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SERVICING FEASIBILITY REPORT

PROPOSED INDUSTRIAL WAREHOUSE DEVELOPMENT
2726 MOODIE DRIVE
CITY OF OTTAWA, ONTARIO

Prepared For:

1000198532 Ontario Inc.
1172 Walkley Road
Ottawa, Ontario
K1V 1P7

PROJECT #: 221099

DISTRIBUTION
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Rev 0 - Issued in support of Site Plan Control Application	October 24, 2025
Rev 1 – Response to the City of Ottawa Formal Review Comments	March 3, 2026
Rev 2 – Fire Flow and Water Delivery Procedure Revised	June 8, 2026

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1 INTRODUCTION

Mr. TJ Sohal of 1000198532 Ontario Inc. retained Kollaard Associates Inc. to complete the civil engineering design including site servicing and stormwater management for the proposed industrial warehouse development at 2726 Moodie Drive in the City of Ottawa, Ontario. The proposed development will occupy a mostly vacant parcel of land along the west side of Moodie Drive at Fallowfield Road. For the purposes of this design, Moodie Drive is considered to be oriented along a north south axis.

This brief will address the serviceability of the proposed industrial warehouse development with respect to the water and sanitary demands, as well as outline the proposed design to meet these requirements. The brief will also provide a summary of the stormwater management design.

The development site is an approximately 6.607 hectares (16.3 acres) and resembles a rectangularly shaped parcel with the northwest corner missing. The development site extends about 390 metres west of Moodie Drive with approximately 240 metres of frontage along the south side of Fallowfield Road. The remaining about 150 metres extends behind existing residential development along the south side of Fallowfield Road. The site has approximately 170 metres of frontage along Moodie Drive.

The proposed development will consist of 5 Industrial Warehouse Buildings together with associated parking, roadway and truck turning areas. The proposed warehouses will be oriented parallel to Fallowfield Road with 3 buildings adjacent to Moodie Drive and 2 buildings behind the existing residential lots along Fallowfield Road. Buildings A and B and buildings D and E will be placed back to back to shield the adjacent residential properties from the loading bays and by extension the vast majority of the truck traffic.

The proposed warehouse buildings will consist of the following:

- Building A: 5,158.4 m^2 (includes an office space allotment of 2,380.8 m^2)
- Building B: 6,040.1 m^2 (includes an office space allotment of 2,788.2 m^2)
- Building C: 5,318.3 m^2 (includes an office space allotment of 2,454.6 m^2)
- Building D: 4,797.0 m^2 (includes an office space allotment of 2,380.8 m^2)
- Building E: 5,158.4 m^2 (includes an office space allotment of 2,214.0 m^2)

The proposed buildings will be designed assuming a medium industrial occupancy. There will be no floor grates or drains within the warehouse portion of the buildings.

1.1 Background

The subject property for the proposed development is located along the west side of Moodie Drive south of Fallowfield Road. There is municipal water available along Fallowfield Road. In addition, the site is currently provided with municipal water by means of a 51 mm diameter copper water service extended along Moodie Drive from Fallowfield Road. There are no other municipal services.

The proposed development site is part of the Jock River Watershed. The east side of the site outlets to the Jock River via the roadside ditches along Fallowfield Road and Moodie Drive while the west portion of the site outlets to the Jock River by means of the Monahan Drain. The existing ground surface elevations varies from about 118.1 metres at the crest of the site to about 115 metres at the southwest corner and about 115.5 m along the east side of the site.

The subsurface conditions at the site in general consist of topsoil overlying silty sand and glacial till. The normal groundwater level is expected to range from 1 to 2 metres below the existing ground surface.

1.2 Proposed Servicing

The proposed development will be serviced by means of a private onsite sanitary sewer system, and municipal water. The stormwater requirements will be addressed with a stormwater management facility developed for the site which discharges to the roadside ditch at the northeast corner of the site.

2 STORMWATER MANAGEMENT DESIGN

The stormwater management design for the site has been completed under a separate report Stormwater Management Report, Proposed Industrial Warehouse Development, 2726 Moodie Drive, City Of Ottawa, Ontario prepared by Kollaard Associates Inc, File No. 221099.

The stormwater management for the site consists of controlling the post-development release rate from the stormwater originating on the impervious areas of the site such that the total post-development runoff rate from the site during a 100 year design storm is less than the runoff rate during pre-development site conditions for a 2 year design storm. Quality control requirements consist of an enhanced level of treatment for the runoff discharged from the site.

The stormwater runoff generated on site will be managed by means of low impact development techniques for the perimeter areas of the site as well as a stormwater management facility for the remainder of the site. The stormwater management facility will consist of underground storage tanks in combination with hydrodynamic oil grit seperators and a storage swale which will provide storage and treatment for the runoff from the site. Discharge from the stormwater management facility will be directed to the roadside ditch along Moodie Drive.

2.1 Storm Sewer Design

The proposed storm sewer network was modelled using InterHYD. InterHYD is a storm modelling software which provides a graphical interface for modelling proposed storm sewer networks using rational method calculations to determine pipe network properties. The onsite

storm network was modelled to ensure that the pipe sizes were adequate to convey flows during a 2-year storm event without surface ponding.

As described in the SWM Report, underground storage chambers are provided to allow for the retention of stormwater in order to satisfy discharge criteria. These chambers are to be installed level to allow for infiltration to the underlying soils. To allow for storm sewer calculations, these chambers were ignored and the calculation was undertaken as if standard storm pipes were installed. The resultant storm pipes had very shallow slopes. The contribution to the storm network from the roof drains was assumed to be the maximum allowable release as controlled by the roof drains.

These assumptions ensure that the storm sewer design is adequate to convey runoff to the storage swale without restriction and thus confirms that no surface ponding will occur. The majority of the storm pipes are 375 mm diameter HDPE. The pipes within the section of the storm network from MH-STM 87 through MH-STM 26 and continuing to the outlet in the SWM storage swale are 525 mm diameter HDPE.

Appendix E of this report contains the storm sewer design sheet for the network, a schematic of the storm sewer network and a sub-catchment area drawing for the site.

3 SANITARY DESIGN

Sewage discharges will be domestic in type and in compliance with the City of Ottawa Sewer Use By-law. The anticipated maximum daily sanitary flow will be a total of 1.08 L/s when considering all five buildings on site. There are no municipal sanitary services available at the site or in close proximity to the site.

Sewage treatment and disposal will be provided by a Newterra Clear^3 MBR.ST-105 Pre-Engineered MBR Sewage Treatment System. This self-contained system is housed in a single modular enclosure which will be packaged on an epoxy painted carbon steel skid and placed within the landscaped area near the Moodie Drive entrance to the site. This proprietary system will be approved by the Ministry of Environment Conservation and Parks (MECP) for surface discharge. Discharge from the treatment system will be to the stormwater management facility. Final discharge criteria will be determined by the MECP. A product brochure has been added to this report as Appendix F.

3.1 Sewer Design

Both the storm sewer and sanitary sewer pipes were designed in keeping with the minimum guidelines for burial depth and pipe slope as specified in the City of Ottawa Sewer design guidelines.

3.2 Design Flows

The sanitary sewage flow for the development was calculated based on the Ontario Building Code (O.B.C Table 8.2.1.3B) for the proposed occupancy. The calculations are provided in Table 3.1 on the following page. The office area was obtained from the information provided on the Architectural site plan. For the purposes of the calculations, it was assumed that there would be 10 employees in each unit. It is noted that the calculation sheet indicates that the flow demand for the office space is much greater when calculated using the floor space than when based on the estimated number of employees. Since the sanitary flow demand for office space is governed by the greater of the demand based on floor space or number of employees, the exact number of office employees is not critical.

Final architectural drawings were not available at the time of submission. To ensure sufficient capacity for sanitary flow, calculations were taken with the assumption that each unit took full advantage of the office space and mezzanine space allowable. Standard practice is to exclude common areas such as hallways and staircases from office space calculations using Table 8.2.1.3B. Given that the final locations of these items are not determined at this time, a conservative estimate of 20 square metres per unit was deducted from the total office space for the development.

Table 3.1 Sanitary Flow Demand Calculations

	Establishment	*Office Floor*	*Quantity*	*Volume, L*	*Flow*
Building A					
	Office Building				
	a) per employee per 8 hour shift, or		52	75	3,900 L/day
x	b) per each 9.3 m^2 of floor space	2380.8	256	75	**19,200** L/day
	Warehouse				
x	a) per loading bay, and		11	150	**1,650** L/day
x	b) per water closet		0	950	**0** L/day
BUILDING B					
	Office Building				
	a) per employee per 8 hour shift, or		64	75	4,800 L/day
x	b) per each 9.3 m^2 of floor space	2788.2	300	75	**22,500** L/day
	Warehouse				
x	a) per loading bay, and		13	150	**1,950** L/day
x	b) per water closet		0	950	**0** L/day
BUILDING C					
	Office Building				
	a) per employee per 8 hour shift, or		64	75	4,800 L/day
x	b) per each 9.3 m^2 of floor space	2454.6	264	75	**19,800** L/day
	Warehouse				
x	a) per loading bay, and		11	150	**1,650** L/day
x	b) per water closet		0	950	**0** L/day
BUILDING D, E					
	Office Building				
	a) per employee per 8 hour shift, or		168	75	12,600 L/day
x	b) per each 9.3 m^2 of floor space	4428	477	75	**35,775** L/day
	Warehouse				
x	a) per loading bay, and		20	150	**3,000** L/day
x	b) per water closet		0	950	**0** L/day
ALLOVANCE FOR STAIRS					
	Office Building				
	a) 10 sqare metres on each floor for stairs	1500	162	75	-12,150 L/day

Total Daily Sewage Design Flow =	**93,375 L/day**

A sewage system application to the Ministry of Environment, Conservation and Parks will be prepared and coordinated with Newterra Corporation Inc.

It is noted that the post development release rate from the stormwater management facility during a 25 mm 4 hour Chicago Storm is 28 L/s. As such an average flow rate of 93,375 L/day (1.08 L/s) from the treatment unit into the stormwater management facility is insignificant.

3.3 Sanitary Service Laterals

A maximum daily sewage flow of 93,375 L/day results in a maximum daily flow of 1.08 L/sec and a peak hourly flow of about 1.73 L/s. The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." The capacity of a proposed 200 mm diameter PVC sanitary sewer lateral at a minimum slope of 1% is 32.8 L/sec. Since 0.65 x 32.8 = 21.3 L/s is much greater than 1.73 L/sec, service laterals of 200 mm diameter at a minimum 1% slope will be sufficient.

3.4 Sanitary Service Main

A proposed private 200 mm diameter sanitary sewer main will be extended along the main drive aisle in the centre of the site. A 200 mm diameter sanitary sewer lateral will be extended from each building to the sanitary main. The main will discharge by gravity to a lift station designed as part of the Newterra Treatment System to distribute the sanitary flow to the treatment system.

4 WATERMAIN DESIGN AND WATER DEMAND

The existing water lateral consists of a 51 mm diameter copper service which extends along Moodie Drive to the existing single family dwelling. The dwelling is to be demolished as part of the development. The proposed development will be also provided with a 150 mm diameter water service connection to the existing 150 mm watermain along Fallowfield Road.

Both services will be connected by means of a "T" connection. Building A will be provided with a 150 mm connection. The remainder of the buildings will be provided with separate connections from the mechanical room of Building A for domestic cold water and sprinkler flow. These connections are shown on the Site Servicing Drawing 221099 – SER.

The water demand for the site consists of three parts which include: domestic water consumption, sprinkler flow allowance, and fire flow requirement.

4.1 Fire Flow Requirement

4.1.1 Boundary Conditions

4.1.1.1 2023 Request

The water demand due to occupancy (domestic water demand) together with the fire flow requirements were provided to Water Services at the City of Ottawa on June 9, 2023.

The information provided as part of the report was as follows:

Amount of Fire Flow: 216.7 L/s (without firewalls)
Amount of Fire Flow: 86.7 L/s (with firewalls)
Sprinkler Demand: 53 L/sec
Average daily water demand: 2.68 L/s
Maximum daily water demand: 4.01 L/s
Maximum Hourly water demand: 7.23 L/s
Peak sanitary flow: N/A – Private Septic System

4.1.1.2 2023 Provided

The following are the boundary conditions, HGL, for hydraulic analysis that were provided by Water Services of the City of Ottawa in response to the above indicated peak hourly demand and fire flow demand.

Results:
Connection 1 - Moodie at Fallowfield

Demand Scenario	Head (m)	Pressure[1] (psi)	Flow Rate * (L/s)
Maximum HGL	153.3	51.3	0
Peak Hour	149.0	45.3	7.2
Max Day plus Fire Flow #1	140.5	33.1	91
Max Day plus Fire Flow #2	133.1	22.6	124
Max Day plus Fire Flow #3	N/A	< 0	221

[1] Ground Elevation = 117.2 m

*The column Flow Rate has been added, for simplicity, to the table provided by Water Services and represents the flow from the demand scenario.

It is noted that this table clearly shows that there is insufficient municipal water supply available to meet a flow demand of 221 L/s as the residual pressure at the proposed connection during a flow demand of 221 L/s is less than zero. It is considered that due to the insufficiency of municipal water supply to the site, the development for fire water calculations is considered to be rural.

4.1.1.3 2025 Request

To confirm the continued suitability of the municipal network to service the development, the water demand due to occupancy (domestic water demand) together with the fire flow requirements were provided to Water Services at the City of Ottawa on November 13, 2025.

The information provided as part of the report was as follows:

Amount of Fire Flow: 105 L/s (with firewalls)
Sprinkler Demand: 56.3 L/sec
Average daily water demand: 2.68 L/s
Maximum daily water demand: 4.01 L/s
Maximum Hourly water demand: 7.23 L/s
Peak sanitary flow: N/A – Private Septic System

The fire flow and sprinkler calculations were revised following the request for boundary conditions. It is noted that the domestic water demands provided to Water Services remains unchanged.

4.1.1.4 2025 Provided

The following are the boundary conditions, HGL, for hydraulic analysis that were provided by Water Services of the City of Ottawa in response to the above indicated peak hourly demand and fire flow demand.

Results:

Connection 1 - Moodie at Fallowfield

Demand Scenario	Head (m)	Pressure[1] (psi)	Flow Rate * (L/s)
Maximum HGL	153.4	51.4	0
Peak Hour	147.6	43.2	7.2
Max Day plus Fire Flow #1	135.8	26.4	109
[1] Ground Elevation =	117.1	m	

*The column Flow Rate has been added, for simplicity, to the table provided by Water Services and represents the flow from the demand scenario.

It is noted that this table shows that the available pressure for domestic flow results in sufficient pressures for domestic flow, however the pressure is near the lower limit for recommended pressures. The residual pressure for fire flow along with further changes to the fire flow calculations in the interim, combined with the results from the 2023 request, confirm that the site will be treated as a rural development for the purposes of fire water storage calculations.

4.1.2 Calculation Procedure - Fire Water Storage Design Rationale

For the City of Ottawa, water demand requirements for fire protection are governed by Section 4.2.11 of the Ottawa Design Guidelines – Water Distribution. For rural areas where the municipal network is not capable of providing the required flow for fire fighting, Appendix J provides guidance on the parameters which will determine whether fire storage should be calculated using FUS calculations or with calculations according to the Ontario Building Code (OBC).

As this site does not meet the requirements for FUS Superior Tanker Shuttle, OBC method is recommended to calculate the fire flow. These calculations are discussed further in the next section. The result of those calculations indicates that the required flow rate is 9,000 litres per minute. This results in a storage volume requirement equal to the storage volume requirement as per OBC calculations.

4.1.3 Building Construction and Construction Type Consideration

The proposed buildings are steel frame warehouse buildings with accessory office use. The buildings will be constructed with unprotected non-combustible structural systems and non-combustible exterior walls.

The warehouse portion of each building will be a single storey with a building height of approximately 7.6 metres. The buildings vary in size and number of units. The buildings may be occupied by one or more tenants. If a single building is occupied by one tenant, there is a potential that there are no dividing walls between units. The accessory office portion will be one storey with the potential for a mezzanine above the office or a second storey office area. If the office portion is two stories it will be constructed with a minimum fire resistance rating of 1 hour on all walls and ceilings. It is understood that there are no plans to provide fire resistance ratings for the steel columns or roof system. Since the structural steel members will not have a fire resistance rating, the buildings will be considered to be ordinary construction.

4.1.4 OBC Fire Water Storage Requirements

The fire flow demand calculation has been included in Appendix A. Calculations were completed for Building B which is the largest proposed building. Building B has a building footprint of 4,647 square metres which translates to a building volume of 35,317 cubic metres. According to the provided OBC calculations the minimum water supply requirement for firefighting purposes is 600,392 litres and the minimum flow rate is 9,000 litres per minute. It is noted that according to Appendix J, this volume is subject to a special consideration from Ottawa Fire Services and the Development Review team.

4.2 Sprinkler Flow Allowance

The sprinkler flow allowance is ultimately determined by the Mechanical Engineer during design for building permit purposes. For the purposes of verifying the adequacy of the available water supply and the required building service size, the sprinkler flow allowance has been determined in keeping with NFPA 13.

The sprinkler flow was calculated by Massoud Yazdani, P.Eng. who has been contracted to provide mechanical engineering services for the project. As per those calculations, the maximum demand for the sprinkler system will not exceed 63 L/s.

4.3 Domestic Water Demand

The water demand for the proposed development was calculated based on the City of Ottawa Water Distribution Design Guidelines (as amended) as follows:

Industrial

The water demand was calculated as follows:
Industrial Property 35,000 L/ha/day x 6.607 ha = 231.65 m3/day = 2.63 L/sec
Max day = 2.63 L/s x 1.5 = 4.01 L/s
Max hour = 4.01 L/s x 1.8 = 7.23 L/s

4.4 Combined Total Flow Demand

The peak hourly demand is 7.2 L/s
The fire flow demand is 105 L/s
The sprinkler demand is 63 L/s

Total Fire Flow Demand + sprinkler demand = 168 L/s
Peak hourly + sprinkler demand = 70.2 L/s

Total Water Demand is 175.2 L/s.

Since the available flow at 22.6 psi is 120.0 L/s there is insufficient water supply to meet the total water demand.

4.5 Water Service Requirements and Pressure Loss Calculations

The maximum and minimum pressures were determined at the ground floor level of buildings A and E. These buildings represent the connections closest to the boundary conditions and the furthest away. The pressure losses were first calculated assuming a single 152mm diameter service. This set of calculations is indicated on the Water Pressure Loss Calculation Sheet included in Appendix D by the label single feed. Using the provided HGL at peak flow of 149 m,

a flow rate of 7.2 L/s was determined to result in minimum pressures of 299 kPa, and 296 kPa for buildings A, and E respectively.

Using the provided HGL of 140.5 m for a flow rate of 87 L/s and linear interpolation, a flow rate of 70.2 L/s was determined to result in a HGL of 142.4 m.

The pressure loss to the mechanical room of the proposed buildings was calculated using Bernoulli's Equation in Combination with the Darcy – Weisbach Equation and the Colebrook Equation. The equations are shown below.

$$H_P + Z_1 - Z_2 + \frac{P_1 - P_2}{S} + \frac{V_1^2 - V_2^2}{2g} = h_f + h_m \quad \text{where:}$$

$$h_m = K_m \frac{V^2}{2g} \qquad \mathrm{Re} = \frac{VD}{\nu} \qquad Q = VA \qquad A = \frac{\pi}{4} D^2$$

$$\text{Darcy – Weisbach Equation: } h_f = f \frac{L}{D} \frac{V^2}{2g} \quad \text{where:}$$

$$\text{If laminar flow } \left(\mathrm{Re} < 4000 \text{ and any } \frac{e}{D}\right), \quad f = \frac{64}{\mathrm{Re}}$$

$$\text{If turbulent flow } \left(4000 \le \mathrm{Re} \le 10^8 \text{ and } 0 \le \frac{e}{D} < 0.05\right), \text{ then}$$

$$\text{Colebrook Equation: } \frac{1}{\sqrt{f}} = -2.0 \log\left(\frac{e/D}{3.7} + \frac{2.51}{\mathrm{Re}\sqrt{f}}\right)$$

Head loss calculations for the proposed water mains are presented in Appendix D.

Calculations were initially completed using a single watermain extended from the proposed connection to the municipal watermain to the mechanical room in each building. The results of the calculations show that the pressure loss along the single watermain, when starting with an HGL of 142.4 m and a flow rate of 70.2 L/s results in pressures ranging from less than 0 kPa to 118 kPa (17 psi). This indicates that there is insufficient pressure and water supply within the existing municipal watermain to meet the sprinkler flow requirements when using a single connection together with a single 152 mm watermain servicing the proposed buildings.

The calculations were then completed in consideration of looping the proposed watermain around the site in combination with two service connections. This set of calculations is indicated by the Label Looped Feed on the Water Pressure Loss Calculation Sheet. With a looped watermain, an HGL of 143 m and a flow rate of 70.2 L/s resulted in residual pressure of 186 kPa (27 psi) for Building A. For Building E the residual pressure is 129 kPa (19 psi).

Based on the results of the analysis as presented in the appendix, when using 152 mm diameter service mains, the provided minimum and maximum HGL provide water pressures of between 296 KPa and 344 KPa at the proposed warehouse buildings when considering only domestic water demand.

The minimum residual pressure, calculated at ground floor level, when there is sprinkler demand would be 186 kPa in Building A, which is below the minimum recommended pressure of 276 kPa but above the minimum residual pressure of 141 kPa (20 psi). The minimum pressure for Building E would be 129 kPA (19 psi).

Based on the lack of available pressure and flow to Building E, the sprinkler system will be pressurized from the mechanical room of Building A. A fire pump will be installed in the mechanical room of Building A to service the sprinkler flow demand for each individual building.

Based on the above calculations and in consultation with the mechanical engineer for the project, a booster pump was recommended for the domestic cold water for the site. In consideration of the proposed building sprinkler demand, the booster pump will be designed to provide pressurized domestic cold water flow to the entire site from the mechanical room of Building A.

Calculations were additionally undertaken by the mechanical engineer for the project and are presented in the report attached to this report as Appendix B.

4.6 Existing Fire Hydrants

There are two municipal hydrants in the general area of the site. The first hydrant consists of a Class C fire hydrant (orange painted cap) across Moodie Drive approximately 100 metres east of Building B. The second hydrant consists of a Class AA fire hydrant (blue painted cap) more than 550 metres west of the site entrance to Fallowfield Road. From Technical Bulletin ISTB-2018-02 a Class AA fire hydrant is assumed to provide a maximum capacity of 1000 gpm when between 76 and 152 metres from a building. A Class C fire hydrant will produce somewhat less flow at this distance. A hydrant beyond 305 metres cannot be relied on to produce any flow. Given that the water demand is more than 4,500 gpm, the two municipal hydrants in the area are not considered adequate for the needs of the proposed development and cannot make any significant contribution to the fire flow demand.

In addition, as indicated above, there is not sufficient flow within the existing 150 mm diameter watermain to which the hydrants are connected to meet the fire flow requirements for the proposed development.

4.7 Proposed Firefighting Water Supply and Hydrants

Since there is insufficient pressure and flow within the municipal system to meet the fire water demand for firefighting purposes, onsite fire water storage is proposed.

It is proposed that this volume will be stored in a cast in place concrete storage tank within the landscaped island west of Building A. The fire water storage tank will be filled from the municipal water supply at a controlled rate. An isolation valve will be used to ensure that there is no contamination of the municipal water from the stored fire water. Water will be withdrawn from the storage tank by means of a dry hydrant connected to the storage tank. A remote fire protection – supply main complete with hydrants will be installed independent of the water main used to meet the domestic water and sprinkler requirements for the site. The proposed fire hydrants will be connected to the fire protection supply main in keeping with STD W54. The fire protection – supply main will consist of 200 mm PVC DR18 C900 Class 235 gasketed pressure pipe. Fire hydrants will be connected to the supply main using factory tees and 152 mm diameter leads.

5 CONCLUSIONS

The sanitary demand for the proposed development will be met by a private Newterra Clear3 MBR.ST-105 Pre-Engineered MBR Sewage Treatment System. This system will treat the sanitary sewage such that the effluent can be discharged into the stormwater storage facility. Since the flow rate is greater than 10,000 L/day, and application will be made with MECP for the sewage system.

The proposed buildings will be serviced by a private 200 mm diameter PVC sanitary main which will direct the effluent from each building to a sanitary lift station associated with the Newterra MBR System. Each building will be provided with a 200 mm diameter sanitary service lateral which connects to a proposed sanitary manhole.

The domestic water demand and the water demand for the sprinkler system will be met with municipal water. The municipal water will be distributed to Building A by means of a gasketed PVC DR18 C900 Class 235 private main. The private main will be connected to the existing municipal watermain at 2 locations as the average daily demand for the development exceeds 50 m^3/day.

The domestic cold water and sprinkler flow will be distributed to each building on the site from the mechanical room within Building A. Connections from Building A to the other buildings on site will be made using PVC DR18 C900 Class 235 gasketed pressure pipe.

The water demand for firefighting purposes will be met with underground water storage placed west of Building A. The water for firefighting will be distributed throughout the site by means of a fire protection – supply main (CofO STD W54) which will consist of 200 mm PVC DR18 C900 Class 235 gasketed pressure pipe.

This report provides a summary of the stormwater management design presented under separate cover. Based on the analysis and summary provided under separate cover, the conclusions are as follows:

Stormwater management for the site has been designed to ensure that post-development runoff rate from the site during a 100 year storm event does not exceed the pre-development runoff rate during a 2-year design storm of the same duration. Stormwater storage will be provided on site and released at a controlled rate. Discharge will be directed to the roadside ditch along Moodie Drive. Quality control will be provided by means of sedimentation and vegetative filtration within the stormwater storage swale.

We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report please do not hesitate to contact our office.

Sincerely,
Kollaard Associates Inc.

Steve deWit, P.Eng.

Appendix A – Fire Flow Demand Calculations Using OBC

APPENDIX A: FIRE FLOW REQUIREMENTS

Client:	**1000198532 Ontario Inc.**
Job No.:	**221099**
Location:	**2725 Moodie Drive, Ottawa, ON**
Date:	**June 8, 2026**

Fire Water Storage and Supply Flow Rate Requirements

The following equation from the latest version of the Ontario Building Code (2024) was used for calculation of the on-site supply rates required to be supplied by the hydrants.

Formulae:

$$Q = KVS_{Tot}$$

$$S_{Tot} = 1.0 + [S_{side1} + S_{side2} + S_{side3} + S_{side4} + ...]$$

OBC Classification of Building Use	Group, Division	Residential Group C		
Assumed Type of Construction	Combustible with Fire Separations	Buidling is of Combustible construction with fire separations and fire resistance ratings provided in accordance with Subsection 3.2.2 including Loadbearing walls, columns and arches.		
Water Supply Coefficient (Table 1, OBC)	K	17		
Exposure Distance 1		>10	m	
Exposure Distance 2		>10	m	
Exposure Distance 3		>10	m	
Exposure Distance 4		>10	m	
Spatial Coefficient 1	Sside	0		
Spatial Coefficient 2	Sside	0		
Spatial Coefficient 3	Sside	0		
Spatial Coefficient 4	Sside	0		
Total Spatial Coefficient	Stot	1		
Average Building Height	H	7.6	m	
Building Footprint	A	4,647	sq.m	
Total Building Volume	V	35,317	cu.m	
Minimum Supply of Water	Q	600,392	L	
Required Fire Flow	Qf	9000	L/min	*per Table 2 on A-3.2.5.7 of the OBC*
		150	L/s	
		2378	US gpm	

OBC - Table 2 of A-3.2.5.7. REQUIRE MINIMUM WATER SUPPLY FLOW RATE (L/min)		
Qf =	2700	If Q ≤ 108 000 L
Qf =	3600	108 000L < Q ≤ 135 000 L
Qf =	4500	135 000L < Q ≤ 162 000 L
Qf =	5400	162 000L < Q ≤ 190 000 L
Qf =	6300	190 000L < Q ≤ 270 000 L
Qf =	9000	Q > 270 000 L

Appendix B – Report on Water Flow and Water Pressure at Building A

Proposed industrial warehouse development
2726 Moodie Drive, Ottawa, Ontario
Report on water flow and water pressure at building ‘A’
Mirriton Ltd.

We have calculated the water flow and pressure at the building ‘A’ and the result are explained hereafter:

As per “Servicing Feasibility Report” the domestic water demands are as follow::

Average daily water demand: 2.68 L/s
Maximum daily water demand: 4.01 L/s
Maximum Hourly water demand: 7.23 L/s
Peak sanitary flow: N/A – Private Septic System

as per our calculation the maximum sprinkler demand is 63 l/s (1000 GPM)

Therefor the maximum demand for domestic use and sprinkler is 70.23 l/s

As per “Servicing Feasibility Report” the Boundary condition is summarized in the ffollowing table:

Demand Scenario	Head (m)	Pressure[1] (psi)	Flow Rate * (L/s)
Maximum HGL	153.3	51.3	0
Peak Hour	149.0	45.3	7.2
Max Day plus Fire Flow #1	140.5	33.1	91
Max Day plus Fire Flow #2	133.1	22.6	124
Max Day plus Fire Flow #3	N/A	< 0	221

[1] Ground Elevation = 117.2 m

With 150 mm service pipe the water pressure at the building ‘A’ would be 35psi minus 7.6 pressure drop= 27.4 psi
Assuming the water main being at 2m below grade, building floor being 1m above the grade at water connection point and fire pump inlet 1m above the floor then the pressure drop due to differences of elevation between city main and inlet of fire pump would be: 4m (5.68 psi) so the result would be 1115 gpm @ 21.72 psi

at this pressure the fire pump is able to work.
On the other hand domestic cold water pressure is low and fixture are not able to work properly. To overcome this problem a domestic booster pump system is required to be installed

Appendix C – Correspondence with City of Ottawa

- 2023 Boundary Conditions
- 2025 Boundary Conditions

Boundary Conditions
2726 Moodie

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	161	2.7
Maximum Daily Demand	241	4.0
Peak Hour	434	7.2
Fire Flow Demand #1	5,220	87.0
Fire Flow Demand #2	7,200	120.0
Fire Flow Demand #3	13,002	216.7

Location

Results

Connection 1 - Moodie at Fallowfield

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	153.3	51.3
Peak Hour	149.0	45.3
Max Day plus Fire Flow #1	140.5	33.1
Max Day plus Fire Flow #2	133.1	22.6
Max Day plus Fire Flow #3	N/A	< 0
[1] Ground Elevation =	117.2	m

Notes

1. BC results represent governing head under existing and future pressurezone reconfiguration.
2. BC results did not consider upsizing existing watermains on Moodie or new connections to the 610 mm backbone watermain.
3. Head loss calculations for new watermains extended from the boundary condition location must be provided.
4. The average day demand for this site exceeds 50 m3/day. As such, two feeds are required to avoid the creation of a vulnerable service area.

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

Boundary Conditions
2726 Moodie

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	161	2.68
Maximum Daily Demand	241	4.01
Peak Hour	434	7.23
Fire Flow Demand	6,300	105.00

Location

Results

Connection 1 –Moodie Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	153.4	51.4
Peak Hour	147.6	43.2
Max Day plus Fire Flow #1	135.8	26.4

[1] Ground Elevation = 117.1 m

Notes

1. Demands for proposed connections at Fallowfield Road and off the 51mm WM on Moodie Drive were assigned to upstream junction at Fallowfield Road & Moodie Drive off the public looped watermains. The engineer must calculate headloss off the proposed future watermain network.
2. Per the OWDG Tech Bulleting ISTB-2021- 03 Section 4.3.1.:
    a. Industrial, commercial, institutional service areas with a basic day demand greater than 50 m^3/day (0.58 L/s) and residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains, separated by an isolation valve, to avoid the creation of a vulnerable service area. Individual residential facilities with a basic day demand greater than 50 m3/day shall be connected with a minimum of two water services, separated by an isolation valve, to avoid the creation of a vulnerable service area.
3. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

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

Pre-Application Consultation Meeting Notes

Property Address: 2726 Moodie Drive
PC2022-0302
December 6, 2022, Microsoft Teams

Attendees:
Erica Ogden, Planner, City of Ottawa
Brian Morgan, Project Manager, City of Ottawa
Matthew Hayley, Environmental Planner, City of Ottawa
Tessa Di Iorio, Hydrogeologist, City of Ottawa
Selma Hassan, Urban Design, City of Ottawa
Adiva Saadat, Student Planner, City of Ottawa
Eric Lalande, Rideau Valley Conservation Authority

Paul Robinson, P H Robinson Consulting
TJ Sohal, HIE Ottawa
Ralph Wiesbrock, KWC Architects Inc.
Renee Reder, KWC Architects Inc.
Arthur Gordon, Castle Glenn Consulting
Steve deWit, Kollaard Associates
Bill Kollaard, Kollaard Associates

Regrets:
Mike Giampa, Transportation, City of Ottawa
Anissa McAlpine, Parks Planner, City of Ottawa

Subject: 2726 Moodie Drive

Meeting notes:

Overview of Proposal

- The proposal includes plans to construct three (3) warehouse buildings that will each have a section of office space. There will be a total of 17 rentable units (including 3 cold storage) in 3 buildings, 205 vehicular parking spaces, and 17 oversized loading spaces. Access to the site is proposed to be on Fallowfield and Moodie. Large transport trucks servicing the warehouse space will use the Moodie access as it is the minor street and to be as far away from the traffic lights, and the regular vehicle access will be off Fallowfield, the major street.

Preliminary comments and questions from staff and agencies, including follow-up actions:

- Planning
  - Official Plan
    - The subject property is designated Rural Industrial and Logistics on Schedule B9 of the City of Ottawa Official Plan.
      - Policy 9.3.1 (2) Development on lands designated as Rural Industrial and Logistics shall consider the following:
        a) Building design, Site layout and landscape in a way that maintains and enhances the rural identity and feel of the area in which such development takes place;
        b) Appropriate screening from public roads and adjacent properties using natural vegetation, preferably existing vegetation where possible;

c) Outdoor amenity areas for employees and landscaping that supports the City's tree canopy targets; and
d) Accesses are designed to minimize hazards between the road on which the development fronts and its vehicular points of access.

- Zoning By-law
  - The subject property is zoned Rural General Industrial, with a rural site-specific exception 886 (RG[886r])
  - The exception provision permits the following additional land uses, agricultural use and detached dwelling.
  - Permitted uses include light industrial uses, truck transport terminal, and warehouse.
  - It is noted that Office as an independent use is not permitted with the RG zone. If Office use is proposed a Zoning By-law Amendment will be required.
  - Outside storage is not permitted within any required front yard or corner side yard. Outside storage must be screened from abutting residential uses or zones and public streets by an opaque screen at least 1.8 m in height from finished grade.
  - Parking
    - Light Industrial Use - 0.8 per 100 m^2 for the first 5000 m^2 of gross floor area & 0.4 per 100 m^2 above 5000 m^2 of gross floor area
    - Truck Transport Terminal - 0.8 per 100 m^2 of gross floor area
    - Warehouse - 0.8 per 100 m^2 for the first 5000 m^2 of gross floor area & 0.4 per 100 m^2 above 5000 m^2 of gross floor area
  - Loading spaces are required. For 25,000 m^2 and over a total of 3 are required. Oversized vehicle loading spaces will also be required. 1 space for the first 5,000 square metres plus all required spaces for gross floor area exceeding 5,000 square metres
  - Accessible parking spaces are required, 3 required for between 200-299 parking spaces or 2 for 100-199 parking spaces.
- Discussion
  - Screening and buffers will be required for the adjacent rural residential uses.
  - Consider vehicular access to the site and minimize personal vehicle and transport truck interactions.
  - Drive aisles should be avoided along the shared property lines with the Rural Residential lots.
  - Submission Requirements
    - Archaeological Impact Assessment
    - Landscape Plan
    - Planning Rationale
    - Site Plan

- Urban Design
  - A Design Brief is required with the application submission. The Terms of Reference is attached; all the items highlighted in yellow must be addressed.

  Building Design
  - Despite the warehouse use, the architectural treatment will be important due to the high visibility of the site from the surrounding roads.
  - The submission drawings need to clearly show the location of all building entries.

Parking and Circulation

- While the number of provided parking spaces (205) is not much greater than the number required (192), it is suggested that the proposal show only 192. The space from the 13 spots can be used to provide larger sidewalk / maneuvering space adjacent to the accessible spots and at the ends of rows.
- It is suggested that the pedestrian walkways in front of buildings be at least 2m in width.

Landscape

- The submission drawings (Site Plan and Landscape Plan) need to clearly show the paved areas and also the areas proposed for planted buffers along the property lines.
- Significant vegetative screening around all of the site (frontage and interior yards) will be required. This is supported by Official Plan policies:
  - 5.5.1 (1) and (2) which speak to a rural pattern / character of built form and site design, the character of access to a site and landscaped frontages
  - 9.3.1 (1) which speaks to supporting the OP canopy targets
  - 9.3.1(2) which requires appropriate screening from public roads and adjacent properties

- Engineering
  - Water
    - As the applicant plans to connect to City water, please provide the City with the information necessary for the calculation of Boundary Conditions. The City understands that the water demand will include: building water supply, fire protection, and landscape watering.
    - What is the plan for Fire Protection? Are fire hydrants being proposed? Will sprinklers be installed? The applicant should contact Allan Evans (Allan.Evans@ottawa.ca) with Ottawa Fire Services for more information.
    - Please confirm that the applicant plans to blank (remove) the existing 51mm water connection on Moodie Drive.
    - Any existing wells on the site must be identified and decommissioned as per O.Reg 903.
    - Plans should include the approximate location of neighbouring wells and septic systems. These services must be protected from any rainwater runoff or any potential contamination from this site.
  - Septic System
    - Regarding septic systems please note that:
      - applications with a Septic Design rate BELOW 10,000 Litres require an OSSO permit and approval before site plan approval. No MECP permit required.
      - applications with a Septic Design rate ABOVE 10,000 Litres require an MECP ECA approval after site plan approval. ECA approvals typically have a wait time of 9 to 11 months. No OSSO permit required.
    - There is no sanitary or storm sewer service available on either Moodie Drive or Fallowfield Road.
  - Stormwater
    - Be advised that the extensive area of hard pavement may generate a large amount of surface runoff. This runoff is not allowed to be directed onto neighbouring properties. How will this runoff be directed to the stormwater management pond and is the proposed pond large enough to deal with it?

- The stormwater management criteria for this site will be 100-yr post to 2-yr pre-development.
- Please include the 2-year and 100-year flood line contours on the Stormwater Management Pond or ditches. Note that the finished floor must be 300mm above this level.
- As stated by the representative from the RVCA, enhanced protection is required for stormwater runoff. This amounts to 80% total suspended solids (TSS) removal.
- An ECA from the MECP for stormwater management is required.
- Will these units have floor drains in them? Where will these outlet too? If floor drains are being directed to the septic system, please make sure this is clear in your ECA application to the MECP.

- Other
  - Please note that there is an Enbridge natural gas line along the south side of Fallowfield Drive.
  - The City will require an Exterior Lighting Certificate certified by a qualified engineer.
  - Any portion of the subject property which is intended to be used for permanent or temporary snow storage shall be as shown on the approved Site Plan and Grading Plan. Snow storage shall not interfere with approved grading and drainage patterns or servicing.
  - Fire Routes now require designation with By-law through the Site Plan application process by contacting fireroutes@ottawa.ca
  - The Geotechnical report should clearly state whether sensitive marine clays are present on this site, or not.

- Hydrogeology
  - A hydrogeological and terrain analysis (HGTA) report is required to support the private servicing (wells and septic systems). HGTA report must meet the requirement of the City's Hydrogeological and Terrain Analysis Guideline Guidelines (March, 2021); requirements related to zoning bylaw amendments are listed in Section 5.0.
  - It is understood that the site will be serviced with municipal water, this must be confirmed though the servicing study. No well assessment is required if the site will be serviced with municipal water; however if servicing with municipal water is no feasible then a well assessment well be required as per City HGTA Guidelines.
  - Any existing wells onsite should be decommissioned, as per O.Reg. 903; an MECP well decommissioning record should be provided as confirmation.
  - Most of the residential development along Fallowfield near the site are serviced with municipal water, however there are a few residences along Fallowfield and in the surrounding area that depend on well water for their drinking water supply, thus it is important that the groundwater aquifer be protected in the long-term. The HGTA report should describe the proposed activities onsite and identify how the aquifer will be protected in the long term; this may include enhanced stormwater management, preparation of a spills prevention and spills response plan, etc.
  - Note that the site lies within the Jock River Subwatershed Study area and is along the edge of the Kars esker, a sensitive groundwater feature. The Jock River Subwatershed Study includes recommendations for infiltration best management practices to protect the aquifer, this recommendation must be considered during the design of stormwater management features and should be referenced and considered in ECA applications.
  - Septic impact assessment:

        - It is understood that the total septic flows for the site will be greater than 10,000 L/day, thus an ECA from the MECP will be required for the septic system to ensure that the septic effluent does not impact the local aquifer. A Reasonable Use Assessment will be submitted to the MECP as part of the ECA application. Note that if septic flows are less than 10,000 L/day then the septic assessment will be required as per City Guidelines.
        - The septic design and reasonable use assessment must be provided as part of the Site Plan Control application to ensure that the septic design is feasible.
        - It is understood that aggressive septic treatment is proposed for the site (to be reviewed by the MECP as part of the ECA application), and treated effluent is proposed to be discharged to the adjacent ditch; it is understood that the discharge will be covered under an ECA. An assessment should be provided to discuss the potential impact of the discharge to the ditch to ensure that potential downgradient impacts are minimal.
    - Technical consultation with the hydrogeological report reviewer is available with the hydrogeological consultant prior to starting field work to help scope onsite assessment and report requirements. Please contact the City hydrogeologist, Tessa Di Iorio (Tessa.diiorio@ottawa.ca) to schedule a technical consultation.

- Transportation
    - A TIA is warranted, please proceed to scoping. Steps 3 and 4 can be combined.
    - The application will not be deemed complete until the submission of the draft step 2-4, including the functional draft RMA package (if road mods are required).
    - Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended.
    - Synchro files are required at Step 4.
    - ROW protection on Fallowfield and Moodie is 34m and 30m, respectively.
    - A road Noise Impact Study is required if there is office use.
    - The throat length requirements should follow the TAC guidelines for arterial roads.

- Environmental
    - Environmental Impact Statement (EIS)
        - Triggered because the site is within 120 m of a significant woodland (the Monaghan Forest which is 25 m north of the site). The largest concern here is with light impacts to wildlife living in the woodlands and would ask the consultant to consider in their EIS how to reduce light pollution.
        - The site may also have habitat for endangered and threatened species (e.g., butternut tree and tall grass bird species like the bobolink)
    - Tree Conservation Report (TCR)
        - Of particular concern is the boundary trees.
        - There is a significant tree located near where the stormwater management pond is proposed, it would be a nice asset to this site if the tree could be retained as part of the stormwater management pond.

- Parks
    - The Owner shall pay cash-in-lieu of parkland in accordance with the Parkland Dedication By-law of the City of Ottawa, as well as the fee for appraisal services. The monies are to be paid at the time of issuance of first building permit for the site.
    - For Industrial development, the parkland dedication rate is 2% the gross land area. Please provide a surveyor's certificate to confirm the land area of the property in hectares to three decimal places.

        - The land area for which the value of parkland dedication is to be provided, is to be indicated in the site plan agreement.
        - The value of the land shall be determined by market appraisal approved by the City, and appraisals submitted to or obtained by the City for the purposes of this by-law.
        - Please contact the parks planner at anissa.mcalpine@ottawa.ca should you have any questions on the above.

    - City Surveyor
        - The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.
        - Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.
        - Questions regarding the above requirements can be directed to the City's Surveyor, Bill Harper, at Bill.Harper@ottawa.ca

    - Conservation Authority
        - The RVCA requires enhanced water quality protection (80% TSS removal to be achieved on-site).
        - There are no natural hazards identified on site.

Submission requirements and fees

- A Complex Rural Site Plan application is required.
- The enclosed list of reports and plans are required.
- Additional information regarding fees related to planning applications can be found here.
- Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- All PDF submitted documents are to be unlocked and flattened.

Next steps

- You are encouraged to discuss the proposal with the Councillor, community groups and neighbours.
- It is anticipated that, as a result of the *More Homes for Everyone Act, 2022*, for applications for site plan approval and zoning by-law amendments, new processes in respect of pre-application consultation will be in place as of January 1, 2023. The new processes are anticipated to require a multiple phase pre-application consultation approach before an application will be deemed complete. Applicants who have not filed a complete application by the effective date may be required to undertake further pre-application consultation(s) consistent with the provincial changes. The by-laws to be amended include By-law 2009-320, the Pre-Consultation By-law, By-law 2022-239, the planning fees by-law and By-law 2022-254, the Information and Materials for Planning Application By-law. The revisions are anticipated to be before Council in the period after the new Council takes office and the end of the year.

Appendix D – Water Flow Analysis – Pressure Loss Calculation Sheet

Water Flow Analysis - Pressure Loss Calculation Sheet

Client 1000198532 Ontario Inc.
Location 2725 Moodie Drive, Ottawa, ON
Date June 8, 2026

Kollaard File No. 221099

Pipe Sections	Along	End	Grade Elevation Start m	Grade Elevation End m	Hydraulic Grade line Start m	Hydraulic Grade line End m	Pressure P_{start} kPa	Pressure P_{end} kPa	P_{end} psi	Q m^3/sec	V m/sec	D m	Length m	A m^2
Maximum HGL - Daily Flow - 2.7 L/s														
Fallowfield	Main	Building A	117.1	118.2	153.3	153.20	354	343	50	0.0027	0.1488	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	153.2	153.10	354	342	50	0.0027	0.1488	0.152	525	0.018146
Peak Hour 7.2 L/s														
Fallowfield	Main	Building A	117.1	118.2	147.5	147.21	298	284	41	0.0072	0.3968	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	147.5	146.87	298	281	41	0.0072	0.3968	0.152	525	0.018146
Sprinkler - 63 L/s - Single Feed														
Fallowfield	Main	Building A	117.1	118.2	142.8	130.26	252	118	17	0.0563	3.1026	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	142.8	116.57	252	-16	-2	0.0563	3.1026	0.152	525	0.018146
Sprinkler + Peak - 70.2 L/s - Single Feed														
Fallowfield	Main	Building A	117.1	118.2	142.4	123.48	248	52	8	0.0702	3.8687	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	142.4	103.00	248	-149	-22	0.0702	3.8687	0.152	525	0.018146
Sprinkler - 63 L/s - Looped Feed														
Fallowfield	Main	Building A	117.1	118.2	142.8	138.04	252	194	28	0.0282	1.5513	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	142.8	135.25	252	167	24	0.0282	1.5513	0.152	525	0.018146
Sprinkler + Peak - 70.2 L/s - Looped Feed														
Fallowfield	Main	Building A	117.1	118.2	142.4	137.18	248	186	27	0.0351	1.9343	0.152	315	0.018146
Fallowfield	Main	Building E	117.1	118.2	142.4	131.37	248	129	19	0.0351	1.9343	0.152	525	0.018146

Note: Any calculation yielding a residual pressure or Pend of less than zero simply means that there is insufficient water supply at the municipal connection to meet the design flow demand for the senario.

Kollaard Associates Engineers

Appendix E – Storm Sewer Design

- Storm Sewer Design Sheet
- Storm Sewer Network Schematic
- Storm Sub-Catchment Drawing

1000198532 Ontario Inc.
Project: 2726 Moodie Drive
File: 221099
Date: June 8, 2026

2-year IDF Data	
A:	732.951
B:	6.199
C:	0.81

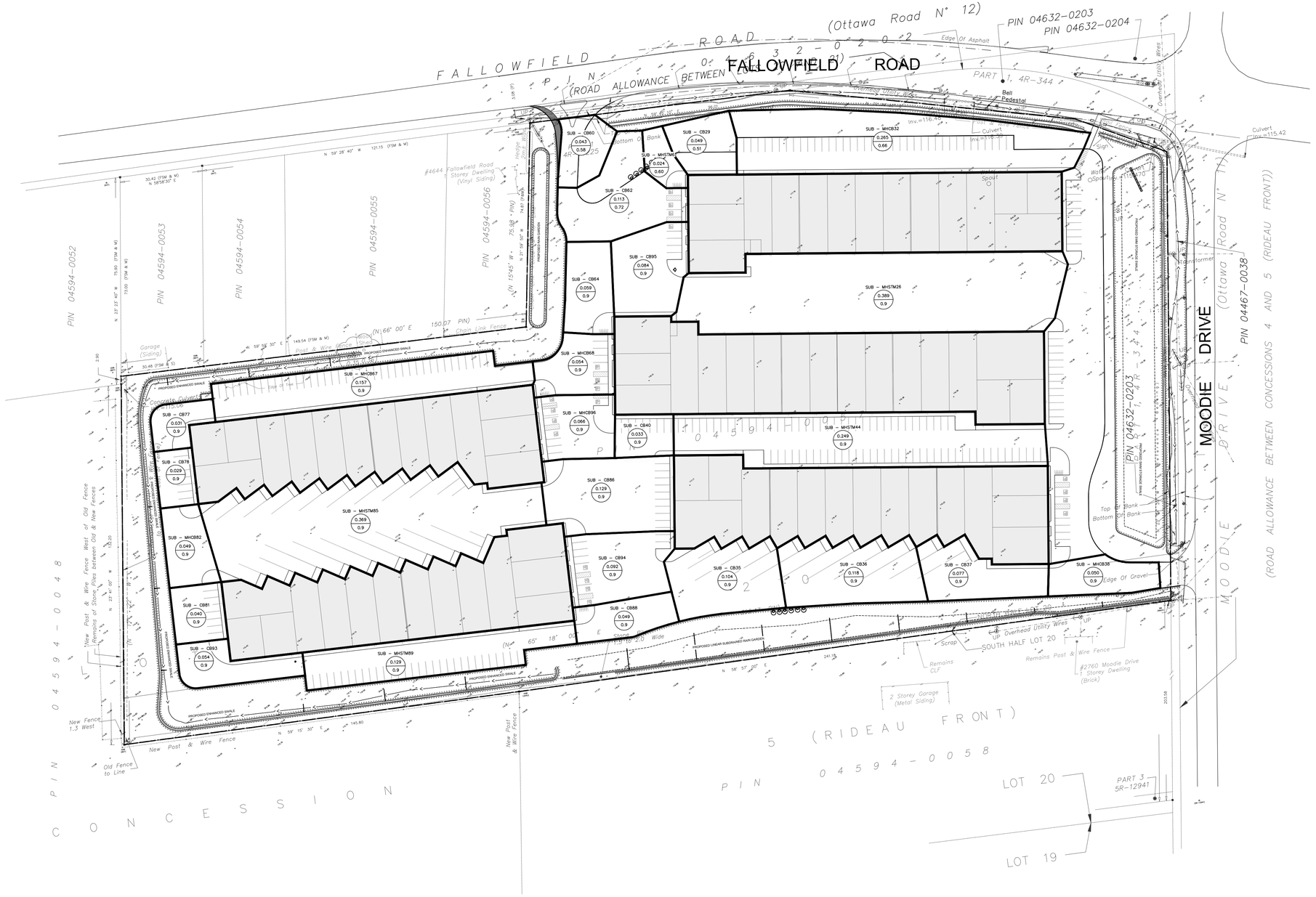
IDF Equation: I = A/(t+B)^C
Units for t: minutes

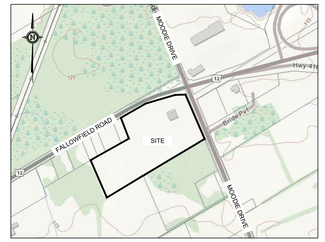
2-year Storm Sewer Design Sheet

Location			Runoff								Constant Flow		Total Flow (L/s)	Pipe Data						Pipe Results						Notes
Catchment	From	To	Area (ha)	R	AxR	Cum. AxR	Inlet Tc (min)	Cum. Tc (min)	I (mm/hr)	Q (L/s)	Incr. Constant Flow (L/s)	Cum. Constant Flow (L/s)		Nominal Size	Length (m)	Invert U/S (m)	Invert D/S (m)	Slope (%)	n	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Actual Flow Velocity (m/s)	Time in Sect. (min)	Total Time (min)	Q Total/ Capacity (%)	
BLDG C ROOF		CB - (35)									2.5	2.5														
SUB - CB35	CB - (35)	CB - (36)	0.104	0.90	0.094	0.094	10.00	10.00	76.81	20.0		2.5	**22.5**	375	50.19	116.51	116.36	0.30	0.013	100.0	0.88	0.71	1.19	11.19	**22.5**	
SUB - CB36	CB - (36)	CB - (37)	0.118	0.90	0.106	0.200	10.00	11.19	72.53	40.3		2.5	**42.8**	375	50.49	116.33	116.18	0.30	0.013	99.7	0.87	0.83	1.01	12.19	**42.9**	
SUB - CB37	CB - (37)	MH-CB - (38)	0.077	0.90	0.069	0.269	10.00	12.19	69.29	51.8		2.5	**54.3**	375	50.31	116.15	116.00	0.30	0.013	99.9	0.88	0.89	0.94	13.14	**54.4**	
SUB - MHCB38	MH-CB - (38)		0.050	0.90	0.045	0.314	10.00	13.14	66.55	58.1		2.5	**60.6**	375	20.97	115.97	115.90	0.33	0.013	105.7	0.93	0.96	0.37	13.50	**57.3**	
SUB - CB62	CB - (62)	MH-STM - (61)	0.113	0.72	0.081	0.081	10.00	10.00	76.81	17.3		0.0	**17.3**	375	23.42	116.49	116.42	0.30	0.013	100.0	0.88	0.66	0.60	10.60	**17.3**	
SUB - CB60	CB - (60)	MH-STM - (61)	0.043	0.58	0.025	0.025	10.00	10.00	76.81	5.3		0.0	**5.3**	375	30.22	116.52	116.42	0.33	0.013	105.2	0.92	0.48	1.06	11.06	**5.0**	
SUB.12	MH-STM - (61)	MH-CB - (29)	0.024	0.60	0.014	0.121	10.00	11.06	72.97	24.4		0.0	**24.4**	375	15.81	116.39	116.33	0.38	0.013	112.7	0.99	0.78	0.34	11.39	**21.7**	
SUB - CB29	MH-CB - (29)	N/A	0.049	0.51	0.025	0.146	10.00	11.39	71.84	29.0		0.0	**29.0**	375	14.02	116.30	116.25	0.36	0.013	109.2	0.96	0.81	0.29	11.68	**26.6**	N/A DENOTES INLET TO STORAGE
	N/A	MH-CB - (32)	0.000	0.00	0.000	0.146	0.00	11.68	70.90	28.7		0.0	**28.7**	375	100.15	116.22	115.99	0.23	0.013	87.7	0.77	0.68	2.44	14.12	**32.7**	CHAMBERS.
BLDG A ROOF		MH-CB - (32)									3.1	3.1														
SUB - MHCB32	MH-CB - (32)	MH-STM - (33)	0.265	0.66	0.174	0.319	10.00	14.12	63.93	56.7		3.1	**59.8**	375	26.23	115.96	115.87	0.34	0.013	107.1	0.94	0.96	0.45	14.57	**55.8**	
	MH-STM - (33)		0.000	0.00	0.000	0.319	0.00	14.57	62.79	55.7		3.1	**58.8**	375	14.57	115.84	115.79	0.34	0.013	107.2	0.94	0.96	0.25	14.83	**54.9**	
SUB - CB40	CB - (40)	MH-STM - (41)	0.033	0.90	0.030	0.030	10.00	10.00	76.81	6.3		0.0	**6.3**	375	10.97	115.98	115.94	0.36	0.013	110.5	0.97	0.52	0.35	10.35	**5.7**	
	MH-STM - (41)	MH-STM - (44)	0.000	0.00	0.000	0.030	0.00	10.35	75.48	6.2		0.0	**6.2**	375	142.76	115.91	115.88	0.02	0.013	26.5	0.23	0.19	12.73	23.08	**23.5**	
SUB - MHSTM44	MH-STM - (44)		0.249	0.90	0.224	0.254	10.00	23.08	47.55	33.5		0.0	**33.5**	375	24.25	115.85	115.79	0.25	0.013	91.0	0.80	0.74	0.55	23.63	**36.8**	
SUB - CB64	CB - (64)	MH-STM - (74)	0.059	0.90	0.053	0.053	10.00	10.00	76.81	11.3		0.0	**11.3**	250	12.83	116.29	116.16	1.01	0.013	62.4	1.23	0.92	0.23	10.23	**18.1**	
BLDG D ROOF		MH-CB - (67)									2.5	2.5														
SUB - MHCB67	MH-CB - (67)	MH-CB - (68)	0.157	0.90	0.141	0.141	10.00	10.00	76.81	30.1		2.5	**32.6**	375	28.14	116.29	116.20	0.32	0.013	103.4	0.91	0.80	0.59	10.59	**31.6**	
SUB - CB93	CB - (93)	MH-STM - (92)	0.054	0.90	0.049	0.049	10.00	10.00	76.81	10.4		0.0	**10.4**	375	40.04	116.83	116.71	0.30	0.013	100.1	0.88	0.56	1.20	11.20	**10.4**	
	MH-STM - (92)	MH-STM - (89)	0.000	0.00	0.000	0.049	0.00	11.20	72.49	9.8		0.0	**9.8**	375	80.71	116.68	116.66	0.02	0.013	28.8	0.25	0.23	5.90	17.10	**34.0**	
SUB - MHSTM89	MH-STM - (89)	CB - (88)	0.129	0.90	0.116	0.165	10.00	17.10	57.21	26.2		0.0	**26.2**	375	29.01	116.63	116.54	0.31	0.013	101.9	0.89	0.74	0.65	17.76	**25.7**	
SUB - CB94	CB - (94)	CB - (88)-MH-STM - (87)	0.092	0.90	0.083	0.083	10.00	10.00	76.81	17.7		0.0	**17.7**	250	11.21	116.68	116.57	0.98	0.013	61.5	1.21	1.04	0.18	10.18	**28.7**	
SUB - CB88	CB - (88)	MH-STM - (87)	0.049	0.90	0.044	0.292	10.00	17.76	55.95	45.3		0.0	**45.3**	375	51.94	116.51	116.37	0.27	0.013	95.0	0.83	0.82	1.06	18.81	**47.7**	
SUB - CB81	CB - (81)	MH-CB - (82)	0.040	0.90	0.036	0.036	10.00	10.00	76.81	7.7		0.0	**7.7**	375	26.62	116.65	116.58	0.26	0.013	93.8	0.82	0.49	0.90	10.90	**8.2**	
SUB - CB77	CB - (77)	CB - (78)	0.031	0.90	0.028	0.028	10.00	10.00	76.81	6.0		0.0	**6.0**	375	21.13	116.74	116.68	0.28	0.013	97.5	0.85	0.46	0.77	10.77	**6.1**	
SUB - CB78	CB - (78)	MH-CB - (82)	0.029	0.90	0.026	0.054	10.00	10.77	73.98	11.1		0.0	**11.1**	375	23.23	116.65	116.58	0.30	0.013	100.4	0.88	0.57	0.68	11.44	**11.1**	
SUB - MHCB82	MH-CB - (82)	N/A	0.049	0.90	0.044	0.134	10.00	11.44	71.68	26.7		0.0	**26.7**	375	18.09	116.55	116.49	0.33	0.013	105.3	0.92	0.77	0.39	11.83	**25.3**	N/A DENOTES INLET TO STORAGE
	N/A	MH-STM - (85)	0.000	0.00	0.000	0.134	0.00	11.83	70.41	26.2		0.0	**26.2**	525	115.52	116.49	116.48	0.01	0.013	41.7	0.19	0.20	9.78	21.62	**62.8**	CHAMBERS.
BLDG E ROOF		MH-STM - (85)									2.5	2.5														
SUB - MHSTM85	MH-STM - (85)	MH-STM - (87)	0.369	0.90	0.332	0.466	10.00	21.62	49.56	64.2		2.5	**66.7**	375	21.85	116.45	116.37	0.37	0.013	110.7	0.97	1.01	0.36	21.98	**60.3**	
SUB - CB86	CB - (86)	MH-STM - (87)	0.129	0.90	0.116	0.116	10.00	10.00	76.81	24.8		0.0	**24.8**	300	7.99	116.45	116.37	1.00	0.013	100.9	1.38	1.13	0.12	10.12	**24.5**	
	MH-STM - (87)	MH-CB - (96)	0.000	0.00	0.000	0.874	0.00	21.98	49.05	119.1		2.5	**121.6**	525	26.68	116.34	116.29	0.19	0.013	194.2	0.87	0.92	0.49	22.47	**62.6**	
SUB - MHCB96	MH-CB - (96)	MH-CB - (68)	0.066	0.90	0.059	0.933	10.00	22.47	48.37	125.4		2.5	**127.9**	525	25.05	116.26	116.20	0.24	0.013	219.6	0.98	1.01	0.41	22.88	**58.3**	
SUB - MHCB68	MH-CB - (68)	MH-STM - (74)	0.054	0.90	0.049	1.123	10.00	22.88	47.82	149.2		5.0	**154.2**	525	27.13	116.17	116.13	0.15	0.013	172.3	0.77	0.87	0.52	23.40	**89.5**	
SUB - CB95	CB - (95)	MH-STM - (74)-MH-STM - (22)	0.084	0.90	0.076	0.076	10.00	10.00	76.81	16.1		0.0	**16.1**	250	7.56	116.24	116.16	1.06	0.013	63.8	1.26	1.05	0.12	10.12	**25.3**	
	MH-STM - (74)	MH-STM - (22)	0.000	0.00	0.000	1.252	0.00	23.40	47.14	163.9		5.0	**168.9**	525	32.61	116.10	116.03	0.21	0.013	207.9	0.93	1.03	0.53	23.92	**81.3**	
	MH-STM - (22)	MH-STM - (26)	0.000	0.00	0.000	1.252	0.00	23.92	46.47	161.6		5.0	**166.6**	525	136.36	116.00	115.80	0.15	0.013	171.8	0.77	0.88	2.59	26.52	**97.0**	
BLDG B ROOF		MH-STM - (26)									3.5	3.5														
SUB - MHSTM26	MH-STM - (26)		0.389	0.90	0.350	1.602	10.00	26.52	43.46	193.4		8.5	**201.9**	525	21.26	115.80	115.74	0.28	0.013	238.4	1.07	1.19	0.30	26.81	**84.7**	

MOODIE DRIVE

FALLOWFIELD ROAD





KEY PLAN

NOT TO SCALE

0 25 50

1:750 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED REAR YARD CATCHBASIN
- EXISTING EDGE OF GRAVEL
- EXISTING CENTERLINE OF FLOW
- EXISTING TOP OF SLOPE
- PROPERTY BOUNDARY
- SUB-CATCHMENT AREA BOUNDARY
- SUB – 'INLET ID' — SUB-CATCHMENT LABEL
- 1.143 — CATCHMENT AREA (HECTARES)
- 0.74 — C - RUN-OFF COEFFICIENT

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NOTES:
1. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED; ALL ELEVATIONS ARE IN METRES.
2. THIS IS NOT A LEGAL SURVEY.
3. EXISTING SERVICES INFORMATION SHOWN ARE BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
4. CLIENT IS RESPONSIBLE FOR ACQUIRING ALL NECESSARY PERMITS.
5. CONTRACTOR TO VERIFY THAT APPROPRIATE PERMITS HAVE BEEN ACQUIRED PRIOR TO ANY CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF UTILITIES.
7. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
8. THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL ALL APPROVALS HAVE BEEN GRANTED.
9. INSPECTION OF ROUGH GRADE BY KOLLAARD ASSOCIATES INC. AND CITY OF OTTAWA MUST BE CONDUCTED PRIOR TO PLACEMENT OF TOPSOIL OR SOD.
10. HYDRO SERVICE TO BE INSTALLED ACCORDING TO THE SPECIFICATIONS OF SERVICE PROVIDER AND THE MECHANICAL ENGINEER.
11. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS
12. ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES, INC.
13. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #221099.

No.	REVISION	DATE	BY
2	RESPONSE TO CITY OF OTTAWA FORMAL REVEW COMMENTS	2026.06.08	ARK

CONSULTANTS

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(613) 860-0923

DESIGN	ARK
DRAWN	JR
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — JUNE 8, 2026 — S. E. deWit 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	STORM SUB-CATCHMENT AREAS
PROJECT No.	221099
DATE	2026.06.08
SCALE	AS_NOTED
DRAWING No.	221099-SCA

ARCH D

D07-12-25-0153

Appendix F – Product Information

MBR.ST-105

Pre-Engineered MBR Sewage Treatment System

The Clear³ MBR.ST-105 is a pre-engineered stand-alone decentralized modular treatment plant capable of treating sewage and waste water from residential, recreational, institutional and commercial developments up to **27,700 gallons per day**. The rugged, self-contained system is housed in a single modular building enclosure, built to meet local **weather conditions from extreme heat to extreme cold**. The Clear³ MBR.ST-105 is built on Newterra's years of membrane bioreactor experience and utilizes world class proven ZeeWeed® membranes for exceptional permeate quality that meets the **most stringent regulatory requirements** for reuse applications or discharge to sensitive receptors.

Clear³ Design Advantages

- Pre-fabricated modular facilities
- Rapid deployment
- Compact footprint
- Scalable
- Operator-friendly
- High-quality effluent
- No odor
- More discharge options
- Sound attenuation
- Reuse-ready effluent

Influent & Effluent Limits

Designed for a range of wastewater strengths and the ability to meet the most stringent discharge and reuse requirements.

Flow Parameter	Influent From…	Effluent Limits
Biological Oxygen Demand **(BOD⁵)**	200 to 400 mg/L	5 mg/L
Total Suspended Solids **(TSS)**	150 to 350 mg/L	5 mg/L
Total Kjeldhal Nitrogen **(TKN)**	35 to 70 mg/L	–
Total Ammania Nitrogen **(TAN)**	25 to 50 mg/L	1 mg/L
Total Nitrogen **(TN)**	–	5 mg/L *
Total Phosphorous **(TP)**	5 to 10 mg/L	0.1 mg/L *
Fat, Oil, and Grease **(FOG)**	Less than 30 mg/L	–
Fecal Coliform	–	2.2 MPN/ 100 mL**
Water Temperature	10 to 25°C	–
Turbidity	–	0.5 mg/L

*With nutrient reduction option(s) selected
**With disinfection option(s) selected

Efficient Modular Design

- 40' long x 8' wide x 9.5' high
- Fully functional building including, but not limited to insulation, heating, ventilation, lighting, operator work space, and eyewash station
- Optional exterior finishings (color, siding, and/or roofing)

Design Flow Parameters

With robust biology and a broad turn-down capability the Clear³ MBR.ST-105 is designed around the following flow conditions.

Flow Parameter	Up To…
Average Daily Flow **(ADF)**	27,700 gal/day
Maximum Monthly Flow **(MMF)**	33,200 gal/day
Maximum Daily Flow **(MDF)**	55,400 gal/day

> "Newterra is leading the way with decentralized wastewater solutions that help reduce project costs with a sustainable treatment approach"

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clean water. modular solutions. simple.

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MBR.ST-105

Modular MBR Sewage Treatment System

Base Unit Features

- Pre-treatment
- Flow equalization
- Aerobic biological treatment
- Membrane filtration with industry leading ZeeWeed® 500S membranes
- Sludge storage and thickening
- Advanced telemetry for remote control, monitoring & diagnostics
- Equipment or treatment train redundancy
- Low power, sludge production, and chemical consumption
- Pre-engineered for fast delivery
- Quality controlled factory assembled and tested
- MET/MET certified

Adders & Options

- ☐ Customized process design, tankage and equipment sizing
- ☐ Biological nutrient reduction, MLE process for denitrification
- ☐ Biological nutrient reduction, 4-stage bardenpho process for denitrification
- ☐ Coagulant dosing for phosphorous reduction
- ☐ UV disinfection
- ☐ Chlorine disinfection
- ☐ Critical spare parts package
- ☐ Turbidity monitoring
- ☐ Increased chemical storage
- ☐ Building exterior finish (selection of colors, siding, roofing)
- ☐ Annual newtN™ service agreement

Flexible Tankage

The Clear³ MBR.ST-105 is designed for use with a variety of in-ground tank configurations. This flexibility allows the benefits of a pre-engineered product, while using the best available tank configuration based on project specific site conditions and availability of labour and materials.

Basin	Required Volume
Trash Trap	16,700 gal
Equalization	12,000 gal
Aerobic	16,800 gal
Sludge Holding (30 days)	16,300 gal

Fiberglass

- 10’ diameter FRP tanks provided by Newterra
- All in-tank components are factory installed prior to delivery
- Minimal mechanical and electrical site-work

Pre-Cast Concrete

- Pre-cast concrete tanks provided by Newterra or supplied locally
- Some mechanical and electrical site work
- All in-tank components are shipped loose for installation at site

Poured Concrete

- Poured in place concrete tanks supplied locally
- Smallest footprint of the tankage options
- More civil engineering and on-site civil, mechanical, and electrical work required
- All in-tank components are shipped loose for installation at site

newtN™ Advanced Remote Monitoring & Control

- Advanced cloud-based data acquisition and control
- Bank level security
- A real-time link to the treatment system familiar HMI screen
- Email/text out upon alarm and a daily system status report
- Operating data is collected and available for download from the customer portal or locally at the HMI
- The customer portal also includes other useful information at your fingertips including manuals, troubleshooting guides, parts lists, etc.

1.800.420.4056 | 1.613.498.1876 | newterra.com

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