NOVATECH

Engineers, Planners & Landscape Architects

Engineering
- Land / Site Development
- Municipal Infrastructure
- Environmental / Water Resources
- Traffic / Transportation
- Structural
- Recreational

Planning
- Land / Site Development
- Planning Application Management
- Municipal Planning Documents & Studies
- Expert Witness (OMB)
- Wireless Industry

Landscape Architecture
- Urban Design & Streetscapes
- Open Space, Parks & Recreation Planning
- Community & Residential Developments
- Commercial & Institutional Sites
- Environmental Restoration

36 Years

Provence Orleans Subdivision
2065 Portobello Boulevard
Ottawa, Ontario

Site Servicing and Stormwater Management Report

Engineering excellence. Planning precision. Inspired landscapes.

PROVENCE ORLEANS SUBDIVISION
2065 PORTOBELLO BOULEVARD
OTTAWA, ONTARIO

SITE SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF

Prepared for:

Provence Orleans Realty Investment Inc
c/o Regional Group

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

Issued: October 31, 2019

Ref: R-2019-000
Novatech File No. 117155

NOVATECH
Engineers, Planners & Landscape Architects

October 31, 2019

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

Attention: Will Curry

Dear Sir:

Re: Provence Orleans Subdivision – Phase 6
Site Serving, Stormwater Management, Noise, Erosion and Sediment Control Brief
Our File No.: 117155

Please find enclosed one (3) copies of the report entitled, "Provence Orleans Subdivision – 2065 Portobello Boulevard – Site Serving and Stormwater Management Design Brief" dated October 31, 2019. 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 E. Riddell, P.Eng.
Senior Project Manager | Land Development

cc: Erin O'Connor, Provence Orleans Realty Investment Inc c/o Regional Group

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

LIST OF PLANS

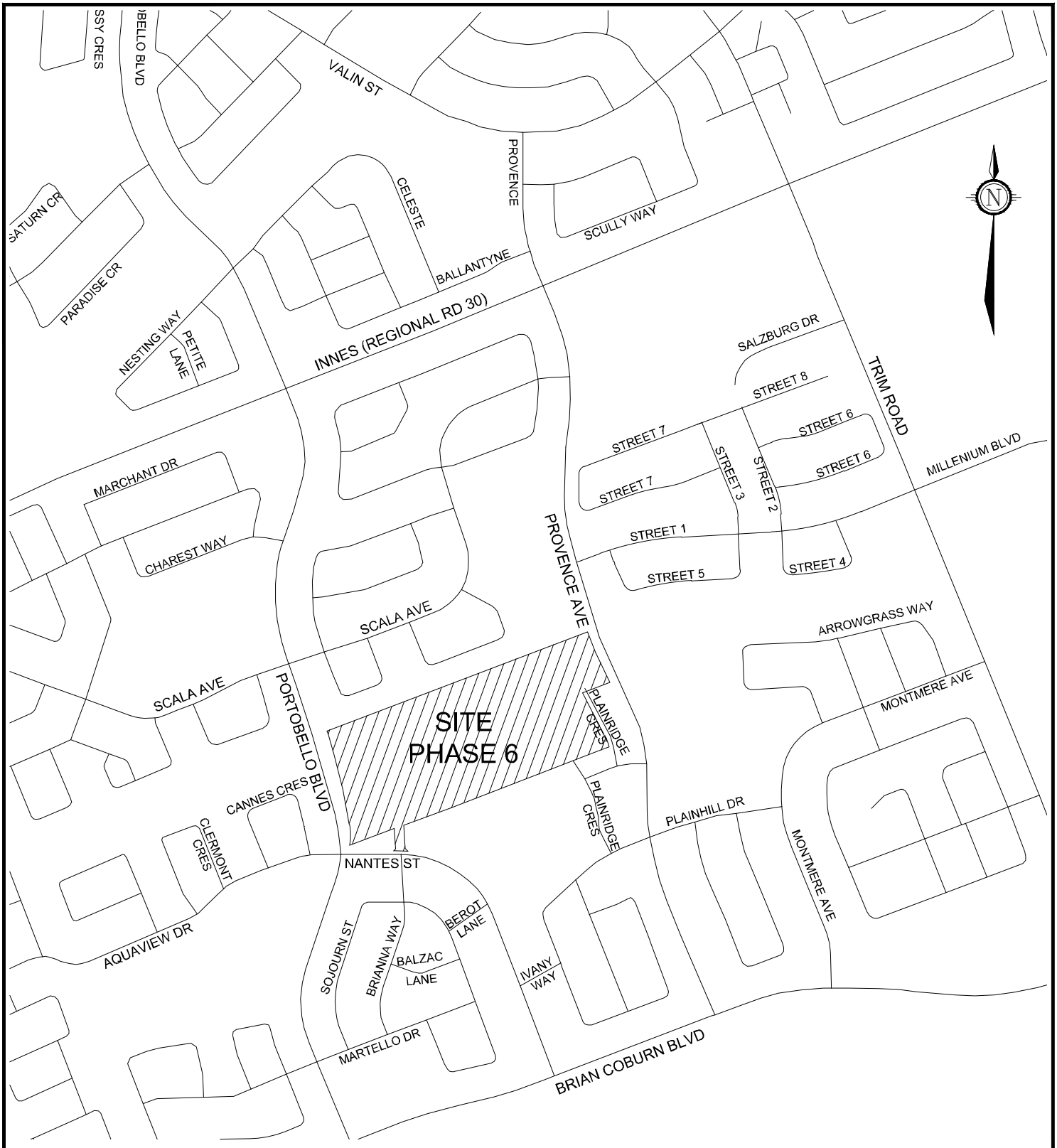
1.0 INTRODUCTION

This Servicing Brief has been prepared in support of the Draft Plan of Subdivision, Rezoning and Official Plan Amendment applications 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 September 2013).

The proposed Provence Orleans Subdivision – Phase 6 development at 2065 Portobello Boulevard, owned by Provence Orleans Realty Investments Inc managed by Regional Group consists of a 10.7ha site located in the City of Ottawa located between Portobello Boulevard, Nantes Street and Plainridge Crescent, as shown on **Figure 1** – Key Plan.

The Provence Orleans Subdivision - Phase 6 development is proposed to consist of 110 residential units, a medium density block with four 6-storey apartment buildings and woodlot park, as shown on **Figure 2** – Concept Plan / Phasing Plan.

The parcel of land consists of farmed fields and the existing woodlot, as shown on **Figure 3** – Existing Conditions Plan.



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

N.T.S

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

KEY PLAN

DATE	JOB	FIGURE
NOV 2019	117155	FIG-1

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-KP.dwg, FIG1-KP, Nov 08, 2019 - 1:30pm, channa

SHT8X11.DWG - 216mmx279mm

CALICO CRESCENT

NEWCARLISLE CRESCENT

FUTURE TRANSIT–WAY

16.50

STREET 11

PHASE 3

PHASE 1

PORTOBELLO BOULEVARD

PROPOSED 6 STOREY APARTMENT BUILDING

PROPOSED 6 STOREY APARTMENT BUILDING

PROPOSED 6 STOREY APARTMENT BUILDING

PROPOSED 6 STOREY APARTMENT BUILDING

Multi-Unit
(AREA = 15459 sq.m)

PHASE 6

PARK
(AREA = 21238 sq.m)

18.00

18.00

18.00

PLAINRIDGE CRESCENT

PLAINRIDGE CR

PROVENCE AVENUE

FUTURE SCHOOL

LALANDE CONSERVATION PARK

NANTES ST

BRIANNA WAY

SOJOURN ST

ÉCOLE ÉLÉMENTAIRE DES SENTIERS

GRAPEFERN TERR

PLAINRIDGE CR

PROVENCE AVENUE

PROVENCE PARK

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-PHS.dwg, PH6-FIG-2, Nov 08, 2019 - 3:29pm, channa

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

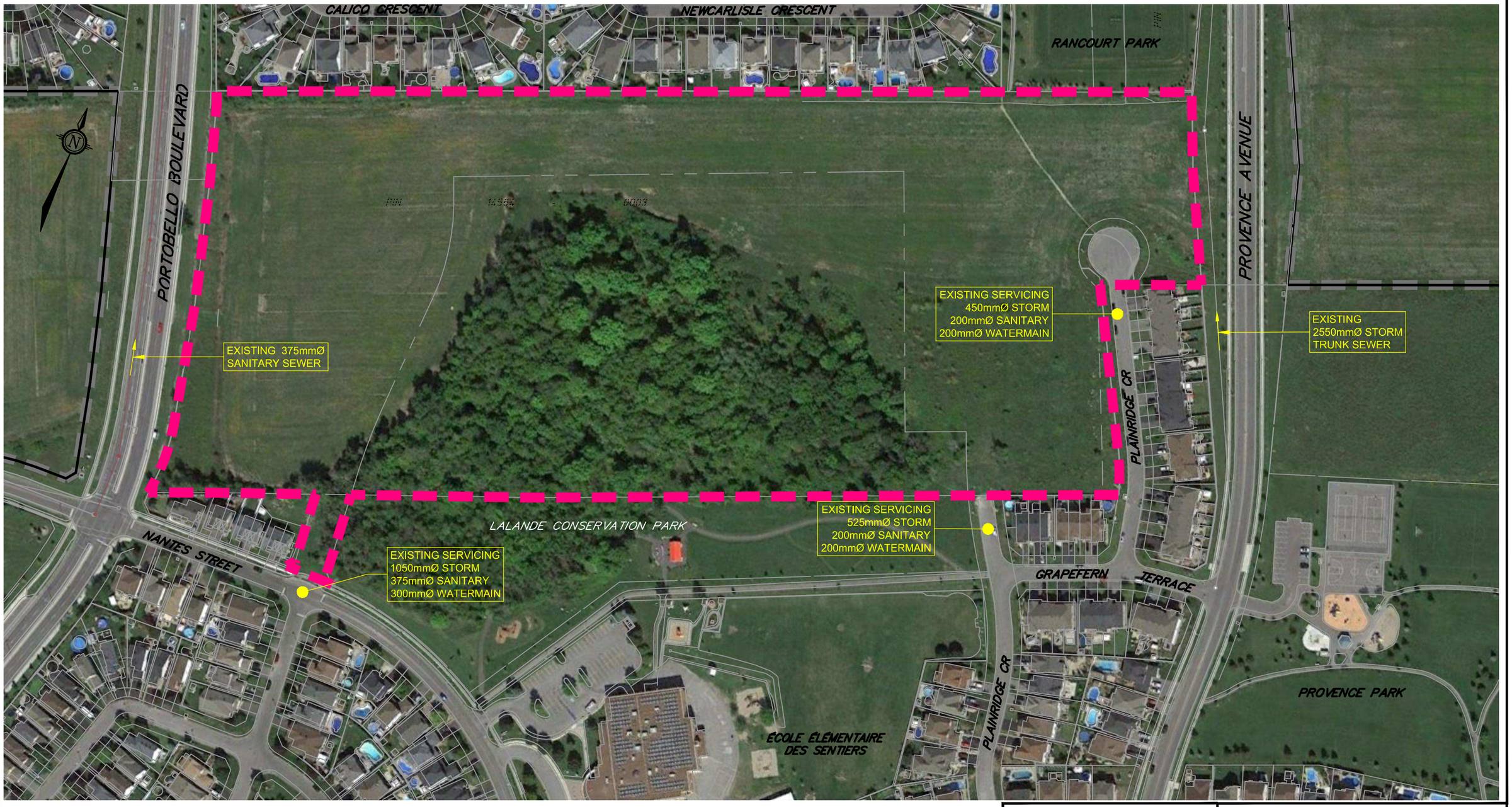
CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 CONCEPT PLAN / PHASING PLAN

SCALE 1 : 2000 (0 20 40 60 80)

DATE NOV 2019 | JOB 117155 | FIGURE FIG-2

SHT11X17.DWG - 279mmX432mm



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 EXISTING CONDITIONS PLAN

SCALE 1 : 2000 (0 20 40 60 80)
DATE NOV 2019 | JOB 117155 | FIGURE FIG-3

SHT11X17.DWG - 279mmX432mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-EXC.dwg, PH6-FIG-3, Nov 08, 2019 - 3:05pm, channa

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.

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 Provence Orleans Subdivision, Phase 6. Per the Master Servicing Plan (Stantec, 2013), the Subject Site will be serviced with a combination of 250mm and 200mm PVC pipe from three (3) separate connection points to the existing watermain, refer to **Figure 4** for Conceptual Watermain Alignment and Watermain Node Locations and the Watermains plan form the Master Servicing Plan in **Appendix A**. 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 required fire flow for the 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 Provence Orleans 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. The fire flow calculated for the 6-storey apartment buildings is 250L/s. The building design for the 6 story apartments is preliminary and assumptions for design were based on the conceptual design and previous projects and will be confirmed during detailed design. A separate report will be required to support the Site Plan Application for this block.

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 — 2.7 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:

- 150mm PVC — 100

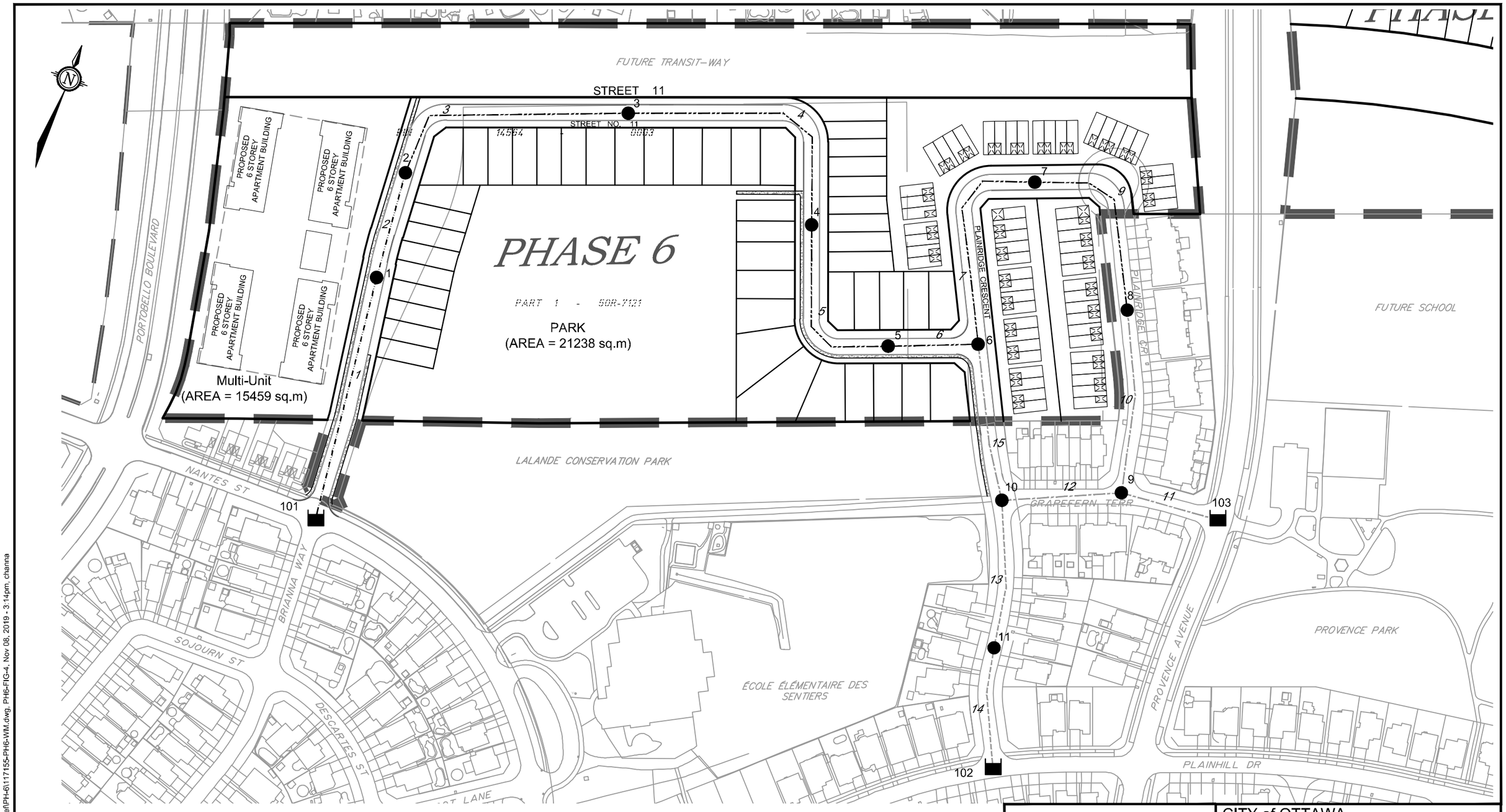
- 200mm-250mm PVC 110

Tables 3.1 summarizes the watermain operating conditions during the high pressure, maximum daily demand and fire flow, and peak hour demands for Phase 6 of the development.

Table 3.1: Phase 1 Water Operating Conditions

Condition	Demand (L/s)	Minimum/Maximum Allowable Pressure (kPa/psi)	Operating Pressure (kPa/psi)
High Pressure	4.20	552/80 (Maximum)	394/57.1
Maximum Daily Demand (c/w Fire Flow)	10.49 (233) at Node 2	140/20.0 (Minimum)	141/20.4 At Node 2
Peak Hour	23.08	276/40.0 (Minimum)	319/46.2

Based on the proposed Concept Plan and this hydraulic analysis, Phase 6 of the Provence Orleans Subdivision can be serviced through a combination of 250mm and 200mm watermain and three (3) connections to the existing watermain. A detailed hydraulic analysis will be required during the detailed engineering design. Refer to **Appendix A** for complete hydraulic analysis results.



LEGEND

1	PROPOSED 250mmØ WATERMAIN PIPE
3	PROPOSED 200mmØ WATERMAIN PIPE
12	WATERMAIN NODE
103	RESERVOIR
F	MAX DAY DEMAND PLUS FIRE FLOW
14	EXISTING 150mmØ WATERMAIN PIPE
11	EXISTING 200mmØ WATERMAIN PIPE

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 - CONCEPTUAL
WATERMAIN LAYOUT /
WATERMAIN NODE LOCATIONS

SCALE 1 : 2000 (0 20 40 60 80)

DATE NOV 2019 | JOB 117155 | FIGURE FIG-4

SHT11X17.DWG - 279mmX432mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-WM.dwg, PH6-FIG-4, Nov 08, 2019 - 3:14pm, channa

4.0 SANITARY SEWER SYSTEM

Per the Master Servicing Plan (Stantec, 2013), the Subject Site will be serviced by 200mm gravity sewers outletting to existing sewers on Plainridge Crescent and Nantes Street and will ultimately outlet to the existing 375mm sanitary sewer on Portobello Boulevard. Refer to **Figure 5** – Conceptual Sanitary and Storm Alignment and **Figure 6** – Conceptual Post-Development Sanitary Drainage Area Plan and the Master Servicing Plan Sanitary Collector Sewers and Drainage Areas in **Appendix B** for details.

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.

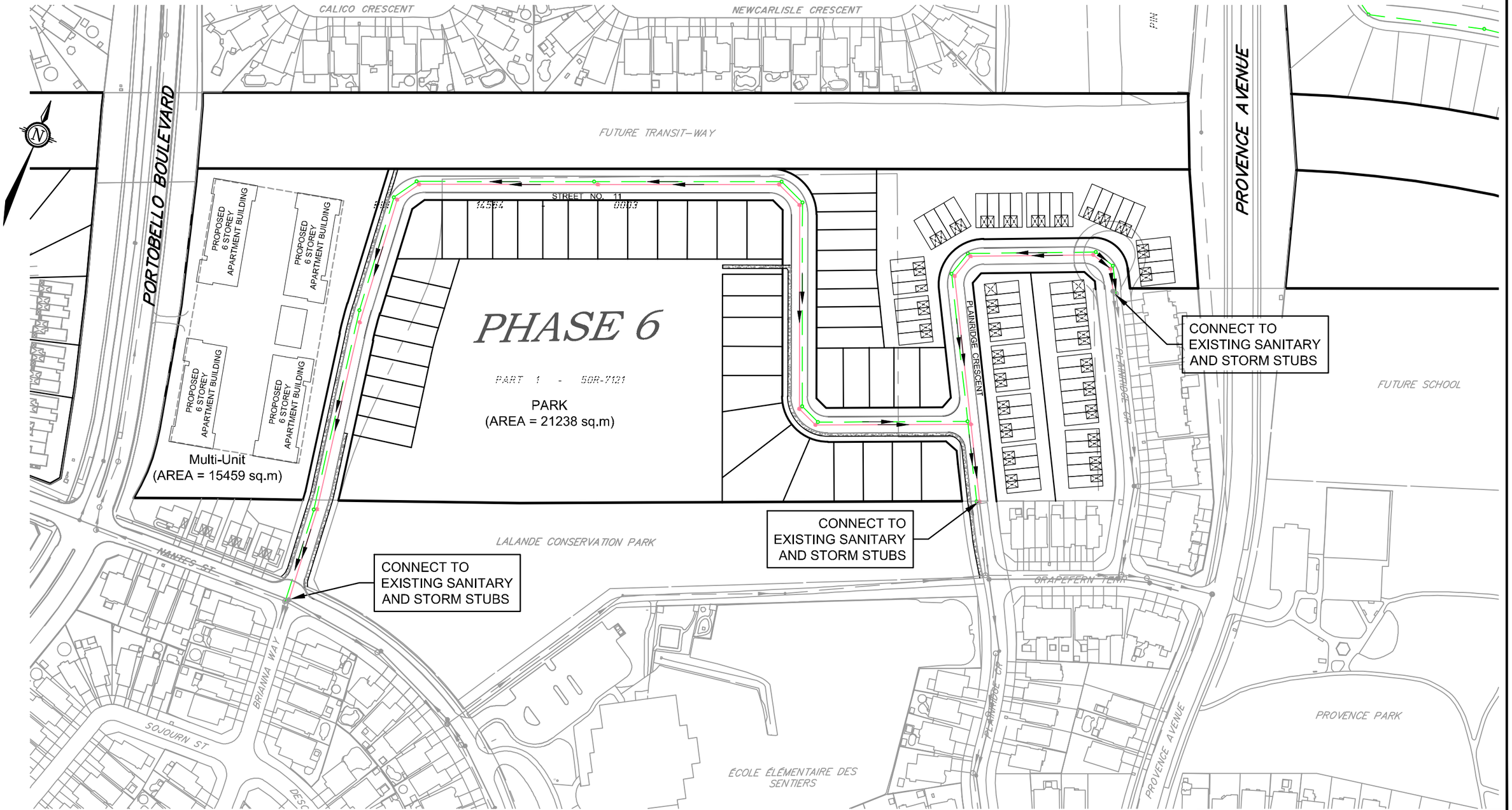
- Design Flow, Residential 350 L/c/day
- Residential Peaking Factor Harmon Equation
- Peak Correction Factor 4.0
- Infiltration Allowance 0.28 L/s/ha
- Single Family Residential Dwelling 3.4 people/unit
- Multiple Family Residential Dwelling 2.7 people/unit
- Apartment Residential Dwelling 2.1 people/unit

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

Table 4.1: Sanitary Flow Summary

Development Outlet	Population	Peak Residential Flow (L/s)	Peak Extraneous Flow (L/s)	Peak Design Flow (L/s)
Nantes – Outlet #1	710	11.19	0.87	12.06
Plainridge – Outlet #2	188	3.05	0.83	3.89
Plainridge – Outlet #3	8	0.13	0.10	0.23

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



LEGEND

- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- *EXISTING STORM SEWER*
- *EXISTING SANITARY SEWER*

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

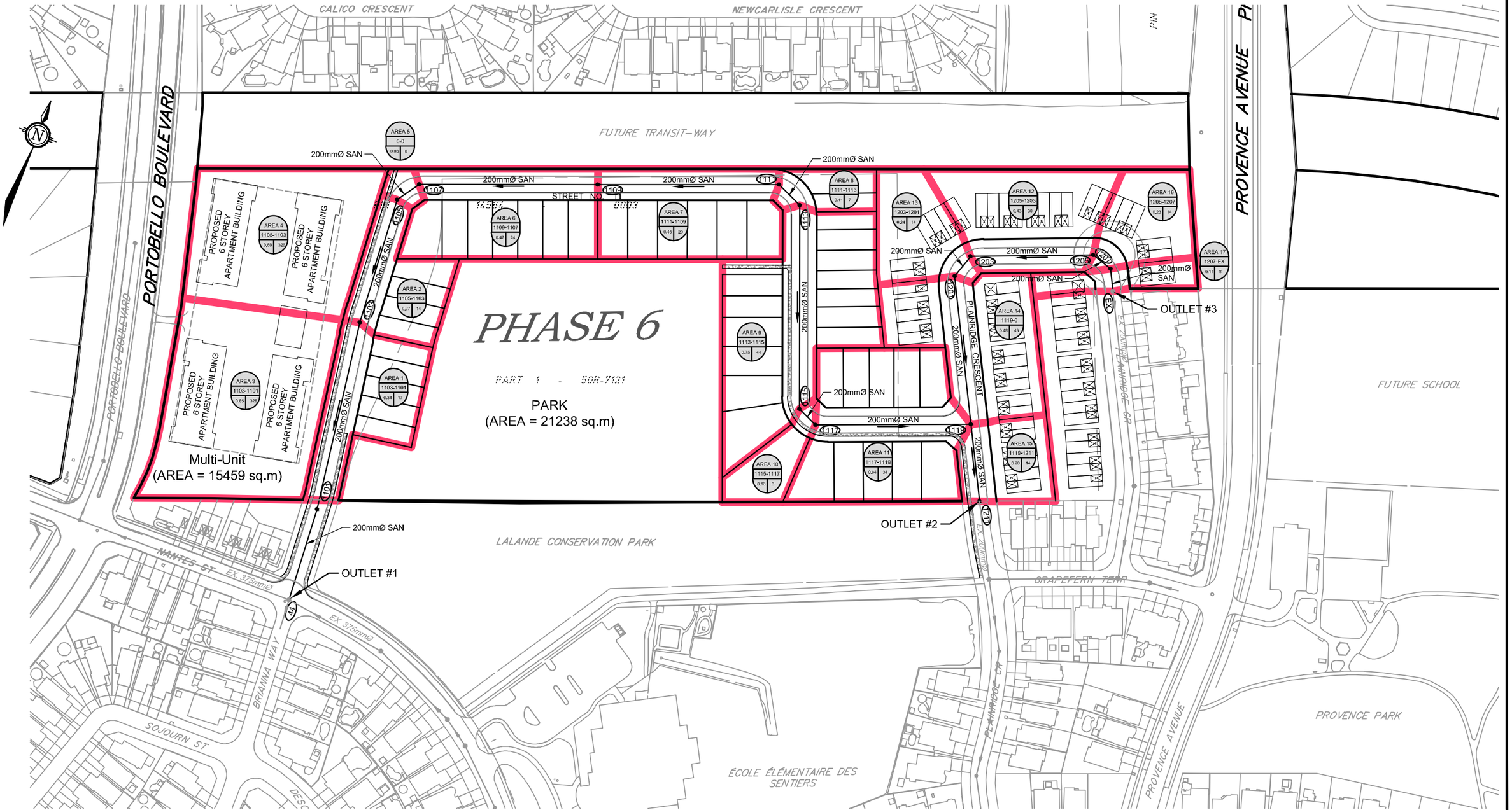
CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 - CONCEPTUAL SANITARY AND STORM ALIGNMENT

SCALE 1 : 2000 (0 20 40 60 80)
DATE NOV 2019 | JOB 117155 | FIGURE FIG-5

SHT11X17.DWG - 279mmX432mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-SAN-STM.dwg, PH6-FIG-5, Nov 08, 2019 - 3:41pm, channa



LEGEND

- AREA NUMBER
- MANHOLE TO MANHOLE
- POPULATION
- AREA (ha)
- PROPOSED SANITARY DRAINAGE AREA
- PROPOSED SANITARY MH & SEWER
- *EXISTING SANITARY MH & SEWER*

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 - CONCEPTUAL POST DEVELOPMENT SANITARY DRAINAGE AREA PLAN

SCALE 1 : 2000 (0 20 40 60 80)
DATE NOV 2019 | JOB 117155 | FIGURE FIG-6

SHT11X17.DWG - 279mmX432mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-SAN.dwg, PH6-FIG-6, Nov 08, 2019 - 6:01pm, channa

5.0 STORMWATER MANAGEMENT

5.1 Existing Conditions

Under existing conditions, the site consists of agricultural lands and a woodlot. Phase 6 is bounded by Portobello Boulevard to the west, Provence Avenue to the east, existing residential development to the north, and a conservation area to the south. Stormwater Management outlets for Phase 6 will be provided via Nantes Street and Plainridge Crescent. Refer to **Figure 3** – Existing Conditions.

Topography and Drainage

The site generally has a very gentle slope from south to north of approximately 0.8%. Within the wooded area, there are small hills with a steeper slope of approximately 2%. Neighboring 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.

5.2 Stormwater Management Criteria

The stormwater management criteria used in the design of the Provence Orleans Subdivision were developed based on the Master Servicing Study (*Gloucester and Cumberland East Urban Community Expansion Area and Bilberry Creek Industrial Park Master Servicing Update* by Stantec dated September 2013) which references the applicable portions of *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. Excerpts are included in **Appendix C.**

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;
    - As this flow is less than the 2-year storm event, some ponding during the 2-year storm event will be allowed. The detailed design report should indicate depth, area, and time to dissipate;
- 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;
- 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 calculated with road sag storage at 0.35m deep dynamic flow and rearyard swale sag storage at 0.4m deep;

  - Note, as discussed with Planning, Infrastructure and Economic Development staff, these criteria have historically been difficult to achieve.
- 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 rearyard swale sags and conveyed overland along defined major system flow routes;
- As per the Master Servicing Study Update (Stantec, 2013), major system storage in rearyards will be included/accounted for in the 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 and flow per hectare are to be calculated for each drainage area to ensure that the following criteria are satisfied and to ensure that the flows are generally balanced to each inlet point.

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 Provence Orleans 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).

Per the Master Servicing Plan (Stantec, 2013), the Subject Site will outlet to the trunk storm sewer on Provence via proposed onsite gravity sewers outletting to existing sewers on Plainridge Crescent and Nantes Street. Refer to **Figure 5** – Conceptual Sanitary and Storm Alignment and **Figure 7** – Conceptual Post-Development Storm Drainage Area Plan and the Master Servicing Plan Storm Collector Sewers and Drainage Areas in **Appendix C** for details.

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 and **Figure 7** – Conceptual Post-Development Storm Drainage Area Plan. 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

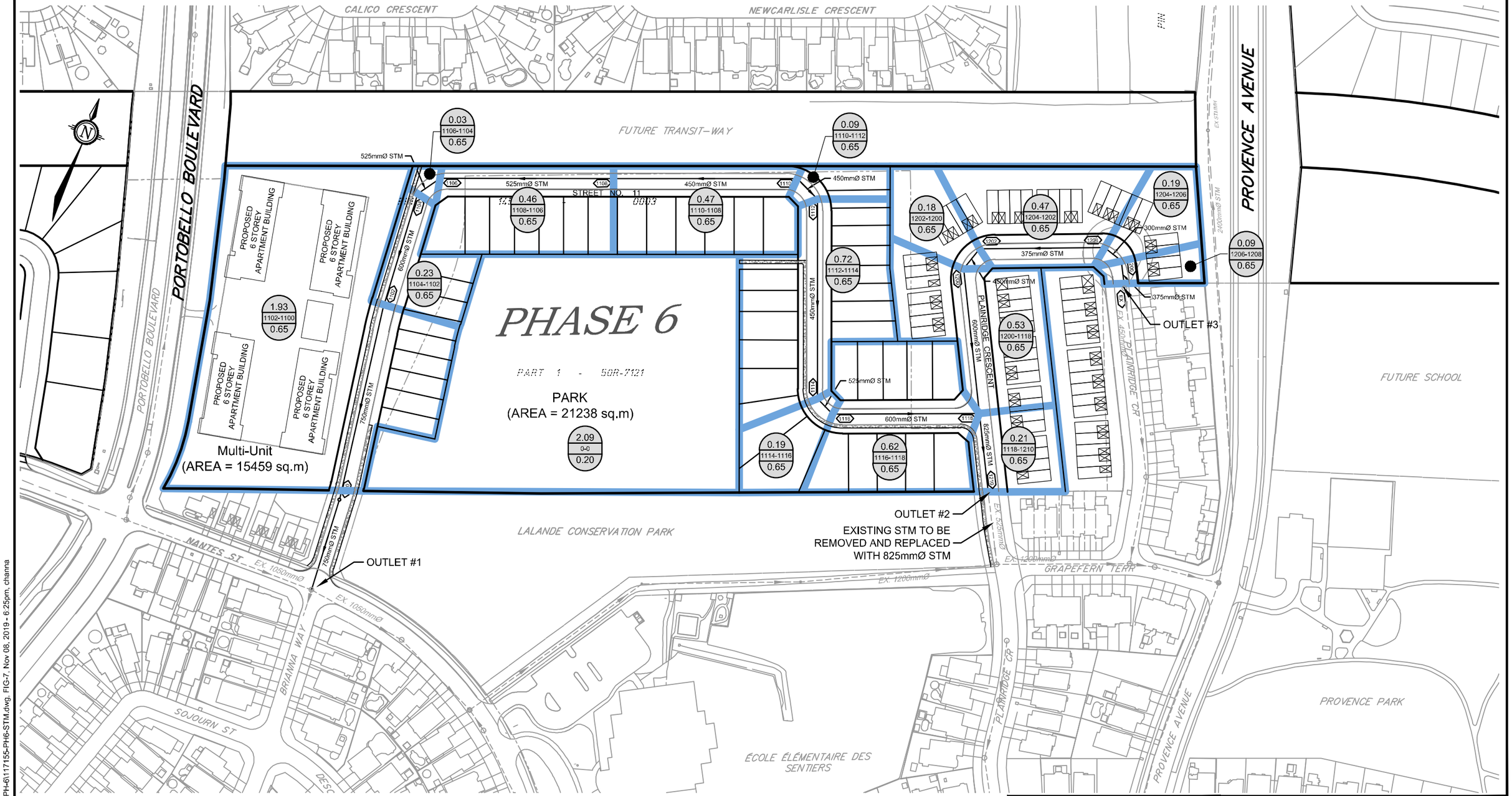
Inflows to the minor system will be controlled using inlet control devices (ICDs) designed to control inflows to the storm sewer system 70L/s/ha for all storm events up to and including the 100-year event. Each road catchbasin will have an individual connection to the storm sewer, catchbasin pairs will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

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



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

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 - CONCEPTUAL POST DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE 1 : 2000 (0 20 40 60 80)
DATE NOV 2019 | JOB 117155 | FIGURE FIG-7

SHT11X17.DWG - 279mmX432mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-STM.dwg, FIG-7, Nov 08, 2019 - 6:25pm, channa

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 7** – Phase 6 Storm Drainage Area Plan and **Figure 8** – Phase 6 Preliminary Macro Grading Plan. The design of the major system will be completed at the detailed design stage. The route will adhere to the macro grading plan prepared in the Master Serving Plan (Stantec, 2013). The east half of the site overland flow will be directed to the Provence park via Plainridge and Grapefern. The west half of the site will have an overland flow route directed to the woodlot.

5.4 Hydrologic & Hydraulic Modeling

The *Ottawa Sewer Design Guidelines* state that hydrologic modeling is required for all dual drainage systems. At detailed design a PCSWMM model for Phase 6 of the development will be 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 will be used :

- 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.

5.4.1 Design Parameters

The hydrologic analysis will be 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	

Infiltration losses for all catchment areas will be 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

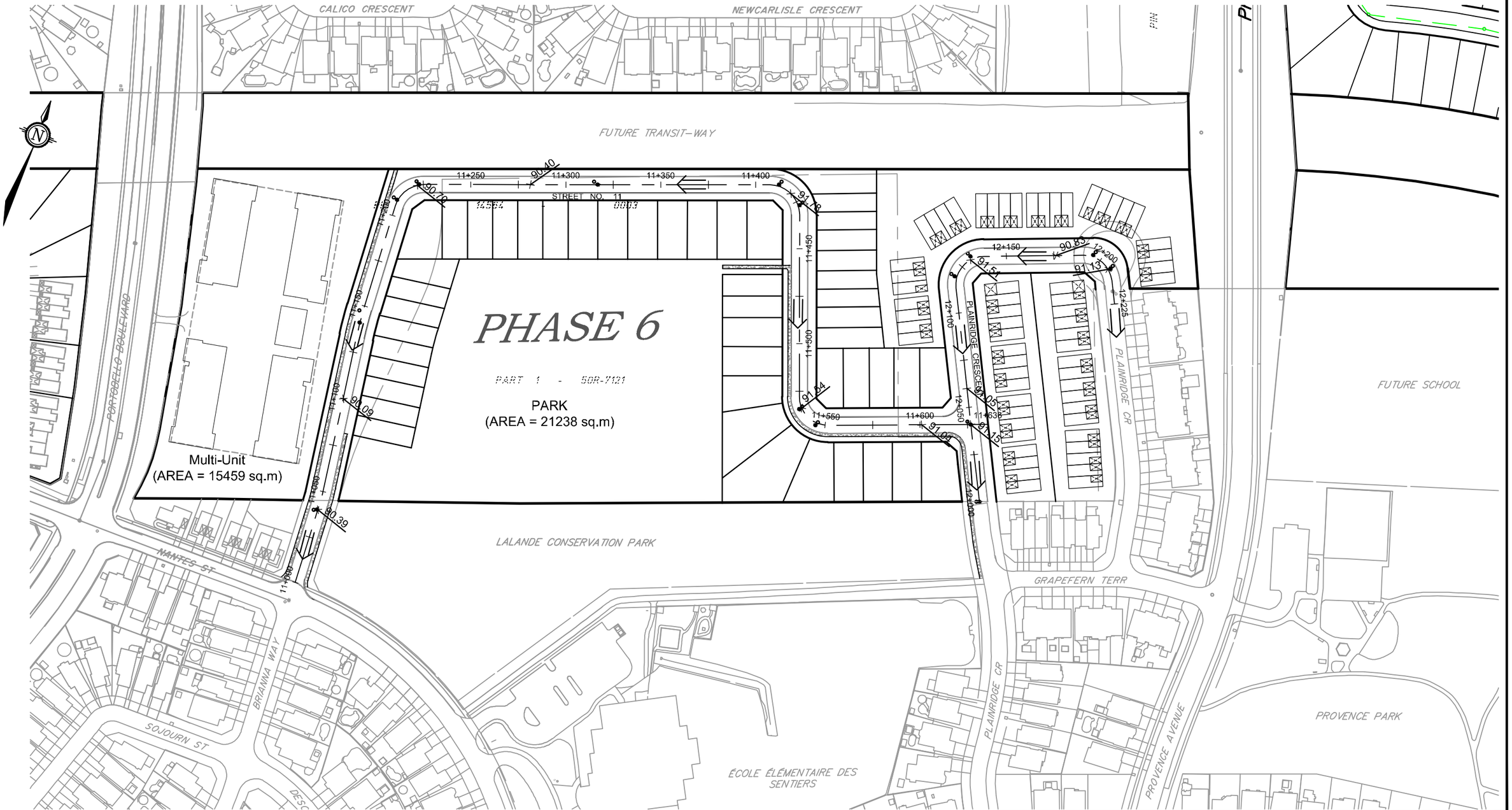
Depression Storage

The default values for depression storage in the City of Ottawa will be 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



LEGEND

89.24 / 88.59 — PRELIMINARY GRADE / EXISTING GRADE

MAJOR OVERLAND FLOW DIRECTION

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

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

PHASE 6 PRELIMINARY MACRO GRADING PLAN

SCALE 1 : 2000 (0 20 40 60 80)

DATE NOV 2019 | JOB 117155 | FIGURE FIG-8

SHT11X17.DWG - 279mmX432mm

'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 will be determined for the each of the proposed land uses. For the preliminary design, single-family and townhouse residential dwellings have been assigned a runoff coefficient of 0.65. The multi-unit medium density block was assigned a runoff coefficient of 0.65. These run-off coefficients will be reviewed during detailed design and confirmed with a typical lot layout calculation.

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

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

5.4.2 Allowable Release Rates & Required Storage

Table 5.2 outlines the required storage and allowable release rate for this phase of the proposed development.

- 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 5.2: Release Rate & Storage Requirements

Phase	Area (ha)	Required Storage (m^3)	Allowable Release Rate (L/s)
Phase 6	6.41	962	448

- Area does not include the woodlot or the transitway lands.

6.0 UTILITIES

The development will be serviced by hydro, gas, phone and cable, which will be constructed as per the City and utility modified right-of-way cross-sections. Refer to **Figures XS-1, XS-2, XS-3** for various road allowances and **Figure 2 Concept Plan** for the proposed locations of each of the cross sections.

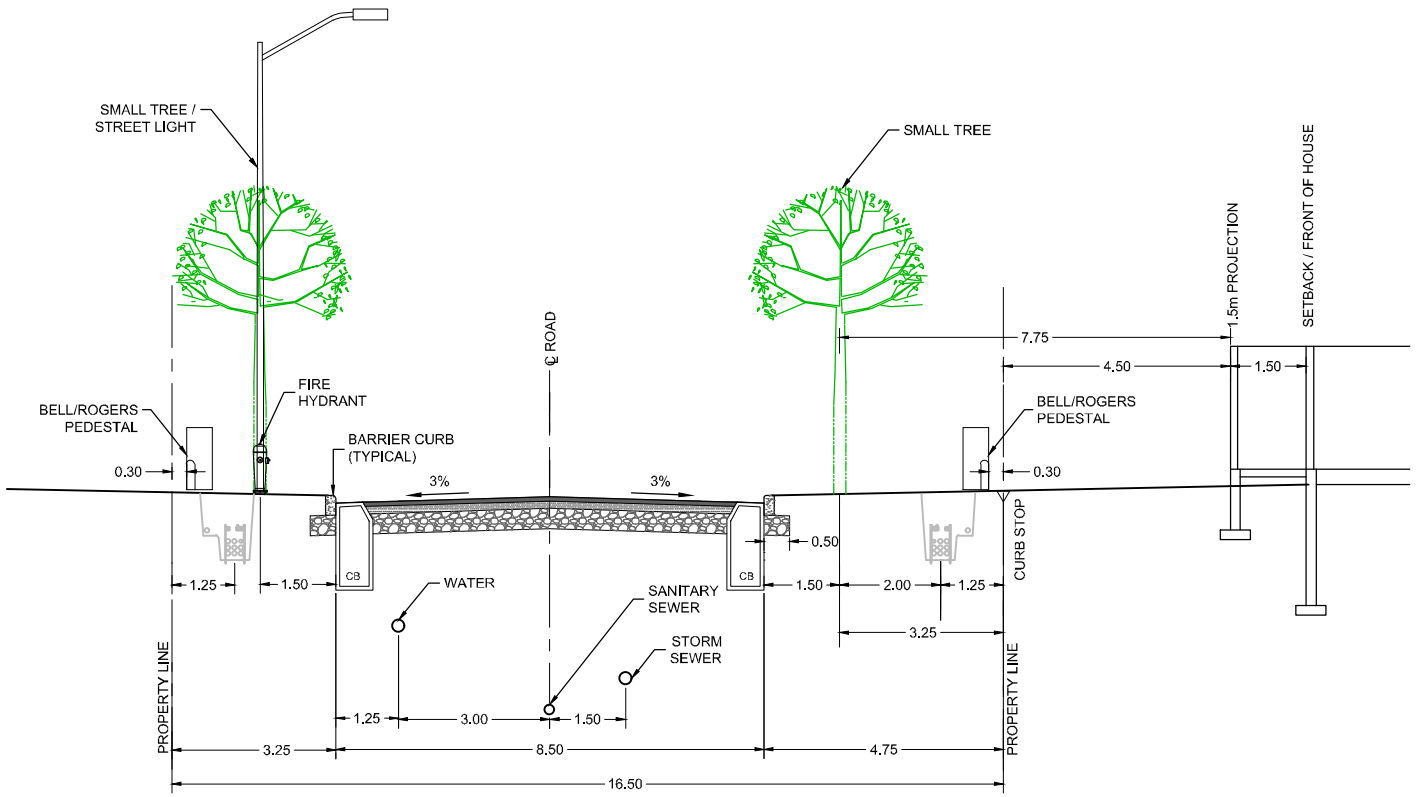
Canada Post will service the site with community mailboxes.

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

7.0 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 (Nantes Street and Plainridge Crescent). See **Figure 9** – 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.



TYPICAL ROAD CROSS SECTION 4
(RESIDENTIAL ROAD 16.5m ROW
OFFSET NO SIDEWALK)

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

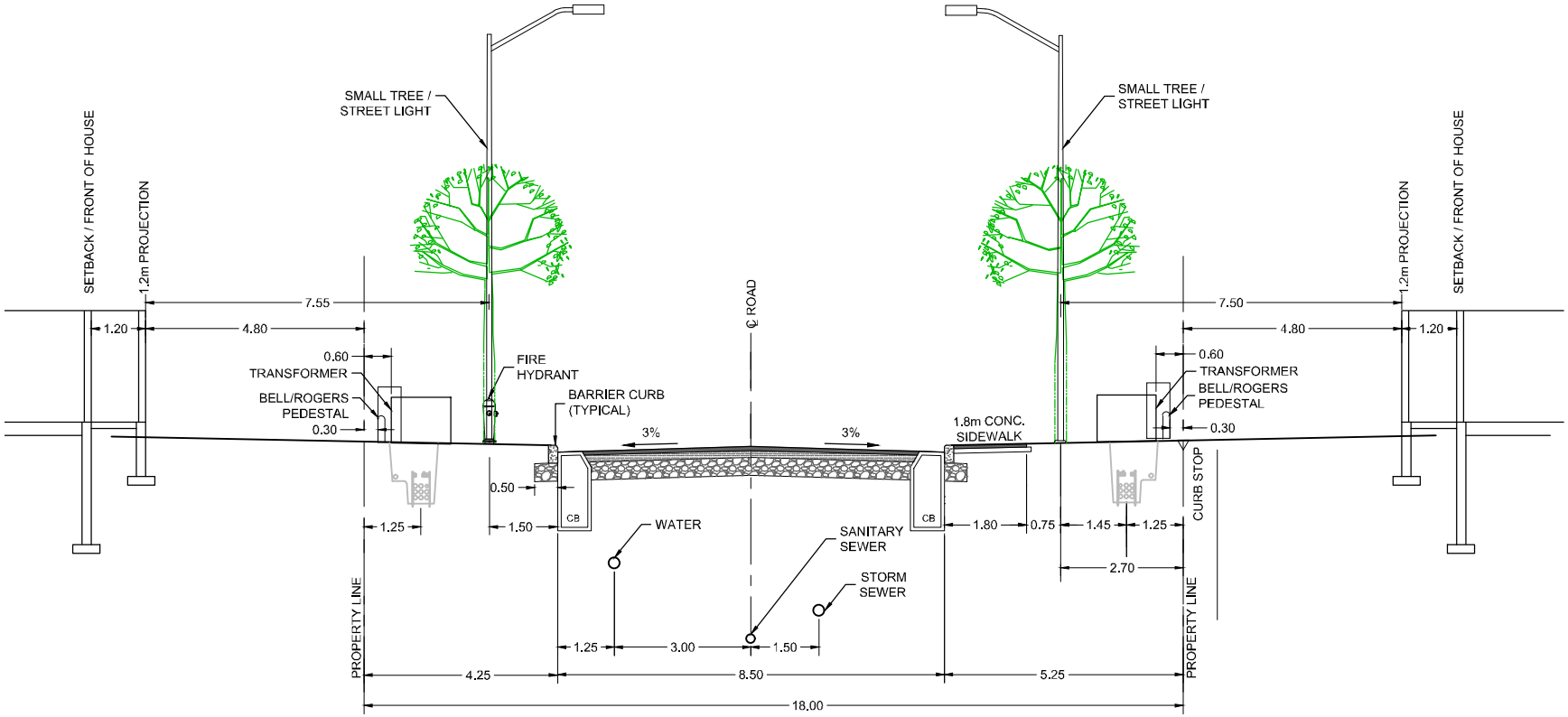
CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

TYPICAL ROAD CROSS SECTION 16.5m ROW

SCALE 1 : 150 (0 2 4 6)

DATE NOV 2019 | JOB 117155 | FIGURE XS-1

SHT8X11.DWG - 216mmx279mm



TYPICAL ROAD CROSS SECTION 2
(RESIDENTIAL ROAD 18m ROW
WITH SIDEWALK OFF CENTRE)

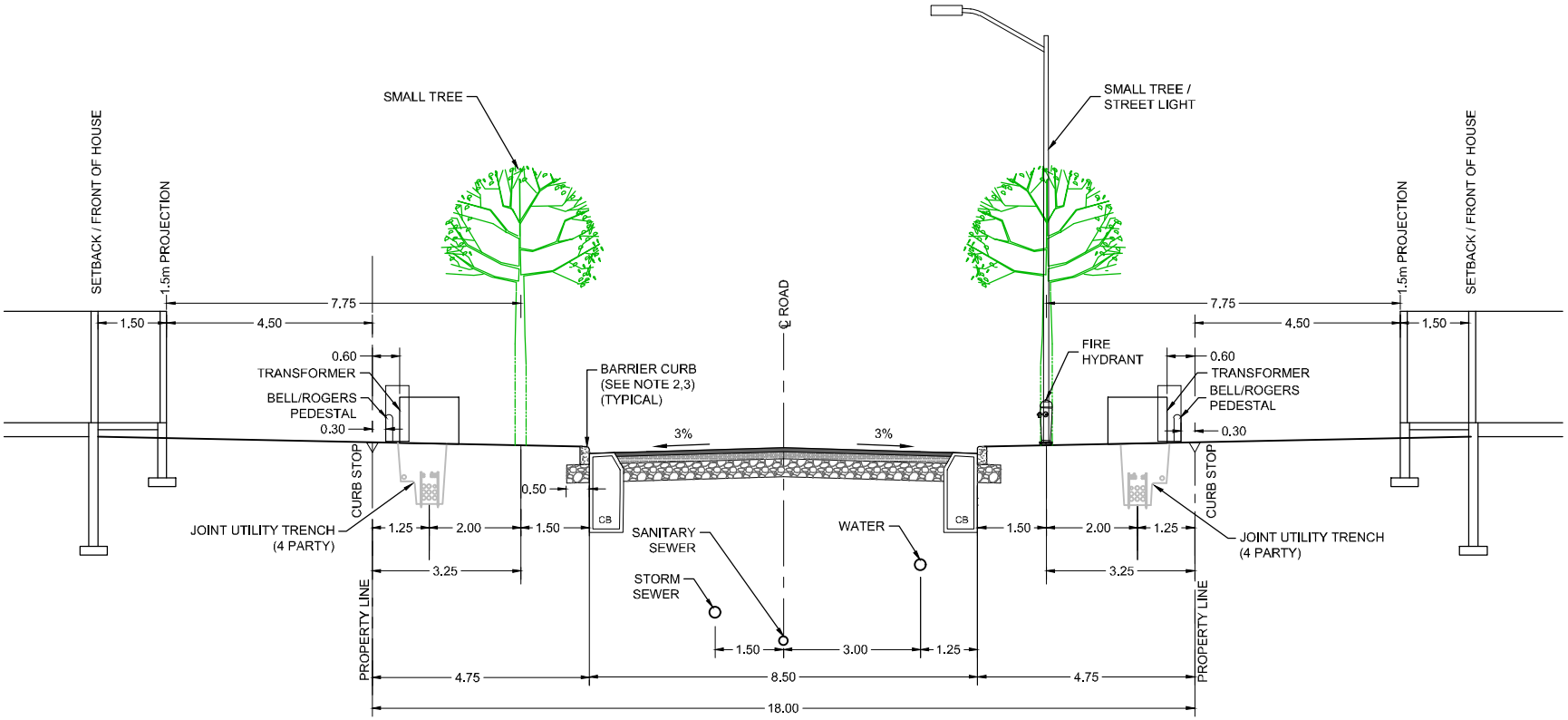
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

TYPICAL ROAD CROSS SECTION 18m ROW - WITH SIDEWALK

SCALE	DATE	JOB	FIGURE
1 : 150	NOV 2019	117155	XS-2



NOTE

1. BARRIER CURB TO BE INSTALLED IN FRONT OF SINGLES
2. MOUNTABLE CURB TO BE INSTALLED IN FRONT OF TOWNS
3. REFER TO GRADING PLAN (117155-GR1) FOR TRANSITION LOCATIONS

TYPICAL ROAD CROSS SECTION
(RESIDENTIAL ROAD 18m ROW
NO SIDEWALK)

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION
(2065 PORTOBELLO BOULEVARD)

TYPICAL ROAD CROSS SECTION 18m ROW - NO SIDEWALK

SCALE 1 : 150 (0 2 4 6)

DATE NOV 2019 | JOB 117155 | FIGURE XS-3

SHT8X11.DWG - 216mmx279mm

M:\2017\117155\CAD\Design\Figures\Design Brief\PH-6\117155-PH6-XS.dwg, XS3-18m-NO SW, Nov 08, 2019 - 6:32pm, channa

8.0 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.

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.

- 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.

9.0 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 Application for this Phase of the Provence Orleans Subdivision. The downstream and existing systems have sufficient capacity to service the proposed development.

- The watermain flows will be supplied by connecting to existing watermains on Nantes and Plainridge.
- The sanitary flows will be collected by the on-site sanitary sewer system and directed to existing sewers on Nantes and Plainridge and ultimately to the collector sewer on Portobello.
- The stormwater flows will be collected by the on-site storm sewer system and directed to existing sewers on Nantes and Plainridge and ultimately to the trunk sewer on Provence.

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 Provence Orleans Subdivision at 2065 Portobello Road, Ottawa, Ontario.

Respectfully issued,

NOVATECH

Prepared By:

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

Prepared By:

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

Reviewed/Approved by:

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

APPENDIX A
Water Calculations

N

0 50 150 250m

NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
305 EXISTING WATERMAIN
305 FUTURE WATERMAIN
EXISTING ELEVATED STORAGE TANK
FUTURE ELEVATED STORAGE TANK

WATERMAINS

FIRST SUBMISSION:	FEB., 2004	WM 2
REVISION No.: 5	JUNE, 2006	

BOUNDARY CONDITIONS

Boundary Conditions For: Legault Lands Phase 1 - 6

Date of Boundary Conditions: 2018-May-24

Provided Information:

Scenario (Phase 1)	Demand	
	L/min	L/s
Average Daily Demand	45	0.8
Maximum Daily Demand	112.2	1.9
Peak Hour	247.2	4.1
Fire Flow #1 Demand	10,000	166.7
Fire Flow #2 Demand	13,000	216.7

Scenario (Phase 2 & 4)	Demand	
	L/min	L/s
Average Daily Demand	178.8	3.0
Maximum Daily Demand	600	10.0
Peak Hour	984	16.4
Fire Flow #1 Demand	10,000	166.7
Fire Flow #2 Demand	13,000	216.7

Scenario (Phase 3 & 5)	Demand	
	L/min	L/s
Average Daily Demand	148.8	2.5
Maximum Daily Demand	371.4	6.2
Peak Hour	816.6	13.6
Fire Flow #1 Demand	10,000	166.7
Fire Flow #2 Demand	13,000	216.7

Scenario (Phase 6)	Demand	
	L/min	L/s
Average Daily Demand	142.2	2.4
Maximum Daily Demand	354.6	5.9
Peak Hour	780.6	13.0
Fire Flow #1 Demand	10,000	166.7
Fire Flow #2 Demand	13,000	216.7

Number of Connections: 9

BOUNDARY CONDITIONS

Location:

Results:

Connection #: 1 – Aquaview Dr. First Connection

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.1	57.2
Peak Hour	123.8	48.3
Max Day Plus Fire (10,000) L/min	124.4	49.1
Max Day Plus Fire (13,000) L/min	123.8	49.9

[1]Elevation: **89.72 m**

Connection #: 2 – Aquaview Dr. Second Connection

BOUNDARY CONDITIONS

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.1	57.4
Peak Hour	123.8	48.5
Max Day Plus Fire (10,000) L/min	124.8	49.9
Max Day Plus Fire (13,000) L/min	123.8	48.5

[1]Elevation: **89.83 m**

Connection #: 3 – Salzburg Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.1	58.3
Peak Hour	123.7	49.4
Max Day Plus Fire (10,000) L/min	121.0	45.4
Max Day Plus Fire (13,000) L/min	119.1	42.8

[1]Elevation: **89.03 m**

Connection #: 4 – Trim Rd

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.0	57.3
Peak Hour	123.7	48.3
Max Day Plus Fire (10,000) L/min	120.4	47.8
Max Day Plus Fire (13,000) L/min	118.4	40.7

[1]Elevation: **89.71 m**

Connection #: 5 – Provence Ave – First Connection

BOUNDARY CONDITIONS

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.0	59.6
Peak Hour	123.7	40.7
Max Day Plus Fire (10,000) L/min	121.6	47.7
Max Day Plus Fire (13,000) L/min	119.9	45.3

[1]Elevation: **88.08 m**

Connection #: 6 – Provence Ave – Second Connection

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	59.3
Peak Hour	123.7	50.2
Max Day Plus Fire (10,000) L/min	119.9	44.9
Max Day Plus Fire (13,000) L/min	116.7	40.4

[1]Elevation: **88.33 m**

Connection #: 7 – Provence Ave and Grapefern Terr

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.0	57.4
Peak Hour	123.7	48.2
Max Day Plus Fire (10,000) L/min	119.9	44.9
Max Day Plus Fire (13,000) L/min	117.4	39.4

[1]Elevation: **90.63 m**

Connection #: 8 – Plainridge Cres and Plainhill Dr.

BOUNDARY CONDITIONS

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.0	58.5
Peak Hour	123.7	49.4
Max Day Plus Fire (10,000) L/min	119.6	43.7
Max Day Plus Fire (13,000) L/min	117.3	40.4

[1]Elevation: **91.08 m**

Connection #: 9 – Nantes Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.0	56.7
Peak Hour	123.7	47.7
Max Day Plus Fire (10,000) L/min	120.9	43.8
Max Day Plus Fire (13,000) L/min	118.9	40.9

[1]Elevation: **90.105 m**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

2) Connection locations included in this boundary condition maybe different from initial request provided by the representing consulting firm in order to better represent current water hydraulic model.

3) 203 mm watermain at Salzburg Dr. is expected to be looped by preferably connecting to 203 mm watermain stub at Millennium Blvd and Trim Rd.

4) 203 mm watermain at Plainridge cres is expected to loop connect with the other 203 mm main extending through Grapfern Terr.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Provence Orleans Phase 6
Watermain Demand Calculations

Phase	Node		Units			Pop.	Demand (L/s)		
	No.	Elev (m)	Single	Town	Apt.		High Pres.	Max Daily	Peak Hour
Phase 6	1		7		156	305	1.24	3.09	6.80
	2		4		156	295	1.20	2.99	6.57
	3		11		0	38	0.15	0.38	0.85
	4		15		0	51	0.21	0.52	1.14
	5		11		0	38	0.15	0.38	0.85
	6			11	0	30	0.12	0.30	0.67
	7			33	0	90	0.36	0.91	2.01
	8			33	0	90	0.36	0.91	2.01
	9			25	0	68	0.28	0.69	1.52
	11		9		0	31	0.13	0.31	0.69
			57	**102**	**312**	**Subtotal**	**4.20**	**10.49**	**23.08**

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

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 117155
Project Name: Provence Orleans Subdivision Phase 6
Date: 10/31/2019
Input By: Mark Bowen
Reviewed By: Melanie Riddell, P. Eng.

Legend: Input by User; No Information or Input Required

Building Description: Singles
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction	No	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		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**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**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 %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**4,463**
		East Side	10.1 - 20 m		15%	
		South Side	0 - 3 m		25%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**75%**	
Results						
6	**(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
7	**Storage Volume**	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 Project #: 117155
Project Name: Provence Orleans Subdivision Phase 6
Date: 10/31/2019
Input By: Mark Bowen
Reviewed By: Melanie Riddell, P. Eng.

Legend: Input by User; No Information or Input Required

Building Description: Block Townhouses
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction	No	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	550			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**1,100**	
	F	**Base fire flow without reductions**				**11,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**9,350**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**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 %)**				**Surcharge**	
	(3)	North Side	2Hr Fire Wall		10%	**3,273**
		East Side	30.1- 45 m		5%	
		South Side	2Hr Fire Wall		10%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**35%**	
Results						
6	**(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
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1950

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 117155
Project Name: Provence Orleans Subdivision Phase 6
Date: 10/31/2019
Input By: Mark Bowen
Reviewed By: Melanie Riddell, P. Eng.

Legend: Input by User; No Information or Input Required

Building Description: Multi-Use Block (assumed)
Ordinary construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1	
		Ordinary construction		1		
		Non-combustible construction	No	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1140			
		Number of Floors/Storeys	6			
		Area of structure considered (m^2)			**6,840**	
	F	**Base fire flow without reductions**				**18,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**15,300**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,590**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**-30%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**4,590**
		East Side	30.1- 45 m		5%	
		South Side	10.1 - 20 m		15%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**30%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**15,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**250**
				or	USGPM	3,963
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2700

Provence Orleans Subdivision Phase 6
High Pressure Condition

Phase	Node		Demand (LPS)	Head (m)	Pressure		Age
	No.	Elev (m)			(m)	(PSI)	(hrs)
Phase 6	1	90.1	1.20	130.0	39.9	57.0	0.8
	2	90.5	1.24	130.0	39.5	56.4	3.4
	3	90.7	0.15	130.0	39.3	56.1	10.2
	4	91.3	0.21	130.0	38.7	55.3	5.1
	5	91.2	0.15	130.0	38.8	55.4	3.4
	6	91.1	0.12	130.0	38.9	55.6	2.7
	7	91.0	0.36	130.0	39.0	55.7	6.8
	8	90.6	0.36	130.0	39.4	56.3	1.6
Existing	9	90.0	0.28	130.0	40.0	57.1	0.3
	10	90.9	0.00	130.0	39.1	55.9	1.8
	11	90.3	0.13	130.0	39.7	56.7	0.8
Boundary Conditions	101	-	-	130.0	-	-	-
	102	-	-	130.0	-	-	-
	103	-	-	130.0	-	-	-

Provence Orleans Subdivision Phase 6
Peak Hour Condition

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	6.80	123.6	33.5	47.9
	2	90.5	6.60	123.6	33.1	47.3
	3	90.7	0.85	123.6	32.9	47.0
	4	91.3	1.14	123.6	32.3	46.2
	5	91.2	0.85	123.6	32.4	46.3
	6	91.1	0.67	123.7	32.6	46.5
	7	91.0	2.01	123.7	32.7	46.6
	8	90.6	2.01	123.7	33.1	47.2
Existing	9	90.0	1.52	123.7	33.7	48.1
	10	90.9	0.00	123.7	32.8	46.8
	11	90.3	0.69	123.7	33.4	47.7
Boundary Conditions	101	-	-	123.7	-	-
	102	-	-	123.7	-	-
	103	-	-	123.7	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 1

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	253.10	107.5	17.4	24.9
	2	90.5	3.00	107.9	17.4	24.8
	3	90.7	0.38	110.1	19.4	27.6
	4	91.3	0.52	113.1	21.8	31.1
	5	91.2	0.38	114.8	23.6	33.7
	6	91.1	0.30	115.7	24.6	35.2
	7	91.0	0.91	116.0	25.0	35.8
	8	90.6	0.91	116.4	25.8	36.8
Existing	9	90.0	0.69	116.7	26.7	38.1
	10	90.9	0.00	116.4	25.5	36.5
	11	90.3	0.31	116.9	26.6	38.0
Boundary Conditions	101	-	-	118.9	-	-
	102	-	-	117.3	-	-
	103	-	-	117.4	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 2

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	108.8	18.7	26.7
	2	90.5	253.00	104.8	14.3	20.4
	3	90.7	0.38	107.7	17.0	24.2
	4	91.3	0.52	111.7	20.4	29.1
	5	91.2	0.38	114.0	22.8	32.5
	6	91.1	0.30	115.2	24.1	34.4
	7	91.0	0.91	115.6	24.6	35.2
	8	90.6	0.91	116.0	25.4	36.3
Existing	9	90.0	0.69	116.5	26.5	37.8
	10	90.9	0.00	116.1	25.2	36.1
	11	90.3	0.31	116.8	26.5	37.8
Boundary Conditions	101	-	-	118.9	-	-
	102	-	-	117.3	-	-
	103	-	-	117.4	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 3

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	117.5	27.4	39.1
	2	90.5	3.00	116.1	25.6	36.6
	3	90.7	167.38	108.0	17.3	24.7
	4	91.3	0.52	112.9	21.6	30.8
	5	91.2	0.38	115.7	24.5	35.0
	6	91.1	0.30	117.2	26.1	37.3
	7	91.0	0.91	117.7	26.7	38.2
	8	90.6	0.91	118.2	27.6	39.5
Existing	9	90.0	0.69	118.8	28.8	41.1
	10	90.9	0.00	118.3	27.4	39.2
	11	90.3	0.31	119.0	28.7	41.0
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 4

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	118.9	28.8	41.1
	2	90.5	3.00	118.1	27.6	39.4
	3	90.7	0.38	113.4	22.7	32.4
	4	91.3	167.52	107.1	15.8	22.5
	5	91.2	0.38	112.3	21.1	30.1
	6	91.1	0.30	115.0	23.9	34.1
	7	91.0	0.91	116.0	25.0	35.7
	8	90.6	0.91	116.9	26.3	37.6
Existing	9	90.0	0.69	117.9	27.9	39.8
	10	90.9	0.00	117.1	26.2	37.4
	11	90.3	0.31	118.4	28.1	40.2
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 5

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	119.5	29.4	42.1
	2	90.5	3.00	119.0	28.5	40.7
	3	90.7	0.38	116.0	25.3	36.1
	4	91.3	0.52	111.9	20.6	29.5
	5	91.2	167.38	109.7	18.5	26.4
	6	91.1	0.30	113.4	22.3	31.8
	7	91.0	0.91	114.7	23.7	33.9
	8	90.6	0.91	116.0	25.4	36.2
Existing	9	90.0	0.69	117.2	27.2	38.9
	10	90.9	0.00	116.2	25.3	36.2
	11	90.3	0.31	118.0	27.7	39.6
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 6

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	119.9	29.8	42.6
	2	90.5	3.00	119.5	29.0	41.5
	3	90.7	0.38	117.4	26.7	38.2
	4	91.3	0.52	114.6	23.3	33.3
	5	91.2	0.38	113.0	21.8	31.2
	6	91.1	167.30	112.2	21.1	30.2
	7	91.0	0.91	113.8	22.8	32.6
	8	90.6	0.91	115.3	24.7	35.3
Existing	9	90.0	0.69	116.7	26.7	38.2
	10	90.9	0.00	115.6	24.7	35.2
	11	90.3	0.31	117.7	27.4	39.2
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 7

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	120.1	30.0	42.9
	2	90.5	3.00	119.8	29.3	41.9
	3	90.7	0.38	118.3	27.6	39.4
	4	91.3	0.52	116.1	24.8	35.5
	5	91.2	0.38	115.0	23.8	34.0
	6	91.1	0.30	114.4	23.3	33.2
	7	91.0	167.91	107.8	16.8	23.9
	8	90.6	0.91	112.0	21.4	30.6
Existing	9	90.0	0.69	116.2	26.2	37.4
	10	90.9	0.00	115.9	25.0	35.7
	11	90.3	0.31	117.9	27.6	39.4
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Maximum Daily Condition and Fire Flow at Node 8

Phase	Node		Demand (LPS)	Head (m)	Pressure	
	No.	Elev (m)			(m)	(PSI)
Phase 6	1	90.1	3.10	120.2	30.1	43.1
	2	90.5	3.00	120.0	29.5	42.1
	3	90.7	0.38	118.7	28.0	39.9
	4	91.3	0.52	116.9	25.6	36.5
	5	91.2	0.38	115.9	24.7	35.3
	6	91.1	0.30	115.4	24.3	34.7
	7	91.0	0.91	111.9	20.9	29.8
	8	90.6	167.91	108.8	18.2	26.0
Existing	9	90.0	0.69	115.9	25.9	37.0
	10	90.9	0.00	115.9	25.0	35.8
	11	90.3	0.31	117.9	27.6	39.4
Boundary Conditions	101	-	-	120.9	-	-
	102	-	-	119.6	-	-
	103	-	-	119.9	-	-

Provence Orleans Phase 6
Pipe Data

Phase	Pipe Data			
	No.	Length (m)	Size (mm)	Roughness
Phase 6	1	140	250	110
	2	60	250	110
	3	125	250	110
	4	170	250	110
	5	95	250	110
	6	50	250	110
	7	125	250	110
	9	110	250	110
Existing	10	105	200	110
	11	55	200	110
	12	65	200	110
	13	81	150	100
	14	70	150	100
	15	85	200	110

APPENDIX B
Storm and Sanitary Design

SANITARY SEWER DESIGN SHEET
Phase 6 Provence Orleans Subdivision -
Developer: Provence Orleans Realty Investment Inc c/o Regional Group

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT: 117155
DESIGNED BY : CAH
CHECKED BY : MER
DATE PREPARED : October 31, 2019

LOCATION				INDIVIDUAL					CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRANEOUS FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Apartments	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 11	1111	1109	7	6			0.0204	0.46	0.020	0.460	4.0	0.33	0.13	0.46	11.3	200	203.20	DR 35	0.65	27.6	0.85	2%
Street 11	1109	1107	6	7			0.0238	0.47	0.024	0.930	4.0	0.39	0.26	0.65	82.2	200	203.20	DR 35	0.35	20.2	0.62	3%
Street 11	1107	1105	5	0			0.0000	0.03	0.024	0.960	4.0	0.39	0.27	0.65	13.3	200	203.20	DR 35	0.35	20.2	0.62	3%
Street 11	1105	1103	1+4	4		156	0.3412	0.96	0.365	1.920	4.0	5.91	0.54	6.45	57.7	200	203.20	DR 35	0.35	20.2	0.62	32%
Street 11	1103	1101	1+3	5		156	0.3446	1.19	0.710	3.110	3.9	11.19	0.87	12.06	41.3	200	203.20	DR 35	0.35	20.2	0.62	60%
Outlet #1									0.710	3.11		11.19	0.87	12.06								
Street 11	1111	1113	8	2			0.0068	0.11	0.007	0.110	4.0	0.11	0.03	0.14	11.3	200	203.20	DR 35	0.65	27.6	0.85	1%
Street 11	1113	1115	9	13			0.0442	0.75	0.051	0.860	4.0	0.83	0.24	1.07	82.2	200	203.20	DR 35	0.35	20.2	0.62	5%
Street 11	1115	1117	10	1			0.0034	0.13	0.054	0.990	4.0	0.88	0.28	1.16	13.3	200	203.20	DR 35	0.35	20.2	0.62	6%
Street 11	1117	1119	11	10			0.0340	0.64	0.088	1.630	4.0	1.43	0.46	1.89	57.7	200	203.20	DR 35	0.35	20.2	0.62	9%
Plainridge Crescent	1205	1203	12		11		0.0297	0.43	0.030	0.430	4.0	0.48	0.12	0.60	11.3	200	203.20	DR 35	0.65	27.6	0.85	2%
Plainridge Crescent	1203	1201	13		5		0.0135	0.24	0.043	0.670	4.0	0.70	0.19	0.89	82.2	200	203.20	DR 35	0.35	20.2	0.62	4%
Plainridge Crescent	1201	1119	14		16		0.0432	0.48	0.086	1.150	4.0	1.40	0.32	1.72	13.3	200	203.20	DR 35	0.35	20.2	0.62	9%
Plainridge Crescent	1119	1211	15		5		0.0135	0.20	0.188	2.98	4.0	3.05	0.83	3.89	11.3	200	203.20	DR 35	0.65	27.6	0.85	14%
Outlet #2									0.188	2.98		3.05	0.83	3.89								
Plainridge Crescent	1205	1207	16		5		0.0135	0.23	0.014	0.230	4.0	0.22	0.06	0.28	11.6	200	203.20	DR 35	0.65	27.6	0.85	1%
Plainridge Crescent	1207	EX	17		3		0.0081	0.11	0.008	0.340	4.0	0.13	0.10	0.23	12.0	200	203.20	DR 35	0.35	20.2	0.62	1%
Outlet #3									0.008	0.34		0.13	0.10	0.23								

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)

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 2.1 persons/apartment)
q = Average per capita flow = 350 L/cap/day - Residential
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)

Phase 6 Provence Orleans Subdivision -

Developer: Provence Orleans Realty Investment Inc c/o Regional Group

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 117155
DESIGNED BY : CAH
CHECKED BY :
DATE PREPARED : 31-Oct-19
DATE REVISED :

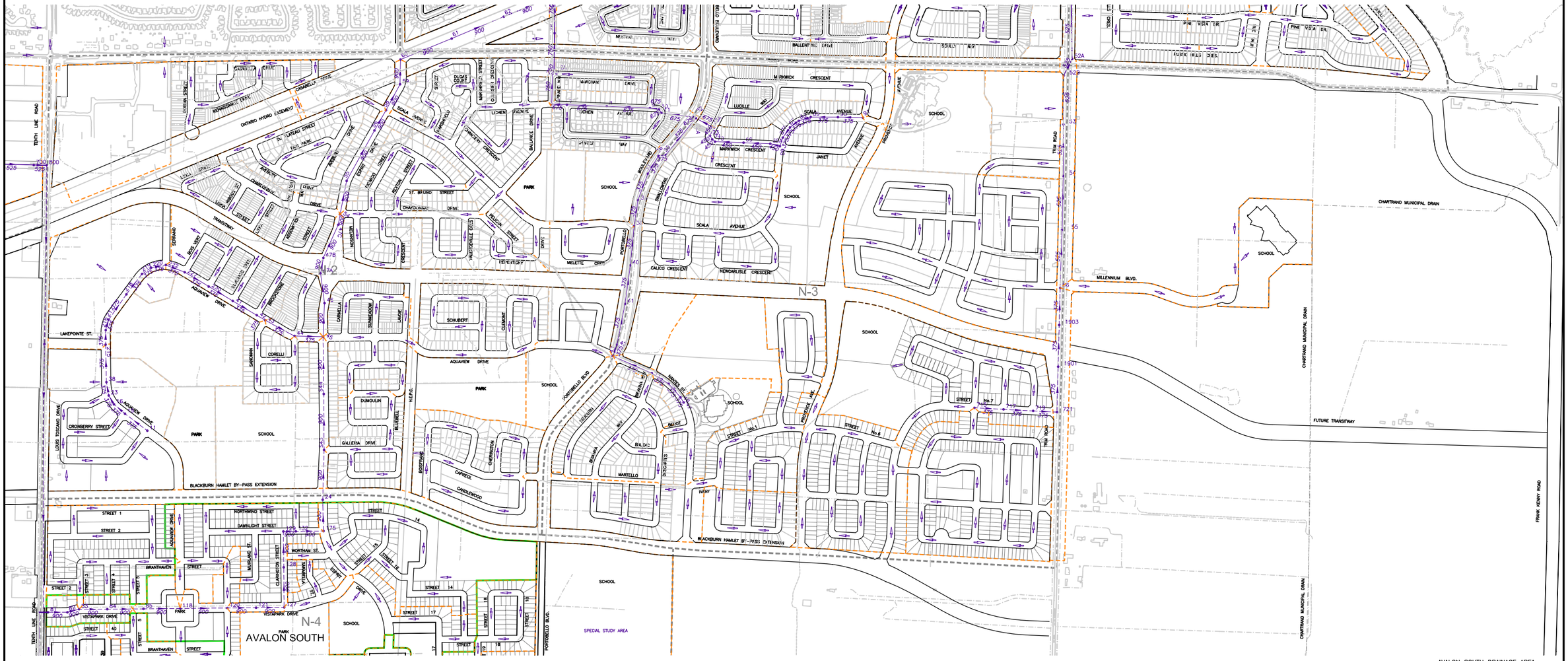
LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
STREET 11	1110	1108		0.47	0.65	0.85	0.85	10.00	104	**88.5**	CONC	450	457	0.20	98.8	133.0	0.81	2.03	67%
STREET 11	1108	1106		0.46	0.65	0.83	1.68	12.03	95	**158.9**	CONC	525	533	0.20	93.9	200.6	0.90	1.74	79%
STREET 11	1106	1104		0.03	0.65	0.05	1.73	13.78	88	**152.2**	CONC	525	533	0.20	14.6	200.6	0.90	0.27	76%
STREET 11	1104	1102		0.23	0.65	0.42	2.15	14.05	87	**186.6**	CONC	600	610	0.20	62.3	286.5	0.98	1.06	65%
STREET 11	1102	1100		1.93	0.65	3.49	5.64	15.10	83	**469.2**	CONC	750	762	0.20	107.7	519.4	1.14	1.58	90%
STREET 11	1100	EX		0.11	0.65	0.20	5.84	16.68	78	**458.1**	CONC	750	762	0.20	50.6	519.4	1.14	0.74	88%
OUTLET #1								**16.68**											
STREET 11	1110	1112		0.09	0.65	0.16	0.16	10.00	104	**16.9**	CONC	450	457	0.30	15.5	162.9	0.99	0.26	10%
STREET 11	1112	1114		0.72	0.65	1.30	1.46	10.26	103	**150.5**	CONC	450	457	0.40	107.4	188.1	1.15	1.56	80%
STREET 11	1114	1116		0.19	0.65	0.34	1.81	11.82	95	**172.5**	CONC	525	533	0.25	11.7	224.3	1.00	0.19	77%
STREET 11	1116	1118		0.62	0.65	1.12	2.93	12.02	95	**277.0**	CONC	600	610	0.30	78.9	350.8	1.20	1.09	79%
								13.11											
PLAINRIDGE CRESCENT	1204	1202		0.47	0.65	0.85	0.85	10.00	104	**88.5**	DR 35	375	381	0.30	67.3	100.2	0.88	1.28	88%
PLAINRIDGE CRESCENT	1202	1200		0.18	0.65	0.33	1.17	11.28	98	**115.0**	CONC	450	457	0.25	13.8	148.7	0.91	0.25	77%
PLAINRIDGE CRESCENT	1200	1118		0.53	0.65	0.96	2.13	11.53	97	**206.3**	CONC	600	610	0.15	78.1	248.1	0.85	1.53	83%
								13.06											
PLAINRIDGE CRESCENT	1118	1210		0.21	0.65	0.38	5.44	13.11	90	**490.6**	CONC	825	838	0.15	42.5	580.0	1.05	0.67	85%
OUTLET #2																			
PLAINRIDGE CRESCENT	1204	1206		0.19	0.65	0.34	0.34	10.00	104	**35.8**	DR 35	300	305	0.35	11.6	59.7	0.82	0.24	60%
PLAINRIDGE CRESCENT	1206	EX		0.09	0.65	0.16	0.51	10.24	103	**52.1**	DR 35	375	381	0.25	14.9	91.5	0.80	0.31	57%
OUTLET #3																			

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.



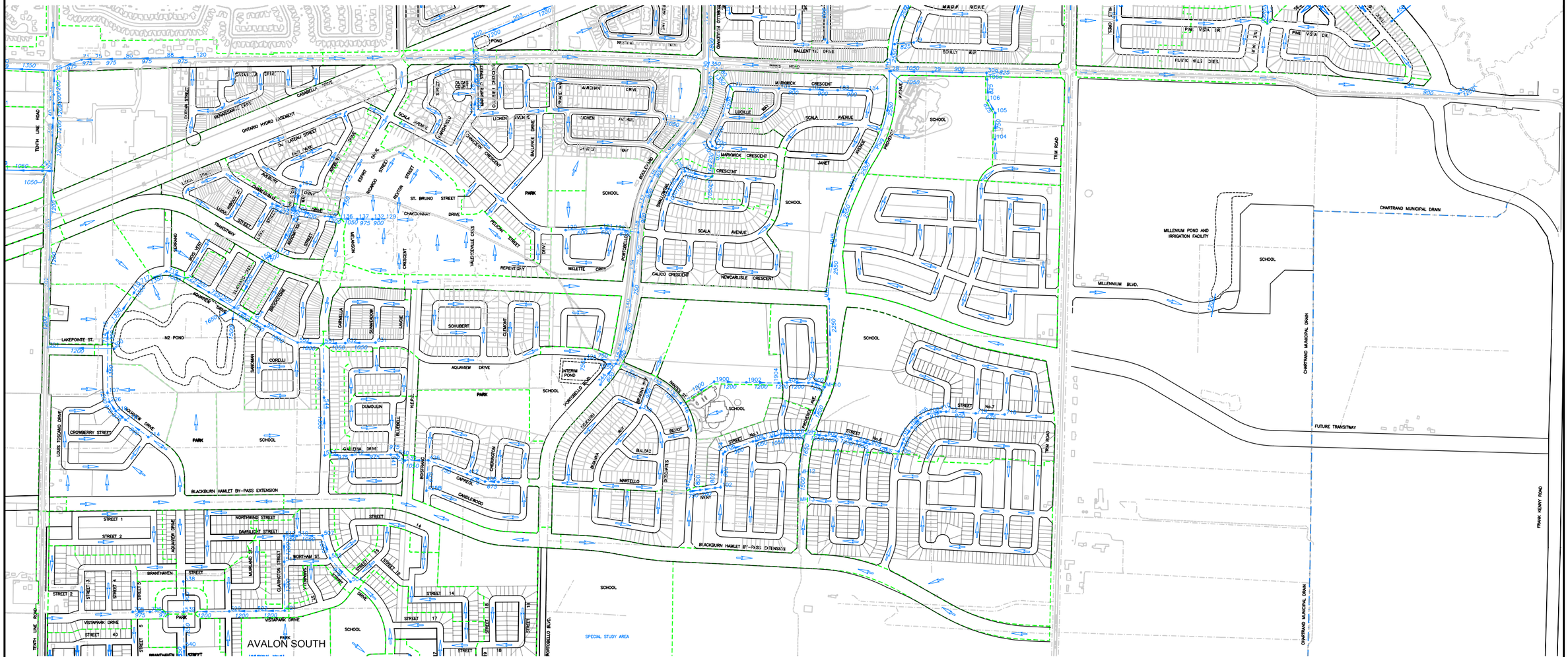
AVALON SOUTH DRAINAGE AREA BOUNDARY BETWEEN GRAVITY SEWER TO ESPRIT DRIVE AND SANITARY SEWER TO TENTH LINE PUMPING STATION.

0 50 150 250m

- NEIGHBOURHOOD BOUNDARY
- EUC AREA BOUNDARY
- FUTURE SANITARY FORCEMAIN
- EXISTING SANITARY FORCEMAIN
- EXISTING SANITARY SEWER
- FUTURE SANITARY SEWER
- SANITARY DRAINAGE AREA
- 375 SANITARY SEWER SIZE
- 101 MANHOLE AND NUMBER
- COLLECTOR SEWER FLOW DIRECTION
- LOCAL SEWER FLOW DIRECTION
- EXISTING SANITARY PUMP STATION
- FUTURE SANITARY PUMP STATION

SANITARY COLLECTOR SEWERS AND DRAINAGE AREAS

FIRST SUBMISSION:		FEB., 2004	SAN 2
REVISION No.:	5	JUNE, 2006	



0 50 150 250m

- NEIGHBOURHOOD BOUNDARY
- EUC AREA BOUNDARY
- EXISTING STORM SEWER
- FUTURE STORM SEWER
- FUTURE MELTWATER FORCEMAIN
- STORM DRAINAGE AREA
- 900 STORM SEWER SIZE
- EXISTING SWM POND
- FUTURE SWM POND
- 101 MANHOLE AND NUMBER
- COLLECTOR SEWER FLOW DIRECTION
- LOCAL SEWER FLOW DIRECTION
- FUTURE MELTWATER PUMP STATION
- FUTURE DITCH REGRADING

STORM COLLECTOR SEWERS AND DRAINAGE AREAS

FIRST SUBMISSION:	FEB., 2004	STM 2
REVISION No.: 5	JUNE, 2006	

APPENDIX C
Stormwater Management

APPENDIX B

Cumberland EUC Expansion Area Drainage Guidelines

Stantec

CITY OF CUMBERLAND

UPDATE TO MASTER DRAINAGE PLAN
EAST URBAN COMMUNITY EXPANSION AREA

PROJECT 3133-LD

AUGUST 2000

City of Cumberland

Cumming Cockburn Ltd
Consulting Engineers, Planners and Environmental Scientists

5.0 LEVEL OF SERVICE

Through meetings with the City of Cumberland regarding acceptable levels of service, it was agreed the following criteria would be utilized within this study area.

I Minor System

I-a Storm sewers will be designed using the Rational formula for the 5 year storm using a 20 minute inlet time. Hydraulic grade line should be evaluated using the steady state Darcy-Weisbach formula.

I-b On an average basis, inflow rates into the minor system should be limited to 70 l/s/ha. All residential inlets will be equipped with inlet restrictions limiting flows to:

- 13.4 l/sec at a density of 5.2 minor system inlets per hectare, or
- 19.8 l/sec at a density of 3.5 minor system inlets per hectare, or a
- combination of both (not exceeding 70 l/s/ha).

(The term "inlet" means: "a single catchbasin" or "a group of interconnected catchbasins" connected by a single lead into the minor system).

I-c Catchbasin densities and capacities for commercial development should be assessed on a site specific basis to limit the inflow into the minor system to a maximum of 70 l/s/ha.

I-d Maximum permitted hydraulic grade line elevation to be 0.30 m below the underside of basement floor slab (top of footing).

II Major System

II-a Grading designs are to be based on split lot drainage.

II-b The major system should be designed to accommodate on-site detention with sufficient capacity to attenuate the July 1st 1979 storm.

II-c Modeling or detailed stormwater management calculations are required for residential subdivisions with an average runoff coefficient higher than c=0.6

and for commercial developments.

II-d The minimum on site storage is to be 150m³/ha (this storage is to be determined at 0.3 m depth on streets and 0.4 m depth in rear yards). Emergency storage in parks and other areas available for surface storage is also to be provided, unless there is a sufficient major system outlet (example: natural watercourse). A minimum of 30m³/ha of emergency storage must be provided. On site storage can be replaced with additional park storage where design constraints dictate. Where the minimum on-site detention requirement of 150 m³/ha cannot be met and where the residential development exceeds 10 hectares in area, modeling will be required to support the proposed major system routing.

II-e On-site detention storage may be provided in the following areas:

- low lying park surfaces; and/or
- road/rear yard low points (sawtoothing design).

II-f Calculation of the actual distributed on-site storage should be supported by stage storage curves developed by the design engineer. The depth and extent of surface storage is to be illustrated on the applicable grading plan.

II-g Maximum hydrostatic ponding depth on low lying park surfaces and the design stage storage curves should be determined and provided on a site specific basis.

II-h The grading plan is to be co-ordinated with the required ponding and the specified house grade is to be set 0.3 m above the ponding depths stated in IId.

II-i The City of Cumberland reserves the right to request detailed modeling if deemed warranted.

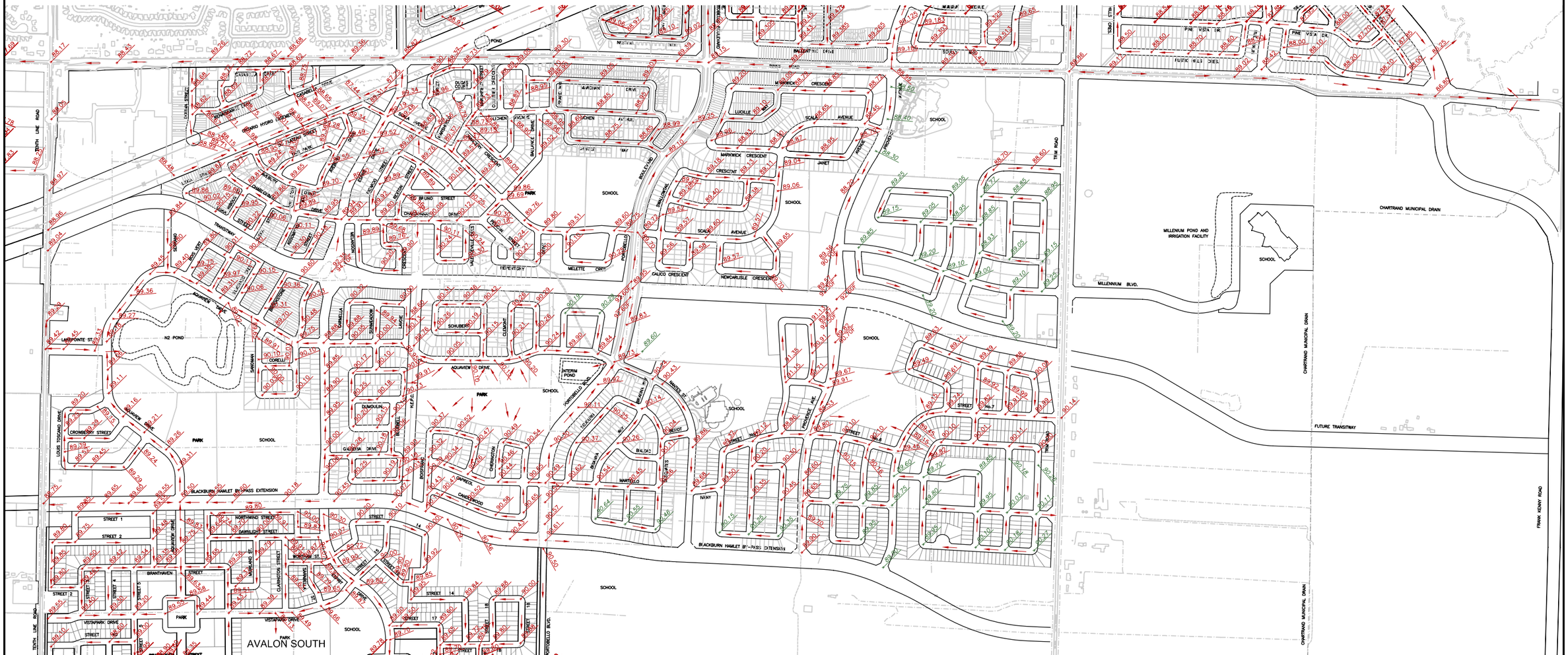
III Street Emergency Overflow

III On street routing to emergency storage areas must be provided and illustrated on the grade control plan or surface storage plan. This routing must incorporate a maximum 0.3 m grade difference between any high point and the adjacent upstream low point. An overall positive slope will be required across consecutive high points for routing purposes.

It should be noted that the City of Cumberland's decision to use split lot drainage in lieu of back to front drainage, wherever possible (see Item II-a) results in a significant increase in the level of protection to all new houses, by directing all surface drainage away from the house. This new grading scenario results in the house becoming the highest point on the lot. This grading method provides additional surface storage potential in rear yards which means that houses will be less likely to flood in any given major storm event.

The decision to use the split lot drainage in lieu of back to front drainage also provided an opportunity for the interconnection of the rear yard catchbasins and for further restriction of inflow into the storm sewer system. With the new design standard, both the street and rear yard catchbasins are now restricted to the design capacity of the sewer system. The updated Master Drainage Plan also establishes the release flow rate at a maximum of 70 litres per second per hectare (see Item I-b), which is generally a slightly higher level of protection than the 5 year rational design. A combination of all of these features reduces the potential for the storm sewer system to be surcharged during major storm events and therefore reduces the potential for basement flooding, thereby further increasing the level of protection to the residents.

The surface storage requirements outlined in II-d,e,f,g,h and III recognize the on site storage potential in street sags and rear yard sags. The suggested design guidelines also provide a higher level of protection by requiring overall surface routing through streets to a positive surface outlet such as a natural water course, or routing to an area such as a park land, where additional storage space is to be provided. The routing and the additional storage space provided in open spaces, as well as the inherent storage available in the system due to the hydraulics of surface routing in flat areas provides a high level of protection against flooding of homes for events in excess of the 1:100 year design storm and the July 1, 1979 event, which is consistent with the City's desire to improve the level of protection.



0 50 150 250m

- NEIGHBOURHOOD BOUNDARY
- EUC AREA BOUNDARY
- EXISTING SWM POND
- FUTURE SWM POND
- 89.45 APPROVED DESIGN BY OTHERS
- 89.45 DESIGN BY OTHERS NOT APPROVED
- 89.30 CONCEPTUAL DESIGN BY STANTEC (CONCEPTUAL GRADES ARE PROVIDED FOR REFERENCE PURPOSES ONLY AND ARE SUBJECT TO THE FINDINGS OF DETAILED GEOTECHNICAL AND ENGINEERING STUDIES.)
- 89.45F FUTURE DESIGN BY OTHERS
- DIRECTION OF MAJOR SYSTEM FLOW

MACRO GRADING PLAN

FIRST SUBMISSION:		FEB., 2004	GRD2
REVISION No.:	5	JUNE, 2006	

APPENDIX D
Development Servicing Study Checklist

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	7.0	

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.	NA		
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.	NA		
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	4.0	
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	
Analysis of the available capacity in existing public infrastructure.	Y	5	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Figures 5 to 7
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	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	5	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	5	
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.	NA		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	5	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	5	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	
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		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	5	Appendix C

Development Servicing Study Checklist

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	Appendix C

4.4 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of municipal drains and related approval requirements.	Y	5	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	5	
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	8	
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		

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.	NA		
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		

Development Servicing Study Checklist

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	9.0	

APPENDIX E
Plans

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.

Unit Breakdown / Phase

Phase #	50' Singles	42' Singles	35' Singles	31' Singles	Street Towns	Multi Unit	Total
Phase 6	17	9	18	4	62	312	422

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

No.	REVISION	DATE	BY
3.	REVISED UNIT COUNT	NOV 08/19	MER
2.	REVISED MULTI UNIT BLOCKS	SEPT 05/19	MER
1.	ISSUED FOR DISCUSSION	APR 17/19	MER

SCALE
1:1000

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

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
PROVENCE ORLEANS SUBDIVISION (2128 TRIM ROAD)

DRAWING NAME
CONCEPT PLAN 17
PHASE 6

PROJECT No. 117155-00
REV REV #2
DRAWING No. 117155-CP17

PLAN24x36.DWG - 914.4mmx609.6mm

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 _____, 20__

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

KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 2
CONCESSION 9
Geographic Township of Cumberland
And
BLOCKS 264, 288, 340, 341 and 343
REGISTERED PLAN 4M-1313
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 750

10 22.5 15 7.5 0 15 30 Metres

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

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

Oct 29/19
Date

T. Harbwick
ONTARIO LAND SURVEYOR

Owner's Certificate

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

Oct 30/19
Date

David Kardish
Provence Orleans Realty Investments Inc.
I have authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) single and multi-family residential housing and park land
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) Block 49 is subject to easement, Inst.'s OC563083 and OC668518. Block 50 is subject to easement, Inst.'s OC563083, OC668494 and OC668518.

NOTES AND LEGEND

BLOCK 264* Denotes Lands to be transferred to developer prior to registration.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: ltsurvey@aovltd.com
Ontario Land Surveyors

Job No. 9981-9 Reqnd Pl Lt 2 Cn 09 CU Pt2 RP5 F N