



# Stormwater Management and Servicing Report

Navan Stacked Town Homes  
6001-6005 Renaud Road  
Orleans, Ontario

Prepared for:

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## 1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Landric Homes Inc. to complete a Stormwater Management Analysis and Servicing Brief for a proposed development of stacked townhomes located at 6001-6005 Renaud Rd, Orleans, Ottawa. The legal description of the property is Part of Lot 7, Concession 3, geographic Township of Gloucester, City of Ottawa.



**Figure 1: Aerial View of Proposed Development**

The site at 6001-6005 Renaud Road has approximately 76.1 metres of frontage along Renaud Road (south property line), maximum side yard depth of approximately 61.0 metres. The overall lot area is approximately **0.46 ha**. The site is currently zoned DR (Development Reserve Zone) and is occupied by two detached residential dwellings (2-storey and 1.5-storey buildings). Most of the site is landscaped with some paved surfaces.

The proposed works will only take into consideration the area of site allocated to the development of the stacked townhomes and amenities. These works will be located primarily within the south portion of the lot, with the exception of a lane along the east property line (to provide site access to Ziegler). Frontage along Renaud will remain the same, at approximately 76.1m. Side yard lengths will vary; west side yard of 35.5m, east side yard of 61.0m. Rear yard lot line will be split



between the lot line abutting the future semi-detached lots at 68.5m, and abutting Ziegler street at 11.6m. The overall limits of construction area is approximately **0.29 ha**

The development proposes five (5) blocks of 3-storey stacked townhome buildings with walk-out basements, consisting of 20 units to the south of the property and 6 semi-detached houses to the north of the property. However, the 6 semi-detached house will not be considered for site plan application or within the stormwater report. The proposed development will also feature 18 surface parking spaces as well as sheltered garages to accommodate parking demands.

For the purposes of this report & design, the lots allocated to the development of future semi-detached homes will not be considered. The combined area of the future semi-detached lots is approximately 68.5m (frontage along Renaud) by 25.3m (side yard along the west property line).

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater considerations, LRL Associates Ltd. should be advised to review the report recommendations.

## 2 EXISTING SITE AND DRAINAGE DESCRIPTION

The development boundary for the stacked townhouses within the larger parcel of land is approximately **0.29 ha**. It is gently sloped north from Renaud Road to Ziegler Street. Existing elevations range from 75.65m along south property line fronting Renaud St to 74.34m along north property line fronting Ziegler St. The topography of the site divides the pre-development drainage pattern into two directions; 1) towards Ziegler Street, and 2) towards Renaud Street.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-way:

### Ziegler Street:

- 200mmØ PVC DR-18 watermain
- 250mmØ PVC DR-35 sanitary sewer
- 750, 825 & 975mmØ CL 100-D concrete storm sewer

## 3 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

### Stormwater management

- Calculate the allowable stormwater release rates towards Renaud Road and towards Ziegler Street (to mimic pre-development conditions)
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity objectives will be achieved.



### Water services

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow.
- Describe the proposed water distribution network and connection to the existing system.

### Sanitary services

- Describe the existing sanitary sewers available to receive wastewater from the building.
- Calculate peak flow rates from the development.
- Describe the proposed sanitary sewer system.
- Review impact of increased sanitary flow on downstream sanitary sewer.

## 4 REGULATORY APPROVALS

An MECP Environmental Compliance Approval is not expected to be required for installation of the proposed storm and sanitary sewers within the site. A Permit to Take Water is not anticipated to be required for pumping requirements for sewer installation. The Rideau Valley Conservation Authority will need to be consulted to obtain municipal approval for site development. No other approval requirements from other regulatory agencies are anticipated.

## 5 WATER SUPPLY AND FIRE PROTECTION

### 5.1 Existing Water Supply Services and Fire Hydrant Coverage

The subject property lies within the City of Ottawa 2E water distribution network pressure zone. The subject property is located within proximity of an existing 200 mm dia. watermain along Ziegler St. There are currently several existing fire hydrants available to service the subject property. Refer to **Appendix B** for the location of fire hydrants.

### 5.2 Water Supply Servicing Design

The subject property is proposed to be serviced via a closed loop network of 150 mm diameter watermain connected to the existing 200 mm watermain within Ziegler Street. Refer to Site Servicing Plan C.401 in **Appendix E** for servicing layout.

Table 1 summarizes the City of Ottawa Design Guidelines design parameters employed in the preparation of the water demand estimate.

**Table 1: City of Ottawa Design Guidelines Design Parameters**

Design Parameter	Value
Residential Townhouse	2.7 P/unit
Average Daily Demand	280 L/d/per
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Desired operating pressure range during normal operating conditions	350 kPa and 480 kPa



During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure shall not exceed	552 kPa
During fire flow operating conditions pressure must not drop below	140 kPa
*Table updated to reflect technical Bulletin ISDTB-2018-02	

The interior layout and architectural floor plans have been reviewed, and it was determined that the total proposed residential development will house twenty (20) stacked town units. Based on the City of Ottawa Design guidelines for population projection, this translates to approximately 54.0 residents. Table 2 below summarizes the proposed development as interpreted using table 4.1 of the City of Ottawa Design Guidelines.

**Table 2: Development Residential Population Estimate**

Proposed Unit type	Persons Per Unit	Number of Units	Population
Townhouse	2.7	20	54.0
<b>Total Residential Population</b>			<b>54.0</b>

The required water supply requirements for the residential units in proposed building have been calculated using the following formula:

Where:

$$Q = (q \times P \times M)$$

$q$  = average water consumption (L/capita/day)

$P$  = design population (capita)

$M$  = Peak factor

Using a calculated Maximum Day Factor and Peak Hour factor of **7.5** and **11.2** respectively as per Table 3-3 in the *MOE Design Guidelines*, anticipated demands were calculated as follows:

- Average daily domestic water demand is **0.18** L/s,
- Maximum daily demand is **1.30** L/s, and
- Maximum hourly is **14.62** L/s.

Refer to **Appendix B** for water demand calculations.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in **Appendix B**. Table 3 below summarizes boundary conditions for the proposed development.



**Table 3: Summary of Anticipated Demands and Boundary Conditions**

Design Parameter	Anticipated Demand (L/min)	Boundary Conditions @ Renaud Road Head (m) / Pressure (psi)
Average Daily Demand	11	130.7 / 81.2
Max Day + Fire Flow (Block A)	78 + 16,000	115.5 / 59.5
Max Day + Fire Flow (Block B)	78 + 16,000	115.5 / 59.5
Peak Hour	877	126.7 / 75.5

*\*Assumed Ground elevation at connection point = 73.60 m.  
 Water demand calculation per City of Ottawa Water Design guidelines. See Appendix B for details.*

As indicated in Table 3, Average Daily Demand pressure exceeded the required pressure range (greater than 80 psi) stated in Table 1 as per City of Ottawa Design Guidelines. Pipe Pressure Losses were calculated to factor in the loss in pressure expected. Considering a PVC pipe (roughness coefficient C of 150) of 150mm inner diameter, at a length of 121.5m and an elevation variable of 1.64m, we could calculate a pipe pressure loss of **2.33 psi** within the network, resulting in an adjusted max pressure of **78.90 psi**, now falling within the allowable range.

Refer to **Appendix B** for Boundary Conditions & Pipe Pressure Loss Calculations.

The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect, see **Appendix A** for collaborating correspondence:

- Type of construction – Wood Frame Construction;
- Occupancy type – Limited Combustibility; and
- Sprinkler Protection – Non-Sprinklered.

The estimated fire flow demand was estimated to be **16,000 L/min** for Blocks A and **16,000 L/min** for Block B. See **Appendix B** for details.

There are several existing fire hydrants within 300 m to the proposed buildings that are available to meet the required fire flow demands stated above. Refer to **Appendix B** for fire hydrant locations.

Table 4 below summarizes the approximate aggregate fire flow of the contributing hydrants within 300 m to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.





**Table 4: Fire Protection Summary Table**

Building	Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Fire Hydrant(s) within 150m	Fire Hydrant(s) within 300m	Approximate Available Combined Fire Flow (L/min)
<b>BLOCK A</b>	16,000	2	6	-	(2 x 5678) + (6 x 3785) = 34,066
<b>BLOCK B</b>	16,000	2	6	-	(2 x 5678) + (6 x 3785) = 34,066

As shown in Table 4, the approximate total available fire flow from contributing hydrants is sufficient to provide adequate fire flow for the proposed buildings.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

## 6 SANITARY SERVICE

### 6.1 Existing Sanitary Sewer Services

The subject property is tributary to the Forest valley trunk sewer. There is an existing 250 mm dia. sanitary sewer within Ziegler St. across from the subject site that ultimately conveys flows to the Forest Valley trunk sewer.

The subject property falls within the area contemplated in the *Gloucester East Urban Community Infrastructure Servicing Study Update (Gloucester EUC)*, prepared by Stantec, revision date March 2005. Refer to Drainage Plan extracted from the *Gloucester EUC* in **Appendix C**.

The post development total wet wastewater flow was calculated to be is **0.80 L/s** as a result of proposed residential population and a small portion of infiltration. Refer to **Appendix C** for further information on the calculated sanitary flows.

As per the **Urbantech Functional Servicing Report** dated December 2020, the 250mm diameter sanitary sewer within Ziegler Street has a full capacity of 38.0 L/s. Maximum design from the current developed subdivision is expected to be 19.97 L/s. Assuming peak design flow should not exceed 85%, the current reserve capacity of the Ziegler sewer is expected to be 12.3 L/s.

The proposed Caivan residential development, directly East of the 6001/6005 Renaud site, is expected to have a peak design flow of 10.5 L/s. This would leave an allowable reserve capacity of **1.8 L/s** for the proposed residential developments at 6001/6005 Renaud Road.

Refer to **Appendix C** for relevant references from the Functional Servicing Report

The current proposed residential developments (Block A, Block B) will require **0.80 L/s** of the sewer capacity. This would leave the sewer with a capacity of **1.00 L/s** for the future semi-detached houses (located along Ziegler Street, refer to site plan). Therefore, it is anticipated that



the existing local sanitary sewer network has sufficient capacity to accommodate the proposed development.

## 6.2 Sanitary Sewer Servicing Design

The proposed development will be serviced via a 150 mm dia. sanitary sewer network which will connect to the existing 250mm dia. sanitary sewer located within Ziegler Street. Refer to LRL drawing C.401 for the proposed sanitary servicing.

The parameters used to calculate the anticipated sanitary flows are; residential average population per unit of 2.7 persons for townhouse units, a residential daily demand of 280 L/p/day, a residential peaking factor of 4.0 and a total infiltration rate of 0.33 L/s/ha. Based on these parameters and the total site area of 0.29 ha, the total wet wastewater flow was calculated as **0.80 L/s**. Refer to **Appendix C** for the site sanitary sewer design sheet.

## 7 STORMWATER MANAGEMENT

### 7.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system as such, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

In pre-development conditions, the stormwater runoff flows uncontrolled overland in two directions; towards the Renaud Road right-of-way and towards the Ziegler Street right-of-way. There is an existing 750 mm diameter storm sewer within Ziegler Street right-of-way. Refer to **Appendix D** for pre- and post-development watershed information.

### 7.2 Design Criteria

The stormwater management criteria for this development are based on the criteria stated in the **Gloucester EUC Study**, as well as pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City standards), as well as the Ministry of the Environment's Stormwater Planning and Design Manual, 2003 (SWMP Manual).

#### 7.2.1 Water Quality

The subject property lies within the Ottawa River East sub-watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

As per the **Gloucester EUC Study**, the subject property falls within the tributary area of SWM Pond 3, refer to Figure 6 as well as the Drainage Plan extracted from the **Gloucester EUC Study** included in **Appendix D**. Therefore, it was determined that no further treatment is required for stormwater runoff from the proposed development. Correspondence with RVCA is included in **Appendix A**.



## 7.2.2 Water Quantity

As per the **Urbantech Functional Servicing Report** dated December 2020, the 750mm diameter storm sewer within Ziegler Street has a full capacity of 1113 L/s. The maximum design flow from the currently developed subdivision is expected to be 757 L/s (1113 L/s at  $\pm 68\%$  capacity). Assuming pipe capacity should not exceed 90% full ( $\pm 1002$  L/s), the current reserve capacity of the Ziegler storm sewer is expected to be  $\pm 245$  L/s for the proposed development and other future downstream developments.

Refer to **Appendix D** for the relevant references from the Functional Servicing Report.

Based on **Gloucester EUC Study**, the following stormwater management requirements were identified for the subject site:

- Meet an allowable release of 85 L/s/ha;
- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site;

The allowable release rate for the subject site was calculated to be **24.82 L/s**, further assigned to each outlet direction to be **11.39 L/s** towards Ziegler and **13.43 L/s** towards Renaud. Refer to **Appendix D** for calculations.

## 7.3 Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site to quantify the detention storage required for quantity control of the development. Refer to **Appendix D** for storage calculations.

## 7.4 Proposed Stormwater Quantity Controls

For the purposes of this report, as pre-development and post-development runoff is split between Renaud Road and Ziegler Street ROW's, independent stormwater management analyses and designs will be performed for each watershed / group of watersheds contributing to the respective outlet point. This will ensure that independent post-development runoff out letting to both Renaud and Ziegler do not exceed their respective pre-development allowable release rates.

The proposed stormwater management quantity control for this development will be accomplished by allowing portions of site runoff to flow overland uncontrolled, and utilizing an inlet control device to restrict flows to the allowable release rate. Storage required as a result of quantity control will be accomplished through a combination of surface storage and underground stormwater chambers in the parking lot.

The subject site is proposed to be serviced via a network of 300mm diameter storm sewers that outlet to the existing 750 mm diameter storm sewer within Ziegler street. The proposed site storm sewer and stormwater management system are shown on drawing C.401 and detailed calculations, including the design sheet, can be found in **Appendix D**.



The existing site is delineated by catchments EWS-01 and EWS-02. The site grading is currently divided by a natural high point running from east to west, running roughly through the existing buildings.

EWS-01 begins from the natural high point and slopes predominantly northwest, conveying overland flow uncontrolled to the north property line and ultimately the Ziegler Street right-of-way. A pre-development allowable release rate of **11.39 L/s** was established for this watershed.

EWS-02 begins from the natural low points and slopes predominantly southeast, conveying overland flow uncontrolled to the south property line and ultimately the Renaud Road right-of-way. A pre-development allowable release rate of **13.43 L/s** was established for this watershed.

The site has been analyzed and post development watersheds have been allocated.

Watershed WS-01 (0.043 ha), consisting of grassed area, landscaping and sidewalk, will flow uncontrolled overland to the Renaud Road right-of-way.

Watershed WS-02 (0.015 ha), consisting of landscaping and a paved driveway, will flow uncontrolled overland to the Ziegler Street right-of-way.

Overland flow within watershed WS-03 (0.233 ha) will be captured by catch basins CBMH02, CBMH04, CBMH05 and CB06. A Hydrovex 50VHV-1 vertical flow regulator is proposed at MH01 to restrict collected runoff to a specific release rate. Grading proposed will provide positive overland drainage to the proposed storm water collection and control systems.

Table 5 below summarizes post-development drainage areas. Calculations can be seen in **Appendix D**.

**Table 5: Drainage Areas**

Drainage Area Name	Area	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
<b>Outlet to Renaud Rd ROW</b>			
WS-01 (uncontrolled)	0.043	0.45	0.56
<b>Outlet to Ziegler St ROW</b>			
WS-02 (uncontrolled)	0.015	0.65	0.81
WS-03 (controlled)	0.233	0.74	0.92

Table 6 below summarize the release rates and storage volumes required to meet the allowable release rates of **13.43 L/s** for Renaud and **11.39 L/s** for Ziegler for 100-year flow rates.



**Table 6: Stormwater Release Rate & Storage Volume Summary (100 Year)**

Catchment Area	Drainage Area (ha)	100-year Allow. Release Rate (L/s)	100-year Release Rate (L/s)	100-Year Required Storage (m <sup>3</sup> )	Total Available Storage (m <sup>3</sup> )
<b>Outlet to Renaud Rd ROW</b>					
WS-01 (uncontrolled)	0.058	13.43	12.06	0	0
<b>Outlet to Ziegler St ROW</b>					
WS-02 (uncontrolled)	0.015	11.39	6.09	0	0
WS-03 (controlled)	0.233		5.00	127.28	129.51

#### 7.4.1 Renaud Road Outlet

It is estimated that **12.06 L/s** of runoff will flow uncontrolled from WS-01 towards the Renaud Road right-of-way. As this release rate falls below the calculated allowable release rate of **13.43 L/s** for the Renaud Road outlet, no further stormwater management design calculations are required.

#### 7.4.2 Ziegler Street Outlet

It is estimated that **6.09 L/s** of runoff will flow uncontrolled from WS-02 towards the Ziegler Street right-of-way. Runoff collected in WS-03 will be attenuated on site and discharged at a specific release rate of **5.00 L/s** via a Hydrovex 50-VHV-1 flow control unit located at the invert of MH01, refer to **Appendix D** for additional info on the flow control unit. With implementation of flow control within the controlled watershed, it is ensured that post-development release rate to the Ziegler Street outlet will not exceed the calculated allowable release rate of **11.39 L/s**.

Considering a halved controlled release rate (to account for variable design head due to the combination of underground and overland storage), it can be calculated that a total **118.35 m<sup>3</sup>** of storage will be required to attenuate flows to the allowable release rate for the 100-year storm event. The project runoff exceeding the allowable release rate will be stored on-site via surface ponding at the parking lot as well as Stormtech underground chambers Model MC-3500 (or approved equivalent). Total proposed surface ponding provides approx. **16.98 m<sup>3</sup>** and the proposed underground chambers provide **112.51 m<sup>3</sup>** to provide a total storage of **129.51 m<sup>3</sup>** during the 100-year storm event. No surface ponding will occur in the 5-year and 2-year storm events, as all necessary storage requirements will be fully accommodated by the proposed stormwater underground chambers.

Refer to **Appendix D** for additional info on Stormtech chambers. The 100-year maximum ponding depths can be found on drawing “C601 – Stormwater Management Plan” of **Appendix E**.



## 8 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction. Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS 577. Refer to LRL Associates drawing C.101 for erosion and sediment control details.

## 9 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 6001/6005 Renaud presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

### Water Service

- The maximum required fire flow was calculated at **16,000 L/min** for Block A and **16,000 L/min** for Block B using the FUS method.
- There are at least seven (8) existing fire hydrants within 150m available to service the proposed developments. They will provide a combined fire flow of **34,066 L/min** to the site.
- The new development/expansion will be serviced with a new 150 mm $\Phi$  closed loop watermain network to be connected to the existing 200mm $\Phi$  watermain within Ziegler Street.
- Boundary conditions received from the City of Ottawa, considering pipe pressure losses, have indicate that sufficient pressure is available to service the proposed site.

### Sanitary Service

- The anticipated sanitary flow from the proposed development is **0.80 L/s**.
- The proposed development will be serviced by a 150 mm diameter sanitary sewer network that connects to the existing 250 mm dia. sanitary sewer within Ziegler Street.



### Stormwater Management

- The subject property is serviced by existing SWM Pond 3 as per the **Gloucester EUC Study**. Hence additional quality control measures are not proposed.
- The storm water release rates from the proposed development will meet the pre-allocated rate of **85 L/s/ha** stated in the **Gloucester EUC Study**. The target release rate for the site, based on the EUC, was calculated to be **13.43 L/s** for all runoff heading to Renaud, and **11.39 L/s** for all runoff heading to Ziegler.
- As the proposed release rate for all site runoff heading to the Renaud ROW, **12.06 L/s**, fell below the calculated allowable release rate, no further verification was required.
- As for the Ziegler outlet, uncontrolled runoff was calculated to be **6.09 L/s**, and stormwater quantity control measures were implemented within the controlled watershed to ensure allowable release to the Ziegler ROW was not exceeded. A Hydrovex 50-VHV-1 flow control unit is proposed to limit controlled runoff to **5.00 L/s**, and a combination of surface ponding and underground storage via Stormtech Chambers will provide **129.51 m<sup>3</sup>** of available storage volume to accommodate stormwater storage requirements.

### 10 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document. If you have any questions or comments, please contact the undersigned.

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**APPENDIX A**  
**Pre-consultation / Correspondance**





**APPENDIX B**  
**Water Supply Calculations**



**APPENDIX C**  
**Wastewater Collection Calculations**  
**Supporting Documents**



**APPENDIX D**  
**Stormwater Management Calculations**  
**Supporting Documents**  
**Hydrovex ICD**  
**Stormtech Chaber Details**



**APPENDIX E**  
**Civil Engineering Drawings**



## **DRAWINGS/FIGURES**

**Proposed Site Plan  
Legal Survey  
As-builts**

