vallee

Consulting Engineers,
Architects & Planners

September 14, 2023

Norfolk County
Community Development Division
185 Robinson Street
Simcoe, Ontario N3Y 5L6

Attention: **Mohammad Alam, Principal Planner**

Reference: **Ryder Subdivision**
Zoning By-Law Amendment and Draft Plan of Subdivision
Delhi, Norfolk County
Our File 21-259

Please accept this package as our formal application for the following planning applications:

1. **Zoning By-Law Amendment**: The Zoning By-Law amendment proposal is required for the following purposes:

    a. Change the existing zoning from Urban Residential Type 1 (R1-A) and Urban Residential Type 2 (R2) to Urban Residential Type 1 (R1-B) for Single Detached dwellings with a special provision for relief of lot and yard provisions.

    b. Change the existing zoning from R1-A and R2 to Urban Residential Type 4 (R4) for Street Townhouses with a special provision for relief of lot and yard provisions.

    c. Change the existing zoning from R1-A and R2 to R4 with a special provision to permit Dual Frontage Townhouses and for relief of lot and yard provisions.

    d. Change the existing zoning from R1-A to Open Space (OS) to permit the establishment of a public park and stormwater management pond.

2. **Draft Plan of Subdivision:** To implement the necessary lot fabric and road pattern required to support the proposed development concept.

In response to Norfolk County's minutes issued in November of 2022 relating to the pre-consultation meeting of September 14, 2022, we include the following documents as part of our complete application package:

1. A copy of the Norfolk County minutes issued in November 2022 from the September 14, 2022, pre-consultation meeting, signed by Mr. Scott Puillandre. It should be noted that formal comments from Norfolk County Development Engineering have not been issued.

2. Completed and executed Norfolk County Planning Department Development Application Form.

3. Planning Justification Report as prepared by G. Douglas Vallee Limited.

4. Draft Plan of Subdivision as prepared by G. Douglas Vallee Limited.

5. Zoning Map as prepared by G. Douglas Vallee Limited.

6. Phasing Plan as prepared by G. Douglas Vallee Limited.

7. Functional Servicing Report to include a Stormwater Management Brief and General Plan of Services as prepared by G. Douglas Vallee Limited.

8. Traffic Impact Study as prepared by Paradigm traffic consultants.

9. Concept Elevation Plans.

10. A cheque in the amount of $15,089 for the Zoning Bylaw Amendment application and a cheque in the amount of $30,490 for the Plan of Subdivision Application. The cheques were hand delivered to the Robinson Administration building on September 14th, 2023.

Should you have any questions or comments, please contact me directly. Thank you in advance for your efforts on this project.

Scott Puillandre, Planner
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners
H:\Projects\2021\21-259 Ryder Subdivision Delhi\Agency\Zoning\ZBA Submission Cover Letter.docx

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Ontario Association of Architects

BIG SKY

SIMCOE 2

PROPOSED PRODUCT DESIGN

CALIBREX

BIG SKY

DUAL FRONTAGE TOWNHOMES

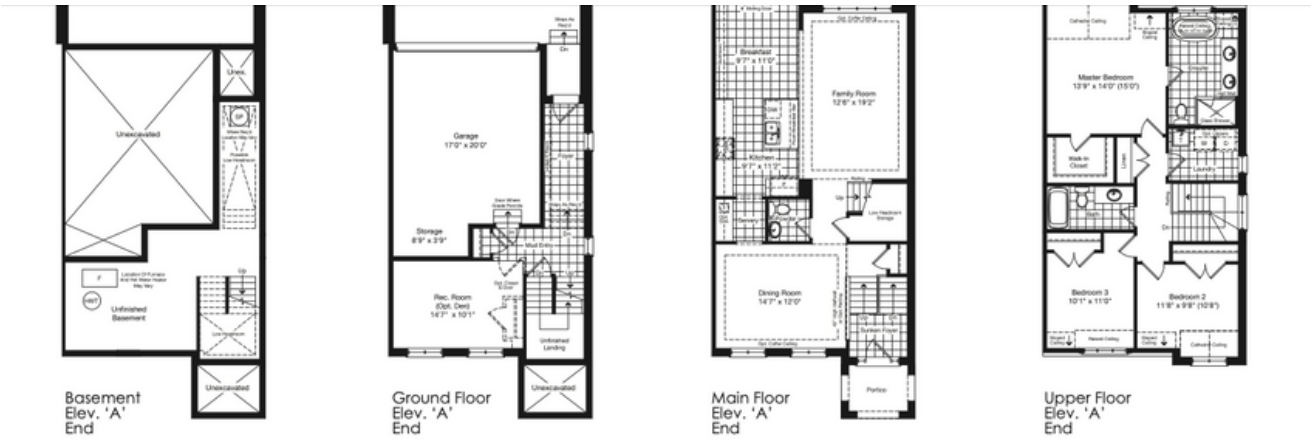
CONCEPT

Images portraited above reflect CONCEPTUAL plans with look & feel | For discussion purpose only and in no shape represents creative ownership | Without prejudice, E.O.&E.

CALIBREX

BIG SKY

CONCEPT ONLY



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BIG SKY

TOWNHOMES

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CALIBREX

BIG SKY

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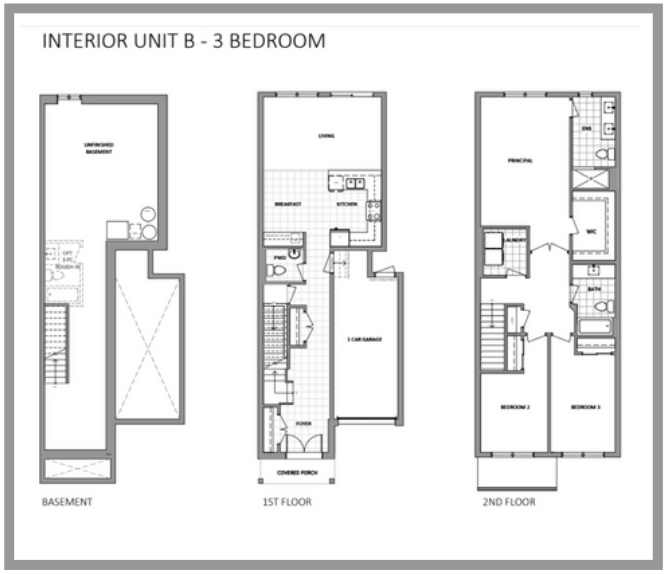

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BIG SKY

30' DETACHED

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CALIBREX

BIG SKY

36' DETACHED

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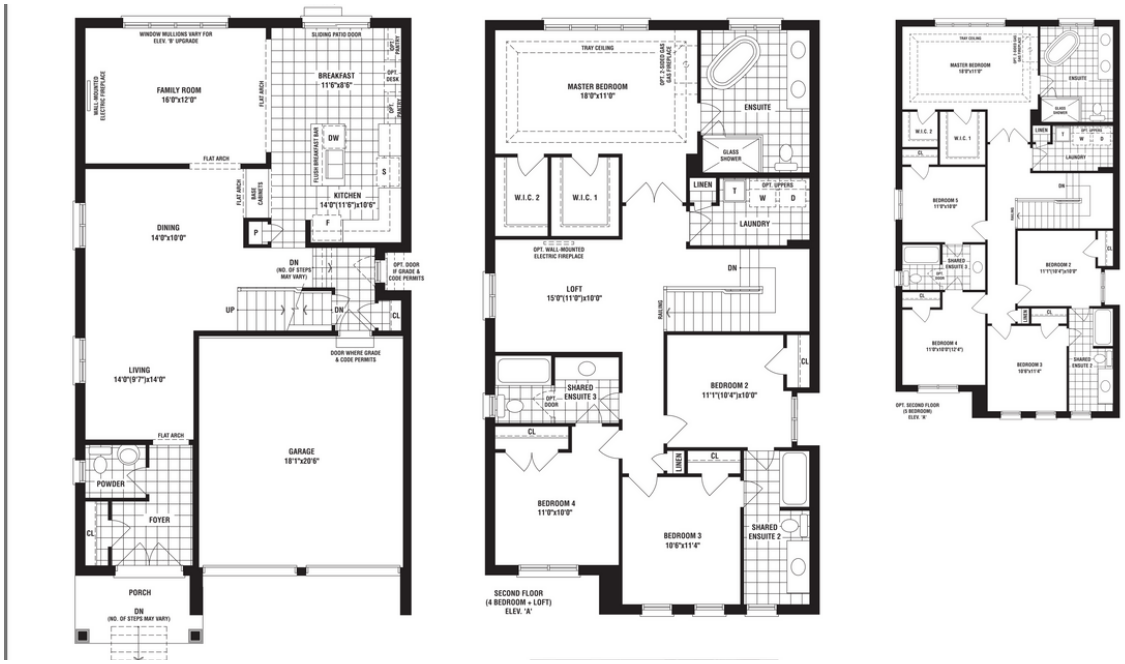
CALIBREX

BIG SKY

CONCEPT ONLY



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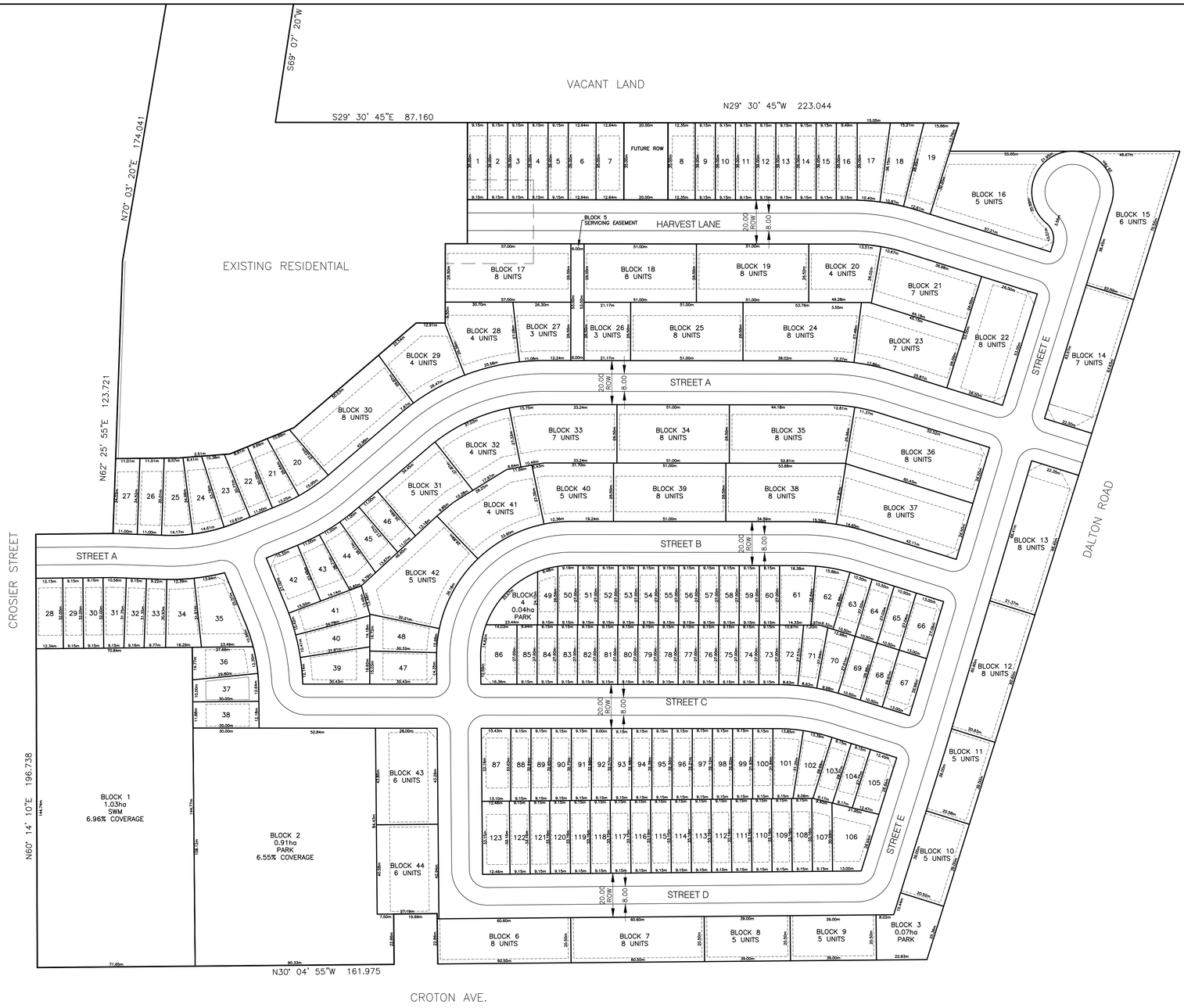

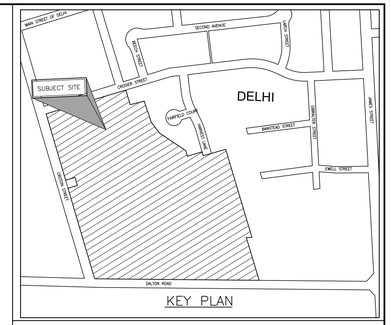

KEY PLAN

DRAFT PLAN OF SUBDIVISION

OF PART OF

LOT 4, BLOCK 42

OF REGISTERED PLAN 189

DELHI

IN

NORFOLK COUNTY

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATED: _____

_____

ONTARIO LAND SURVEYOR

OWNER'S CONSENT

I HEREBY CONSENT TO THE FILING OF THIS PLAN IN DRAFT FORM FOR APPROVAL.

DATED: _____

OWNER: _____

OWNER: _____

OWNER: _____

SECTION 51 (17) PLANNING ACT, R.S.O. 1990

(a) THE BOUNDARIES OF THE LAND PROPOSED TO BE SUBDIVIDED, CERTIFIED BY AN ONTARIO LAND SURVEYOR; SHOWN ON DRAWING

(b) THE LOCATIONS, WIDTHS AND NAMES OF THE PROPOSED HIGHWAYS WITHIN THE PROPOSED SUBDIVISION AND OF EXISTING HIGHWAYS ON WHICH THE PROPOSED SUBDIVISION ABUTS; SHOWN ON DRAWING

(c) ON A SMALL KEY PLAN, ON A SCALE OF NOT LESS THAN ONE CENTIMETRE TO 100 METRES, ALL OF THE LAND ADJACENT TO THE PROPOSED SUBDIVISION THAT IS OWNED BY THE APPLICANT OR IN WHICH THE APPLICANT HAS INTEREST, EVERY SUBDIVISION ADJACENT TO THE PROPOSED SUBDIVISION AND THE RELATIONSHIP OF THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED TO THE BOUNDARIES OF THE TOWNSHIP LOT OR OTHER ORIGINAL GRANT OF WHICH THE LAND FORMS THE WHOLE OR PART; SHOWN ON DRAWING

(d) THE PURPOSE FOR WHICH THE PROPOSED LOTS ARE TO BE USED; SEE LAND USE TABLE.

(e) THE EXISTING USES OF ALL ADJOINING LANDS; SHOWN ON DRAWING

(f) THE APPROXIMATE DIMENSIONS AND LAYOUT OF THE PROPOSED LOTS; SHOWN ON DRAWING

(f.1) IF ANY AFFORDABLE HOUSING UNITS ARE BEING PROPOSED, THE SHAPE AND DIMENSIONS OF EACH PROPOSED AFFORDABLE HOUSING UNIT AND THE APPROXIMATE LOCATION OF EACH PROPOSED AFFORDABLE HOUSING UNIT IN RELATION TO OTHER PROPOSED RESIDENTIAL UNITS;

(g) NATURAL AND ARTIFICIAL FEATURES SUCH AS BUILDINGS OR OTHER STRUCTURES OR INSTALLATIONS, RAILWAYS, HIGHWAYS, WATERCOURSES, DRAINAGE DITCHES, WETLANDS AND WOODED AREAS WITHIN OR ADJACENT TO THE LAND PROPOSED TO BE SUBDIVIDED; SHOWN ON DRAWING

(h) THE AVAILABILITY AND NATURE OF DOMESTIC WATER SUPPLIES; A MUNICIPAL WATER SUPPLY WILL BE INSTALLED BY THE DEVELOPER IN ACCORDANCE WITH THE REQUIREMENTS OF NORFOLK COUNTY.

(i) THE NATURE AND POROSITY OF THE SOIL; SOIL NATURE – SAND ; SOIL POROSITY – HIGH

(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; SHOWN ON DRAWING

(k) THE MUNICIPAL SERVICES AVAILABLE OR TO BE AVAILABLE TO THE LAND PROPOSED TO BE SUBDIVIDED; MUNICIPAL SERVICES INCLUDING WATER SUPPLY, SANITARY SEWERS, STORM SEWERS, CURB AND GUTTER, PAVED ROADS, STREET LIGHTING AND SIDEWALKS WILL BE INSTALLED BY THE DEVELOPER IN ACCORDANCE WITH THE REQUIREMENTS OF NORFOLK COUNTY.

(l) THE NATURE AND EXTENT OF ANY RESTRICTIONS AFFECTING THE LAND PROPOSED TO BE SUBDIVIDED, INCLUDING RESTRICTIVE COVENANTS OR EASEMENTS; NO RESTRICTIVE COVENANTS IN EXCESS OF THE EXISTING ZONING AND BUILDING BY–LAWS ARE PROPOSED. SEE LAND USE TABLE.

DATE	REVISION

RYDER SUBDIVISION DRAFT PLAN

TOWN OF DELHI

DRAWN BY:	DESIGNED BY:	CHECKED BY:	SCALE
NBN/TJC	NBN/TJC	JTI	1:1000

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

DATE: AUG 10/23

DRAWING NO.: 21-259-DP

LEGEND:

- SITE TRIANGLE TO FORM PART OF THE ROAD ALLOWANCE
- 0.3m RESERVE
- CENTRELINE TURNING RADIUS
- PROPOSED 1.5m SIDEWALK
- PROPOSED CURB AND GUTTER AS PER OPSD 600.070

NOTE:
ACCESS EASEMENTS REQUIRED FOR STREET TOWNS REAR YARDS. TO BE SHOWN ON M–PLAN

LAND USE TABLE

LOT OR BLOCK	PROPOSED LAND USE	AREA	UNITS
1 TO 123	SINGLE DETACHED	3.99ha (26.9%)	123
BLOCK 6-15	DUAL FRONTAGE TOWNHOUSES	1.16ha (7.8%)	65
BLOCK 16-44	TOWNHOUSES	3.53ha (23.8%)	183
BLOCK 1	STORMWATER	1.03ha (6.9%)	
BLOCK 2 - 4	PARKS	1.02ha (6.8%)	
BLOCK 5	SERVICING EASEMENT	0.03ha (0.2%)	
	TOTAL RESIDENTIAL AREA	10.76ha (72.6%)	
	TOTAL ROADS AREA	4.06ha (27.4%)	
TOTAL		14.82 ha	371

ZONING TABLE

ZONE	DESCRIPTION	INTERIOR LOT AREA		CORNER LOT AREA		INTERIOR LOT FRONTAGE		CORNER LOT FRONTAGE		FRONT YARD		REAR YARD		EXTERIOR SIDE YARD		INTERIOR SIDE YARD		BUILDING HIGHT	
		MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MAX	PROP
R1-B	SINGLE DETACHED DWELLINGS	360m²	233.5m²	450m²	340.5m²	12m	9.15m	15m	12.15m	6m	4.4m	7.5m	6.0m	6m	2m	1.2m	1.20.8m	11m	11m
R4	STREET TOWNHOUSE	156m²	168m²	264m²	225.4m²	6.5m	6m	11m	8.5m	6m	4.4m	7.5m	6.0m	6m	2m	1.2m	1.2m	11m	11m
R4	DUAL FRONTAGE TOWNHOUSES	156m²	147.6m²	264m²	393.6m²	6.5m	7.2m	11m	17.85m	6m	2m	7.5m	0m	6m	7m	1.2m	1.2m	11m	14m
OS	OPEN SPACE (SWM AND PARK)	1390m²	362.9m²	1390m²	362.9m²	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Consulting Engineers,
Architects & Planners

September 11th, 2023

Kris Carson
1000011047 Ontario Inc.
1150 Vittoria Road
Vittoria, Ontario
N0E 1W0

Attention: **Mr. Kris Carson**

Reference: **Functional Servicing Report**
Ryder Subdivision
Delhi – Norfolk County
Project No. 21-259

Introduction

This Functional Servicing Report has been prepared in support of the draft plan of subdivision application for the construction of a development consisting of 123 singles, 183 townhouses, and 65 dual frontage townhouses in Delhi - Norfolk County. This report presents the functional level servicing design for the proposed Ryder subdivision, including sanitary, storm, domestic, and fire water servicing.

Background

The proposed 14.82 ha development site is situated on the north side of Dalton Street and east of Croton Avenue in Delhi – Norfolk County. The subject lands are bounded by residential houses to the north, a recreational field to the northwest, and agricultural land to the east, west, and south. Refer to Figure 1 below.

Figure 1 - Site Location

The development site is currently vacant land, primarily comprised of agricultural lands but is zoned as "Urban Residential Type 1 (R1-A)" and "Urban Residential Type 2 (R2(H))" in the Zoning by-Law 1-Z-2014.

The proposed residential development consists of the following construction:

- 123 Single Detached,
- 183 Townhouses,
- 65 Dual Frontage Townhouse,
- Storm and sanitary infrastructure to support proposed construction,
- Stormwater management pond,
- Curbs, sidewalks, swales, and other miscellaneous items to support proposed construction.

Due to limitations with the depths of the existing sanitary services, the intention is to construct this development in two phases; Phase 1 would be 80 units, and Phase 2 the remaining 291 units.

Sanitary Servicing

As-constructed drawings from Norfolk County indicate existing 200mm diameter sanitary gravity sewers along Harvest Lane and 525mm at the intersection of Imperial and Main Street. Given the differing depths of these sewers, the Harvest Lane sewer will only service the east side of the development along the extension of Harvest Lane and the remainder of the development will be serviced through the connection point at Imperial Street and Main Street. To service this development, a sewer extension is required from the intersection of Main Street and First Avenue to the development site. This extension and the on-site conveyance division can be seen in Appendix A – Conceptual Servicing Schematic.

Sanitary design flows were calculated using the Norfolk County Design Criteria. Table 1 presents the populations for each phase, whereas Table 2 shows the flow information for the proposed development phases. Supporting calculations can be found in Appendix B.

Table 1
Subject Lands – Estimate of Populations

	Number of Units	Population
Phase 1	80 units @ 2.75ppu	220
Phase 2	291 units @ 2.75ppu	801

Table 2
Sanitary Flows

	Phase 1	Phase 2
Population	220	801
Per Capita Flow (L/person/day)	450	
Peak Extraneous Flow (L/sec/hectare)	4	
Cumulative Area (ha)	2.88	11.93
Infiltration Flow (L/s)	0.28	
Average Sewage Flow (L/s)	1.146	4.172
Peak Design Flow (L/s)	5.54	19.44

In summary, the development is anticipated to generate a sanitary flow of approximately 24.98 L/s to the existing sanitary sewer network with 5.54 L/s going to Harvest Lane and the remaining 19.44 L/s going to Imperial and Main Street.

R.V. Anderson Associates Limited (RVA) is retained by Norfolk County to review the sanitary sewer network and determine if capacity exists to support development applications. In November of 2022, RVA reviewed a previous version of this development layout and provided a report which confirmed that sanitary collection system has adequate conveyance capacity to carry peak design flows from the proposed development to the municipal waste water treatment plant. This report can be found in Appendix C. Since this report was issued, the proposed development layout has been modified to increase the density. RVA will need to review the revisions to the development concept outlined within this Functional Servicing Report and confirm the existing system can support the development.

Stormwater Management

Under existing conditions, the subject site is predominately agricultural land. Runoff from the site drains overland in a north direction towards the catch basins located along the north property line, into the Crosier Street and Croton Avenue storm sewers before ultimately discharging to a ravine located at the end of Croton Avenue. The stormwater management (SWM) quantity control objective for the development is to control the total post-development peak flow rates from the site to levels that do not exceed the allowable pre-development flow rates, for all storm events up to and including the 100-year storm event.

To meet this objective, runoff from the proposed development will be detained and released at a rate such that the pre-development peak flow rates from the subject site are not exceeded. Runoff from the proposed site will be conveyed to a network of storm catch basins throughout the site where it will then outlet to a storm pond located in southeast corner of the site. Controlled discharge from the SWM pond will be released to the storm sewer system along Croton Ave released to the aforementioned ravine.

Visual OTTHYMO was utilized to simulate the pre-development and post-development conditions for the subject site and determine the storage volume and orifice control required to meet the quantity control objective. The proposed system uses a storage pond, resulting in a total storage volume of 7125 m^3. To control the release rate from the proposed facility, two orifices (250mm and 325mm) and an overflow weir (0.5m by 0.8m) will be installed in the outlet control structure. Control structure calculations and drainage area plans can be found in Appendix D.

Due to the vintage of the existing storm sewer within Crosier Street and Croton Ave, record drawings were not able to be provided by the County. Sewer length, size and elevation have been measured in the field and used to re-create a drainage area plan for the existing catchment. It was determined the existing sewer downstream of the development will need to be upgraded to accommodate the development. The Conceptual Servicing Schematic, including the required municipal upgrades can be found in Appendix A.

Table 3 summarizes the peak total post-development runoff rates found using Visual OTTHYMO and compares them to the allowable total pre-development release rates for all storm events up to and including the 100-year storm event. Refer to Appendix D for detailed Visual OTTHYMO modeling results.

Table 3 Pre to Post-Development Flow Rates			
Event	**Total Pre (cms)**	**Total Post (cms)**	**Net Change (cms)**
2-year	0.106	0.027	-0.079
5-year	0.224	0.189	-0.035
10-year	0.321	0.279	-0.042
25-year	0.455	0.417	-0.038
50-year	0.572	0.539	-0.033
100-year	0.691	0.668	-0.023

For all storm events, the peak post-development discharge has been controlled to less than the peak pre-development runoff for the entire development site and external drainage areas combined. During the detailed design stage, low-impact development infiltration practices will be analyzed to reduce the required storage volume.

Stormwater quality control for the site will be analyzed during the detailed design stage. At that time, multiple quality control solutions will be investigated, such as low-impact development (LID) treatment, fore bay, and oil grit separators (OGS), and the most practical solution that meets the municipal design criteria will be proposed.

Water Servicing

Norfolk County's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

The following summarizes the domestic water flow information for the proposed development:

- Total Number of Units: 371
- Population Density: 2.75 persons per unit
- Population: 1021 people
- Average Daily Water Demand (per person) 0.450 m^3/person/day
- Maximum Day Demand Factor: 2.25
- Maximum Day Demand: 1033.76 m^3/day (11.96 L/s)
- Peak Hourly Demand Factor (Residential) 4.00
- Peak Hourly Demand 76.58 m^3/hour (21.27 L/s)

Fire Water Service

According to the County GIS online mapping, there are two existing fire hydrants located in proximity to the development site. One hydrant is located at the end of Harvest Lane and the other is located at the end of Fairfield Court. However, given their location relative to the entire site, further hydrants will need to be placed throughout the site to provide adequate area coverage.

Typically, available fire flow during the maximum day demand is the critical criteria when evaluating a watermain distribution system's ability to service a residential subdivision. The estimated fire flow requirement for the development has been determined using the recommendations of the Fire Underwriters Survey – 2020 (FUS). Using the FUS recommendations, the minimum required fire flow was determined to be 166.67 L/s. Supporting calculations are detailed in Appendix B, and distances can be seen in Appendix E.

Through consultation with Norfolk County and R.V. Anderson, it has been identified that the development will require a connection to the municipal system at three locations, including upgrades to those municipal mains. The connections are as follows:

1- Connect to the existing 200mm watermain on Harvest Lane,
2- Connect to James Street, via Dalton Road, with a 200mm watermain (replacing the existing 150mm)
3- Connect to the existing watermain at Beech Ave, via Crosier Ave, with a 200mm watermain (replacing the existing 150mm)

In November of 2022, RVA reviewed a previous version of this development layout and provided a report which outlined the anticipated pressures and fire flow available given the above noted upgrades. This report can be found in Appendix C. Since this report was issued, the proposed development and required fire flow calculations have been updated. As noted above, the required fire flow is 166.67L/s revised from the more conservative, preliminary estimate of 200L/s that was provided to RVA prior to completing their report. Based on the conclusions within the RVA report, sufficient pressure and flow can be provided within the municipal system once the noted upgrades to the watermain network are constructed. RVA will need to review this updated Functional Servicing Report and provide a revision to their previously issued report to confirm this.

Conclusions and Recommendations

The functional servicing design for the proposed Ryder Subdivision can be summarized as follows:

- The proposed development will be serviced by a sanitary sewer network that connects to the existing sanitary sewer along Harvest Lane and Main Street at Imperial Street.
- A peak sanitary design flow of approximately 24.98 L/s is anticipated for the proposed development.
- A Stormwater Detention Pond will be utilized to ensure that post-development flow rates are equal to or lower than that of the pre-development rates.
- Three locations will serve as water connection locations for the development: 200mm on Dalton Road at James Street, 200mm on Harvest Lane, and 200mm on Crosier Street at Beech Ave.
- An analysis of the hydraulic modelling was conducted by County consultants to determine the water servicing capacity and constraints on the existing water system which proved that adequate system

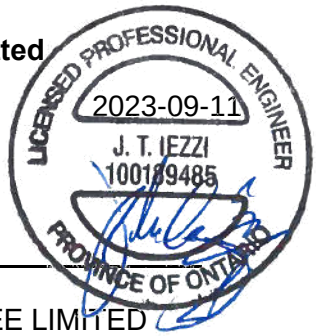
flows and pressure for the aforementioned domestic and fire demands exist if recommended upgrades are conducted.

- The domestic maximum day demand and peak hourly demand were found to be 11.96L/s and 21.27 L/s, respectively.
- The required fire flow demand for the proposed development was found to be 166.67 L/s, which is within the estimated range of available fire flow.

It is recommended that this report be provided to Norfolk County and the Long Point Region Conservation Authority in support of the application for draft plan approval of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted



John Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

Appendix A
– Conceptual Servicing Schematic
– Conceptual Site Servicing and Landscape plan

Appendix B
– Domestic Water Demand Calculations
– FUS Fire Flow Calculations
– Fire Separation Figure
– Sanitary Flow Calculations

Appendix C
– RVA Sanitary Capacity Report
– RVA Water Capacity Report

Appendix D
– FIG 2 – Pre-Development Area Plan
– FIG 3 – Post Development Area Plan
– SWM Control Calculations
– OTTHYMO Modelling Results

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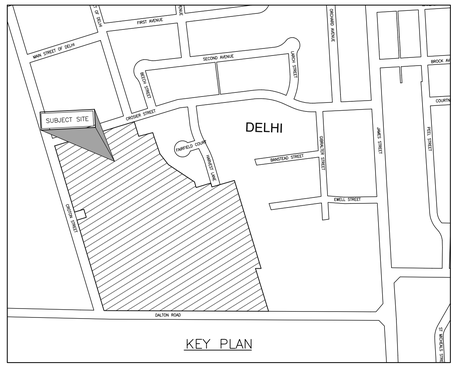
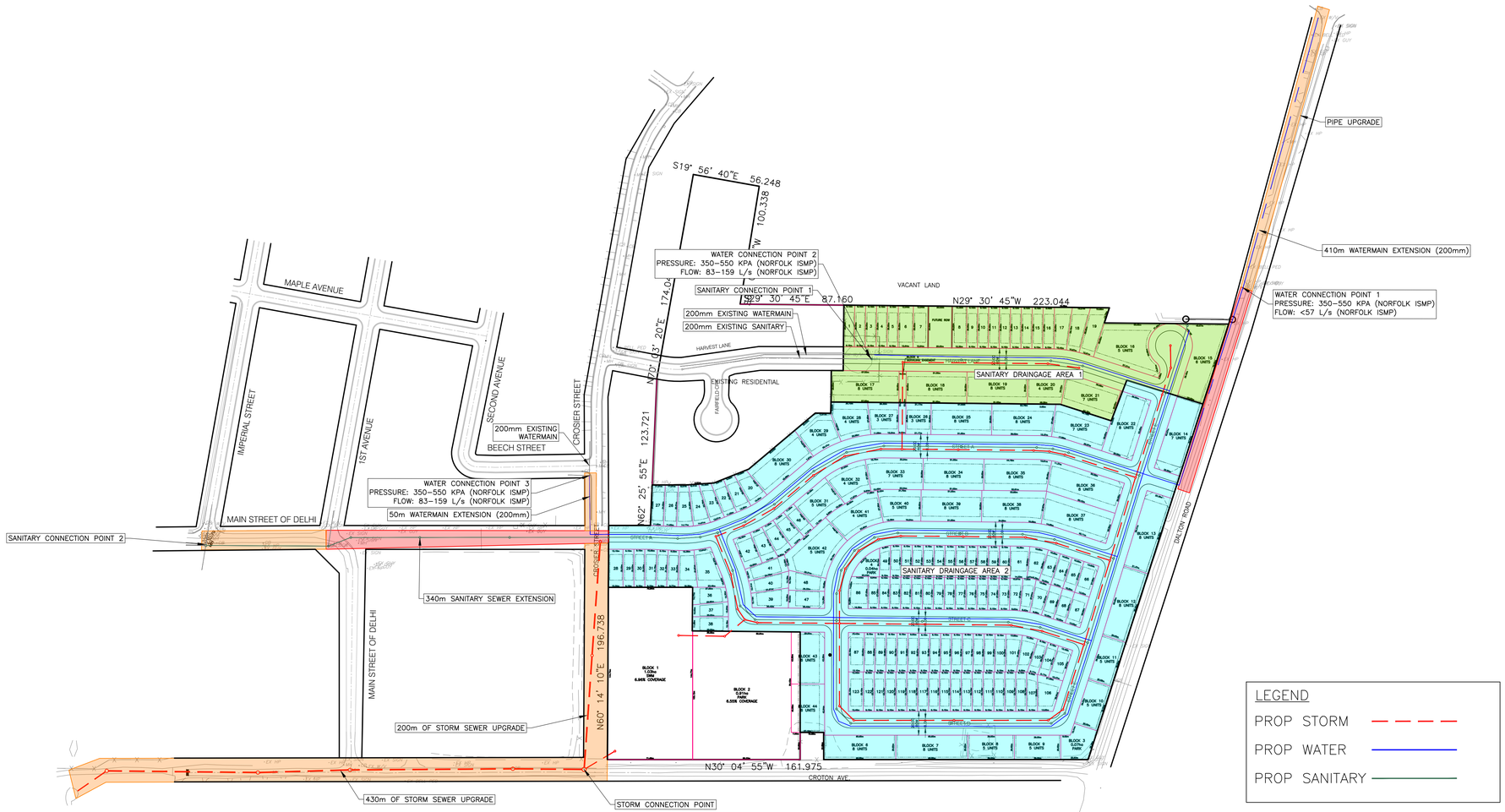
Ontario Association of Architects

APPENDIX A

Conceptual Servicing Schematic
Conceptual Site Servicing and Landscape Plan



KEY PLAN



REV. No.	DATE	REVISION

SCALE:
20 60 100
HORIZONTAL : 1 : 2000

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

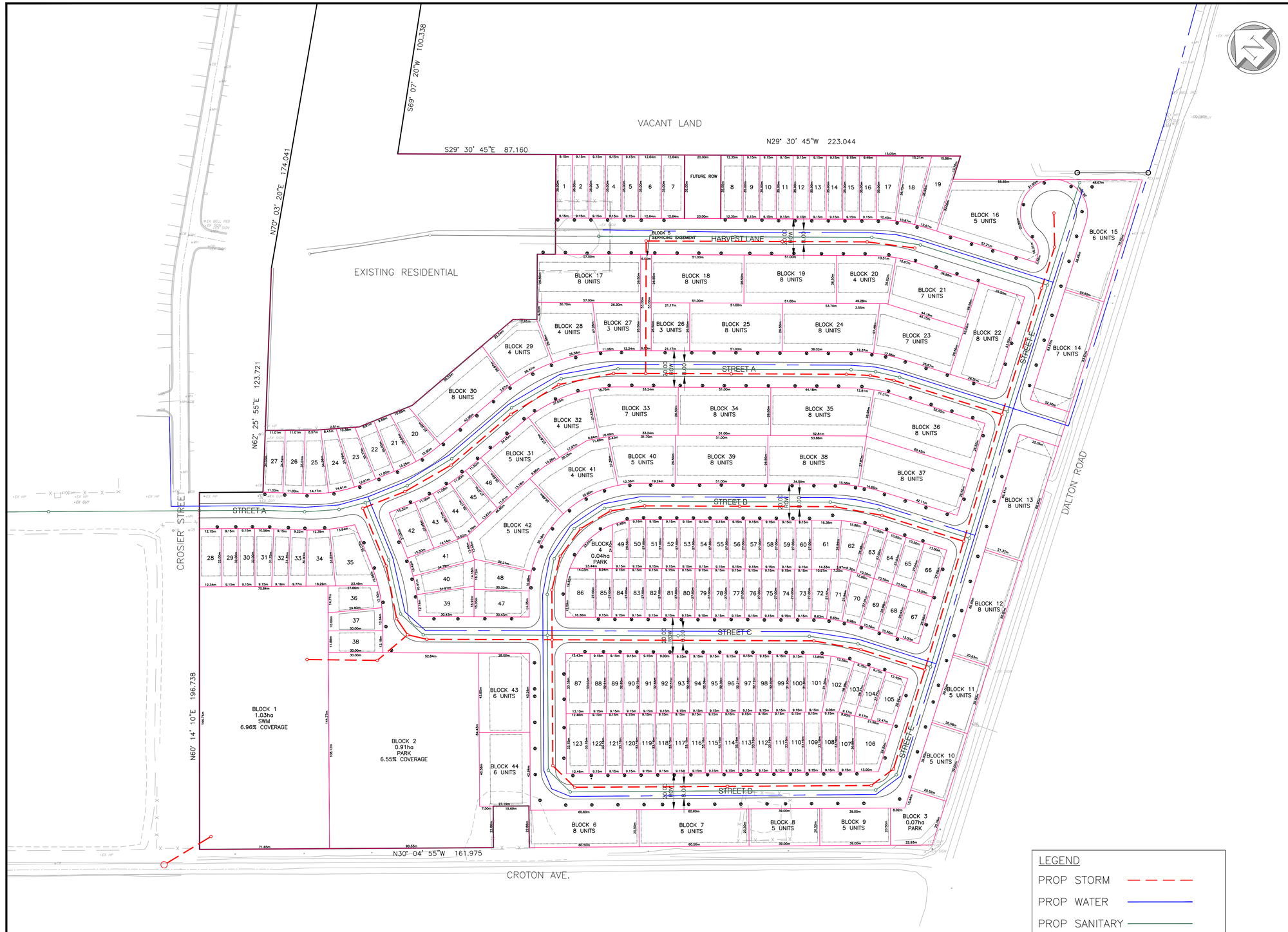
Stamp

Project Title
RYDER SUBDIVSION
DELHI - NORFOLK COUNTY

Drawing Title
CONCEPTUAL SERVICING SCHEMATIC

Designed by : N.B.N/K.R.A	Drawn By : N.B.N/K.R.A.
Checked by : J.T.I.	Date Started : 2023-07-28
Drawing Scale : 1:2000	Drawing No. FIG 01
Project No. 21-259	

DATE LAST PLOTTED : September 11, 2023



LEGEND

PROP STORM

PROP WATER

PROP SANITARY

PROP TREE

REV. No.	DATE	REVISION

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CAN NOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

SCALE:
0 20 40 60
HORIZONTAL : 1 : 1000

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

Project Title
RYDER SUBDIVISION
DELHI, NORFOLK COUNTY

Drawing Title
CONCEPTUAL SITE SERVICING AND LANDSCAPE PLAN

Designed by : NBN	Drawn By : NBN
Checked by : JTI	Date Started : August 10, 2023
Drawing Scale : AS SHOWN	Drawing No. C100
Project No. 21-259	

DATE LAST PLOTTED : September 11, 2023

APPENDIX B

Domestic Water Demand Calculations
FUS Fire Flow Calculations
Fire Separation Figure
Sanitary Flow Calculations

vallee
Consulting Engineers, Architects & Planners

Subject: Ryder Subdivison

Date: Sep-23 By: KRA

Project #: 21-259 Page 1

Entire Site

Maximum Daily Demand

Total Number of Units	371	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/unit
Equiv. Population	1021	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	1033.76	m^3/day
	11.96	l/s

Maximum Hourly Demand

Total Number of Units	371	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/ha
Equiv. Population	1021	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	76.58	m^3/hour
	21.27	l/s

vallee
Consulting Engineers, Architects & Planners

Subject:	Ryder Subdivision		
Date:	2023-09-11	By:	KRA
Project #:	21-259	Page:	1

LOT 6

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 192.8 Total Floor Area m^2 *Approximate

= 385.6 Fire Area m^2 = First floor + Second Floor

F_1= 6480 L/min

F_1= 6000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 5100 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
	North	9999	0%
	East	3.00	25%
	South	28.8	10%
	West	3.00	25%
		Total:	60%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 3060 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 8160 L/min

= 8000 L/min (Round to the nearest 1,000 l/min)

= **133.3 L/s**

Notes:

1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020

2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

3)USING DRAFT PLAN 2023.08.10 ASSUMING TOP OF PAGE IS NORTH

Block 34

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 195.6 Total Floor Area m^2 *Approximate with firewall every 2 units

= 391.2 Fire Area m^2 = First floor + Second Floor

F_1= 6527 L/min

F_1= 7000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 5950 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
	North	28.8	10%
	East	3.0	25%
	South	12.0	15%
	West	9999.0	0%
		Total:	50%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 2975 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 8925 L/min

= 9000 L/min (Round to the nearest 1,000 l/min)

= **150.0 L/s**

Notes: *1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

3)USING DRAFT PLAN 2023.08.10 ASSUMING TOP OF PAGE IS NORTH

LOT 106

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 200.0 Total Floor Area m^2 *Approximate

= 400.0 Fire Area m^2 = First floor + Second Floor

F_1= 6600 L/min

F_1= 7000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 5950 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
	North	12	15%
	East	22	10%
	South	22	10%
	West	3.0	25%
		Total:	60%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 3570 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 9520 L/min

= 10000 L/min (Round to the nearest 1,000 l/min)

= **166.7 L/s**

Notes: *1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

3)USING DRAFT PLAN 2023.08.10 ASSUMING TOP OF PAGE IS NORTH

LOT 114

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 165.0 Total Floor Area m^2 *Approximate

= 330.0 Fire Area m^2 = First floor + Second Floor

F_1= 5995 L/min

F_1= 6000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 5100 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
	North	12.0	15%
	East	3.0	25%
	South	24.45	10%
	West	3.0	25%
		Total:	75%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 3825 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 8925 L/min

= 9000 L/min (Round to the nearest 1,000 l/min)

= **150.0 L/s**

Notes: *1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

3)USING DRAFT PLAN 2023.08.10 ASSUMING TOP OF PAGE IS NORTH

BLOCK 7

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 268.0 Total Floor Area m^2 *Approximate with firewall every 2 units

= 536.0 Fire Area m^2 = First floor + Second Floor

F_1= 7640 L/min

F_1= 8000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 6800 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
	North	24.45	10%
	East	3	25%
	South	9999	0%
	West	9999.0	0%
		Total:	35%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 2380 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 9180 L/min

= 9000 L/min (Round to the nearest 1,000 l/min)

= **150.0 L/s**

Notes: *1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

2) 9999 denotes either the nearest building > 45m away or a fire wall is provided

3)USING DRAFT PLAN 2023.08.10 ASSUMING TOP OF PAGE IS NORTH

REV. No.	DATE	REVISION
1	SEPT 11/23	ISSUED FOR FSR

SCALE:
0 30 60 Meters
1:1000

vallee
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Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
RYDER SUBDIVISION
DELHI - NORFOLK COUNTY

Drawing Title
FIRE SEPERATION DRAWING

Designed by : KRA	Drawn By : KRA
Checked by : JTI	Date Started : 2023-09-11
Drawing Scale : 1:1000	Drawing No. FIG 01
Project No. 21-259	

DATE LAST PLOTTED : September 12, 2023 H:\Projects\2021\21-259 Ryder Subdivision Delhi\Drawings\Civil\21-259 Fire Seperations.dwg

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow
Phase 1

9.2.01 Tributary Population

Residential Development:	2.75	persons/unit
Units:	80	Units
Number of Persons:	220	persons
Site Area	2.88	ha

9.2.02 Sewage Flow

Residential Development:	0.45	m^3/person/day
Average Sewage Flow:	1.146	L/s

9.2.03 Peak Sanitary Flow Factor

Residential Peaking Factor Formula:
M = 1 + (14/(4+ [14 / { 4 + P^(0.5)}])

P =	0.22
M =	4

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.806	L/s

9.2.05 Design Flow

Design Flow:
Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	5.54	L/s

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow
Phase 2

9.2.01 Tributary Population

Residential Development:	2.75	persons/unit
Units:	291	Units
Number of Persons:	801	persons
Site Area	11.933	ha

9.2.02 Sewage Flow

Residential Development:	0.45	m^3/person/day
Average Sewage Flow:	4.172	L/s

9.2.03 Peak Sanitary Flow Factor

Residential Peaking Factor Formula:
M = 1 + (14/(4+ [14 / { 4 + P^(0.5)}])

P =	0.801
M =	4

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	3.341	L/s

9.2.05 Design Flow

Design Flow:
Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	19.44	L/s

APPENDIX C

RVA Sanitary Capacity Report
RVA Water Capacity Report

R.V. Anderson Associates Limited
557 Southdale Road East Suite 200
London Ontario N6E 1A2 Canada
Tel 519 681 9916 Fax 855 833 4022
www.rvanderson.com

TECHNICAL MEMORANDUM

TO: Stephen Gradish **RVA:** 215178.41

FROM: Mukesh Choudhary, P.Eng.

Date: November 25, 2022

SUBJECT: Delhi – Croton Ave & Dalton Rd (Ryder Subdivision) - Sanitary System

1.0 Introduction

R.V. Anderson Associates Limited (RVA) conducted an analysis of the impact of the proposed Ryder Subdivision at the intersection of Croton Avenue and Dalton Road of the sanitary sewer system in Delhi, as requested by Norfolk County (County).

2.0 Background

The proposed subdivision consists of 237 residential units over 2 phases with a total area of 14.82 ha. Wastewater from Phase 1 and Phase 2 is to be discharged to the existing 200 mm diameter sewer on Harvest Lane and Crosier Crescent, respectively.

The County provided RVA with the following reports completed by G. Douglas Vallee Limited. (including drawings and appendices) to complete the analysis:

- Water and Sanitary Servicing Investigation, September 2022

Table 1 below presents the proposed population density and peak wastewater discharges.

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Table 1 – Proposed Development Peak Design Flow

	Phase 1	Phase 2
Dwelling Unit	53	184
Density	2.75ppl/unit [1]	2.75ppl/unit [1]
Persons	146	506
Unit Sewage Rate	450 L/capita/day [1]	450 L/capita/day [1]
Average Flow	0.76 L/s	2.64 L/s
Peaking Factor	4.19	3.97
Peak Design Flow	**3.18 L/s**	**10.48 L/s**
Serviced Area	1.97 ha [2]	12.85 ha [2]
Infiltration Allowance	0.28 L/s/ha [1]	0.28 L/s/ha [1]
Infiltration Flow	**0.55 L/s**	**3.60 L/s**
Total Peak Design Flow	**3.73 L/s**	**14.08 L/s**

1. *Norfolk County Design Criteria, Figure 4-54 in Norfolk County Integrated Sustainable Master Plan (ISMP), last updated in 2016.*
2. *Total Serviced Area from Servicing Investigation. Area for each phase is estimated via Google Earth.*

The objective of this report is to summarize the impact of the proposed development on the existing wastewater collection system that ultimately conveys wastewater flows to the Delhi Wastewater Treatment Plant (WWTP). Figure 1 displays the limits of the development, and the proposed sanitary sewer routing to the WWTP is presented in Figure 2.

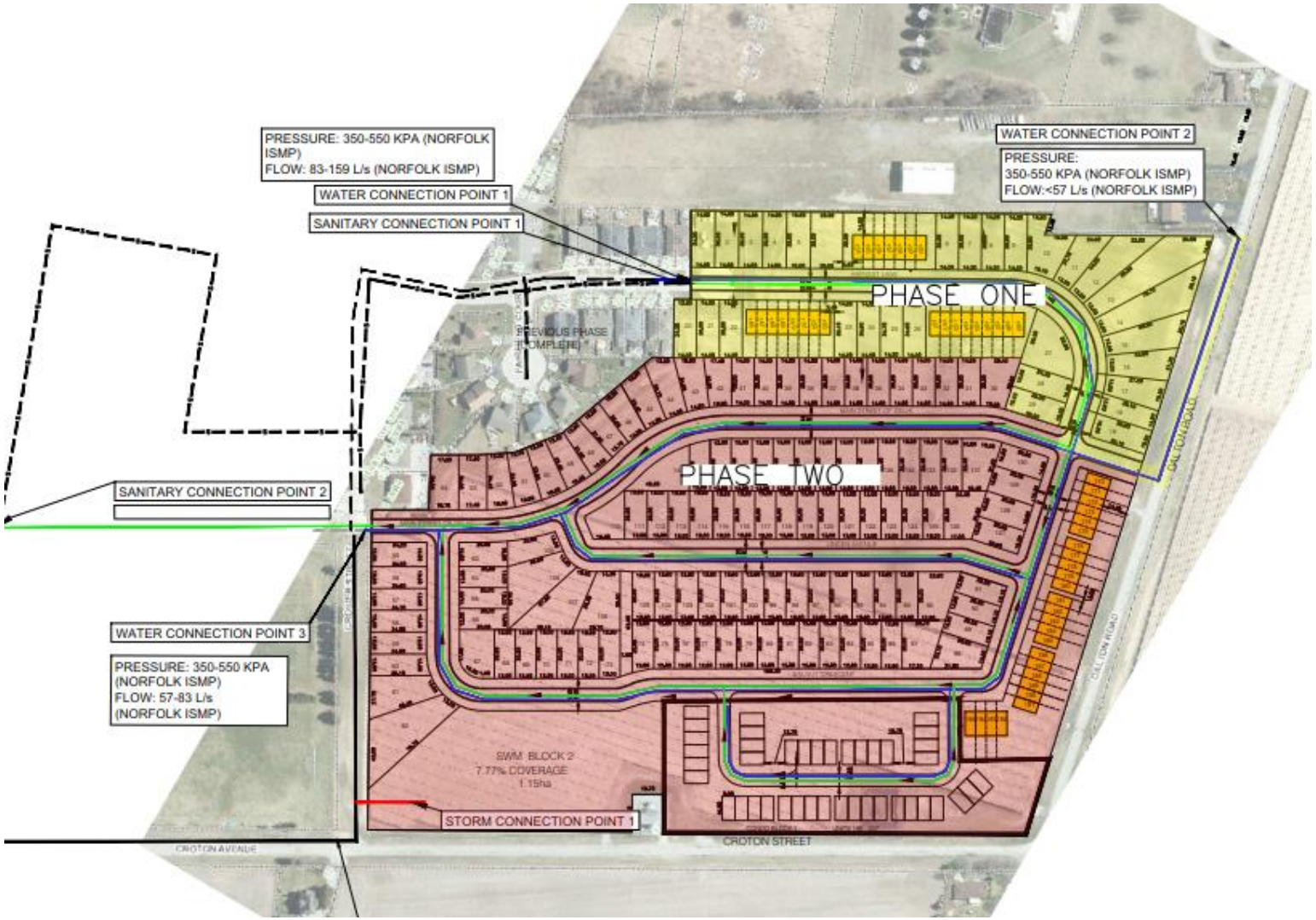


Figure 1 – Limits of Construction

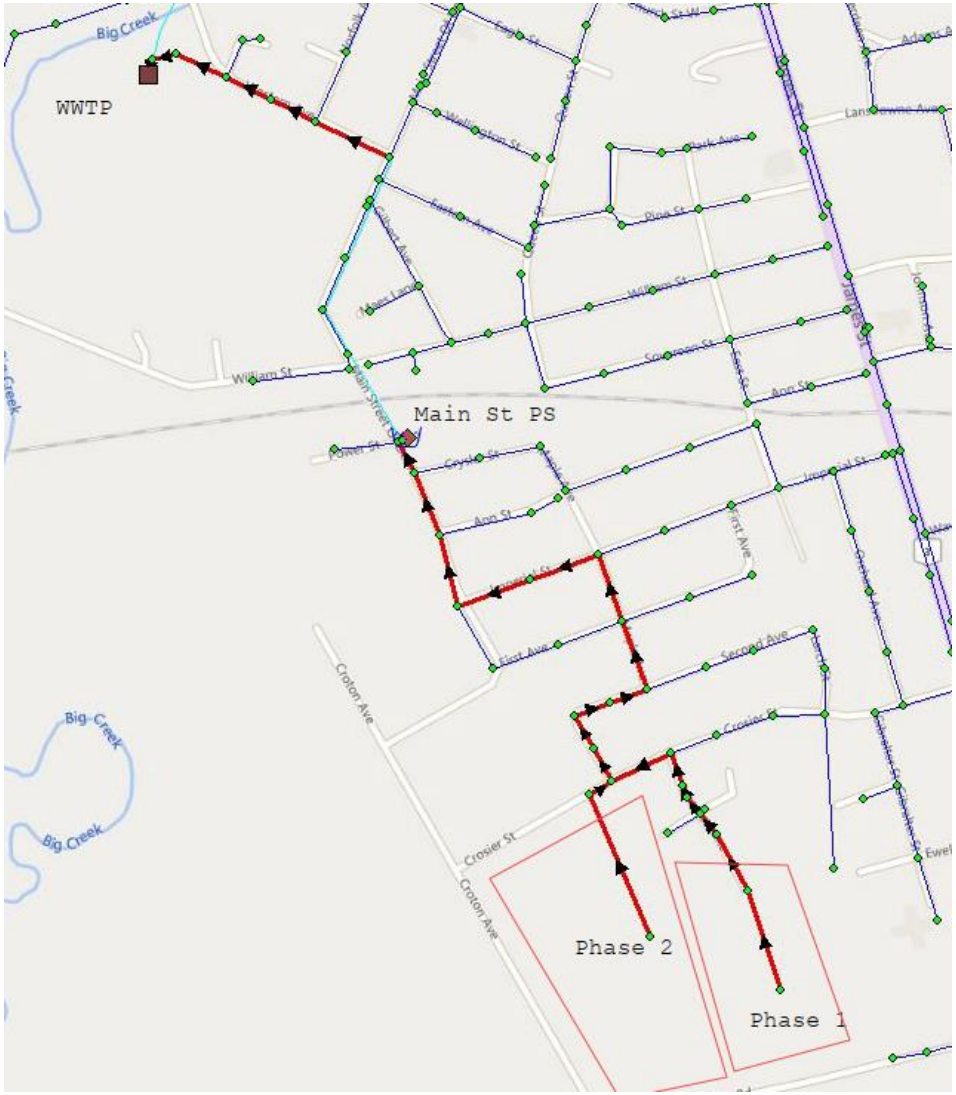


Figure 2 – Sanitary Sewer Route from the Development to WWTP

3.0 Summary of the Sanitary Sewer Hydraulic Modelling

An InfoSewer sanitary sewer model of the County was used for this analysis. The model included sewer attributes and flows from earlier master planning studies. The InfoSewer model was reviewed and updated to include proposed flows from the proposed development.

The following summarizes the key tasks performed in this study:

- The existing manholes, sewers, and pumps extracted from the County's shape files were reviewed for completeness to ensure the flow path from the proposed development to the Delhi WWTP was represented;
- The current flows based on the County's earlier master planning studies were assigned to the same locations within the model;
- Simulations were performed to assess the capacity to convey existing and proposed flows in the sewers between the proposed development and the WWTP.
- The following proposed upgrades are not yet completed; however, were modeled as completed with the understanding these have been approved by the County and, as such, included in the model:
    - 360 James Street Development;
    - Storage Guyz;
    - 171 King Street Development;
    - 40 Arnold Sayeau Development ;
    - William Street Development;
    - Banstead Street Development;
    - 161 Wellington Street Development; and
    - 124 King Street Development.

4.0 Results of the Hydraulic Analysis

Table 1 summarizes the conveyance capacity usage along the flow path to the WWTP. Figure A1 to A2 and notes detail the results of the sanitary sewer capacity analysis.

Table 1 – Conveyance Capacity Usage for the Proposed Site

Sewer Sections	Pipe Diam. (mm)	Fraction of Conveyance Capacity Usage		
		Existing Condition	Phase 1	Phase 2
Beech St	250	0.13	0.22	0.54
Second Ave	250	0.19	0.28	0.60
Maple Ave	375	0.11	0.15	0.32
Imperial St	525	0.25	0.28	0.36
Main St	525	0.25	0.27	0.34
Main Street PS (Total Capacity of 64.8 L/s		0.77	0.83	1.04
Western Ave	450	0.24	0.26	0.31
WWTP Entrance	525	0.23	0.24	0.27

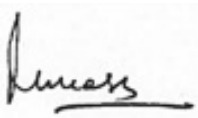
Note:
1. *The capacity analysis is based on future peak flow projections and may include sewage flow estimates that exceed those of current conditions.*

5.0 Conclusion

The proposed Ryder Subdivision is expected to increase peak wastewater flows by approximately 17.81 L/s. Hydraulic modelling indicates that the existing sanitary collection system has adequate conveyance capacity to carry peak design flows from the proposed development to the WWTP. Noted that when the development is built out, the Main Street PS would be over its total capacity. The PS is downstream of a large area, and it should be assessed for actual flow and runtime data to understand the operation of the pump and determine the need for an upgrade.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED



Mukesh Choudhary, P.Eng.
Manager, Hydraulic Modeling

Enclosures:

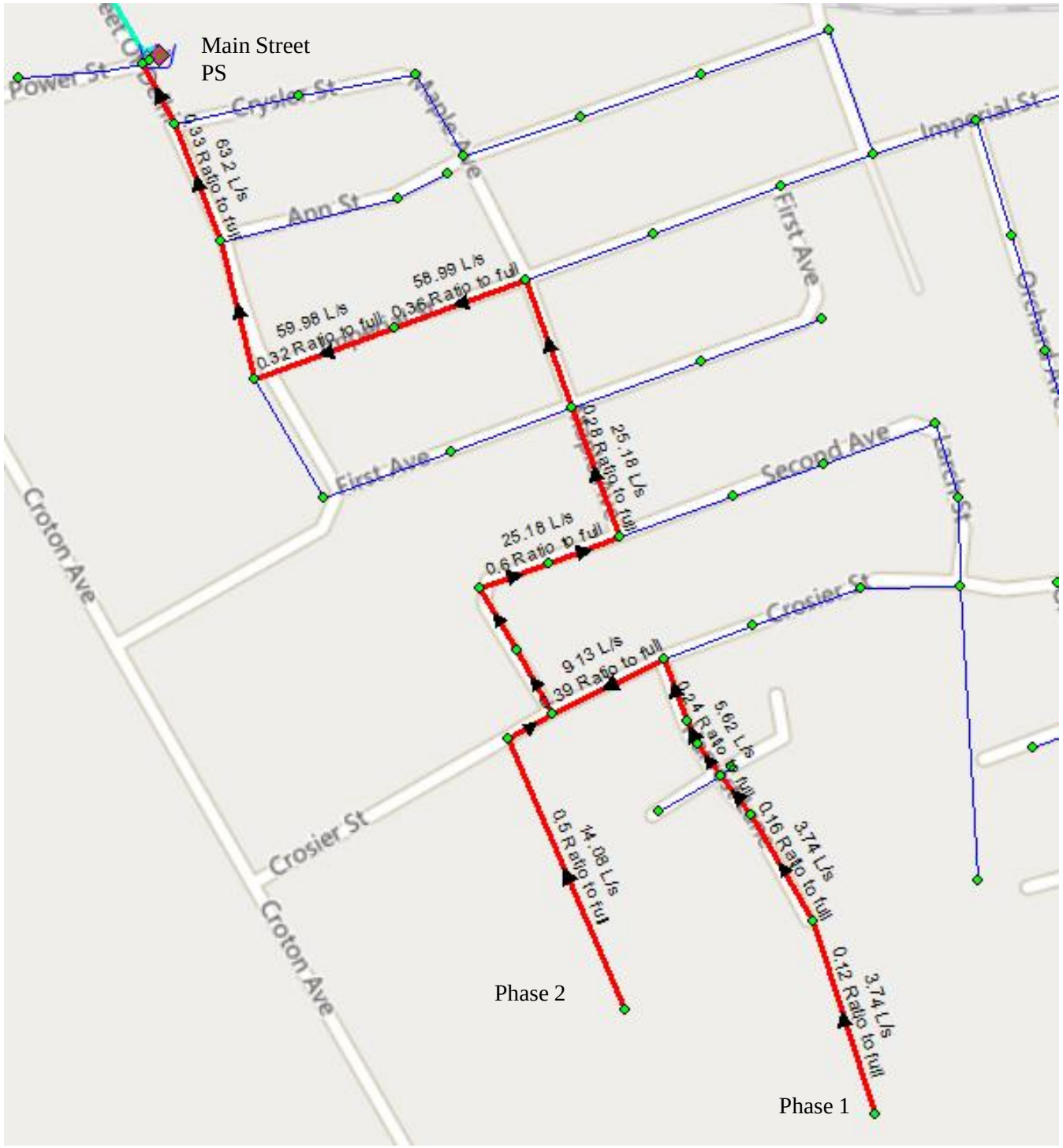
1. Figure A1 – Capacity Usage Plan – From Ryder Subdivision to Main Street PS
2. Figure A2 – Capacity Usage Plan – From Main Street PS to WWTP

REVISIONS AND PUBLICATION REGISTER			
Revision #	**Date**	**Details**	**Distribution**
00	November 25, 2022	Tech Memo Issued via email	Stephen Gradish – Norfolk County

LEGEND

N

- Manhole
- Sanitary sewer
- Sanitary sewer servicing From proposed subdivision
- Forcemain
- 0.13 Ratio of full flow capacity (future peak flow)
- Pump station

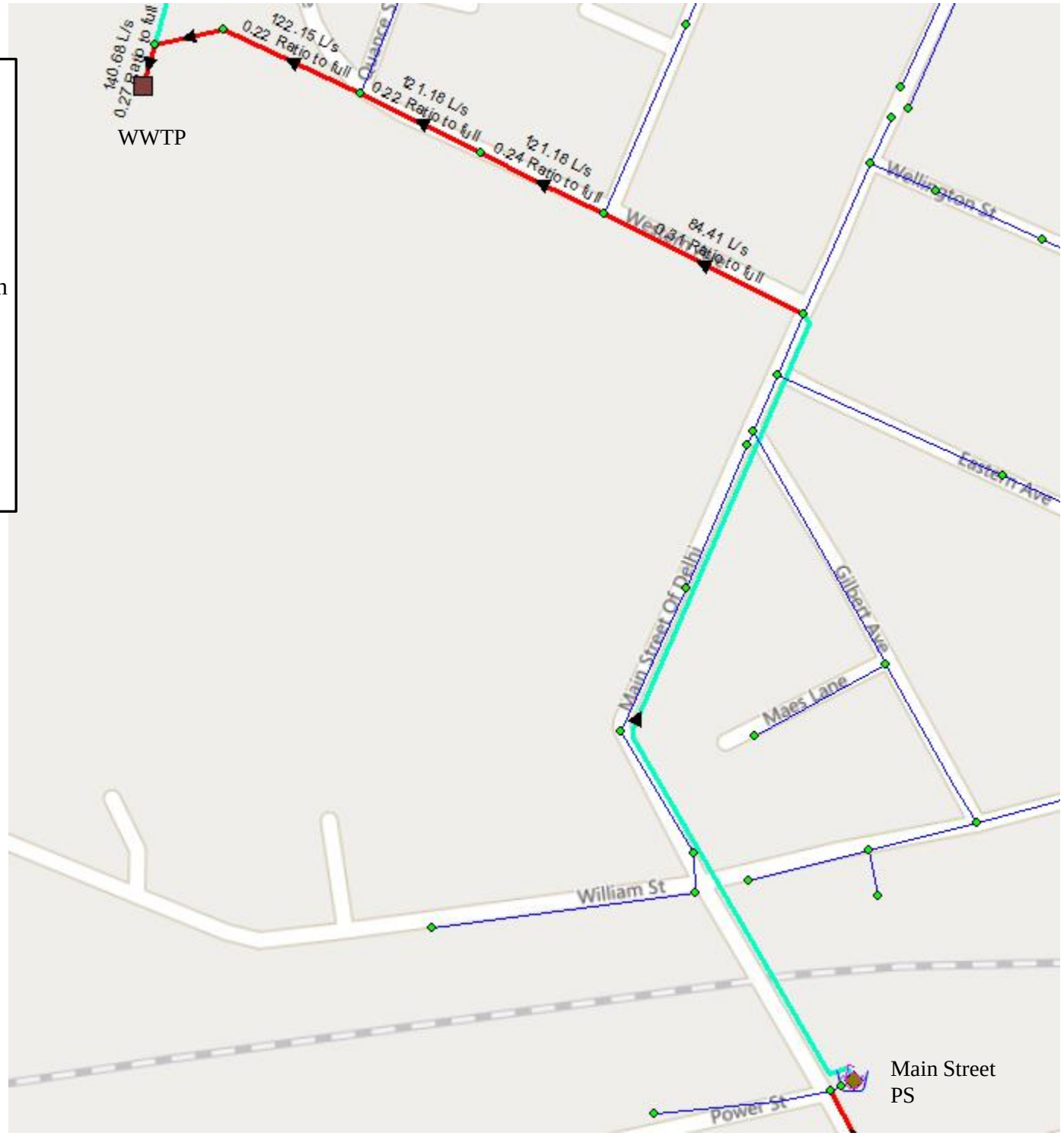


Delhi Ryder Subdivision Downstream Sanitary Sewer Capacity Review Sanitary Sewer Flow Path to Delhi WWTP	Date: 2022.10	Scale: NTS	arva R.V. Anderson Associates Limited engineering • environment • infrastructure
	Project No. 215178.41	Figure: A1	

LEGEND

N

- Manhole
- Sanitary sewer
- Sanitary sewer servicing From proposed subdivision
- Forcemain
- 0.13 Ratio of full flow capacity (future peak flow)
- Pump station



Delhi Ryder Subdivision Downstream Sanitary Sewer Capacity Review Sanitary Sewer Flow Path to Delhi WWTP	Date: 2022.10	Scale: NTS	arva R.V. Anderson Associates Limited engineering • environment • infrastructure
	Project No. 215178.41	Figure: A2	

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TECHNICAL MEMORANDUM

TO: Stephen Gradish **RVA:** 215178.41

FROM: Mukesh Choudhary, P.Eng.

Date: November 25, 2022

SUBJECT: Delhi – Ryder Subdivision – Water Distribution Model

1.0 INTRODUCTION

R.V. Anderson Associates Limited (RVA) was retained by Norfolk County (County) to conduct an analysis of the impact of the proposed development at the intersection of Croton Avenue and Dalton Road on the water distribution system in Delhi, Ontario.

2.0 Background

The proposed subdivision consists of 237 residential units over 2 phases with a total area of 14.82 ha. It is bound by Dalton Road to the south, and Croton Ave to the west.

The objective of this report is to determine the impact of the proposed development on the existing water distribution system and evaluate the adequacy of the proposed watermains to supply required fire flow to the proposed development under Maximum Daily Demand (MDD) plus Fire Flow (FF) scenario and provide adequate pressures in the system under a Peak Hour Demand (PHD) scenario.

The County provided RVA with the following reports completed by G. Douglas Vallee Limited. (including drawings and appendices) to complete the analysis:

- Water and Sanitary Servicing Investigation, September 2022.

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Figure 2-1 below shows the area of the Ryder Subdivision.

Figure 2-1 Ryder Subdivision Construction Area

3.0 Summary of the Water Distribution Hydraulic Modelling

RVA used the existing Delhi Water Distribution Model to review the impact of the proposed watermain on the surrounding community.

The following points summarize the assumptions and analysis that were completed:

- Based on the Norfolk County Design Criteria, the population density of 2.75 persons per residential unit was used. The average daily demand based upon 450 litres per person per day, was estimated as 2.64 L/s. A peak hour demand (PHD) factor of 3.0 was used, per the Norfolk County Integrated Sustainable Master Plan (ISMP). The maximum day demand (MDD) factor of 2.12 was used, per the Norfolk ISMP update TM in 2022;

- The existing water model was updated to include new nodes, pipe segments, and Average Day Demands (ADDs) to reflect the proposed development. Node elevation data was obtained from Google Earth.
- Simulations were completed to estimate the pressure in the system during PHD scenario and the available FF was determined under the MDD scenario. The simulations were completed using the scenarios in the existing Delhi Water Distribution Model;
- Based on the FUS calculation provided, single houses, townhouses and condos would require FF of 150L/s, 183L/s and 200 L/s, respectively;
- We understand that the following proposed water distribution system upgrades are not completed yet, however, these upgrades were assumed to be in service based on our understanding that these have been approved by the County and, as such, included in the model runs for this analysis.:

  - 250mm watermain reconstruction on King Street;
  - Crysler Street and Maple Street Reconstruction;
  - 360 James Street Development;
  - Ann Street Reconstruction;
  - Transmission Main at Fertilizer Road;
  - James Street Watermain Replacement;
  - Storage Guyz;
  - 171 King Street Development;
  - 40 Arnold Sayeau Development;
  - Norfolk Ave & Eagle St Watermain Replacement;
  - William Street Development;
  - Banstead Street Development;
  - 161 Wellington Street Development; and
  - James Street Argyle to Brock Reconstruction.

  It is important to note these upgrades have a significant impact on the result noted in this memorandum. If any of these developments are likely not to occur, the result may vary significantly.

4.0 Results of the Hydraulic Analysis

The following points summarize the results of the analysis completed by RVA.

4.1 Existing Conditions

- Figure A-1 - The model results indicated that the pressure in the vicinity of the proposed Development is 64 psi on Harvest Lane and 53 psi on Dalton Road, which are higher than the MECP recommended minimum operating pressure of 40 psi.
- Figure A-2 – The available FFs during MDD are approximately 87 L/s on Harvest Lane and 40 L/s on Dalton Road.

4.2 Phase 1

Phase 1 of Ryder Subdivision consists of 53 residential units. It is designed to have two connections to the existing water system: One on Harvest Lane with a 200mm watermain and another on Dalton Road with a 150mm watermain. The internal watermains are assumed to be 200mm.

- Figure B-1 – Based on the model results, the pressure within the Phase 1 would be 64 to 66 psi, above the MECP recommended 40 psi. The proposed development has minimal impact on the pressure in its vicinity.
- Figure B-2 – The modelled available FFs during MDD in the development would be approximately 113 to 123 L/s. It will potentially increase the available FF in its vicinity as the connections eliminates deadends.

The existing 150mm watermain on Dalton Road was constructed in 1962 based on the GIS data. The condition of this section of watermain is likely unsatisfactory and hinder the flow rate during high demand. The following scenarios shows the simulations when this section of watermain is upgraded to 200mm diameter.

- Figure B-3 – Pressure within the Phase 1 would be 64 to 66 psi and is similar to the result showed in Figure B-1. This is because the minor change in watermain size does not impact pressure very much when it is mostly dictated by topography and the supply pressure of the system.
- Figure B-4 – The modelled available FFs during MDD in the development would increase to approximately 144 to 147 L/s. It can be seen that the available FF on Dalton Road and Harvest Lane also increase distinctly.

5.0 Phase 2

Phase 2 of Ryder Subdivision consists of 184 residential units. Other than two proposed connections in Phase 1, Phase 2 would have the third connection to

the existing 150mm watermain on Crosier Street. (Refer to Figure C-1) The internal watermains are assumed to be 200mm.

- Figure C-1 – Pressure during PHD would be 66 to 68 psi and is above the MECP recommended 40psi. The proposed development has minimal impact on the pressure in its vicinity.
- Figure B-2 – The modelled available FFs during MDD in the development would be approximately 136 to 152 L/s. Phase 2 would bring the FF down by about 2 L/s in the vicinity.

The 50m-long existing 150mm watermain on Crosier Street, west of the intersection of Beech Street and Crosier Street was constructed in 1968 based on the GIS data. The following scenarios shows the simulations when this section of watermain is upgraded to 200mm diameter.

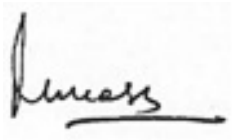
- Figure C-3 – Pressure within the Phase 1 would be 66 to 68 psi and is similar to the result showed in Figure C-1.
- Figure C-4 – The available FFs during MDD in the development would increase by 2-5 L/s due to the upgrade on Crosier Street. The vicinity could also benefit.

6.0 Conclusions and Recommendations

The existing water distribution system is capable of providing sufficient pressure to the proposed Ryder Subdivision in Delhi. However, even with the watermain upgrade in the vicinity, the proposed subdivision would not be able to receive the required FF[redacted]

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED

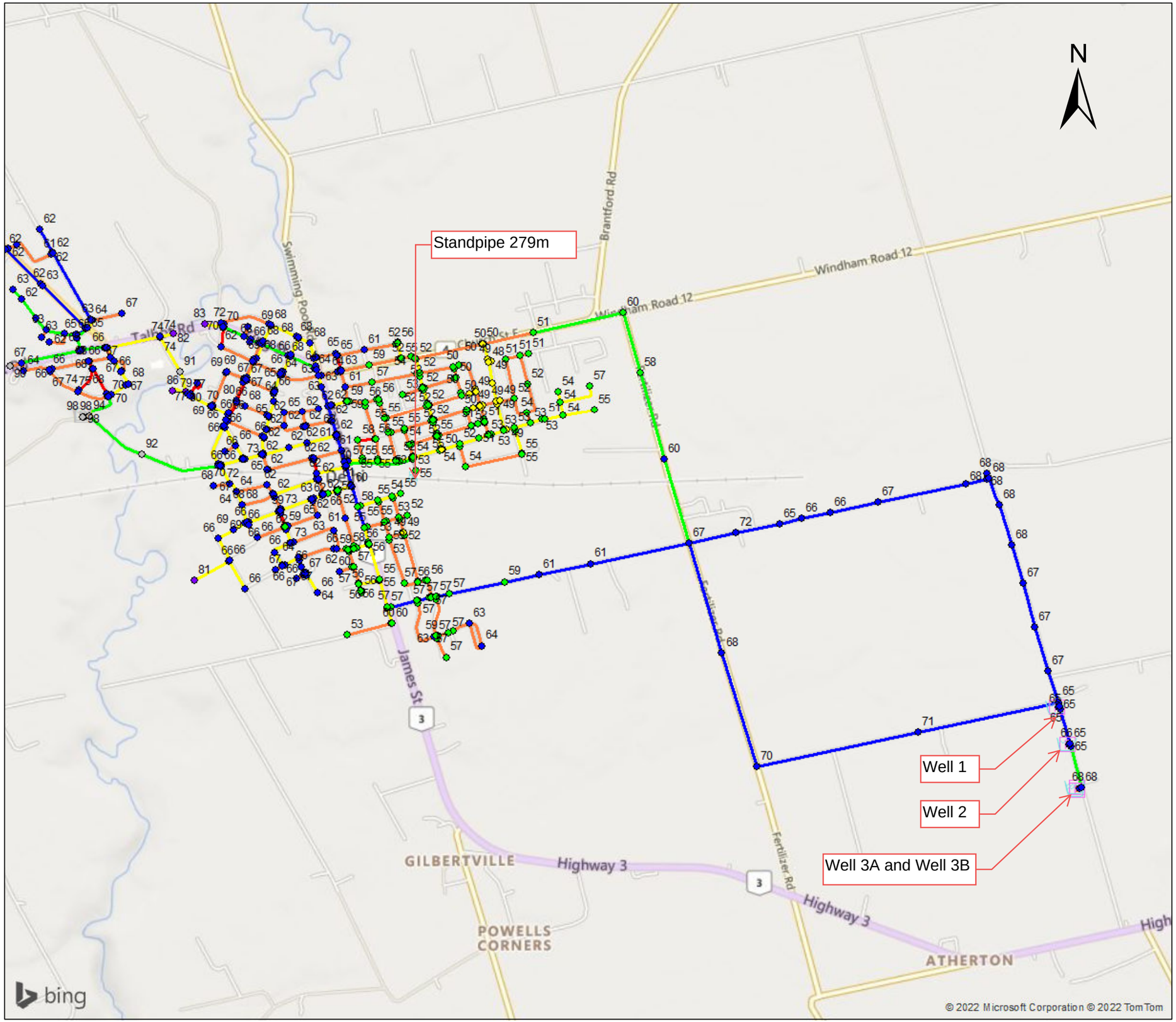


Mukesh Choudhary, P.Eng.
Manager, Hydraulic Modeling

Enclosures:

1. Figure A-1 – Existing: Pressure During Peak Hour Demand
2. Figure A-2 – Existing: Available Fire Flow During Max Day Demand + Fire Flow
3. Figure B-1 – Phase 1 Proposed: Pressures During Peak Hour Demand
4. Figure B-2 – Phase 1 Proposed: Available Fire Flow During Max Day Demand + Fire Flow
5. Figure B-3 – Phase 1 Proposed: Pressures During Peak Hour Demand
6. Figure B-4 – Phase 1 Proposed: Available Fire Flow During Max Day Demand + Fire Flow
7. Figure C-1 – Phase 2 Proposed: Pressures During Peak Hour Demand
8. Figure C-2 – Phase 2 Proposed: Available Fire Flow During Max Day Demand + Fire Flow
9. Figure C-3 – Phase 2 Proposed: Pressures During Peak Hour Demand
10. Figure C-4 – Phase 2 Proposed: Available Fire Flow During Max Day Demand + Fire Flow

REVISIONS AND PUBLICATION REGISTER			
Revision #	**Date**	**Details**	**Distribution**
00	November 25, 2022	Tech Memo Issued via email	Stephen Gradish – Norfolk County



Norfolk County

Delhi Ryder Subdivision

Figure A-1
Pressure during PHD
Existing

Legends

Node Pressure (psi)

- < 40
- 40 ~ 50
- 50 ~ 60
- 60 ~ 80
- 80 ~ 90
- 90 ~ 100

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

RVA

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

Standpipe 277m

Well 1

Well 2

Well 3A and Well 3B

Swimming Pool

Brantford Rd

Windham Road 12

James St

Fertilizer Rd

GILBERTVILLE

POWELLS CORNERS

ATHERTON

Highway 3

N

bing

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Norfolk COUNTY

Delhi Ryder Subdivision

Figure A-2
Available Fire Flow during MDD
Existing

Legends

Node Flow (L/s)

- < 67
- 67 ~ 100
- 100 ~ 150
- 150 ~ 200
- 200 ~ 250
- >250

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

rva

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

Standpipe 279m

Phase 1

Well 1

Well 2

Well 3A and Well 3B

Windham Road 12

Brantford Rd

Swimming Pool Rd

James St

Fertilizer Rd

GILBERTVILLE

POWELLS CORNERS

ATHERTON

Highway 3

N

bing

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Delhi Ryder Subdivision

Figure B-1
Pressure during PHD
Phase 1

Legends

Node Pressure (psi)

- < 40
- 40 ~ 50
- 50 ~ 60
- 60 ~ 80
- 80 ~ 90
- 90 ~ 100

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

rva

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

Standpipe 277m

Phase 1

Well 1

Well 2

Well 3A and Well 3B

Norfolk County

Delhi Ryder Subdivision

Figure B-2
Available Fire Flow during MDD
Phase 1

Legends

Node Flow (L/s)

- < 67
- 67 ~ 100
- 100 ~ 150
- 150 ~ 200
- 200 ~ 250
- >250

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

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Standpipe 279m

Phase 1

Well 1

Well 2

Well 3A and Well 3B

Windham Road 12

Brantford Rd

James St

Fertilizer Rd

Highway 3

GILBERTVILLE

POWELLS CORNERS

ATHERTON

N

bing

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Norfolk COUNTY

Delhi Ryder Subdivision

Figure B-3
Pressure during PHD
Phase 1

Legends

Node Pressure (psi)

- < 40
- 40 ~ 50
- 50 ~ 60
- 60 ~ 80
- 80 ~ 90
- 90 ~ 100

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

rva

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

Standpipe 277m

Phase 1

Well 1

Well 2

Well 3A and Well 3B

Norfolk County

Delhi Ryder Subdivision

Figure B-4
Available Fire Flow during MDD
Phase 1

Legends

Node Flow (L/s)

- < 67
- 67 ~ 100
- 100 ~ 150
- 150 ~ 200
- 200 ~ 250
- >250

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

RVA

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

bing
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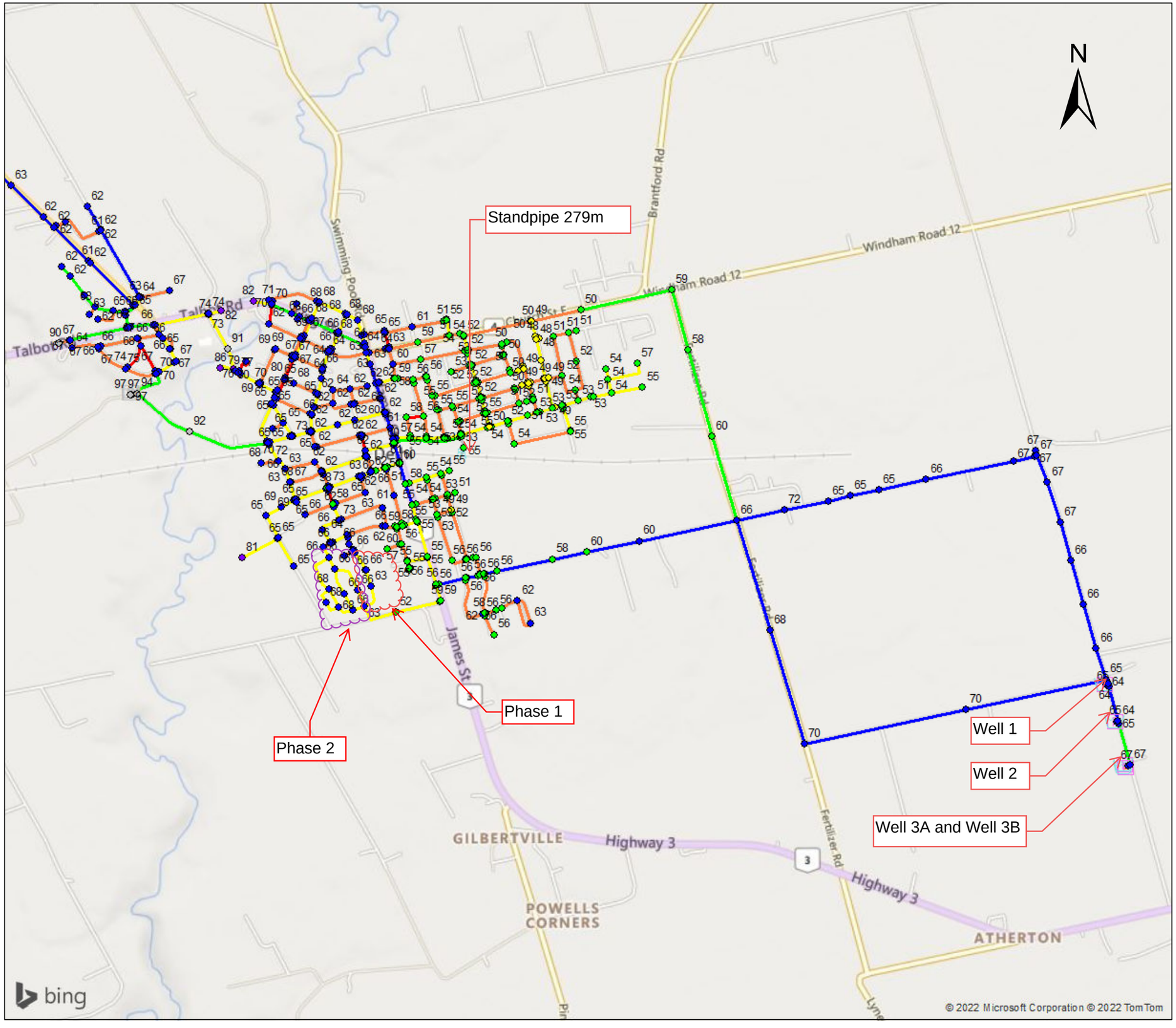


Norfolk COUNTY

Delhi Ryder Subdivision

Figure C-1
Pressure during PHD
Phase 1 & 2

Legends

Node Pressure (psi)

- < 40
- 40 ~ 50
- 50 ~ 60
- 60 ~ 80
- 80 ~ 90
- 90 ~ 100

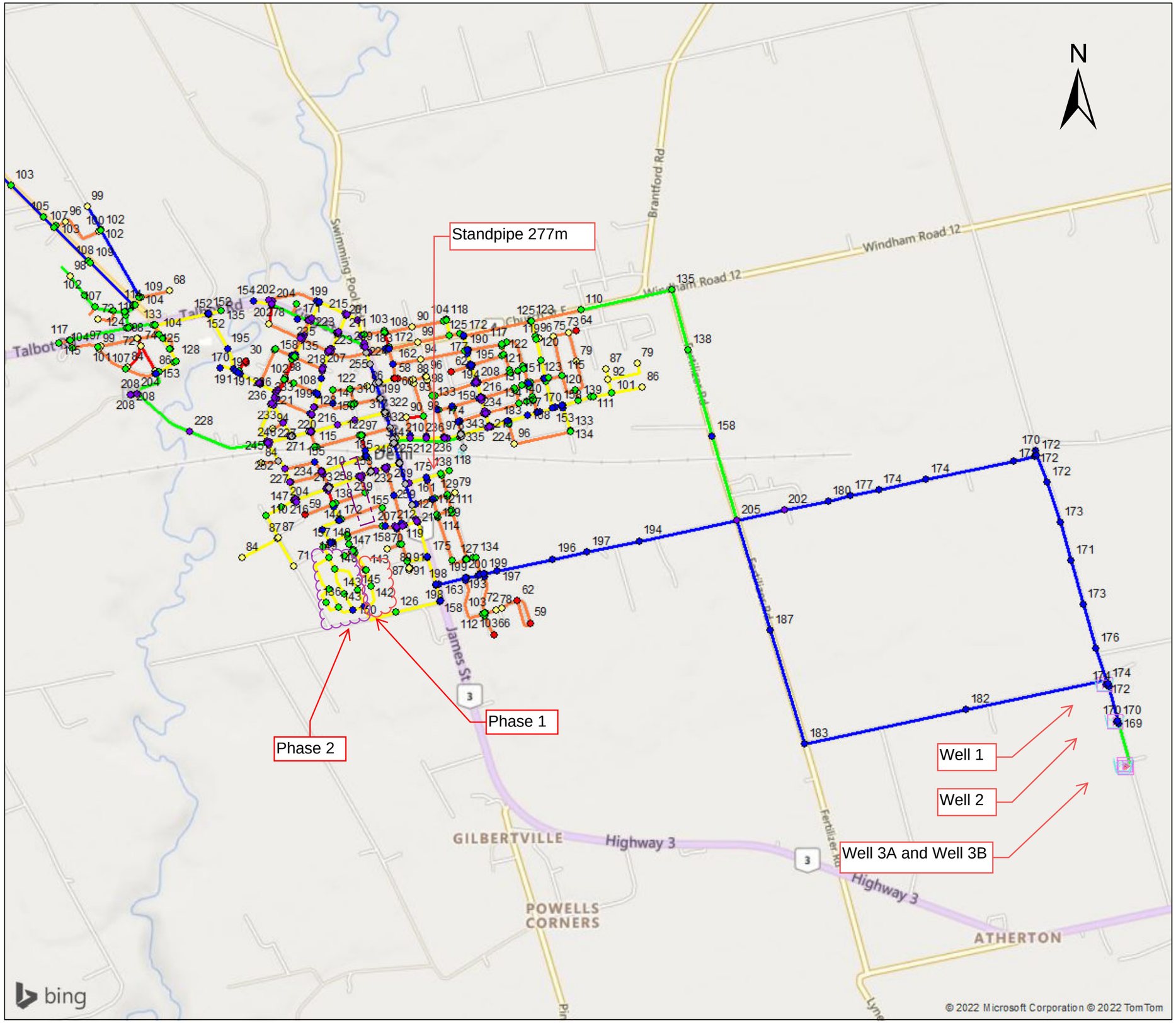
Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

arva

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters



Norfolk County

Delhi Ryder Subdivision

Figure C-2
Available Fire Flow during MDD
Phase 1 & 2

Legends

Node Flow (L/s)

- < 67
- 67 ~ 100
- 100 ~ 150
- 150 ~ 200
- 200 ~ 250
- >250

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

rva

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

Standpipe 279m

Phase 1

Phase 2

Well 1

Well 2

Well 3A and Well 3B

Norfolk County

Delhi Ryder Subdivision

Figure C-3
Pressure during PHD
Phase 1 & 2

Legends

Node Pressure (psi)

- < 40
- 40 ~ 50
- 50 ~ 60
- 60 ~ 80
- 80 ~ 90
- 90 ~ 100

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

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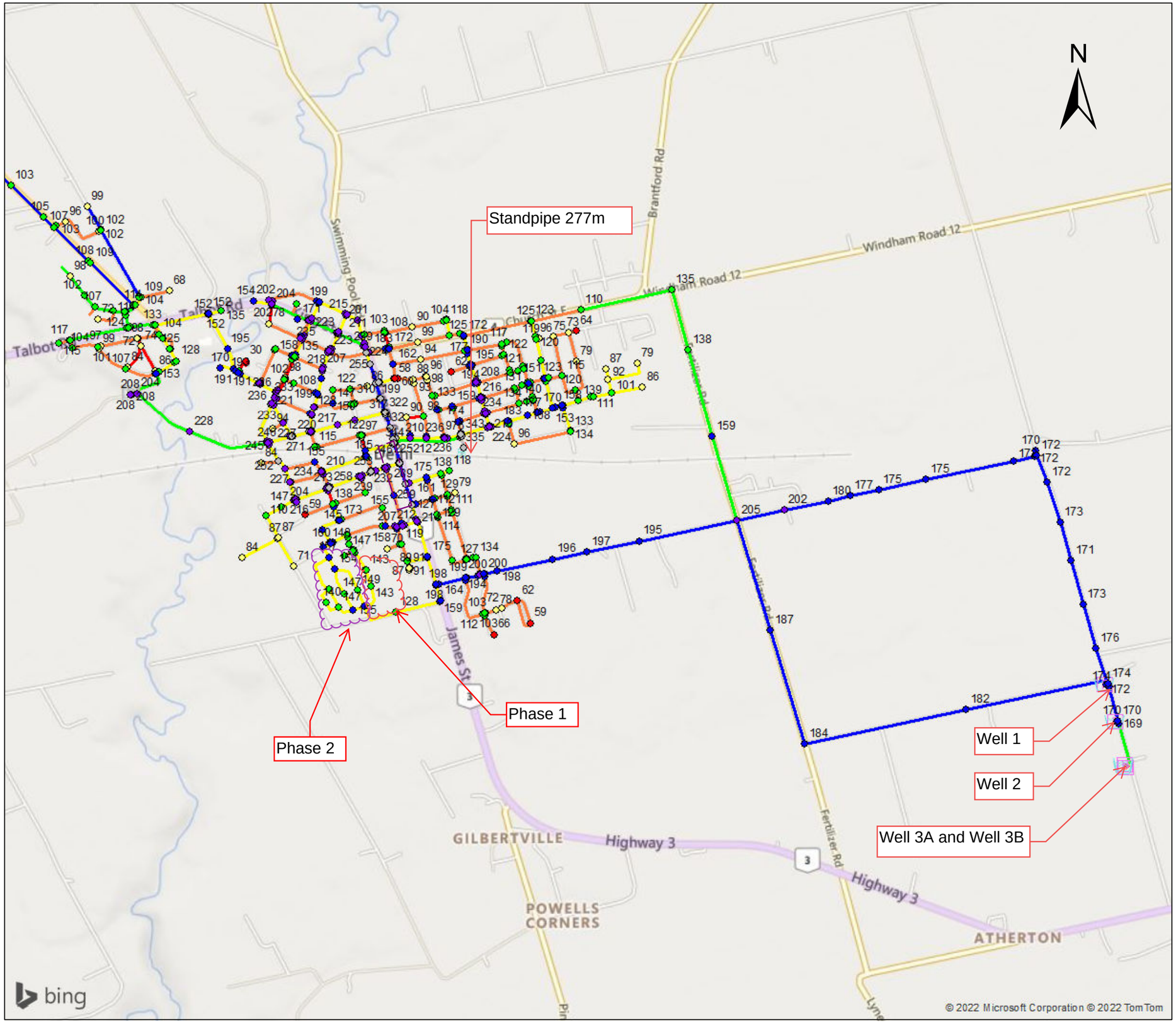


Norfolk County

Delhi Ryder Subdivision

Figure C-4
Available Fire Flow during MDD
Phase 1 & 2

Legends

Node Flow (L/s)

- < 67
- 67 ~ 100
- 100 ~ 150
- 150 ~ 200
- 200 ~ 250
- >250

Watermains (mm)

- =<100
- 150
- 200
- 250
- 300
- 350
- 400

RVA

RVA Project Number: 215718.41
Date: 2022.10

0 500 1,000 2,000
Meters

APPENDIX D

Fig 2 – Pre-Development Drainage Conditions
Fig 3 – Post-Development Drainage Conditions
SWM Control Calculations
OTTHYMO Modelling Results

REV. No.	DATE	REVISION
1	2022-05-31	ISSUED FOR FSR

AREA NUMBER
1
2.86 0.2
RUN OFF COEFFICIENT
AREA (Ha)

SCALE:
5 15 25
HORIZONTAL : 1 : 500

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

Project Title
RYDER SUBDIVISION
DELHI, ONTARIO

Drawing Title
PRE-DEVELOPMENT
DRAINAGE AREA

Designed by :	Drawn By : KRA
Checked by :	Date Started : 2023-03-13
Drawing Scale : AS NOTED	Drawing No. FIG 2
Project No. 21-259	

DATE LAST PLOTTED : May 31, 2023

1
2.86 46%

AREA NUMBER
% IMPERVIOUSNESS
AREA (Ha)

REV. No.	DATE	REVISION
1	2022-05-31	ISSUED FOR FSR

SCALE:
5 15 25
HORIZONTAL : 1 : 500

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

Project Title
RYDER SUBDIVISION
DELHI, ONTARIO

Drawing Title
POST-DEVELOPMENT DRAINAGE AREA

Designed by :	Drawn By : KRA
Checked by :	Date Started : 2023-03-13
Drawing Scale : AS NOTED	Drawing No. FIG 3
Project No. 21-259	

DATE LAST PLOTTED : May 31, 2023

Pre-Development Flow Rates

Design Storm	Q (m3/s)
2	0.106
5	0.224
10	0.321
25	0.455
50	0.572
100	0.691

Pre-Development Rainfall Volumes

Return Period	Pre-Development		
	Area (ha.)	Vol. (mm)	Vol. (m3)
2	17.267	2.333	402.8
5		10.763	1858.4
10		15.181	2621.3
25		21.541	3719.4
50		26.968	4656.5
100		32.618	5632.1

Post-Development Rainfall Volumes

Return Period	Remaining Post Area		
	Area (ha.)	Vol. (mm)	Vol. (m3)
2	17.390	19.989	3476.1
5		31.189	5423.8
10		38.779	6743.7
25		48.807	8487.5
50		56.821	9881.2
100		64.795	11267.9

100 YR Post - 100 YR Initial (m3)	5635.8
Overall Target Pond Storage (15% Surplus) (m3)	6481.1

vallee
Consulting Engineers, Architects & Planners

Subject: Stage-Storage-Discharge
Date: 1/2/2023 By:
Project #: 21-259 Page

Pond Parameters

Bottom Elev. (m)	0.00
Side Slopes (#:1)	-
Pond Area (m2)	4750.00

Orifice Parameters

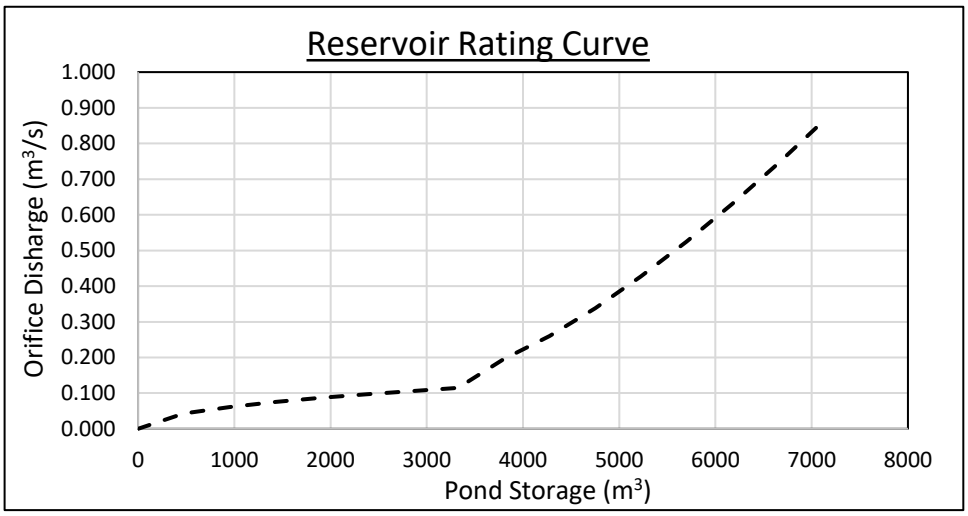
Orifice #1	Diameter	0.250	m
	Area	0.0491	m2
	Elevation	0.00	m
Orifice #2	Diameter	0.325	m
	Area	0.0830	m2
	Elevation	0.70	m

Weir Parameters

Width	0.50
Elevation	0.80

Stage-Storage-Discharge

Description	Elevation (m)	Stage (m)	Pond Volume (m3)	Total Volume (ha.m)	Q (m3/s) Orifice 1	Q (m3/s) Orifice 2	Q (m3/s) Weir	Total Q (m3/s)
Bottom	0.00	0.0	0.0	0.0000	0.000	0.000	0.000	0.000
	0.10	0.1	475.0	0.0475	0.043	0.000	0.000	0.043
	0.20	0.2	950.0	0.0950	0.061	0.000	0.000	0.061
	0.30	0.3	1425.0	0.1425	0.075	0.000	0.000	0.075
	0.40	0.4	1900.0	0.1900	0.087	0.000	0.000	0.087
	0.50	0.5	2375.0	0.2375	0.097	0.000	0.000	0.097
	0.60	0.6	2850.0	0.2850	0.106	0.000	0.000	0.106
	0.70	0.7	3325.0	0.3325	0.115	0.000	0.000	0.115
	0.80	0.8	3800.0	0.3800	0.123	0.073	0.000	0.196
	0.90	0.9	4275.0	0.4275	0.130	0.104	0.026	0.260
	1.00	1.0	4750.0	0.4750	0.137	0.127	0.075	0.338
	1.10	1.1	5225.0	0.5225	0.144	0.146	0.137	0.427
	1.20	1.2	5700.0	0.5700	0.150	0.164	0.211	0.525
	1.30	1.3	6175.0	0.6175	0.156	0.179	0.295	0.631
	1.40	1.4	6650.0	0.6650	0.162	0.194	0.388	0.744
Top of Active Storage	1.50	1.5	7125.0	0.7125	0.168	0.207	0.489	0.864



Pre-Development to Post-Development Flow Rates

Return Period	Q (m3/s)			Check
	Pre	Post	Net	
2	0.106	0.027	-0.079	✓
5	0.224	0.189	-0.035	✓
10	0.321	0.279	-0.042	✓
25	0.455	0.417	-0.038	✓
50	0.572	0.539	-0.033	✓
100	0.691	0.668	-0.023	✓

Stage-Storage

Description	Elevation (m)	Ponding Depth (m)	Total Volume (m3)
Bottom	0.00	0.0	0.0
	0.10	0.1	475.0
	0.20	0.2	950.0
	0.30	0.3	1425.0
	0.40	0.4	1900.0
	0.50	0.5	2375.0
	0.60	0.6	2850.0
	0.70	0.7	3325.0
	0.80	0.8	3800.0
	0.90	0.9	4275.0
	1.00	1.0	4750.0
	1.10	1.1	5225.0
	1.20	1.2	5700.0
	1.30	1.3	6175.0
	1.40	1.4	6650.0
Top of Active Storage	1.50	1.5	7125.0

Approximate Stages from OTTHYMO Model

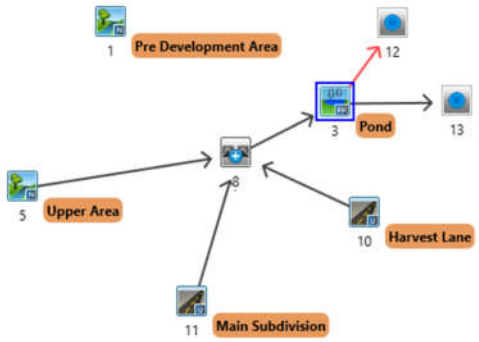
Return Period	Utilized Storage (m3)	Ponding Depth (m)	Elev. (m)
2	2450	0.50	0.50
5	3760	0.79	0.79
10	4393	0.92	0.92
25	5172	1.09	1.09
50	5765	1.21	1.21
100	6331	1.33	1.33

X_1	Y_1
X_2	Y_2
X_3	Y_3

$$y_2 = \frac{(x_2 - x_1)(y_3 - y_1)}{(x_3 - x_1)} + y_1$$

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

2-Year Storm Event

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         VV     I    SSSSS  UUUUU  A   A  LLLLL

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       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M M M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
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DATE: 08-11-2023                          TIME: 07:36:07

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
----------------------
  ************************************************
  ** SIMULATION : 01_2-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 35.21 mm |                          B=   4.501
--------------------                          C=   0.745
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.68 |  1.17   17.69 |  2.17    5.90 |  3.17    3.14
                0.33    3.04 |  1.33   72.24 |  2.33    5.09 |  3.33    2.94
                0.50    3.53 |  1.50   22.78 |  2.50    4.50 |  3.50    2.76
                0.67    4.26 |  1.67   12.62 |  2.67    4.04 |  3.67    2.60
                0.83    5.49 |  1.83    8.98 |  2.83    3.68 |  3.83    2.47
                1.00    8.02 |  2.00    7.08 |  3.00    3.39 |  4.00    2.35


--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=  17.27   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   2.68 | 1.083   17.69 | 2.083   5.90 |  3.08   3.14
                0.167   2.68 | 1.167   17.69 | 2.167   5.90 |  3.17   3.14
                0.250   3.04 | 1.250   72.24 | 2.250   5.09 |  3.25   2.94
                0.333   3.04 | 1.333   72.24 | 2.333   5.09 |  3.33   2.94
                0.417   3.53 | 1.417   22.78 | 2.417   4.50 |  3.42   2.76
                0.500   3.53 | 1.500   22.78 | 2.500   4.50 |  3.50   2.76
                0.583   4.26 | 1.583   12.62 | 2.583   4.04 |  3.58   2.60
                0.667   4.26 | 1.667   12.62 | 2.667   4.04 |  3.67   2.60
                0.750   5.49 | 1.750    8.98 | 2.750   3.68 |  3.75   2.47
                0.833   5.49 | 1.833    8.98 | 2.833   3.68 |  3.83   2.47
                0.917   8.02 | 1.917    7.08 | 2.917   3.39 |  3.92   2.35
                1.000   8.02 | 2.000    7.08 | 3.000   3.39 |  4.00   2.35

     Unit Hyd Qpeak  (cms)=   1.030

     PEAK FLOW       (cms)=   0.106 (i)
     TIME TO PEAK    (hrs)=   2.333
     RUNOFF VOLUME    (mm)=   5.086
     TOTAL RAINFALL   (mm)=  35.210
     RUNOFF COEFFICIENT   =   0.144

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   2.11   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   2.68 | 1.083   17.69 | 2.083   5.90 |  3.08   3.14
                0.167   2.68 | 1.167   17.69 | 2.167   5.90 |  3.17   3.14
                0.250   3.04 | 1.250   72.24 | 2.250   5.09 |  3.25   2.94
                0.333   3.04 | 1.333   72.24 | 2.333   5.09 |  3.33   2.94
                0.417   3.53 | 1.417   22.78 | 2.417   4.50 |  3.42   2.76
                0.500   3.53 | 1.500   22.78 | 2.500   4.50 |  3.50   2.76
                0.583   4.26 | 1.583   12.62 | 2.583   4.04 |  3.58   2.60
                0.667   4.26 | 1.667   12.62 | 2.667   4.04 |  3.67   2.60
                0.750   5.49 | 1.750    8.98 | 2.750   3.68 |  3.75   2.47
                0.833   5.49 | 1.833    8.98 | 2.833   3.68 |  3.83   2.47
                0.917   8.02 | 1.917    7.08 | 2.917   3.39 |  3.92   2.35
                1.000   8.02 | 2.000    7.08 | 3.000   3.39 |  4.00   2.35

     Unit Hyd Qpeak  (cms)=   0.403

     PEAK FLOW       (cms)=   0.023 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   5.076
     TOTAL RAINFALL   (mm)=  35.210
     RUNOFF COEFFICIENT   =   0.144

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0010)|   Area     (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.15          0.12
     Dep. Storage      (mm)=       1.00          9.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       42.43         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   2.68 | 1.083   17.69 | 2.083   5.90 |  3.08   3.14
                0.167   2.68 | 1.167   17.69 | 2.167   5.90 |  3.17   3.14
                0.250   3.04 | 1.250   72.24 | 2.250   5.09 |  3.25   2.94
                0.333   3.04 | 1.333   72.24 | 2.333   5.09 |  3.33   2.94
                0.417   3.53 | 1.417   22.78 | 2.417   4.50 |  3.42   2.76
                0.500   3.53 | 1.500   22.78 | 2.500   4.50 |  3.50   2.76
                0.583   4.26 | 1.583   12.62 | 2.583   4.04 |  3.58   2.60
                0.667   4.26 | 1.667   12.62 | 2.667   4.04 |  3.67   2.60
                0.750   5.49 | 1.750    8.98 | 2.750   3.68 |  3.75   2.47
                0.833   5.49 | 1.833    8.98 | 2.833   3.68 |  3.83   2.47
                0.917   8.02 | 1.917    7.08 | 2.917   3.39 |  3.92   2.35
                1.000   8.02 | 2.000    7.08 | 3.000   3.39 |  4.00   2.35

     Max.Eff.Inten.(mm/hr)=      72.24         44.30
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      1.74 (ii)    11.51 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.32          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.00          0.01      0.009 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.50       1.50
     RUNOFF VOLUME    (mm)=     34.21         11.90      11.87
     TOTAL RAINFALL   (mm)=     35.21         35.21      35.21
     RUNOFF COEFFICIENT   =      0.97          0.34       0.34

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

2-Year Storm Event

```
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       7.56         7.26
    Dep. Storage     (mm)=       1.00         1.50
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     314.32        40.00
    Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
             0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
             0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
             0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
             0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
             0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
             0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
             0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
             0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
             0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
             0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
             1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35

    Max.Eff.Inten.(mm/hr)=      72.24        57.48
              over (min)         5.00        15.00
    Storage Coeff.  (min)=       5.78 (ii)   14.59 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.20         0.08
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.59         0.60        0.909 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.50         1.33
    RUNOFF VOLUME    (mm)=      34.21        18.69        22.26
    TOTAL RAINFALL   (mm)=      35.21        35.21        35.21
    RUNOFF COEFFICIENT   =       0.97         0.53         0.63


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.27   0.009     1.50    11.87
     + ID2= 2 (  0011):    14.82   0.909     1.33    22.26
       ====================================================
       ID = 3 (  0008):    15.09   0.913     1.33    22.07

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0008):    15.09   0.913     1.33    22.07
     + ID2= 2 (  0005):     2.11   0.023     1.58     5.08
       ====================================================
       ID = 1 (  0008):    17.20   0.923     1.33    19.99

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.1960     0.3800
                         0.0430     0.0475    |   0.2600     0.4275
                         0.0610     0.0950    |   0.3380     0.4750
                         0.0750     0.1425    |   0.4270     0.5225
                         0.0870     0.1900    |   0.5250     0.5700
                         0.0970     0.2375    |   0.6310     0.6175
                         0.1060     0.2850    |   0.7440     0.6650
                         0.1150     0.3325    |   0.8640     0.7125

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)   17.200     0.923      1.33      19.99
   OUTFLOW: ID= 1 (  0003)   17.200     0.098      3.83      19.97
   OVERFLOW:ID= 3 (  0003)    0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.67
                  TIME SHIFT OF PEAK FLOW          (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2450

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  --------------------------
  | Junction Command(0012) |
  --------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

--------------------------
| Junction Command(0013) |
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                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
INFLOW : ID= 1(  0003)   17.20     0.10    3.83     19.97
OUTFLOW: ID= 2(  0013)   17.20     0.10    3.83     19.97

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21-259 Ryder Subdivision
Visual OTTHYMO MODEL

5-Year Storm Event

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       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat
  Output  filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\1b364cd1-1519-4a38-844c-845c6bc29433\scena
  Summary filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\1b364cd1-1519-4a38-844c-845c6bc29433\scena


DATE: 08-11-2023                          TIME: 07:36:07

USER:



COMMENTS: _____________________________________________________

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  **********************************************
  ** SIMULATION : 02_5-Year Norfolk           **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 49.03 mm |                          B=   3.007
--------------------                          C=   0.703
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.20 |  1.17   23.22 |  2.17    8.64 |  3.17    4.87
                0.33    4.72 |  1.33   96.03 |  2.33    7.56 |  3.33    4.58
                0.50    5.42 |  1.50   29.33 |  2.50    6.76 |  3.50    4.32
                0.67    6.44 |  1.67   17.13 |  2.67    6.13 |  3.67    4.10
                0.83    8.09 |  1.83   12.62 |  2.83    5.63 |  3.83    3.90
                1.00   11.39 |  2.00   10.19 |  3.00    5.22 |  4.00    3.72


--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=  17.27   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Unit Hyd Qpeak  (cms)=   1.030

    PEAK FLOW       (cms)=   0.224 (i)
    TIME TO PEAK    (hrs)=   2.250
    RUNOFF VOLUME    (mm)=  10.763
    TOTAL RAINFALL   (mm)=  49.033
    RUNOFF COEFFICIENT   =   0.220

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   2.11   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Unit Hyd Qpeak  (cms)=   0.403

    PEAK FLOW       (cms)=   0.051 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=  10.743
    TOTAL RAINFALL   (mm)=  49.033
    RUNOFF COEFFICIENT   =   0.219

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0010)|   Area     (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           0.15          0.12
    Dep. Storage     (mm)=           1.00          9.00
    Average Slope     (%)=           1.00          2.00
    Length            (m)=          42.43         40.00
    Mannings n            =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Max.Eff.Inten.(mm/hr)=      96.03         81.04
                over (min)        5.00         10.00
    Storage Coeff.  (min)=       1.55 (ii)     9.23 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.33          0.12
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.00          0.02      0.019 (iii)
    TIME TO PEAK    (hrs)=       1.33          1.42       1.42
    RUNOFF VOLUME    (mm)=      48.03         21.22      21.20
    TOTAL RAINFALL   (mm)=      49.03         49.03      49.03
    RUNOFF COEFFICIENT   =       0.98          0.43       0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           7.56          7.26
    Dep. Storage     (mm)=           1.00          1.50
    Average Slope     (%)=           1.00          2.00
    Length            (m)=         314.32         40.00
    Mannings n            =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Max.Eff.Inten.(mm/hr)=      96.03         91.48
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

5-Year Storm Event

```
              over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.16 (ii)   12.48 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.21         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.81         1.02          1.389 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      48.03        30.18          34.28
     TOTAL RAINFALL   (mm)=      49.03        49.03          49.03
     RUNOFF COEFFICIENT   =       0.98         0.62           0.70


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0010):     0.27   0.019     1.42    21.20
     + ID2= 2 (  0011):    14.82   1.389     1.33    34.28
       ====================================================
       ID = 3 (  0008):    15.09   1.404     1.33    34.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0008):    15.09   1.404     1.33    34.05
     + ID2= 2 (  0005):     2.11   0.051     1.58    10.74
       ====================================================
       ID = 1 (  0008):    17.20   1.438     1.42    31.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1960     0.3800
                          0.0430     0.0475   |   0.2600     0.4275
                          0.0610     0.0950   |   0.3380     0.4750
                          0.0750     0.1425   |   0.4270     0.5225
                          0.0870     0.1900   |   0.5250     0.5700
                          0.0970     0.2375   |   0.6310     0.6175
                          0.1060     0.2850   |   0.7440     0.6650
                          0.1150     0.3325   |   0.8640     0.7125

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)    17.200     1.438      1.42      31.19
   OUTFLOW: ID= 1 (  0003)    17.200     0.189      3.42      31.17
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.15
                  TIME SHIFT OF PEAK FLOW          (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3760

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0012) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0013) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0003)   17.20     0.19    3.42    31.17
  OUTFLOW: ID= 2(  0013)   17.20     0.19    3.42    31.17

  --------------------------------------------------------------------------------
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

10-Year Storm Event

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 08-11-2023                          TIME: 07:36:07

USER:



COMMENTS: _____

--------------------------------------------------------------------------------
------------------------
  ***********************************************
  ** SIMULATION : 03_10-Year Norfolk           **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 670.324
| Ptotal= 57.94 mm |                          B=   3.007
--------------------                          C=   0.698
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.17    5.04 |  1.17   27.43 |'  2.17   10.30 |  3.17    5.84
    0.33    5.66 |  1.33  111.84 |'  2.33    9.03 |  3.33    5.49
    0.50    6.49 |  1.50   34.58 |'  2.50    8.07 |  3.50    5.18
    0.67    7.70 |  1.67   20.31 |'  2.67    7.33 |  3.67    4.92
    0.83    9.66 |  1.83   15.00 |'  2.83    6.74 |  3.83    4.68
    1.00   13.55 |  2.00   12.13 |'  3.00    6.25 |  4.00    4.47


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  17.27   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
   0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
   0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
   0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
   0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
   0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
   0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
   0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
   0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
   0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
   0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
   1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

    Unit Hyd Qpeak  (cms)=   1.030

    PEAK FLOW       (cms)=   0.321 (i)
    TIME TO PEAK    (hrs)=   2.250
    RUNOFF VOLUME    (mm)=  15.181
    TOTAL RAINFALL   (mm)=  57.945
    RUNOFF COEFFICIENT   =   0.262

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   2.11   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
   0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
   0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
   0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
   0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
   0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
   0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
   0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
   0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
   0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
   0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
   1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

    Unit Hyd Qpeak  (cms)=   0.403

    PEAK FLOW       (cms)=   0.075 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  15.152
    TOTAL RAINFALL   (mm)=  57.945
    RUNOFF COEFFICIENT   =   0.261

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.15         0.12
    Dep. Storage     (mm)=       1.00         9.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      42.43        40.00
    Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
   0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
   0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
   0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
   0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
   0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
   0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
   0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
   0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
   0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
   0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
   1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

    Max.Eff.Inten.(mm/hr)=     111.84       108.12
              over (min)        5.00        10.00
    Storage Coeff.  (min)=       1.46 (ii)    8.30 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.33         0.13
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.00         0.03          0.026 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.42          1.42
    RUNOFF VOLUME    (mm)=      56.94        27.87         27.85
    TOTAL RAINFALL   (mm)=      57.94        57.94         57.94
    RUNOFF COEFFICIENT   =       0.98         0.48          0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       7.56         7.26
    Dep. Storage     (mm)=       1.00         1.50
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     314.32        40.00
    Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
   0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
   0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
   0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
   0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
   0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
   0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
   0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
   0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
   0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
   0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
   1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

10-Year Storm Event

```
     Max.Eff.Inten.(mm/hr)=     111.84       115.18
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.86 (ii)   11.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.22         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.95         1.32          1.740 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.42
     RUNOFF VOLUME    (mm)=      56.94        37.98         42.34
     TOTAL RAINFALL   (mm)=      57.94        57.94         57.94
     RUNOFF COEFFICIENT   =       0.98         0.66          0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.27   0.026     1.42    27.85
     + ID2= 2 (  0011):    14.82   1.740     1.42    42.34
       ================================================
       ID = 3 (  0008):    15.09   1.766     1.42    42.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0008):    15.09   1.766     1.42    42.08
     + ID2= 2 (  0005):     2.11   0.075     1.50    15.15
       ================================================
       ID = 1 (  0008):    17.20   1.831     1.42    38.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1960     0.3800
                          0.0430     0.0475   |   0.2600     0.4275
                          0.0610     0.0950   |   0.3380     0.4750
                          0.0750     0.1425   |   0.4270     0.5225
                          0.0870     0.1900   |   0.5250     0.5700
                          0.0970     0.2375   |   0.6310     0.6175
                          0.1060     0.2850   |   0.7440     0.6650
                          0.1150     0.3325   |   0.8640     0.7125

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)    17.200     1.831      1.42      38.78
   OUTFLOW: ID= 1 (  0003)    17.200     0.279      3.00      38.76
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.25
                  TIME SHIFT OF PEAK FLOW         (min)= 95.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4393

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0012) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0013) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 1(  0003)  17.20     0.28    3.00    38.76
  OUTFLOW: ID= 2(  0013)  17.20     0.28    3.00    38.76

  --------------------------------------------------------------------------------
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

25-Year Storm Event

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T *****


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  Summary filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\261e0b03-8d06-457b-a398-2909881b6cc9\scena


DATE: 08-11-2023                          TIME: 07:36:07

USER:



COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
----------------------
  ***********************************************
  ** SIMULATION : 04_25-Year Norfolk           **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 721.533
| Ptotal= 69.38 mm |                          B=   2.253
--------------------                          C=   0.679
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    6.34 |  1.17   31.84 |  2.17   12.58 |  3.17    7.30
                0.33    7.08 |  1.33  131.63 |  2.33   11.08 |  3.33    6.87
                0.50    8.07 |  1.50   39.74 |  2.50    9.96 |  3.50    6.50
                0.67    9.51 |  1.67   23.97 |  2.67    9.08 |  3.67    6.18
                0.83   11.82 |  1.83   17.98 |  2.83    8.38 |  3.83    5.90
                1.00   16.33 |  2.00   14.70 |  3.00    7.79 |  4.00    5.64


--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=  17.27   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
               0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
               0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
               0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
               0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
               0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
               0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
               0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
               0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
               0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
               0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
               1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Unit Hyd Qpeak  (cms)=   1.030

    PEAK FLOW       (cms)=   0.455 (i)
    TIME TO PEAK    (hrs)=   2.167
    RUNOFF VOLUME    (mm)=  21.541
    TOTAL RAINFALL   (mm)=  69.379
    RUNOFF COEFFICIENT   =   0.310

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   2.11   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
               0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
               0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
               0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
               0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
               0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
               0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
               0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
               0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
               0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
               0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
               1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Unit Hyd Qpeak  (cms)=   0.403

    PEAK FLOW       (cms)=   0.109 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  21.500
    TOTAL RAINFALL   (mm)=  69.379
    RUNOFF COEFFICIENT   =   0.310

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0010)|   Area     (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           0.15          0.12
    Dep. Storage     (mm)=           1.00          9.00
    Average Slope     (%)=           1.00          2.00
    Length            (m)=          42.43         40.00
    Mannings n           =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
               0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
               0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
               0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
               0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
               0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
               0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
               0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
               0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
               0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
               0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
               1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Max.Eff.Inten.(mm/hr)=     131.63       144.72
                over (min)        5.00        10.00
    Storage Coeff.  (min)=        1.37 (ii)    7.46 (ii)
    Unit Hyd. Tpeak (min)=        5.00        10.00
    Unit Hyd. peak  (cms)=        0.33         0.13
                                                      *TOTALS*
    PEAK FLOW       (cms)=        0.00         0.04        0.036 (iii)
    TIME TO PEAK    (hrs)=        1.33         1.42         1.42
    RUNOFF VOLUME    (mm)=       68.38        36.91        36.89
    TOTAL RAINFALL   (mm)=       69.38        69.38        69.38
    RUNOFF COEFFICIENT   =        0.99         0.53         0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           7.56          7.26
    Dep. Storage     (mm)=           1.00          1.50
    Average Slope     (%)=           1.00          2.00
    Length            (m)=         314.32         40.00
    Mannings n           =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
               0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
               0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
               0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
               0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
               0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
               0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
               0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
               0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
               0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
               0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
               1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Max.Eff.Inten.(mm/hr)=     131.63       145.95
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

25-Year Storm Event

```
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.55 (ii)   10.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.23         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.14         1.72      2.207 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50       1.42
     RUNOFF VOLUME    (mm)=      68.38        48.29      52.91
     TOTAL RAINFALL   (mm)=      69.38        69.38      69.38
     RUNOFF COEFFICIENT   =       0.99         0.70       0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     0.27   0.036     1.42    36.89
      + ID2= 2 (  0011):    14.82   2.207     1.42    52.91
        ================================================
        ID = 3 (  0008):    15.09   2.243     1.42    52.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0008):    15.09   2.243     1.42    52.63
      + ID2= 2 (  0005):     2.11   0.109     1.50    21.50
        ================================================
        ID = 1 (  0008):    17.20   2.341     1.42    48.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)  |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1960     0.3800
                           0.0430     0.0475   |   0.2600     0.4275
                           0.0610     0.0950   |   0.3380     0.4750
                           0.0750     0.1425   |   0.4270     0.5225
                           0.0870     0.1900   |   0.5250     0.5700
                           0.0970     0.2375   |   0.6310     0.6175
                           0.1060     0.2850   |   0.7440     0.6650
                           0.1150     0.3325   |   0.8640     0.7125

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)     17.200     2.341      1.42      48.81
   OUTFLOW: ID= 1 (  0003)     17.200     0.417      2.67      48.79
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.82
                  TIME SHIFT OF PEAK FLOW          (min)= 75.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5172

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0012) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0013) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0003)   17.20     0.42    2.67    48.79
  OUTFLOW: ID= 2(  0013)   17.20     0.42    2.67    48.79

  --------------------------------------------------------------------------------
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21-259 Ryder Subdivision
Visual OTTHYMO MODEL

50-Year Storm Event

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat
  Output  filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\f96c8a4e-6c4e-45b3-a499-cee270ec5c3e\scena
  Summary filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\f96c8a4e-6c4e-45b3-a499-cee270ec5c3e\scena

DATE: 08-11-2023                          TIME: 07:36:07

USER:


COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : 05_50-Year Norfolk           **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 766.038
| Ptotal= 78.32 mm |                          B=   1.898
--------------------                          C=   0.668
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.17    7.35 |  1.17   35.40 |'  2.17   14.38 |  3.17    8.44
   0.33    8.19 |  1.33  146.50 |'  2.33   12.71 |  3.33    7.96
   0.50    9.32 |  1.50   43.93 |'  2.50   11.45 |  3.50    7.55
   0.67   10.95 |  1.67   26.91 |'  2.67   10.46 |  3.67    7.18
   0.83   13.53 |  1.83   20.36 |'  2.83    9.66 |  3.83    6.85
   1.00   18.53 |  2.00   16.73 |'  3.00    9.00 |  4.00    6.56


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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  17.27   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56

    Unit Hyd Qpeak  (cms)=   1.030

    PEAK FLOW       (cms)=   0.572 (i)
    TIME TO PEAK    (hrs)=   2.167
    RUNOFF VOLUME    (mm)=  26.968
    TOTAL RAINFALL   (mm)=  78.320
    RUNOFF COEFFICIENT   =   0.344

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   2.11   Curve Number   (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56

    Unit Hyd Qpeak  (cms)=   0.403

    PEAK FLOW       (cms)=   0.138 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  26.917
    TOTAL RAINFALL   (mm)=  78.320
    RUNOFF COEFFICIENT   =   0.344

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.15         0.12
    Dep. Storage     (mm)=      1.00         9.00
    Average Slope     (%)=      1.00         2.00
    Length            (m)=     42.43        40.00
    Mannings n           =     0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56

    Max.Eff.Inten.(mm/hr)=     146.50       174.05
              over (min)        5.00        10.00
    Storage Coeff.  (min)=      1.31 (ii)    6.97 (ii)
    Unit Hyd. Tpeak (min)=      5.00        10.00
    Unit Hyd. peak  (cms)=      0.33         0.14
                                                    *TOTALS*
    PEAK FLOW       (cms)=      0.00         0.04          0.044 (iii)
    TIME TO PEAK    (hrs)=      1.33         1.42          1.42
    RUNOFF VOLUME    (mm)=     77.32        44.29         44.27
    TOTAL RAINFALL   (mm)=     78.32        78.32         78.32
    RUNOFF COEFFICIENT   =      0.99         0.57          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      7.56         7.26
    Dep. Storage     (mm)=      1.00         1.50
    Average Slope     (%)=      1.00         2.00
    Length            (m)=    314.32        40.00
    Mannings n           =     0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

50-Year Storm Event

```
     Max.Eff.Inten.(mm/hr)=     146.50       169.77
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       4.36 (ii)   10.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.23         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.28         2.03          2.580 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.42
     RUNOFF VOLUME    (mm)=      77.32        56.52          61.31
     TOTAL RAINFALL   (mm)=      78.32        78.32          78.32
     RUNOFF COEFFICIENT   =       0.99         0.72           0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.27   0.044     1.42    44.27
     + ID2= 2 (  0011):    14.82   2.580     1.42    61.31
       ================================================
       ID = 3 (  0008):    15.09   2.624     1.42    61.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0008):    15.09   2.624     1.42    61.00
     + ID2= 2 (  0005):     2.11   0.138     1.50    26.92
       ================================================
       ID = 1 (  0008):    17.20   2.749     1.42    56.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1960     0.3800
                           0.0430     0.0475   |   0.2600     0.4275
                           0.0610     0.0950   |   0.3380     0.4750
                           0.0750     0.1425   |   0.4270     0.5225
                           0.0870     0.1900   |   0.5250     0.5700
                           0.0970     0.2375   |   0.6310     0.6175
                           0.1060     0.2850   |   0.7440     0.6650
                           0.1150     0.3325   |   0.8640     0.7125

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)     17.200     2.749      1.42      56.82
   OUTFLOW: ID= 1 (  0003)     17.200     0.539      2.50      56.81
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.62
                  TIME SHIFT OF PEAK FLOW         (min)= 65.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5765

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  --------------------------
  | Junction Command(0012) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0013) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 1(  0003)   17.20     0.54    2.50    56.81
  OUTFLOW: ID= 2(  0013)   17.20     0.54    2.50    56.81

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```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

100-Year Storm Event

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       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat
  Output  filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\713e60d7-ff80-4a27-be8c-ablba2f9a8dd\scena
  Summary filename: C:\Users\Keegan\AppData\Local\Civica\VH5\201356ea-22f7-49f0-
bdbe-dffbe49d1c05\713e60d7-ff80-4a27-be8c-ablba2f9a8dd\scena


DATE: 08-11-2023                          TIME: 07:36:07

USER:


COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : 06_100-Year Norfolk           **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 801.041
| Ptotal= 87.09 mm |                          B=   1.501
--------------------                          C=   0.657
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    8.40 |  1.17   38.70 |  2.17   16.17 |  3.17    9.61
                0.33    9.34 |  1.33  160.97 |  2.33   14.33 |  3.33    9.08
                0.50   10.59 |  1.50   47.72 |  2.50   12.95 |  3.50    8.61
                0.67   12.39 |  1.67   29.71 |  2.67   11.86 |  3.67    8.20
                0.83   15.24 |  1.83   22.67 |  2.83   10.97 |  3.83    7.84
                1.00   20.69 |  2.00   18.74 |  3.00   10.24 |  4.00    7.51


--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=  17.27   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
               0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
               0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
               0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
               0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
               0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
               0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
               0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
               0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
               0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
               0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
               1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51

    Unit Hyd Qpeak  (cms)=   1.030

    PEAK FLOW       (cms)=   0.691 (i)
    TIME TO PEAK    (hrs)=   2.167
    RUNOFF VOLUME    (mm)=  32.618
    TOTAL RAINFALL   (mm)=  87.089
    RUNOFF COEFFICIENT   =   0.375

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   2.11   Curve Number    (CN)= 70.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
               0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
               0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
               0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
               0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
               0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
               0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
               0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
               0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
               0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
               0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
               1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51

    Unit Hyd Qpeak  (cms)=   0.403

    PEAK FLOW       (cms)=   0.167 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  32.556
    TOTAL RAINFALL   (mm)=  87.089
    RUNOFF COEFFICIENT   =   0.374

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0010)|   Area     (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  54.00   Dir. Conn.(%)=   0.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           0.15          0.12
    Dep. Storage     (mm)=           1.00          9.00
    Average Slope     (%)=           1.00          2.00
    Length            (m)=          42.43         40.00
    Mannings n           =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
               0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
               0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
               0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
               0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
               0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
               0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
               0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
               0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
               0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
               0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
               1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51

    Max.Eff.Inten.(mm/hr)=     160.97       203.54
                over (min)        5.00        10.00
    Storage Coeff.  (min)=        1.26 (ii)    6.57 (ii)
    Unit Hyd. Tpeak (min)=        5.00        10.00
    Unit Hyd. peak  (cms)=        0.33         0.14
                                                      *TOTALS*
    PEAK FLOW       (cms)=        0.00         0.05        0.052 (iii)
    TIME TO PEAK    (hrs)=        1.33         1.42         1.42
    RUNOFF VOLUME    (mm)=       86.09        51.72        51.71
    TOTAL RAINFALL   (mm)=       87.09        87.09        87.09
    RUNOFF COEFFICIENT   =        0.99         0.59         0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=  14.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  51.00   Dir. Conn.(%)=  23.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=           7.56          7.26
    Dep. Storage     (mm)=           1.00          1.50
    Average Slope     (%)=           1.00          2.00
    Length            (m)=         314.32         40.00
    Mannings n           =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
               0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
               0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
               0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
               0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
               0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
               0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
               0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
               0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
               0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
               0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
               1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51

    Max.Eff.Inten.(mm/hr)=     160.97       193.22
```

21-259 Ryder Subdivision
Visual OTTHYMO MODEL

100-Year Storm Event

```
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.20 (ii)    9.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.42         2.51          3.610 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      86.09        64.71         69.62
     TOTAL RAINFALL   (mm)=      87.09        87.09         87.09
     RUNOFF COEFFICIENT   =       0.99         0.74          0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     0.27   0.052     1.42    51.71
      + ID2= 2 (  0011):    14.82   3.610     1.33    69.62
        ================================================
        ID = 3 (  0008):    15.09   3.656     1.33    69.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0008):    15.09   3.656     1.33    69.30
      + ID2= 2 (  0005):     2.11   0.167     1.50    32.56
        ================================================
        ID = 1 (  0008):    17.20   3.764     1.33    64.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1960     0.3800
                          0.0430     0.0475   |   0.2600     0.4275
                          0.0610     0.0950   |   0.3380     0.4750
                          0.0750     0.1425   |   0.4270     0.5225
                          0.0870     0.1900   |   0.5250     0.5700
                          0.0970     0.2375   |   0.6310     0.6175
                          0.1060     0.2850   |   0.7440     0.6650
                          0.1150     0.3325   |   0.8640     0.7125

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0008)    17.200     3.764      1.33      64.80
   OUTFLOW: ID= 1 (  0003)    17.200     0.668      2.33      64.78
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.74
                  TIME SHIFT OF PEAK FLOW          (min)= 60.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6331

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0012) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0003)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0012)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0013) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 1(  0003)   17.20     0.67    2.33    64.78
  OUTFLOW: ID= 2(  0013)   17.20     0.67    2.33    64.78

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 FINISH
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Planning Department Development Application Form

Complete Application

A complete development application consists of the following:

1. A completed, signed, and notarized application form
2. Supporting information adequate to illustrate your proposal as indicated in **Section H** of this application form
3. Written authorization from the registered owner of the subject lands where the applicant is not the owner as per Section N
4. Cash, debit, credit or cheque payable to Norfolk County in the amount set out in the user fees By-Law that will be accepted and deposited once the application has been deemed complete.

Pre-Submission Consultation:

Norfolk County requires a Pre-Consultation Meeting for all applications; however, minor applications may be exempted depending on the nature of the proposal. The purpose of a Pre-Consultation Meeting is to provide the applicant with an opportunity to present the proposed application, discuss potential issues, and for the Norfolk County and Agency staff to identify the application requirements. Application requirements, as detailed in the Pre-Consultation Meeting Comments, are valid for one year after the meeting date.

Development Application Process

Once an application has been deemed complete by a Planner, Norfolk County staff will circulate the application to adjacent landowners, public agencies, and internal departments for comment. The time involved in application processing varies depending on its complexity, acceptability to the other agencies, and statutory Planning Act decision time-frames.

Payment is required once your application is deemed complete. Pre-payments will not be accepted.

Norfolk County collects personal information submitted through this form under the Municipal Freedom of Information and Protection Act's authority. Norfolk County will use this information for the purposes indicated or implied by this form. You can direct questions about collecting personal information to Norfolk GIS Services at NorfolkGIS@norfolkcounty.ca.

Additional studies required for the complete application shall be at the applicant's sole expense. Sometimes, peer reviews may be necessary to review particular studies at the applicant's expense. In these caseds, Norfolk County staff will select the company to complete the peer review.

Norfolk County will refund the original fee if applicants withdraw their applications before circulation. If Norfolk County must recirculate your drawings, there will be an additional fee. If Norfolk County must do more than three reviews of engineering drawings due to revisions by the owner or failure to revise engineering drawings as requested, Norfolk County will charge an additional fee. Full refunds are only available before Norfolk County has circulated the application.

Notification Sign Requirements

For public notification, Norfolk County will provide you with a sign to indicate the intent and purpose of your development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands.
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level and not on a tree.
3. Notify the Planner when the sign is in place.
4. Maintain the sign until the development application is finalized and, after that, remove it.

Contact Us

For additional information or assistance completing this application, please contact a Planner at 519-426-5870 or 519-875-4485 extension 1842 or planning@norfolkcounty.ca. Please submit the completed application and fees to the attention of the Planning Department at 185 Robinson Street, Suite 200, Simcoe, ON N3Y 5L6.

For Office Use Only:

File Number	_____	Public Notice Sign	_____
Related File Number	_____	Application Fee	_____
Pre-consultation Meeting	_____	Conservation Authority Fee	_____
Application Submitted	_____	Well & Septic Info Provided	_____
Complete Application	_____	Planner	_____

Check the type of planning application(s) you are submitting.

- ☐ Official Plan Amendment
- ☒ Zoning By-Law Amendment
- ☐ Temporary Use By-law
- ☒ Draft Plan of Subdivision/Vacant Land Condominium
- ☐ Condominium Exemption
- ☐ Site Plan Application
- ☐ Extension of a Temporary Use By-law
- ☐ Part Lot Control
- ☐ Cash-in-Lieu of Parking
- ☐ Renewable Energy Project or Radio Communication Tower

Please summarize the desired result of this application (for example, a special zoning provision on the subject lands to include additional use(s), changing the zone or official plan designation of the subject lands, creating a certain number of lots, or similar)

_____
_____
_____
_____
_____
_____
_____

Property Assessment Roll Number: _____

A. Applicant Information

Name of Owner _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Name of Applicant _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Name of Agent _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

Unless otherwise directed, Norfolk County will forward all correspondence and notices regarding this application to both owner and agent noted above.

☐ Owner ☐ Agent ☐ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:

_____

_____

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):

   _____

   _____

   Municipal Civic Address: _____

   Present Official Plan Designation(s): _____

   Present Zoning: _____

2. Is there a special provision or site specific zone on the subject lands?

   ☐ Yes ☐ No If yes, please specify corresponding number:

   _____

3. Present use of the subject lands:

   _____

   _____

4. Please describe **all existing** buildings or structures on the subject lands and whether they will be retained, demolished or removed. If retaining the buildings or structures, please describe the type of buildings or structures, and illustrate the setback, in metric units, from the front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

   _____

   _____

   _____

5. If an addition to an existing building is being proposed, please explain what it will be used for (for example: bedroom, kitchen, or bathroom). If new fixtures are proposed, please describe.

   _____

   _____

   _____

6. Please describe **all proposed** buildings or structures/additions on the subject lands. Describe the type of buildings or structures/additions, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

   _____

   _____

   _____

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being architecturally and/or historically significant? Yes ☐ No ☐

   If yes, identify and provide details of the building:

   _____

   _____

8. If known, the length of time the existing uses have continued on the subject lands:

   _____

9. Existing use of abutting properties:

   _____

10. Are there any easements or restrictive covenants affecting the subject lands?

    ☐ Yes ☐ No If yes, describe the easement or restrictive covenant and its effect:

    _____

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please explain what you propose to do on the subject lands/premises which makes this development application necessary:

   _____

   _____

   _____

   _____

2. Please explain why it is not possible to comply with the provision(s) of the Zoning By-law/and or Official Plan:

   _____

   _____

   _____

3. Does the requested amendment alter all or any part of the boundary of an area of settlement in the municipality or implement a new area of settlement in the municipality? ☐ Yes ☐ No If yes, describe its effect:

   _____

   _____

   _____

4. Does the requested amendment remove the subject land from an area of employment? ☐ Yes ☐ No If yes, describe its effect:

   _____

   _____

   _____

5. Does the requested amendment alter, replace, or delete a policy of the Official Plan? ☐ Yes ☐ No If yes, identify the policy, and also include a proposed text of the policy amendment (if additional space is required, please attach a separate sheet):

_____

_____

_____

6. Description of land intended to be severed in metric units:

Frontage: _____

Depth: _____

Width: _____

Lot Area: _____

Present Use: _____

Proposed Use: _____

Proposed final lot size (if boundary adjustment): _____

If a boundary adjustment, identify the assessment roll number and property owner of the lands to which the parcel will be added: _____

_____

Description of land intended to be retained in metric units:

Frontage: _____

Depth: _____

Width: _____

Lot Area: _____

Present Use: _____

Proposed Use: _____

Buildings on retained land: _____

7. Description of proposed right-of-way/easement:

Frontage: _____

Depth: _____

Width: _____

Area: _____

Proposed use: _____

8. Name of person(s), if known, to whom lands or interest in lands to be transferred, leased or charged (if known):

No easement or interest change is proposed.

_____

9. **Site Information** this section is not applicable

	Zoning	**Proposed**
Please indicate unit of measurement, for example: m, m^2 or %		
Lot frontage		
Lot depth		
Lot width		
Lot area		
Lot coverage		
Front yard		
Rear yard		
Left Interior side yard		
Right Interior side yard		
Exterior side yard (corner lot)		
Landscaped open space		
Entrance access width		
Exit access width		
Size of fencing or screening		
Type of fencing		

10. Building Size

Number of storeys		
Building height		
Total ground floor area		
Total gross floor area		
Total useable floor area		

11. Off Street Parking and Loading Facilities This section is not applicable

Number of off street parking spaces		
Number of visitor parking spaces		
Number of accessible parking spaces		
Number of off street loading facilities		

12. Residential (if applicable)

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ☐ No

If yes, describe: _____

Type	Number of Units	Floor Area per Unit in m2
Single Detached	_____	_____
Semi-Detached	_____	_____
Duplex	_____	_____
Triplex	_____	_____
Four-plex	_____	_____
Street Townhouse	_____	_____
Dual Front Townhouse	_65_____	_____
Apartment - Bachelor	_____	_____
Apartment - One bedroom	_____	_____
Apartment - Two bedroom	_____	_____
Apartment - Three bedroom	_____	_____

Other facilities provided (for example: play facilities, underground parking, games room, or swimming pool):

13. Commercial/Industrial Uses (if applicable) This section is not applicable

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ☐ No

If yes, describe:

_____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

_____

_____

_____

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Is open storage required: ☐ Yes ☐ No

Is a residential use proposed as part of, or accessory to commercial/industrial use?

☐ Yes ☐ No If yes please describe:

_____

_____

14. Institutional (if applicable) This section is not applicable

Describe the type of use proposed: _____

Seating capacity (if applicable): _____

Number of beds (if applicable): _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

_____

_____

_____

15. Describe Recreational or Other Use(s) (if applicable)

_____

_____

_____

_____

_____

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands? ☐ Yes ☐ No ☐ Unknown
   If yes, specify the uses (for example: gas station or petroleum storage):

   _____

   _____
2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites?☐ Yes ☐ No ☐ Unknown
3. Provide the information you used to determine the answers to the above questions:

   _____

   _____

   _____
4. If you answered yes to any of the above questions in Section D, a previous use inventory showing all known former uses of the subject lands, or if appropriate, the adjacent lands, is needed. Is the previous use inventory attached? ☐ Yes ☐ No

E. Provincial Policy

1. Is the requested amendment consistent with the provincial policy statements issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*? ☐ Yes ☐ No

   If no, please explain:

   _____

   _____

   _____
2. It is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the provincial policy statement subsection 2.1.7? ☐ Yes ☐ No

   If no, please explain:

   _____

   _____

   _____

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection? ☐ Yes ☐ No

   If no, please explain:

   _____

   _____

   Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C please attach relevant information and approved mitigation measures from the Risk Manager Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

   Livestock facility or stockyard (submit MDS Calculation with application)

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Wooded area

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Municipal Landfill

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Sewage treatment plant or waste stabilization plant

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Provincially significant wetland (class 1, 2 or 3) or other environmental feature

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Floodplain

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Rehabilitated mine site

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Non-operating mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Active mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Industrial or commercial use (specify the use(s))

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Active railway line

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Seasonal wetness of lands

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Erosion

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Abandoned gas wells

   ☐ On the subject lands or ☐ within 500 meters – distance _____

F. Servicing and Access

1. Indicate what services are available or proposed:
   Water Supply
   - ☐ Municipal piped water
   - ☐ Communal wells
   - ☐ Individual wells
   - ☐ Other (describe below)

   _____

   Sewage Treatment
   - ☐ Municipal sewers
   - ☐ Communal system
   - ☐ Septic tank and tile bed in good working order
   - ☐ Other (describe below)

   _____

   Storm Drainage
   - ☐ Storm sewers
   - ☐ Open ditches
   - ☐ Other (describe below)

   _____

2. Existing or proposed access to subject lands:
   - ☐ Municipal road
   - ☐ Provincial highway
   - ☐ Unopened road
   - ☐ Other (describe below)

   Name of road/street: _____

G. Other Information

1. Does the application involve a local business? ☐ Yes ☐ No
   If yes, how many people are employed on the subject lands?
   _____
2. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.
   _____
   _____
   _____
   _____

H. Supporting Material to be submitted by Applicant

In order for your application to be considered complete, **folded** hard copies (number of paper copies as directed by the planner) and an **electronic version (PDF) of the properly named site plan drawings, additional plans, studies and reports** will be required, including but not limited to the following details:

1. Concept/Layout Plan
2. All measurements in metric
3. Key map
4. Scale, legend and north arrow
5. Legal description and municipal address
6. Development name
7. Drawing title, number, original date and revision dates
8. Owner's name, address and telephone number
9. Engineer's name, address and telephone number
10. Professional engineer's stamp
11. Existing and proposed easements and right of ways
12. Zoning compliance table – required versus proposed
13. Parking space totals – required and proposed
14. All entrances to parking areas marked with directional arrows
15. Loading spaces, facilities and routes (for commercial developments)
16. All dimensions of the subject lands
17. Dimensions and setbacks of all buildings and structures
18. Location and setbacks of septic system and well from all existing and proposed lot lines, and all existing and proposed structures
19. Gross, ground and useable floor area
20. Lot coverage
21. Floor area ratio
22. Building entrances, building type, height, grades and extent of overhangs
23. Names, dimensions and location of adjacent streets including daylighting triangles
24. Driveways, curbs, drop curbs, pavement markings, widths, radii and traffic directional signs
25. All exterior stairways and ramps with dimensions and setbacks
26. Retaining walls including materials proposed
27. Fire access and routes
28. Location, dimensions and number of parking spaces (including visitor and accessible) and drive aisles
29. Location of mechanical room, and other building services (e.g. A/C, HRV)
30. Refuse disposal and storage areas including any related screening (if indoors, need notation on site plan)
31. Winter snow storage location

32. Landscape areas with dimensions
33. Natural features, watercourses and trees
34. Fire hydrants and utilities location
35. Fencing, screening and buffering – size, type and location
36. All hard surface materials
37. Light standards and wall mounted lights (plus a note on the site plan that all outdoor lighting is to be dark sky compliant)
38. Business signs (make sure they are not in sight lines)
39. Sidewalks and walkways with dimensions
40. Pedestrian access routes into site and around site
41. Bicycle parking
42. Architectural elevations of all building sides
43. All other requirements as per the pre-consultation meeting

In addition, the following additional plans, studies and reports, including but not limited to, **may** also be required as part of the complete application submission:

☐ Zoning Deficiency Form

☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)

☐ Architectural Plan

☐ Buildings Elevation Plan

☐ Cut and Fill Plan

☐ Erosion and Sediment Control Plan

☐ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)

☐ Landscape Plan

☐ Photometric (Lighting) Plan

☐ Plan and Profile Drawings

☐ Site Servicing Plan

☐ Storm water Management Plan

☐ Street Sign and Traffic Plan

☐ Street Tree Planting Plan

☐ Tree Preservation Plan

☐ Archaeological Assessment

☐ Environmental Impact Study

☐ Functional Servicing Report

☐ Geotechnical Study / Hydrogeological Review

☐ Minimum Distance Separation Schedule

☐ Noise or Vibration Study

☐ Record of Site Condition

☐ Storm water Management Report

☐ Traffic Impact Study – please contact the Planner to verify the scope required

Site Plan applications will require the following supporting materials:

1. Two (2) complete sets of the site plan drawings folded to 8½ x 11 and an electronic version in PDF format
2. Letter requesting that the Holding be removed (if applicable)
3. A cost estimate prepared by the applicant's engineer
4. An estimate for Parkland dedication by a certified land appraiser
5. Property Identification Number (PIN) printout

Standard condominium exemptions will require the following supporting materials:

☐ Plan of standard condominium (2 paper copies and 1 electronic copy)

☐ Draft condominium declaration

☐ Property Identification Number (PIN) printout

Your development approval might also be dependent on other relevant federal or provincial legislation, municipal by-laws or other agency approvals.

All final plans must include the owner's signature as well as the engineer's signature and seal.

I. Development Agreements

A development agreement may be required prior to site plan approval, subdivision and condominium applications. Should this be necessary for your development, you will be contacted by the agreement administrator with further details of the requirements including but not limited to insurance coverage, professional liability for your engineer, additional fees and securities.

J. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required, it is their solicitor's responsibility on behalf of the owner, to disclose the registration of all transfer(s) of land and/or easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner for the registration of postponements of any charges in favour of the County.

K. Permission to Enter Subject Lands

Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purposes of making inspections associated with this application, during normal and reasonable working hours.

L. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act, R.S.O. 1990, c. P. 13* for the purposes of processing this application.

Aug 10 / 2023

Owner/Applicant Signature — Date

M. Owner's Authorization

If the applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We _____ am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize G. Douglas Vallee Limited to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.

Aug. 10 /2023

Owner — Date

Owner — Date

N. Declaration

I, KRIS CARSON of BRANTFORD, ON

solemnly declare that:

all of the above statements and the statements contained in all of the exhibits transmitted herewith are true and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of *The Canada Evidence Act*.

Declared before me at:

BRANTFORD

Owner/Applicant Signature

In BRANT COUNTY

This 10th day of AUGUST

A.D., 20 23

A Commissioner, etc.

Pre-Submission Consultation Meeting Minutes

Date: September 14 2022

Description of Proposal: The applicant proposes a 235-unit subdivision.

Property Location: Northeast corner of Croton Ave. and Dalton Rd.

Roll Number: 9200805000

As a result of the information shared at the pre-consultation meeting dated September 14, 2022, the following applications and qualified professional documents / reports are required as part of the development review process.

Please note that various fees are associated with each application and there are also costs for qualified professionals retained to complete various documents / reports. All requirements identified are minimum and determined as of the date of the pre-consultation meeting with the information available at that time. As the proposal proceeds and more information is made available, additional applications, studies, reports, etc. may be required.

This summary including checklists, comments and requests are applicable for a period of one (1) year from the date of meeting. If an application is not received within that time frame, a subsequent pre-consultation meeting may be required due to changes in policies and technical requirements.

Before you submit your application, please contact the assigned Planner to confirm submission requirements and the applicable fee

---

Agent	Signature	Date
Scott Puillandre		September 14, 2023

Attendance List

Proponent	1000011047 Ontario Ltd. c/o Scott Puillandre of Vallee
Community Development – Planning and Agreement	Tricia Givens, Director, Planning (Chair) Mohammad Alam, Senior Planner
Community Development – Building and Zoning	Scott Northcott, Senior Building Inspector Devon Staley, Building Inspector Roxanne Lambrecht, Zoning Administrator Hayley Stobbe, Zoning Administrator
Environment & Infrastructure Services – Development Engineering	Tim Dickhout, Project Manager, Development Stephen Gradish, Development Technologist
Community Services – Fire	Katie Ballantyne, Community Safety Officer
Community Development – Economic Development	Chris Garwood, Economic Development Supervisor
Paramedic Services	Stuart Burnett, Deputy Chief
Operations – Forestry	Adam Biddle, Supervisor of Forestry
Operations – Parks and Facilities	Todd Shoemaker, Director, Parks
Corporate Support Services – Realty Services	Lydia Harrison, Specialist, Realty Services Kelly Darbishire, Specialist, Realty Services
Corporate Support Services – Accessibility	Sam McFarlane, Manager, Accessibility and Special Projects
Haldimand Norfolk Health Unit	Emily Kichler, Community Health Dietician
Long Point Regional Conservation Authority	Leigh-Anne Mauthe, Supervisor of Planning Services Isabel Johnson, Resource Planner
Community Development – Heritage and Culture	Melissa Collver, Director Heritage and Culture
Community Development – Recreation	Nikki Slote, Director Recreation

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Proposal Summary

The applicant proposes a 235-unti subdivision. The development will be located along cycling routes. The proposed development will include 41 group townhouses, 49 street townhouses, and the remainder will be single-detached dwellings. The applicant has identified two servicing locations, three water servicing locations, and proposes an on-site storm water management pond.

List of Application Requirements

Planning Department

Planning application(s) required to proceed		**Required**
Official Plan Amendment Application Choose an item.		
Zoning By-law Amendment Application Choose an item.		X
Site Plan Application Choose an item.		X
Draft Plan of Subdivision Application		X
Draft Plan of Condominium Application		X
Part Lot Control Application		X
Consent / Severance Application		
Minor Variance Application		
Removal of Holding Application		
Temporary Use By-Law Application		
Other - Click here to enter text.		
Planning requirements for a complete application The items below are to be submitted as part of the identified Planning Application(s). ** electronic/PDF copies of all plans, studies and reports are required**	**Required at OPA/ Zoning Stage**	**Required at Site Draft Subdivision Stage**
Proposed Site Plan / Drawing	X	X
Planning Impact Analysis Report / Justification Report	X	X
Environmental Impact Study Choose an item.		
Neighbourhood Plan (TOR must be approved by the County)		
Agricultural Impact Assessment Report		

Archaeological Assessment		
Heritage Impact Assessment		
Market Impact Analysis		
Dust, Noise and/or Vibration Study		
MOE D-Series Guidelines Analysis		
Landscaping Plan/Tree Plantation Plan		X
Elevation Plan		X
Photometrics (Lighting) Plan		
Shadow Analysis Report		
Record of Site Condition		
Phasing Plan		X
Minimum Distance Separation Schedule		
Parking Assessment		
Hydrogeological Study		
Restricted Land Use Screening Form		
Topographical Survey Drawing		X
Additional Planning requirements		**Required**
Development Agreement		X
Parkland Dedication/Cash-in-lieu of Parkland		X

*the list of requirements is based on the information submitted and as presented for this specific pre-consultation meeting. Any changes to a proposal may necessitate changes to Planning Department submission requirements.

*Community Development fees, applications, and helpful resources can be found can be found by visiting https://www.norfolkcounty.ca/government/planning/

Planning Comments

The subject lands are designated as Urban Residential. Proposed single detached and townhouse development is permitted in the Official Plan.

Section 5.6.1 related to park policies states that the County shall secure the maximum benefit of the Planning Act with respect to parkland dedication from development. Parkland dedication shall be conducted in accordance with Section 9.10.5 (Parkland Dedication) of this Plan. An adequate supply of parkettes within neighbourhoods should be provided where appropriate. Parkettes should be neighbourhood-based, generally be up to 0.3 ha in size and the development and maintenance of these parkettes should involve local residents, where possible. Land set aside for parkettes shall not form part of the parkland dedication under the provisions of the Planning Act.

Staff recommends a parkette be provided within this 235 units subdivision considering the fact that the adjacent soccer field is on private property and readily available for future development. The County requirement for neighbourhood park is minimum 2 ha. In case a parkette is proposed, it is recommended that the parkette is included within the future condominium block adjacent or close to the stormwater pond.

Section 5.4 d) related to community design states that development design that establishes reverse lotting on Provincial Highways and County Roads will not be permitted. New developments need to be oriented toward streets or parks.

Staff recommends all proposed units along Dalton Road, Croton St and Crosser Street have frontage along respective existing streets; Vehicular access can be provided at the rear side from the proposed public or private streets. It is Staff's opinion that street Townhouses are the best housing product that can meet this requirements.

Zoning By-Law: The existing zoning of the subject lands are R1-A(H) and R2(H). A zoning by-law amendment will be required to change the zoning of certain portion of lands to R4.

Community Design Considerations:

- Avoid all reverse lotting from the existing streets and convert them to street townhouse blocks.
- Staff recommends construction of sidewalks along the pedestrian access to all street townhouses.
- The condo development should incorporate a parkette area shared with the whole development;
- Please show the sidewalks and community mailbox locations in the future planning applications;
- Please provide a phasing plan (if any) with the future planning application;

Endangered and threatened species and their habitat are protected under the provinces Endangered Species Act, 2007 (ESA), O. Reg. 242/08 & O. Reg. 830/21. The Act prohibits development or site alteration within areas of significant habitat for endangered or threatened species without demonstrating that no negative impacts will occur. The Ministry of Environment, Conservation and Parks provides the service of responding to species at risk information requests and project screenings. The proponent is responsible for discussing the proposed activity and having their project screened with MECP.

Please be advised that it is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals.

[see Appendix A for additional comments]

Assigned Planner:

Mohammad Alam
Senior Planner
Extension 1828
Mohammad.Alam@norfolkcounty.ca

Fabian Serra
Planner
Extension 1834
Fabian.Serra@norfolkcounty.ca

Hannelore Yager
Junior Planner
Extension 8095
Hannelore.Yager@norfolkcounty.ca

Jennifer Catarino
Senior Planner
Extension 8013
Jennifer.Catarino@norfolkcounty.ca

Agreements

A recommended condition of your planning application approval will be to enter into a development agreement with the County that will be registered on title to the subject lands, at the Owner's expense. The additional requirements for a development agreement could include, but are not limited to the following:

- Engineering drawing review
- Engineer's schedule of costs for the works
- Clearance letter and supporting documentation to support condition clearance
- User fees and performance securities
- Current property identification number (PIN printout) (can be obtained by visiting https://help.onland.ca/en/home/)
- Owner's commercial general liability insurance to be obtained and kept in force during the terms of the agreement
- Postponement of interest. If there are mortgagees / charges on your property identifier, your legal representative will be required to obtain a postponement from your bank or financial institution to the terms outlined in your development agreement
- Transfers and / or transfer easements along with registered reference plan

Annette Helmig
Agreement and Development Coordinator
Extension 8053

Annette.Helmig@norfolkcounty.ca

Development Engineering

Development Engineering comments are pending, and once they are ready, Norfolk County's Planning Department will provide an updated and final version of the Pre-Consultation comments. Future development planning applications will only be accepted once Development Engineering comments are provided. Applications include all required items outlined in the final version of the Pre-Consultation Meeting comments and per any additional discussions with the Planning Department.

Stephen Gradish
Development Technologist
Extension 1702
Stephen.Gradish@norfolkcounty.ca
Tim Dickhout
Project Manager, Development
Extension 1700
Tim.Dickhout@norfolkcounty.ca

Conservation Authority

Long Point Regional Conservation Authority

Conservation Authority requirements to proceed	May be Required	Required
Conservation Authority Permit		
Slope Stability Analysis / Erosion Analysis		
Coastal Engineers Report		
Environmental Impact Study		
Sub watershed Plan/Study		
Master Drainage Study		
Stormwater Management Report/Brief		X
Grading Plan		X
Other		

Provincial Policy Statement, 2020, Section 3.1 Natural Hazards

The subject property is not subject to natural hazards. The proposed application is consistent with section 3.1 of the Provincial Policy Statement, 2020.

Ontario Regulation 178/06

The subject lands are not regulated by Long Point Region Conservation Authority

LPRCA and Norfolk County's Memorandum of Understanding for Plan Review Services

Based on LPRCA and Norfolk County's Memorandum of Understanding for Plan Review Services, LPRCA staff can provide the following comments with regard to Stormwater Management:

Stormwater Management

LPRCA will review the final stormwater management design using the 2003 MECP Stormwater Management Planning and Design Manual, MTO Drainage Manual, LID Stormwater Management Manual, the sustainable technologies STEP website https://sustainabletechnologies.ca/, and the Municipal SWM guidelines.
Based on the site and receiving watercourse, an enhanced level of treatment as per the 2003 MECP Stormwater Management Planning and Design Manual is required for the proposed development.

LPRCA requires the following be included and addressed in the design of stormwater management:

- Minimize, or, where possible, prevent increases in contaminant loads.
- Minimize, erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure.
- Mitigate risks to human health, safety, property and the environment.
- Maximize the extent and function of vegetative and pervious surfaces.
- Implement stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development, for end of pipe facilities 24-48hr drawdown times to be targeted in all case.
- Provide adequate and legal outlet for major, minor, and all flow conditions from the site be provided.

In addition to the above requirements, the following must be clearly shown on the submitted design drawings:

- Major flow systems are delineated on the drawing. Overland flow paths and depths from surcharged storm sewer systems and the stormwater treatment facility during a 100-year storm must not increase the flood risk to life, property and the environment.
- Minor overland flow systems and paths are to be delineated and shown on the drawings.
- Erosion and sedimentation control during construction.
- Adequate erosion control on inlets and outlets.

Current Planning Application Fees (2022)
Pre-consultation Fee - $339

Draft Plan of Subdivision including associated OPA and ZBA- $1,380.00 + $100/lot + HST (Max $15,000.00 +HST)

LPRCA fees, applications, and helpful resources can be found can be found by visiting https://lprca.on.ca/planning-permits/planning-fees/

Isabel Johnson, *Resource Planner*
Long Point Region Conservation Authority
Office:519-842-4242 ext. 229.
ijohnson@lprca.on.ca

*LPRCA fees, applications, and helpful resources can be found can be found by visiting https://lprca.on.ca/planning-permits/planning-fees/

Leigh-Anne Mauthe, BES
Supervisor of Planning Services
519-842-4242 or 1-888-231-5408 ext.229
lmauthe@lprca.on.ca

Bonnie Bravener
Resource Technician
519-842-4242 extension 233
bbravener@lprca.on.ca

Corporate Support Services – Realty Services

The County will require postponements of any charges/mortgages (if any) on title to the County's site plan agreement. We recommend that you connect with your Lender(s) (if any) and/or your solicitors as early in the process as possible to avoid any delays.

Karen Lambrecht
Corporate Services Generalist, Realty Services
Extension 8140
Karen.Lambrecht@norfolkcounty.ca

Building

Zoning Administrator:

Pre-Con
Ryder Subdivsion Delhi (Croton Ave Dalton Road)

Summary as written in Valley's report

The following planning applications are anticipated:
-Zoning Bylaw Amendment to permit
- Single detached dwellings undertheR1-BZone
-Street Townhouses under the R4 Zone
-Group Townhouses under the R4 Zone.
-Draft Plan of Subdivision
-Exemption from Part Lot control for the street townhouse dwelling units
-Site Plan approval for Group Townhouses.

Ensure that Section 5.0, 5.4, 4.9, of the zoning bylaw are listed in a zoning table for each area of development that has a different zone, with required provisions vs. proposed.

Roxanne Lambrecht
Zoning Administrator
Extension 1839
Roxanne.Lambrecht@norfolkcounty.ca

Building Inspector:

The proposed construction is considered a Residential Group C as defined by the Ontario Building Code (OBC). You will need to retain the services of a qualified individual with BCIN House, HVAC House, an Architect and/or a Professional Engineer to complete the design documentation for this application.

Items for Building Permit

"New Residential" Step by Step Guide have been attached to the minutes herein, they contain information on drawing requirements, designers, forms, contact information for Building Department etc.
If you have any questions on the building permit process or plans required, please check out our website www.norfolkcounty.ca/business/building or call 519-426-5870 ext. 6016

Please see below OBC Part 9 requirements for firefighting.
9.10.20.3. Fire Department Access to Buildings
(1) Access for fire department equipment shall be provided to each *building* by means of a *street*, private roadway or yard.
(2) Where access to a *building* as required in Sentence (1) is provided by means of a roadway or yard, the design and location of such roadway or yard shall take into account connection with public thoroughfares, weight of firefighting equipment, width of roadway, radius of curves, overhead clearance, location of fire hydrants, location of fire department connections and vehicular parking.

Jonathan Weir,
Building Official III
Extension 1832
jonathan.weir@norfolkcounty.ca

Fire Department

Norfolk County Fire has the following comments:

- Hydrants to be provided as per OBC 3.2.5.
- Ensure internal roadways are an adequate width for fire department apparatus, allowing for appropriate turn radius- designed as a fire access route
- Internal roadways to be built to accommodate any propose on-street parking

Katie Ballantyne
Community Safety Officer
Extension 2423
Katie.ballantyne@norfolkcounty.ca

Appendix A: Summary of Applicable Planning Legislation, Policy and Zoning

Following is a summary of key items related to the proposal as presented; noting these documents are meant to be read in their entirety with relevant policies to be applied in each situation. This is not an exhaustive list and only in response to the information submitted for the pre-consultation. This feedback is subject to change pending full submission of a development application and any changes or additional information provided therein.

Provincial Policy Statement, 2020

https://www.ontario.ca/page/provincial-policy-statement-2020

Click here to enter text.

Norfolk County Official Plan
https://www.norfolkcounty.ca/government/planning/official-plan/

Section 9.6.1 outlines requirements in relation to requests to amend the Official Plan.

Section 9.6.2 outlines requirements in relation to requests to amend the Zoning By-law.

Click here to enter text.

It is the responsibility of the proponent to review and ensure relevant Official Plan policies are addressed in any future development application.

Norfolk County Zoning By-Law 1-Z-2014
https://www.norfolkcounty.ca/government/planning/new-zoning-by-law/

Click here to enter text.

The provisions of the Norfolk County Zoning By-Law shall apply to all lands within the boundaries of Norfolk County. No land, building or structure shall be used, erected or altered in whole or in part except in conformity with the provisions of this By-Law. No land, building or structure shall be used or occupied except for uses that are specifically identified in the By-Law as permitted uses by the relevant zoning category.

It is the responsibility of the proponent to review and ensure relevant Zoning By-law provisions are addressed in any future development application

Site Plan Control:

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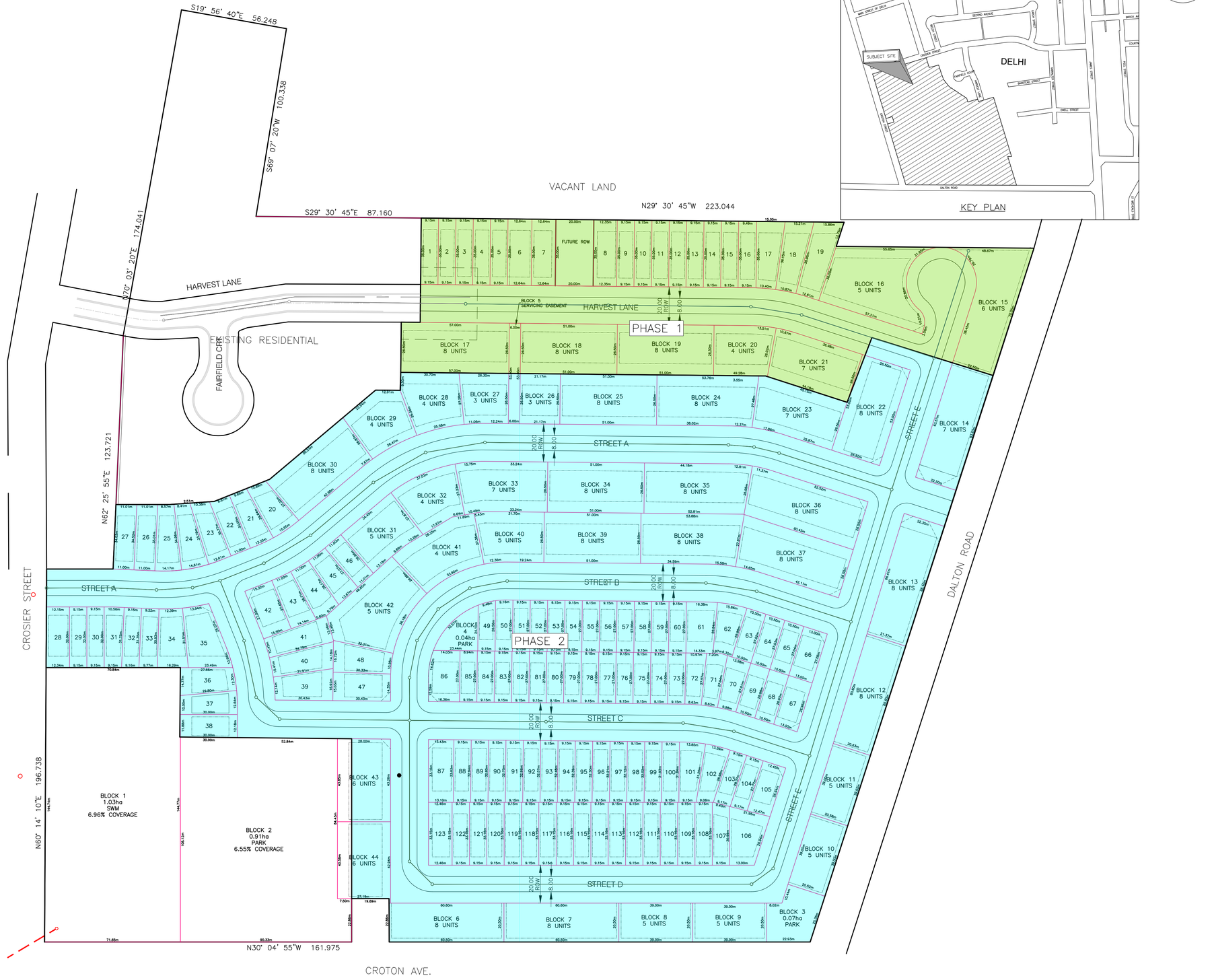

REV. No.	DATE	REVISION

SCALE:
10 30 50
HORIZONTAL : 1 : 1000

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

Project Title
RYDER SUBDIVSION
DELHI - NORFOLK COUNTY

Drawing Title
PHASING PLAN

Designed by : N.B.N/K.R.A	Drawn By : N.B.N/K.R.A.
Checked by : J.T.I.	Date Started : 2023-07-28
Drawing Scale : 1:2000	Drawing No. FIG 01
Project No. 21-259	

DATE LAST PLOTTED : September 13, 2023

1000011047 ONTARIO INC.

Planning Justification Report

Zoning Amendment & Draft Plan of Subdivision

Project #21-259

September 5, 2023

vallee

Consulting Engineers,
Architects & Planners

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Appendices

- Appendix A: Draft Plan of Subdivision A-1
- Appendix B: Zoning Map B-1

Referenced Documents

- Draft Plan of Subdivision (G. Douglas Vallee Ltd.)
- Functional Servicing Report (G. Douglas Vallee Ltd.)
- Traffic Impact Study (Paradigm Transportation Solutions Ltd.)

Introduction

G. Douglas Vallee Limited has been retained by 1000011047 ONTARIO INC. to apply for a Draft Plan of Subdivision and a Zoning Bylaw Amendment on a property located in the urban residential area of Delhi. The draft plan application is required to facilitate the development of 371 dwelling residential subdivision as shown on Appendix 1. It is important to note that the subject lands are currently zoned and designated for residential development and already have an approved draft plan of subdivision. The updated draft plan of subdivision will result in a more efficient and compact residential development, while the zoning bylaw amendment is required to implement the necessary zoning provisions. As shown on Appendix 2, the zoning bylaw amendment application is seeking to permit the following zoning provisions:

- **Part 1**
  - Change the existing zoning from Urban Residential Type 1 (R1-A) and Urban Residential Type 2 (R2) to Urban Residential Type 1 (R1-B) for Single Detached dwellings with a special provision for relief of lot and yard provisions.

- **Part 2**
  - Change the existing zoning from R1-A and R2 to Urban Residential Type 4 (R4) for Street Townhouses with a special provision for relief of lot and yard provisions.

- **Part 3**
  - Change the existing zoning from R1-A and R2 to R4 with a special provision to permit Dual Frontage Townhouses and for relief of lot and yard provisions.

- **Part 4**
  - Change the existing zoning from R1-A to Open Space (OS) to permit the establishment of a public park and stormwater management pond.

- **Note: A full zoning review is provided later in this report**

Approval of these applications would provide much needed housing options to the residents of Norfolk County, including a variety of more attainable housing types in the form of Street Townhouses and Dual Frontage Townhouses. These creative dwellings allow for increased urban density, while maintaining an aesthetically appealing street scape along exterior and interior roads.

The purpose of this planning justification report is to provide planning support to Norfolk County staff, and Council when considering the applications for a Draft Plan of Subdivision and Zoning Bylaw amendment on the subject lands.

Site Description

The subject lands are 14.82ha in area, located within the urban area of Delhi at the northeast corner of Cronton Avenue and Dalton Road. Presently, the property has no municipal address and is identified by municipal roll number 49200805000.

The property has been cleared of vegetation and there are no existing water features on the subject lands. The cumulative lands are currently vacant and have been used for agricultural purposes.

Figure 1 Aerial view of subject lands

Existing and Surrounding Land Uses

The subject lands are designated Urban Residential under the Norfolk County Official plan with an existing approved draft plan of subdivision. The western portion of the property is zoned Urban Residential Type 1 (R1-A), while the eastern portion of the property is zoned Urban Residential Type 2 (R2). A Holding provision has been applied to the entire property, in both the R1-A and R2 zones.

The subject lands are surrounded by a variety of land uses.

- To the north
    - Existing low and medium density residential development in the form of single detached, semi-detached, multi-plex, and townhouse dwellings
    - E&E McLaughlin Soccer Fields

- To the East
    - Existing low and medium density residential development in the form of single detached and townhouse dwellings
    - A small-scale truck terminal known as Verspeeten Cartage
    - The Delhi Long Term Care Centre
    - Existing commercial development, including hotels, and automotive sales & service.

- To the South
  - Agricultural
  - Rural Residential in the form of single detached dwellings

- To the West
  - Agricultural
  - Rural Residential in the form of single detached dwellings

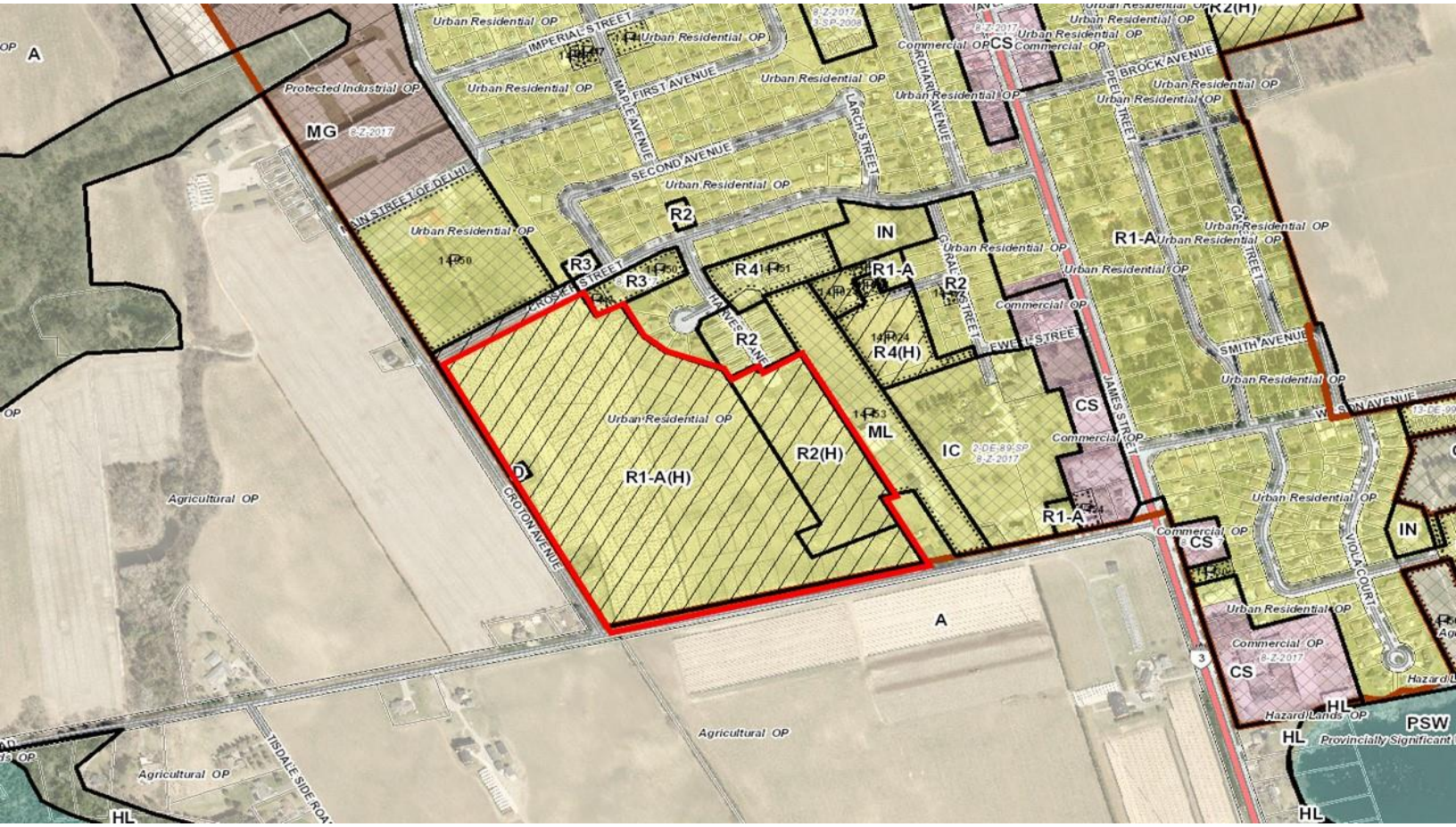


Figure 2 Existing and Surrounding Land uses

Planning Applications

Draft Plan of Subdivision

As shown on Appendix A and in Figure 3 below, the proposed Draft Plan of Subdivision will include the following forms of housing:

- 123 lots for Single Detached Dwellings
- Blocks 6-15 for 65 Dual Frontage Townhouses
- Blocks 16-44 for 183 Street Townhouses
- Block 1 for a Stormwater Management Pond
- Blocks 2-4 for Park Land dedication to Norfolk County

The total dwelling count of the proposed subdivision is 371. It is important to note that there is an existing approved draft plan of subdivision on the subject lands. The existing draft plan would permit the development of a smaller unit count in the form of single detached and semi-detached dwellings. However, the existing plan has not received final approval, and the land remains undeveloped. The proposed new draft plan will provide a more compact form of development with a variety of different housing types. The updated design will result in a more efficient use of the land while providing a greater variety of housing options for the citizens of Norfolk County.

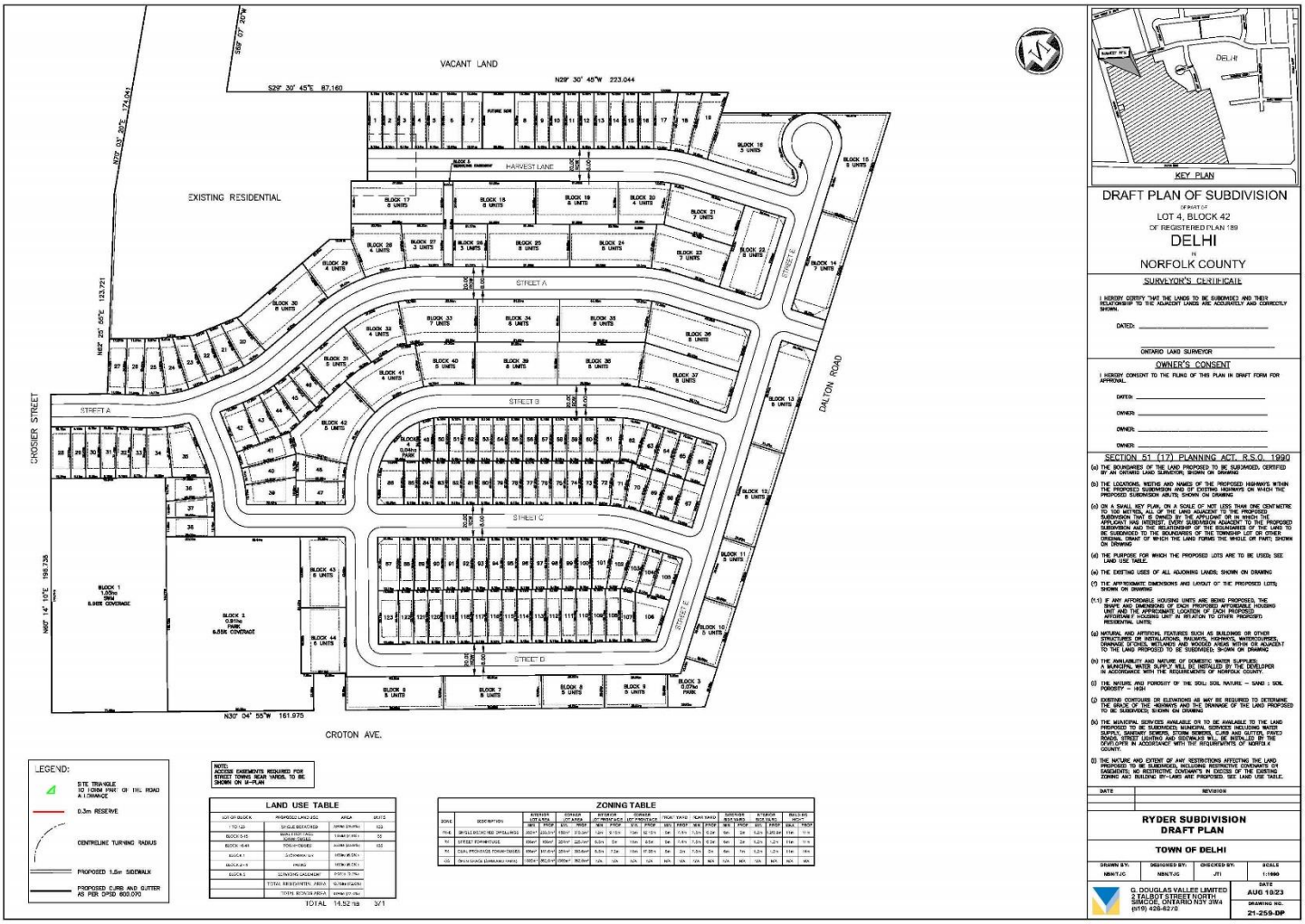


Figure 3 Draft Plan of Subdivion

Zoning Bylaw Amendments

As outlined above, the proposed zoning bylaw amendment is required to apply the appropriate zoning provisions to the subject lands to permit this form of development. While the lands are currently designated and zoned to permit residential use, the proposed amendment would enable more efficient use of the lands through reduced zone provisions and permitting alternative forms of housing.

The following amendments are sought as part of the application for Zoning By-Law Amendment:

Part 1

In lieu of the corresponding provisions in the R1-B Zone, the following shall apply:

Zone Provisions

a) Minimum Lot Area:
    i. Interior Lot – 233m^2
    ii. Corner Lot – 340m^2
b) Minimum Lot Frontage:
    i. Interior Lot – 9.0m
    ii. Corner Lot – 12.0m
c) Minimum Front Yard – 4.4m
d) Minimum Rear Yard – 6.0m
e) Minimum Interior Side Yard – 1.2m on one side / 0.8m on the other side
f) Minimum Exterior Side Yard – 2.0m

Part 2

In lieu of the corresponding provisions in the R4 Zone, the following shall apply:

Zone Provisions

a) Minimum Lot Area:
    i. Corner Lot – 225m^2
b) Minimum Lot Frontage:
    i. Interior Lot – 6.0m
    ii. Corner Lot – 8.5m
c) Minimum Front Yard – 4.4m
d) Minimum Rear Yard – 6.0m
e) Minimum Exterior Side Yard – 2.0m

Part 3

In lieu of the corresponding provisions in the R4 Zone, the following shall apply:

Permitted Uses

a) Dual Frontage Townhouses – Shall mean a townhouse dwelling which is fronting on a public street with pedestrian access only and a driveway access from the rear yard.
b) Home Occupation
c) Accessory Residential Dwelling Units

Zone Provisions

a) Minimum Lot Area:
    i. Interior Lot – 147m^2
b) Front Yard:
    i. Attached Garage – 2.0m
c) Rear Yard:
    i. Attached Garage – 0.0m

Part 4

In addition to the uses permitted in the OS Zone the following uses shall also be permitted:

a) Stormwater Management Pond

Supporting Studies

Required studies identified through the pre-consultation process with Norfolk County staff have been completed and are enclosed in support of the proposed development. These studies are summarized as follows:

Functional Servicing Report (prepared by G. Douglas Vallee Ltd.), to include:

- General Plan of Service
- Stormwater Management Brief
- Preliminary Landscaping Plan

The Functional Servicing Report confirms that the site can be fully serviced with sanitary sewers, water mains and stormwater management. As is required for all developments in Norfolk County, sanitary and water main network modelling is required to confirm system capacities.

Traffic Impact Study (Paradigm Transportation Solutions Ltd.)

The Traffic Impact Study confirms that the existing road network can support the anticipated traffic from this proposed development.

Policy Context

Planning Act

The Planning Act provides the legislative framework for land use planning in Ontario. The applicable sections of the Planning Act that apply to this application are as follows:

Section 2 – Lists matters of provincial interest, including:

(b) the protection of agricultural resources

(f) the adequate provisions and efficient use of communication, transportation, sewage and water services and waste management

(h) the orderly development of safe and healthy communities

(j) the adequate provision of a full range of housing, including affordable housing

(o) the protection of public health and safety

(p) the appropriate location of growth and development

(q) the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians

(r) the promotion of built form that

(i) is well-designed,

(ii) encourages a sense of place, and

(iii) provides for public spaces that are of high quality, safe, accessible, attractive, and vibrant

Section 3 – Requires that, in exercising any authority that affects a planning matter, planning authorities "shall be consistent with the policy statements" issued under the Act and "shall conform with the provincial plans that are in effect on that date, or shall not conflict with them, as the case may be".

Section 34 – Allows for amendments to the Zoning By-Law.

Section 51 – Allows for approval of Plans of Subdivisions.

The proposed Plan of Subdivision and Zoning Bylaw Amendment applications align with the framework and interests of the Planning Act by providing a range of housing on lands zoned and designated for residential development. The proposed zoning bylaw amendment will allow for a more efficient use of the land through alternative forms of housing and higher density residential zoning provisions. Through the plan of subdivision process, detailed design will take place for servicing, roads, grading, stormwater management and other requirements as requested by the municipality. This process will ensure a well-designed, safe, and functional residential development.

Provincial Policy Statement

The subject lands are within a Settlement Area (Delhi) as defined by the Provincial Policy Statement, 2020 (PPS). The PPS provides policy direction for appropriate land use planning and development patterns to achieve healthy, liveable, and resilient communities through efficient development that will protect resources of provincial interest, public health and safety, the quality of the natural and built environment, and will facilitate economic growth.

Under Section 1.1 of the PPS, planning authorities are required to accommodate an appropriate affordable and market-based range and mix of residential types. The proposed application provides residents with a compact form of housing at variable price points in Norfolk County.

Section 1.4 directs planning authorities to provide for an appropriate range and mix of housing types and densities. The proposed development provides increased housing options at a higher density, within walking distance of outdoor recreation facilities and the downtown shopping area. This development will serve the well-being of current and future residents within a municipally serviced urban area.

The PPS encourages intensification and redevelopment within established settlement areas which shall be the focus of growth and development within the province. This application seeks to utilize an existing lot of record within the Delhi urban area which is already zoned and designed for residential development. The subject lands will have access to full municipal services including water and wastewater.

The proposed Draft Plan of Subdivision and Zoning Bylaw Amendment is seeking to establish the necessary zoning provisions and lot configuration to facilitate the construction of 371 dwellings in the settlement area of Delhi. The proposed development represents a more compact and efficient use of an underdeveloped area with access to full municipal services. This application will provide the citizens of Norfolk County with additional housing options which are not readily available, are desirable and encouraged by policy.

A decision by Council to approve the updated proposed Draft Plan of Subdivision and Zoning Bylaw amendment will provide a more efficient designed and be consistent with PPS, 2020.

Norfolk County Official Plan

The subject property is designated Urban Residential in accordance with Schedule “B-17” of the Norfolk County Official Plan. Several sections of the Official Plan are applicable when considering a plan of subdivision and zoning bylaw amendment. As part of this report the following sections were reviewed and considered:

a) Section 2.2 – Goals and Objectives
b) Section 5.3 – Housing
c) Section 5.4 – Community Design
d) Section 6.4 – Urban Areas
e) Section 6.5.3 – Delhi Urban Area
f) Section 7.7 – Urban Residential Designation
g) Section 8.0 – Networks and Infrastructure
h) Section 8.9 – Water and Wastewater Services
i) Section 9.6 – Development Controls
j) Section 9.10.5 – Parkland Dedications

Generally, the policies of the official plan direct and encourage the greatest amount of development to take place within the six urban areas within Norfolk County. The lands are currently within the Urban Area of Delhi and are designated for residential development. The policy of the Official Plan encourages this form of development.

On a high level, details of the Official Plan policies are captured by the overarching Goals and Objectives. Section 2.2 of the Official Plan set out six “Goals and Objectives” to which the following five are applicable to the proposed residential development:

- Protecting and Enhancing the Natural Environment
- Maintaining and Enhancing the Rural and Small-Town Character
- Maintaining a High Quality of Life
- Upgrading and Expanding Infrastructure
- A Well Governed, Well Planned and Sustainable County

Following a review of the applicable policies, the proposed draft plan of subdivision and zoning bylaw amendment achieves the ‘Goals and Objectives’ of the Official Plan. Given the lands already have an approved draft plan of subdivision and are within an area designated for residential development, the proposed applications will provide a more efficient use of lands by providing more compact housing forms and densities.

The Official Plan specifically encourages residential intensification within its Urban Residential Areas. Section 5.3.1 seeks to implement a minimum density of 15uph within the County’s six urban areas – including Delhi. The proposed application will implement a density of 24.9uph, exceeding the County’s minimum target. The proposed plan of subdivision and zoning bylaw amendment will implement a more efficient and compact form of development while ensuring compatibility with the existing uses in the area through similar housing types.

The subject lands are vacant and underutilized. The subject lands are located immediately adjacent to trail systems as shown on Schedule I-4 “Active Transportation” of the Official Plan. The County Official Plan supports the development of vacant and underutilized lands that are compact and efficiently used and lends support to the location of the development being within close proximity to active transportation and potential active transportation networks as identified on Schedule “I”.

Norfolk County’s existing infrastructure capacity will be reviewed by Norfolk County’s consultant (RV Anderson Associates) in consideration of the connections proposed to service this development and considering the Functional Servicing Report prepared by G. Douglas Vallee Limited. The proposed infrastructure will be designed and constructed in accordance with Norfolk County’s requirements and will be subject to Norfolk County’s approval through the plan of subdivision process.

Accordingly, the proposed application meets the intent and purpose of the Official Plan and represents good planning.

Norfolk County Zoning Bylaw

The western portion of the subject lands are zoned Urban Residential Type 1 (R1-A), while the eastern portion of the property is zoned Urban Residential Type 2 (R2) in accordance with Schedule “A-22” of the Norfolk County Zoning Bylaw. A Holding provision has been applied to the entire property, in both the R1-A and R2 zones.

The proposed amendment would implement the necessary zoning provisions to permit residential development in the form of single detached dwellings, street townhouses. The tables below provide a comprehensive zoning review for Parts 1 – 4 as shown on Appendix B.

Part 1 Zoning Review – R1-B			
Provision	**Required**	**Proposed**	**Comment**
Permitted Uses	a) dwelling, single detached b) bed & breakfast, subject to Subsection 3.4 c) home occupation d) accessory residential dwelling unit, subject to Subsection 3.2.3.	a) dwelling, single detached b) bed & breakfast, subject to Subsection 3.4 c) home occupation d) accessory residential dwelling unit, subject to Subsection 3.2.3.	No changes proposed to the permitted uses
a) minimum lot area: i) interior lot ii) corner lot	i) 360m^2 ii) 450m^2	i) 233m^2 ii) 340m^2	**Relief Required** The reduced lot areas will permit a more efficient use of the subject lands
b) minimum lot frontage: i) interior lot ii) corner lot	i) 12.0m ii) 15.0m	i) 9.0m ii) 12.0m	**Relief Required** The reduced lot frontages will permit a more functional and efficient lot fabric on the subject lands
c) minimum front yard: i) attached garage ii) detached garage with rear lane	i) 6.0m ii) 3.0m	i) 4.4m ii) 3.0m	**Relief Required** The reduced front yard will allow for a more functional use of the lands. It is recognized that bylaw parking requirements must be met. This will be achieved through unit design to ensure min two parking spaces per dwelling.
d) minimum exterior side yard:	6.0m	2.0m	**Relief Required** The reduced exterior side yard will permit a more functional and efficient lot fabric on the subject lands
e) minimum interior side yard: i) detached garage ii) detached garage with a rear lane; attached garage	i) 3.0m and 1.2m ii) 1.2m each side	i) 3.0m and 1.2m ii) 1.2m on one side and 0.8m on the other side	**Relief Required** The reduced interior yard will allow for a more functional use of the lands while providing additional space to achieve an appealing built form.
f) minimum rear yard:	7.5m	6.0m	**Relief Required** The reduced rear yard will allow for a more functional use of the lands while maintaining

			sufficient amenity area for residents.
g) maximum building height:	11.0m	11.0m	No relief required

Part 2 Zoning Review – R4 Street Townhouses			
Provision	**Required**	**Proposed**	**Comment**
Permitted Uses	a) group townhouse b) stacked townhouse c) street townhouse d) semi-detached, duplex, tri-plex and four-plex dwellings provided they are located on the same lot with, and in accordance with the Zone provisions of, group townhouse e) home occupation f) accessory residential dwelling unit, subject to Subsection 3.2.3.[7-Z-2020]	a) group townhouse b) stacked townhouse c) street townhouse d) semi-detached, duplex, tri-plex and four-plex dwellings provided they are located on the same lot with, and in accordance with the Zone provisions of, group townhouse e) home occupation f) accessory residential dwelling unit, subject to Subsection 3.2.3.[7-Z-2020]	No changes proposed to the permitted uses
a) minimum lot area: i) attached garage ii) corner lot iii) detached garage	i) 156m^2 ii) 264m^2 iii) 162m^2 (access via a rear lane)	i) 156m^2 ii) 225m^2 iii) 162m^2 (access via a rear lane)	**Relief Required** The reduced lot areas will permit a more efficient use of the subject lands
b) minimum lot frontage: i) interior lot ii) corner lot iii) corner lot accessed by a rear lane	i) 6.5m ii) 11.0m iii) 6.5m	i) 6.0m ii) 8.5m iii) 6.5m	**Relief Required** The reduced lot frontages will permit a more functional and efficient lot fabric on the subject lands
c) minimum front yard: i) attached garage ii) detached garage or rear yard parking	i) 6.0m ii) 1.5m (accessed by a rear lane)	i) 4.4m ii) 1.5m (accessed by a rear lane)	**Relief Required** The reduced front yard will allow for a more functional use of the lands. It is recognized that bylaw parking requirements must be met. This will be achieved through unit design to ensure min two parking spaces per dwelling.
d) minimum exterior side yard: i) with a 6m front yard ii) with a 1.5m front yard	i) 6.0m ii) 1.5m	i) 2.0m ii) 1.5m	**Relief Required** The reduced exterior side yard will permit a more functional and

			efficient lot fabric on the subject lands
e) minimum interior side yard:	1.2m	1.2m	No relief required
f) minimum rear yard: i) attached garage ii) detached garage	i) 7.5m ii)13.0m (access via a rear lane including half of the lane)	i) 6.0m ii)13.0m	**Relief Required** The reduced rear yard will allow for a more functional use of the lands while maintaining sufficient amenity area for the residents.
g) minimum separation: between townhouse dwellings	2.0m	2.0m	No relief required
h) maximum building height:	11.0m	11.0m	No relief required

Part 3 Zoning Review – R4 Dual Frontage Townhouses			
Provision	**Required**	**Proposed**	**Comment**
Permitted Uses	a) group townhouse b) stacked townhouse c) street townhouse d) semi-detached, duplex, tri-plex and four-plex dwellings provided they are located on the same lot with, and in accordance with the Zone provisions of, group townhouse e) home occupation f) accessory residential dwelling unit, subject to Subsection 3.2.3.[7-Z-2020]	a) In lieu of the corresponding provisions in the R4 Zone, a Dual Frontage Townhouse shall be permitted. b) home occupation c) accessory residential dwelling unit, subject to Subsection 3.2.3.[7-Z-2020]	**Relief Required** A Dual Frontage Townhouse shall mean a *townhouse dwelling* which fronts a public street with pedestrian access only and has a driveway access from the *rear yard* Home occupations and accessory residential units shall still be permitted in this zone, subject to the applicable provisions of the zoning bylaw This innovated form of housing will help ensure an efficient use of the subject lands while ensuring an appeal streetscape by eliminating reverse lotting
a) minimum lot area: i) attached garage ii) corner lot iii) detached garage	i) 156m^2 ii) 264m^2 iii) 162m^2 (access via a rear lane)	i) 147m^2 ii) 264m^2 iii) NA	**Relief Required** The reduced lot areas will permit a more efficient use of the subject lands

b) minimum lot frontage: i) interior lot ii) corner lot iii) corner lot accessed by a rear lane	i) 6.5m ii) 11.0m iii) 6.5m	i) 6.5m ii) 8.5m iii) NA	**Relief Required** The reduced lot frontages will permit a more functional and efficient lot fabric on the subject lands
c) minimum front yard: i) attached garage ii) detached garage or rear yard parking	i) 6.0 m ii) 1.5m (accessed by a rear lane)	i) 2.0m ii) NA	**Relief Required** The reduced front yards will allow for a functional use of the lands while maintaining an appeal streetscape
d) minimum exterior side yard: i) with a 6m front yard ii) with a 1.5m front yard	i) 6.0m ii) 1.5m	i) 6.0m ii) 1.5m	No relief required
e) minimum interior side yard:	1.2m	1.2m	No relief required
f) minimum rear yard: i) attached garage ii) detached garage	i) 7.5m ii)13.0m (access via a rear lane including half of the lane)	i) 0.0m ii) NA	**Relief Required** The reduced rear yard will allow for a functional use of the lands while maintaining an appeal streetscape
g) minimum separation: between townhouse dwellings	2.0m	2.0m	No relief required
h) maximum building height:	11.0m	14.0m or three (3) storeys	**Relief Required** The increased height will allow for these dwelling units to provide sufficient floor for residents, while providing a compact built form to achieve increased density.

A zoning review table has not been provided for Part 4 as the only requested relief is to permit a Stormwater Management Pond within the OS Zone.

As outlined above, the proposed zoning bylaw amendment is required for the following reasons:

- Apply the R1-B Zone to Part 1 with a special provision to permit:
    - Minimum Lot Area:
        - Interior Lot – 233m2
        - Corner Lot – 340m2
    - Minimum Lot Frontage:
        - Interior Lot – 9.0m
        - Corner Lot – 12.0m

  - Minimum Front Yard: 4.4m
  - Minimum Rear Yard: 6.0m
  - Minimum Interior Side Yard: 1.2m on one side and 0.8m on the other side
  - Minimum Exterior Side Yard – 2.0m

- Apply the R4 Zone to Part 2 with a special provision to permit:
  - Minimum Lot Area:
    - Corner Lot – 225m2
  - Minimum Lot Frontage:
    - Interior Lot – 6.0m
    - Corner Lot – 8.5m
  - Minimum Front Yard – 4.4m
  - Minimum Rear Yard – 6.0m
  - Minimum Exterior Side Yard – 2.0m

- Apply the R4 Zone to Part 3 with a special provision to permit:
  - Dual Frontage Townhouses, Home Occupations, and Accessory Residential Dwelling units.
  - Minimum Lot Area:
    - Interior Lot – 147m2
  - Front Yard:
    - Attached Garage – 2.0m
  - Rear Yard:
    - Attached Garage – 0.0m
  - Maximum Building Height – 14.0m or three (3) storeys

- Apply the OS Zone to Part 4 to permit:
  - Stormwater Management Pond within the OS Zone.

As shown in the above sections the proposed draft plan of subdivision will require site specific zone provisions to facilitate the proposed form of development. The site-specific zone provisions will enable a more efficient use of the lands by permitting a variety of compact housing types which are not readily available in Norfolk County. Residential intensification of the Delhi Urban Area is encouraged by the Norfolk County Official Plan. The proposed applications will help Norfolk County meet its growth targets, while providing an appropriate and compatible development.

In this instance, a decision by Council to approve the proposed Draft Plan of Subdivision and Zoning Bylaw Amendment is considered appropriate.

Conclusion

The proposed Draft Plan of Subdivision and Zoning Bylaw Amendment are consistent with the policies of the Provincial Policy Statement and the Norfolk County Official Plan. The proposed development will provide a variety of compact and efficient housing forms that will cater to a diverse range of price points, ages, and abilities.

It is important to note that the subject lands are already approved for residential use in the form of single detached and semi-detached dwelling units. Approval of the proposed applications will help provide a more compact built form and greater density, both of which are encouraged and supported by provincial and local planning policies.

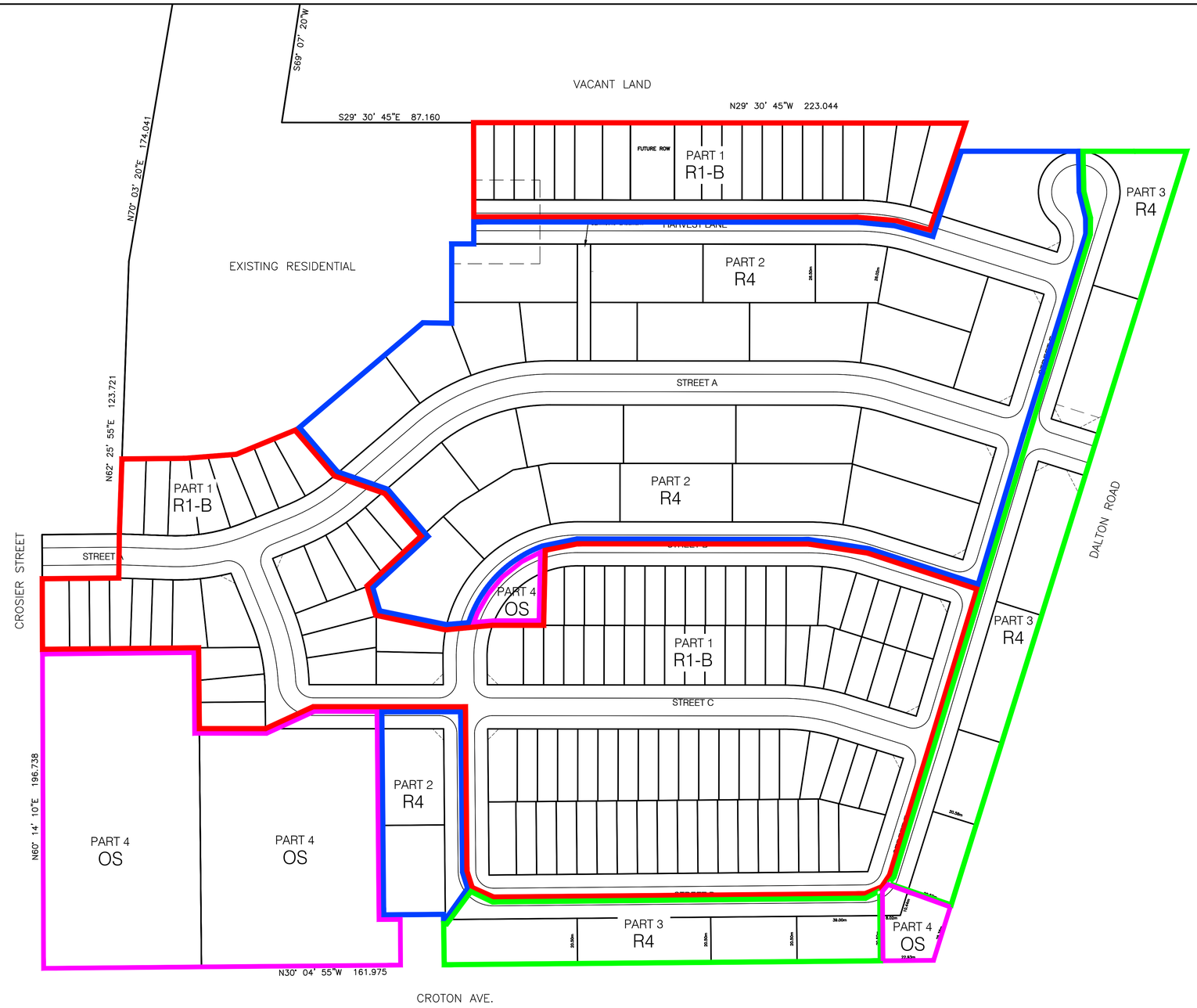
The analysis of this application is supportive. The proposed application is consistent with Provincial and County planning policies. Accordingly, it is our opinion that the applications:

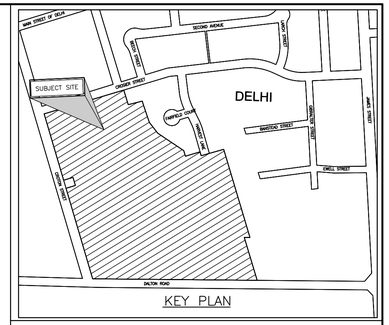
- model good planning
- facilitate a development with the most appropriate land use
- ensure efficiency and compatibility with the surrounding land uses

As such, it is requested that Norfolk County approve the proposed Draft Plan of Subdivision and Zoning Bylaw Amended to permit the development as presented.

Report prepared by:

Scott Puillandre, MSc, Planner
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners
H:\Projects\2021\21-259 Ryder Subdivision Delhi\Agency\Zoning\Working Files\PJR\Planning Justification Report - Draft.docx





DRAFT PLAN OF SUBDIVISION

OF PART OF

LOT 4, BLOCK 42

OF REGISTERED PLAN 189

DELHI

IN

NORFOLK COUNTY

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATED: _____

_____

ONTARIO LAND SURVEYOR

OWNER'S CONSENT

I HEREBY CONSENT TO THE FILING OF THIS PLAN IN DRAFT FORM FOR APPROVAL.

DATED: _____

OWNER: _____

OWNER: _____

OWNER: _____

SECTION 51 (17) PLANNING ACT, R.S.O. 1990

(a) THE BOUNDARIES OF THE LAND PROPOSED TO BE SUBDIVIDED, CERTIFIED BY AN ONTARIO LAND SURVEYOR; SHOWN ON DRAWING

(b) THE LOCATIONS, WIDTHS AND NAMES OF THE PROPOSED HIGHWAYS WITHIN THE PROPOSED SUBDIVISION AND OF EXISTING HIGHWAYS ON WHICH THE PROPOSED SUBDIVISION ABUTS; SHOWN ON DRAWING

(c) ON A SMALL KEY PLAN, ON A SCALE OF NOT LESS THAN ONE CENTIMETRE TO 100 METRES, ALL OF THE LAND ADJACENT TO THE PROPOSED SUBDIVISION THAT IS OWNED BY THE APPLICANT OR IN WHICH THE APPLICANT HAS INTEREST, EVERY SUBDIVISION ADJACENT TO THE PROPOSED SUBDIVISION AND THE RELATIONSHIP OF THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED TO THE BOUNDARIES OF THE TOWNSHIP LOT OR OTHER ORIGINAL GRANT OF WHICH THE LAND FORMS THE WHOLE OR PART; SHOWN ON DRAWING

(d) THE PURPOSE FOR WHICH THE PROPOSED LOTS ARE TO BE USED; SEE LAND USE TABLE.

(e) THE EXISTING USES OF ALL ADJOINING LANDS; SHOWN ON DRAWING

(f) THE APPROXIMATE DIMENSIONS AND LAYOUT OF THE PROPOSED LOTS; SHOWN ON DRAWING

(f.1) IF ANY AFFORDABLE HOUSING UNITS ARE BEING PROPOSED, THE SHAPE AND DIMENSIONS OF EACH PROPOSED AFFORDABLE HOUSING UNIT AND THE APPROXIMATE LOCATION OF EACH PROPOSED AFFORDABLE HOUSING UNIT IN RELATION TO OTHER PROPOSED RESIDENTIAL UNITS;

(g) NATURAL AND ARTIFICIAL FEATURES SUCH AS BUILDINGS OR OTHER STRUCTURES OR INSTALLATIONS, RAILWAYS, HIGHWAYS, WATERCOURSES, DRAINAGE DITCHES, WETLANDS AND WOODED AREAS WITHIN OR ADJACENT TO THE LAND PROPOSED TO BE SUBDIVIDED; SHOWN ON DRAWING

(h) THE AVAILABILITY AND NATURE OF DOMESTIC WATER SUPPLIES; A MUNICIPAL WATER SUPPLY WILL BE INSTALLED BY THE DEVELOPER IN ACCORDANCE WITH THE REQUIREMENTS OF NORFOLK COUNTY.

(i) THE NATURE AND POROSITY OF THE SOIL; SOIL NATURE – SAND ; SOIL POROSITY – HIGH

(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; SHOWN ON DRAWING

(k) THE MUNICIPAL SERVICES AVAILABLE OR TO BE AVAILABLE TO THE LAND PROPOSED TO BE SUBDIVIDED; MUNICIPAL SERVICES INCLUDING WATER SUPPLY, SANITARY SEWERS, STORM SEWERS, CURB AND GUTTER, PAVED ROADS, STREET LIGHTING AND SIDEWALKS WILL BE INSTALLED BY THE DEVELOPER IN ACCORDANCE WITH THE REQUIREMENTS OF NORFOLK COUNTY.

(l) THE NATURE AND EXTENT OF ANY RESTRICTIONS AFFECTING THE LAND PROPOSED TO BE SUBDIVIDED, INCLUDING RESTRICTIVE COVENANTS OR EASEMENTS; NO RESTRICTIVE COVENANTS IN EXCESS OF THE EXISTING ZONING AND BUILDING BY–LAWS ARE PROPOSED. SEE LAND USE TABLE.

LEGEND:

- PART 1 SINGLE DWELLINGS (ZONE R1–B)
- PART 2 STREET TOWNHOUSES (ZONE R4)
- PART 3 DUAL FRONTAGE TOWNHOUSES (ZONE R4)
- PART 4 SWM POND AND PARK (ZONE OS)

NOTE:
ACCESS EASEMENTS REQUIRED FOR STREET TOWNS REAR YARDS. TO BE SHOWN ON M–PLAN

LAND USE TABLE

LOT OR BLOCK	PROPOSED LAND USE	AREA	UNITS
1 TO 123	SINGLE DETACHED	3.99ha (26.9%)	123
BLOCK 6-15	DUAL FRONTAGE TOWNHOUSES	1.16ha (7.8%)	65
BLOCK 16-44	TOWNHOUSES	3.53ha (23.8%)	183
BLOCK 1	STORMWATER	1.03ha (6.9%)	
BLOCK 2 - 4	PARKS	1.02ha (6.8%)	
BLOCK 5	SERVICING EASEMENT	0.03ha (0.2%)	
	TOTAL RESIDENTIAL AREA	10.76ha (72.6%)	
	TOTAL ROADS AREA	4.06ha (27.4%)	
	TOTAL	14.82 ha	371

ZONING TABLE

ZONE	DESCRIPTION	INTERIOR LOT AREA		CORNER LOT AREA		INTERIOR LOT FRONTAGE		CORNER LOT FRONTAGE		FRONT YARD		REAR YARD		EXTERIOR SIDE YARD		INTERIOR SIDE YARD		BUILDING HIGHT	
		MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MIN	PROP	MAX	MIN
R1-B	SINGLE DETACHED DWELLINGS	360m²	233.5m²	450m²	340.5m²	12m	9.15m	15m	12.15m	6m	4.4m	7.5m	6.0m	6m	2m	1.2m	1.2/0.8m	11m	11m
R4	STREET TOWNHOUSE	156m²	168m²	264m²	225.4m²	6.5m	6m	11m	8.5m	6m	4.4m	7.5m	6.0m	6m	2m	1.2m	1.2m	11m	11m
R4	DUAL FRONTAGE TOWNHOUSES	156m²	147.6m²	264m²	393.6m²	6.5m	7.2m	11m	17.85m	6m	2m	7.5m	0m	6m	7m	1.2m	1.2m	11m	14m
OS	OPEN SPACE (SWM AND PARK)	1390m²	362.9m²	1390m²	362.9m²	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DATE	REVISION

RYDER SUBDIVISION
MAP A

TOWN OF DELHI

DRAWN BY:	DESIGNED BY:	CHECKED BY:	SCALE
NBN/TJC	NBN/TJC	JTI	1:1000

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

DATE: AUG 10/23

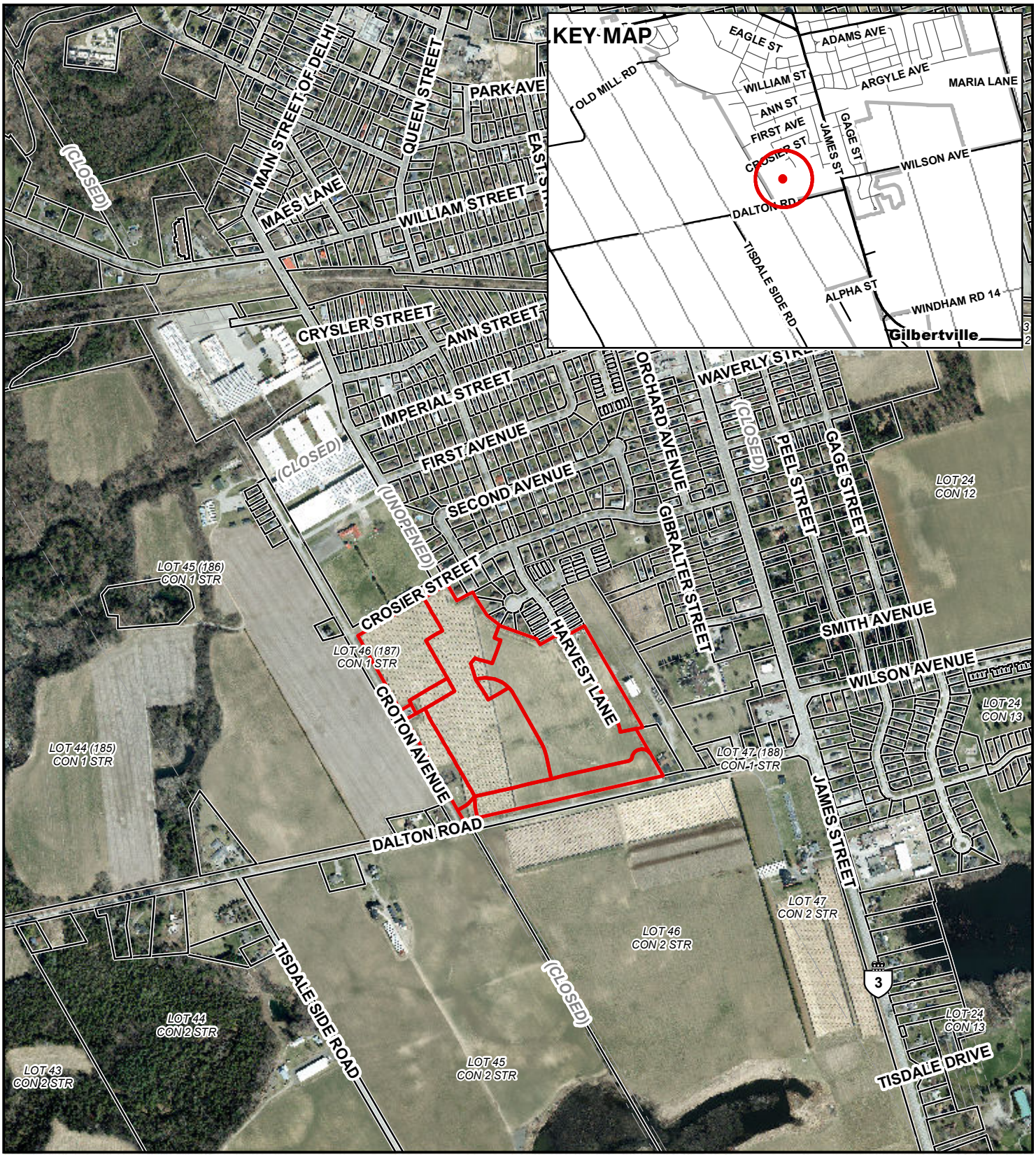
DRAWING NO.: 21-259-DP

MAP A

CONTEXT MAP

Urban Area of DELHI

28TPL2023316
ZNPL2023320



11/9/2023

Legend

Subject Lands

2020 Air Photo

N

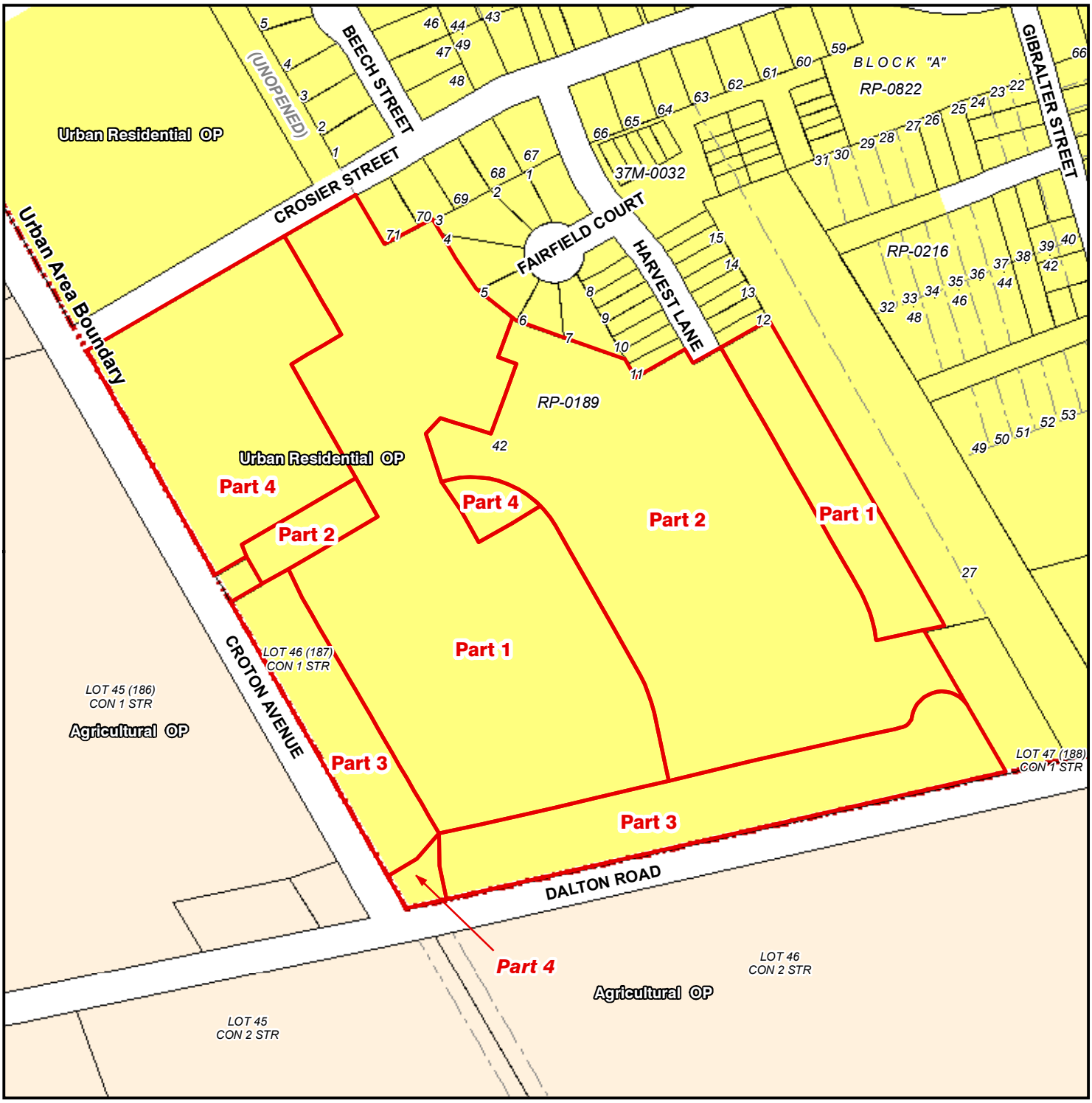
80 40 0 80 160 240 320 Meters

MAP B

OFFICIAL PLAN MAP

Urban Area of DELHI

28TPL2023316
ZNPL2023320



Legend

Subject Lands

Official Plan Designations

Agricultural

Urban Residential

Urban Area Boundary

11/9/2023

N

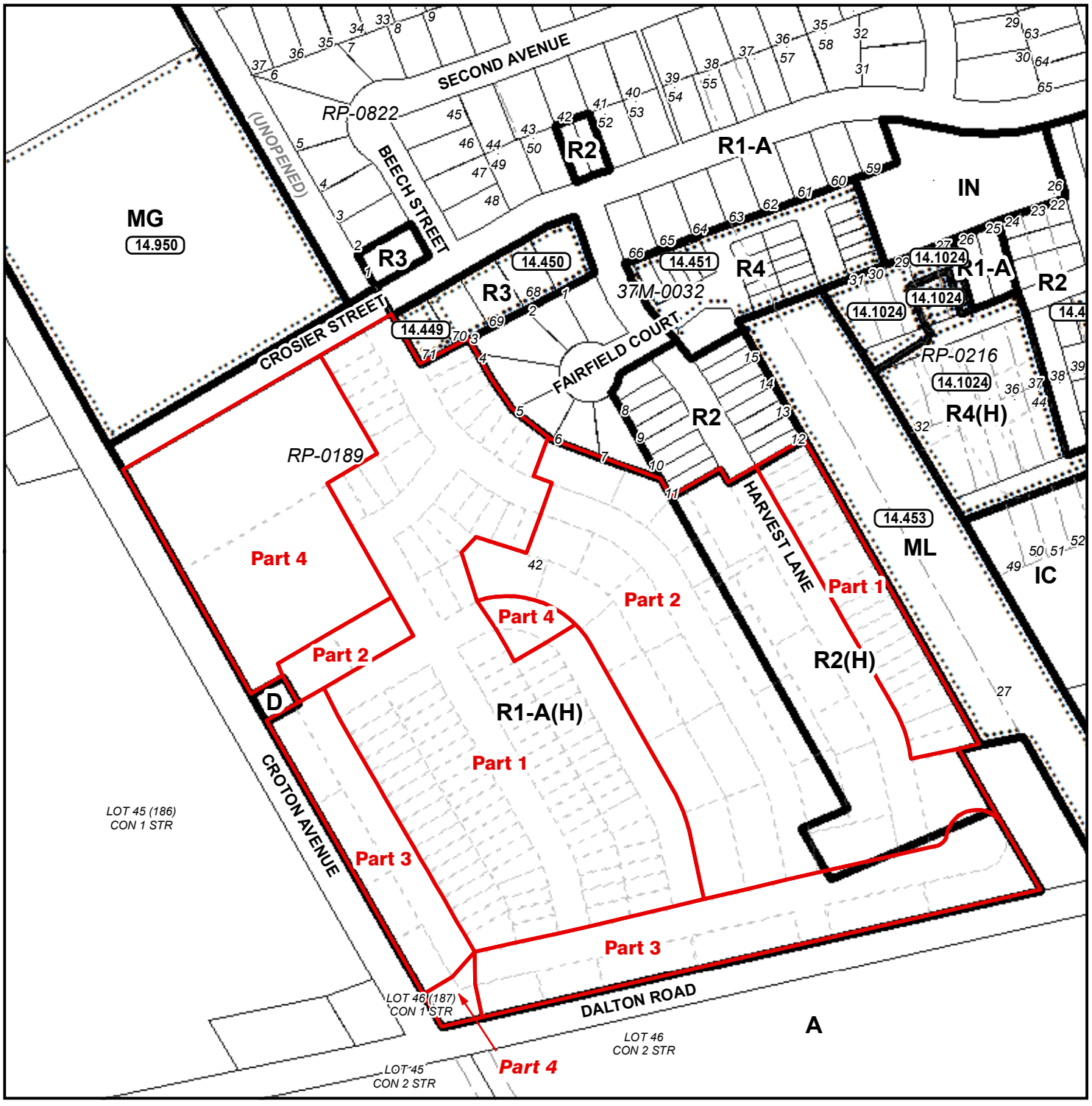
25 12.5 0 25 50 75 100 Meters

MAP C

PROPOSED ZONING BY-LAW AMENDMENT MAP

Urban Area of DELHI

28TPL2023316
ZNPL2023320



LEGEND

Subject Lands

ZONING BY-LAW 1-Z-2014

- (H) - Holding
- A - Agricultural Zone
- IC - Community Institutional Zone
- D - Development Zone
- MG - General Industrial Zone
- ML - Light Industrial Zone
- IN - Neighbourhood Institutional Zone
- OS - Open Space Zone
- R1-A - Residential R1-A Zone
- R2 - Residential R2 Zone
- R3 - Residential R3 Zone
- R4 - Residential R4 Zone

Part 1
From: R1-A(H) & R2(H)
To: R1-B with Special Provision

Part 2
From: R1-A(H) & R2(H)
To: R4 with Special Provision

Part 3
From: R1-A(H) & R2(H)
To: R4 with Special Provision

Part 4
From: R1-A(H)
To: OS

11/9/2023

N

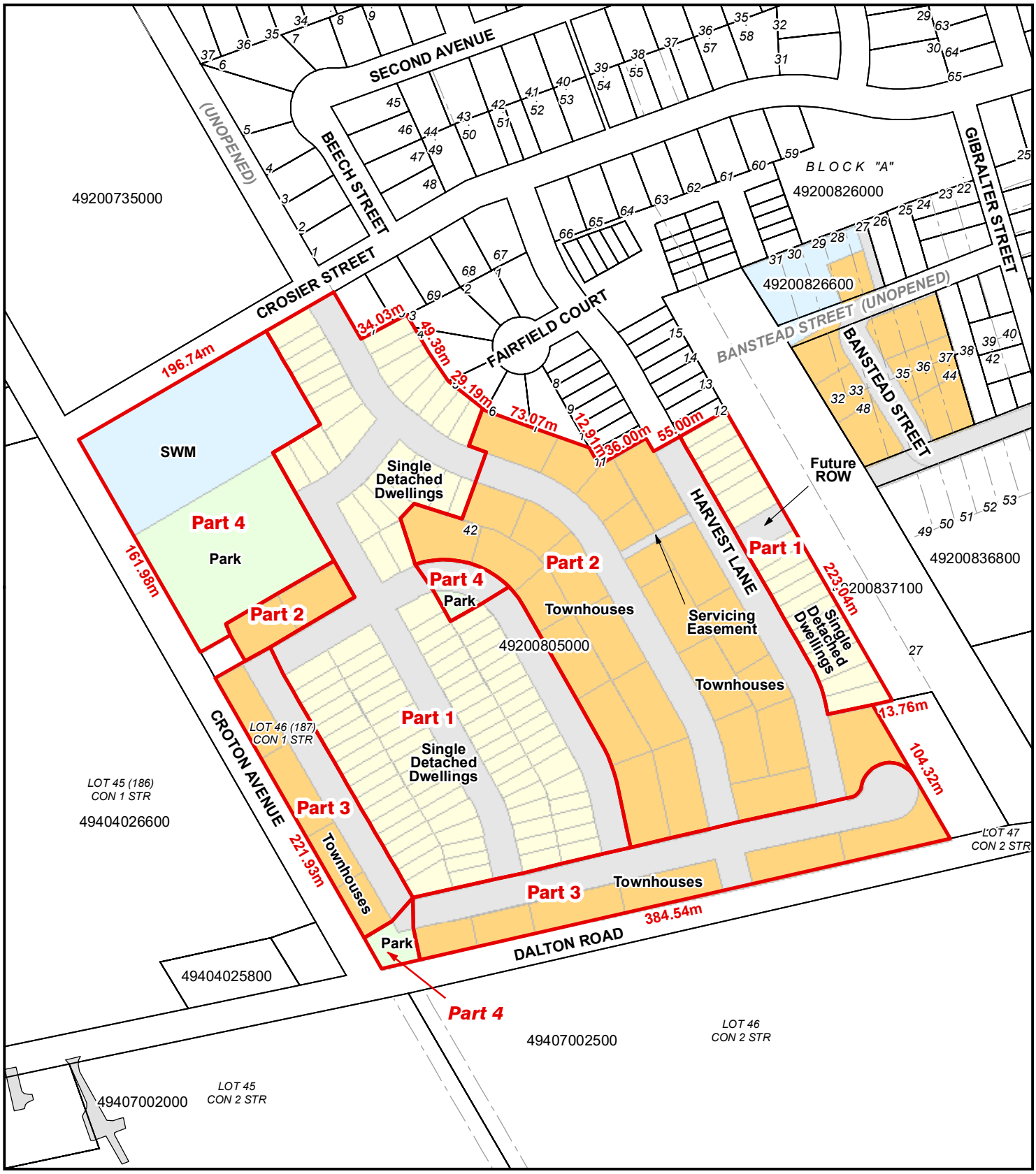
25 12.5 0 25 50 75 100 Meters

MAP D

CONCEPTUAL PLAN

Urban Area of DELHI

28TPL2023316
ZNPL2023320



Legend

Subject Lands

11/9/2023

N

25 12.5 0 25 50 75 100 Meters