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FUNCTIONAL SERVICING REPORT

FOR

2325483 ONTARIO INC.
195 HUNTMAR DRIVE

CITY OF OTTAWA

PROJECT NO.: 12-624

MAY 2019 – REV 3

FUNCTIONAL SERVICING REPORT
FOR
195 HUNTMAR DRIVE

2325483 ONTARIO INC.

TABLE OF CONTENTS

IN-TEXT FIGURES

DESIGN FIGURES & DRAWINGS

TABLES

APPENDICES

Appendix A

1. Pre-Consultation Notes (City of Ottawa, March 2016)
2. MVCA Pre-Consultation Comment Letter (MVCA, April 2016)
3. Pond 7 Release Rate Correspondence (City of Ottawa, June 2016)
4. MVCA Comment Letter (MVCA, November 2016)
5. MTO Correspondence:
    a. MTO Agreement in Principle for Stormwater Management Concept (MTO, May 2017)
    b. DSEL Description of Stormwater Management Concept to MTO (DSEL, April 2017)
6. Open House Boards (DSEL, January 2018)
7. Draft Plan of Subdivision (Stantec, January 2019)
8. Servicing Guidelines Checklist (DSEL, May 2018)
9. Response to City Comments Complete with Attachments & Feedback from City (DSEL, January 2019)
10. MTO Comment Letter (MTO, April 2019)
11. Response to MTO Comments Complete with Attachments (DSEL, May 2019)
12. City & MVCA Comment Letters:
    a. Plan of Subdivision and Rezoning Application Comments (City of Ottawa, March 2019)
    b. MVCA Engineering Comments (MVCA, March 2019)
    c. Functional Servicing Report Comments (City of Ottawa, March 2019)
13. Response to City & MVCA Comments Complete with Attachments (DSEL, May 2019)

Appendix B

1. Excerpts from Kanata West Master Servicing Study (Stantec, CCL, IBI, June 2006)
2. Excerpts from Autopark Engineering Drawings (JL Richards, May 2003)
3. IBI Concept for KWMSS Sanitary Sewer Realignments (IBI Group, December 2015)
4. As-Built Sewershed Mapping (City of Ottawa, 2019)
5. As-Built Watermain Mapping (City of Ottawa, 2018)
6. Excerpt from Pond 4 Design Drawings (DSEL, December 2014)

Appendix C

1. Hydraulic Capacity and Modeling Analysis, 195 Huntmar Drive Subdivision Development (GeoAdvice, February 2019)

Appendix D

1. Sanitary Sewer Design Sheet (DSEL, April 2019)
2. KWMSS Sanitary Sewer Design Sheet (Stantec, CCL, IBI, April 2005) & DSEL Recreation of KWMSS Sanitary Sewer Design Sheet (DSEL, February 2019)
3. Maple Grove Sanitary Sewer Capacity Analysis (10/MH91-SAMH3) (DSEL, May 2019)

4. Reconstruction of Maple Grove Road Sanitary Sewer As-Builts (DSEL, Sept 2013) & Issued for Construction Drawings for Kanata West Pump Station and Forcemain, Maple Grove Road (Stantec, November 2015)
5. Sanitary Drainage Plan – Reconstruction of Maple Grove Road (DSEL, Jan 2013)
6. Area 27 - Sanitary Drainage Plans & Design Sheets – Fairwinds North (DSEL, various dates)
7. Area 22 – Sanitary Drainage Plans & Design Sheets - Fairwinds West (DSEL, Oct 2014)
8. Area 22 – Sanitary Drainage Plan - Pool Creek Village (IBI, Sept 2014)
9. Area 24 – Excerpts from Site Servicing Brief – Hazeldean Road and Huntmar Drive Commercial Site (IBI, March 2016)
10. Area 23 - Excerpts from Development Servicing Study – The Keg Kanata (Novatech Sept 2016)
11. Kanata West North South Sanitary Interceptor (IBI, Dec 2015)
12. Mion Lands Concept Plan (Novatech, June 2016)
13. KWPS ECA (MOECC, September 2015)

Appendix E

1. Storm Sewer Design Sheet (DSEL, April 2019)
2. Pre Development Flow Calculations (DSEL, February 2018)
3. Pond 4 ECA (MOE, October 2014)
4. Preliminary Kanata West Pond 7 Sizing (JFSA, February 6 2019)
5. 195 Huntmar Drive / Flood Analysis of Feedmill Creek Crossings (JFSA, May 3 2019)
6. Excerpts from Amendment to: Kanata West Business Park Stormwater Management Report and Pond 6 East Design Brief (Taggart, November 2015)
7. Preliminary Pond 7 Design:
    a. Stage-Storage-Outflow Curve Pond 7 (JFSA, April 2019)
    b. 100-year HGL Results (JFSA, April 2019)
8. Preliminary Pond 4 Ultimate Design:
    a. Stage-Storage-Outflow Curve Pond 4 (JFSA, April 2019)
    b. 100-year HGL Results (JFSA, April 2019)

Appendix F

1. Excerpt from Mississippi-Rideau Source Water Protection Plan, Schedule M (MVCA & RVCA, August 2014)

Appendix G

1. Kanata West Development Area Meander Belt Width Assessment and Erosion Analysis (GEOMorphix, July 2016)
2. Slope Stability Assessment - Feedmill Creek, Proposed Development - Kanata West, Palladium Drive at Huntmar Drive – Ottawa (Paterson Group, October 2016)
3. 195 Huntmar Feedmill Creek Cross Sections & Setbacks (DSEL, April 2017)
4. Topographic Survey of Normal High Water Mark (Stantec, April 2017)
5. Flood Risk Map Feedmill Creek (MVCA, January 2017)

Appendix H

1. Bedrock Contour Plan (Paterson Group, February 2019)
2. Inferred Bedrock Contours Along Servicing Alignment (Paterson Group, March 2019)
3. Geotechnical Review – Feedmill Creek Flood Levels (Paterson Group, February 2019)
4. Geotechnical Review – Feedmill Creek Flood Berm (Paterson Group, February 2019)

Appendix I

1. Feedmill Creek SWM Criteria Study – Pond 7 Increased Drainage Area – Erosion and In-Stream Work Analysis (Coldwater Consulting, March 2019)

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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained to prepare a Functional Servicing Report in support of Official Plan Amendment, Zoning By-law Amendment, and Plan of Subdivision applications for 195 Huntmar Drive. This FSR has been prepared in accordance with City of Ottawa's *Servicing Study Guidelines for Development Applications*, as demonstrated by the checklist included in ***Appendix A***.

The subject property is located within the City of Ottawa urban boundary, in the Stittsville ward. As illustrated in ***Figure 1***, the subject property is located south of the Highway 417 interchange with Palladium Drive and west of Huntmar Drive. The subject property measures approximately 58 ha. The property is currently zoned Development Reserve (DR) Zone.

The proposed concept plan would allow for the development of commercial and employment blocks, an apartment block, back-to-back townhomes, townhomes, single detached homes, a district park, a parkette, a stormwater management pond, walkways, open space blocks, and a highschool. The proposed concept plan shows the proposed layout of these land uses on a network of local (18m right-of-way), collector (26m right-of-way), and arterial road segments (see ***Appendix A*** for Draft Plan of Subdivision). The subject lands are expected to be developed in distinct phases according to the landowner's preferred timing.

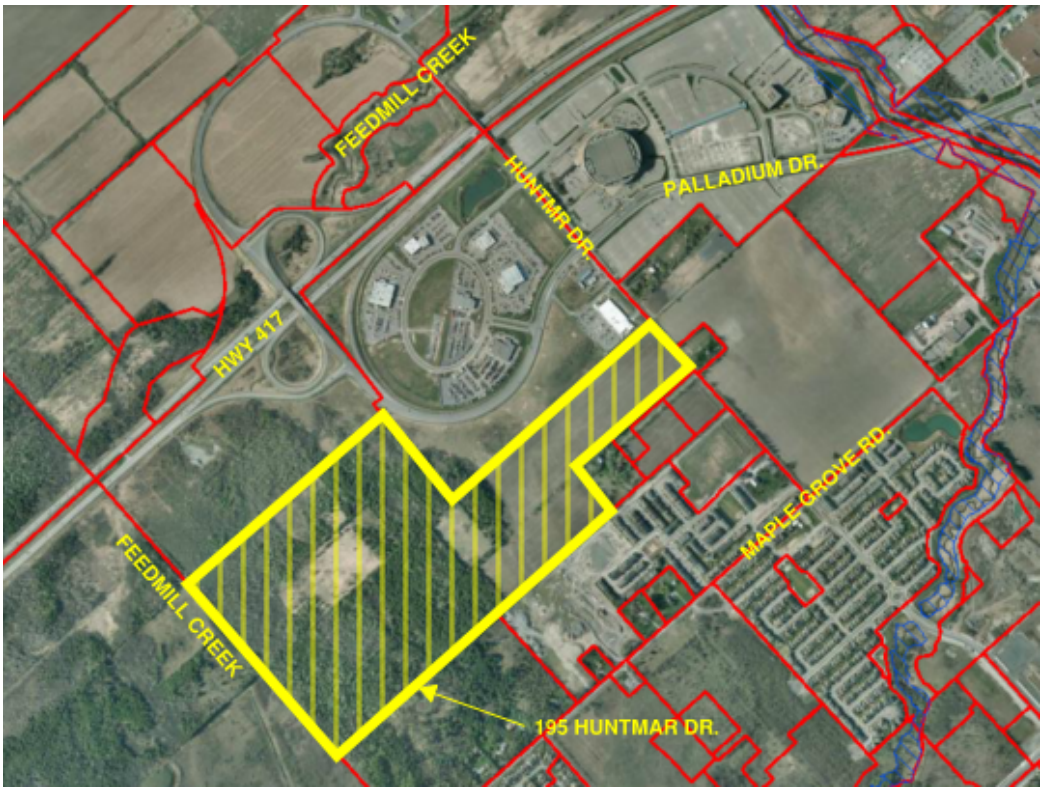

Figure 1: Site Location

The subject property is within the *Kanata West Concept Plan* (KWCP) area and is subject to the associated *Kanata West Master Servicing Study* (KWMSS) (Stantec/CLC/IBI, June 2006) and the *Implementation Plan for the Kanata West Development Area* (Delcan, October 2009) that were completed under the *Municipal Engineers Association Class Environmental Assessment Process* (June 2000). The KWMSS was completed in order to provide a conceptual servicing strategy and cohesive development approach for an overall development area of 725 ha. west of the Carp River and north of Hazeldean Road at the intersection of the former municipalities of Goulbourn, West Carleton, and Kanata. The proposed concept plan differs from the 'prestige business park' and 'extensive employment' land use contemplated in the KWCP and the KWMSS. The approximately 8.3 ha district park identified in the KWCP and KWMSS is proposed to be relocated and re-sized under the current concept plan.

The KWMSS identifies existing infrastructure and environmental constraints, describes the neighbourhood-level trunk services that will service all properties within the study area, establishes quantity and quality control targets for future site-specific stormwater management plans, and identifies required infrastructure upgrades to support the proposed development of the KWMSS area. Since completion of the KWMSS, many of the identified neighbourhood-level infrastructure projects have been completed or are underway, including stormwater management ponds, trunk sewers, and the Kanata West pumpstation. The following outstanding projects related to 195 Huntmar Drive have been

identified in the KWMSS and the *Implementation Plan for the Kanata West Development Area* for future design and construction:

- Sanitary Servicing Projects:
    - Trunk sanitary sewer from Silver Seven & along Carp River between Maple Grove Road and Palladium Drive.
- Watermain Projects:
    - Watermains in Huntmar Drive Widening from Maple Grove Road to Campeau Drive.
    - Watermains in North-South Arterial from Hazeldean Road to Campeau Drive Extension.
    - Watermains in Stittsville Main Street Extension from Maple Grove Road to Palladium Drive.
- Stormwater Management Projects:
    - Stormwater Management Pond #4 and associated storm sewers.
    - Stormwater Management Pond #7 and associated storm sewers.

The objectives of this report are to:

- Provide sufficient detail to demonstrate that development of the subject lands will be adequately supported by municipal services, as set out in the Kanata West Master Servicing Study (Stantec, CCL, IBI, June 2006) and as refined during the planning, detailed design, and buildout of the various municipal infrastructure projects within the KWMSS 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, Conservation, and Parks 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 Pre-Development Conditions

Under pre-development conditions, the east portion of the subject lands was cultivated for agricultural use and the remainder of the subject lands was a natural wooded area. The pre-development elevations range approximately between 101m – 108m based on available topographic mapping provided by the City of Ottawa.

The approximate pre-development drainage is depicted in ***Design Figure 4.*** The subject lands are within Carp River watershed, and are under the jurisdiction of the Mississippi Valley Conservation Authority (MVCA).

- The western part of the lands are believed to naturally drain to Feedmill Creek via the Northwest Swale, as identified in the *Environmental Impact Statement* (Muncaster, May 2018). The Northwest Swale outlets to a series of downstream ditches and culverts associated with the Highway 417/Palladium Drive interchange. An existing 1500mm dia. culvert brings flows under Highway 417 to Feedmill Creek, which then discharges to the Carp River.
- The remaining lands are believed to naturally drain through the East Swale – as identified in the Environmental Impact Statement (Muncaster, May 2018) – to the Huntmar Drive roadside ditch which is within the Carp River watershed per the Carp River Watershed/Subwatershed Study (Robinson Consultants, December 2004). A culvert under Huntmar Drive, just north of the site, conveys flows from the western roadside ditch to an east-west ditch that eventually drains through a culvert under Palladium Drive and flows directly into the Carp River (just north of Palladium Drive).

Paterson Group's geotechnical investigations (March 2018) for the subject lands explain that the long-term groundwater table is estimated to be between 2 to 3 m below existing ground surface. The geotechnical investigations (Paterson Group, March 2018) suggest that the east portion of the subject lands consists of a topsoil layer overlying a silty clay layer and glacial till deposit: a permissible grade raise restriction of 2m will be required in the east portion of the site. The other portions of the site consist of topsoil underlain by a silty sand to sandy silt and/or a glacial till deposit (Paterson Group, March 2018). The inferred bedrock surface is between 0.3 and 3.7 m depth from existing surface within the subdivision (Paterson Group, March 2018). See ***Appendix H*** for approximate bedrock contours, including inferred bedrock information for servicing extensions beyond the subdivision.

There is an existing Autopark northeast of the subject lands, with planned commercial development at 2499 Palladium Drive, 2500 Palladium Drive, and 675 Autopark Private.

South of the subject lands, there are existing residential developments and planned residential/mixed use developments, including:

- a development proposal at 173 Huntmar Drive, potentially including low rise apartment buildings, townhouses blocks, and commercial buildings with retail on the ground floor and office uses above, complete with surface parking and associated private streets;
- a development proposal at 1981 Maple Grove Road, potentially including single-detached dwellings, townhomes, and back-to-back townhomes.

It is understood that these planning applications are ongoing. For the purpose of this study, servicing demand associated with land uses from the KWMSS have been carried forward.

West of the subject lands, there is natural vegetated land that is currently zoned Rural Countryside Zone (RU) but is partially identified as a 69.5 ha Developing Community in the City's Official Plan. The area is also known as the Area 3 Developing Community. It is understood that development applications are underway for these lands, and as such, the detailed design of sanitary municipal services through the subject lands ought to be coordinated to ensure that sufficient municipal infrastructure capacity is provided. Coordination with the landowner has resulted in sanitary servicing demand rates for a 73.25 Ha development area and 4900 residents being carried for these lands.

1.2 Development Concept

The proposed development concept can be seen in the Draft Plan of Subdivision included in ***Appendix A.*** Street No.15, a north-south arterial road, bisects the site. Street No.1, a minor collector, is shown through the residential and commercial area. Street No. 2, a major collector, runs east-west along the southern boundary of the site. The predicted populations associated with the development concept are described in ***Table 1*** below. Please note that a site plan application is expected to be required to support the development of the condo/apartment Block 248. For the purpose of this servicing study, an allowance of 15% increased population above the predicted 143 units is provided, to provide flexibility at the site plan application stage in the development process.

Table 1: Development Statistics

Land Use	Total Area (ha)	Projected Residential Units	Residential Population per Unit	Population*
Singles	4.57	155	3.4	527
Towns	6.85	352	2.7	951
Back-to-Back Towns	0.65	64	2.7	173
Condo/Apartments	1.75	143 (+0.15%)	2.7	445
Commercial/Employment	11.99			
Highschool	7.47			
Stormwater Management (SWM) Pond	4.21			
Roads	13.44			
Parks	6.37			
Open Space/Easements	0.82			
Total	58.12 ha	714		2069

** 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 and Climate Change guidelines for servicing demand calculations.*

The proposed concept plan for the subject lands requires closure of the Northwest Swale and Eastern Swale that are characterized in the *Environmental Impact Statement*

(Muncaster Environmental Planning, May 2018), and require closure of all other on-site watercourses identified in the *Headwaters Report* (Bowfin, May 2018).

The proposed concept plan is specifically associated with:

- Closure of Part of HWF1 (Conservation Classification) – 218m proposed for closure, average channel width 2.47m, average wetted width 1.47m;
- Closure of Part of HWF4 (Conservation Classification) – 42m proposed for closure, average channel width 3.22m, average wetted width 1.80m;
- Closure of HWF5 (Conservation Classification) – 156m proposed for closure, average channel width 3.37m, average wetted width 1.80m; and,
- Redirecting full or partial flows away from Part of HWF4 and Part of HWF 6 (Conservation Classification) - 608m to be impacted by partial diversion or full diversion of flows, average channel width 2.36m, average wetted width 1.40m.

The headwater features are shown in ***Figure 2*** below, which is an excerpt from the Headwaters Report (Bowfin, May 2018).

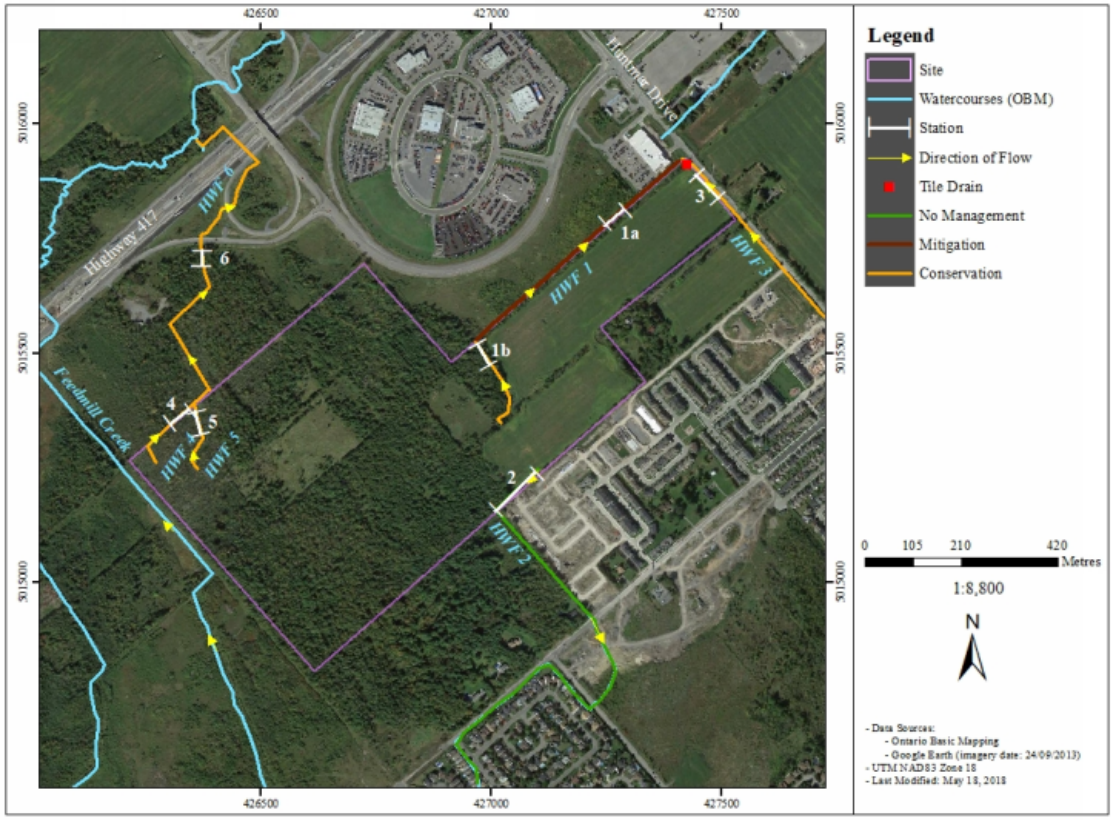

Figure 2: Headwater Feature Management Classifications (Bowfin, May 2018)

Written authorization from MVCA pursuant to Ontario Regulation 153/06, MVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulation is required to fill the features (***Section 1.4***), and is being addressed through the *Headwater Assessment* study (Bowfin, May 2018).

The creation of amphibian habitat within the Feedmill Creek Corridor is proposed to mitigate the impacts of the closures of the features that have a Conservation classification. Multiple depressions 0.5m deep are proposed to be added to the detailed landscape plans for the Feedmill Creek Corridor within Blocks 263 and 266 in the Draft Plan of Subdivision (***Appendix A***). These features are to be designed alongside the revegetation plans for the Feedmill Creek Corridor, which are required per the *Carp River Watershed Subwatershed Study* to add native riparian vegetation for 75% of the adjacent stream length (where it does not already exist). These features are to be fed exclusively by rainwater or infrequent flooding events, by way of locating the features in Blocks 263 and 266. Blocks 263 and 266 are at least 11.75m away from the surveyed Normal High Water Mark (***Appendix G***).

In total, multiple features are propose to be created, with details to be determined as part of the MVCA permitting process. The overall area of habitat creation by the features is proposed to be 825 sq.m. The proposed concept is provided in ***Appendix A,*** and has been accepted by MVCA.

Please note that the proponent is also planning to undertake in-stream and bank rehabilitation measures within Feedmill Creek, including where HWF6 outlets to Feedmill Creek, per the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA, April 2018) and the *Feedmill Creek SWM Criteria Study, Pond 7 Increased Drainage Area – Erosion and In-Stream Works Analysis* (Coldwater, March 2019) (***Section 5.0***). An excerpt of the proposed in-stream works from the *City of Ottawa's Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018) is provided in ***Design Figure 3.*** Written authorization from MVCA pursuant to Ontario Regulation 153/06, MVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulation is required to complete this work.

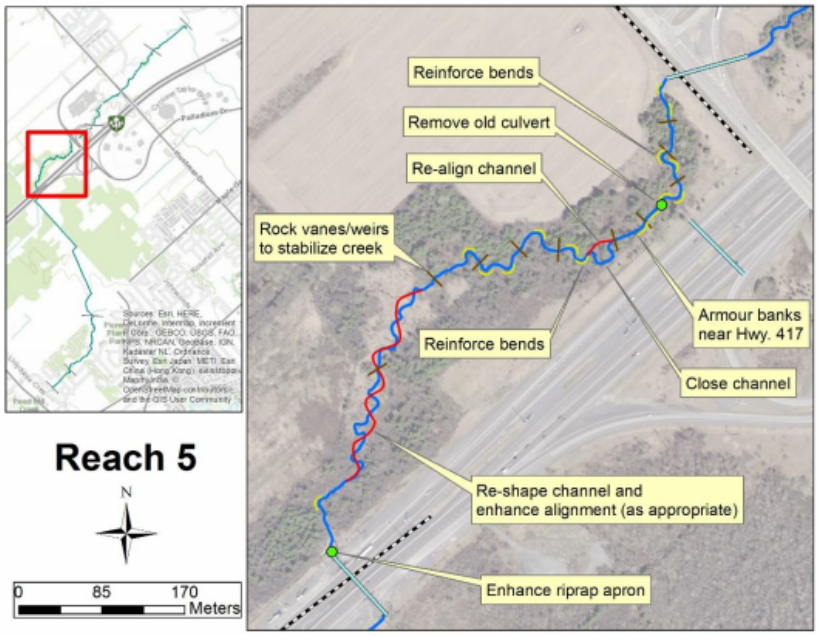

Figure 3: Proposed In-Stream Works Near Headwater Feature 6 Outlet to Feedmill Creek (Coldwater, April 2018)

1.3 Limit of Development

As part of the development application for the subject lands, the limit of the Feedmill Creek corridor was defined, using the greatest setback from the watercourse based on the following parameters:

- 1:100 year floodplain [Sources: Feedmill Creek Floodplain Mapping (MVCA, January 2017) & Feedmill Creek Floodplain Mapping Study (MVCA, January 2017) (***Appendix G***)];
- Geotechnical limit of hazard lands [Sources: Site-specific Slope Stability Assessment - Feedmill Creek (Paterson Group, October 2016)(***Appendix G***)];
- Meanderbelt allowance [Source: Site-specific Meander Belt Width Assessment and Erosion Analysis (Geomorphix, July 2016) (***Appendix G***)];
- Aquatic buffer - 30 meter setback from Normal High Water Mark [Sources: Site-specific Environmental Impact Statement (Muncaster Environmental Planning, May 2018) and Topographic Survey (Stantec, April 2017) (***Appendix G***)];
- Aquatic Buffer - 15 meter setback from top of valley slope [Sources: Slope Stability Assessment - Feedmill Creek (Paterson Group, October 2016) (***Appendix G***), Environmental Impact Statement (Muncaster Environmental Planning, May 2018) and Topographic Survey (Stantec, April 2017) (***Appendix G***)];

- Tree retention area - 30 meter setback from Normal High Water Mark taken as extents of tree retention area, per Environmental Impact Statement (Muncaster Environmental Planning, May 2018) [Sources: Site-specific Environmental Impact Statement (Muncaster Environmental Planning, May 2018) and Topographic Survey (Stantec, April 2017) (***Appendix G***)]; and,

- 5 meter development / environmental protection setback from top of defined bank – geotechnical limit of hazard lands taken as proxy, since it includes stable slope allowance, toe erosion allowance, and 6m erosion access allowance [Sources: Carp River, Poole Creek and Feedmill Creek Corridor Width Limits Rationale (City of Ottawa, 2009) and site-specific Slope Stability Assessment - Feedmill Creek (Paterson Group, October 2016) (***Appendix G***)].

Appendix G provides a drawing that compiles the constraint lines identified in the above-noted sources. The 30m setback from Normal High Water Mark is proposed to act as a proxy for the development setback limit, until such time as the extents of the 1:100 year floodplain is determined via topographic survey once the 195 Huntmar development site has been raised in conformance with the *Feedmill Creek Floodplain Mapping Study* (MVCA, January 2017). Additional clarification on select parameters is included in ***Section 1.3.1***, ***Section 1.3.2***, and ***Section 1.3.3*** below.

1.3.1 1:100 Year Floodplain

The 1:100 year floodplain is approximated in the drawing in ***Appendix G*** that compiles the constraint lines, to include all lands within the subject property and within the property to the north that are below an elevation of 107.3 m.

However, it is understood that:

- the 1:100 year floodplain elevation adjacent to the 195 Huntmar development is 107.2m to 107.1m, as identified in the *Feedmill Creek Floodplain Mapping* (MVCA, January 2017) (***Appendix G***);

- a 15m setback from the spill hazard line identified in the *Feedmill Creek Floodplain Mapping* (MVCA, January 2017) (***Appendix G***) will act as the MVCA regulation line in this area; and,

- the spill hazard line identified in the Feedmill Creek Floodplain Mapping (MVCA, January 2017) (***Appendix G***) was contemplated to be eliminated by filling the 195 Huntmar development site above the 1:100 year floodplain elevation by means of 3:1 sloping starting from 31.5m from the centre of the low-flow channel of Feedmill Creek, in order to allow for urban development to proceed in general accordance with the KWCP, KWMSS, Official Plan, etc. MVCA has confirmed that a vertical wall starting from 31.5m from the centre of the low-flow channel of Feedmill Creek would not impact the 1:100 year floodplain elevations reported in the Feedmill Creek Floodplain Mapping (MVCA, January 2017) (***Appendix G***).

It is expected that additional topographic survey would be completed at the time of filling the 195 Huntmar development site in order to determine the final extents of the regulatory 1:100 year floodplain.

At this time, given that the Normal High Water Mark is located at the top of bank along parts floodplain (see *Stantec Topographic Mapping* in ***Appendix G***), and is considered to range from approximately 2m to 3.5m from the bottom of bank, a setback of 30m from Normal High Water Mark has been considered to act as proxy for the development setback limit until such time as the extent of the 1:100 year floodplain is determined via topographic survey once the 195 Huntmar development site has been raised in conformance with the *Feedmill Creek Floodplain Mapping Study* (MVCA, January 2017). A 30m setback from the Normal High Water Mark is shown in the Draft Plan of Subdivision (***Appendix A***).

1.3.2 Geotechnical Limit of Hazard Lands

Per the *Slope Stability Assessment - Feedmill Creek* (Paterson Group, October 2016): "the geotechnical setback limit (limit of hazard lands) includes the geotechnical stable slope allowance, a toe erosion allowance (where applicable), as well as a 6 m toe erosion access allowance". Signs of erosion were noted along the existing watercourse, especially where the watercourse has meandered in close proximity to the toe of the corridor wall. A toe erosion allowance of 2m is recommended for the corridor walls confining the existing watercourse.

1.3.3 Meanderbelt Allowance

Per the *Kanata West Development Area Meander Belt Width Assessment and Erosion Analysis* report by Geomorphix (***Appendix G***), the existing channel can naturally migrate within its valley setting. Given this, a meanderbelt width for the reach of Feedmill Creek directly adjacent to the 195 Huntmar development site (Reach 5) is recommended to be 27 m based on existing conditions, and 30 m in the event that the channel is realigned. Given that no re-alignment work is known to be proposed for this portion of Feedmill Creek, a 27m meanderbelt width is shown in the drawing in ***Appendix G*** that compiles the constraint lines.

1.4 Required Permits / Approvals

The City of Ottawa & MVCA 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 Plan of Subdivision application process, and potentially through block-specific Site Plan Control approval processes.

The municipal infrastructure proposed includes minor deviations from the KWMSS and may form part of a future KWMSS addendum, potentially in concert with other changes currently being proposed by other landowners in the community.

Based on pre-consultation with City & MVCA staff, the following additional approvals and permits are expected to be required prior to construction of the municipal infrastructure detailed herein.

Table 2: Required Permits/Approvals

Agency	Potential Permit/Approval Required	Potential Trigger	Remarks
MNRF	Butternut removal permit.	Vegetation requiring removal due to development/grading.	MNRF permitting required per Environmental Impact Statement (Muncaster Environmental Planning, May 2018).
MVCA	Permit under Ontario Regulation 153/06, MVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Ditches requiring closure due to development/grading, potential changes to existing downstream culverts/ditches outletting to Feedmill Creek, and proposed work in Feedmill Creek corridor.	Proposed land uses & municipal infrastructure require grading within the subject lands and result in the closure of existing ditches. Modifications to downstream drainage features is also required.
MVCA	Permit under Ontario Regulation 153/06, MVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Grading within the regulatory limit (15m from spill hazard line) & new definition of regulatory floodplain.	Existing grades in the subject lands are below the 100-year floodplain elevation as reported by Mississippi Valley Conservation Authority (MVCA), based on their Feedmill Creek watershed study, and need to be raised to eliminate the spill hazard.
MECP	Environmental Compliance Approval	Construction of new stormwater management pond (Pond 7), amendment to existing stormwater management pond (Pond 4), construction of sanitary & storm sewers.	The MECP is expected to review all stormwater collection system, stormwater management, and wastewater collection system by transfer of review or direct submission – pre-consultation with MECP will be required to confirm processes.
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	Tree Cut Permit per City of Ottawa Urban Tree Conservation By-law No. 2009-200.	Trees requiring removal due to development/grading.	The subject property contains trees, and re-grading the site to accommodate the proposed development (including municipal services and drainage) may impact or require removal of existing trees. See Tree Conservation Report

			(Muncaster Environmental Planning, May 2018).
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.
DFO	Request for Review Application	Ditch requiring closure due to development/grading, and potential changes to existing downstream culverts/ditches outletting to Feedmill Creek.	DFO Request for Review may be required for removal/modifications of existing drainage features – see Environmental Impact Statement (Muncaster Environmental Planning, May 2018) for additional details.
MTO	Land agreements & development permits	Stormwater management facility to be constructed on Provincial Lands.	Note that because the proposed development is within 395m of Highway 417 Interchange, additional development permits may be required – permit requirements to be determined through consultation.

1.5 Consultation Summary

Pre-application consultation was conducted with interested parties at the City of Ottawa on March 30, 2016. The municipal servicing approach was discussed, including proposed deviations from the KWMSS. Pre-consultation correspondence is provided in ***Appendix A***.

Subsequent to the pre-consultation meeting, the City of Ottawa provided a suggested 100-year release rate of 8 L/s/ha for the proposed Pond 7 stormwater pond that discharges to Feedmill Creek. A copy of the information is provided in ***Appendix A.***

The first submission of this FSR was completed in June 2016, and a subsequent clarification report was submitted in September 2016 entitled *Summary of Design Refinements to Projects Identified in Kanata West Master Servicing Study, 195 Huntmar Drive*.

MVCA provided comments on the development application, including requirements for setting the limit of development/municipal infrastructure and for stormwater management criteria. Correspondence is provided in ***Appendix A***.

MTO provided comments on the development application, including their agreement in principle on the stormwater management program presented herein. Correspondence is provided in ***Appendix A***.

A public meeting was held on January 10, 2018 to present a revised development concept and revised servicing strategy to the public and agency stakeholders. The servicing plans that formed the open house boards are provided in ***Appendix A.***

A second submission of this FSR was completed in May 2018, accompanying a revised concept plan for the lands. City staff provided FSR comments in August 2018.

DSEL met with City and MVCA staff on Jan 9, 2019 to review the status of the development application, including a revised concept plan for the lands. The MVCA and City demonstrated agreement that 30m setback from Normal High Water Mark ought to be used to define the development limit for the site. This is shown on the Draft Plan of Subdivision (***Appendix A***). MVCA confirmed that permitting for earthworks related to the fill program for the site would be required subsequent to approval of the Draft Plan of Subdivision (***Section 1.4***). MVCA confirmed that a revegetation plan is required for the Feedmill Creek corridor as part of detailed design, in accordance with the CRSWSS. MVCA confirmed that no fencing is required along the Feedmill Creek corridor. MVCA provided additional comments on the development application, as summarized in ***Section 1.6.***

A third submission of this FSR was completed in February 2019, accompanying a revised concept plan for the lands. Responses to MVCA & City comments are documented in ***Appendix A,*** and were incorporated into the revised February 2019 version of the FSR.

City, MVCA, and MTO comments were received about the February 2019 version of the FSR. This May 2019 version of the FSR addresses these comments. Responses to agency comments are documented in ***Appendix A.*** Key changes include re-routing the storm service for the highschool, relocating a segment of the Pond 7 outlet pipe from MTO lands to subdivision lands, providing details on the ultimate expansion of Pond 4 and the associated trunk sewer (as defined in the KWMSS), and providing 100-year hydraulic gradeline results for storm trunk sewers.

1.6 Summary of Revisions

The following key elements have been incorporated into this FSR since the original submission (DSEL, June 2016) and the subsequent clarification report *Summary of Design Refinements to Projects Identified in Kanata West Master Servicing Study, 195 Huntmar Drive* (DSEL, September 2016):

- All servicing strategies have been updated to address the latest proposed development concept (***Appendix A***);
- Stormwater management Pond 7 has been shifted onto the 195 Huntmar development site and sized to accommodate inflows from only the 195 Huntmar development site;

- The Pond 7 outlet has been shifted and entombed, now following the MTO property limit to a new culvert under a segment of the Highway 417/Palladium Drive interchange;

- The Pond 7 outlet has been sized to accommodate the planned development of the 195 Huntmar development site and the development of part of the MTO lands to the north that are shown to be tributary to Pond 7 in the KWMSS;

- The sanitary sewer system has been designed with an allowance for the lands west of the 195 Huntmar development site;

- Hydraulic modelling has been completed to confirm the watermain servicing strategy;

- Development limit information has been compiled and is summarized in the FSR report;

- Development information has been compiled for part of the KWMSS area, and used to update the information used in the KWMSS design sheet for the Maple Grove Road sanitary sewer;

- Commitments for implementation of Low Impact Development measures have been added to this FSR, in order to meet the requirements set out in the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA, April 2018);

- Impacts of the proposed changes to Pond 4 and Pond 7 on Feedmill Creek have been detailed, and are summarized in this FSR report, based on detailed input from City staff;

- Paterson Group has confirmed the interaction between flood levels on Feedmill Creek and the proposed foundations nearby, to address MVCA comments (***Appendix H***);

- Background mapping for the area was updated per latest LRT information provided by City of Ottawa;

- Additional information about the proposed amphibian habitat creation in the Feedmill Creek corridor has been included in this FSR, which is meant to help mitigate the impact of closure of on-site headwater features (***Section 1.2***); and,

- Berms and retaining walls have been proposed to raise the site and stormwater pond block outside of the 1:100 year Feedmill Creek floodplain.

Additional details related to revisions triggered by City comments are provided in ***Appendix A.***

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following key studies were utilized in the preparation of this report:

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

  - **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)

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

- **Fire Underwriters Survey, 1999.**
  (FUS)

- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, 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)

- **Kanata West Master Servicing Study,**
  Stantec, CCL, IBI, June 2006.
  (KWMSS)

- **Carp River Watershed/Subwatershed Study,**
  Robinson Consultants, December 2004.
  (CRWSS)

- **Mississippi-Rideau Source Water Protection Plan,**
  MVCA & RVCA, August 2014.

- **Summary of Design Refinements to Projects Identified in Kanata West Master Servicing Study, 195 Huntmar Drive,**
  David Schaeffer Engineering Ltd, September 2016.
  (KWMSS Refinements Report)

- **Feedmill Creek Floodplain Mapping,**
  MVCA, January 2017.

- **Feedmill Creek Flood Plain Mapping Study, Sections 6.1.1- 8.0,**
  MVCA, January 2017.

- **Building Better and Smarter Suburbs: Strategic Directions and Action Plan,**
  City of Ottawa, February 2015.

- **Feedmill Creek Stormwater Management Criteria Study**
  JFSA & Coldwater Consulting, April 2018.

- **Design Brief for Pond 4, Kanata West, Mattamy Homes**
  JFSA, December 2014.

2.2 Report Integration

Table 3 summarizes the studies that are being completed in support of the development application for 195 Huntmar Drive, and their relationship to this Functional Servicing Report.

Table 3: Associated Reports for 195 Huntmar Drive and Relationship to Functional Servicing Report

Report	Author	Relationship to Functional Servicing Study
Planning Rationale	Fotenn, 2016 & Addendum 2018	Delineates the study area and explains the development context. Provides spatial information on land uses, development densities, and projected populations to be serviced.
Environmental Impact Statement	Muncaster Environmental Planning, 2018	Delineates the natural heritage system. Defines fish habitat within watercourses in the subject lands and adjacent to the subject lands, which influences stormwater management recommendations for the development. Considers impacts of on-site and off-site municipal infrastructure and details any additional studies required prior to construction. Assesses the existing ditches that are proposed to be closed due to proposed concept plan and site grading.
Geotechnical Investigations	Paterson Group, 2018	Provides grade-raise recommendations, provides bedrock contours, and other subsurface information to inform the detailed design of municipal infrastructure and grading within the subject lands.
Community Transportation Study	Parsons/CGH, July 2016 & Addenda 2018/2019	Identifies required ROW widths and alignments.
KWMSS Refinements Report	DSEL, 2016	Addresses City staff's request for additional details about the proposed project refinements, with a focus on demonstrating that neighboring properties are not negatively affected by the proposed refinements to the KWMSS.
Headwaters Report	Bowfin Environmental Consulting Inc., 2018	Examines existing headwater features within the property, and provides management recommendations (e.g. mitigation, conservation, no management, etc.).

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies adjacent to the existing City of Ottawa 3W pressure zone as shown in the excerpt from the City of Ottawa Water Distribution Mapping in ***Appendix B***. Existing watermain infrastructure is shown in ***Design Figure 1.***

An existing 600mm diameter trunk watermain extends on Huntmar Drive from north of Highway 417 to Cyclone Taylor Boulevard.

Existing 300mm diameter trunk watermains are located along Palladium Drive, within the Palladium Autopark, along Maple Grove Road and along the portion of Huntmar Drive north of the subject lands. One public 300mm diameter watermain stub is provided in close proximity to the subject lands along Palladium Drive and another private 300mm diameter watermain stub exists in the Palladium Autopark, as depicted in ***Design Figure 1.***

The 3W pressure zone network is operational within the existing residential neighbourhood (Mattamy Fairwinds) south of the subject lands, and a 200mm diameter watermain stub is available for connection at the limit of the subject lands, as depicted in ***Design Figure 1.***

3.2 Water Supply Servicing Design

Per the KWMSS, in support of full buildout of the KWMSS area:

- the existing 600mm diameter watermain on Huntmar Drive at Highway 417 was to be extended south to and along the North-South Arterial Road;
- a 400 mm watermain was to be provided on Huntmar Drive from the North-South Arterial Road to Maple Grove Road;
- 300 mm diameter watermains were to be provided along Palladium Drive and along the arterial and collector road network within and adjacent to the site; and,
- a 300 mm diameter watermain was to be provided along the future minor collector to connect to the existing watermain infrastructure at Stittsville Main Street.

The proposed ultimate alignment of the trunk watermain network is depicted in ***Design Figure 2.*** All of the watermains listed in the KWMSS are proposed in ***Design Figure 2***, except for the extension of the 600mm diameter watermain on Huntmar Drive to and along the North-South Arterial Road, which is understood to be recommended to be downsized to a 400mm watermain per correspondence with the City of Ottawa (***Appendix C***).

Potential alignments of local watermains are also depicted in ***Design Figure 2*** to illustrate that a redundant looped network is achievable to support the development of the site,

extending from existing and planned infrastructure. At this time, proposed watermains are shown in road right-of-ways. Servicing easement requirements are to be confirmed as detailed designs progress, which may trigger minor amendments to the proposed lot fabric in the concept plan.

As detailed designs progress, timing of watermains will be confirmed. Specifically, the timing of the extensions of the trunk watermains on Huntmar Drive (from Cyclone Taylor to and along the North-South Arterial Road) and on the major collector (from the site to Maple Grove Road) are expected to be determined based on phased development demands for the site and for the surrounding properties.

The subdivision's watermain network has been sized to meet maximum hour and maximum day plus fire flow demands. ***Table 4*** summarizes the Water Supply Guidelines employed in the preparation of the preliminary watermain network hydraulic modelling and design (***Appendix C***).

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 proposed land uses. For planning purposes, fire flow estimates are provided in the preliminary water demand estimate (***Appendix C*** and ***Table 5***) based on the information available in the preliminary concept plan and comparable recent developments in the City of Ottawa.

Table 4: Water Supply Design Criteria

Design Parameter	Value
Residential – Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential Average Daily Demand	280 L/d/p
Residential – Maximum Daily Demand	2.5 x Average Daily Demand
Residential – Maximum Hourly Demand	2.2 x Maximum Daily Demand
Residential – Minimum Hourly Demand	0.5 x Average Daily Demand
Commercial/Institutional Average Daily Demand	50,000 L/gross ha/day
District Park Average Daily Demand	28,000 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	275kPa
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 Table 4.2 – Consumption Rates for Subdivisions of 501 to 3,000 Persons.*
- *No Outdoor Water Demand considered for residential uses.*
- *Park water demand assumed as Commercial/Institutional Use, since potential for community facilities, etc. Apply 'other commercial' rate of 28,000 L/gross ha/day per Table 4.2 & per MECP Design Guidelines: for other Institutional and Commercial flows and tourist-commercial areas, an allowance of 28 m3/(ha·d) average flow should be used in the absence of reliable flow data.*
- *MTO Lands demand rate (9,120 L/ha/d) and fire flow demand (216.67 L/s) are consistent with the rates used in the Kanata West MSS.*

All single detached homes and townhomes have been assumed to conform to the City of Ottawa ISDTB-2014-02 for fire flow requirements, resulting in a maximum fire flow of 10,000 L/min (166.67 L/s). Back-to-back townhomes and condo units that would not conform to the described fire flow requirements in ISDTB-2014-02 are assumed to have a maximum estimated fire flow demand of approximately 17,000 L/min (283.33 L/s). This assumption is based on conceptual footprints for the back-to-back townhomes and fire flow demands used for similar developments. Note that the actual building materials selected will affect the required fire flow, and as such, fire flow requirements may decrease as detailed designs progress, based on additional input from City staff. At detailed design, the number and spacing of hydrants will be confirmed, especially in the context of the required detailed fire flows. Additional details are provided in ***Appendix C.***

Boundary conditions were provided by the City of Ottawa in the form of Hydraulic Grade Line (HGL) at the proposed connections to the site. Two sets of boundary conditions were provided. The first set of boundary conditions represents the interim City water distribution system conditions (i.e. 2016 City conditions plus expected subdivision water and fire flow demands). The second set represents the ultimate buildout conditions of the City water distribution system reflecting the 2031 water demands as well as recommended water infrastructure. Per correspondence with the City of Ottawa; "boundary conditions from the City's 2013 Infrastructure Master Plan (IMP) which includes growth for the entire pressure zone 3W under the 2031 planning scenario was provided. The IMP model also incorporates the findings from the original Kanata West MSS and updated water servicing plan undertaken by Stantec in 2013*" (**Appendix C**).* Therefore, both interim and ultimate boundary conditions are considered to incorporate all demands from future developments in lands adjacent to the subdivision. Boundary conditions were provided for peak hour, maximum day plus fire and maximum HGL (high pressure check) conditions. The boundary conditions provided are summarized below in **Table 6** and **Table 7** and their associated figures. Details of the boundary conditions can be found in **Appendix C**.

Table 5: Water Demand Estimate

Land Use	Approx Area (ha.)	Units	Pop.	Res. Water Demand (L/s)	Com. Water Demand (L/s)	Inst. Water Demand (L/s)	Total Average Water Demand (L/s)	Fire Flow (L/s)
Singles	-	155	527	1.71	-	-	1.71	166.67
Towns	-	352	951	3.08	-	-	3.08	166.67
Back-to-Back Towns	-	64	173	0.56	-	-	0.56	283.33
Condos	-	143	445	1.44	-	-	1.44	283.33
Parks	6.47	-	-	-	-	2.10	2.10	250.00 & 166.67
Commercial	12.10	-	-	-	7.00	-	7.00	250.00
Highschool	8.03	-	-	-	-	4.65	4.65	250.00
MTO Lands	16.50	-	-	-	1.74	-	1.74	216.67
Total	**-**	**714**	**2096**	**6.79**	**8.74**	**6.75**	**22.28**	**-**

Notes:

- *MTO Lands demand rate (9,120 L/ha/d) and fire flow demand (216.67 L/s) are consistent with the rates used in the Kanata West MSS.*
- *District Park calls for a variety of active and passive recreation opportunities which may include a community centre, pool /arena complex, indoor / outdoor rinks, splash pads, children's play areas, pedestrian walkways, seating areas, and shelters, as determined by the City, as such, was assigned a fire flow of 250 L/s. The smaller park was assigned a fire flow of 167 L/s since the size and potential amenities of this space are less at risk of fire.*
- *Approximate areas include areas outside of 195 Huntmar that are proposed for highschool & commercial developments, consistent with Table 1.*

Table 6: Interim Boundary Conditions

Condition	Connection 1 HGL (Huntmar and Palladium Drive)	Connection 2 HGL (Huntmar and Maple Grove Road)	Connection 3 HGL (Future minor Arterial and Stittsville Main Street)	Connection 4 HGL (Future minor Arterial and Maestro Avenue)
	(m)	(m)	(m)	(m)
Min Hour (max. pressure)	161.2	160.9	160.7	160.9
Peak Hour (min. pressure)	155.6	155.9	155.6	155.6
Max Day + Fire (167 L/s)	148.4	152.8	151.3	143.1
Max Day + Fire (250 L/s)	145.9	152.5	150.5	136.6
Max Day + Fire (283 L/s)	144.2	152.3	149.1	132.3

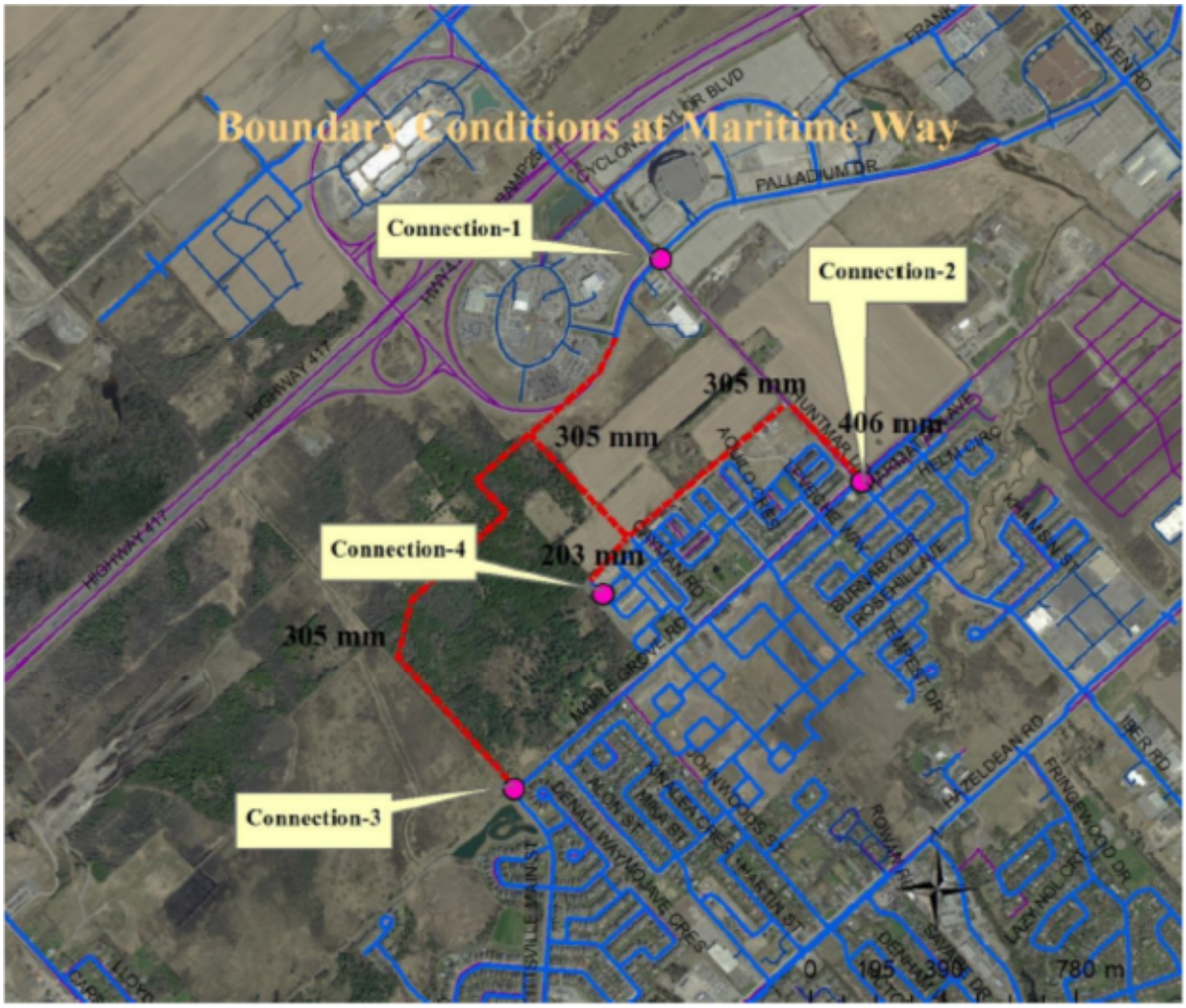

Figure 4: Interim Boundary Condition – Existing Watermains

Table 7: Ultimate Boundary Conditions

Condition	Connection 1 HGL (Huntmar and Palladium Drive)	Connection 2 HGL (Huntmar and Maple Grove Road)	Connection 3 HGL (Future minor Arterial and Stittsville Main Street)	Connection 4 HGL (Future minor Arterial and Maestro Avenue)
	(m)	(m)	(m)	(m)
Min Hour (max. pressure)	164.6	163.6	162.4	162.8
Peak Hour (min. pressure)	156.6	156.6	156.5	156.4
Max Day + Fire (167 L/s)	157.7	157.7	155.3	146.7
Max Day + Fire (250 L/s)	157.1	156.6	152.7	137.0
Max Day + Fire (283 L/s)	156.5	156.4	151.4	133.2

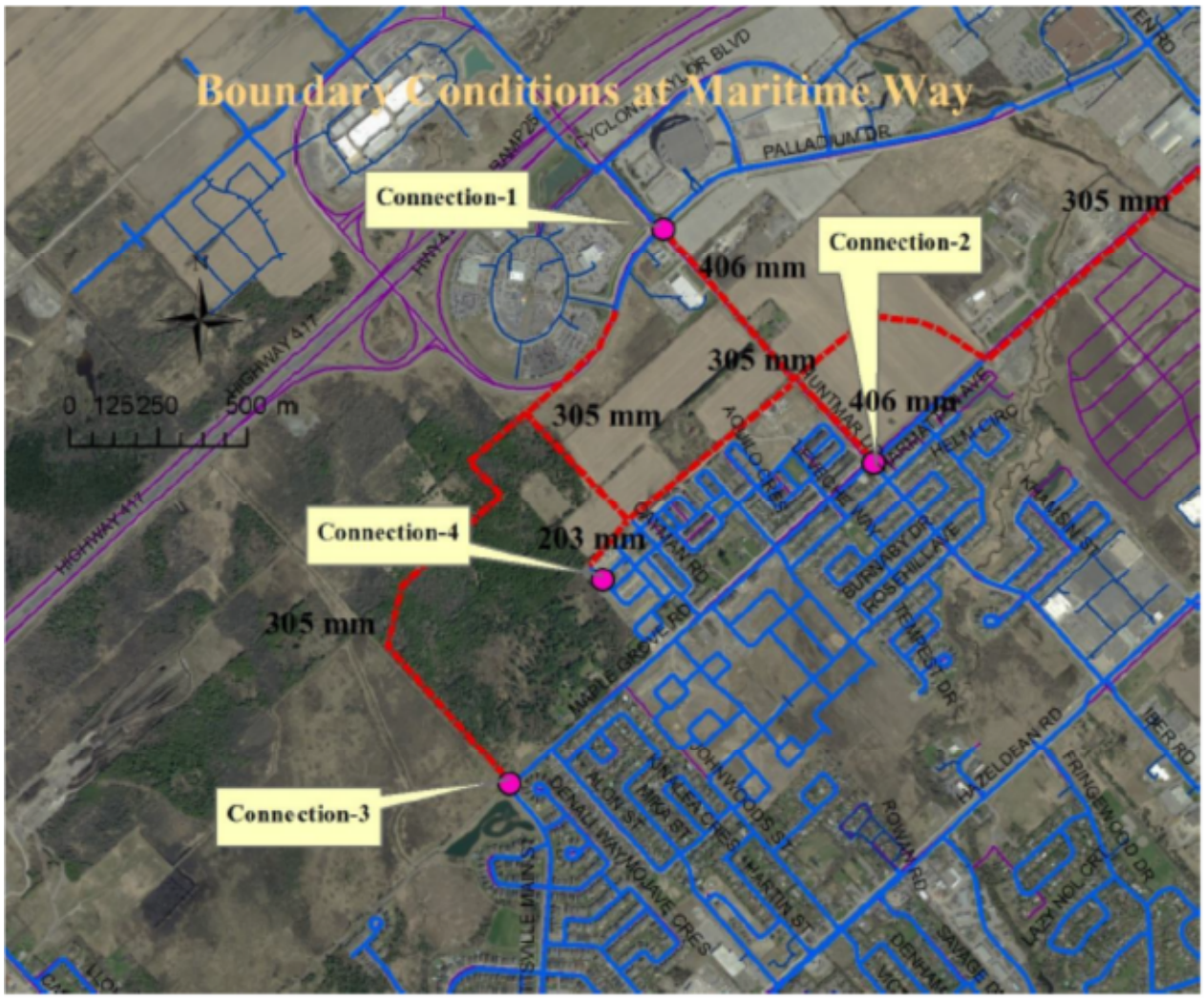

Figure 5: Ultimate Boundary Condition – Future Watermains

The watermain network has been sized based on the ultimate boundary conditions to demonstrate serviceability at the FSR stage in the development process. Please note that due to a change in the concept plan since the boundary conditions request, the anticipated average daily demand is approximately 1% higher than that used in the boundary condition request. At detailed design, updated boundary conditions are to be provided by the City of Ottawa for both interim and ultimate conditions - to reflect detailed fire flow calculations, etc. – and are to be used to confirm watermain sizing prior to construction.

Please note that the proposed alignment of the trunk watermain infrastructure differs from the KWMSS because of changes to the proposed road network. Furthermore, the KWMSS average water demand allowance for the subject lands is inferred to be approximately 5.2 L/s – using the rate of 152 l/d/p and an estimate of 60 employees/ha for 49.82 ha of 'prestige business park' and 'extensive employment' land uses (total site area less KWMSS district park area of 8.3 ha.). Under the proposed concept plan, total demands of 20.54 L/s are to be accommodated for the subject lands - 22.28 L/s when including the additional demands from the MTO lands. The KWMSS fire flow allowance for the subject lands was 13,000 L/min, whereas now up to 17,000 L/min may need to be accommodated. The increased water and fire flow demand can be adequately serviced by the proposed water main layout as indicated by water modeling results (***Section 3.2.1***).

3.2.1 Watermain Modelling

A hydraulic analysis has been completed for the study area within the *Hydraulic Capacity and Modeling Analysis – 195 Huntmar Drive Subdivision Development* (GeoAdvice, Feb 2019). The analysis, including the watermain network configuration and sizing, is provided in ***Appendix C.***

The proposed watermains within the development have been sized to the minimum diameter which would satisfy the greater of maximum day plus fire and peak hour demand. As noted in ***Section 3.2***, the ultimate boundary condition was used for sizing of the watermain network within the *Hydraulic Capacity and Modeling Analysis – 195 Huntmar Drive Subdivision Development* (GeoAdvice, Feb 2019).

Modelling was carried out for minimum hour, peak hour and maximum day plus fire flow. Modelling results shown in ***Table 8*** indicate that the development can be adequately serviced for minimum hour and peak hour criteria.

Table 8: Summary of Available Service Pressures

Pressure Zone	Minimum Hour Demand Maximum Pressure (kPa)	Peak Hour Demand Minimum Pressure (kPa)
3W	579	469

Per the *Hydraulic Capacity and Modeling Analysis – 195 Huntmar Drive Subdivision Development* (GeoAdvice, Feb 2019), pressure reducing valves may be required within certain at locations on the eastern portion of the study area in order to be within the City's and MECP's acceptable operating pressure ranges. The requirement for pressure reducing valves will be further analyzed at the time of detailed design.

Per ***Table 4,*** the minimum allowable pressure under fire flow conditions is 140 kPa (20 psi) at the location of the fire. A summary of available fire flows is shown below in ***Table 9***. Further details can be found in ***Appendix C***.

As shown in ***Table 9***, the model predicts that the fire flow requirements can be met throughout the development.

Table 9: Summary of Available Fire Flows

Land Use	Estimated Required Fire Flow (L/s)	Minimum Available Fire Flow (L/s)	No. of Nodes where residual pressure is less than 140 kPa
Single / Townhome / Parkette	167	167 (J-17)	0
MTO Lands	217	309 (J-10)	0
Commercial / High School / District Park	250	309 (J-10)	0
Back-to-Back Townhomes / Condos	283	283 (J-43)	0

Please note that the interim boundary conditions represent the existing City conditions from August 2016, and are no longer considered up to date given development in the surrounding area. However, the watermain network was reviewed under the August 2016 interim boundary conditions as part of a modelling check, and no pressure deficiencies and no major fire flow deficiencies were noted.

3.3 Water Servicing Conclusions

The City's 3W pressurized water supply network will be expanded to meet the water demands of the proposed concept plan. The proposed water supply design is expected to conform to all relevant City and MECP Guidelines and Policies. Detailed modelling is required at detailed design to confirm phasing of the extensions of trunk and local watermains.

The trunk watermain network has shifted from the alignments proposed in the KWMSS, in order to follow the proposed arterial and collector road network. Expected total average water demand has increased from the suggested 5.2 L/s per KWMSS to 20.54 L/s. KWMSS fire flow allowance for the subject lands is 13,000 L/min, whereas now 17,000 L/min may need to be accommodated. The increased water and fire flow demand can be adequately serviced by the proposed water main layout, as indicated by water modelling results.

The proposed watermain network can deliver all domestic flow, with service pressures expected to range between 469 kPa and 579 kPa in pressure zone 3W. As such, pressure reducing valves may be required where the maximum pressures are expected to exceed the City's guidelines of 552 kPa.

Anticipated fire flow requirements can be met throughout the development lands. A minimum 167 L/s fire flow is expected to be available to single homes, traditional townhomes, and the parkette. The required 250 L/s fire flow is expected to be available for the high school, the commercial/employment blocks and the district park. A minimum of 217 L/s is expected to be available to the MTO Lands, while the back-to-back townhomes and condos are expected to receive a minimum of 283 L/s in fire flows. Detailed modelling is required at detailed design to confirm watermain sizes prior to construction.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject lands are within the Kanata West Pump Station (KWPS) catchment area, as originally defined in the KWMSS.

An existing sanitary trunk sewer runs along Maple Grove Road (MGR) from John Woods Street to the west side of Poole Creek, and conveys flow to a recently constructed 1200mm sanitary sewer that continues along Maple Grove Road and outlets into the KWPS.

The City of Ottawa has indicated that the KWPS is designed to serve a drainage area larger than that contemplated in the KWMSS. The drainage area for the KWPS provided by the City is shown in ***Figure 6.*** Per ECA No. 7443-9Y8Q8R (***Appendix D***), the design of the KWPS will accommodate 528 L/s firm capacity upon completion in 2018, and 1250 L/s in 2031 ultimate conditions.

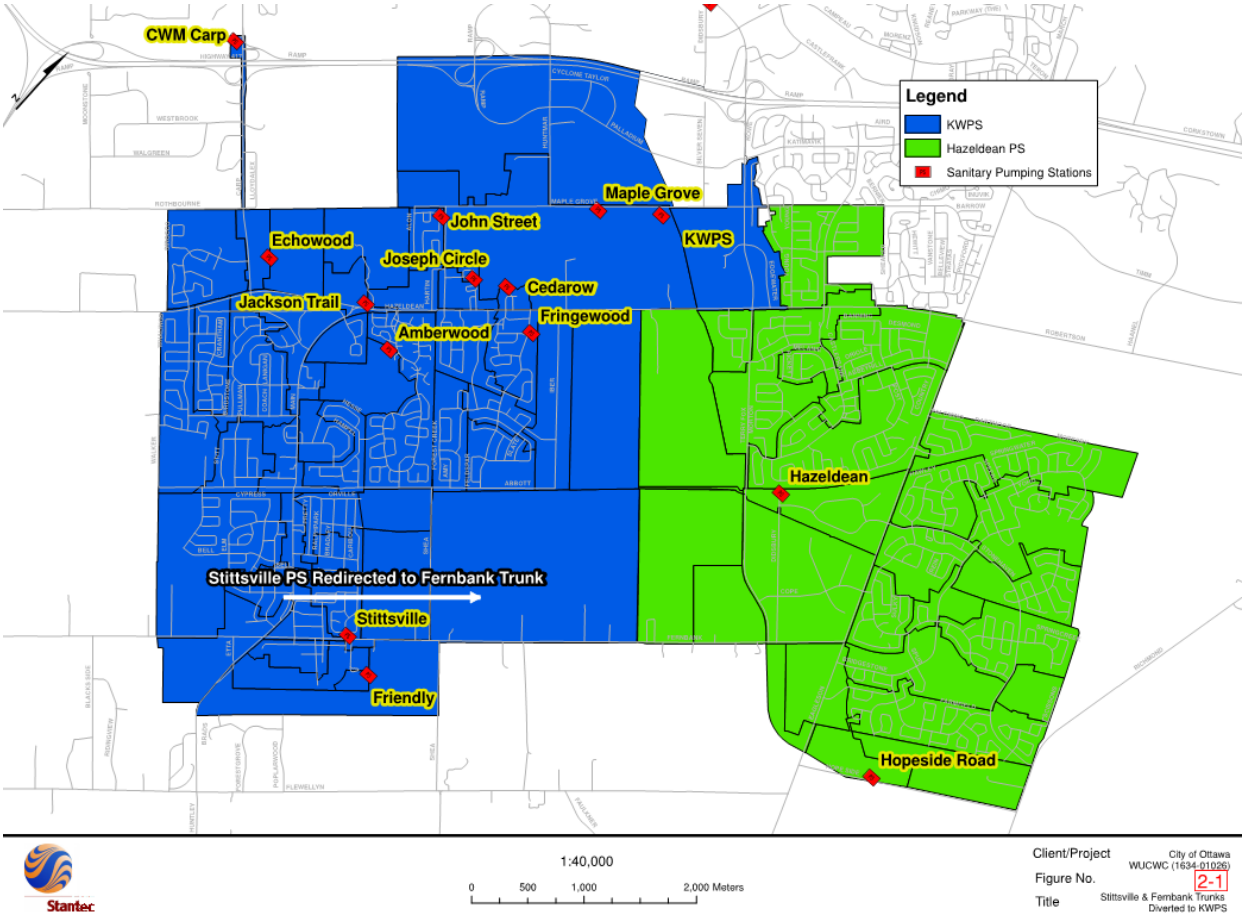

Figure 6: KWPS Drainage Area (Stantec, August 2012)

4.2 Wastewater Design

The subject lands are expected to be serviced by an internal gravity sanitary sewer system that is to follow the local road network. As detailed designs progress, alignment and sizing of local sanitary sewers will be confirmed and servicing easements may be required, which may trigger minor amendments to the proposed lot fabric in the concept plan. The proposed alignment of the trunk sanitary sewer infrastructure within the subject lands differs from the KWMSS because of the changes to the proposed road network.

The KWMSS contemplates that the subject lands will be serviced by a 625mm trunk sanitary sewer draining through servicing easements and/or future road rights-of-way eastwards towards the Palladium Drive crossing of the Carp River, to the north of Pond 4, and finally south to the KWPS. The KWMSS alignment is illustrated in ***Appendix B.***

The land owners affected by this KWMSS trunk sanitary sewer alignment have discussed re-aligning the sewer to take advantage of residual capacity within the MGR trunk sewer and to avoid the requirement to cross undeveloped lands owned by others. An alternative sanitary sewer alignment east & south of the Huntmar Drive and future North-South Arterial intersection is shown in ***Appendix B***, representing the proposed revisions to KWMSS sanitary routing per the City of Ottawa's *Functional Design Study for Kanata West Development North-South Sanitary Collector Sewer* (IBI, 2015). The alternative alignment follows Huntmar Drive and the future North South Arterial to outlet to the existing MGR trunk east of Huntmar Drive.

In support of development of 195 Huntmar, an adjustment to this solution is proposed, whereby a new sanitary sewer would follow Huntmar Drive directly to the MGR trunk sewer (KWMSS MH 10, a.k.a. MGR MH91). This is considered the preferred sanitary trunk sewer alignment to service the subject lands, as this option avoids the requirement to access undefined road alignments on adjacent private property between the site and the KWPS.

Capacity within the MGR sewer was analyzed:

- from KWMSS MH10 (MGR MH91) to MGR MH98A downstream, as defined by *Reconstruction of Maple Grove Road As-Builts* (DSEL, Sept 2013); and,
- then onto SAMH 3 west of Poole Creek, as defined by the *Issued for Construction Drawings for Kanata West Pump Station and Forcemain, Maple Grove Road* (Stantec, November 2015).

The detailed analysis can be found in ***Appendix D***. The KWMSS sanitary design sheet for areas tributary to MH10 was recreated in ***Appendix D,*** in order to be updated based on the latest sanitary design information available to DSEL and current City of Ottawa demand parameters. The information referenced in the MGR sewer capacity analysis is as follows:

- Sanitary Drainage Plan – Reconstruction of Maple Grove Road (DSEL, Jan 2013);
- Area 27 - Sanitary Drainage Plans & Design Sheets – Fairwinds North (DSEL, various dates);
- Area 22 – Sanitary Drainage Plans & Design Sheets – Fairwinds West (DSEL, Oct 2014);
- Area 22 – Sanitary Drainage Plan - Pool Creek Village (IBI, Sept 2014);
- Area 24 – Excerpts from Site Servicing Brief – Hazeldean Road and Huntmar Drive Commercial Site (IBI, March 2016);
- Area 23 - Excerpts from Development Servicing Study – The Keg Kanata (Novatech, Sept 2016);
- Kanata West North South Sanitary Interceptor (IBI, Dec 2015);
- Existing development on Hazeldean Road (geoOttawa, April 2019); and,
- Mion Lands Concept Plan (Novatech, June 2016).

A schematic showing which land use areas have and have not been modified from the KWMSS can be found in ***Appendix D***, along with the information listed above.

Aligning the trunk sanitary sewer along Huntmar Drive to outlet into the MGR sewer would direct the subject site's wastewater flows into the MGR sewer at KWMSS MH10. The subject land and the external areas proposed to be serviced are equivalent to the KWMSS sanitary drainage Areas 32, 32A, 34 and portion of Area 33. These areas have been updated with the subject lands' anticipated wastewater flows and according to current City of Ottawa design parameters.

KWMSS Modified Area 33 & Area 35 (Palladium Autopark) are already developed and wastewater is conveyed through sewers on Cyclone Taylor Boulevard. These flows along with flows from Areas 36, 37 and 38 are understood to be directed to the MGR sewer per the proposed revisions to KWMSS sanitary routing seen in the City of Ottawa's *Functional Design Study for Kanata West Development North-South Sanitary Collector Sewer* (***Appendix D***, IBI, 2015). These areas have been updated according to current City of Ottawa design parameters.

KWMSS areas 18, 22, 23, 24, 27, 28 and 30 have been updated based on the information from the *Sanitary Drainage Plan – Reconstruction of Maple Grove Road* (DSEL, Jan 2013), the as-built sanitary information listed above (***Appendix D),*** and current City of Ottawa design parameters.

All other KWMSS drainage areas are assumed to be serviced per the KWMSS land uses, but with current City of Ottawa demand parameters. See KWMSS "Preferred Wastewater Option" drawing S-1 and accompanying sanitary sewer design sheet in ***Appendix D*** for details.

For the purposes of this analysis, all flows from the areas detailed above were directed to KWMSS MH 10, in order to use a conservative approach to verify capacity within the MGR sewer segment from KWMSS MH 10 (a.k.a. MH91) to MH 98A. The *Reconstruction of Maple Grove Road As-Builts* (DSEL, Sept 2013) were used to determine the capacity of the sewer segments between KWMSS MH 10 (a.k.a. MH91) to MH 98A.

Downstream of MH 98A, the *Issued for Construction Drawings for Kanata West Pump Station and Forcemain, Maple Grove Road* (Stantec, November 2015) were used to determine the sanitary capacity of the sewer segments up to SAMH3. SAMH 3 has a 975mm dia. sanitary sewer stub to accept flows from areas outside of the original KWMSS service area that are planned to be tributary to the KWPS in ultimate conditions (***Figure 6***). The City has indicated that detailed sanitary drainage/flow information for this area is not available for the purpose of the 195 Huntmar FSR, however it is understood that the recently constructed 1200mm dia. sanitary sewer downstream of SAMH3 has been designed for the ultimate operating conditions of the KWPS and is not considered to introduce capacity constraints for the lands tributary to the MGR sewer. As part of detailed design, the City is expected to provide detailed flow information for the Kanata West North South Sanitary Interceptor and provide HGL information for SAMH3 that can be used to inform detailed hydraulic modelling of the sewer system upstream of SAMH3. Specifically, the detailed modelling of the sewer system is to include consideration of catastrophic failure of the KWPS.

Applying the wastewater parameters in ***Table 10***, the total peak flow to KWMSS MH 10 was determined to be 542.55 L/s, see ***Appendix D***. While this represents an increase compared to the 368.56 L/s flow considered in the MSS, there is demonstrated capacity within the MGR sewer to accommodate the flows. No segment of sewer between MH 10 and SAMH3 is at greater than 71% capacity (217 L/s of residual capacity). Note that all flows to this run of sewer have conservatively been directed to MH 10 for the purposes of this analysis. In reality, portions of the 542.55 L/s flow will enter the MGR sewer at different locations between KWMSS MH 10 and SAMH3.

Based on the wastewater parameters in ***Table 10*** and the proposed development concept, the 195 Huntmar development site and its external drainage areas are responsible for 144.10 L/s of flow directed to MH 10. The development is to be serviced by the sanitary sewer network shown in ***Drawings 4 & 5***. An allowance of 73.25 Ha of future residential development (4900 population) for the Area 3 developing community has been accommodated in the proposed sanitary sewer network. This allowance is to be confirmed with affected landowners and City staff as detailed design progresses. For the purpose of demonstrating serviceability in the FSR, Trunk 1 & Trunk 6 [from Maple Grove to Trunk 1] are proposed to maintain depth to ensure servicing for the large Area 3 developing community. Opportunities for raising the affected trunks and/or re-routing internal to the 195 Huntmar subdivision are to be coordinated as part of detailed design, and are expected to be subject to private cost sharing agreements. The MGR sewer capacity analysis demonstrates the downstream infrastructure ought to have sufficient capacity to accommodate the additional flows attributed to the future residential

development, but details are to be confirmed by the proponent for the development of these lands. As noted above, part of detailed design of the infrastructure for the 195 Huntmar development application, a detailed sanitary HGL analysis will be required for all downstream sanitary sewers, including consideration of catastrophic failure of the KWPS.

Table 10 summarizes the City standards applied in the preliminary sanitary analysis above (detailed in ***Appendix D)***. The same ***Table 10*** parameters are to be employed in the detailed design of the proposed wastewater sewer system.

Table 10: 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	28,000 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	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
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 subdivision in City of Ottawa.	

4.3 Wastewater Servicing Conclusions

The proposed wastewater servicing strategy for the subject lands is to be designed to conform to all relevant City Standards and MECP Guidelines, including the design parameters for the Kanata West Pump Station.

The subject lands will be serviced by off-site trunk sanitary sewer(s) delivering collected wastewater to the Kanata West Pump Station. The preferred offsite trunk sanitary sewer alignment to service the subject lands is an extension of a trunk sewer along Huntmar Drive to the existing Maple Grove Road trunk sewer. The preferred alignment is a deviation from the proposed alignment in the KWMSS because of changes to the proposed road network.

An allowance for future Area 3 development west of 195 Huntmar has been incorporated into the conceptual sanitary servicing design. This allowance is to be confirmed with affected landowners and City staff as the development application progresses.

Sufficient residual capacity is expected within the Maple Grove Road trunk sanitary sewer to accommodate the preferred sanitary sewer alignment and the buildout of the 195 Huntmar development, including the allowance for the developing community lands west of 195 Huntmar. As part of detailed design, capacity will be confirmed and a detailed sanitary HGL analysis will be completed to verify conditions during catastrophic failure of the KWPS.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The subject lands are within the Carp River watershed - under the jurisdiction of the Mississippi Valley Conservation Authority (MVCA) - and drain according to the pattern described in ***Section 1.1***.

The existing drainage split between Feedmill Creek and the Carp River is shown in ***Design Figure 4***, and is consistent with City of Ottawa base mapping and with the drainage boundaries set out in the City of Ottawa's *Feedmill Creek SWM Criteria Study* (JFSA & Coldwater Consulting, April 2018).

Per the pre-development flowrate calculations in ***Appendix E,*** approximately 1.2 m^3/s of stormwater runoff arrives at the existing 1500mm culvert under Highway 417 under pre-development 100-year design storm conditions as calculated via rational method calculations, and approximately 1.9 m^3/s is estimated via stormwater modelling undertaken as part of the City of Ottawa's *Feedmill Creek SWM Criteria Study* (JFSA & Coldwater Consulting, April 2018).

5.2 Stormwater Management Criteria

Stormwater management requirements for the proposed development have been adopted from the KWMSS, and refined based on consultation with City of Ottawa staff.

The KWMSS proposes that stormwater runoff from the subject lands be treated for quantity control and quality control by two stormwater management wet ponds. Refer to ***Appendix B*** for details. In general:

- The northern 7 ha of the subject lands was planned to be treated by Pond 7 (total drainage area approximately 34 ha., Runoff Coefficient C=0.7), which was to be located within the Palladium Drive/ Highway 417 interchange and outlet to Feedmill Creek.
- The remaining subject lands were planned to be treated by Pond 4 (total drainage area 278 ha., Runoff Coefficient C=0.63), which is located beside and outlets to the Carp River. A Normal Level of quality control is required, given the aquatic habitat in the Carp River.

An interim footprint of Pond 4 has been constructed under ECA No. 4298-9Q6HQ3, and has been sized to receive partial drainage from its catchment in accordance with the KWMSS (***Appendix B***). The interim Pond 4 and ultimate Pond 4 are to provide Normal Level water quality control, provide erosion protection, and attenuate post-development peak flows to pre-development levels for all storm events up to and including the 10-year storm event for the KWMSS drainage area.

For stormwater runoff destined to Feedmill Creek:

- All stormwater runoff up to and including that generated in a City of Ottawa 100-year design event is required to be attenuated. City of Ottawa staff have provided a suggested 8 L/s/ha release rate for the 100-year 12-hour SCS Type II design storm event for Pond 7, to respect the flow regime of Feedmill Creek (the receiving watercourse). The 8 l/s/ha allowance was suggested based on the original Pond 7 tributary area in the KWMSS.
- An Enhanced Level of quality control is expected to be required, given the aquatic habitat in Feedmill Creek.
- Furthermore, a unit release rate of 0.51 L/s/ha for the 15mm 3-hour Chicago design storm is suggested, per the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018) for erosion protection for the downstream watercourse. The 0.51 l/s/ha allowance was suggested based on the original Pond 7 tributary area in the KWMSS.

The following key City standards will be required for stormwater management within the subject lands and conveyance to the proposed stormwater management ponds, among other requirements:

- Storm sewers on local roads are to be designed to provide a minimum 2-year level of service per the City's latest Technical Bulletin PIEDTB-2016-01.
- Storm sewers on collector roads are to be designed to provide a minimum 5-year level of service per the City's latest Technical Bulletin PIEDTB-2016-01.
- Storm sewers on arterial roads are to be designed to provide a minimum 10-year level of service.
- For less frequent storms (i.e. larger than the minimum level of service), 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 local and collector roads, the maximum depth of water (static and/or dynamic) on streets, rearyards, public space and parking areas shall not exceed 0.35 m at the gutter. For arterial roads, no barrier curb overtopping is permitted.
- 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.

- Arterial roads must leave at least one lane free of water in each direction at all times up to a 100-year return period.
- 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.

5.3 Stormwater Management Design

It is proposed that Pond 7 be constructed within the site boundary and outlet to Feedmill Creek via a proposed 750mm outlet pipe within easements in the subdivision and within easements in the approximately 16.5 ha MTO lands directly north of the site. The outlet pipe would continue under the Highway 417 eastbound on-ramp and off-ramp (proposed to be installed as a culvert via jack and bore technique), and connect via a new ditch to an existing 1500 mm dia culvert under Highway 417. The facility footprint is proposed to shift and expand from that shown in the KWMSS, to achieve orderly and cost-effective development of the subject lands. A facility footprint close to the north-south arterial was considered, but the proposed pond location within the 195 Huntmar site and close to Feedmill Creek was selected to group low-intensity land uses near the Feedmill Creek corridor and to accommodate design principles for grouping commercial uses near the arterial road network.

The expanded Pond 7 is proposed to receive all stormwater runoff within the part of the subject lands that is west of the North-South arterial road, allowing this portion of development to proceed in one phase. Pond 7 could be expanded onto the 16.5 ha MTO lands directly north of the site, to also receive flows from development north of the subject lands, to better align with the original KWMSS Pond 7 tributary area. Therefore, the pond outlet pipe has been sized to accommodate future development of the approximately 16.5 ha MTO lands directly adjacent to the site. MTO have reviewed the proposed design and have offered their agreement in principle – see ***Appendix A.***

Specifically, a proposed 100-year 12-hour SCS Type II design storm release rate for Pond 7 of 276.32 L/s is proposed, based on an allowance of 34.54 Ha of development controlled to 8 l/s/h per the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018). This allowance is to be shared by the 195 Huntmar site (144 L/s for the proposed 40.8 Ha drainage area) and the MTO lands (132 L/s for the 16.5 Ha drainage area). The MTO lands associated with the existing interchange (8.95 Ha) that were proposed to be controlled by Pond 7 in the KWMSS and in the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018) are assumed to remain uncontrolled, and are modelled as uncontrolled release to Feedmill Creek as part of the detailed stormwater modelling in ***Appendix E***. The Pond 7 erosion control rate of 0.51 L/s/ha for the 15mm 3-hour Chicago design storm has been established and shared in the same way. See ***Appendix E*** for details.

The remaining subject lands that are east of the North-South arterial road are to drain to Pond 4, via an off-site 'North Trunk' storm sewer, as planned in the KWMSS (***Appendix B & E***). East of Huntmar Drive, the off-site 'North Trunk' storm sewer is to be aligned through servicing easements and/or future road rights-of-way eastwards to the Pond 4 north forebay. Because the Pond 4 catchment area is decreasing from the catchment contemplated in the KWMSS, the ultimate Pond 4 footprint is expected to be smaller than originally anticipated in the KWMSS. A conceptual ultimate Pond 4 layout is shown in ***Drawing 2.***

The proposed stormwater drainage areas for the subject lands differ from the existing drainage split and the drainage pattern proposed in the KWMSS, as detailed in ***Table 11.***

Table 11: Comparison of Subject Land Drainage to Feedmill Creek and Carp River

	Existing Drainage (ha.)	MSS Drainage (ha.)	Proposed Drainage (ha.)
Feedmill Creek	21.34	7.77	40.27
Carp River	36.78	50.35	17.85
Total Subject Land Area	**58.12**	**58.12**	**58.12**

Refer to ***Drawing 2*** for the preferred storm management system for the subject lands. Rational method design sheets are provided in ***Appendix E.*** Based on examples from similar residential subdivisions in Ottawa, predicted runoff coefficients (C-values) have been assigned as follows, considering paved areas at C=0.90 and grassed areas at C=0.20:

- District Park: Allowance of C=0.40 until additional programming information is known;
- Arterial & Collector Roads: C=0.70;
- Single Detached, Townhomes, Back-to-Back Townhomes, Local Roads: C=0.70;
- High School: Allowance of C=0.60 until additional programming information is known;
- Parkette: C=0.40;
- Condo/Apartments: C=0.70 until additional development information is known; and,
- Commercial/Auto Park: C=0.80.

Per the drainage areas and runoff coefficients shown in ***Drawing 2***, the estimated average imperviousness for the Pond 7 drainage area is 71%, including the pond block itself. Pond 4 is now associated with an ultimate drainage area of 243 Ha. at 64% imperviousness – see ***Appendix E.***

The *Preliminary Kanata West Pond 7 Sizing* (JFSA, February 2019, ***Appendix E***) report details the proposed pond size for the new Pond 7, to meet the erosion, quality, and quantity requirements outlined in ***Section 5.2***. The proposed characteristics are summarized in ***Table 12*** and compared to previous reports.

Table 12: Comparison of Proposed and Previous Versions of Pond 7 Design

	Pond 7 KWMSS	**Pond 7 Feedmill Creek Stormwater Management Criteria Study (JFSA & Coldwater Consulting, April 2018)**	**Pond 7 Proposed**	
			Excluding 16.5 Ha MTO lands	Including 16.5 Ha MTO lands
Drainage Area	34.08 ha.	34.54 Ha	40.8 Ha	57.3 Ha
Average Imperviousness	70%	85%	71% (To be confirmed at detailed design)	TBD
Required Permanent Pool Volume	6305 m^3 (185 m^3/ha)	N/A	7616 m^3 (185 m^3/ha)	TBD
Permanent Pool Elevation	102.20	N/A	Approx 103.80-103.85, TBD	Approx 103.80-103.85, TBD
Required Quality Control Volume	1363 m^3 (40m^3/ha)	N/A	1632 m^3 (40m^3/ha)	TBD
100-year Release Rate	3654 L/s (Carp River Restoration Plan – Greenland International Consulting Engineers, Feb 2014)	276.32 L/a	144 L/s	276.32 L/s

It is anticipated that approximately 28,600 m^3 of storage will be required in Pond 7 within the 195 Huntmar site to attenuate stormwater runoff to Feedmill Creek to the established release rate for a 100-year design storm event. Actual required storage volumes will vary, and need to be confirmed as detailed design progresses based on a number of factors including grading constraints and detailed modelling of the stormwater management plan. A conceptual pond footprint is shown in ***Drawing 1 & 2*** and ***Design Figure 5*** to illustrate the scale of attenuation required, but is subject to change as part of detailed design.

Detailed pond design will be completed according to KWMSS and the MECP SWMP Design Manual, detailing storage requirements and operating characteristics, inlet and outlet structures, orifice sizing, and pond block design including amenity space and pathways. Pond side slopes are to vary and designs are to be approved by a licensed geotechnical engineer prior to construction. Detailed grading, outlet orifices and weirs, and operational characteristics will be developed using modelling at the detailed design

level, with input from other professionals (e.g. geomorphologists, geotechnical engineer, etc.) where required. A spillway will be designed to convey emergency overflow to Feedmill Creek.

The detailed design of the stormwater outlet will be required to confirm that there are no unacceptable negative erosion, thermal, or water level impacts caused by the introduction of pond discharge to Feedmill Creek (and the existing ditches and culverts between Pond 7 and Feedmill Creek). As part of preliminary analysis in this FSR, these impacts have been analyzed and deemed acceptable. Specifically, to address the change in flow regime in Feedmill Creek under the proposed Pond 7 plan:

- A *Feedmill Creek SWM Criteria Study, Pond 7 Increased Drainage Area – Erosion and In-Stream Works Analysis* (Coldwater Consulting Ltd., March 2019) has been prepared to examine the impact of Pond 7 to erosion in Feedmill Creek, and recommends additional in-stream protection measures in Feedmill Creek beyond those originally identified in the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018). There is an opportunity for 2325483 Ontario Inc. to enter into a front-ending agreement for the required in-stream erosion protection works in Feedmill Creek. All costs for additional in-stream works triggered by the proposed changes to Pond 7 are to be assigned at 100% to 2325483 Ontario Inc. See ***Appendix I.***
- An analysis of MTO culverts has been prepared - see ***Appendix E***, *Flood Analysis of Feedmill Creek Crossings* (JFSA, May 3, 2019). All analysed crossings perform in accordance with MTO standards or show an improvement over existing conditions.
- A flood analysis has been prepared - see ***Appendix E***, *Preliminary Kanata West Pond 7 Sizing* (JFSA, February 2019) - showing that water levels may be expected to increase on Feedmill Creek in the 100-year 12-hour SCS Type II storm event in the worst case by 7 cm, as compared to the ultimate conditions modelled in the City of Ottawa's *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018). However, the predicted 100-year 12-hour SCS Type II storm event water levels are below the MVCA regulatory water levels (***Appendix A***) in all cases, and the predicted waterlevels do not raise above the existing creek banks. Water levels do not increase on the Carp River.

  A check of the downstream Pond 6E and Pond 6W pond outlets was completed, especially given the reported 7 cm increase in the 100-year 12-hour SCS Type II water level noted above. See ***Appendix E*** for background information per IBI Group. Per ***Table 13***, the proposed water levels are equal to or below the expected waterlevels in Feedmill Creek under existing conditions, and below the MVCA regulatory water levels.

Table 13: Comparison of Feedmill Creek Water Levels at Pond 6 Outlets

	100-year 12-hour SCS Type II water level					
	Pond 6 Design Pond 6 East Design Brief (IBI, Nov 2015)	2015 Existing Conditions City of Ottawa's Feedmill Creek Stormwater Management Criteria Study (JFSA & Coldwater Consulting, April 2018)	Near Future Conditions* City of Ottawa's Feedmill Creek Stormwater Management Criteria Study (JFSA & Coldwater Consulting, April 2018)	Ultimate Conditions City of Ottawa's Feedmill Creek Stormwater Management Criteria Study (JFSA & Coldwater Consulting, April 2018)	Proposed Ultimate Conditions Preliminary Kanata West Pond 7 Sizing (JFSA, February 2019)	MVCA Regulatory Flood Elevation
Pond 6 West (FJ038):	101.35 m	101.08 m	101.31 m	101.16 m	101.24 m	102.0m
Pond 6 East (FJ019):	97.89 m	97.87 m	97.95 m	97.91 m	97.95 m	98.2m
** 'Near Future' conditions are representative of ongoing development to existing constructed SWM facilities, per City of Ottawa's Feedmill Creek Stormwater Management Criteria Study (JFSA & Coldwater Consulting, April 2018).*						

As detailed design progresses, the City and agencies are expected to provide further input on these matters. Prior to construction, MECP Environmental Compliance Approval (ECA) will be required and specific MTO, MNRF, DFO, and/or MVCA permits may be required.

The proposed Pond 4 footprint shown in ***Drawings 1 & 2*** and ***Design Figure 5*** has been sized to meet the erosion, quality, and quantity requirements outlined in ***Section 5.2***. The proposed characteristics are summarized in ***Table 14*** and compared to previous reports. Specifically, preliminary outlet controls for Pond 4 were sized to satisfy baseflow requirements, quality control requirements, and the 10-year quantity control target release rate from the *Design Brief for Pond 4, Kanata West, Mattamy Homes* (JFSA, December 2014) (set to match the KWMSS 10-year outflow). The preliminary outlet controls are also sized to ensure that the 100-year pond level does not exceed 94.74 m (set to match the KWMSS 100-year pond level, and the pond level used in HGL analyses for existing and approved developments on the South Trunk sewer). See ***Appendix E*** for additional details.

Table 14: Comparison of Proposed and Previous Versions of Pond 4 Design

	Ultimate Pond 4 KWMSS	Ultimate Pond 4 Design Brief for Pond 4, Kanata West, Mattamy Homes (JFSA, December 2014)	Ultimate Pond 4 Proposed
Drainage Area	267.97	278.29	242.65
Average Imperviousness	70%	62%	64%
Required Permanent Pool Volume	28,120 cu.m.	22,078 cu.m.	19,897 cu.m.
Permanent Pool Elevation	93.25m	93.20m	93.20m
100-year Elevation	94.74m	94.74m	94.74 m

It is anticipated that approximately 59,500 m^3 of storage will be required in Pond 4 in the 100-year design storm event to attenuate stormwater runoff to the Carp River to the established release rates and water level requirements. Actual required storage volumes will vary, and need to be confirmed as detailed design progresses based on a number of factors including grading constraints and detailed modelling of the stormwater management plan. A conceptual pond footprint is shown in ***Drawing 1 & 2*** and ***Design Figure 5*** to illustrate the scale of expansion required, but is subject to change as part of detailed design.

Detailed pond design will be completed according to KWMSS and the MECP SWMP Design Manual, detailing storage requirements and operating characteristics, inlet and outlet structures, orifice sizing, and pond block design including amenity space and pathways. Pond side slopes are to vary and designs are to be approved by a licensed geotechnical engineer prior to construction. Detailed grading, outlet orifices and weirs, and operational characteristics will be developed using modelling at the detailed design level, with input from other professionals (e.g. geomorphologists, geotechnical engineer, etc.) where required.

Please note that under the proposed stormwater plan, the inflows through the Pond 4 'North Trunk' will be reduced from the KWMSS, potentially providing an opportunity to reduce pipe sizes and reduce capital costs for installation. The change is not expected to have a negative impact to the operation of the pond, and is not associated with negative environmental impacts (Muncaster Environmental Planning, May 2018). On approval of the development and servicing concept for 195 Huntmar, 2325483 Ontario Inc. is expected to work with the Kanata West Owner's Group to formalize the reduction in storm sewer sizes and negotiate any associated cost-sharing implications.

Conceptual storm sewer sizing and profile information is provided in ***Drawing 3***, based on rational method calculations and assumptions related to on-site storage up to the 100-year design storm event for all institutional, park, and commercial blocks. With storage and controlled release rates, there may also be an opportunity to use existing ditch

systems east of Huntmar Road as an interim stormwater management strategy prior to the construction of the complete 'North Trunk' storm sewer to Pond 4: for example, existing ditches may be adequate to convey runoff from the park block and school site towards Pond 4 before piped infrastructure is built. Regardless of any future proposed changes in the 'North Trunk' stormwater sewer size, ECA No. 4298-9Q6HQ3 for construction of Pond 4 (***Appendix E***) did not include the 'North Trunk' sewer, so a Pond 4 ECA amendment is expected to be required to support development of the 195 Huntmar development and the expansion of Pond 4 to ultimate conditions. As detailed design progresses, the City and agencies are expected to provide further input on the Pond 4 design. Prior to construction, specific MNRF, DFO, and/or MVCA permits may be required.

5.3.1 Minor System

The subject lands are expected to be serviced by an internal gravity storm sewer system that is to follow the local road network. 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. The proposed alignment of the trunk storm sewer infrastructure within the subject lands differs from the KWMSS because of the changes to the proposed road network.

As part of detailed design, flow from adjacent developments will be further defined – currently some external drainage from south of the site is expected to be required to be picked up in the Pond 4 storm sewer system prior to development of the lands south of the site, as shown by the cut-off swales and ditch inlet catchbasin along the southern property line in ***Drawing 1 - 3***. Should the lands south of the site develop before or at the same time as the 195 Huntmar, no flows are expected to be required to be accepted, as these lands are planned to drain to Pond 4 via existing infrastructure on Maple Grove Road. Furthermore, some rear yard drainage is expected to be required to be picked up in the Pond 4 storm system, based on existing drainage in the Mattamy Fairwinds subdivision. This is demonstrated in the rational method design sheet in ***Appendix E***, where the 10-year less 5-year flows are captured into the Pond 4 trunk storm sewer.

Table 14 summarizes the standards that will be employed in the detailed design of the storm sewer network, meeting the requirements in ***Section 5.2.*** Capture rate for the parkette is assumed at 2-year capture, while capture for the highschool and district park are assumed at 5-year capture. Conceptual trunk storm sewer sizing and profile information is provided in ***Appendix E & Drawing 3***, according to the drainage areas and sewer routing shown in ***Drawing 2***, but is subject to change as part of detailed design. The profiles show that frost cover can be achieved with the conceptual grading plan (***Section 5.4***) and that pipe submergence at the Pond 7 outlet is not currently proposed. Pipe submergence for Pond 4 is proposed in conformance with the KWMSS. Runoff from events greater than the minor system is expected to be addressed via road sag storage, overland flow, or on-site storage (***Section 5.3.3).***

5.3.2 Hydraulic Grade Line

A detailed hydraulic gradeline (HGL) analysis will be completed for the proposed system at the detailed design level, per the requirements in ***Table 15.*** Detailed grading design and storm sewer design will be modified as required to achieve a 0.3 m freeboard between the 100-year HGL and all underside of footing elevations.

For the purpose of this FSR, preliminary analyses have been completed for the proposed trunk sewer systems, to demonstrate serviceability of the site. Specifically, a preliminary hydraulic gradeline analysis of the proposed storm sewer system and proposed Pond 7 was undertaken within the larger City of Ottawa Carp River PCSWMM model (specifically the Ultimate Conditions Scenario D2 version submitted with the February 6, 2019 *Preliminary Kanata West Pond 7 Sizing* memo – see ***Appendix E***). The preliminary stage-storage-discharge curve prepared for Pond 7 for the purpose of this analysis is provided in ***Appendix E***, and satisfies quality, erosion and quantity control requirements for the stormwater management pond (see ***Section 5.3)***. Inflows to the storm sewer were modelled in PCSWMM based on the drainage area delineation in ***Drawing 2*** and the Rational Method design in ***Appendix E***, with 2-year + 14% capture on local roads and 5-year + 14% capture on collector roads. The additional 14% capture is intended to account for the additional capture during the 100-year storm, when the head over catchbasins and inlet control devices is increased. Sufficient surface storage on the road to contain the excess 100-year flows was assumed for the purposes of this analysis.

The 100-year 3-hour Chicago storm and 100-year 12-hour SCS Type II storm hydraulic gradeline results as modelled in PCSWMM are provided in ***Appendix E*** and marked in ***Drawing 3***. Based on the preliminary assumption that underside of footing elevations within the proposed subdivision are 1.8 m below the top of manhole elevation (approximately road centreline elevation), it has been demonstrated based on this preliminary analysis that a 0.3 m freeboard between the 100-year hydraulic gradeline and the underside of footing elevations is feasible throughout the proposed development.

Digital PCSWMM modelling files are provided in ***Appendix E.***

Similarly, a preliminary hydraulic gradeline analysis of the proposed 195 Huntmar development storm sewer system and revised Ultimate Pond 4 was undertaken based on the detailed ultimate conditions DDSWMM / XPSWMM modelling submitted with the *Design Brief for Pond 4, Kanata West, Mattamy Homes (JFSA, December 2014)*, modified to reflect:

- The proposed stage-storage curve for Pond 4 under revised ultimate conditions (see ***Appendix E***).
- Preliminary outlet controls for Pond 4 sized to satisfy baseflow requirements, quality control requirements, the 10-year quantity control target release rate from the December 2014 *Design Brief*, and the 100-year water level of 94.74m (see ***Section 5.3***).

- Storm sewer data for 195 Huntmar upstream of MH 4C10 – see ***Drawings 2 & 3***.
- KWMSS drainage areas and KWMSS storm sewer data (sizing, top of grate, and obvert information) downstream of MH 4C10 (east of Huntmar Drive) – except for one proposed storm pipe downsizing from MH 4C10 to 4C11 (from 2250 to 1950mm dia.). See ***Drawings 2 & 3***. It is understood that there is no updated development information approved for the areas east of Huntmar Drive, so the information in the KWMSS is understood to govern.
- Inflows to the storm sewer from 195 Huntmar were modelled in SWMHYMO based on the drainage area delineation in ***Drawing 2*** and the Rational Method design in ***Appendix E***, with 2-year + 14% capture on local roads, 5-year + 14% capture on collector roads, and 10-year + 14% capture on arterial roads. The additional 14% capture is intended to account for the additional capture during the 100-year storm, when the head over catchbasins and inlet control devices is increased. Sufficient surface storage on the road to contain the excess 100-year flows was assumed for the purposes of this analysis.
- For all other areas within the Pond 4 catchment, the modelling from the December 2014 *Design Brief* was left unchanged: minor system capture was modelled as 5-year on local and collector roads, and 10-year on arterial roads, as updated to meet current City standards at the time of the December 2014 *Design Brief*.

The 100-year 3-hour Chicago storm and 100-year 12-hour SCS Type II storm hydraulic gradeline results are provided in ***Appendix E*** and marked in ***Drawing 3***. Based on the preliminary assumption that underside of footing elevations within the proposed subdivision are 1.8 m below the top of manhole elevation (approximately road centreline elevation), it has been demonstrated based on this preliminary analysis that a 0.3 m freeboard between the 100-year hydraulic gradeline and the underside of footing elevations is feasible throughout the proposed development at 195 Huntmar, as well as throughout the existing/approved detailed developments along the Pond 4 South Trunk sewer established in the December 2014 *Design Brief*. However, despite redirecting significant flows away from the Pond 4 north inlet, the 100-year HGL east of Huntmar Drive in the North Trunk has risen from the values reported in the KWMSS, due to the capture rates described above. At the time of the KWMSS, 85 L/s/ha capture was assumed for residential and non-residential lands.

Digital DDSWMM, SWMHYMO and XPSWMM modelling files for the Pond 4 HGL analysis are provided in ***Appendix E.***

Table 15: Storm Sewer Design Criteria

Design Parameter	Value
Minimum Minor System Design Return Period	1:2 year (PIEDTB-2016-01) (local) or 1:5 year (collector) or 1:10 year (arterial)
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 (or 1.5m where USF freeboard to HGL is not a constraint, such as in slab-on-grade products)
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 (USF)	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, 12-hour SCS Type II 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 Technical Bulletins	

5.3.3 Major System

All commercial, highschool, employment, park, and parkette blocks are expected to provide on-site storage for 100-year flows less the minor system capture.

The grading program described in ***Section 5.4*** and shown in ***Drawing 1*** includes a saw-toothed road design with about 0.15% from highpoint to highpoint in the residential area, in order to maximize available surface storage for management of flows up to the 100-year design event. Per the *Preliminary Kanata West Pond 7 Sizing* (JFSA, February 2019) (***Appendix E***), 35cm deep road ponding areas are expected to be sufficient to contain 100-year flows less the minor system capture in this area.

In areas where the 100-year flows less the minor system capture are not able to be accommodated in full using road ponding, 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 surface flow along the road network and service easements to the stormwater management facilities, per the drainage boundaries shown in ***Drawing 2*** and grading shown in ***Drawing 1.***

If the detailed design results in violations in the City's flow depth or flow spread parameters (as summarized 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 KWMSS and City standards.

5.4 Grading and Drainage

A conceptual grading plan is shown in ***Drawing 1,*** but is subject to change as part of detailed design to minimize earthworks. To achieve the planned stormwater drainage program, meet MVCA requirements to eliminate the 1:100 year spill hazard, and meet City of Ottawa guidelines pertaining to road and lot grading, final road grades in the subject lands are planned to be set to between 107.8m and 109.0m west of the North-South Arterial, which requires about 2m – 3m of fill above existing ground. Springline connections for certain storm sewers are proposed, in order to reduce fill requirements in some areas and/or prevent downstream pipe submergence in the Pond 7 catchment – see ***Drawing 3***. Additional springline connections may be explored as part of detailed design.

To support the development concept, retaining walls are proposed on private property. For approximately 100m adjacent to Street No.1, retaining walls or terracing is proposed in order to accommodate the proposed road grades. The City has requested that retaining walls in the ROW be avoided. As such, as part of detailed design, the opportunity to terrace within the road allowance (PIN 04487 - 0434), Block 263, and the boulevard of Street No.1 are to be explored, with sloping to begin no closer than 31.5m from the

centerline of Feedmill Creek in accordance with MVCA requirements. As part of detailed design, detailed recommendations will be provided by a geotechnical engineer to support detailed terracing and retaining wall designs.

A berm is proposed around the stormwater management facility in order to eliminate the 1:100 year spill hazard in this area. Paterson Group has reviewed the interaction of Feedmill Creek peak water levels with the proposed berm. The analysis concludes that the proposed berm is considered stable from a geotechnical perspective – see ***Appendix H*** for details.

Paterson Group has reviewed the interaction of Feedmill Creek peak water levels with the proposed retaining walls and nearby foundations. Paterson Group is recommending construction of an impermeable clay liner behind the retaining wall - see ***Appendix H*** for details. As part of detailed design, detailed foundation recommendations will be provided for all proposed development.

Based on the *Preliminary Kanata West Pond 7 Sizing* (JFSA, February 2019) (***Appendix E***), water levels in the section of channel adjacent to the proposed subdivision are:

- 100-year design storm: 106.86m – 107.16m; and,
- 100-year + 20% stress test: 106.97m – 107.20m.

The regulatory 100-year waterlevels identified in the MVCA Flood Risk Maps (***Appendix A***) for the area range from 107.2m - 107.1m. Therefore, the lowest road grade in the Pond 7 catchment area is 0.6m above the 20% stress test WL in the Creek beside the site. It is assumed that the freeboard could be reduced to 0.3m above the 100-year regulatory waterlevel in Feedmill Creek as part of detailed design, if opportunities exist for minor reductions to fill requirements. This would allow for at least 0.2m of freeboard from the modelled 20% stress test WL in the Creek beside the site.

The following additional grading criteria and guidelines will be applied to detailed design, per ***City of Ottawa 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.

The proposed concept plan for the subject lands and associated fill requires closure of the Northwest Swale and Eastern Swale that are characterized in the Environmental

Impact Statement (Muncaster Environmental Planning, May 2018) and all other on-site watercourses identified in the Headwaters Report (Bowfin, May 2018) (***Section 1.2***).

Existing grades in the subject lands are below the 100-year floodplain elevation as reported in the *Feedmill Creek Floodplain Mapping Study* (MVCA, January 2017). Written authorization from MVCA pursuant to Ontario Regulation 153/06, MVCA's *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* regulation is required to fill site areas below the 100-year floodplain elevation that are within 15m of the MVCA spill hazard. See ***Section 1.4, Appendix A,*** and ***Appendix G*** for additional details.

5.5 Infiltration

Per the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018), LID measures will be required to be included in the detailed design so that the entire site controls (retains) the runoff from 5 mm rainfall on-site. The 5mm target retention volume is proposed to be met through implementing LIDs such as:

- In Residential Backyards:
    - Where eavestroughs are provided on residential units, they are to be directed to landscaped surfaces, to promote infiltration.
    - Rear-yard swales should be designed with minimum grades where possible, to promote infiltration.
    - Rear-yard catchbasin leads should be perforated (except for the last segment connecting to the storm sewer within the right-of-way), to promote infiltration.
    - Increased topsoil depth can be considered for use.
- In Commercial Blocks:
    - Increased topsoil depth can be considered for use.
    - Swales should be designed with minimum grades where possible, to promote infiltration.
    - Underground infiltration measures in parking lots and soft landscapes can be considered for use.
- In Local ROWs (minimum 18m wide):
    - Infiltration chambers under soft landscapes, sidewalks, and driveways, connected to select curb inlet catchbasins can be considered for use.
- In the Highschool and Park Blocks:
    - Increased topsoil depth can be considered for use.
    - Micro-grading can be considered to promote infiltration.

- Surface ditches could be implemented within the highschool and district park (as opposed to storm sewers) to promote infiltration.

As detailed designs progress, a detailed site-specific water budget is to be undertaken to characterize pre-development and post-development infiltration for the subject lands. Paterson Group (May 2018) has suggested that infiltration rates of 3 mm/hr to 8 mm/hr ought to be applied to the design of LIDs based on infiltration testing of the native soils (***Appendix A***), however these rates are subject to change as part of detailed design, according to the imported material to be brought into the site. Based on similar developments in Ottawa with similar soil conditions, the 5mm target is expected to be met under the current Draft Plan of Subdivision (***Appendix A***), especially given that no roads are proposed with ROWs less than 18m.

The KWMSS calls for an increase of 25% in infiltration rates from pre-development levels for all areas subject to the KWMSS: for the subject lands, the KWMSS suggests pre-development infiltration rate is 70-100mm/yr. The existing subsurface conditions in the area and the amount of impervious surfaces - among other factors - have made it difficult to achieve this target for development applications to date within the KWMSS area. As such, soil and groundwater conditions will require further site-specific evaluation through the detailed design process, to determine the feasibility of achieving the post-development 25% increase in infiltration. It is expected that the amount of imported fill within the Pond 7 tributary area will provide a benefit to infiltration over the existing soils.

Because the subject lands are not identified as a Significant Groundwater Recharge area in the Mississippi-Rideau Source Water Protection Plan, Schedule M (MVCA & RVCA, August 2014) (***Appendix F***), an infiltration deficit in the post-development scenario for the subject lands is not considered to have a significant negative impact on the natural heritage system (Muncaster Environmental Planning, May 2018).

5.6 Stormwater Servicing Conclusions

The proposed alignment of storm sewers differs from the KWMSS due to modifications to the street network and block layout under the planning application, and due to a proposed change in catchment area for the proposed stormwater management facilities. Whereas the KWMSS proposed drainage from the subject lands to be mainly treated by Pond 4, the current proposal is for Pond 7 to provide erosion protection, Enhanced Level quality treatment, and attenuation of storm events up to the 100-year design storm event for a greater drainage area than previously contemplated (all lands west of the North-South arterial road).

To address the change in flow regime in Feedmill Creek under the proposed Pond 7 plan, a *Feedmill Creek SWM Criteria Study* (Coldwater Consulting Ltd., March 2019) has been prepared to examine the impact of Pond 7 to erosion in Feedmill Creek, and recommends additional in-stream protection measures in Feedmill Creek beyond those originally identified in the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018). In addition, a flood analysis has been prepared (see

Preliminary Kanata West Pond 7 Sizing (JFSA, February 2019)), showing that water levels may be expected to increase by 7cm on Feedmill Creek and 0cm on the Carp River under the proposed plan under specific modelling comparisons of the 100-year 12-hour SCS Type II design storm flows, but that all predicted waterlevels are below the 100-year regulatory waterlevels established by MVCA.

The remaining subject lands that are east of the North-South Arterial are to drain to Pond 4, via an off-site trunk storm sewer, as planned in the KWMSS. Pond 4 has been constructed under ECA No. 4298-9Q6HQ3 in an interim footprint, and is to be expanded to provide Normal Level water quality control, erosion protection, attenuate post-development peak flows to pre-development levels for all storm events up to and including the 10-year storm event, and meet all targets outlined in the *Design Brief for Pond 4, Kanata West, Mattamy Homes (JFSA, December 2014)* that supports ECA No. 4298-9Q6HQ3. Trunk storm sewers destined to Pond 4 may be able to be downsized from the KWMSS due to the decrease in drainage area, but would need to consider HGL impacts. With the use of current City of Ottawa servicing guidelines, the HGL in the storm sewer system has risen from the values reported in the KWMSS, largely due to the fact that 85 L/s/ha capture was assumed for residential and non-residential lands at the time of the KWMSS.

As part of detailed design, the storm sewers will be sized by the Rational Method and inlet control devices (ICDs) will be used to restrict the capture rates to 2-, 5-, or 10-year flow for local, collector, and arterial roads, respectively. Storm sewers sizing will be confirmed at the detailed design level, in conformance with MECP and City standards, with regard for 100-year hydraulic gradeline impacts.

The major overland flows from the subject lands will be conveyed by public right-of-ways and servicing easements to the proposed stormwater management facilities for treatment. Low Impact Development techniques will be implemented where feasible, to promote infiltration of stormwater and to control (retain) the runoff from 5 mm rainfall on-site per City requirements outlined in the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018).

6.0 UTILITIES

Overhead hydro lines run along the Huntmar Drive right-of-way adjacent to the site. Clearances in accordance with the local authority will need to be observed. It is expected that Hydro One would provide service to the subject lands, however additional consultation is required as part of detailed design.

The closest Enbridge gas infrastructure is believed to be located at the intersections of Huntmar Drive-Palladium Drive and Huntmar Drive-Maple Grove Road and within the existing residential neighbourhoods to the south of the subject lands. Service extending to the site may require connections to multiple existing infrastructure points: consultation with Enbridge gas is required as part of detailed design to confirm the servicing plan for the subject lands.

Rogers Communications has service adjacent to the subject lands via pole-mounted utilities on Huntmar Drive and within the existing residential neighbourhoods to the south of the subject lands. Consultation is required as part of detailed design to confirm servicing plan for the subject lands. Similarly, Bell infrastructure is provided within the existing residential neighbourhoods to the south of the subject lands, and consultation is required as part of detailed design to confirm the servicing plan for the subject lands.

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, including protection of any headwater features and areas governed by the MVCA regulatory limit prior to receipt of permits for proposed alterations.

Silt fence will be installed around the perimeter of the active part of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated. Material stockpiles shall not be permitted within the Feedmill Creek corridor.

Catchbasins will have catchbasin inserts installed during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following 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 entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install catchbasin inserts.
- Plan construction at proper time to avoid flooding.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers.
- Clean and change inserts at catch basins.

8.0 CONCLUSION AND RECOMMENDATIONS

The overall municipal servicing strategy for the subject lands was approved as part of the Kanata West Master Servicing Study (KWMSS) (Stantec, CCL, IBI, June 2006) and can be described as follows:

- Water supply is to be provided through extensions of the existing pressurized trunk watermain system.
- Wastewater is to be conveyed through sanitary trunk gravity sewers to the Kanata West Pumping Station.
- Stormwater runoff is to be conveyed via storm trunk gravity sewers (minor system) and overland flow routes (major system) to designated off-site stormwater management facilities: one new stormwater management pond outletting to Feedmill Creek (Pond 7) and one existing stormwater management pond outletting to the Carp River (Pond 4).

This Functional Servicing Study (FSR) (DSEL, May 2019) provides details on the planned on-site and off-site municipal services for the subject lands, highlights proposed deviations from the KWMSS, and explains that adequate municipal infrastructure capacity is expected to be available for the planned development of the subject lands.

- This FSR proposes alternative alignments for trunk sewer and watermain infrastructure as compared to the KWMSS, to achieve orderly and cost-effective development given the proposed phasing of the subject lands and having regard for how the MSS area has built out since the original 2006 study. Proposed sewer and watermain alignments are within the urban area and within planned municipal road rights-of-way or planned servicing easements. Sanitary flows from the subject lands are proposed to be conveyed in a new wastewater trunk sewer along Huntmar Drive to the existing Maple Grove Road Trunk Sewer and Kanata West Pump Station. Sufficient capacity has been demonstrated for the proposed development of 195 Huntmar in the existing Maple Grove Road Trunk Sewer to accommodate this realignment. A detailed sanitary HGL analysis will be required for all downstream sanitary sewers as part of detailed design, including consideration of catastrophic failure of the KWPS.
- This FSR details the planned location and sizing of Pond 7, which is a new stormwater management wet pond that is to be constructed within the 195 Huntmar site. Pond 7 is to outlet to Feedmill Creek via an outlet pipe and new ditch within lands owned by the Ontario Ministry of Transportation, to gain access to an existing culvert under Highway 417 at its interchange with Palladium Drive. Pond 7 was identified in the approved KWMSS, but the proposed facility footprint is proposed to shift and expand in order to achieve orderly and cost-effective development of the subject lands. The expanded Pond 7 is proposed to receive all stormwater runoff within the part of the subject lands that is west of the North-South Arterial road. The Pond 7 stormwater management system is to be designed to meet MECP Enhanced Level of suspended solid removal before

stormwater is discharged to Feedmill Creek. A maximum 144 L/s 100-year storm event release rate is to be applied to the Pond 7 design, per City of Ottawa direction, to respect the flow regime of Feedmill Creek. As such, Pond 7 is expected to require 28,600 m^3 of storage within the 195 Huntmar site. Pond 7 can be expanded in the future, to accommodate development of the approximately 16.5ha Ontario Ministry of Transportation lands north of the site. The 100-year storm event pond release rate is planned to be 277 L/s after expansion.

- To address the change in flow regime in Feedmill Creek under the proposed Pond 7 plan, a *Feedmill Creek SWM Criteria Study* (Coldwater Consulting Ltd., March 2019) has been prepared to examine the impact of Pond 7 to erosion in Feedmill Creek, and recommends additional in-stream protection measures in Feedmill Creek beyond those originally identified in the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018). In addition, a flood analysis has been prepared (see *Preliminary Kanata West Pond 7 Sizing* (JFSA, February 2019)), showing that water levels may be expected to increase by 7cm on Feedmill Creek and 0cm on the Carp River under the proposed plan and under specific modelling comparisons of the 100-year 12-hour SCS Type II design storm flows, but that all predicted waterlevels are below the 100-year regulatory waterlevels established by MVCA and that all MTO standards are met for downstream infrastructure.
- The remaining subject lands – the North – South arterial and lands east of the arterial - are to drain to Pond 4, via an off-site trunk storm sewer, as planned in the KWMSS. Pond 4 has been constructed under ECA No. 4298-9Q6HQ3 in an interim footprint. Pond 4 is to be expanded to provide Normal Level water quality control, erosion protection, attenuate post-development peak flows to pre-development levels for all storm events up to and including the 10-year storm event, and meet all targets outlined in the *Design Brief for Pond 4, Kanata West, Mattamy Homes (JFSA, December 2014)* that supports ECA No. 4298-9Q6HQ3. Approximately 59,500 m^3 of storage is expected to be required in Pond 4 in the 100-year design storm event to attenuate stormwater runoff to the Carp River to the established release rates and water level requirements. Trunk storm sewers destined to Pond 4 may be able to be downsized from the KWMSS due to the decrease in drainage area, but would need to consider HGL impacts. With the use of current City of Ottawa servicing guidelines, the HGL in the storm sewer system has risen from the values reported in the KWMSS, largely due to the fact that 85 L/s/ha capture was assumed for residential and non-residential lands at the time of the KWMSS.
- To achieve the planned stormwater drainage program, eliminate a 1:100 year floodplain spill hazard identified in the *MVCA Feedmill Creek Floodplain Mapping* (MVCA, January 2017), and meet City of Ottawa guidelines pertaining to road and lot grading, final road grades in the area tributary to Pond 7 are planned to be set to between 107.7m and 109.0m, which requires about 2m – 3m of fill above existing ground.

- Low Impact Development (LID) techniques are to be implemented as part of detailed design to control (retain) the runoff from 5 mm rainfall on-site per City requirements outlined in the *Feedmill Creek Stormwater Management Criteria Study* (JFSA & Coldwater Consulting, April 2018).

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 Official Plan Amendment, Zoning By-law Amendment, and Plan of Subdivision applications. Project-specific approvals are also expected to be required from the City of Ottawa, Ministry of Environment Conservation and Parks, Ministry of Transportation, Department of Fisheries and Oceans, Ministry of Natural Resources and Forestry, and Mississippi Valley Conservation Authority.

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