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FUNCTIONAL SERVICING REPORT

FOR

RICHCRAFT HOMES
TRAILS EDGE NORTH

CITY OF OTTAWA

PROJECT NO.: 20-1195

APRIL 2021

FUNCTIONAL SERVICING REPORT
FOR
RICHCRAFT HOMES
TRAILS EDGE NORTH

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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Richcraft Homes to prepare a Functional Servicing Report in support of the Draft Plan of Subdivision application for Trails Edge North.

The study area is located within the City of Ottawa urban boundary in the Innes ward. As illustrated in ***Figure 1***, the study area is located east of future residential lands, west of Mer Bleue Road, south of existing commercial lands fronting Innes Road, and north of a Hydro Corridor. The study area measures approximately 82 ha and is comprised of the following parcels:

- PIN 04404-1303
- PIN 04404-0280
- PIN 04404-0503
- PIN 04404-0539
- PIN 04404-0541
- PIN 04404-0542
- PIN 04404-0543
- PIN 04404-0544

The proposed concept plan would allow for the development of employment lands, park blocks, a mix of low, medium and high density residential development, and a network of roads with a mix of 14.50m, 18m, and 24m right-of-way (ROW) widths.

The subject property is within the study area of the *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan* (MSS) (DSEL, Dec 2020). The *MSS* was completed in order to provide a conceptual servicing strategy and cohesive development approach for the EUC Phase 3 Area, in support of the Official Plan Amendment based on the *East Urban Community Phase 3 Area Community Design Plan* (CDP) (Fotenn, 2020). The MSS identifies existing infrastructure and environmental constraints, describes the neighbourhood-level trunk services that will service all properties within the study area, establishes targets for future site-specific stormwater

management plans, and identifies required infrastructure upgrades to support the proposed development of the MSS area.

The objectives of this report are to:

- Provide sufficient detail to demonstrate that development of the study area will be adequately supported by municipal services, as set out in the *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan* (DSEL, Dec 2020);
- Justify any alternative servicing strategies to those proposed in the MSS, to be evaluated for the purpose of optimizing the development potential of the study area;
- Define the course of subsequent detailed design, review, and acceptance of the proposed municipal services;
- Demonstrate how the proposed municipal services will conform with current Ministry of the Environment servicing design criteria and other applicable agency guidelines; and,
- Demonstrate good engineering practice for the protection of public safety, the environment, and sustainable operation.

1.1 Existing Conditions

Under existing conditions, the study area is primarily vacant undeveloped land.

There is a stormwater management pond in the north western portion of the study area servicing the existing commercial development to the north. The stormwater management facility directs treated stormwater along an open ditch towards the existing EUC Pond 1 SWM facility.

A snow disposal facility was constructed by the City of Ottawa at 2170 Innes Road adjacent to the southern boundary of the study area.

Per the MSS, depending on the snapshot in time being considered, the study area has had different portions draining to Mud Creek and Bilberry Creek. Based on the latest info at the time of the MSS, it is understood that the full study area is within the Mud Creek watershed.

The *Geotechnical - Existing Conditions Report – PG3130-2, Revision 2* (Paterson Group, July 7, 2019) includes the following information for the study area:

- the long-term groundwater table is estimated to be between 1.5 m – 2.5 m below the ground surface;

- the overburden varies between shallow bedrock and deep silty clay deposit. Based on available geological mapping, the overburden drift thickness is 0 to 30 m in depth;
- the bedrock within the study area consists of interbedded limestone and dolomite of the Gull River formation. Based on the borehole and test pitting program, the bedrock ranges from 1 m to 25 m below the existing surface. Proposed development within bedrock may require blasting; specific blasting requirements would apply; and,
- a grade raise restriction of 2.0 m is recommended for the majority of the study area. A grade raise restriction of 0.5 to 1.5 m applies to the southern and western portions of the study area.

To the west of the study area there is a planned residential development project by Glenview Homes, known as 3610 Innes Road. A preliminary network is shown in ***Figure 1*** and ***Drawings 1-4*** to provide context for the servicing strategies. The road network is preliminary and subject to refinements through future planning applications for these neighbouring lands. Richcraft is proceeding with development applications for the study area with the understanding that development applications for these neighbouring lands are to also proceed in the short term.

1.2 Development Concept

The proposed development concept is shown in ***Drawings 1-4***. The development concept consists of 340 detached single homes, 529 townhomes, 114 back-to-back townhomes, park blocks, employment blocks, open space and the associated road network.

The road network consists of local roads with 14.5 m and 18 m ROW widths and collector roads with a 24 m ROW width.

Table 1 summarizes the land use breakdown and predicted populations associated with the development concept.

Although similar to the development concept in the CDP and MSS, the road network, land uses, and arrangement of land uses for the study area have been refined as part of the Draft Plan of Subdivision application and take into consideration the preliminary road layout of the neighbouring properties. Within the MSS, the projected population for the study area was approximately 4,868. The minor changes in land use have resulted in a minor decrease (1.4%) in the anticipated population when compared to the MSS.

Please note that, per the MSS, there is expected to be some limited additional capacity available within the planned servicing infrastructure to accommodate select increases to anticipated populations in the future. Any changes to anticipated future populations would be addressed through future revisions to the Draft Plan or separate development applications under the *Planning Act.*

The study area is expected to be developed in distinct phases according to the landowner's preferred timing. Depending on future phases limits, temporary construction access roads and/or out-of-phase servicing corridors may be required, and may require City approval prior to construction.

Table 1: Development Statistics (Richcraft Homes, August 2020)

Land Use	Area (ha)	Projected Number of Units	Residential Population per Unit*	Projected Population*
Low Density Residential	25.87	340 Singles	3.4	1156
		529 Townhomes	2.7	1429
		114 B2B	2.7	308
Medium Density Residential	2.51	200	1.8	360
High Density Residential	8.60	859	1.8	1547
Employment	19.34			
Park	6.41			
Open Space	3.65			
Roads	15.61			
Total	**81.99**	**2042**		**4800**

** NOTE: Population projections may differ from population estimates used in background Transportation Studies, Planning Rationale, and other studies. Population projection and residential population per unit values are based on Ministry of Environment, Conservation and Parks guidelines for servicing demand calculations.*

It is expected that the employment blocks and the high density/mixed use development blocks included in the development concept will be subject to future site plan application processes. While the *general* servicing concept for the blocks is described in this FSR, *detailed* servicing designs for these blocks are expected to be developed, reviewed, and approved separate from this FSR through the site plan application process.

Environmental studies related to the Draft Plan of Subdivision application for the study area characterize and provide management recommendations for vegetation, natural features, and drainage features affected by the development concept and the planned off-site servicing projects. The recommendations from other studies are not repeated within this FSR, unless directly related to the servicing concept.

Please note that an alternative development concept may be pursued in the northwest area of the Draft Plan of Subdivision. The proposed alternative concept is depicted in ***Exhibit 1***. The alternative concept re-orients lands uses around the main road network, maintains external servicing/drainage connections (where required), and offers a like-for-like substitution from a population and imperviousness perspective. Therefore, the analysis and conclusions outlined in the following sections of the FSR are considered to apply to both the concept plan in the Draft Plan of Subdivision (***Appendix A***), and the alternative development concept in ***Exhibit 1.***

Exhibit 1: Alternative Development Concept (Richcraft Homes, December 2020)

1.3 Required Permits / Approvals

The City of Ottawa must approve detailed engineering design drawings and reports prior to construction of the municipal infrastructure identified in this report. This is expected to occur as part of the next steps in the Draft Plan of Subdivision process.

The specific additional approvals and permits listed in ***Table 2*** are expected to be required prior to construction of the municipal infrastructure detailed herein. Please note that other permits and approvals may be required, as detailed in the other studies submitted as part of the Draft Plan of Subdivision application (e.g. *Tree Conservation Report, Environmental Impact Statement, Phase 1 Environmental Site Assessment, etc.)*. Coordination and permissions from the land owner will be required for any infrastructure works outside of the study area.

Table 2: Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
RVCA	Permit under Ontario Regulation 174/06, RVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Ditches requiring closure due to development/grading.	Proposed land uses & municipal infrastructure require grading within the subject lands and result in the closure of existing ditches.
MECP	Environmental Compliance Approval	Construction of new sanitary & storm sewers.	The MECP is expected to review the stormwater collection system and wastewater collection system via transfer of review.
MECP	Permit to Take Water	Construction of proposed land uses (e.g. basements for residential homes) and services.	Pumping of groundwater may be required during construction, given groundwater conditions and proposed land uses and on-site/off-site municipal infrastructure.
City of Ottawa	MECP Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains.	The City of Ottawa is expected to review the watermains on behalf of the MECP through the Form 1 – Record of Watermains Authorized as a Future Alteration.

Please note that there are specific requirements for the design of the extension of Frank Bender Street, involving mitigation measures associated with the adjacent snake habitat area. There are services in this same ROW corridor, and allowances for culvert connections within the ROW under the roadway. The design of the road and associated services is expected to be advanced as part of detailed design, and will be subject to additional site-specific permitting.

Please also note that there will be specific approval requirements related to the road crossing of the Hydro One Corridor, and the associated services within the ROW. Coordination with Hydro One is also expected to be required for development of services and land uses adjacent to the Hydro One Corridor.

1.4 MECP Pre-Consultation

Per the City of Ottawa Transfer of Review Agreement No. TOR-OTT-E-2019-01, Ministry of the Environment, Conservation and Parks (MECP) pre-consultation is not required, as the City of Ottawa is expected to assess that the proposed works fall under Schedule A of the agreement. As such, the City of Ottawa is expected to review the proposed

infrastructure on behalf of MECP as part of issuing Environmental Compliance Approval for the appropriate works.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following studies were utilized in the preparation of this report.

- **Ottawa Sewer Design Guidelines**,
  City of Ottawa, *SDG002,* October 2012
  (Sewer Design Guidelines)

  - **Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines - Sewer**
    City of Ottawa, February 5, 2014.
    (ISDTB-2014-01)

  - **Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines – Sewer**
    City of Ottawa, September 6, 2016.
    (PIEDTB-2016-01)

  - **Technical Bulletin ISTB-2018-01, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, March 21, 2018.
    (ISTB-2018-01)

  - **Technical Bulletin ISTB-2019-02, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, July 8, 2019.
    (ISTB-2019-02)

- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, July 2010.
  (Water Supply Guidelines)

  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISDTB-2010-2*)

  - **Technical Bulletin ISDTB-2014-02**
    City of Ottawa, May 27, 2014.
    (*ISDTB-2014-02*)

  - **Technical Bulletin ISTB-2018-02**
    City of Ottawa, March 21, 2018
    (*ISDTB-2018-02*)

- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, Conservation and Parks, 2008.
  (MECP* Design Guidelines*)

- **Stormwater Planning and Design Manual,**
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2012, as updated from time to time.
  (OBC)

- **Existing Conditions Water Budget**
  Palmer, December 2014

- **First Innes Shopping Centres, Stormwater Management Report - Phase 3 Update**
  Stantec, February 2006

- **Geotechnical - Existing Conditions Report – PG3130-2, Revision 2**
  Paterson Group, July 7, 2019

- **Conceptual Site Servicing and Stormwater Management Report**
  Novatech, 2020

- **Mud Creek Cumulative Impact Study**
  Stantec, 2020

- **Environmental Impact Statement Trails Edge North**
  GHD, 2020

- **East Urban Community Phase 3 Area Community Design Plan Master Transportation Study**
  Castleglenn, 2020

- **East Urban Community Phase 3 Area Community Design Plan**
  FOTENN, 2020

- **Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan**
  David Schaeffer Engineering Ltd., December 2020
  (MSS)

- **EUC Pond 1 North Main Cell and North Forebay Modifications**
  DSEL, August 31, 2020

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The study area lies within the existing City of Ottawa 2E pressure zone. There is an existing elevated storage tank just north of the study area on Frank Bender Street. There is an existing 600 mm diameter watermain along the Hydro Corridor to the south, a 400 mm diameter watermain within Mer Bleue Road to the east and a 300 mm diameter watermain within Pagé Road to the west. There is also a 400-600 mm diameter watermain within Innes Road and a 300-600 mm watermain within Frank Bender Street (formerly Belcourt Extension) to the north of the study area. The surrounding existing watermain infrastructure is shown in ***Drawing 4***.

3.2 Water Supply Servicing Design

The proposed alignment of the trunk watermain network is depicted in ***Drawing 4.***

Adequacy of sizing and configuration of trunk watermain infrastructure is provided in the MSS. Per the MSS (as shown in excerpts in ***Appendix B***), in support of full buildout of the MSS area, the following trunk watermains will be required within the study area:

- a 300 mm diameter watermain will be required on Street 13, connecting to the 600mm diameter watermain within the Hydro Corridor;
- a 300 mm diameter watermain will be required on Street 14, connecting to the existing 300 mm diameter watermain within Frank Bender Street; and
- a 300 mm diameter watermain will be required on Street 12, connecting to the existing 400 mm diameter watermain within Mer Bleue road and the future 300 mm diameter watermain within the neighbouring development to the west.

Depending on phasing and timing of development, not all of the watermains listed above are anticipated to be required to be in place prior to development of the study area. At the time of detailed design, detailed hydraulic modelling will be undertaken to verify that the proposed on-site and off-site watermains are in conformance with the City's *Water Supply Guidelines*, according to the phasing plans for the study area. At minimum, a looped watermain network with two connections will be required to service the study area.

Potential alignments of local watermains are also depicted in ***Drawing 4***, to illustrate that a redundant looped network can be achieved to support the development of the site, extending from the planned trunk watermain infrastructure. At this time, the proposed watermains are primarily shown in right-of-ways and proposed servicing easements, causing slight deviations in watermain alignment as compared to the MSS. Implementing the local watermain network shown in ***Drawing 4*** allows all development blocks to be adequately serviced by local distribution mains or connected directly to one of the trunks. At the time of detailed design, detailed hydraulic modelling will be undertaken to verify that the proposed local watermains are in conformance with the City's *Water Supply*

Guidelines. The alignment and sizing of local watermains will also be confirmed by the detailed hydraulic modelling. Additional servicing easements may be determined to be required, which may trigger minor amendments to the proposed lot fabric in the concept plan.

Please note that Richcraft Homes may seek City approval at detailed design for any opportunities to minimize the amount of infrastructure to be constructed to support the proposed development. (e.g. Richcraft may propose minor infrastructure sizing changes and minor alignment changes at detailed design, ensuring the changes have no adverse environmental impacts and no adverse capacity implications on affected landowners).

Table 3: Water Supply Design Criteria

Design Parameter	Value
Residential - Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – Apartment	1.8 p/unit
Residential Average Daily Demand	280 L/d/p
Residential - Maximum Daily Demand	2 x Average Daily Demand
Residential - Maximum Hourly Demand	3 x Average Daily Demand
Residential – Minimum Hourly Demand	0.5 x Average Daily Demand
Commercial/Institutional Average Daily Demand	35,000 L/gross ha/day
Park Average Daily Demand	9,300 L/gross ha/day
Commercial/Institutional Maximum Daily Demand	1.5 x Average Daily Demand
Commercial/Institutional Maximum Hour Demand	1.8 x Maximum Daily Demand
Commercial/Institutional Minimum Hourly Demand	0.5 x Average Daily Demand
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	276kPa
During normal operating conditions pressure must not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa

Notes:

- *Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010), Table 4.1 - Per Unit Populations and Design Guidelines for Drinking Water Systems (MECP, 2008), Table 3-1 Peaking Factors.*
- *No Outdoor Water Demand considered for residential uses.*

The MSS contemplated the development of the study area by employing a 15,000 L/min fire flow for the design of the trunk watermain network and an average water demand allowance based on the following consumption rates: single family homes at 570 L/unit/d and 1050 L/unit/day outdoor water demand; towns at 560 L/unit/d; apartments at 400 L/unit/day; and employment at 8500 L/ha/d. As detailed designs progress, timing, alignment, and sizing of local watermains will be confirmed. The subdivision's local watermain network will be sized to meet maximum hour and maximum day plus fire flow

demands. ***Table 3*** summarizes the *Water Supply Guidelines* employed in the preparation of the preliminary water demand estimate (***Appendix C*** and ***Table 4***) and that will be applied in future watermain network hydraulic modelling and detailed design.

Fire flow requirements are to be confirmed in accordance with Local Guidelines (Fire Underwriters Survey), City of Ottawa *Water Supply Guidelines*, and the Ontario Building Code, upon development of detailed concepts for the different land uses. For planning purposes, fire flow estimates are provided in the preliminary water demand estimate (***Appendix C*** and ***Table 4***) based on the information available in the preliminary concept plan and comparable recent developments in the City of Ottawa.

Table 4: Water Demand Estimate and Comparison to Equivalent MSS Demands

	Avg. Daily		Max Day		Peak Hour		Fire Flow Requirement
	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min	L/min
Residential Demand	1344.0	933.3	2688.0	1866.7	4032.0	2800.0	10000 L/min* *(per ISDTB-2014-02)*
Commercial Demand	676.9	470.1	1015.4	705.1	1827.6	1269.2	15000 L/min *(considered adequate for most types of structures and occupancies, but is to be confirmed at the detailed design level)*
Park	59.61	41.4	89.4	62.1	161.0	111.8	
Total Demands	**2080.5**	**1444.8**	**3792.8**	**2633.9**	**6020.6**	**4181.0**	
Demands for Study Area under MSS Dev Stats	**2101.2**	**1459.2**	**3833.5**	**2662.2**	**6082.3**	**4223.8**	

*Residential Fire Flow demands will be confirmed at detailed design. There is a possibility certain units may not meet the requirements to apply the 10,000 L/min cap. In these instances, the Fire Flow demand will be calculated in accordance with the FUS method per the *Water Supply Guidelines.* Mitigation measures may also be proposed to lower the required Fire Flow.

As stated in ***Section 1.2***, the proposed concept plan represents a slight decrease in anticipated population when compared to what the MSS considered for the study area. When applying the design criteria from ***Table 3*** to the MSS development stats for the study area, the resultant water demand is slightly higher (approx. 1%) then the anticipated water demand for the study area per the Draft Plan of Subdivision. See ***Table 4*** and ***Appendix C*** for details. As such, the MSS adequately considered the watermain servicing of the study area, and no additional modelling or design information is required in support of the Draft Plan of Subdivision.

3.3 Water Supply Conclusion

The study area will connect to the City's 2E pressurized water supply network to meet the water demands of the proposed concept plan, via the trunk watermain infrastructure identified in the MSS and a network of local watermains. The proposed concept plan

development statistics yield a water demand below what was anticipated by the MSS, therefore it follows that the trunk watermain infrastructure described in the MSS will adequately service the study area.

Detailed future modelling will confirm phasing of the extensions of trunk watermains and sizing of the local watermain network. The proposed water supply design will conform to all relevant City and MECP Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The existing 900 mm diameter Forrest Valley Trunk (FVT) sanitary sewer is located on Pagé Road to the west of the study area. Within the Orleans Village development to the west of the study area, there is an existing sanitary sewer network that includes a 675 mm diameter sanitary sewer stubbed at the western boundary of the Glenview lands on Street 3. The surrounding existing sanitary sewer infrastructure is shown in ***Drawing 3***.

4.2 Wastewater Design

The study area is expected to be serviced by an internal gravity trunk sanitary sewer system ranging in diameter from 300mm to 600 mm, which is to follow the local road network and select servicing easements. See ***Drawing 3*** for details. As detailed designs progress, alignment and sizing of local sanitary sewers will be confirmed and additional servicing easements may be required, which may trigger minor amendments to the proposed lot fabric in the concept plan.

The MSS contemplated that the study area would be serviced by the FVT sanitary sewer via a trunk sewer running from Pagé Road towards the study area via Nature Trail Crescent as well as Ponthieu Circle and Beaugency Street within the Orleans Village development. The MSS confirmed capacity within the FVT at the intersection of Pagé Road and Nature Trail Crescent for the study area along with the neighbouring upstream and downstream drainage areas. The upstream drainage area consists of a commercial development to the north of the study area while the downstream drainage areas consist of the Glenview lands and Orleans Village development to the west.

Per the MSS, the total peak flow from the study area, the Glenview lands and the external commercial developments directed towards MH1A within the Orleans Village development is 113.41 L/s. See ***Appendix D*** for details.

Table 5 summarizes the *Sewer Design Guidelines* applied in the preliminary sanitary design, see ***Appendix D*** for details. The ***Table 5*** parameters are also to be employed in the future detailed design of the proposed wastewater sewer system.

The only deviations from the MSS wastewater servicing strategy are the minor land use changes associated with the proposed concept plan. Applying the wastewater parameters in ***Table 5*** to the proposed development concept, the estimated peak sanitary flow, including external flows from the the Glenview lands and the external commercial developments, directed towards MH1A within the Orleans Village development is 113.75 L/s. See ***Appendix D*** for details.

A comparison between the anticipated peak flow and the MSS anticipated peak flow from the Draft Plan of Subdivision can be found in ***Table 6***. The anticipated peak flow of 113.75 L/s is 0.03% higher than the peak flow considered in the MSS. There is not expected to

be any issues associated with the minor flow increase as the anticipated peak flow is still below the conservative flow of 120.83 L/s that was used within the FVT capacity analysis in the MSS. As such, the MSS adequately considered the wastewater servicing of the study area, and no additional design information is required in support of the Draft Plan of Subdivision.

Table 5: Wastewater Design Criteria

Design Parameter	Value
Residential - Single Family	3.4p/unit
Residential – Townhome/ Semi	2.7p/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor, where K=0.8
Commercial / Institutional Flows	35,000 L/gross ha/day
Commercial / Institutional Peak Factor	1.5 if contribution >20%, otherwise 1.0
Light Industrial Flows	35,000 L/gross ha/day
Industrial Peaking Factor	Per Figure in Appendix 4-B, City of Ottawa Guidelines
Infiltration and Inflow Allowance	0.33 L/s/gross ha for all areas
Park Flows	9,300 L/ha/d (75 p/acre per Sewer Guidelines Appendix 4-A)
Park Peaking Factor	1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, Technical Bulletins, and recent residential subdivisions in City of Ottawa.	

Richcraft Homes may seek City approval at detailed design for any opportunities to minimize the amount of infrastructure to be constructed to support the proposed development (e.g. Richcraft may propose minor infrastructure sizing changes and minor alignment changes at detailed design, ensuring the changes have no adverse environmental impacts and no adverse capacity implications on affected landowners).

Table 6: Peak Sanitary Flow Contribution to MH1A

	Total Residential Area (ha)	Population	Total Employment Area (ha)	Total Park Area (ha)	Total Flow to MH1A (L/s)
Trails Edge North FSR (DSEL, April 2021)	64.63	7118	28.60	7.71	113.75
MSS (DSEL, Dec 2020)	64.39	7181	27.78	7.63	113.41

4.3 Wastewater Servicing Conclusions

The proposed wastewater system for the subject lands is to be designed to conform to all relevant City of Ottawa *Sewer Design Guidelines* and *MECP Guidelines*.

The study area will be serviced by local and trunk sanitary sewers within the study area and an off-site trunk sanitary sewer network extending through neighbouring developments towards the FVT in Pagé Road, consistent with the MSS. There is proven to be adequate capacity in the downstream infrastructure to accommodate the anticipated flows from the subject lands in the Draft Plan of Subdivision.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The study area is tributary to Mud Creek, which outlets to Green's Creek before ultimately draining to the Ottawa River. The City of Ottawa has recently completed an Environmental Assessment related to Mud Creek, and has recommended in-stream improvements in order to mitigate existing erosion patterns and anticipated changes in erosion patterns based on planned development in the watershed (including the planned development within the Draft Plan of Subdivision).

There is a small stormwater management facility located adjacent to the northern boundary of the study area, behind an existing Canadian Tire store. Per the *First Innes Shopping Centres, Stormwater Management Report - Phase 3 Update* (Stantec, February 2006), the stormwater management facility is a permanent surcharge basin at the upstream end of the shopping center's storm sewer system. The pond is required due to a restrictive release rate for the downstream sewers on Frank Bender Street. The 0.3 ha stormwater management facility is to be left in place as-is.

A temporary stormwater management pond was previously constructed within the study area to support the commercial development at 3730 Innes Road. Per the *Trinity Development – Innes / Belcourt Stormwater Management System,* (IBI Group, 2009) the facility directs treated stormwater along an open ditch towards the existing EUC Pond 1 SWM facility.

A snow disposal facility was constructed by the City of Ottawa at 2170 Innes Road adjacent to the southern boundary of the study area. Per the MSS, this facility directs treated snow melt water from the onsite facility to the North Cell of the EUC Pond 1 via a 150 mm diameter forcemain installed within the Hydro Corridor.

The existing stormwater management infrastructure surrounding the North West quadrant can be seen in ***Drawing 2***. Brian Coburn Boulevard has been constructed complete with a piped sewer network discharging to the South Main Cell of EUC Pond 1 (first receiving treatment by an OGS), and a cut off ditch on the north side, directing flows to the North Main Cell.

The MSS outlines specific modifications required to existing EUC Pond 1 in order to support additional development in its drainage catchment, including the planned development within the Draft Plan of Subdivision. The EUC Pond 1 modifications outlined in the MSS are being completed through a review & approval process separate to this FSR.

5.2 Post-Development Stormwater Management Targets

The MSS proposes that stormwater runoff from the study area be treated for erosion, quality, and quantity control by EUC Pond 1, including proposed pond modifications.

The associated stormwater management requirements within the Draft Plan of Subdivision proper have been adopted from the MSS, current City of Ottawa *Sewer Design Guidelines*, the latest technical bulletins and the MECP *SWMP Manual*. The following City standards will be required for stormwater management within the subject property:

- Storm sewers on local roads are to be designed to provide a 2-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- Storm sewers on collector roads are to be designed to provide a 5-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- Storm sewers on arterial roads are to be designed to provide a 10-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- For less frequent storms (i.e. larger than 1:2 or 1:5 year), the minor system sewer capture will be restricted with the use of inlet control devices to prevent excessive hydraulic surcharges.
- Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 6.0 m/s.
- For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets shall not exceed 0.35 m at the gutter.
- The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within the public ROW or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope, must remain below all building openings during the stress test event (100-year + 20%), and must maintain 15 cm vertical clearance between spill elevation on the street and the ground elevation at the nearest building envelope.
- When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas. A minimum of 30 cm of vertical clearance is required between the rear yard spill elevation and the ground elevation at the adjacent building envelope.
- The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

The list of standards above is not exhaustive, and additional requirements are expected to apply in accordance with typical residential subdivision design in the City of Ottawa.

5.3 Proposed Minor System

The study area is expected to be serviced by an internal gravity storm sewer system that is to follow the local road network. The stormwater runoff will be conveyed within the underground piped sewer system towards the EUC Pond 1 SWM facility. The trunk storm network consists of sewers ranging in diameter from 450 mm to 2700 mm and can be seen in ***Drawing 2***. As detailed designs progress, alignment and sizing of local storm sewers will be confirmed and servicing easements may be required, which may trigger minor amendments to the proposed lot fabric in the concept plan.

Table 7 summarizes the standards that will be employed in the future detailed design of the storm sewer network, meeting the requirements in ***Section 5.2.***

Table 7: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding 1:5 year (PIEDTB-2016-01) for collector roads, without ponding 1:10 year (PIEDTB-2016-01) for arterial roads, without ponding
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A=732.951 | B=6.199 | C=0.810 5-year storm event: A = 998.071 | B = 6.053 | C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n' for pipe flow	0.013
Minimum Depth of Cover	2.0m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s (where velocities in excess of 3.0 m/s are proposed, provision shall be made to protect against displacement of sewers by sudden movement)
Clearance from 100-Year Hydraulic Grade Line to Building Opening	0.30 m
Max. Allowable Flow Depth on Municipal Roads	35 cm above gutter (PIEDTB-2016-01)
Extent of Major System	To be contained within the municipal right-of-way or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100-year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016-01)
Stormwater Management Model	DDSWMM (release 2.1), SWMHYMO (v. 5.02) and XPSWMM (v. 10)
Model Parameters	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm
Imperviousness	Based on runoff coefficient (C) where

	Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Design Storms	Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes.
Historical Events	July 1st, 1979, August 4th, 1988 and August 8th, 1996
Climate Change Street Test	20% increase in the 100-year, 3-hour Chicago storm
Extracted from City of Ottawa Sewer Design Guidelines, October 2012 and subsequent Technical Bulletins, and based on recent residential subdivisions in the City of Ottawa.	

Street catchbasins will collect drainage from the streets and front yards, while rear yard catchbasins will capture drainage from backyards. Perforated catch basin leads will be provided in rear yards, except the last segment where it connects to the right-of-way which will be solid pipe, per current *Sewer Design Guidelines*. The design for the minor system captures drainage for storm events up to and including the 2-year (local streets) and 5-year (collector streets) events assuming the use of inlet control devices (ICDs) for all street catchbasins.

Rational Method storm sewer design sheets are provided in ***Appendix E***, based on average predicted runoff coefficients for various land uses and applying assumptions consistent with the MSS. As detailed designs progress, the imperviousness and runoff coefficient values will be refined to reflect the proposed detailed building envelopes, driveways, etc. At this stage, the development area and expected imperviousness for the Draft Plan of Subdivision are comparable to the assumptions in the MSS.

Consistent with the MSS, 100-year flows from the Innes Park Woods to the north of the study area and 10-year capture from a portion of Mer Bleue Road have been considered within the proposed storm sewer design. The capture within the Innes Park Woods involves construction of a cutoff swale that serves to mimic existing drainage conditions, per the recommendations of the *Environmental Impact Statement* (GHD, 2020).

The existing temporary stormwater management pond within the study area is to be decommissioned and the proposed storm sewer network is to capture the flows from the commercial block to the north. Consistent with the MSS, the flows from this commercial block have been considered to be controlled to 85 L/s/ha.

The only deviation from the MSS stormwater servicing strategy are the minor land use and road alignment changes associated with the proposed concept plan.

As shown in ***Drawing 2***, the proposed sewer network is to direct flows to two separate northern forebays of the Pond 1 SWM facility, as considered in the latest design of the facility in the *EUC Pond 1 North Main Cell and North Forebay Modifications* (DSEL, August 31, 2020). The majority of the study area is to be serviced by storm sewer Trunks 1 and 2, which are to inlet into the southernmost forebay. As shown in ***Appendix E***, the peak rational method design flow (2 to 100-year flow, depending on land use) to Pond 1 is 9931 L/s. The remaining portion of the study area and the Glenview lands are to be serviced by storm sewer Trunk 3, directed to the northeastern forebay with a peak rational method design flow (2 to 5-year flow, depending on land use) to Pond 1 of 2456 L/s.

A comparison to the peak flows considered in the MSS is provided in ***Table 8***. As shown, the proposed design anticipates a 16% decrease in the peak rational method flow within storm sewer Trunks 1 and 2. A 9% increase is expected in the peak rational method flow within storm sewer Trunk 3, which is largely attributed to the Trunk 3 minor change in alignment based on the minor land use and road alignment changes associated with the proposed concept plan. Trunk 3 demonstrates 38% residual capacity despite the minor increase in peak rational method flow, therefore the minor modification from the MSS is not expected to have an adverse impact on the operation or characteristics of the storm sewer network or the downstream EUC Pond 1. Because the development area and expected imperviousness for the Draft Plan of Subdivision are comparable to the assumptions in the MSS, the MSS is considered to have adequately addressed stormwater servicing of the study area. Therefore, no additional design information is required in support of the Draft Plan of Subdivision.

Table 8: Peak Rational Method Storm Flow Contribution to EUC Pond 1

	Trails Edge North FSR (DSEL, April 2021)	**MSS (DSEL, Dec 2020)**
Rational Method Peak Flow from Trunk 1/2	9,931 L/s	11,844 L/s
Rational Method Peak Flow from Trunk 3	2,456 L/s	2,260 L/s

The stormwater flows from the study area were considered in the design and sizing of the proposed EUC Pond 1 modifications, as described in the MSS and in the subsequent *EUC Pond 1 North Main Cell and North Forebay Modifications* (DSEL, August 31, 2020). As such, capacity in the EUC Pond 1 SWM facility for the anticipated flows has been demonstrated and will be further confirmed at the time of detailed design. As previously noted, it is understood that the modifications to the EUC Pond 1 SWM facility are to be undertaken at the time of development of the Draft Plan of Subdivision or any other development within the catchment that is to occur beforehand. It is understood that there will be agreements in place facilitating cost sharing and site access where necessary.

Please note that Richcraft Homes may seek City approval at detailed design for any opportunities to minimize the amount of infrastructure to be constructed to support the proposed development (e.g. Richcraft may propose minor infrastructure sizing changes and minor alignment changes at detailed design, ensuring the changes have no adverse environmental impacts and no adverse capacity implications on affected landowners).

5.4 Hydraulic Grade Line

A detailed hydraulic gradeline (HGL) analysis will be completed for the proposed system at the detailed design level, based on the 100-year 3-hour Chicago, 12-hour SCS, and 24-hour SCS design storms. Other design storms and/or historical events may be

considered at detailed design, as required. Detailed grading design and storm sewer design will be modified as required to achieve the freeboard requirements set out in *the Sewer Design Guidelines and* PIEDTB-2016-0. A preliminary HGL analysis was conducted as part of the MSS and no issues were found.

5.5 Major System

Major system conveyance, or overland flow (OLF), will be provided to accommodate flows in excess of the minor system capacity. OLF is accommodated by generally routing any surface flow exceeding surface ponding along the road network, service easements and the Hydro Corridor towards the EUC Pond 1 SWM facility, as shown in ***Drawing 1***.

Consistent with the MSS, the proposed major system design is to have employment, commercial, park, medium density residential, and medium-high density residential blocks within the study area provide onsite storage up to the 100-year storm event.

If the detailed design results in total (e.g. static + dynamic) depths greater than 35 cm or violations of the flow spread parameters in ***Section 5.2***, excess flows may be redirected to a different overland flow route, attenuated in surface storage, or captured within the minor system in order to reduce flow depths/spread, if necessary.

Therefore, the proposed drainage systems are expected to safely capture and convey all storms up to and including the 100-year event in accordance with the requirements of the MSS and *Sewer Design Guidelines.*

5.6 Grading and Foundation Drainage

A site grading plan has been developed to optimize earthworks, provide sewer cover, provide major system conveyance, and tie into existing roads adjacent to the site. The proposed grading plan is illustrated in ***Drawing 1***. The preliminary grading plan illustrates that there is an anticipated area of fill at the southern and eastern ends of the study area, with cut areas at the northwestern end.

Consistent with the MSS, in certain areas the proposed road grades are to be higher than the maximum permissible grade raises in the study area per the *Geotechnical – Existing Conditions Report East Urban Community Mixed Use CDP* (Paterson Group, July 7, 2019). The grading plan has been designed as low as possible to best respect the grade raise restrictions, and was determined by providing minimum cover to the infrastructure (assuming full basements for all land uses), facilitating major system flow to the EUC Pond 1, and respecting existing road grades in the surrounding developments.

Since the proposed grading plan indicates portions of the study area are to be above proposed grade raise restrictions, a surcharge program and potentially a lot-level lightweight fill program may be required to the satisfaction of a licensed Geotechnical Engineer in Ontario. As the design process advances for the Draft Plan of Subdivision, grading plans, grade raise restrictions, surcharge programs and fill specifications will be

required from a Geotechnical Engineer. Please note that Richcraft Homes may also look to modify the infrastructure design and associated earthworks program according to future more refined information related to the land uses (e.g. architectural relationships, presence of basements, etc.).

The following additional grading criteria and guidelines will be applied to detailed design, per City of Ottawa *Sewer Design Guidelines*:

- Driveway slopes will have a maximum slope of 6%;
- Slope in grassed areas will be between 2% and 5%;
- Grades in excess of 7% will require terracing to a maximum of a 3:1 slope;
- Swales are to be 0.15m deep with 3:1 side slopes unless otherwise indicated on the drawings; and,
- Perforated pipe will be required for drainage swales if they are less than 1.5% in slope (preferred to promote infiltration) and will be used to interconnect rear yard catchbasins where possible.

5.7 Infiltration

Per the MSS and the *Existing Conditions Water Budget* (Palmer, December 2014), pre-development infiltration rates are to be preserved for the limited exposed bedrock areas within the EUC Phase 3 CDP area. As discussed in the MSS, the protection of the Innes Park Woods to the north of the study area and the associated buffer will ensure that the infiltration rates in this area will remain unchanged.

The *Mud Creek Cumulative Impact Study* (Stantec, May 2020) found that the implementation of LIDs would have little impact on the erosion protection requirements for Mud Creek, and as such has recommended that the requirement for LIDs in the EUC MUC CDP study area west of Mer Bleue include:

- A tree planting program in parkland, which is addressed in the CDP (Fotenn, 2020);
- Using infiltration trenches in backyards of singles and townhomes where feasible, which is addressed in the proposed development; and,
- Setting right-of-way widths for the majority of local roadways at 18 m (not 16.5 m) to ensure healthy street trees that will be effective in providing evapotranspiration in post-development conditions, which is addressed in the proposed development.

As noted in ***Section 5.3***, as part of the development residential uses, shallow rear yard swales with perforated pipes in rear yards are to be provided, in accordance with City *Sewer Design Guidelines*.

5.8 Stormwater Servicing Conclusions

Consistent with the MSS, the study area is to be serviced by directing post development runoff to the EUC Pond 1 SWM facility, which is to be modified to support development in the catchment area. Capacity in the EUC Pond 1 SWM facility is demonstrated in the MSS and will be confirmed at the time of detailed design.

Major system conveyance will generally be accounted for by routing surface flow along the road network, service easements, and the Hydro Corridor towards the EUC Pond 1 SWM facility. Consistent with the MSS, the proposed major system design is to have employment, commercial, park, medium density residential, and medium-high density residential blocks within the study area provide onsite storage up to the 100-year storm event. The proposed minor and major storm conveyance systems will be designed in accordance with City of Ottawa, RVCA, and MECP requirements as set out in background studies and current standards.

A preliminary site grading plan has been developed to optimize earthworks, tie into the surrounding transportation network and provide major system conveyance. The site is subject to permissible grade raises and at the time of detailed design, the grading plans will be subject to review by a Geotechnical Engineer.

Consistent with the MSS, using infiltration trenches in backyards of singles and townhomes where feasible will be considered to appropriately promote infiltration of stormwater.

In general, the proposed Draft Plan of Subdivision has a comparable development pattern and impervious to the MSS, and therefore it follows that the trunk storm sewer network and EUC Pond 1 modifications described in the MSS will adequately service the study area.

6.0 UTILITIES

Utility services extending to the site may require connections to multiple existing infrastructure points. Consultation with Enbridge gas, Hydro Ottawa, Rogers, and Bell is required as part of the development process to confirm the servicing plan for the subject lands. It is understood through preliminary discussions that there is existing infrastructure surrounding the study area on Innes Road, Mer Bleue Road and Pagé Road. The servicing strategy is to be confirmed as the design process advances.

7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate, and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

The following specific recommendations to the Contractor will be included in contract documents.

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from leaving the site and entering existing watercourses, and clean and maintain throughout construction.
- Install catchbasin inserts during construction to protect from silt entering the storm sewer system.
- Install mud mats in order to prevent mud tracking onto adjacent roads.
- No refueling or cleaning of equipment near existing watercourses.
- No material stockpiles within 30m of existing watercourses, unless otherwise permitted by RVCA and City of Ottawa.
- Provide sediment traps and basins during dewatering.
- Plan construction at proper time to avoid flooding.

The Contractor will, at every rainfall, complete inspections and guarantee proper performance.

Erosion and sediment control will remain in place until the working areas have been stabilized and re-vegetated.

8.0 CONCLUSION AND RECOMMENDATIONS

The overall municipal servicing strategy for the subject property was contemplated as part of the *Master Servicing Study for East Urban Community Phase 3 Area Community Design Plan* (MSS) (DSEL, Dec 2020).

This *Functional Servicing Report* (FSR) (DSEL, April 2021) provides details on the planned on-site and off-site municipal services for the subject property, highlights proposed deviations from the MSS, and demonstrates that adequate municipal infrastructure capacity is expected to be available for the planned development of the subject property.

- Water service is to be provided to the study area via extensions of the existing 2E pressure zone watermains, including through neighbouring properties, per the MSS.
- Sanitary service is to be provided to the study area via extensions of the existing sanitary sewer network through neighbouring properties, directing wastewater to the west, to the existing Forrest Valley Trunk sanitary sewer within Pagé Road. Downstream capacity has been confirmed within the MSS.
- Consistent with the MSS, the study area is to be serviced by directing post development runoff to the EUC Pond 1 SWM facility. Capacity in the EUC Pond 1 SWM facility is demonstrated in the MSS, and will be confirmed at the time of detailed design.
- Major system conveyance will generally be accounted for by routing surface flow along the road network, service easements and the Hydro Corridor towards the EUC Pond 1 SWM facility. Consistent with the MSS, the proposed major system design is to have employment, commercial, park, medium density residential, and medium-high density residential blocks within the study area provide onsite storage up to the 100-year storm event.
- The site will be graded in accordance with City of Ottawa design guidelines and standards. Consistent with the MSS, in certain areas the proposed road grades are to be higher than the maximum permissible grade raises of 0.5-1.5 m and 2 m per the *Geotechnical – Existing Conditions Report East Urban Community Mixed Use CDP* (Paterson Group, July 7, 2019). The detailed grading design will be reviewed and certified by a Geotechnical Engineer prior to construction.
- Consistent with the MSS, select Low Impact Development techniques detailed in ***Section 5.7*** will be implemented to promote infiltration of stormwater.

The proposed servicing and grading plans are expected to meet all City, RVCA, and MECP requirements as set out in background studies and current standards.

Prior to detailed design of the infrastructure presented in this report, this FSR will require approval under the *Planning Act* as supporting information for the Draft Plan of Subdivision application. Project-specific approvals are also expected to be required for the infrastructure presented in this report from the City of Ottawa, Ministry of Environment,

Conservation and Parks, and Rideau Valley Conservation Authority, among other agencies.

Prepared By:
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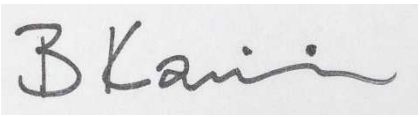

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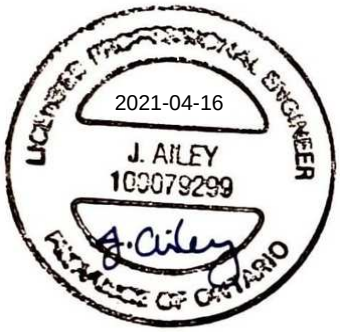

Per: Jennifer Ailey, P.Eng.

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