development Servicing Study Checklist

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: Notting Hill Subdivision
Project Number: 117155
Date: June 29, 2018

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Fig 1-2	
Plan showing the site and location of all existing services.	Y	Fig 3	
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	1.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	N		
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	1.0-7.0	
Statement of objectives and servicing criteria.	Y	3.0-5.0	
Identification of existing and proposed infrastructure available in the immediate area.	Y		Figures 4A/4B to 7A/7B
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Y	5.0	
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	9.0	

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	Y	6.0	
Reference to geotechnical studies and recommendations concerning servicing.	Y	2.0	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		
North arrow (including construction North)	Y		
Key plan	Y		
Name and contact information of applicant and property owner	Y		
Property limits including bearings and dimensions	Y		
Existing and proposed structures and parking areas	Y		
Easements, road widening and rights-of-way	Y		
Adjacent street names	Y		

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	3.0	
Availability of public infrastructure to service proposed development.	Y	3.0	
Identification of system constraints.	Y	3.0	
Identify boundary conditions.	Y	3.0	And Appendix A
Confirmation of adequate domestic supply and pressure.	Y	3.0	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	3.0	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	3.0	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y	3.0-6.0	
Address reliability requirements such as appropriate location of shut-off valves.	Y	3.0	
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	3.0	
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	3.0	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	3.0	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y		Appendix A

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	4.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	4.0	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	Y	4.0	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	4.0	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	4.0	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y		Appendix B
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	4.1	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	5.0	
Analysis of the available capacity in existing public infrastructure.	Y	5.1	Appendix C
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Figures 5A/5B to 7A/7B
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	5.2	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	5.2	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	5.2	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	NA		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Y	5.2	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	5.2	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y		Appendix C
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	5.3	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y		Appendix C
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		

Development Servicing Study Checklist

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	5.3	And Appendix C
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Y	5.0	And Appendix C

4.4 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of municipal drains and related approval requirements.	Y	5.1	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	5.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		Appendix C
Inclusion of hydraulic analysis including HGL elevations.	Y		Appendix C
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	5.6-5.8 &10.0	
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	NA		
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	5.2	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	NA		
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y		
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	11.0	

Unit Breakdown / Phase						
Phase #	50' Singles	42' Singles	35' Singles	31' Singles	Street Towns	Total
Phase 1		6	23	6	24	59
Phase 2	1	5	44	35	90	175
Phase 3	24	23	36	36	30	149
Phase 4		4	12	11	27	54
Phase 5	10	20			28	58
Total	**35**	**58**	**115**	**88**	**199**	**495**

Multi-Unit Count	
Phase #	Multi-Unit
Phase 4	40

LEGEND:

- 31' SINGLES
- 35' SINGLES
- 42' SINGLES
- 50' SINGLES
- PARK / WALKWAY BLOCK

Saleable Frontage & Road Length	Phase 4	
	Frontage (m)	roads (m)
Back-to-Back Units	304.36	367.96

Saleable Frontage & Road Length	Concept 14-1											
	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		TOTAL	
	Frontage (m)	roads (m)	Frontage (m)	roads (m)	Frontage (m)	roads (m)	Frontage (m)	roads (m)	Frontage (m)	roads (m)	Frontage (m)	roads (m)
Single Detached Units	387.38	319.29	913.29	1257.75	1406.52	1166.94	291.23	279.73	409.14	360.66	3407.56	3384.37
Medium Density	167.72		615.04		205.47		179.31		186.37		1353.91	
Total	555.10	319.29	1528.33	1257.75	1611.99	1166.94	470.54	279.73	595.51	360.66	4761.47	3384.37

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
6.	ISSUED WITH DP APPLICATION	JUNE 29/18	MER
5	ADDED STREET B / CLEANUP	JUNE 08/18	MER
4.	FRONTAGE AND UNIT COUNTS UPDATED	MAY 15/18	MER
3.	UNIT COUNTS UPDATED	JAN 08/18	MER
2.	PATHWAYS ADDED	JAN 03/18	JGR
1.	PARK ADJUSTED	DEC 11/17	JGR

SCALE: 1:2000 (A1) / 1:4000 (11x17)

1:2000 0 20 40 60 80

DESIGN MER/WLS
CHECKED MER
DRAWN CAH
CHECKED MER
APPROVED MER

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
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Ottawa, Ontario, Canada K2M 1P6
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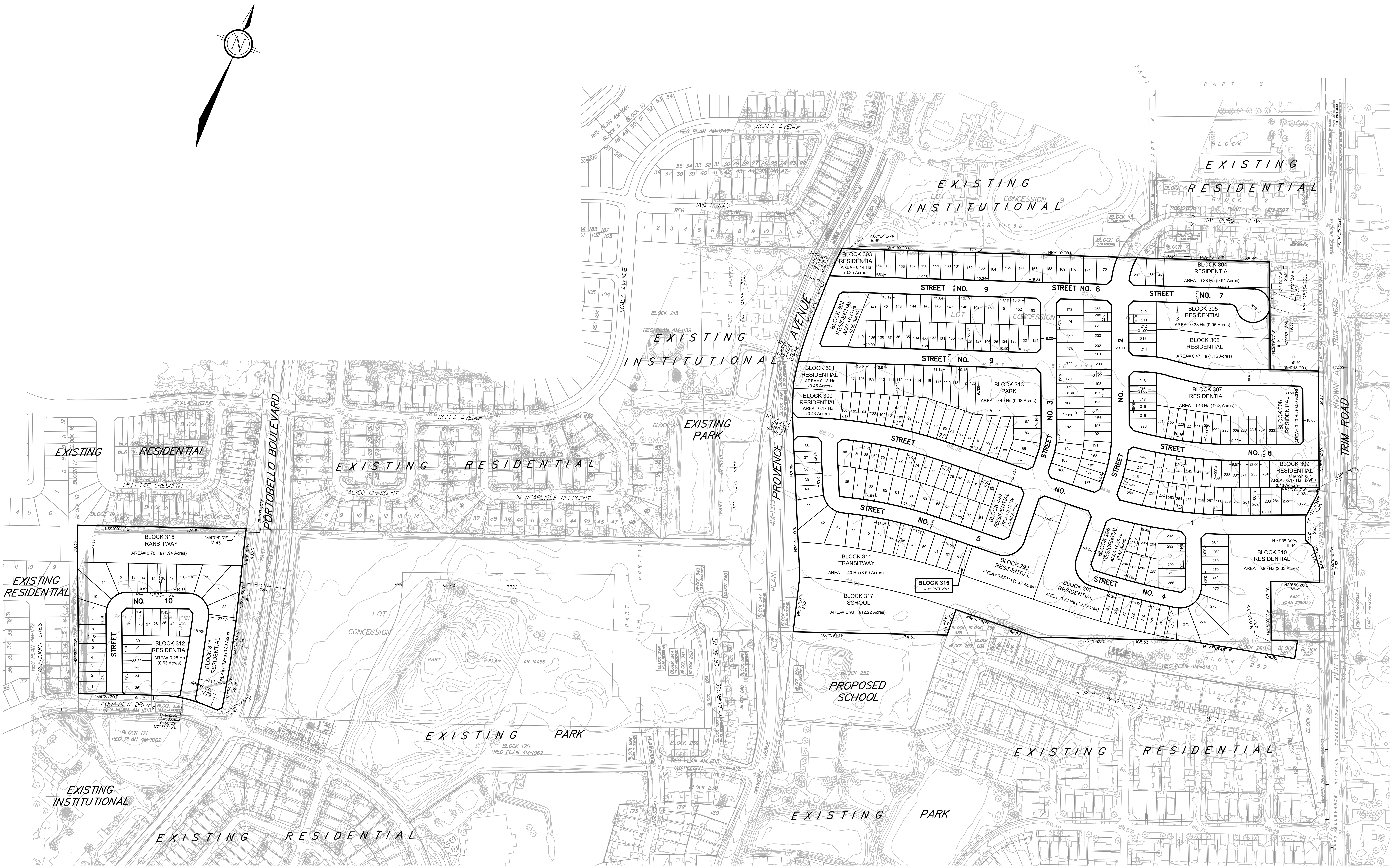
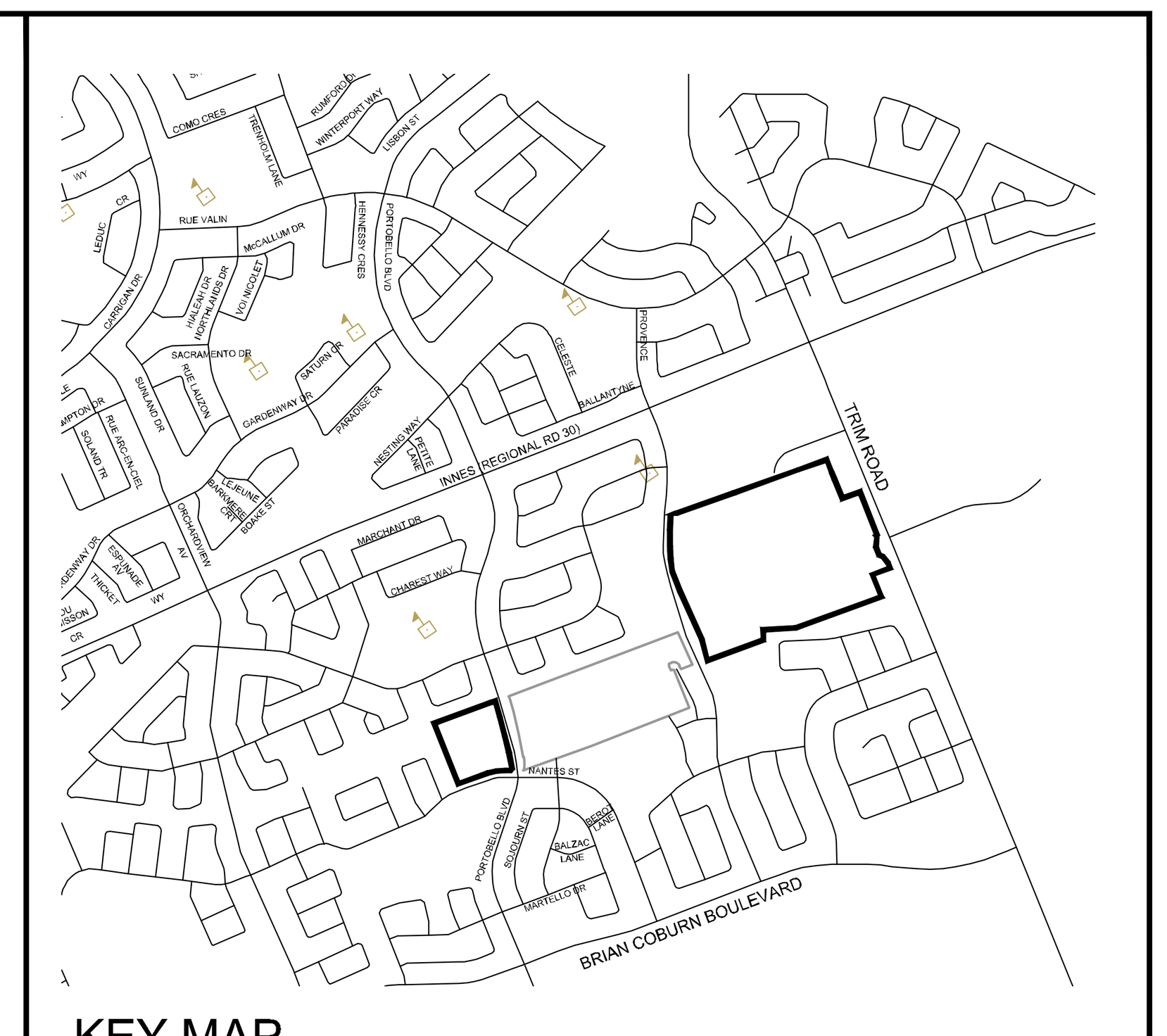
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
NOTTING HILL SUBDIVISION (2128 TRIM ROAD)

DRAWING NAME
CONCEPT PLAN 14-1

PROJECT No. 117155-00
REV REV # 6
DRAWING No. 117155-CP14-1





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

DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 2, CONCESSION 9

Geographic Township of Cumberland

and PART OF BLOCK 1, REGISTERED PLAN 50R-7121

CITY OF OTTAWA

SCALE

1 : 2000

DATE: JUNE, 2018

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJOINING LANDS ARE CORRECTLY SHOWN.

DATED ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___
RON ROBINSON
ONTARIO LAND SURVEYOR

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
ONTARIO LAND SURVEYORS 18965-18

OWNER'S CERTIFICATE

I/WE, NOTTING HILL REALTY INVESTMENTS INC. ,BEING THE REGISTERED OWNER(S), HEREBY AUTHORIZE NOVATECH TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF OTTAWA FOR REVIEW AND APPROVAL.

DATED ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___
DAVID KARDISH

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT.

A) The boundaries of the land proposed to be subdivided, certified by an Ontario land Surveyor;
As shown on Draft Plan

B) The locations, widths & names of the proposed highways within the proposed subdivision & of existing highways on which the proposed subdivision abuts;
As shown on Draft Plan

C) On a small keyplan, on a scale of not less than 1cm to 100m, all of the land adjacent to the proposed subdivision that is owned by the applicant or in which the applicant has an interest, every subdivision adjacent to the proposed subdivision & the relationship of the boundaries of the land to be subdivided to the boundaries of the township lot of other original grant of which the land forms the whole part;
As Shown on Draft Plan

D) The purpose for which the proposed lots are to be used;
Residential, Park, Institutional and Transitway shown on Draft Plan

E) The existing uses of all adjoining lands;
Residential, Institutional, and Park shown on Draft Plan

F) The approximate dimensions & layout of the proposed lots;
As shown on Draft Plan

G) Natural & artificial features such as buildings or other structures or installations, railways, highways, watercources, drainage ditches, wetlands & wooded areas within or adjacent to the land proposed to be subdivided;
As shown on Draft Plan

H) The availability and nature of domestic water supplies;
Development will be supplied with full municipal piped water service

I) The nature & porosity of the soil;
Brown to Grey Silty Clay, trace Sand

J) Existing contours or elevations as may be required to determine the grade of the highways and the drainage of the land proposed to be subdivided;
Contours shown at 0.5 metre intervals on Draft Plan

K) The municipal services available or to be available to the land proposed to be subdivided;
Development will be supplied with full sanitary and storm water sewer services.

L) The nature & extent of any restrictions affecting the land proposed to be subdivided, including restrictive covenants or easements. 1994, c. 23, s. 30; 1996, c. 4, s. 28 (3).;
As shown on Draft Plan.

SUBJECT TO THE CONDITIONS, IF ANY SET FORTH IN OUR LETTER DATED

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS _ __ _ DAY OF

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_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
JEFF MCEWEN, P.ENG,
MANAGER DEVELOPMENT REVIEW - EAST
PLANNING, INFRASTRUCTURE & ECONOMIC DEVELOPMENT DEPARTMENT,
CITY OF OTTAWA

NOTTING HILL SUBDIVISION

NOVATECH
Engineers, Planners & Landscape Architects
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PROJECT No. 117155

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