FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

SITE PLAN SUBMISSION - MARCH 2025

4497 O'Keefe Court, Ottawa, Ontario
Proposed Office and Warehouse Development

KWA PROJECT: 21684

Report Prepared for:

O'Keefe Court Properties
c/o The Properties Group Mgmt Ltd.
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Ottawa, ON K20 1R3

Report Prepared by:

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1.0 INTRODUCTION

KWA Site Development Consulting Inc. (KWA) has been retained by The Properties Group to prepare a detailed Functional Servicing and Stormwater Management Report along with a corresponding grading and servicing design in support of the Site Plan Application (SPA) for the proposed development. The subject property is located at the northwest corner of O'Keefe Court at municipal address 4497 O'Keefe Court in the City of Ottawa (formerly the Municipality of Nepean). Refer to **Figure 1.1** below.

This report will:

- Provide background information regarding the subject property;
- Summarize the existing site conditions;
- Provide information regarding the proposed development conditions;
- Outline the proposed grading for the development; and
- Outline the existing and proposed municipal servicing.

The recommended servicing has been developed in accordance with the applicable design criteria and requirements of the City of Ottawa (the City).

Figure 1-1: Location Plan

1.1 PROJECT BACKGROUND

The total property is approximately 6.88ha in area at municipal address 4497 O'Keefe Court in the City of Ottawa. The existing site was previously a quarry which has not been active for many years and is now vacant greenfield.

The subject site is bound by O'Keefe Court to the south, Lytle Park to the East, Highway 416 to the west and Vacant greenfield to the north.

The existing topography of the site slopes from north-west to south-east, towards the existing ditches along O'Keefe Court. Existing elevations are 113.0-114.50 in the north-west corner sloping down to the south-east corner with elevations of 102.50-103.00. Site elevation differences of approximately 10-12 m across the length of the site.

1.2 PROPOSED DEVELOPMENT

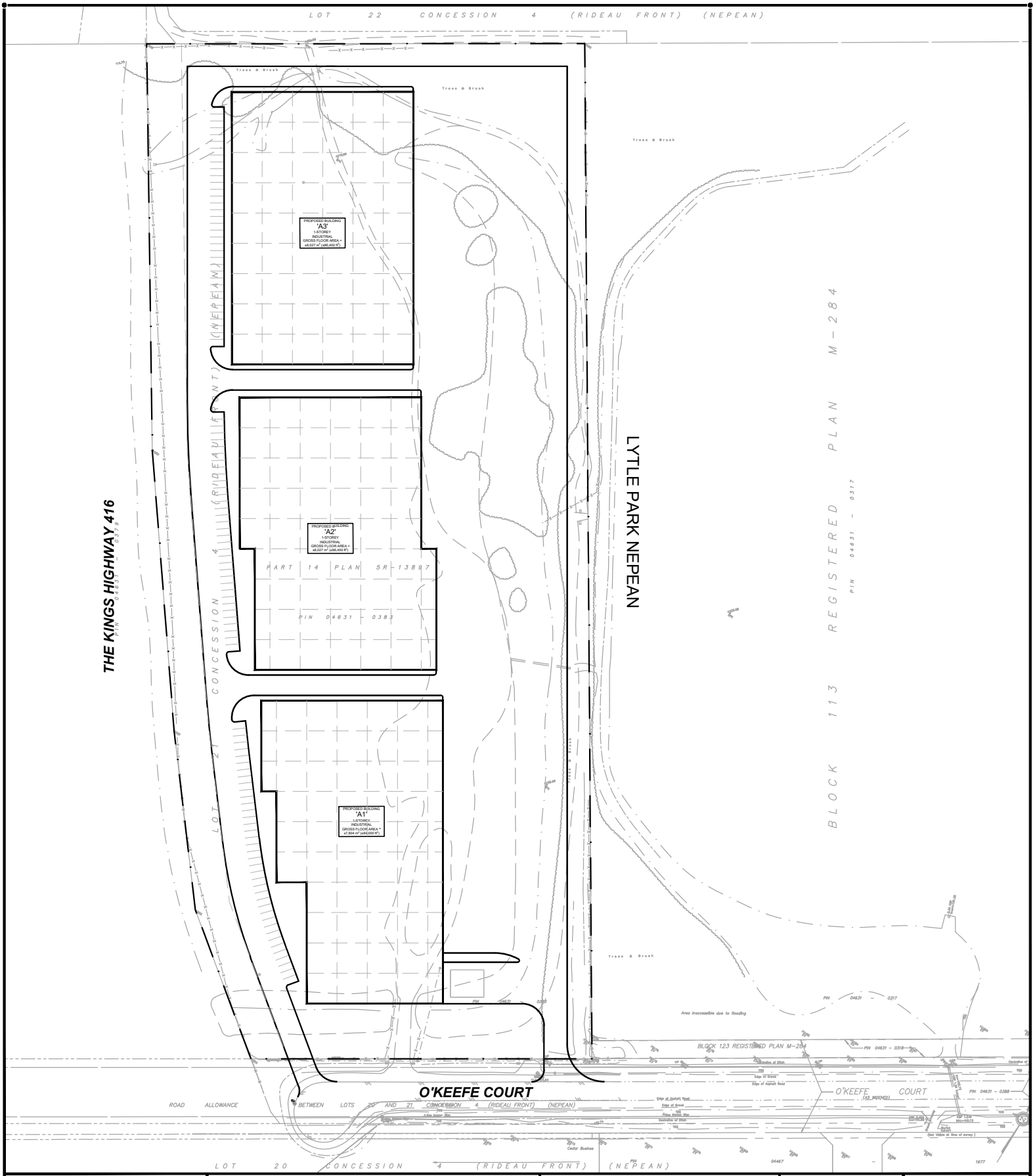
The proposed development of the site includes three (3) industrial warehouse buildings, with a total anticipated floor area of 23,858m^2 (256,800ft^2). The buildings will be surrounded by driveways, parking, and loading docks located on the east side of the buildings, with entrances facing the highway on the west side. Refer to Figure 1-1 for the proposed development plan.

1.3 SITE ACCESS

The site's main vehicular access will be two proposed entrances from O'Keefe Court.

1.4 UTILITIES

As the proposed development is located within a well-developed area of Ottawa, all utilities including telephone, cable, electricity and gas are readily available to service the subject property. Water and sanitary servicing will be further elaborated in the subsequent respective sections in this report.



KWA SITE DEVELOPMENT CONSULTING INC.
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REVISION BLOCK

#	DATE	DESCRIPTION
1.	02/12/2025	FIRST SUBMISSION

PROPOSED DEVELOPMENT PLAN

THE PROPERTIES GROUP
O'KEEFE COURT
NEPEAN, ONTARIO

PROJECT No: | DRAWN BY: | CHECKED BY:

NORTH ARROW

METRIC SCALE

FIG 1-1

2.0 STORMWATER MANAGEMENT

2.1 EXISTING DRAINAGE CONDITIONS

The existing topography of the site slopes from north-west to south-east, towards the existing ditches along O'Keefe Court. Existing elevations are 113.0-114.50 in the north-west corner sloping down to the south-east corner with elevations of 102.50-103.00. Site elevation differences of approximately 10-12 m across the length of the site.

Most of the existing drainage from the site drains towards the east-middle of the site where drainage is conveyed by a 750mm culvert through a landscaped berm along the eastern property limit. This drainage is then conveyed towards a ditch within the neighbouring Lytle Park, where the drainage enters a water feature located on the south side of the Lytle Park property. Flows after this water feature are then conveyed along a swale on the north side of O'Keefe Court, which then crosses to the south side of O'Keefe Court through a culvert. Drainage then continues to flow south-east through conveyance swales and culverts down to Jock River, which finally flows east into the Rideau River flowing north to Ottawa River.

Although existing drainage of the subject site is tributary to the north swale of O'Keefe Court (via Lytle Park), discussions with City staff have determined that the swale along the south side of O'Keefe Court will serve as the most functionally acceptable outfall for the site (i.e. bypassing Lytle Park and the north swale), provided there is sufficient flow capacity. Therefore, the site will be designed based on the allowable outlet determined by City staff instead of existing conditions. Further discussion and analysis can be found in Section 2.7.

The pre-development rates are determined using the Modified Rational Method. The inputs are:

- Drainage area = 6.88ha
- Time of Concentration = 40 minutes (calculated using the Airport Method)
- Runoff Coefficient = 0.30
- Intensity based on the City of Ottawa IDF curves.

Table 1: Pre-development Runoff Peak Flows

Storm Event	Intensity (mm/hr)	Peak Flows (L/s)
2-yr	32.9	188.6
5-yr	44.2	253.5
10-yr	51.6	296.2
25-yr	61.0	349.8
50-yr	68.0	389.9
100-yr	75.1	431.2

Refer to **Figure F2-1** for the proposed drainage plan and **Figure F2-2** for the extent of external drainage route south-east of the site down to Jock River.

2.2 STORMWATER MANAGEMENT DESIGN CRITERIA

The proposed stormwater management design is based on the MOE 2008 Stormwater Management Planning & Design (SWMPD), The City of Ottawa Sewer Guidelines (October 2012), and The City of Ottawa Stormwater Management Design Guidelines (2012).

- **Quantity Control:** Stormwater runoff is to be controlled from pre-development to post-development peak runoff rates for storms up to and including the 100-year event using on-site detention.
- **Quality Control:** Stormwater quality control measures will be provided to achieve at a minimum, Enhanced level of protection (i.e. 80% TSS removal) as described in the MOE SWMPD manual for TSS removal. Thermal mitigation through on-site Best Management Practices (BMP's) is also required.

- **Water Balance:** Retention of the first 5mm of all rainfall events will be provided through on-site infiltration. Retention of the first 5mm of rainfall is equivalent to a 50% annual runoff reduction.
- **Construction Erosion and Sediment Control:** All applicants must include an Erosion and Sediment Control plan demonstrating that fish habitat and water quality are not affected by sediment from the property during or following site construction.
- **Ponding and Overflows:** Allowable flow depth shall not exceed 300mm in parking lot/private roadway areas. Excess runoff greater than the 100-year storm event must overflow to City ROW (O'Keefe Court).
- **Stormwater Outlet:** Stormwater drainage systems shall discharge to municipal storm sewer system where feasible. In cases where this is not possible, stormwater drainage systems may discharge to natural watercourses.

2.3 PROPOSED STORMWATER MANAGEMENT DESIGN STRATEGY

The proposed stormwater management system will include the capture and conveyance of the entire proposed development (6.88ha). The primary stormwater management will be achieved by utilization of rooftop storage using control drains. Since the rooftop of the buildings cover a significant portion of the site area, this will provide considerable and effective stormwater management for the site. Surface drainage will be captured by a series of catchbasins spread out across the site. The storm sewers will be sized to capture and convey 5-year storm flows and directed to a series of stormwater management facilities in the southeast corner of the site before outfall.

Catchbasin inlets are designed with a 50% blockage factor to capture the 5-year flows, with storm events above the 5-year and up to the 100-year draining overland and being picked up by subsequent catchbasins. In order to ensure overland drainage up to the 100-year storm event does not spill out from the site, the final catchbasin inlet for both the west and east drive aisles have been designed to receive all overland drainage above the 5-year and up to the 100-year storm events for upstream catchments.

The stormwater management facilities include a Cultec storage chamber and dry pond. An orifice and weir is designed at the outlet of the control maintenance hole at the south-east corner prior to release to a culvert that will cross O'Keefe Court and discharge to the south swale. A 255mm orifice plate has been proposed with a 1.50m rectangular weir to match post-development flows to pre-development for all storm events from the 2-year to 100-year storms.

Water balance volumes for infiltration will be achieved with proposed underground infiltration galleries located at building storm outfalls. The infiltration chambers will be sized to provide the water balance infiltration volumes for the building rooftops and drainage captured from the west side of the site. The chambers will be located such that the base of the infiltration gallery is at least 1.0m above existing groundwater and bedrock elevations. Total suspended solids treatment will be achieved primarily using a treatment inlet row (i.e. a Separator Row) located in the first row of the chambers with final treatment by an OGS located at the south-east corner of the property prior to site discharge out to the O'Keefe Court drainage swale.

2.4 STORMWATER QUANTITY CONTROL

The quantity control criteria is to control the post-development peak runoff rates to the pre-development peak runoff rates (as found in Section 2.1) for every storm event up to the 100-year event.

In the post-development condition, the drainage areas and directions will be as follows:

- **Controlled Rooftops:** runoff from **2.39ha** of rooftops is proposed to be controlled to a rate of 42L/s/roof ha by controlled roof drains. Runoff coefficient of 0.90 (used for the purpose of Quality Control sizing)
- **Controlled Landscaped and Pavement areas:** Runoff from **4.40ha** of the landscaped areas, loading docks, and parking lots is collected by catch basins and conveyed to the on-site storm sewers that are sized to accommodate the 5-year design flows. Runoff coefficient of 0.90.
- **Uncontrolled Pavement areas:** Runoff from **0.14ha** of paved and landscape areas (runoff coefficient of 0.74) will discharge uncontrolled towards O'Keefe Court
- Total net developable area is **6.88ha**

Building rooftops (2.39ha) are proposed to be controlled at a rate of 42L/s/ha. Based on the modified rational method, the maximum rooftop storage volume required is **841.9m³** across the three building rooftops. Assuming 50% of the rooftops are available for ponding storage and a maximum depth of ponding on rooftops of 0.15m (6"), the total available rooftop storage is estimated to be **1,793m³**, therefore it is expected that the rooftops will have capacity to provide the rooftop storage required. Further details will be reviewed and refined with the mechanical and structural engineers of the building at a later stage.

A dry pond and underground chamber by Cultec (Recharger 280HD) is proposed to achieve the storage requirements for the remaining controlled site areas (4.40ha), accounting for inflows coming from the upstream controlled rooftops. To optimize attenuation of post-development flows to pre-development levels storm events up to the 100-year storm event, a 255mm orifice plate and 1.5m rectangular weir has been proposed in the control manhole located immediately downstream of the dry pond. Using the modified rational method, a maximum storage volume required during the 100-year storm event was calculated to **1,299m³**.

The dry pond has been sized to maximize the available landscape area at the south end of the site, while maintaining sufficient freeboard and horizontal clearances from the adjacent building and drive aisles, providing a total pond volume of **644m³**. The remaining storage deficit will be provided by a Cultec Recharger 280HD that is connected upstream of the dry pond by a transfer pipe and has been sized to provide up to **686m³** of storage volume, providing a total storage of **1,330m³**. Table 2 below summarizes the stage-storage-discharge relationship of the quantity control measures.

The uncontrolled pavement area of 0.14 ha will discharge uncontrolled in all storm events. Refer to Table 3 below for the total release rates for the site, including the controlled and uncontrolled drainage.

Table 2: Stage-Storage-Discharge

Storm Event	Elevation (m)	Required/Provided Storage (m³)	Post-development Release Rate (L/s)	Target Controlled Release Rate (L/s)
2-yr	104.38	793	151.0	166
5-yr	104.60	1,059	169.0	224
10-yr	104.65	1,140	202.2	261
25-yr	104.71	1,203	262.2	308
50-yr	104.74	1,253	317.8	343
100-yr	104.78	1,300	378.0	380

- The required/provided storage corresponds to the available storage in both the pond and chamber at the various elevations for each storm event
- The target controlled release rate is the total allowable release rate less the post-development uncontrolled release rate
- Post-development release rate is based on the acting head on the orifice/weir

Table 3: Comparison of Pre-development and Post-development Peak Flows

Storm Event	Pre-development Release Rates (L/s)	Post-development Release Rates (L/s)			Net Reduction
		Controlled Flows	Uncontrolled Flows	Total	
2-yr	**188.6**	151.0	22.1	**173.1**	**8.2%**
5-yr	**253.5**	169.0	30.0	**199.0**	**21.5%**
10-yr	**296.2**	202.2	35.2	**237.5**	**19.8%**
25-yr	**349.8**	262.2	41.7	**303.9**	**13.1%**
50-yr	**389.9**	317.8	46.5	**364.4**	**6.5%**
100-yr	**431.2**	378.0	51.4	**429.4**	**0.4%**

As shown in Table 3, the proposed quantity controls will have a net reduction in site flows for all storm events in post-development conditions as compared to pre-development conditions, thus achieving the required stormwater quantity criteria.

2.5 STORMWATER WATER QUALITY

2.5.1 TOTAL SUSPENDED SOLIDS

The quality control objective is to provide an enhanced protection level, which corresponds to the removal of minimum 80% TSS.

Runoff on the site will follow a treatment train approach, where rooftop flows (which is generally considered clean), will enter initial treatment through the Separator Rows of the Cultec infiltration systems. Overflows from the infiltration system will be conveyed to secondary treatment from the Oil Grit Separator (OGS), which also treats asphalted surface runoff which are captured by catchbasins on the site. The final treatment occurs at the final Separator Row of the Cultec underground storage chamber, before it is released into the downstream dry pond.

Both the Separator Row and Oil Grit Separator hold Environmental Technology Verification (ETV) and has been sized to achieve 80% TSS removal (granting a 50% TSS removal credit). The OGS unit sized and specified is a Stormceptor EF12. Using the New Jersey Department of Environmental Protection (NJDEP) formula for TSS Removal rates for BMP's in series, the total TSS removal rate for the site was calculated to **84%**, which meets the minimum 80% TSS removal requirement for the site.

Refer to **Appendix A** for Cultec and OGS design calculations for quality control and the ETV verification statement.

2.5.2 THERMAL MITIGATION

The primary form of thermal reduction on the subject site will be achieved through capturing and conveying stormwater flows to at least one of the four underground detention chambers. Drainage from the west and from rooftops are all directed to an underground infiltration gallery, before merging with runoff from the east side of the site where then flows enter a final underground detention chamber and dry detention pond.

The performance of thermal reduction of stormwater in underground stormwater detention chambers was tested by the department of Civil Engineering at the University of Toronto in collaboration with the TRCA. The results of the analysis determined a maximum temperature reduction of 5 degrees Celsius from inlet to outlet, and outlet temperatures remained within the thermal regime for Coldwater fish habitat throughout the evaluation period (which lasted 6 months). The nominal outlet temperature ranged from 10C in the spring to a high of 13C by the end of the summer. This finding was published in the journal Water, 21 January 2016, an excerpt of the journal article is included in **Appendix A**. Based on these results and the existing high thermal capacity of the subsurface soils, it is expected that the underground chamber would provide a similar order of magnitude thermal benefit to the stormwater for the site.

2.6 WATER BALANCE

To meet the water balance criteria, a Cultec chamber used for retention and infiltration is provided immediately downstream of the storm stub of each building. The chambers will have an open bottom design, with the bottom of stone set at least 1.0m above the highest observed groundwater elevation from the hydrogeological investigation and is intended to infiltrate all runoff generated from the building rooftops. Although roof water is generally considered clean, the Cultec chamber is equipped with an inlet Separator Row which is intended to treat any suspended solids prior to distribution throughout the rest of the infiltration chamber.

The total 5mm rainfall volume requirement for the subject site is calculated as 344m^3 (6.88ha x 5mm). Based on review of the hydrogeological investigation in relation to the site plan and servicing plan, the following limitations were determined:

- Infiltration is most suitable north of the site, and directly adjacent to building storm outfalls

- Infiltration near the outfall of the site is not feasible due to high groundwater and poor soil infiltration rates
- Connecting storm sewers from the east side of the buildings into the infiltration galleries will be logistically challenging, as the sewers will be sloped against the slope of the surface.

Based on the above limitations, a best-efforts approach for infiltration has been assumed for the subject site, of which only the drainage areas on the west of the site and rooftops will be captured and retained. The total drainage area capture is 3.59ha (2.39ha of rooftop, 1.20ha of impervious), and amounts to a water balance volume of **179.5m³**.

Three infiltration chambers serving each building rooftop have been sized with a total retention volume of **197m³**, which is approximately **57.3%** of the total 5mm rainfall volume requirement. Drawdown calculations were completed and confirms that retained water can infiltrate within a 72-hour drawdown period. For supporting calculations on infiltration, drawdown, and Cultec sizing, please refer to **Appendix A**.

2.7 Stormwater Emergency Overland Flow Route

The site has been graded such that drainage up to the 100-year storm event will be contained within the site. All catchbasin inlets have been sized to ensure capture of the 5-year storm event. For storm events above the 5-year and up to the 100-year, flows will drain overland where the final catchbasin has been sized to capture the 100-year (less the 5-year) storm event. The designed grading pattern ensures a maximum 0.30m ponding for each inlet catchment while ensuring a distinctive overland flow route towards the emergency outfall at O'Keefe Court during extreme storm events (beyond the 100-year event), where then drainage will be conveyed through the ditches on O'Keefe Court.

The City of Ottawa stormwater management criteria requires that the overland flow route be designed for the 100-year post development flow from the site + 20% as a safety factor.

The post development uncontrolled 100-yr flow generated from the subject site is 1294L/s, therefore the design flow with 20% addition is **1553L/s**. Further analysis of this flow in relation to the capacity of the O'Keefe swales is discussed in the following section. Refer to **Appendix A** for swale design calculations.

2.8 Proposed Stormwater Outfall

It has been determined that the existing swale along the south side of O'Keefe Court will serve as the most functionally acceptable outfall, provided there is sufficient flow capacity. An analysis of the existing swale was completed to determine flow capacity relative to the anticipated contributing flows. The site outlet will consist of a culvert under O'Keefe Court to direct site flows to the south swale along O'Keefe Court.

Based on the characteristics of the south swale, an analysis was completed using the Manning's equation to estimate a minimum flow capacity of **2275L/s**. This calculation was based on the following characteristics observed from available data on the south swale:

- A top width of approximately **7.0m** (i.e. measured between Top of Slope's from the topographic survey)
- An assumed freeboard of **0.30m,** resulting in a flow depth of **0.87m** for a triangular shaped swale
- A minimum observed slope of **0.30%** between the O'Keefe cul-de-sac bulb to approximately 383m east (where the swale diverts southwards)
- Existing side slopes of **3:1**
- Manning's 'n' coefficient of **0.03**

Based on topographical survey of the existing swale, there appears to be few locations of filled material and reverse slope conditions. It is therefore recommended that remedial improvements to the swale be completed, including regrading the swale to a more consistent slope of 1.0% to provide sufficient flow conveyance. Under these conditions, it is anticipated the minimum flow capacity of the swale would be **4153L/s.**

Based on review of the topographic survey, LIDAR information, existing record drawings (specifically the Storm Drainage Area Plan, drawing 500 for the 416 Lands by IBI Group), and Google imagery, the south swale is assumed to

capture drainage from the subject site, Lytle Park, and the O'Keefe ROW (total contributing drainage area of 17.9ha). Based on these contributing drainage areas, the estimated 100-year contributing flow to the O'Keefe south swale is approximately **1356L/s** in post-development conditions, which makes up approximately **33%** of the full flow capacity of the reinstated south swale.

As per Section 2.8, the overland flow route shall be designed such that the 100-year post development flow (with a 20% surcharge) can safely be conveyed from the site. This flow was estimated to be 1553L/s for the subject site, and totals **2477L/s** when accounting for 100-year flows from the remaining contributing drainage areas to the south swale. During emergency overland flow conditions, the south swale is estimated to operate at **60%** of the full flow capacity of the south swale. Therefore, the south swale is sufficiently sized to convey flows in post-development conditions.

The proposed sewer infrastructure is shown on the Servicing Plans and Grading Plans. For detailed calculations on swale capacity and contributing flows, refer to **Appendix A.** For the cross-sections and profiles of the existing south swale, as well as the drainage area plan for this swale, please refer to the figures in **Appendix D**.

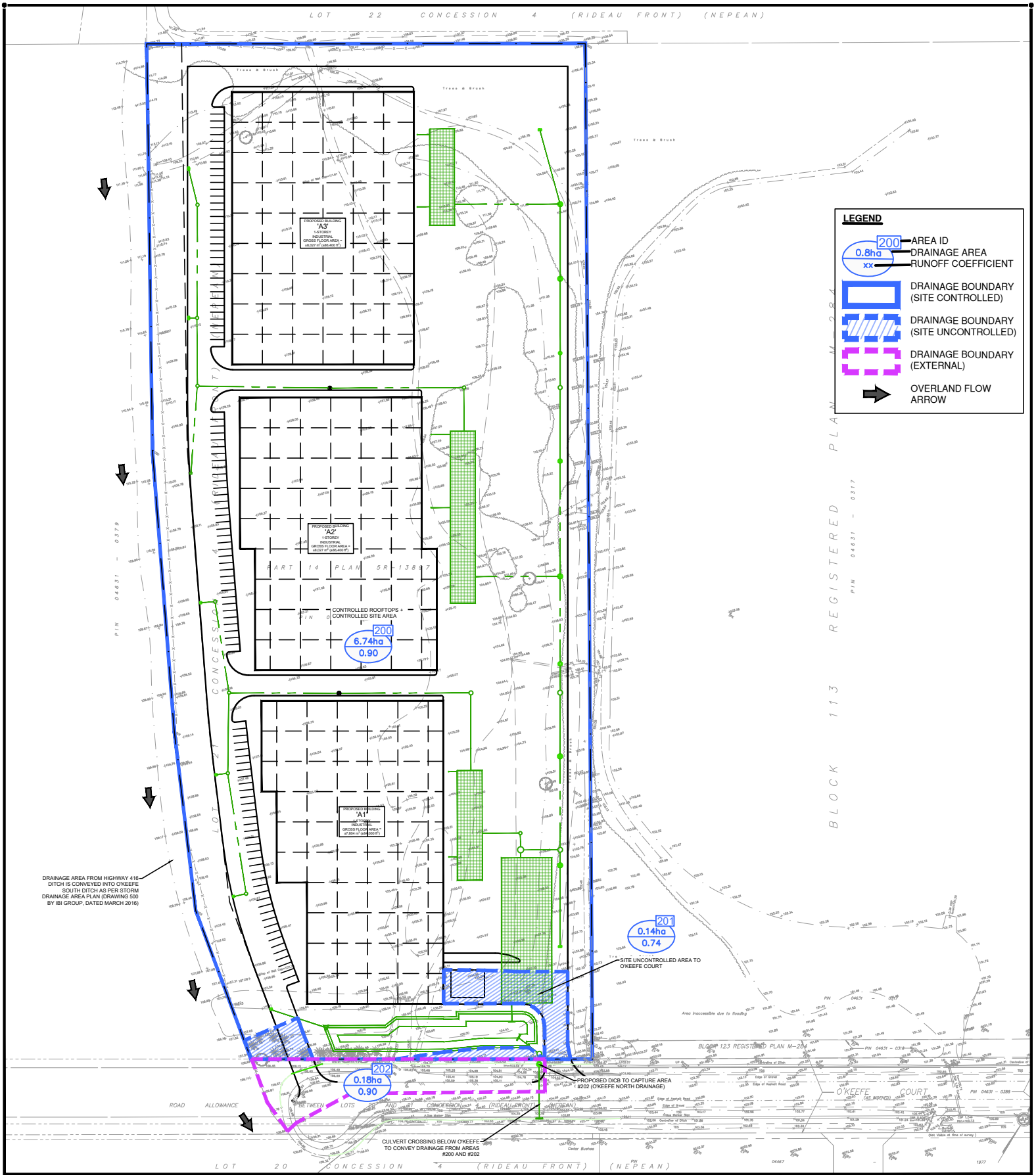
2.9 Construction Erosion and Sediment Control

Best practices are implemented to control erosion and sedimentation during construction and prior to build-out of stormwater quantity and quality control measures. All measures will be designed in accordance with the Sustainable Technologies Evaluation Program (STEP) "Erosion and Sediment Control Guideline for Urban Construction" dated 2019, and City of Ottawa design criteria. In general, the ESC approach can be outlined as:

- Silt fence to be installed around the site perimeter.
- A construction access (mud mat) is to be provided at the entrance off O'Keefe Court
- Cut-off swales and sediment traps provided on site and prior to discharging to the O'Keefe swales
- Catch basins and catch basin manholes on adjacent streets to have underside of the grate covered with Terrafix 240R non-woven geotextile.

These ESC measures should be regularly inspected and maintained to ensure they are operating as designed.

Refer to **Appendix F** for the **Erosion and Sediment Control Plan**.



KWA SITE DEVELOPMENT CONSULTING INC.
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Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	02/12/2025	FIRST SUBMISSION

PROPOSED DRAINAGE PLAN

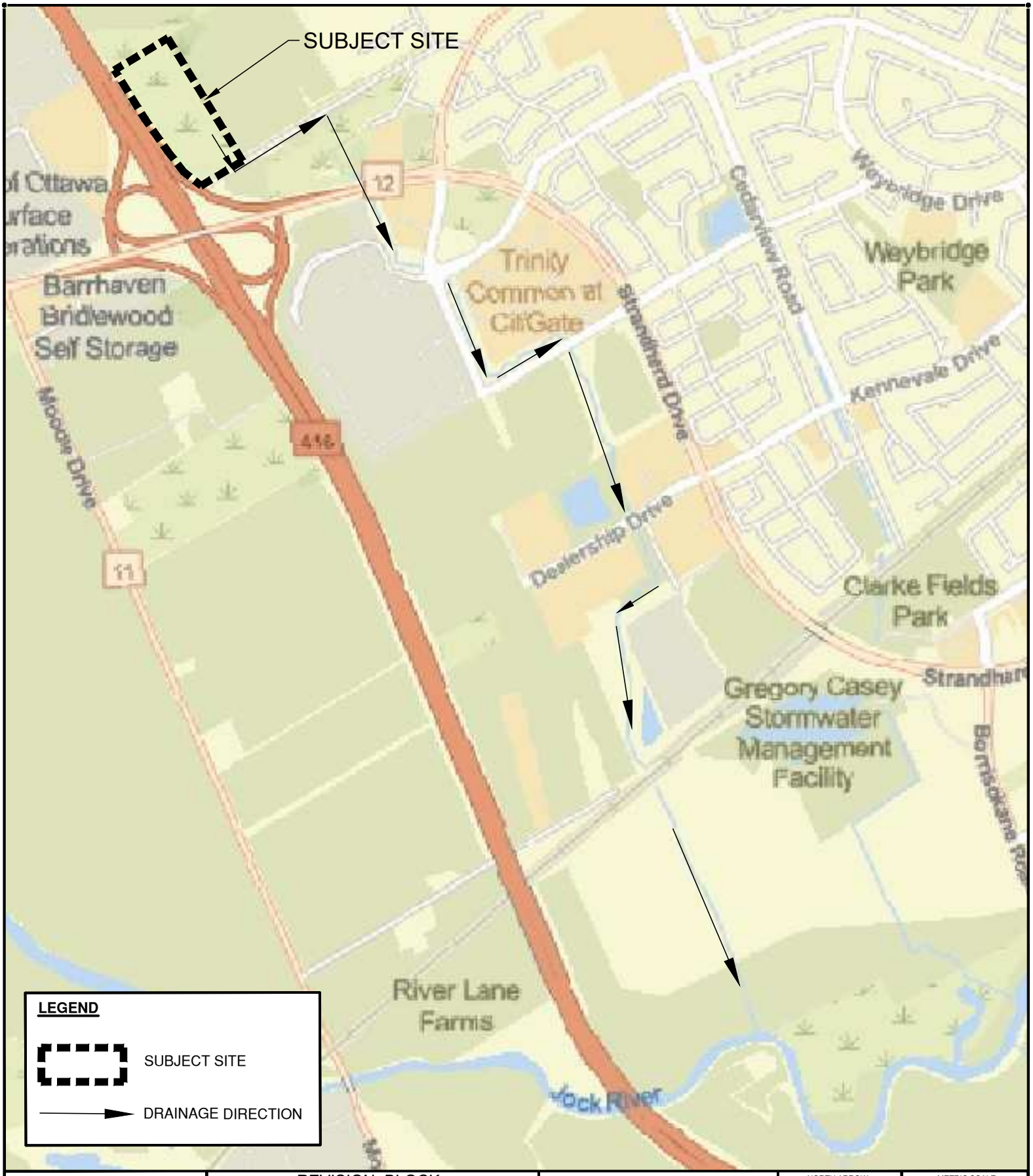
THE PROPERTIES GROUP
O'KEEFE COURT
NEPEAN, ONTARIO

PROJECT No:	DRAWN BY:	CHECKED BY:

NORTH ARROW

METRIC SCALE

2-1



KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	02/12/2025	FIRST SUBMISSION

DRAINAGE ROUTE TO ULTIMATE OUTFALL

THE PROPERTIES GROUP
O'KEEFE COURT
NEPEAN, ONTARIO

PROJECT No: | DRAWN BY: | CHECKED BY:

NORTH ARROW

METRIC SCALE

FIG 2-2

3.0 SANITARY SERVICING

3.1 EXISTING SANITARY SERVICING

A development application for the 416 Lands to the south of the subject development indicates there are sanitary sewers proposed and partially constructed as part of this development (City File No. D07-16-13-0013, City Plan No. 17492).

The advancement of the 416 Lands development and availability of the remaining sanitary sewers to be constructed as part of this development is currently not known, and therefore it is assumed that there are no available sanitary sewers in the vicinity of the subject site.

Record drawings for the General Plan of Services for the 416 Lands development can be found in the supporting documentation in **Appendix E**.

3.2 PROPOSED SANITARY SERVICING

Design flows for the proposed development has been calculated using the Ottawa Sewer Design Guidelines (Second Edition – Technical Bulletin ISTB-2018-1 Update March 21, 2018). The internal sanitary sewer drainage system for the subject site is designed to accommodate peak sanitary sewage flows as per the City of Ottawa's design criteria.

The total peak sanitary flow for the proposed development (including the infiltration allowance) has been calculated as **3.24L/s**. Refer to **Appendix B** for details of the calculations.

As there are no gravity sanitary sewer infrastructure available for the site, the proposed design involves an on-site septic system to treat and manage sanitary sewage and is to be completed by others in separate reports and design documents.

Sanitary site servicing for industrial warehouse buildings will consist of a 150 mm diameter connection at a 1.0% slope. These sewers will then be conveyed and discharged to the proposed on-site sanitary sewage treatment facility located at the south-east corner of the property.

The proposed and existing servicing is shown on the **Servicing Drawings**.

4.0 WATER SERVICING

4.1 EXISTING WATER SERVICING

The existing site servicing details obtained from The City of Ottawa engineering plan and profiles and a topographical survey completed of the area, indicate that there is watermain infrastructure in the vicinity of the site. The following watermain infrastructure is adjacent to the subject site;

- A 610mm diameter watermain located within O'Keefe Court, which extends east from Fallowfield Road to the end of the cul-de-sac in front of the subject site
- A 300mm diameter watermain which was recently constructed extending down Lusk Street to the end of storm water management pond,
- A 300mm diameter watermain located in Foxtail Avenue, approximately 750m east of the subject site.

4.2 PROPOSED WATER SERVICING

The proposed water servicing design and calculations are based on the Ottawa Design Guidelines – Water Distribution (Technical Bulletin ISTB-2021-03 – August 18, 2021). Based on the available record drawings indicated above there is the obvious primary connection made to the existing 610mm watermain located within O'Keefe Court. Through preliminary consultation the city requires that a secondary watermain connection be provided under such conditions in which the existing 610mm watermain were to require shut down for maintenance an alternative water supply be provided to the site. There are two primary considerations for this configuration, which are explained further below.

Previous reports and analyses had contemplated a connection through the future anticipated proposed development to the south. But as discussed previously, there is some uncertainty in the advancement of this development, and should it not proceed, alternative options should be considered such that the site can proceed and be serviced independently of this site.

The first option would be to provide a new 300mm waterline along O'Keefe Court, and then connect south to the existing 300mm watermain located in the newly installed and extended watermain in Lusk Street. This watermain would need to remain outside of the private properties so would need to be proposed through the public drainage right-of-way that currently serves for the drainage swale and culvert for the drainage outlet of O'Keefe Court. This watermain would be installed at the very edge of Block 15 such that it does not impact any function or access of the block drainage conveyance infrastructure. This would be the preferred option, since it is the shortest and simplest distance and connection point.

The second option would be to extend the watermain further down O'Keefe Court all the way to the 300mm watermain at Lusk Street and O'Keefe Court. This would be the secondary option but would require longer lengths of pipe to be installed and an increased disturbance for the O'Keefe Court right-of-way, but it is possible should the first option not be considered acceptable to the City.

Domestic water demand was calculated based on the Ottawa Design Guidelines for Water Distribution. A industrial flow rate of 35,000 L/Ha/day was used to determine the average water demand for the proposed development. The average day water demand was calculated to be **0.97 L/s**. A Peak Hour factor of 1.80 and a Maximum Day factor of 1.5 were used in determining Peak Hour and Maximum Day demands. The Peak Hour demand was calculated to be **1.74 L/s** and Maximum Day demand was calculated to be **1.45 L/s**. Calculations are provided in **Appendix C**.

Fire flow calculations we completed based on the Fire Underwriters Survey Water Supply for Public Fire Protection, 2020. Under proposed conditions the development is anticipated to have a fire flow demand of **167L/s** for the worst-case scenario building A3, at the north end of the property, the largest building and furthest distance for the watermain connection. The anticipated maximum day combined with the peak fire flow would be a total maximum site flow of 168.1 L/s. The furthest length of fire line to service a fire hydrant to suppress a fire under this situation would be approximately 500m in distance, which would result in a pressure loss of 11.98 psi for a 300mm fire watermain. This pressure loss level for fire flow conditions is anticipated to be accommodated with the existing 610mm and proposed additional 300mm watermain in O'Keefe Court.

However, at the time of this report seasonal conditions did permit a hydrant flow test and cannot be confirmed. As such it is recommended that a hydrant flow test be completed to confirm the adequacy of the 610/300mm watermain line to

service the proposed development. Should existing pressures not adequately support the require fire flow, then the proposed watermain may be increased in size if required.

The water demand calculations are shown in **Appendix C** and the proposed and existing watermain infrastructure are shown on the Servicing Drawings. Servicing exhibits, demonstrating the two options of off-site watermain servicing works can be found in **Figure WAT-E** in **Appendix D**.

4.3 FIRE HYDRANT COVERAGE

There are four (4) proposed fire hydrants to provide sufficient fire protection coverage, three of which are proposed private within the subject site, and one of which is a future hydrant as part of ongoing off-site works on O'Keefe Court. The coverage radius is shown and indicated by a dashed circle on the servicing plan to show sufficient coverage is provided for fire protection.

5.0 CONCLUSION

The proposed development consists of three industrial buildings across a 6.88ha site area. The proposed development can be serviced utilizing the existing and proposed infrastructure outlined in the Servicing Drawings. Our conclusions and recommendations for servicing of the proposed development is summarized as follows:

Stormwater Management Servicing:

- The proposed development will match post-development flows to pre-development levels for all storm events between the 2-year and 100-year storm events. Quantity controls will be achieved by the use of rooftop controls, Cultec chambers and an on-site dry pond
- Stormwater quality will be achieved by a treatment train approach, primarily through ETV certified technologies including a Separator Row and Oil Grit Separator
- Water balance will be met by infiltrating the initial 5mm rainfall depth of roof runoff and the west drainage area, which achieves approximately 57.3% of the total 5mm volume requirement for the site.
- Sediment and erosion control measures to be taken during construction have been presented in this report.

Sanitary Servicing:

- The anticipated peak sanitary peak flow for the proposed development is 3.24L/s.
- There are no existing or future planned sanitary sewer infrastructure on O'Keefe Court, therefore the subject site proposes an on-site septic system to manage sanitary sewage. This design is to be completed by others.

Water Servicing:

- The calculated maximum day and peak hour demands were calculated as 1.45L/s and 1.74L/s, respectively.
- The calculated fire flow demand for the proposed development is 167L/s, based on the furthest and largest building (Building A3)
- The proposed development will be serviced by a proposed 300mm watermain connection made to the existing 610mm watermain on O'Keefe Court.
- Additional confirmation of the fire and domestic branch sizing and fire flow requirements should be provided by the Mechanical Consultant at the Building Permit stage of approval.

5.1 RECOMMENDATIONS:

The following recommendations are presented:

- The contractor shall locate and verify all dimensions, levels, inverts, and datums onsite and report any discrepancies or omissions to the engineer prior to construction.

In summary, the site can be adequately serviced in respect to water supply, sanitary drainage, stormwater drainage, and stormwater management. The stormwater quantity and quality controls can be implemented in accordance to The City of Ottawa Sewer Guidelines (October 2012), and The City of Ottawa Stormwater Management Design Guidelines (2012).

Accordingly, we hereby recommend the adoption of this report as it relates to the provision of servicing works, and for the purposes of site plan application, and building permit application approvals. We trust that this Functional Servicing and Stormwater Management Report is sufficient for your purposes. If you have any questions or comments, please do not hesitate to contact the undersigned.

Yours very truly,

KWA Site Development Consulting Inc.

Ted Fair, P.Eng.

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APPENDIX A

STORMWATER CALCULATIONS

Pre-development Site Statistics

	Drainage Area #1	Area (ha)	Runoff Coefficient	AxC
1)	Landscape	6.88	0.30	2.06
	Total	6.88		2.06

Composite Runoff Coefficient = 0.30

Time of Concentration - Airport Formula (Runoff Coefficient less than 0.40)

Catchment Area =	6.88	ha
Max. Catchment Elevation =	114.5	
Min. Catchment Elevation =	102.5	
Catchment Length =	440	
Catchment Slope =	2.7	%
Runoff C =	0.30	
Time of Concentration =	39.29	min

Time of Concentration - Bransby William Formula (Runoff Coefficient more than 0.40)

Catchment Area =	6.88	ha
Max. Catchment Elevation =	110.5	
Mni. Catchment Elevation =	102.5	
Catchment Length =	380	
Catchment Slope =	2.1	%
Time of Concentration =	15.39	min

Pre-development Flow Rates

From calculations above, pre-development Time of Concentration = 40 min

Storm Event	Intensity (mm/hr)	Flow Rate (L/s)
2 year	32.9	188.6
5 year	44.2	253.5
10 year	51.6	296.2
25 year	61.0	349.8
50 year	68.0	389.9
100 year	75.1	431.2

Uncontrolled Flow and Allowable Release Rate Calculation

Uncontrolled area (ha) =	0.14
Runoff Coefficient =	0.74
Time of Concentration (min) =	10

Storm Event	Intensity (mm/hr)	Uncontrolled Flow Rate (L/s)	Pre-Development Flow Rate (L/s)	Target Release Rate for Orifice (L/s)
2 year	76.8	22.1	188.6	166.5
5 year	104.2	30.0	253.5	223.5
10 year	122.1	35.2	296.2	261.0
25 year	144.7	41.7	349.8	308.1
50 year	161.5	46.5	389.9	343.4
100 year	178.6	51.4	431.2	379.8

MODIFIED RATIONAL METHOD

			Site (Vault)			*Controlled Rooftop*		
2-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	151.00				
Storm Duration	Rainfall Intensity	Inflow	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} + $Q_{in,roof}$ (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	$Q_{in,roof}$ (L/s)	$Q_{out,roof}$ (L/s)	V (m^3)
10	76.8	936.3	151.00	471.18	459.28	100.38	215.34
15	61.8	772.6	151.00	559.47	369.36	100.38	242.08
20	52.0	666.7	151.00	618.81	311.14	100.38	252.91
25	45.2	592.0	151.00	661.44	270.09	100.38	254.56
30	40.0	536.2	151.00	693.36	239.45	100.38	250.33
40	32.9	458.1	151.00	736.95	196.52	100.38	230.74
60	24.6	367.7	151.00	779.96	146.85	100.38	167.29
70	21.9	338.9	151.00	789.05	131.03	100.38	128.74
80	19.8	316.2	151.00	792.96	118.58	100.38	87.35
90	18.1	297.8	151.00	792.94	108.49	100.38	43.80
100	16.7	282.4	151.00	788.39	100.14	100.14	0.00
120	14.6	245.6	151.00	680.86	87.08	87.08	0.00
140	12.9	218.0	151.00	562.62	77.30	77.30	0.00
160	11.7	196.5	151.00	436.57	69.67	69.67	0.00
180	10.6	179.2	151.00	304.56	63.54	63.54	0.00
200	9.8	165.0	151.00	167.83	58.50	58.50	0.00
240	8.5	142.9	151.00	0.00	50.68	50.68	0.00
280	7.5	126.5	151.00	0.00	44.86	44.86	0.00
320	6.7	113.8	151.00	0.00	40.35	40.35	0.00
360	6.1	103.6	151.00	0.00	36.74	36.74	0.00
			Max Storage (m^3) =	**792.96**		**Max Roof Storage (m^3) =**	**254.56**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**151.00**			
			Target Release Rate (L/s) =	**166.45**			

			Site (Vault)			*Controlled Rooftop*		
5-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	168.91				
Storm Duration	Rainfall Intensity	Storm Runoff	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)
10	104.2	1234.4	168.91	639.29	623.05	100.38	313.60
15	83.6	1009.8	168.91	756.79	499.65	100.38	359.35
20	70.3	865.0	168.91	835.27	420.09	100.38	383.65
25	60.9	763.2	168.91	891.37	364.14	100.38	395.65
30	53.9	687.3	168.91	933.12	322.48	100.38	399.77
40	44.2	581.3	168.91	989.66	264.21	100.38	393.20
60	32.9	458.9	168.91	1044.06	196.99	100.38	347.81
70	29.4	420.1	168.91	1054.81	175.64	100.38	316.08
80	26.6	389.5	168.91	1058.70	158.84	100.38	280.59
90	24.3	364.7	168.91	1057.41	145.24	100.38	242.24
100	22.4	344.3	168.91	1052.05	133.99	100.38	201.66
120	19.5	312.3	168.91	1032.11	116.41	100.38	115.43
140	17.3	288.3	168.91	1003.07	103.26	100.38	24.20
160	15.6	262.3	168.91	896.71	93.02	93.02	0.00
180	14.2	239.1	168.91	758.32	84.79	84.79	0.00
200	13.0	220.1	168.91	613.73	78.03	78.03	0.00
240	11.3	190.5	168.91	310.36	67.54	67.54	0.00
280	10.0	168.5	168.91	0.00	59.74	59.74	0.00
320	9.0	151.5	168.91	0.00	53.71	53.71	0.00
360	8.2	137.8	168.91	0.00	48.88	48.88	0.00
			Max Storage (m^3) =	**1058.70**		**Max Roof Storage (m^3) =**	**399.77**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**168.91**			
			Target Release Rate (L/s) =	**223.52**			

MODIFIED RATIONAL METHOD

			Site (Vault)			*Controlled Rooftop*		
10-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	202.35				
Storm Duration	Rainfall Intensity	Storm Runoff	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)
10	122.1	1429.7	202.35	736.43	730.38	100.38	378.00
15	97.9	1165.4	202.35	866.72	585.13	100.38	436.28
20	82.2	995.1	202.35	951.34	491.60	100.38	469.46
25	71.2	875.6	202.35	1009.81	425.90	100.38	488.28
30	63.0	786.6	202.35	1051.56	377.00	100.38	497.92
40	51.6	662.2	202.35	1103.63	308.68	100.38	499.91
60	38.5	518.9	202.35	1139.48	229.93	100.38	466.39
70	34.3	473.4	202.35	1138.30	204.93	100.38	439.12
80	31.0	437.6	202.35	1129.15	185.27	100.38	407.49
90	28.3	408.6	202.35	1113.99	169.37	100.38	372.55
100	26.1	384.7	202.35	1094.12	156.22	100.38	335.01
120	22.7	347.3	202.35	1043.68	135.67	100.38	254.08
140	20.1	319.3	202.35	982.70	120.30	100.38	167.35
160	18.1	297.6	202.35	914.04	108.34	100.38	76.40
180	16.5	278.4	202.35	821.76	98.74	98.74	0.00
200	15.2	256.2	202.35	645.92	90.84	90.84	0.00
240	13.1	221.6	202.35	277.83	78.60	78.60	0.00
280	11.6	196.0	202.35	0.00	69.50	69.50	0.00
320	10.4	176.1	202.35	0.00	62.46	62.46	0.00
360	9.5	160.3	202.35	0.00	56.83	56.83	0.00
			Max Storage (m^3) =	**1139.48**		**Max Roof Storage (m^3) =**	**499.91**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**202.35**			
			Target Release Rate (L/s) =	**261.01**			

			Site (Vault)			*Controlled Rooftop*		
25-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	262.82				
Storm Duration	Rainfall Intensity	Storm Runoff	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)
10	144.7	1675.2	262.82	847.41	865.23	100.38	458.91
15	115.8	1361.0	262.82	988.39	692.64	100.38	533.03
20	97.3	1158.9	262.82	1075.27	581.56	100.38	577.42
25	84.2	1017.0	262.82	1131.20	503.59	100.38	604.81
30	74.5	911.4	262.82	1167.37	445.57	100.38	621.34
40	61.0	763.9	262.82	1202.62	364.56	100.38	634.03
60	45.4	594.1	262.82	1192.66	271.27	100.38	615.21
70	40.4	540.3	262.82	1165.22	241.68	100.38	593.45
80	36.5	497.9	262.82	1128.43	218.41	100.38	566.56
90	33.4	463.7	262.82	1084.58	199.60	100.38	535.79
100	30.8	435.4	262.82	1035.21	184.04	100.38	501.98
120	26.7	391.1	262.82	923.95	159.75	100.38	427.50
140	23.7	358.1	262.82	800.36	141.60	100.38	346.23
160	21.3	332.4	262.82	667.79	127.47	100.38	260.04
180	19.4	311.7	262.82	528.39	116.13	100.38	170.09
200	17.9	294.8	262.82	383.59	106.81	100.38	77.18
240	15.4	260.5	262.82	0.00	92.36	92.36	0.00
280	13.7	230.2	262.82	0.00	81.64	81.64	0.00
320	12.3	206.8	262.82	0.00	73.34	73.34	0.00
360	11.2	188.1	262.82	0.00	66.71	66.71	0.00
			Max Storage (m^3) =	**1202.62**		**Max Roof Storage (m^3) =**	**634.03**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**262.82**			
			Target Release Rate (L/s) =	**308.14**			

MODIFIED RATIONAL METHOD

		Site (Vault)			*Controlled Rooftop*		
50-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	317.97				
Storm Duration	Rainfall Intensity	Storm Runoff	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)
10	161.5	1857.8	317.97	923.88	965.56	100.38	519.11
15	129.2	1506.8	317.97	1069.91	772.70	100.38	605.09
20	108.5	1280.9	317.97	1155.57	648.63	100.38	657.90
25	93.9	1122.5	317.97	1206.72	561.55	100.38	691.76
30	83.1	1004.6	317.97	1235.85	496.78	100.38	713.52
40	68.0	840.0	317.97	1252.79	406.35	100.38	734.32
60	50.5	650.5	317.97	1197.10	302.25	100.38	726.73
70	45.0	590.4	317.97	1144.26	269.24	100.38	709.20
80	40.7	543.2	317.97	1081.02	243.29	100.38	685.96
90	37.2	505.0	317.97	1009.94	222.31	100.38	658.41
100	34.3	473.4	317.97	932.72	204.96	100.38	627.48
120	29.7	424.1	317.97	764.37	177.88	100.38	557.99
140	26.4	387.3	317.97	582.33	157.64	100.38	480.98
160	23.7	358.6	317.97	390.32	141.89	100.38	398.49
180	21.6	335.6	317.97	190.72	129.25	100.38	311.83
200	19.9	316.7	317.97	0.00	118.87	100.38	221.88
240	17.2	287.4	317.97	0.00	102.77	100.38	34.47
280	15.2	256.1	317.97	0.00	90.83	90.83	0.00
320	13.6	230.1	317.97	0.00	81.59	81.59	0.00
360	12.4	209.2	317.97	0.00	74.20	74.20	0.00
			Max Storage (m^3) =	**1252.79**		**Max Roof Storage (m^3) =**	**734.32**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**317.97**			
			Target Release Rate (L/s) =	**343.41**			

		Site (Vault)			*Controlled Rooftop*		
100-Year			Area	Runoff C	Area	Runoff C	Unit Rate (L/s/ha)
		Controlled	4.35	0.90	2.39	0.90	42
		Uncontrolled	0.14	0.74			
			4.49				
		Orifice Control Flow (L/s) =	377.99				
Storm Duration	Rainfall Intensity	Storm Runoff	Controlled Flow	Storage Required	Storm Runoff	Roof Flow	Storage Required
t_d (min)	i (mm/h)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)	Q_{in} (L/s)	$Q_{out,con}$ (L/s)	V (m^3)
10	178.6	2043.8	377.99	999.46	1067.74	100.38	580.42
15	142.9	1655.6	377.99	1149.85	854.48	100.38	678.69
20	120.0	1405.9	377.99	1233.47	717.28	100.38	740.28
25	103.8	1230.6	377.99	1278.94	620.98	100.38	780.90
30	91.9	1100.2	377.99	1300.06	549.35	100.38	808.15
40	75.1	918.2	377.99	1296.60	449.35	100.38	837.53
60	55.9	708.7	377.99	1190.63	334.24	100.38	841.89
70	49.8	642.3	377.99	1110.00	297.73	100.38	828.87
80	45.0	590.0	377.99	1017.88	269.04	100.38	809.55
90	41.1	547.8	377.99	917.07	245.83	100.38	785.45
100	37.9	512.9	377.99	809.49	226.65	100.38	757.63
120	32.9	458.4	377.99	578.93	196.70	100.38	693.53
140	29.2	417.7	377.99	333.24	174.32	100.38	621.12
160	26.2	386.0	377.99	76.52	156.91	100.38	542.64
180	23.9	360.5	377.99	0.00	142.93	100.38	459.56
200	22.0	339.6	377.99	0.00	131.45	100.38	372.84
240	19.0	307.2	377.99	0.00	113.65	100.38	191.09
280	16.8	283.2	377.99	0.00	100.44	100.38	1.06
320	15.1	254.4	377.99	0.00	90.22	90.22	0.00
360	13.7	231.4	377.99	0.00	82.05	82.05	0.00
			Max Storage (m^3) =	**1300.06**		**Max Roof Storage (m^3) =**	**841.89**
$V = (Q_{in} - Q_{out,con}) * t_d$			**Total Outflow (L/s) =**	**377.99**			
			Target Release Rate (L/s) =	**379.75**			

ORIFICE SIZING

Orifice Equation: $Q = C \times A \times \sqrt{2gh}$

Weir Equation: $Q = (C)(L)(H)^{\frac{3}{2}}$

Orifice Details

Orifice 1		Weir	
Orifice Location =	Chamber Outlet	Orifice Location =	Chamber Outlet
Orifice Type =	Plate		
Discharge Coefficient =	0.63	Discharge Coefficient =	1.81
Orifice Diameter =	255	Weir Width =	1.50
Orifice Area =	0.05		
Orifice Invert =	103.13	Weir Invert =	104.60

440

Storm Event	Volume Required	Headwater Elevation	Total Head	Orifice Release Rate, a		Orifice Release Rate, b		Target Release Rate	Difference [Target - Flow] (L/s)	Proportion [Flow/ Target] (%)
	(m^3)	(m)	(m)	(L/s)		(L/s)				
2-Year	792.96	104.37	1.11	150.1		151.0		166	15.45	91%
5-Year	1058.70	104.57	1.31	163.3		168.9		224	54.61	76%
10-Year	1139.48	104.64	1.38	186.2		202.4		261	58.66	78%
25-Year	1202.62	104.68	1.43	236.7		262.8		308	45.32	85%
50-Year	1252.79	104.72	1.46	289.8		318.0		343	25.44	93%
100-Year	1300.06	104.76	1.50	344.9		378.0		380	1.76	100%

STAGE STORAGE DISCHARGE

Orifice 1		Weir	
$Q = (C)(A)\sqrt{2g\Delta h}$		$Q = (C)(A)\sqrt{2g\Delta h}$	
Invert	103.13	Invert	104.6
Size (mm)	255	Width	1.50
Area (m2)	0.0511		
Type	Plate		
Cd	0.63	Cd	1.81

Elevation (m)	Total Storage (cu.m)	Pond	Cultec	Stage (m)		Orifice 1 Discharge		Weir Discharge	TOTAL DISCHARGE
104.82	1356.58	644.05	712.53	1.01		178.14		280.16	458.30
104.79	1344.95	644.05	700.90	0.98		176.43		224.85	401.28
104.77	803.78	114.50	689.28	0.96		175.27		190.30	365.57
104.74	1276.90	599.25	677.65	0.93		173.52		142.22	315.74
104.71	1106.02	440.00	666.02	0.90		171.76		99.05	270.81
104.69	1210.20	555.81	654.39	0.88		170.57		73.31	243.88
104.66	1173.16	530.39	642.77	0.85		168.78		39.90	208.68
104.64	1144.85	513.71	631.14	0.83		167.57		21.72	189.29
104.61	1108.60	489.09	619.51	0.80		165.74		2.72	168.46
104.59	1080.83	472.94	607.89	0.78		164.51		0.00	164.51
104.56	1045.37	449.11	596.26	0.75		162.65		0.00	162.65
104.54	1018.12	433.49	584.63	0.73		161.39		0.00	161.39
104.51	983.47	410.46	573.01	0.70		159.50		0.00	159.50
104.50	970.07	402.88	567.19	0.69		158.86		0.00	158.86
104.47	935.26	380.48	554.78	0.66		156.93		0.00	156.93
104.45	906.92	365.81	541.11	0.64		155.63		0.00	155.63
104.42	869.31	344.18	525.13	0.61		153.66		0.00	153.66
104.40	837.70	330.03	507.67	0.59		152.33		0.00	152.33
104.37	798.31	309.19	489.12	0.56		150.32		0.00	150.32
104.35	765.25	295.55	469.70	0.54		148.96		0.00	148.96
104.32	725.07	275.48	449.59	0.51		146.90		0.00	146.90
104.30	691.22	262.36	428.86	0.49		145.51		0.00	145.51
104.27	650.68	243.06	407.62	0.46		143.40		0.00	143.40
104.25	616.34	230.45	385.89	0.44		141.98		0.00	141.98
104.22	575.68	211.91	363.77	0.41		139.82		0.00	139.82
104.19	535.15	193.84	341.31	0.38		137.62		0.00	137.62
104.17	500.27	182.04	318.23	0.36		136.14		0.00	136.14
104.14	459.69	164.71	294.98	0.33		133.88		0.00	133.88
104.12	424.98	153.42	271.56	0.31		132.35		0.00	132.35
104.09	384.80	136.85	247.95	0.28		130.03		0.00	130.03
104.07	350.21	126.05	224.16	0.26		128.46		0.00	128.46
104.04	310.25	110.23	200.02	0.23		126.07		0.00	126.07
104.02	275.59	99.93	175.66	0.21		124.45		0.00	124.45
103.99	236.07	84.86	151.21	0.18		121.97		0.00	121.97
103.97	201.33	75.05	126.28	0.16		120.30		0.00	120.30
103.94	162.01	60.71	101.30	0.13		117.74		0.00	117.74
103.91	123.05	46.81	76.24	0.10		115.12		0.00	115.12
103.89	88.88	37.79	51.09	0.08		113.34		0.00	113.34
103.86	50.47	24.62	25.85	0.05		110.62		0.00	110.62
103.84	16.09	16.09	0.00	0.03		108.77		0.00	108.77
103.81	3.65	3.65	0.00	0.00		105.93		0.00	105.93

CULTEC Stormwater Design Calculator

Date:	February 19, 2025

Project Information:

Calculations Performed By:

RECHARGER 280HD

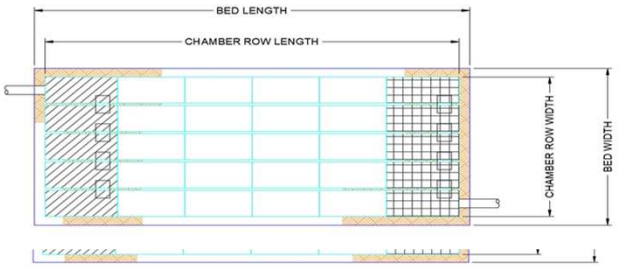
Recharger 280HD Chamber Specifications		
Height	**673**	mm
Width	**1194**	mm
Length	**2.44**	meters
Installed Length	**2.13**	meters
Bare Chamber Volume	**1.20**	cu. meters
Installed Chamber Volume	**2.19**	cu. meters

Breakdown of Storage Provided by Recharger 280HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**441.02**	cu. meters
Within Stone	**375.87**	cu. meters
Total Storage Provided	**816.9**	**cu. meters**
Total Storage Required	786.56	cu. meters

Materials List

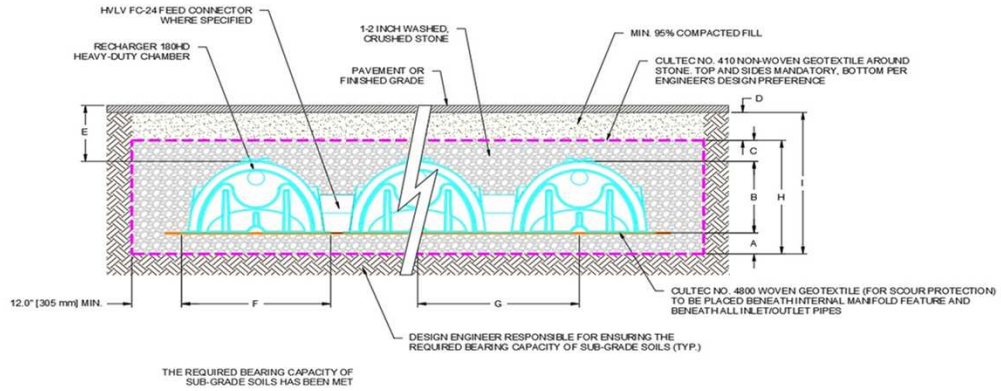
Recharger 280HD			
Total Number of Chambers Required	**364**	**pieces**	
Separator Row Chambers	**26**	pieces	Separator Row Qty Included in Total
Starter Chambers		pieces	
Intermediate Chambers	**336**	pieces	
End Chambers	**14**	pieces	
HVLV FC-24 Feed Connectors	**26**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**3092**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**99**	meters	
Stone	**940**	cu. meters	

Bed Detail



Bed Layout Information		
Number of Rows Wide	**14**	pieces
Number of Chambers Long	**26**	pieces
Chamber Row Width	**19.69**	meters
Chamber Row Length	**55.78**	meters
Bed Width	**20.29**	meters
Bed Length	**56.39**	meters
Bed Area Required	**1144.37**	sq. meters
Length of Separator Row	**55.78**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**229**	mm
B	Chamber Height	**673**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**254**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**1194**	mm
G	Center to Center Spacing	**1.42**	meters
H	Effective Depth	**1.21**	meters
I	Bed Depth	**1.46**	meters

CULTEC Stage-Storage Calculations

Date:	February 19, 2025

Project Information:

Project Number: 0

Chamber Model -	**Recharger 280HD**	
Number of Rows-	14	units
Total Number of Chambers -	364	units
Stone Void -	40	%
Stone Base -	229	mm
Stone Above Units -	305	mm
Area -	1144.37	m2
Base of Stone Elevation -	103.61	

Recharger 280HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft²	m²	ft	m	
47.5	1207	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	28858.13	817.17	4927.17	457.73	107.57	104.82	Top of Stone Elevation
46.5	1181	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	28447.53	805.54	4927.17	457.73	107.49	104.79	
45.5	1156	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	28036.94	793.92	4927.17	457.73	107.40	104.77	
44.5	1130	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	27626.34	782.29	4927.17	457.73	107.32	104.74	
43.5	1105	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	27215.74	770.66	4927.17	457.73	107.24	104.71	
42.5	1080	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	26805.14	759.04	4927.17	457.73	107.15	104.69	
41.5	1054	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	26394.55	747.41	4927.17	457.73	107.07	104.66	
40.5	1029	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	25983.95	735.78	4927.17	457.73	106.99	104.64	
39.5	1003	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	25573.35	724.16	4927.17	457.73	106.90	104.61	
38.5	978	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	25162.76	712.53	4927.17	457.73	106.82	104.59	
37.5	953	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	24752.16	700.90	4927.17	457.73	106.74	104.56	
36.5	927	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	24341.56	689.28	4927.17	457.73	106.65	104.54	
35.5	902	0.3	0.0	0.0	0.0	205.2	5.8	205.452	5.8	23930.96	677.65	2465.43	229.04	106.57	104.51	Top of Chamber Elevation
35.0	889	46.1	1.3	0.0	0.0	392.2	11.1	438.267	12.4	23725.51	671.83	5259.20	488.58	106.53	104.50	
34.0	864	120.4	3.4	0.0	0.0	362.4	10.3	482.846	13.7	23287.24	659.42	5794.15	538.28	106.44	104.47	
33.0	838	256.2	7.3	0.0	0.0	308.1	8.7	564.317	16.0	22804.40	645.75	6771.81	629.10	106.36	104.45	
32.0	813	343.3	9.7	0.0	0.0	273.3	7.7	616.582	17.5	22240.08	629.77	7398.98	687.37	106.28	104.42	
31.0	787	407.4	11.5	0.0	0.0	247.7	7.0	655.012	18.5	21623.50	612.31	7860.14	730.21	106.19	104.40	
30.0	762	458.6	13.0	0.0	0.0	227.2	6.4	685.756	19.4	20968.49	593.76	8229.07	764.48	106.11	104.37	
29.0	737	499.6	14.1	0.0	0.0	210.8	6.0	710.351	20.1	20282.73	574.34	8524.21	791.90	106.03	104.35	
28.0	711	535.5	15.2	0.0	0.0	196.4	5.6	731.872	20.7	19572.38	554.23	8782.46	815.89	105.94	104.32	
27.0	686	566.2	16.0	0.0	0.0	184.1	5.2	750.318	21.2	18840.51	533.50	9003.82	836.45	105.86	104.30	
26.0	660	594.4	16.8	0.0	0.0	172.8	4.9	767.228	21.7	18090.19	512.26	9206.73	855.31	105.78	104.27	
25.0	635	617.4	17.5	0.0	0.0	163.6	4.6	781.062	22.1	17322.96	490.53	9372.75	870.73	105.69	104.25	
24.0	610	637.9	18.1	0.0	0.0	155.4	4.4	793.360	22.5	16541.90	468.41	9520.32	884.44	105.61	104.22	
23.0	584	673.8	19.1	0.0	0.0	141.1	4.0	814.881	23.1	15748.54	445.95	9778.57	908.43	105.53	104.19	
22.0	559	684.1	19.4	0.0	0.0	137.0	3.9	821.030	23.2	14933.66	422.87	9852.36	915.28	105.44	104.17	
21.0	533	694.3	19.7	0.0	0.0	132.9	3.8	827.222	23.4	14112.63	399.62	9926.67	922.19	105.36	104.14	
20.0	508	704.6	20.0	0.3	0.0	128.8	3.6	833.666	23.6	13285.41	376.20	10003.99	929.37	105.28	104.12	
19.0	483	714.8	20.2	0.7	0.0	124.7	3.5	840.131	23.8	12451.74	352.59	10081.57	936.58	105.19	104.09	
18.0	457	735.3	20.8	0.8	0.0	116.5	3.3	852.571	24.1	11611.61	328.80	10230.85	950.45	105.11	104.07	
17.0	432	748.1	21.2	0.9	0.0	111.4	3.2	860.344	24.4	10759.04	304.66	10324.13	959.11	105.03	104.04	
16.0	406	753.2	21.3	0.9	0.0	109.3	3.1	863.462	24.5	9898.70	280.30	10361.55	962.59	104.94	104.02	
15.0	381	781.4	22.1	1.0	0.0	98.0	2.8	880.415	24.9	9035.23	255.85	10564.98	981.49	104.86	103.99	
14.0	356	784.0	22.2	1.0	0.0	97.0	2.7	881.996	25.0	8154.82	230.92	10583.95	983.25	104.78	103.97	
13.0	330	789.1	22.3	1.0	0.0	95.0	2.7	885.092	25.1	7272.82	205.94	10621.11	986.70	104.69	103.94	
12.0	305	794.2	22.5	1.1	0.0	92.9	2.6	888.188	25.2	6387.73	180.88	10658.26	990.15	104.61	103.91	
11.0	279	799.3	22.6	1.1	0.0	90.9	2.6	891.285	25.2	5499.54	155.73	10695.42	993.60	104.53	103.89	
10.0	254	835.2	23.7	1.2	0.0	76.5	2.2	912.882	25.8	4608.26	130.49	10954.58	1017.68	104.44	103.86	
9.0	229	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	3695.38	104.64	4927.17	457.73	104.36	103.84	Bottom of Chamber Elevation
8.0	203	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	3284.78	93.01	4927.17	457.73	104.28	103.81	
7.0	178	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	2874.18	81.39	4927.17	457.73	104.19	103.79	
6.0	152	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	2463.58	69.76	4927.17	457.73	104.11	103.76	
5.0	127	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	2052.99	58.13	4927.17	457.73	104.03	103.74	
4.0	102	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	1642.39	46.51	4927.17	457.73	103.94	103.71	
3.0	76	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	1231.79	34.88	4927.17	457.73	103.86	103.69	
2.0	51	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	821.19	23.25	4927.17	457.73	103.78	103.66	
1.0	25	0.0	0.0	0.0	0.0	410.6	11.6	410.597	11.6	410.60	11.63	4927.17	457.73	103.69	103.64	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	103.61	103.61	Bottom of Stone Elevation
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Quality Control Calculations

	Device	TSS Removal Efficiency
BMP1	Separator Row-1	50%
BMP2	OGS	50%
BMP3	Separator Row-2	50%

NJDEP Calculation for TSS removal rates for BMP in Series:
R = A + B - [(AxB)/100]
A = TSS Removal rate from First (Upstream BMP)
B = TSS Removal rate from Second (Downstream BMP)

Land Type	Area (m^2)	Starting TSS Removal (A)	TSS Removal (B_1)	TSS Removal (B_2)	TSS Removal (B_3)	Notes
Roof	23,900	90%	95%	98%	99%	*Roof is treated by all three BMPs*
Landscape	1,400	90%	90%	95%	98%	*Landscape does not get treated by BMP1*
Impervious	43,500	0%	0%	50%	75%	*Impervious does not get treated by BMP1*
TOTAL	68,800	**33%**	**35%**	**67%**	**84%**	

Stormceptor EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

02/16/2025

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	O'Keefe Court

Drainage Area (ha):	6.88
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	199.85
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	7583
Estimated Average Annual Sediment Volume (L/yr):	6165

Project Name:	O'Keefe Court
Project Number:	21684
Designer Name:	Luan Phan
Designer Company:	KWA
Designer Email:	luan.phan@kwasitedev.com
Designer Phone:	437-453-3130
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	43
EF5	52
EF6	59
EF8	69
EF10	76
EF12	81

Recommended Stormceptor EF Model: EF12

Estimated Net Annual Sediment (TSS) Load Reduction (%): 81

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

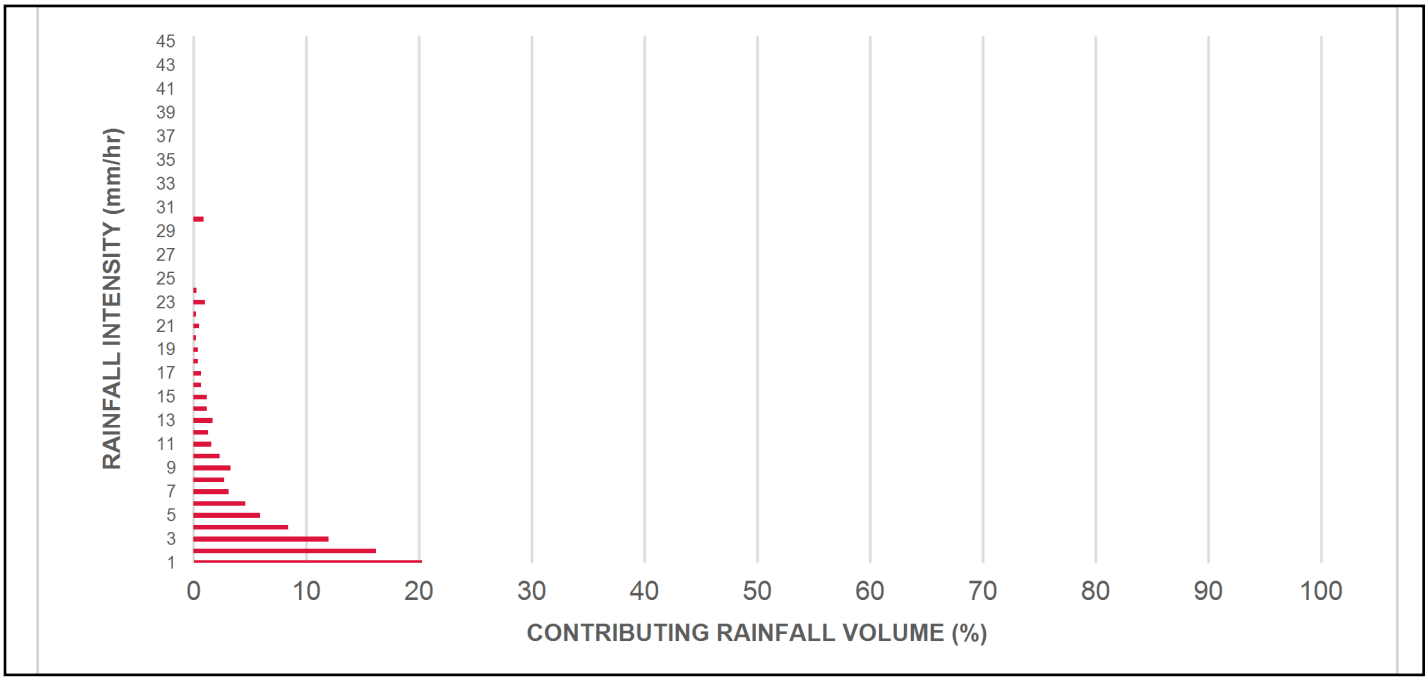
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

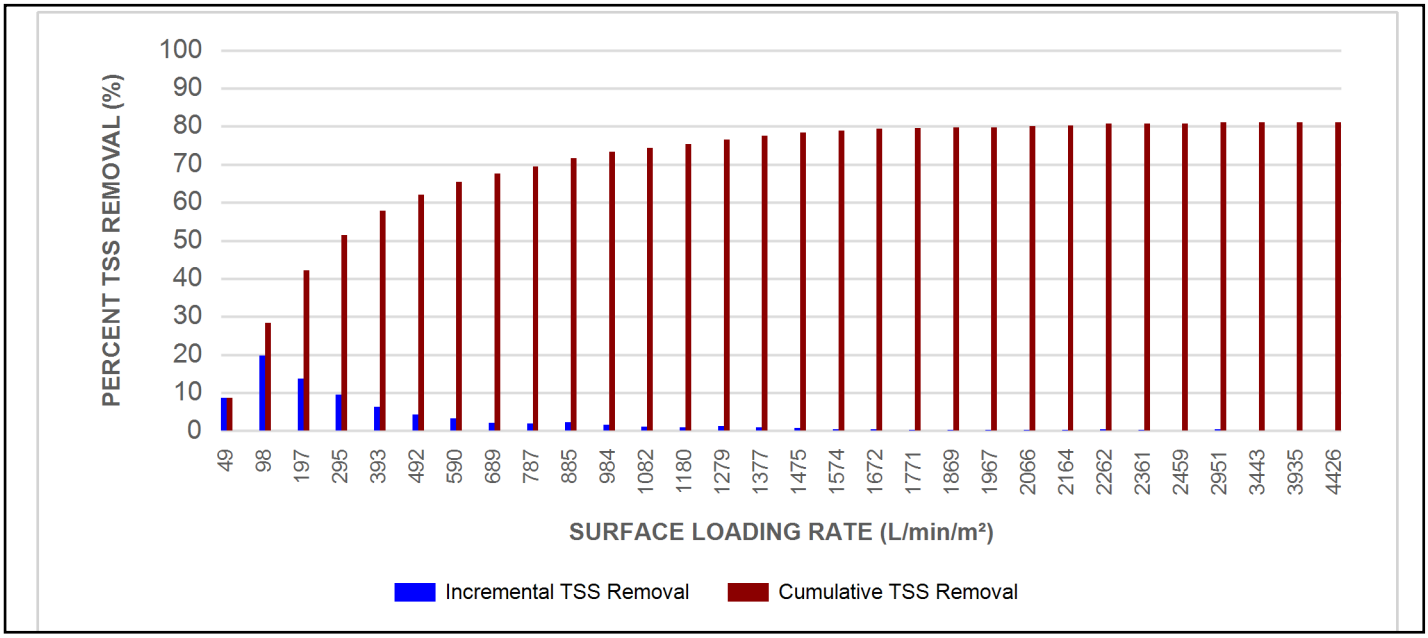
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	8.61	516.0	49.0	100	8.6	8.6
1.00	20.3	29.0	17.21	1033.0	98.0	97	19.8	28.4
2.00	16.2	45.2	34.43	2066.0	197.0	84	13.7	42.1
3.00	12.0	57.2	51.64	3098.0	295.0	79	9.5	51.5
4.00	8.4	65.6	68.86	4131.0	393.0	74	6.3	57.8
5.00	5.9	71.6	86.07	5164.0	492.0	72	4.3	62.1
6.00	4.6	76.2	103.28	6197.0	590.0	71	3.3	65.4
7.00	3.1	79.3	120.50	7230.0	689.0	70	2.1	67.6
8.00	2.7	82.0	137.71	8263.0	787.0	69	1.9	69.5
9.00	3.3	85.3	154.92	9295.0	885.0	69	2.3	71.7
10.00	2.3	87.6	172.14	10328.0	984.0	68	1.6	73.3
11.00	1.6	89.2	189.35	11361.0	1082.0	69	1.1	74.4
12.00	1.3	90.5	206.57	12394.0	1180.0	71	0.9	75.3
13.00	1.7	92.2	223.78	13427.0	1279.0	73	1.3	76.6
14.00	1.2	93.5	240.99	14460.0	1377.0	75	0.9	77.5
15.00	1.2	94.6	258.21	15492.0	1475.0	72	0.8	78.3
16.00	0.7	95.3	275.42	16525.0	1574.0	67	0.5	78.8
17.00	0.7	96.1	292.63	17558.0	1672.0	63	0.5	79.3
18.00	0.4	96.5	309.85	18591.0	1771.0	60	0.2	79.5
19.00	0.4	96.9	327.06	19624.0	1869.0	57	0.2	79.7
20.00	0.2	97.1	344.28	20657.0	1967.0	54	0.1	79.8
21.00	0.5	97.5	361.49	21689.0	2066.0	51	0.2	80.1
22.00	0.2	97.8	378.70	22722.0	2164.0	49	0.1	80.2
23.00	1.0	98.8	395.92	23755.0	2262.0	47	0.5	80.7
24.00	0.3	99.1	413.13	24788.0	2361.0	45	0.1	80.8
25.00	0.0	99.1	430.34	25821.0	2459.0	43	0.0	80.8
30.00	0.9	100.0	516.41	30985.0	2951.0	36	0.3	81.1
35.00	0.0	100.0	602.48	36149.0	3443.0	31	0.0	81.1
40.00	0.0	100.0	688.55	41313.0	3935.0	27	0.0	81.1
45.00	0.0	100.0	774.62	46477.0	4426.0	24	0.0	81.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**81 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

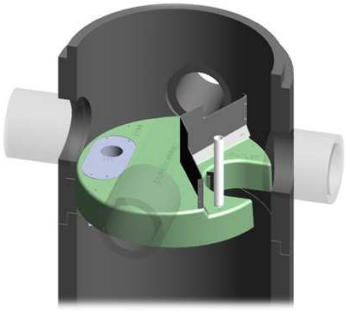
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

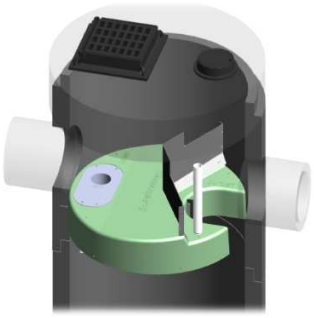
DESIGN FLEXIBILITY

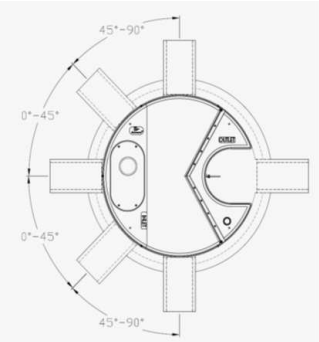
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

water

MDPI

Article

Performance of an Underground Stormwater Detention Chamber and Comparison with Stormwater Management Ponds

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Abstract: The transportation of pollutants from impervious surfaces during runoff events to receiving water bodies is a serious environmental problem. Summer runoff is also heated by impervious surfaces, causing thermal enrichment in receiving water body systems and degradation of coldwater aquatic ecosystems. End-of-pipe stormwater management facilities that are open to the environment can result in further elevated temperatures due to exposure to solar radiation. Receiving water systems that provide coldwater habitat require cool water temperatures to sustain healthy conditions for cold water flora and fauna (e.g., trout, dace). Underground Stormwater Detention Chambers (USDC) are a technology for the detention and treatment of stormwater runoff that can potentially solve the thermal issues associated with sun-exposed detention facilities while still providing an equivalent level of treatment services for stormwater pollutants. A field study of an USDC located in Southern Ontario was undertaken to characterize its treatment performance and effect on water temperature. The results were: the USDC was found to provide similar levels of stormwater treatment as wet detention ponds. On average, outlet maximum temperatures were 5 °C cooler than inlet maximum temperatures, and outlet water temperatures remained within the thermal regime for coldwater fish habitat throughout the evaluation period. There was little to no stratification of temperature, nor dissolved solids, but stratification of dissolved oxygen was observed mid-winter and into the spring.

Keywords: stormwater detention; end-of-pipe; underground detention chambers; ponds; water quality; temperature

1. Introduction

Stormwater management is a key issue in the design of urban infrastructure. Sustained increases in urbanization have resulted in large-scale replacement of pervious land by impervious surfaces, which reduces infiltration rates and available surface storage [1]. Due to these changes, a larger proportion of urban precipitation becomes runoff. Runoff from urban areas causes non-point source pollution by transporting pollutants-which are deposited on impervious surfaces through human activities and atmospheric deposition-to receiving water bodies [2,3].

Stormwater management (SWM) ponds have been the most widely employed management practice in urban drainage for over 40 years [4]. SWM ponds have been widely documented to improve stormwater quality reducing concentrations of suspended sediments [5], metals [5], nutrients [5,6] and bacteria [7]. Ponds are often assumed to provide high removal efficiency for total suspended solids

Mannings Equation - Trapezoidal Channel

Project Name: O'Keefe Court
Project Number: 21684
Location: Nepean, Ontario
Date: 2/19/2025
Prepared By: LP

EXISTING SWALE

Parameter	Value		Units	
Flow depth	0.87		m	
Freeboard	0.3			*assumed*
Side slope Ratio	3	:1	H:V	*existing side slopes approx. 3:1*
Bed width	0		m	*assume triangular - per cross sections*
Top width	7		m	*existing top width is >7m*
Area	2.253		m^2	
Wetted Perimeter	5.481		m	
Slope	0.3		%	*MINIMUM SLOPE ALONG SOUTH SWALE*
Mannings 'n'	0.03			*BETWEEN CUL-DE-SAC AND POINT OF*
Channel Capacity	2.275		m^3/s	*DIRECTIONAL SWITCH*
Channel Capacity	**2275**		**L/s**	*FLOW CAPACITY OF DITCH AT WORST*
Channel Capacity	1.009		m/s	*CASE SCENARIO*

REINSTATED SWALE

Parameter	Value		Units	
Flow depth	0.87		m	
Freeboard	0.3			*assumed*
Side slope Ratio	3	:1	H:V	*existing side slopes approx. 3:1*
Bed width	0		m	*assume triangular - per cross sections*
Top width	7		m	*existing top width is >7m*
Area	2.253		m^2	
Wetted Perimeter	5.481		m	
Slope	1		%	*APPROXIMATE SLOPE FROM AVERAGING*
Mannings 'n'	0.03			*OUT SLOPE BETWEEN CUL-DE-SAC AND*
Channel Capacity	4.153		m^3/s	*POINT OF DIRECTIONAL SWITCH*
Channel Capacity	**4153**		**L/s**	
Channel Capacity	1.843		m/s	

Total Site - Uncontrolled Flow

Uncontrolled area (ha) =	6.88
Runoff Coefficient =	0.9
Time of Concentration (min) =	40

Storm Event	Intensity (mm/hr)	Uncontrolled Flow Rate (L/s)
2 year	32.9	565.7
5 year	44.2	760.6
10 year	51.6	888.6
25 year	61.0	1049.4
50 year	68.0	1169.7
100 year	75.1	1293.5

100-year Flow + 20% Surcharge = 1552.2

Calculation of Contributing Flow to O'Keefe South Swale (Up to Block 15 Inlet)

					Rainfall Intensity (mm/hr)		Rational Flow (L/s)	
*Drainage ID	Description	Area (ha)	**ToC (min)	Runoff C	2 year	100 year	2 year	100 year
200	Subject Site - Controlled Flow	6.74	***Flow is predetermined - Refer to SWM Calcs***				166.5	379.8
201	Subject Site - Uncontrolled Flow	0.14	***Flow is predetermined - Refer to SWM Calcs***				22.1	51.4
202a	O'Keefe ROW - North	0.57	15	0.90	61.8	142.9	88.1	203.8
202b	O'Keefe ROW - South	0.66	20	0.90	52.0	120.0	85.9	198.1
203	Lytle Park	9.8	50	0.30	28.0	64.0	229.2	522.7
		17.91						
						Total Flow (L/s)	**591.8**	**1355.8**

IDF curve equations (Intensity in mm/hr)

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity = $1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity = $1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity = $1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Ditch Capacity =	**4153**	L/s
Total Tributary Flow (2-year) =	**591.8**	L/s
Total Tributary Flow (100-year) =	**1355.8**	L/s
***Site Overland Flow Conditions =	**2476.8**	L/s

Operating Capacities

2-year	**14%**
100-year	**33%**
Overland Flow	**60%**

*Refer to Figure PDP-A in Appendix E

**time of concentration calculated using Airport Formula (RC<0.4) and Bransby William Formula (RC>0.4)

***site overland flow conditions based on uncontrolled flow of total site (with 20% surcharge) + 100-year flows from areas 202a, 202b, 203

Culvert Sizing

Pipe Size =	600	mm		**Area (m^2)**	**Runoff C**	**ToC (min)**	
Pipe Grade % =	2		**Area #202**	1828	0.75	10	*O'Keefe north ROW drainage*
Full Wetted Area =	0.28	m2					
Full Wetted Perimeter =	1.88	m		**Pre-Development Flow (L/s)**			
Mannings Coefficient	0.024			**2 year**	**5 year**	**10 year**	**25 year**	**50 year**	**100 year**
Full Flow Velocity =	**1.66**	**m/s**	**Area 202**	29.27	39.71	46.55	55.15	61.54	68.06
Full Flow Capacity =	**470.4**	**L/s**	**Site (Area 200)**	151.00	166.41	202.35	266.16	317.97	378.29
			% of FFC	38%	44%	53%	68%	81%	95%

Project:	**O'Keefe Court**
Project #:	21684
Designed By:	L.P.
Checked By:	T.F
Date:	4-Mar-2025

Site Total - Infiltration Rate & Drawdown Time

Infiltration Storage Required

Rainfall Retention Depth =	**5.00**	mm
Site Area =	**6.88**	ha
Total Water Balance Volume Required =	**344.00**	m^3
Combined Rooftop Area =	**2.39**	ha
West Drainage Area =	**1.20**	ha
Total Target Water Balance Volume =	**179.50**	m^3
Total Water Balance Volume Provided =	**197.02**	m^3
% of total volume requirement =	57.3%	

Project:	**O'Keefe Court**
Project #:	21684
Designed By:	T.G
Checked By:	T.F
Date:	4-Mar-2025

Infiltration Gallery - 1 (Cultec 100HD Stormwater System) - Infiltration Rate & Drawdown Time

Infiltration Rate

Infiltration Rate =	25.8	mm/hr	*as per Hydrogeological Investigation (Gemtech) dated 09/04/24*
Safety Correction Factor =	2.5		
Total Target Water Balance Volume P	10.32	mm/hr	

Infiltration Storage Required

Rainfall Retention Depth =	**5.00**	mm
Building A3 Area =	**0.80**	ha
Total Target Water Balance Volume	**40.14**	m^3

Cultec 100HD Stormwater System Dimensions

Footprint	**240.39**	m2
Volume	**41.45**	m3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*
Infiltration	41.45	0.0103	240.39	2.5	16.7
Total	**41.45**				

*Max allowable drawdown time = 72 hours (3 days)

**effective depth of water from Cultec stage-storage sheet multiplied by 0.40 (water volume/bulk volume ratio)

Project:	**O'Keefe Court**
Project #:	21684
Designed By:	T.G
Checked By:	T.F
Date:	4-Mar-2025

Infiltration Gallery - 2 (Cultec 100HD Stormwater System) - Infiltration Rate & Drawdown Time

Infiltration Rate

Infiltration Rate =	4.3	mm/hr	*as per Hydrogeological Investigation (Gemtech) dated 09/04/24*
Safety Correction Factor =	2.5		
Total Target Water Balance Volume P	1.72	mm/hr	

Infiltration Storage Required

Rainfall Retention Depth =	**5.00**	mm
Building A2 +West Parking Lot Area =	**1.52**	ha
Total Target Water Balance Volume	**75.82**	m^3

Cultec 100HD Stormwater System Dimensions

Footprint	**697.47**	m2
Volume	**78.56**	m3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*
Infiltration	78.56	0.0017	697.47	1.2	65.5
Total	**78.56**				

*Max allowable drawdown time = 72 hours (3 days)
**effective depth of water from Cultec stage-storage sheet multiplied by 0.40 (water volume/bulk volume ratio)

Project:	**O'Keefe Court**
Project #:	21684
Designed By:	T.G
Checked By:	T.F
Date:	4-Mar-2025

Infiltration Gallery - 3 (Cultec 100HD Stormwater System) - Infiltration Rate & Drawdown Time

Infiltration Rate

Infiltration Rate =	13.2	mm/hr	*as per Hydrogeological Investigation (Gemtech) dated 09/04/24*
Safety Correction Factor =	2.5		
Total Target Water Balance Volume P	5.28	mm/hr	

Infiltration Storage Required

Rainfall Retention Depth =	**5.00**	mm
Building A1 Area =	**1.44**	ha
Total Target Water Balance Volume	**71.77**	m^3

Cultec 100HD Stormwater System Dimensions

Footprint	**444.54**	m2
Volume	**77.01**	m3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*
Infiltration	77.01	0.0053	444.54	2.3	32.8
Total	**77.01**				

*Max allowable drawdown time = 72 hours (3 days)

**effective depth of water from Cultec stage-storage sheet multiplied by 0.40 (water volume/bulk volume ratio)

CULTEC Stormwater Design Calculator

Date:	March 04, 2025

Project Information:

Building A1 - Chamber

Calculations Performed By:

CONTACTOR 100HD

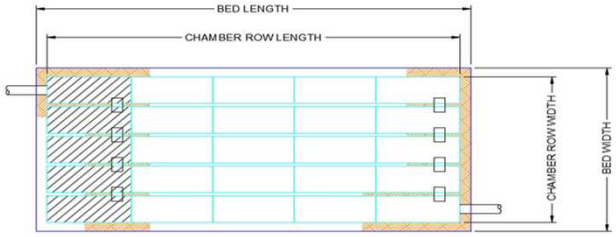
Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**0.97**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**68.55**	cu. meters
Within Stone	**105.82**	cu. meters
Total Storage Provided	**174.4**	**cu. meters**
Total Storage Required	170.00	cu. meters

Materials List

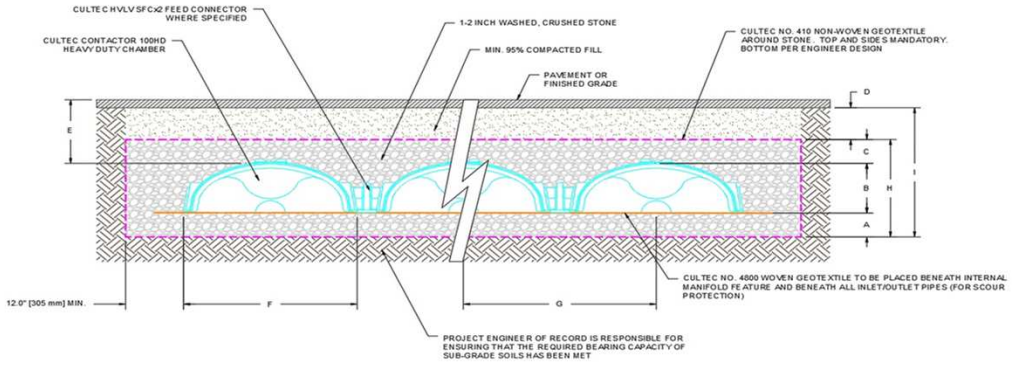
Contactor 100HD			
Total Number of Chambers Required	**171**	**pieces**	
Separator Row Chambers	**19**	pieces	Separator Row Qty Included in Total
Starter Chambers	**9**	pieces	
End Chambers	**162**	pieces	
HVLV SFCx2 Feed Connectors	**16**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1213**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**66**	meters	
Stone	**265**	cu. meters	

Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**9**	pieces
Number of Chambers Long	**19**	pieces
Chamber Row Width	**9.45**	meters
Chamber Row Length	**43.59**	meters
Bed Width	**10.06**	meters
Bed Length	**44.20**	meters
Bed Area Required	**444.54**	sq. meters
Length of Separator Row	**43.59**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**280**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**152**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.07**	meters
H	Effective Depth	**0.75**	meters
I	Bed Depth	**0.95**	meters

CULTEC Stage-Storage Calculations

Date:	March 4, 2025

Project Information:	Project Number:
Building A1 - Chamber	0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	9	units
Total Number of Chambers -	171	units
Stone Void -	40	%
Stone Base -	280	mm
Stone Above Units -	152	mm
Area -	444.54	m2
Base of Stone Elevation -	104.90	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
29.5	749	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	6159.41	174.41	1914.00	177.81	107.36	105.65	Top of Stone Elevation
28.5	724	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	5999.91	169.90	1914.00	177.81	107.28	105.62	
27.5	699	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	5840.41	165.38	1914.00	177.81	107.19	105.60	
26.5	673	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	5680.91	160.87	1914.00	177.81	107.11	105.57	
25.5	648	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	5521.41	156.35	1914.00	177.81	107.03	105.55	
24.5	622	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	5361.91	151.83	1914.00	177.81	106.94	105.52	
23.5	597	0.1	0.0	0.0	0.0	79.7	2.3	79.827	2.3	5202.41	147.32	957.93	88.99	106.86	105.50	Top of Chamber Elevation
23.0	584	30.9	0.9	0.0	0.0	147.1	4.2	178.033	5.0	5122.58	145.06	2136.39	198.47	106.82	105.48	
22.0	559	86.2	2.4	0.0	0.0	125.0	3.5	211.237	6.0	4944.55	140.01	2534.85	235.49	106.73	105.46	
21.0	533	141.6	4.0	0.0	0.0	102.9	2.9	244.442	6.9	4733.31	134.03	2933.30	272.50	106.65	105.43	
20.0	508	178.9	5.1	0.0	0.0	87.9	2.5	266.836	7.6	4488.87	127.11	3202.03	297.47	106.57	105.41	
19.0	483	204.6	5.8	0.0	0.0	77.6	2.2	282.287	8.0	4222.03	119.55	3387.44	314.69	106.48	105.38	
18.0	457	223.9	6.3	0.0	0.0	69.9	2.0	293.908	8.3	3939.74	111.56	3526.90	327.65	106.40	105.36	
17.0	432	236.8	6.7	0.2	0.0	64.8	1.8	301.749	8.5	3645.84	103.24	3620.98	336.39	106.32	105.33	
16.0	406	247.1	7.0	0.2	0.0	60.7	1.7	307.981	8.7	3344.09	94.69	3695.77	343.34	106.23	105.31	
15.0	381	261.3	7.4	0.2	0.0	55.0	1.6	316.497	9.0	3036.11	85.97	3797.97	352.83	106.15	105.28	
14.0	356	261.3	7.4	0.3	0.0	55.0	1.6	316.510	9.0	2719.61	77.01	3798.12	352.85	106.07	105.26	
13.0	330	261.3	7.4	0.3	0.0	55.0	1.6	316.523	9.0	2403.10	68.05	3798.28	352.86	105.98	105.23	
12.0	305	287.0	8.1	0.4	0.0	44.7	1.3	332.075	9.4	2086.58	59.09	3984.90	370.20	105.90	105.20	
11.0	279	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	1754.50	49.68	1914.00	177.81	105.82	105.18	Bottom of Chamber Elevation
10.0	254	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	1595.00	45.17	1914.00	177.81	105.73	105.15	
9.0	229	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	1435.50	40.65	1914.00	177.81	105.65	105.13	
8.0	203	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	1276.00	36.13	1914.00	177.81	105.57	105.10	
7.0	178	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	1116.50	31.62	1914.00	177.81	105.48	105.08	
6.0	152	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	957.00	27.10	1914.00	177.81	105.40	105.05	
5.0	127	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	797.50	22.58	1914.00	177.81	105.32	105.03	
4.0	102	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	638.00	18.07	1914.00	177.81	105.23	105.00	
3.0	76	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	478.50	13.55	1914.00	177.81	105.15	104.98	
2.0	51	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	319.00	9.03	1914.00	177.81	105.07	104.95	
1.0	25	0.0	0.0	0.0	0.0	159.5	4.5	159.500	4.5	159.50	4.52	1914.00	177.81	104.98	104.93	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	104.90	104.90	Bottom of Stone Elevation
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CULTEC Stormwater Design Calculator

Date:	March 04, 2025

Project Information:

Building A2 - Chamber

Calculations Performed By:

CONTACTOR 100HD

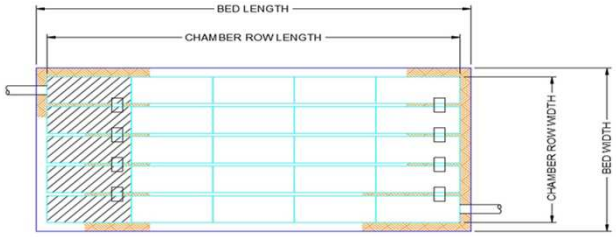
Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**0.92**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**108.10**	cu. meters
Within Stone	**151.63**	cu. meters
Total Storage Provided	**259.7**	**cu. meters**
Total Storage Required	255.00	cu. meters

Materials List

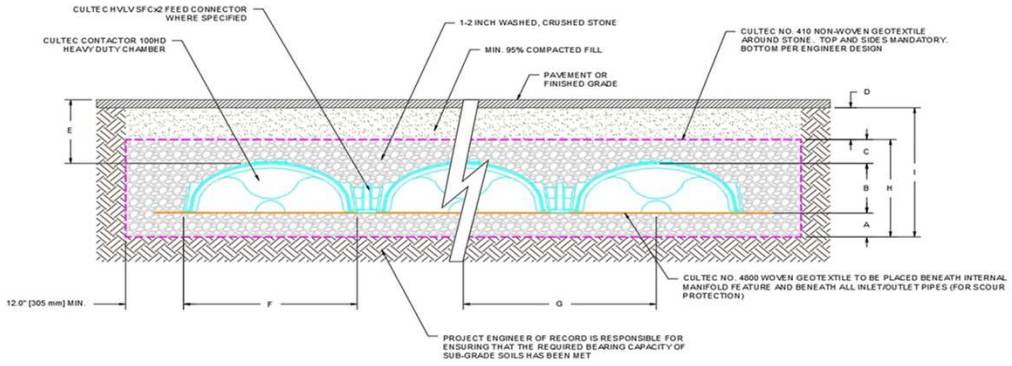
Contactor 100HD			
Total Number of Chambers Required	**270**	**pieces**	
Separator Row Chambers	**30**	pieces	Separator Row Qty Included in Total
Starter Chambers	**9**	pieces	
End Chambers	**261**	pieces	
HVLV SFCx2 Feed Connectors	**16**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1882**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**92**	meters	
Stone	**379**	cu. meters	

Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**9**	pieces
Number of Chambers Long	**30**	pieces
Chamber Row Width	**9.45**	meters
Chamber Row Length	**68.73**	meters
Bed Width	**10.06**	meters
Bed Length	**69.34**	meters
Bed Area Required	**697.47**	sq. meters
Length of Separator Row	**68.73**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**230**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**152**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.07**	meters
H	Effective Depth	**0.70**	meters
I	Bed Depth	**0.90**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	March 4, 2025

Project Information:
Building A2 - Chamber

Project Number:
0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	9	units
Total Number of Chambers -	270	units
Stone Void -	40	%
Stone Base -	230	mm
Stone Above Units -	152	mm
Area -	697.47	m2
Base of Stone Elevation -	104.80	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
27.5	699	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	9174.06	259.78	3003.00	278.98	107.09	105.50	Top of Stone Elevation
26.5	673	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	8923.81	252.69	3003.00	278.98	107.01	105.47	
25.5	648	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	8673.56	245.61	3003.00	278.98	106.93	105.45	
24.5	622	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	8423.31	238.52	3003.00	278.98	106.84	105.42	
23.5	597	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	8173.06	231.43	3003.00	278.98	106.76	105.40	
22.5	572	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	7922.81	224.35	3003.00	278.98	106.68	105.37	
21.5	546	0.2	0.0	0.0	0.0	125.0	3.5	125.247	3.5	7672.56	217.26	1502.96	139.63	106.59	105.35	Top of Chamber Elevation
21.0	533	48.7	1.4	0.0	0.0	230.8	6.5	279.475	7.9	7547.31	213.72	3353.70	311.56	106.55	105.33	
20.0	508	136.0	3.9	0.0	0.0	195.9	5.5	331.836	9.4	7267.84	205.80	3982.03	369.93	106.47	105.31	
19.0	483	223.2	6.3	0.0	0.0	161.0	4.6	384.197	10.9	6936.00	196.41	4610.36	428.30	106.38	105.28	
18.0	457	282.1	8.0	0.0	0.0	137.4	3.9	419.510	11.9	6551.81	185.53	5034.12	467.67	106.30	105.26	
17.0	432	322.7	9.1	0.0	0.0	121.2	3.4	443.871	12.6	6132.30	173.65	5326.46	494.83	106.22	105.23	
16.0	406	353.1	10.0	0.0	0.0	109.0	3.1	462.175	13.1	5688.42	161.08	5546.10	515.23	106.13	105.21	
15.0	381	373.4	10.6	0.2	0.0	100.9	2.9	474.471	13.4	5226.25	147.99	5693.65	528.94	106.05	105.18	
14.0	356	389.7	11.0	0.2	0.0	94.4	2.7	484.267	13.7	4751.78	134.56	5811.21	539.86	105.97	105.16	
13.0	330	412.0	11.7	0.2	0.0	85.5	2.4	497.684	14.1	4267.51	120.84	5972.21	554.82	105.88	105.13	
12.0	305	412.0	11.7	0.3	0.0	85.5	2.4	497.697	14.1	3769.83	106.75	5972.36	554.83	105.80	105.10	
11.0	279	412.0	11.7	0.3	0.0	85.5	2.4	497.709	14.1	3272.13	92.66	5972.51	554.85	105.72	105.08	
10.0	254	452.6	12.8	0.4	0.0	69.2	2.0	522.172	14.8	2774.42	78.56	6266.06	582.12	105.63	105.05	
9.0	229	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	2252.25	63.78	3003.00	278.98	105.55	105.03	Bottom of Chamber Elevation
8.0	203	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	2002.00	56.69	3003.00	278.98	105.47	105.00	
7.0	178	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	1751.75	49.60	3003.00	278.98	105.38	104.98	
6.0	152	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	1501.50	42.52	3003.00	278.98	105.30	104.95	
5.0	127	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	1251.25	35.43	3003.00	278.98	105.22	104.93	
4.0	102	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	1001.00	28.35	3003.00	278.98	105.13	104.90	
3.0	76	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	750.75	21.26	3003.00	278.98	105.05	104.88	
2.0	51	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	500.50	14.17	3003.00	278.98	104.97	104.85	
1.0	25	0.0	0.0	0.0	0.0	250.3	7.1	250.250	7.1	250.25	7.09	3003.00	278.98	104.88	104.83	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	104.80	104.80	Bottom of Stone Elevation
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CULTEC Stormwater Design Calculator

Date:	February 25, 2025

Project Information:

Building A3 - Chamber

Calculations Performed By:

CONTACTOR 100HD

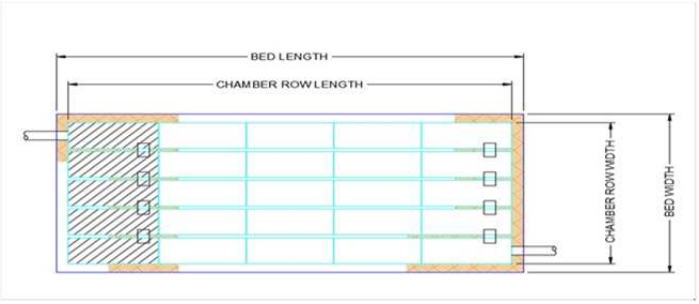
Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**0.85**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**58.48**	cu. meters
Within Stone	**72.43**	cu. meters
Total Storage Provided	**130.9**	**cu. meters**
Total Storage Required	120.00	cu. meters

Materials List

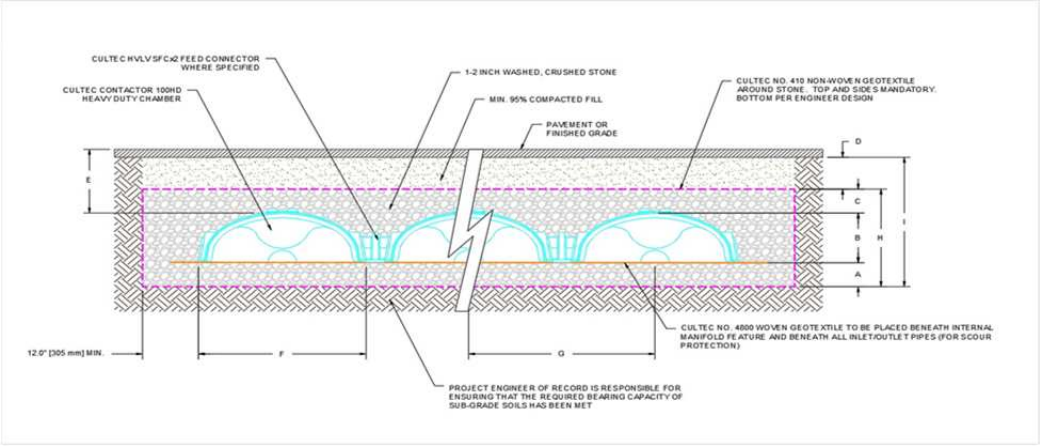
Contactor 100HD			
Total Number of Chambers Required	**144**	**pieces**	
Separator Row Chambers	**4**	pieces	Separator Row Qty Included in Total
Starter Chambers	**36**	pieces	
End Chambers	**108**	pieces	
HVLV SFCx2 Feed Connectors	**70**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1038**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**88**	meters	
Stone	**181**	cu. meters	

Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**36**	pieces
Number of Chambers Long	**4**	pieces
Chamber Row Width	**38.25**	meters
Chamber Row Length	**9.30**	meters
Bed Width	**38.86**	meters
Bed Length	**9.91**	meters
Bed Area Required	**384.97**	sq. meters
Length of Separator Row	**9.30**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**152**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.07**	meters
H	Effective Depth	**0.62**	meters
I	Bed Depth	**0.83**	meters

CULTEC Stage-Storage Calculations

Date:	February 25, 2025

Project Information:
Building A3 - Chamber

Project Number:
0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	36	units
Total Number of Chambers -	144	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	152	mm
Area -	384.97	m2
Base of Stone Elevation -	106.20	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft²	m²	ft	m	
24.5	622	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	4630.20	131.11	1657.50	153.98	108.24	106.82	Top of Stone Elevation
23.5	597	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	4492.08	127.20	1657.50	153.98	108.16	106.80	
22.5	572	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	4353.95	123.29	1657.50	153.98	108.08	106.77	
21.5	546	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	4215.83	119.38	1657.50	153.98	107.99	106.75	
20.5	521	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	4077.70	115.47	1657.50	153.98	107.91	106.72	
19.5	495	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	3939.58	111.56	1657.50	153.98	107.83	106.70	
18.5	470	0.1	0.0	0.0	0.0	69.0	2.0	69.128	2.0	3801.45	107.64	829.54	77.06	107.74	106.67	Top of Chamber Elevation
18.0	457	26.4	0.7	0.0	0.0	127.6	3.6	153.936	4.4	3732.32	105.69	1847.23	171.61	107.70	106.66	
17.0	432	73.6	2.1	0.0	0.0	108.7	3.1	182.265	5.2	3578.39	101.33	2187.18	203.19	107.62	106.63	
16.0	406	120.8	3.4	0.0	0.0	89.8	2.5	210.593	6.0	3396.12	96.17	2527.12	234.77	107.53	106.61	
15.0	381	152.6	4.3	0.0	0.0	77.1	2.2	229.698	6.5	3185.53	90.20	2756.38	256.07	107.45	106.58	
14.0	356	174.6	4.9	0.0	0.0	68.3	1.9	242.906	6.9	2955.83	83.70	2914.87	270.79	107.37	106.56	
13.0	330	191.1	5.4	0.2	0.0	61.7	1.7	252.954	7.2	2712.92	76.82	3035.44	281.99	107.28	106.53	
12.0	305	202.0	5.7	0.7	0.0	57.3	1.6	260.061	7.4	2459.97	69.66	3120.74	289.92	107.20	106.50	
11.0	279	210.8	6.0	1.0	0.0	53.8	1.5	265.571	7.5	2199.91	62.29	3186.86	296.06	107.12	106.48	
10.0	254	222.9	6.3	1.1	0.0	49.0	1.4	272.915	7.7	1934.34	54.77	3274.97	304.25	107.03	106.45	
9.0	229	222.9	6.3	1.1	0.0	49.0	1.4	272.971	7.7	1661.42	47.05	3275.65	304.31	106.95	106.43	
8.0	203	222.9	6.3	1.2	0.0	49.0	1.4	273.027	7.7	1388.45	39.32	3276.32	304.37	106.87	106.40	
7.0	178	244.9	6.9	1.6	0.0	40.2	1.1	286.676	8.1	1115.43	31.59	3440.11	319.59	106.78	106.38	
6.0	152	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	828.75	23.47	1657.50	153.98	106.70	106.35	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	690.63	19.56	1657.50	153.98	106.62	106.33	
4.0	102	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	552.50	15.65	1657.50	153.98	106.53	106.30	
3.0	76	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	414.38	11.73	1657.50	153.98	106.45	106.28	
2.0	51	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	276.25	7.82	1657.50	153.98	106.37	106.25	
1.0	25	0.0	0.0	0.0	0.0	138.1	3.9	138.125	3.9	138.13	3.91	1657.50	153.98	106.28	106.23	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	106.20	106.20	Bottom of Stone Elevation
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Project Name: O'KEEFE COURT
Project #: 21684
Date: 3/4/2025

Prepared by: TG
Checked by: TF,LP

LOCATION: OTTAWA
STORM SEWER DESIGN SHEET
STORM EVENT (yr) 5

a = 998.071
b = 6.053
c = 0.814

$i = a[(T+b)/60]^{-c}$, where i (mm/h) ; T (min)
$Q = A(i)C/3600 + C.\ FLOW \times (42)$, where A ($m^2$) ; i (mm/h)
AC = AREA x RUNOFF COEFFICIENT
C. FLOW = CONTROLLED FLOW

	STREET	UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	AREA (m^2) C=0.90	AC (m^2)	CUMULATIVE AC (m^2)	ToC (min)	C. FLOW @42L/s/ha (m^2)	CUMULATIVE C. FLOW (m^2)	i (mm/h)	Q (L/s)	PIPE SIZE (mm)	GRADE (%)	CAPACITY (L/s)	VELOCITY (m/s)	LENGTH (m)	% CAPACITY
0	STUB - BLDG A3-1	INFIL GALLERY 1	0	0	0	10.00	4000	4000	104.19	16.8	250	1.00	59.5	1.2	5.0	28%
1	STUB - BLDG A3-2	INFIL GALLERY 1	0	0	0	10.00	4000	4000	104.19	16.8	250	1.00	59.5	1.2	5.1	28%
2	INFIL GALLERY 1	STM CBMH8	0	0	0	10.07		8000	103.83	33.6	250	1.00	59.5	1.2	42.5	57%
3	STM CB10	STM CBMH8	4900	4410	4410	10.00		0	104.19	127.6	525	0.30	235.6	1.1	31.0	54%
4	STM CBMH8	STM CBMH7	1700	1530	5940	10.65		8000	100.86	200.0	600	0.30	336.3	1.2	30.1	59%
5	STM CBMH7	STM CBMH6	1800	1620	7560	11.08		8000	98.83	241.2	600	0.30	336.3	1.2	29.9	72%
6	STM CBMH6	STM MH12	1600	1440	9000	11.50		8000	96.91	275.9	600	0.30	336.3	1.2	13.9	82%
7	STM CB8	STM MH16	2500	2250	2250	10.00		0	104.19	65.1	375	0.70	146.7	1.3	14.9	44%
8	STM MH16	STM MH15	0	0	2250	10.19		0	103.21	64.5	375	0.70	146.7	1.3	45.6	44%
9	STM CB7	STM MH15	1600	1440	1440	10.00		0	104.19	41.7	250	1.10	62.4	1.3	3.4	67%
10	STM MH15	STM MH14	0	0	3690	10.76		0	100.35	102.9	375	0.70	146.7	1.3	27.4	70%
11	STM CB6	STM MH14	2100	1890	1890	10.00		0	104.19	54.7	300	0.80	86.5	1.2	35.2	63%
12	STM MH14	STM CBMH12	0	0	5580	11.10		0	98.71	153.0	450	0.70	238.5	1.5	53.4	64%
13	STM CBMH12	STM MH12	1000	900	6480	11.70		0	96.02	172.8	525	0.46	291.7	1.3	92.7	59%
14	STM MH12	STM CBMH9	0	0	15480	12.84		8000	91.25	426.0	750	0.30	609.8	1.4	29.6	70%
15	STM CBMH9	STM CBMH5	3400	3060	18540	13.20		8000	89.87	496.4	750	0.30	609.8	1.4	46.4	81%
16	STUB - BLDG A2-1	INFIL GALLERY 2	0	0	0	10.00	4500	4500	104.19	18.9	250	1.00	59.5	1.2	7.7	32%
17	STUB - BLDG A2-2	INFIL GALLERY 2	0	0	0	10.00	3600	3600	104.19	15.1	250	1.00	59.5	1.2	7.8	25%
18	INFIL GALLERY 2	STM MH20	0	0	0	10.11		8100	103.63	34.0	250	1.00	59.5	1.2	10.9	57%
19	STM MH20	STM CBMH5	0	0	0	10.26		8100	102.85	34.0	250	0.96	58.3	1.2	35.6	58%
20	STM CBMH5	STM CBMH4	2700	2430	20970	13.76		16100	87.79	579.0	825	0.30	786.2	1.5	35.2	74%
21	STM CBMH4	STM CBMH3	1300	1170	22140	14.16		16100	86.38	598.8	825	0.30	786.2	1.5	11.7	76%
22	STM CB5	STM MH10	1800	1620	1620	10.00		0	104.19	46.9	250	2.00	84.1	1.7	6.2	56%
23	STM MH10	STM MH6	0	0	1620	10.06		0	103.88	46.7	250	2.00	84.1	1.7	37.1	56%
24	STM HONEYCOMB CB1	STM MH9	800	720	720	10.00		0	104.19	20.8	250	0.40	37.6	0.8	15.9	55%
25	STM MH9	STM MH8	0	0	720	10.35		0	102.40	20.5	250	0.40	37.6	0.8	31.9	54%
26	STM CB3	STM MH8	2100	1890	1890	10.00		0	104.19	54.7	300	1.00	96.7	1.4	5.5	57%
27	STM MH8	STM MH7	0	0	2610	11.04		0	99.00	71.8	375	0.40	110.9	1.0	49.1	65%
27.5	STM CB4	STM MH7	1900	1710	1710	10.00		0	104.19	49.5	300	1.00	96.7	1.4	5.1	51%
28	STM MH7	STM MH6	0	0	4320	11.85		0	95.32	114.4	450	0.40	180.3	1.1	32.4	63%
29	STM MH6	STM CBMH11	0	0	5940	12.33		0	93.31	154.0	525	0.30	235.6	1.1	44.3	65%
30	STM CBMH11	STM CBMH3	700	630	6570	13.01		0	90.59	165.3	525	0.30	235.6	1.1	89.0	70%
31	STM CBMH3	STM CBMH10	0	0	28710	14.37		16100	85.64	750.6	900	0.30	991.6	1.6	25.6	76%
32	STM CBMH10	STM MH19	3100	2790	31500	14.65		16100	84.72	808.9	900	0.30	991.6	1.6	37.6	82%
33	STM HONEYCOMB CB2	STM CBMH2	2000	1800	1800	10.00		0	104.19	52.1	375	0.30	96.0	0.9	32.7	54%
34	STM CBMH2	STM MH19	0	0	1800	10.63		0	100.99	50.5	375	0.30	96.0	0.9	6.3	53%
35	STM MH19	OGS EF12	1200	1080	34380	15.05		16100	83.40	864.1	900	0.30	991.6	1.6	15.9	87%
36	STUB - BLDG A1-1	INFIL GALLERY 3	0	0	0	10.00	4400	4400	104.19	18.5	250	1.03	60.4	1.2	3.3	31%
37	STUB - BLDG A1-2	INFIL GALLERY 3	0	0	0	10.00	3400	3400	104.19	14.3	250	1.00	59.5	1.2	3.3	24%
38	INFIL GALLERY 3	STM MH2	0	0	0	10.05		7800	103.96	32.8	250	0.83	54.2	1.1	18.7	60%
39	STM MH2	OGS EF12	0	0	0	10.33		7800	102.50	32.8	250	1.98	83.7	1.7	6.7	39%
40	OGS EF12	CULTEC	0	0	34380	15.22		23900	82.86	891.7	900	1.00	1810.3	2.8	3.2	49%
41	CULTEC	HW1 (OPSD 804.030)	0	0	34380	15.24		23900	82.80	891.1	900	0.55	1342.6	2.1	7.5	66%

Inlet Capcity Analysis

Project Name: O'Keefe Court
Project Number: 21684
Location: Nepean, Ottawa
Date: 3/4/2025

Prepared By: T.G
Checked By: T.F

Rainfall Data		
Location:	Nepean, Ottawa	
Event	5 year	100 year
a	998.071	1735.688
b	6.053	6.014
c	0.814	0.820

Drain ID	Structure Name	Overland Outlet	Drain Catchment Area (m^2)	Runoff Coefficient	Tc (min)	Intensity (mm/hr)	Flow (m^3/s)	Drain Type	Depth of Ponding (m)	Inlet Capacity (m^3/s)	Inlet Capacity with 50% Blockage (m^3/s)	OK with 50% Blockage?
1	STM CB8	West	2500	0.90	10.00	104.2	0.065	Single CB	0.30	0.220	0.110	OK
2	STM CB10	East	4900	0.90	10.00	104.2	0.128	Twin CB	0.30	0.405	0.203	OK
3	STM CBMH8	East	1700	0.90	10.00	104.2	0.044	Single CB	0.20	0.155	0.078	OK
4	STM CBMH7	East	1800	0.90	10.00	104.2	0.047	Single CB	0.20	0.155	0.078	OK
5	STM CB7	West	1600	0.90	10.00	104.2	0.042	Single CB	0.20	0.155	0.078	OK
6	STM CBMH9	East	3400	0.90	10.00	104.2	0.089	Single CB	0.30	0.220	0.110	OK
7	STM CBMH5	East	2700	0.90	10.00	104.2	0.070	Single CB	0.25	0.180	0.090	OK
8	STM CBMH4	East	1300	0.90	10.00	104.2	0.034	Single CB	0.15	0.120	0.060	OK
9	STM CBMH10	East	3100	0.90	10.00	104.2	0.081	Single CB	0.25	0.180	0.090	OK
10	STM CBMH2	East	2000	0.90	10.00	104.2	0.052	Single CB	0.20	0.155	0.078	OK
11	**STM HONEYCOMB CB2**	**East - Final Catchment***	**1200**	**0.90**	**10.00**	**178.6**	**0.504**	**Twin Honeycomb CB**	**0.20**	**1.202**	**0.601**	OK
12	STM CBMH11	East	700	0.90	10.00	104.2	0.018	Single CB	0.10	0.060	0.030	OK
13	**STM HONEYCOMB CB1**	**West - Final Catchment***	**800**	**0.90**	**10.00**	**178.6**	**0.259**	**Honeycomb CB**	**0.25**	**0.672**	**0.336**	OK
14	STM CB3	West	2100	0.90	10.00	104.2	0.055	Single CB	0.30	0.220	0.110	OK
15	STM CB4	West	1900	0.90	10.00	104.2	0.050	Single CB	0.30	0.220	0.110	OK
16	STM CB5	West	1800	0.90	10.00	104.2	0.047	Single CB	0.30	0.220	0.110	OK
17	STM CB6	West	2100	0.90	10.00	104.2	0.055	Single CB	0.30	0.220	0.110	OK
18	STM CBMH6	East	1600	0.90	10.00	104.2	0.042	Single CB	0.30	0.220	0.110	OK
19	STM CBMH12	East	1000	0.90	10.00	104.2	0.026	Single CB	0.12	0.085	0.043	OK

Overland Flow Route Design (East Outlet)

Return Period	ToC (min)	i (mm/hr)	Runoff Coefficient	Area (m2)	Flow (m3/s)	
5-year	10	104.19	0.9	24200	0.631	
100-year	10	178.56			1.081	
			Flow Difference (m3/s) =		**0.450**	<- Flow added to 100-yr Flow of Drain #11

Overland Flow Route Design (West Outlet)

Return Period	ToC (min)	i (mm/hr)	Runoff Coefficient	Area (m2)	Flow (m3/s)	
5-year	10	104.19	0.9	12000	0.313	
100-year	10	178.56			0.536	
			Flow Difference (m3/s) =		**0.223**	<- Flow added to 100-yr Flow of Drain #13

*Flow calculated for the final catchments in each overland outlet is based on the 100-year storm flow for that catchment plus the flow difference (100-year minus 5-year) for all upstream catchments

KWA Site Development Consulting
2453 Auckland Drive
Burlington, ON
L7L 7A9

APPENDIX B

SANITARY CALCULATIONS

Project Name : **4497 O'Keefe Court, Ottawa**
Project # : **21684**
Sanitary Servicing Analysis

Prepared by: TF
Checked by: TF
Date: February 20, 2025

Standards = Ottawa

Formulas
Peaking Factor (Harmon) = $1+14/[4+(P/1000)^{1/2}]$
Peak Flow = p(q)M(unit conversion) + infiltration

Existing Sanitary Design Flow

Land Type	Area (m^2)	# of Units /Floor Area	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	68836				0.33 L/ha/d		2.27
Total	**68836**						**2.27**

Proposed Sanitary Design Flow

Land Type	Area (m^2)	Floor Area (Ha)	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	68836				0.33 L/ha/d		2.27
BUILDING A1	7804	0.7804			35000 L/day/ha of floor	1.00	0.32
BUILDING A2	8027	0.8027			35000 L/day/ha of floor	1.00	0.33
BUILDING A3	8027	0.8027			35000 L/day/ha of floor	1.00	0.33
Total	**68836**						**3.24**

Summary

Existing Sanitary Design Flow =	2.27	L/s
Proposed Sanitary Design Flow =	3.24	L/s
Increased Flow =	0.97	L/s

Service Connection	Diameter (m)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Spare Capacity (L/s)	Usage Increased (%)	Total Usage (%)
Residential	150	1.0	0.86	15.23	11.99	-	21.3%
San. Main	250	0.5	0.86	42.05	38.81	2.3%	7.7%

Notes
1. The proposed development would be an increase of 0.97 L/s of peak sanitary flow to the downstream sanitary sewer system.
2. This increase is equal to 2.3% of the total pipe capacity of the 250mm municipal sanitary sewer.
3. This flow is equal to 21.3% of the total pipe capacity of a 150mm diameter service connection.

APPENDIX C

WATER CALCULATIONS

4497 O'Keefe Court, Ottawa Prepared by: **TF**

Project Number 21684 Checked by: **TF**

Required Fire Flow - BLDG A3 Date: **February 20, 2025**

as per Fire Underwriters Survey Water Supply for Public Fire Protection, 2020

1. Initial Required Fire Flow (Step A, B, C)

Construction Type =	Type III Ordinary Construction	
Construction Coefficient, C =	1	
Total Effective Area, A* =	8027	m^2

*Single townhome unit, middle worst case surrounded, 55sqm x 3.5 storeys

Required Fire Flow, RFF =	19710.58	LPM
RFF, rounded =	**20000**	**LPM**

2. Occupancy and Contents Adjustment Factor (Step D)

Contents =	Noncombustible contents	
Adjustment Factor =	-25%	
RFF =	**15000**	**LPM**

3. Automatic Sprinkler Protection (Step E)

Sprinkler Design	Designed	Building Coverage	Credit
Automatic sprinkler protection designed and installed in accordance with NFPA 13	Yes	100%	30%
Water supply is standard for both the system and Fire Department hose lines	Yes	100%	10%
Fully supervised system	Yes	100%	10%
	Total Sprinkler Credit =		50%

Reduction =	**7500**	**LPM**

4. Exposure Adjustment Charge (Step F)

Direction	Distance	Charge
North	Greater than 30	0%
South	10.1m to 20m	15%
East	Greater than 30	0%
West	Greater than 30	0%

Total Charge =	15%	
Charge =	**2250**	**LPM**

5. Final Required Fire Flow (Step G)

RFF =	15000	LPM
Reduction =	7500	LPM
Charge =	2250	LPM
RFF =	9750	LPM

Final RFF, rounded =	**10000**	**LPM**
	2642	**GPM**
	167	**L/s**

4497 O'Keefe Court, Ottawa
Project Number 21684
Domestic Demand

Prepared by: **TF**
Checked by: **TF**
Date: **February 20, 2025**

as per CITY OF OTTAWA DESIGN GUIDELINES

TOTAL BUILDING AREA =	2.3858	HA
FLOW =	35000	L/HA/day
Average Daily Demand =	83503	L/day
	0.97	L/s

	Average Day	Minimum Hour	Peak Hour	Maximum Day	
Peaking Factor	n/a	0.80	1.80	1.50	
Demand	**0.97**	**0.77**	**1.74**	**1.45**	**L/s**
	15.32	12.26	27.57	22.98	GPM

Fire Flow = 167 L/s
Max Day Flow = 1.45 L/s
Total Flow = **168.1 L/s**

Major Losses

Pipe Section	Diameter	Area (m^2)	Length (m)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
1	300	0.0707	500	2.4	0.075	0.02	8.42	11.98
2	150	0.0177	0	9.5	0.0375	0.49	0.00	0.00
						Total major loss (psi) =		**11.98**

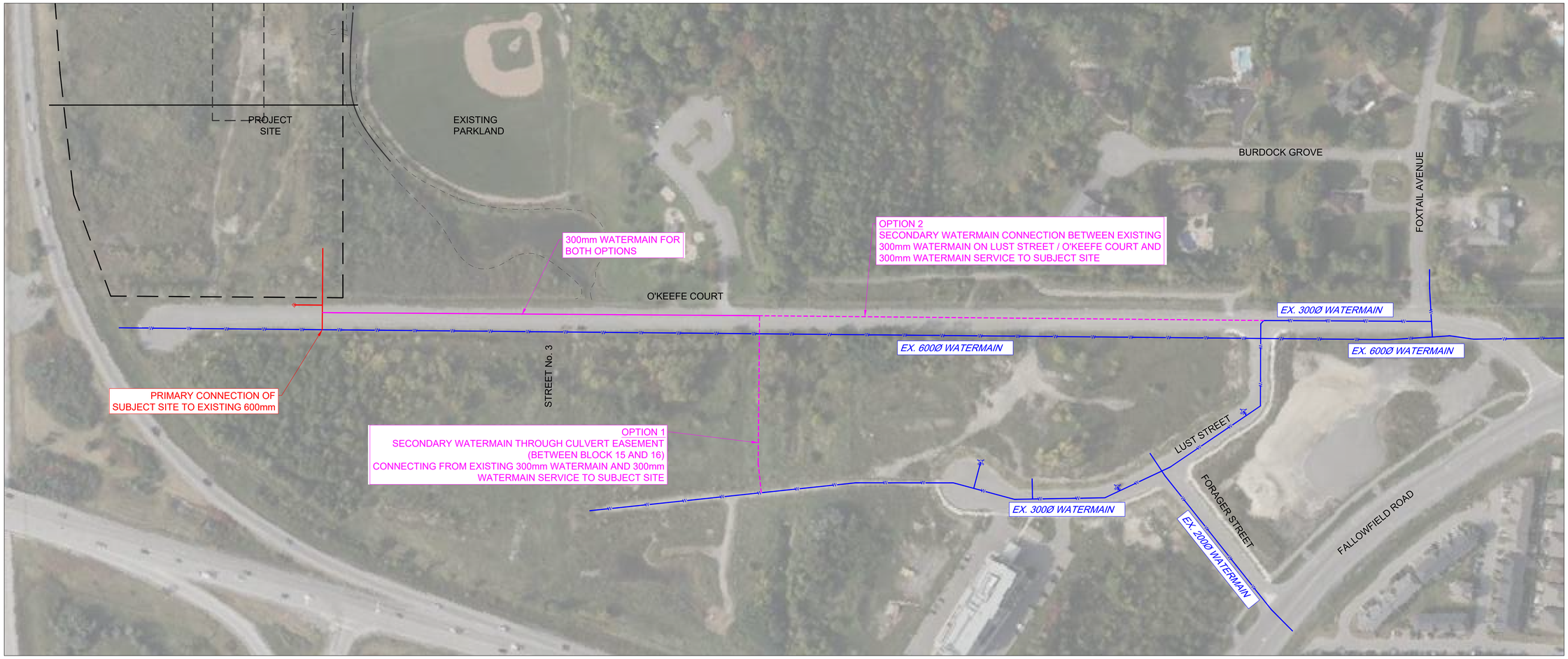
Minor Losses

System Component	K-Value	Velocity (m/s)	Velocity Head (m)	Headloss (m)	Headloss (psi)
	0	2.38	0.29	0.0	0.00
				Total minor loss (psi) =	**0.00**

Total Headloss = 11.98 psi

APPENDIX D

OFFSITE WORKS EXHIBITS



LEGEND

- EXISTING WATERMAIN
- EXISTING HYDRANT
- PROPOSED WATERMAIN (KWA)
- PROPOSED HYDRANT (KWA)
- FUTURE WATERMAIN (BY OTHERS)
- FUTURE HYDRANT (BY OTHERS)

REVISION BLOCK

#	DATE	DESCRIPTION

KWA SITE DEVELOPMENT CONSULTING INC.
2650 Queensview Drive, Suite 250
Ottawa, ON, K2B 8H6

NORTH ARROW

METRIC SCALE

N.T.S

WATERMAIN SERVICING EXHIBIT

THE PROPERTIES GROUP
PROPOSED OFFICE & WAREHOUSE DEVELOPMENT
NEPEAN, ONTARIO

PROJECT No.21884 | DRAWN BY:ARV | CHECKED BY:COB

WAT-E

PROPOSED BUILDING "A3" 1-STOREY INDUSTRIAL GROSS FLOOR AREA = ±8,597 m² (±86,400 ft²)

PROPOSED BUILDING "A2" 1-STOREY INDUSTRIAL GROSS FLOOR AREA = ±8,037 m² (±86,400 ft²)

200
6.74ha
0.90

CONTROLLED ROOFTOPS + CONTROLLED SITE AREA

PROPOSED BUILDING "A1" 1-STOREY INDUSTRIAL GROSS FLOOR AREA = ±7,804 m² (±84,000 ft²)

DRAINAGE AREA FROM HIGHWAY 416 DITCH IS CONVEYED INTO O'KEEFE SOUTH DITCH AS PER STORM DRAINAGE AREA PLAN (DRAWING 500 BY IBI GROUP, DATED MARCH 2016)

201
0.14ha
0.74

SITE UNCONTROLLED AREA TO O'KEEFE COURT

SEPTIC PAD (BY OTHERS) ELEV=108.00

LYTLE PARK DRAINAGE AREA (INTO O'KEEFE SWALES VIA LYTLE PARK POND)

203
9.8ha
0.30

202a
0.40ha
0.90

O'KEEFE NORTH DRAINAGE AREA

CULVERT CROSSING

CULVERT CROSSING

INLET TO BLOCK 15 DRAINAGE SWALE/CULVERT

O'KEEFE SOUTH DRAINAGE AREA

202b
0.66ha
0.90

LEGEND

- 200 / 0.8ha / xx — AREA ID / DRAINAGE AREA / RUNOFF COEFFICIENT
- DRAINAGE BOUNDARY (SITE CONTROLLED)
- DRAINAGE BOUNDARY (SITE UNCONTROLLED)
- DRAINAGE BOUNDARY (EXTERNAL)
- OVERLAND FLOW ARROW

REVISION BLOCK

#	DATE	DESCRIPTION
1.	MM/DD/YY	DESCRIPTION

KWA SITE DEVELOPMENT CONSULTING INC.
2150 Fairview St., Unit 201
Burlington, ON L7L 7Y9

NORTH ARROW

METRIC SCALE
1:750

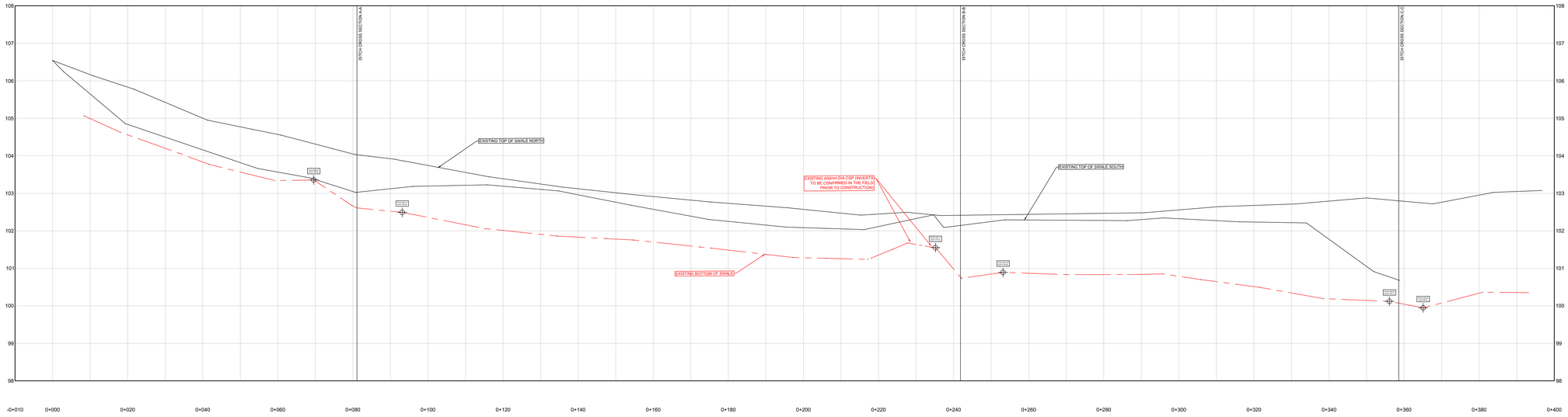
DRAINAGE PLAN (FOR SOUTH SWALE)

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)
NEPEAN, ONTARIO

PROJECT No.21664 | DRAWN BY:LP | CHECKED BY:TF

PDP-A

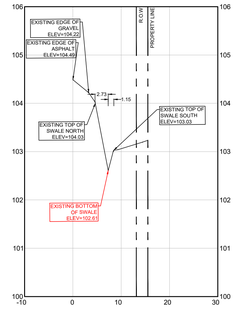
O'KEEFE COURT MODEL VIEW
SCALE = 1:500



EXISTING DITCH AND TOP OF SLOPE PROFILE

HORIZONTAL SCALE = 1:500
VERTICAL SCALE = 1:50

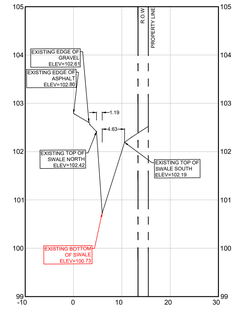
A-A



EXISTING DITCH CROSS SECTION A-A

HORIZONTAL SCALE = 1:500
VERTICAL SCALE = 1:50

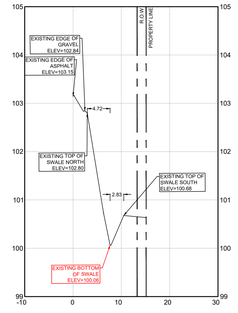
B-B



EXISTING DITCH CROSS SECTION B-B

HORIZONTAL SCALE = 1:500
VERTICAL SCALE = 1:50

C-C



EXISTING DITCH CROSS SECTION C-C

HORIZONTAL SCALE = 1:500
VERTICAL SCALE = 1:50

REVISION BLOCK

#	DATE	DESCRIPTION
1.	MM/DD/YY	DESCRIPTION

KWA SITE DEVELOPMENT CONSULTING INC.
210-1 Robertson Rd.
Barrhaven, ON K2L 7A9

NORTH ARROW

METRIC SCALE
AS NOTED

EXISTING DITCH CROSS SECTION

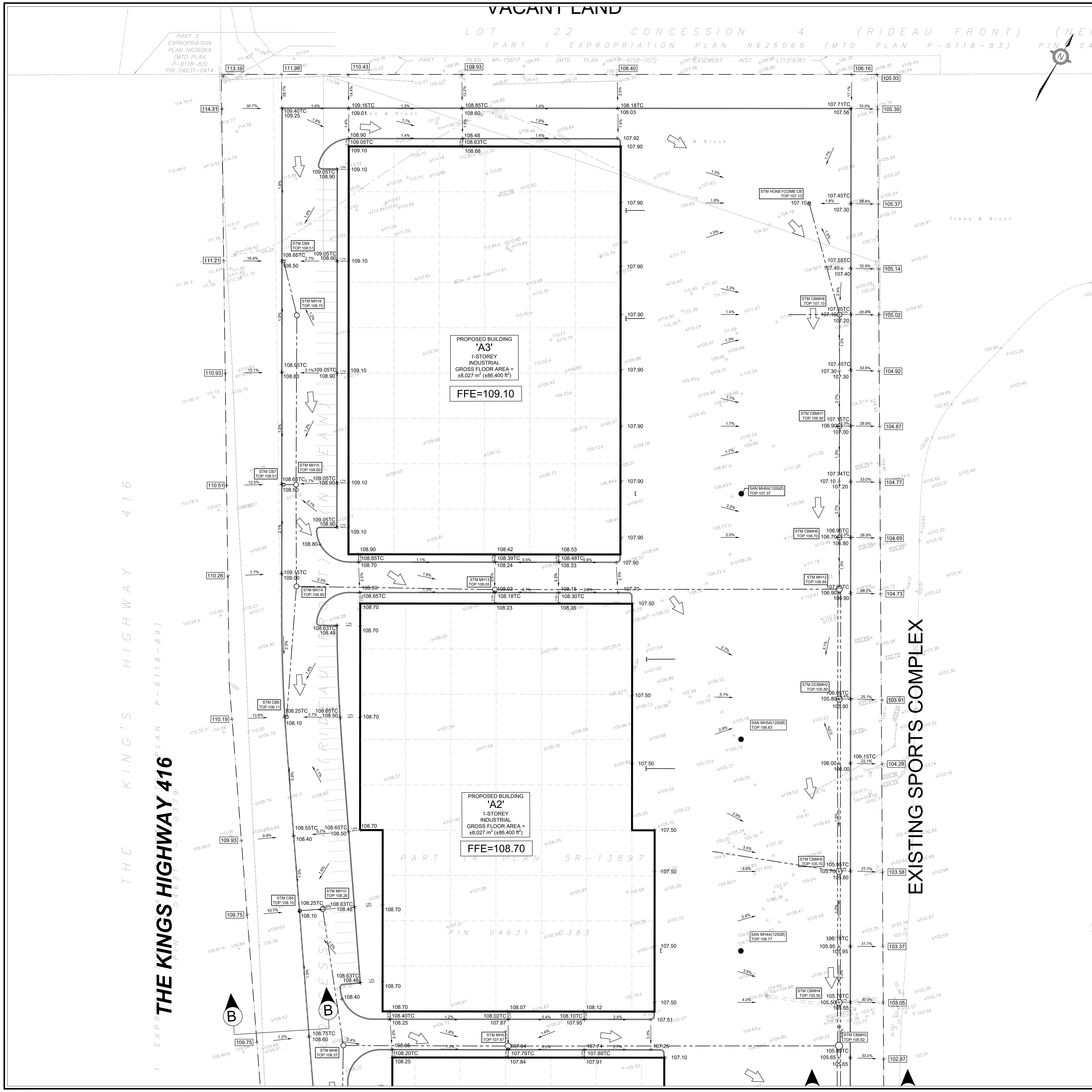
THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)
NEPEAN, ONTARIO

PROJECT No: 21684 | DRAWN BY: RC | CHECKED BY: RA

X-SEC

APPENDIX E

DRAWINGS



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4. PROVIDE SUBDRAINS, MINIMUM LENGTH OF 3.0m, EXTENDING FROM ALL CATCHBASINS AND CATCHBASIN MANHOLES TO DRAIN THE GRANULAR SUB-BASE LAYER AS PER DETAIL ON DRAWING D1.
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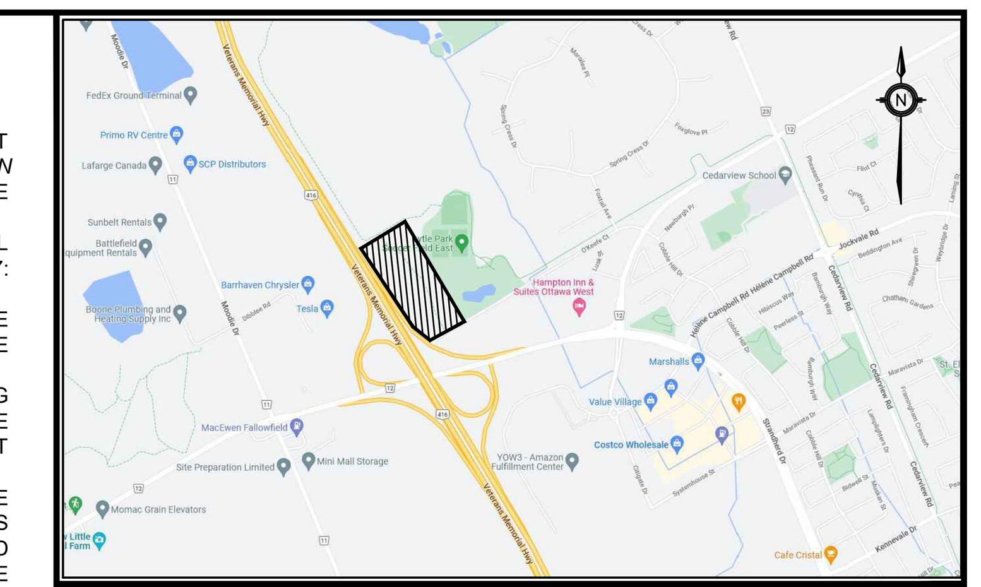
14. THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS CONSTRUCTED SITE SERVICING, GRADING, AND SITE ELECTRICAL DRAWINGS.



KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

200.00 0.5% MH 1A	PROPOSED ITEMS
200.00 0.5% EX MH 1A	EXISTING ITEMS
	LIMIT OF PROPERTY LINE
	LIMIT OF BUILDING STRUCTURE
200.00	PROP ELEVATION TO MATCH EXISTING
	EMERGENCY OVERLAND FLOW ROUTE
	SANITARY MH
	STM MH / CBMH / DCBMH
	CB / DCB
	HYDRANT / SIAMESE
	VALVE BOX

BENCHMARK:	ELEVATIONS ARE GEODETIC, IN METRES, AND RELATED TO: CITY OF XXXX BENCHMARK No. XXX, ELEVATION OF XXX.XXXm LINE 2 (IF REQ.)
BEARING:	BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO: LINE 1 LINE 2
SITE PLAN:	KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10
SURVEY:	ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23

NO.	ISSUE	DATE	BY
1	SITE PLAN APPROVAL - SUBMISSION 1	YYMMDD	X.X.

NOT FOR CONSTRUCTION

2. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
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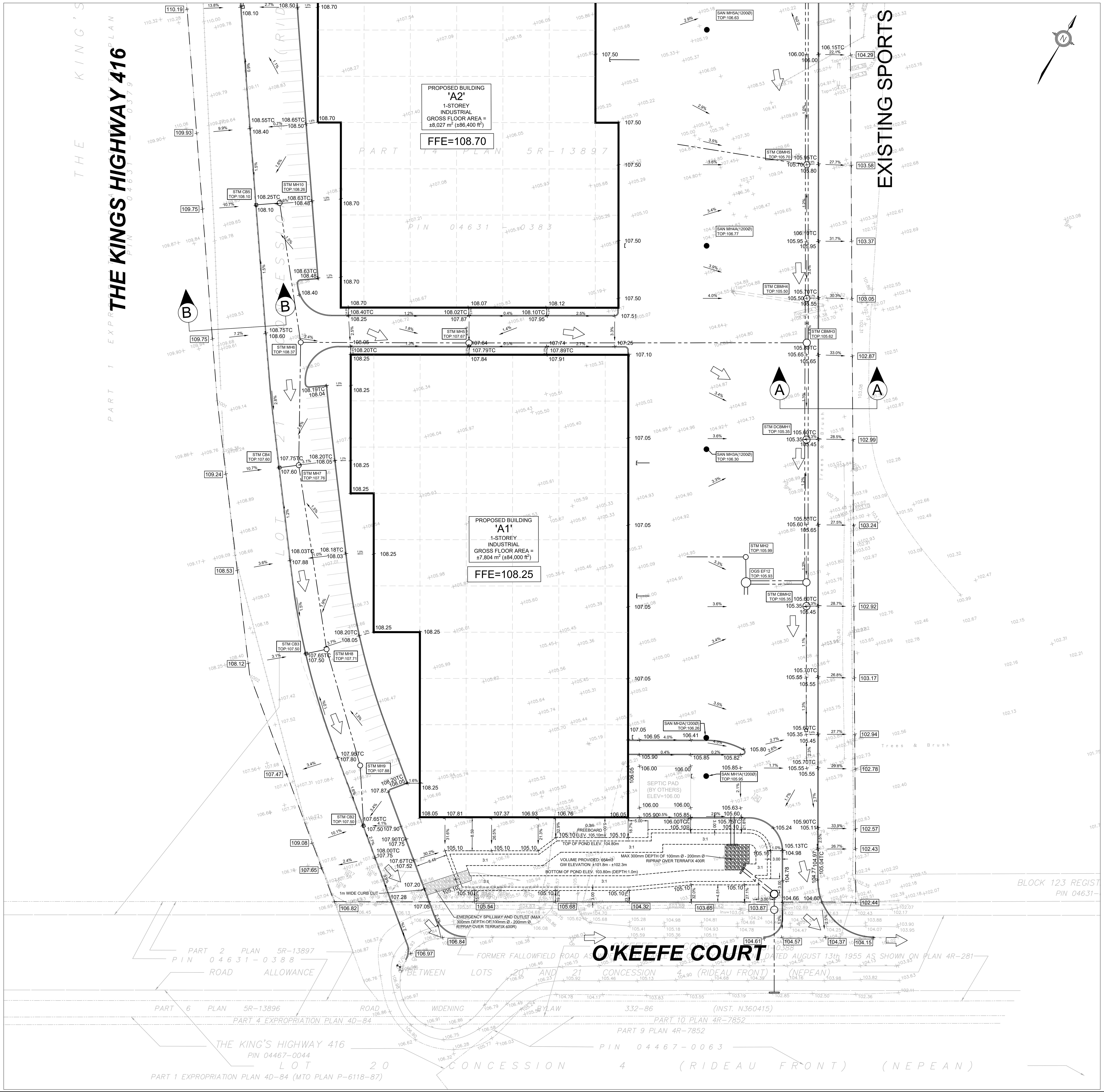
KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

GRADING PLAN

SCALE:	1:500
DATE:	JANUARY 2025
DRAWN BY:	T.G.
DESIGNED BY:	T.G.
CHECKED BY:	T.F.
PROJECT #	21684
DRAWING #	G1



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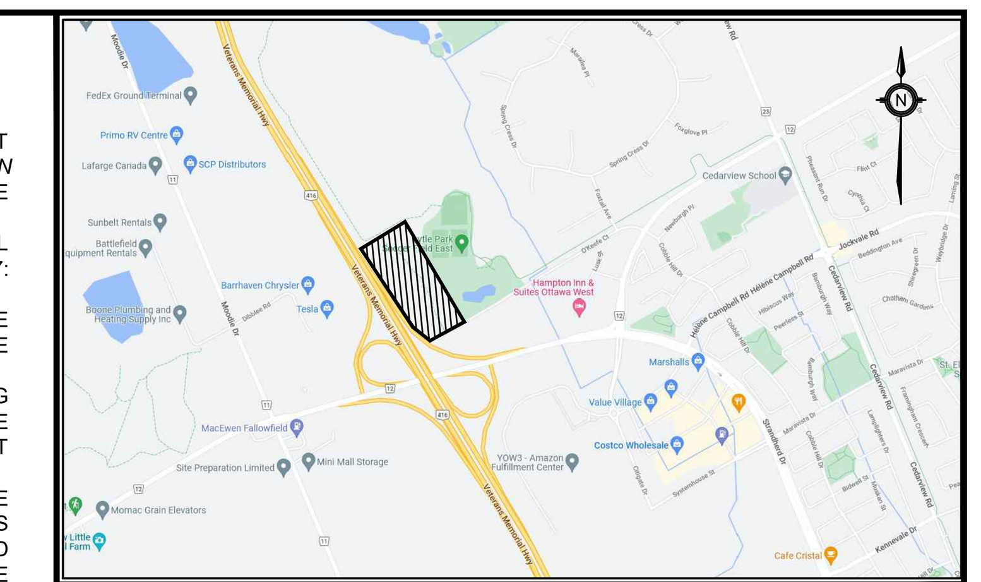

KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

Symbol	Description
× 200.00 0.5% MH 1A	PROPOSED ITEMS
× 200.00 0.5% EX MH 1A	EXISTING ITEMS
	LIMIT OF PROPERTY LINE
	LIMIT OF BUILDING STRUCTURE
× 200.00	PROP ELEVATION TO MATCH EXISTING
	EMERGENCY OVERLAND FLOW ROUTE
	SANITARY MH
	STM MH / CBMH / DCBMH
	CB / DCB
	HYDRANT / SIAMESE
	VALVE BOX

BENCHMARK:	ELEVATIONS ARE GEODETIC, IN METRES, AND RELATED TO: CITY OF XXXX BENCHMARK No. XXX, ELEVATION OF XXX.XXXm LINE 2 (IF REQ.)
BEARING:	BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO: LINE 1 LINE 2
SITE PLAN:	KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10
SURVEY:	ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23

NO.	ISSUE	DATE	BY
1	SITE PLAN APPROVAL - SUBMISSION 1	YYMMDD	X.X.

NOT FOR CONSTRUCTION

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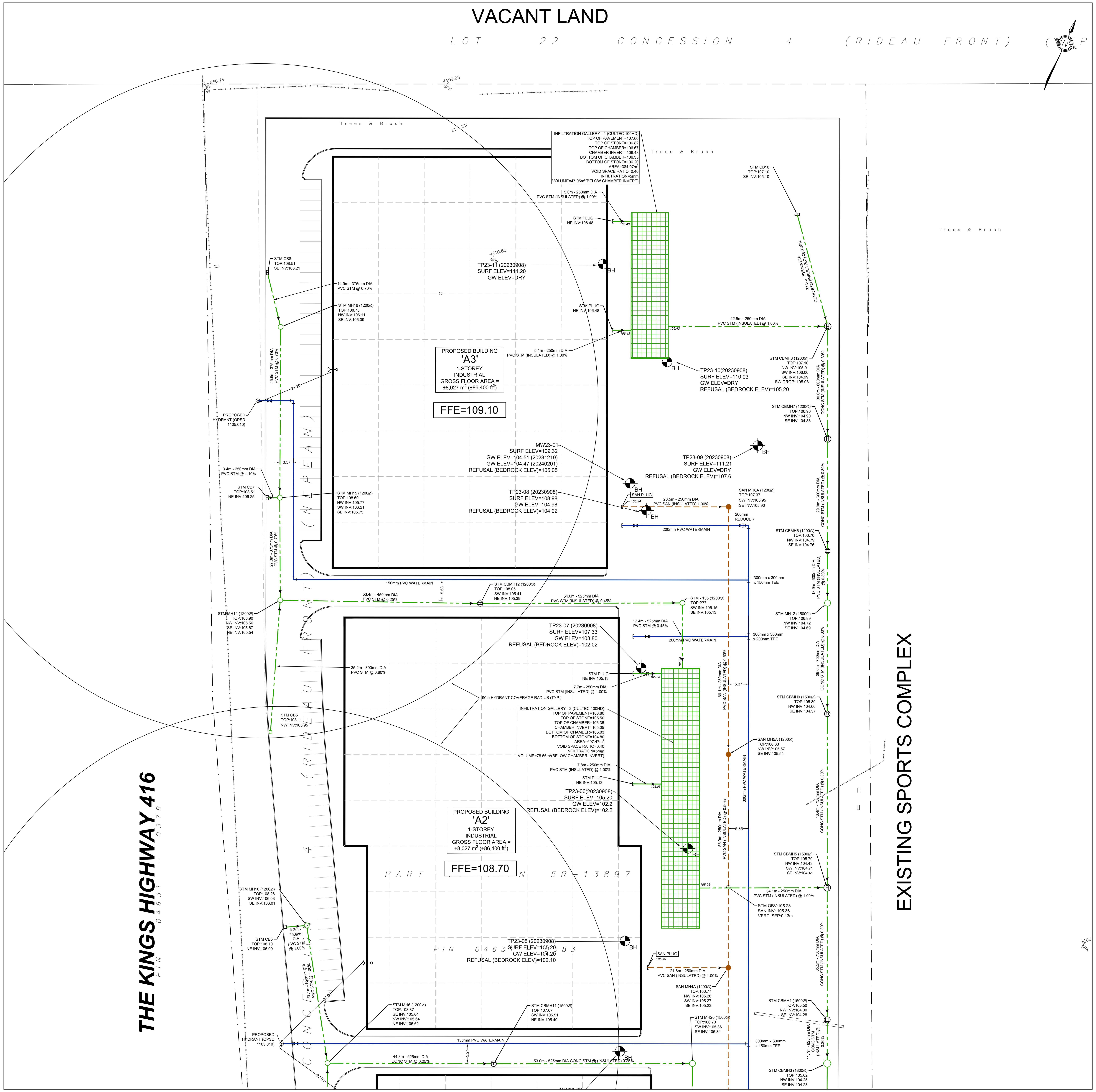
KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

GRADING PLAN

SCALE:	1:500 (10m)	PROJECT #	21684
DATE:	JANUARY 2025		
DRAWN BY:	T.G.	DRAWING #	G2
DESIGNED BY:	T.G.		
CHECKED BY:	T.F.		



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WATERMAINS:

1. WATERMAIN SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150 DR-18 PIPE MANUFACTURED TO AWWA C900-89 AND CSA CAN3 B137.3-M1986 WITH GASKETED BELL END C/W #14 AWG SOLID COPPER TRACER WIRE.
2. WATERMAINS SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 300mm OVER AND 500mm UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING. ALL WATERMAINS AND SERVICES SHALL HAVE 1.80m MINIMUM COVER.
3. BEDDING FOR WATERMAINS SHALL BE AS PER OPSD 802.030.
4. COVER REQUIRED ON WATERMAIN IS 1.8m MINIMUM.
5. ALL WATERMAIN HORIZONTAL AND VERTICAL BENDS, JOINTS AND PLUGS TO BE MECHANICALLY RESTRAINED. THRUST BLOCKS/MECHANICAL RESTRAINERS MUST BE INSTALLED ON ALL WATERMAIN BENDS, TEES, AND PLUGS AS PER LOCAL MUNICIPAL STANDARDS.
6. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50mm BLOW OFF UNLESS OTHERWISE NOTED.
7. HYDRANT AND VALVE TO BE AS PER OPSD 1105.010.
8. ALL HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.15m ABOVE PROPOSED FINISHED GRADE AT HYDRANT.
9. BUILDING SERVICE VALVES TO BE 3.0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12m BACK FROM STUB.
10. PROVISIONS FOR FLUSHING WATERMAINS MUST BE PROVIDED WITH A MINIMUM 50mm OUTLET FOR MAINS 100mm AND LARGER. FLUSHING POINTS MATCHING THE SIZE OF THE PIPE MUST BE PROVIDED AT THE END OF EACH COPPER MAIN. FIRE MAIN FLUSHING OUTLETS TO BE 100mm DIAMETER MINIMUM OR A HYDRANT. FLUSHING POINTS MUST BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN.
11. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH LOCAL MUNICIPAL AND PROVINCIAL GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
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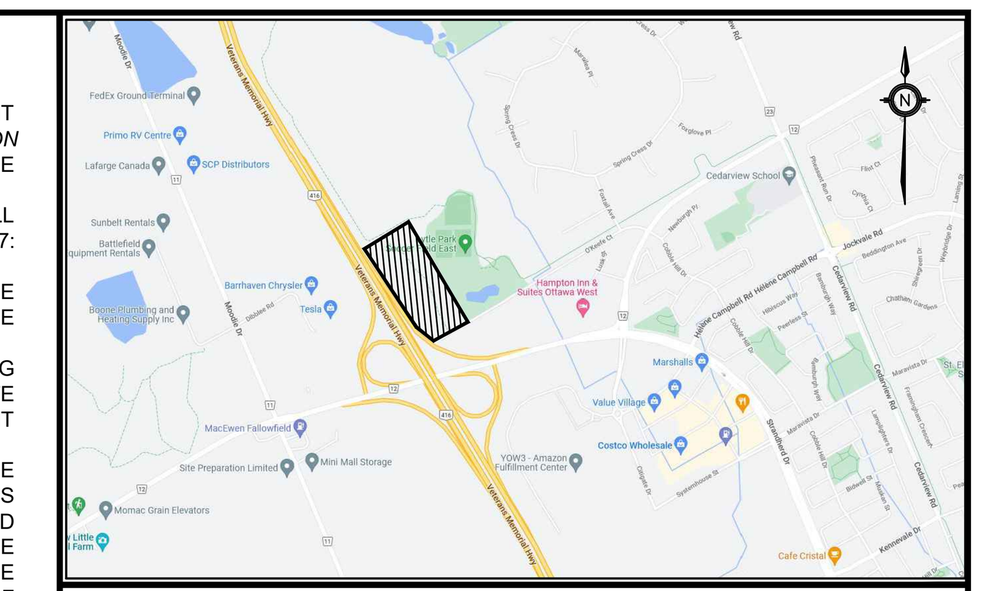
13. BOTH THE FIRE AND DOMESTIC WATER SERVICES MUST COMPLY WITH THE CURRENT BUILDING CODE ACT, THE CURRENT WATER SUPPLY BY-LAW, CHAPTER 851 AND CSA B-64 SERIES STANDARDS.

SANITARY & STORM SEWER:

1. MANHOLES SHALL BE AS PER OPSD 701.010 AND OPSD 701.011; FRAMES AND COVERS SHALL BE AS PER OPSD 401.010. SAFETY PLATFORMS TO BE INSTALLED WHERE DEPTH EXCEEDS 5.0m.
2. MAIN LINE PVC PIPE AS PER SDR-35 CSA B182.2-06 CERTIFIED ASTM D3034-04A, F679-03. SERVICE CONNECTION PVC PIPE TO BE AS PER SDR-28 CSA B 182.2-06 CERTIFIED ASTM D3034-04A.
3. SINGLE CATCHBASINS SHALL BE AS PER OPSD 705.010, WITH FRAMES AND COVERS AS PER OPSD 400.020. DOUBLE CATCHBASINS SHALL BE AS PER OPSD 705.020.
4. CONCRETE PIPE SEWER BEDDING SHALL BE CLASS 'B' AS PER OPSD 802.030, PVC PIPE SEWER BEDDING SHALL BE CLASS 'B' AS PER OPSD 802.030 TO TOP OF SEWER WITH A MINIMUM 300mm SAND COVER OVER PIPE NATIVE BACKFILL TO BE COMPACTED TO A MIN. 98% STANDARD PROCTOR DENSITY.
5. ALL STORM SEWER PIPES UP TO 450mm DIA. SHALL BE PVC SDR-35 OR APPROVED EQUIVALENT. ALL STORM SEWER PIPES 525mm DIA. AND LARGER SHALL BE CONCRETE AND EQUAL TO C.S.A. SPECIFICATIONS A257.2 REINFORCED CLASSES AS SPECIFIED (65-D, 100-D, 140-D,) OR LATEST AMENDMENT UNLESS OTHERWISE SPECIFIED.
6. PIPE INSULATION SHALL CONFORM TO OPSD 1109.030.
7. ALL SANITARY PVC SEWER PIPES SHALL BE SDR-35 EQUAL CSA SPECIFICATIONS B182.2-M1990 OR LATEST AMENDMENT UNLESS OTHERWISE NOTED.
8. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 150mmØ MINIMUM, PVC CLASS DR 28 INSTALLED AT 2 % AND ANY COLOUR EXCEPT WHITE, FOR SINGLE RESIDENTIAL DWELLINGS.
9. SANITARY MAINTENANCE HOLE SHALL HAVE WATERTIGHT FRAME AND COVER IN PONDING AREAS AS PER OPSD 401.030
10. NON-REINFORCED CONCRETE PIPE 150mm TO 250mm SHALL BE AS PER CSA A257.1-03 CLASS 3. HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLES 807.040. BEDDING FOR RIGID PIPE SHALL BE CLASS B AS PER OPSD 802.030, 802.031, 802.032 OR 802.033
11. BEDDING FOR RIGID PIPE SHALL BE CLASS B AS PER OPSD 802.030, 802.031, 802.032 OR 802.033
12. ALL MANHOLE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY.
13. ALL CATCH BASINS AND CATCH BASIN MANHOLES ARE TO INCLUDE SUBDRAIN TREATMENT AS PER DETAIL ON DRAWING D1.
14. ALL BLIND CONNECTIONS TO MATCH THE INVERT OF THE CATCH BASIN LEAD TO THE SPRINGLINE OF THE STORM PIPE. OTHERWISE INSTALL THE CATCH BASIN LEAD AT A MAXIMUM 2.00% AND DROP INTO PIPE.
15. UNLESS OTHERWISE NOTED, CATCHBASIN LEADS SHALL BE 250mmØ AT MINIMUM 1.00% SLOPE.
16. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SANITARY AND STORM SEWERS, INCLUDING PICTORIAL REPORT, TWO (2) CD COPIES AND ONE (1) VIDEO TAPE IN A FORMAT SATISFACTORY TO THE ENGINEER. ALL SEWERS ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION.
17. THE CONTRACTOR SHALL CONTACT THE MUNICIPALITY AT LEAST 48 HOURS PRIOR TO CONNECTING TO THE EXISTING SANITARY& STORM MANHOLE.
18. SERVICE CONNECTIONS AND UTILITY CUTS TO BE BACKFILLED WITH UNSHRINKABLE FILL.



KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

- 200.00 0.5% MH 1A — PROPOSED ITEMS
- 200.00 0.5% EX MH 1A — EXISTING ITEMS
- LIMIT OF PROPERTY LINE
- LIMIT OF BUILDING STRUCTURE
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- SAN MH / PIPE STUB / PIPE OUTLET
- STM MH / CBMH / DCBMH
- CB / DCB
- HYDRANT / SIAMESE
- VALVE BOX
- WAT BENDS: 11.25° / 22.5° / 45° / 90°
- WAT TEE / CROSS / REDUCER

BENCHMARK: ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CGVD28 GEODETIC DATUM

SITE PLAN: KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10

SURVEY: ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23

NO.	ISSUE	DATE	BY
1	SITE PLAN APPROVAL - SUBMISSION 1	250221	T.F.

NOT FOR CONSTRUCTION

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF KWA. THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT FROM KWA IS STRICTLY PROHIBITED.
2. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
3. THIS DRAWING IS NOT TO BE ISSUED FOR CONSTRUCTION UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, INVERTS AND DATA ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO KWA 48 HOURS PRIOR TO ANY CONSTRUCTION.

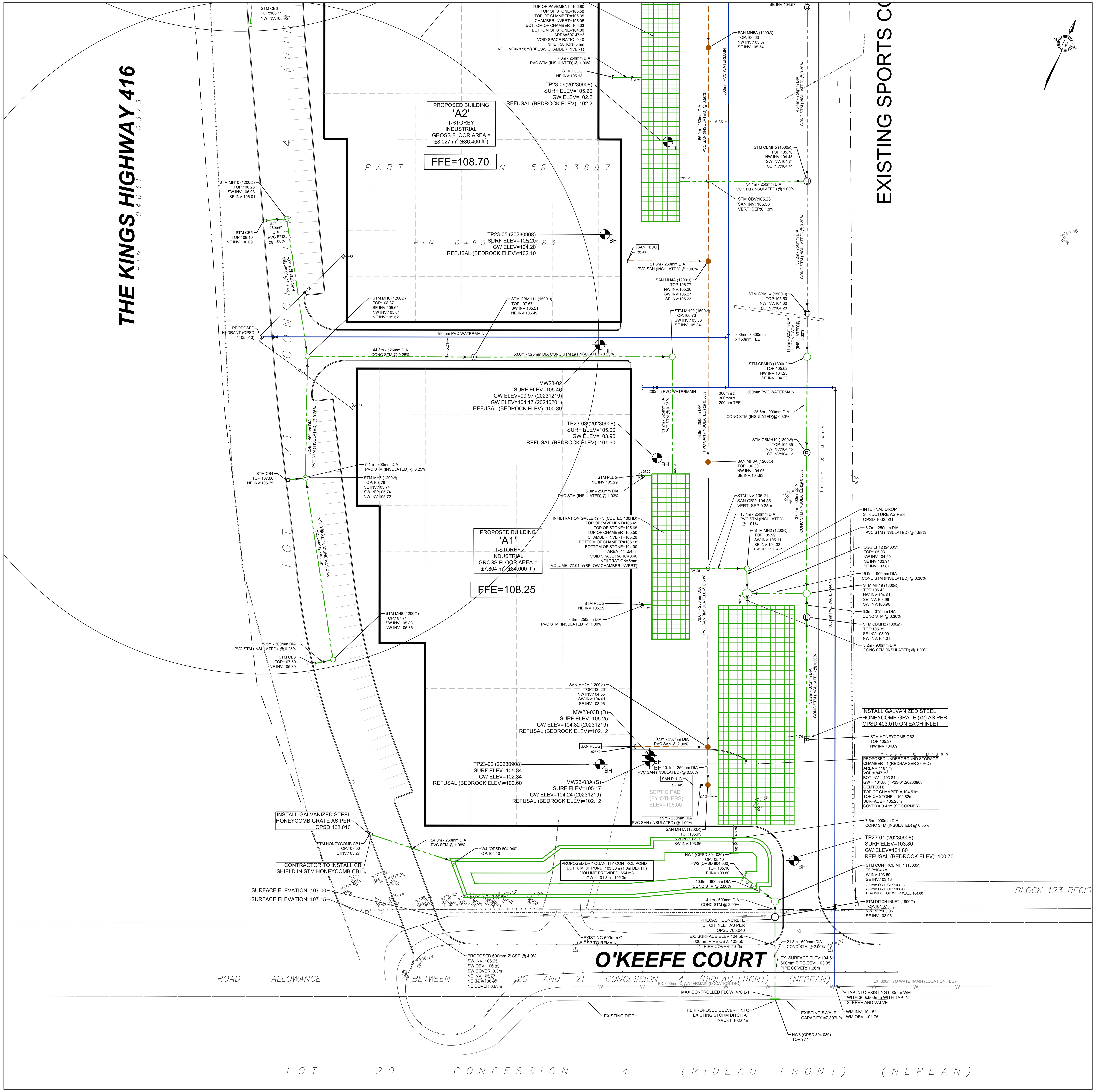
KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

SERVICING PLAN

SCALE:	1:500 (10m)
DATE:	JANUARY 2025
DRAWN BY:	T.G.
DESIGNED BY:	T.G.
CHECKED BY:	T.F.
PROJECT #	21684
DRAWING #	S1



GENERAL NOTES:

1. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT "*OCCUPATIONAL HEALTH AND SAFETY ACT* AND *REGULATIONS FOR CONSTRUCTION PROJECTS*". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
2. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.
3. ALL THE CONSTRUCTION WORK FOR THIS PROJECT SHALL COMPLY WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF THE CITY , THE REGION AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
4. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH ALL OTHER CONTRACTORS AND PREVENT CONSTRUCTION CONFLICTS.
5. THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
5. PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR OR DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT-OF-WAY MANAGEMENT UNIT. ROAD OCCUPANCY/ACCESS PERMIT MUST BE OBTAINED 48 HOURS PRIOR TO COMMENCING ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOW.
6. ALL WORK TO BE DESIGNED AND COMPLETED AS PER OPSS, OPSD, AND MTOD.
7. NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.

WATERMAINS:

1. WATERMAIN SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150 DR-18 PIPE MANUFACTURED TO AWWA C900-89 AND CSA CAN3 B137.3-M1986 WITH GASKETED BELL END C/W #14 AWG SOLID COPPER TRACER WIRE.
2. WATERMAINS SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 300mm OVER AND 500mm UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING. ALL WATERMAINS AND SERVICES SHALL HAVE 1.80m MINIMUM COVER.
3. BEDDING FOR WATERMAINS SHALL BE AS PER OPSD 802.030.
4. COVER REQUIRED ON WATERMAIN IS 1.8m MINIMUM.
5. ALL WATERMAIN HORIZONTAL AND VERTICAL BENDS, JOINTS AND PLUGS TO BE MECHANICALLY RESTRAINED. THRUST BLOCKS/MECHANICAL RESTRAINERS MUST BE INSTALLED ON ALL WATERMAIN BENDS, TEES, AND PLUGS AS PER LOCAL MUNICIPAL STANDARDS.
6. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50mm BLOW OFF UNLESS OTHERWISE NOTED.
7. HYDRANT AND VALVE TO BE AS PER OPSD 1105.010.
8. ALL HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.15m ABOVE PROPOSED FINISHED GRADE AT HYDRANT.
9. BUILDING SERVICE VALVES TO BE 3.0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12m BACK FROM STUB.
10. PROVISIONS FOR FLUSHING WATERMAINS MUST BE PROVIDED WITH A MINIMUM 50mm OUTLET FOR MAINS 100mm AND LARGER. FLUSHING POINTS MATCHING THE SIZE OF THE PIPE MUST BE PROVIDED AT THE END OF EACH COPPER MAIN. FIRE MAIN FLUSHING OUTLETS TO BE 100mm DIAMETER MINIMUM OR A HYDRANT. FLUSHING POINTS MUST BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN.
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5. ALL STORM SEWER PIPES UP TO 450mm DIA. SHALL BE PVC SDR-35 OR APPROVED EQUIVALENT. ALL STORM SEWER PIPES 525mm DIA. AND LARGER SHALL BE CONCRETE AND EQUAL TO C.S.A. SPECIFICATIONS A257.2 REINFORCED CLASSES AS SPECIFIED (65-D, 100-D, 140-D,) OR LATEST AMENDMENT UNLESS OTHERWISE SPECIFIED.
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8. SANITARY MAINTENANCE HOLE SHALL HAVE WATERTIGHT FRAME AND COVER IN PONDING AREAS AS PER OPSD 401.030
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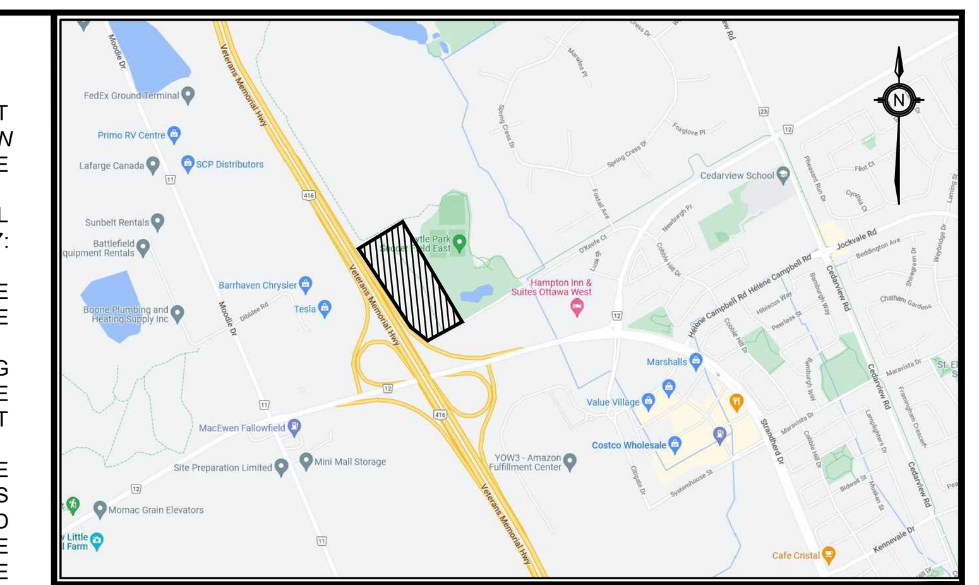

KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

200.00 0.5% MH 1A	PROPOSED ITEMS
200.00 0.5% EX MH 1A	EXISTING ITEMS
	LIMIT OF PROPERTY LINE
	LIMIT OF BUILDING STRUCTURE
	SANITARY SEWER
	STORM SEWER
	WATERMAIN
	SAN MH / PIPE STUB / PIPE OUTLET
	STM MH / CBMH / DCBMH
	CB / DCB
	HYDRANT / SIAMESE
	VALVE BOX
	WAT BENDS: 11.25° / 22.5° / 45° / 90°
	WAT TEE / CROSS / REDUCER

BENCHMARK:	ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CGVD28 GEODETIC DATUM
SITE PLAN:	KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10
SURVEY:	ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23

NO.	ISSUE	DATE	BY
1	SITE PLAN APPROVAL - SUBMISSION 1	250221	T.F.

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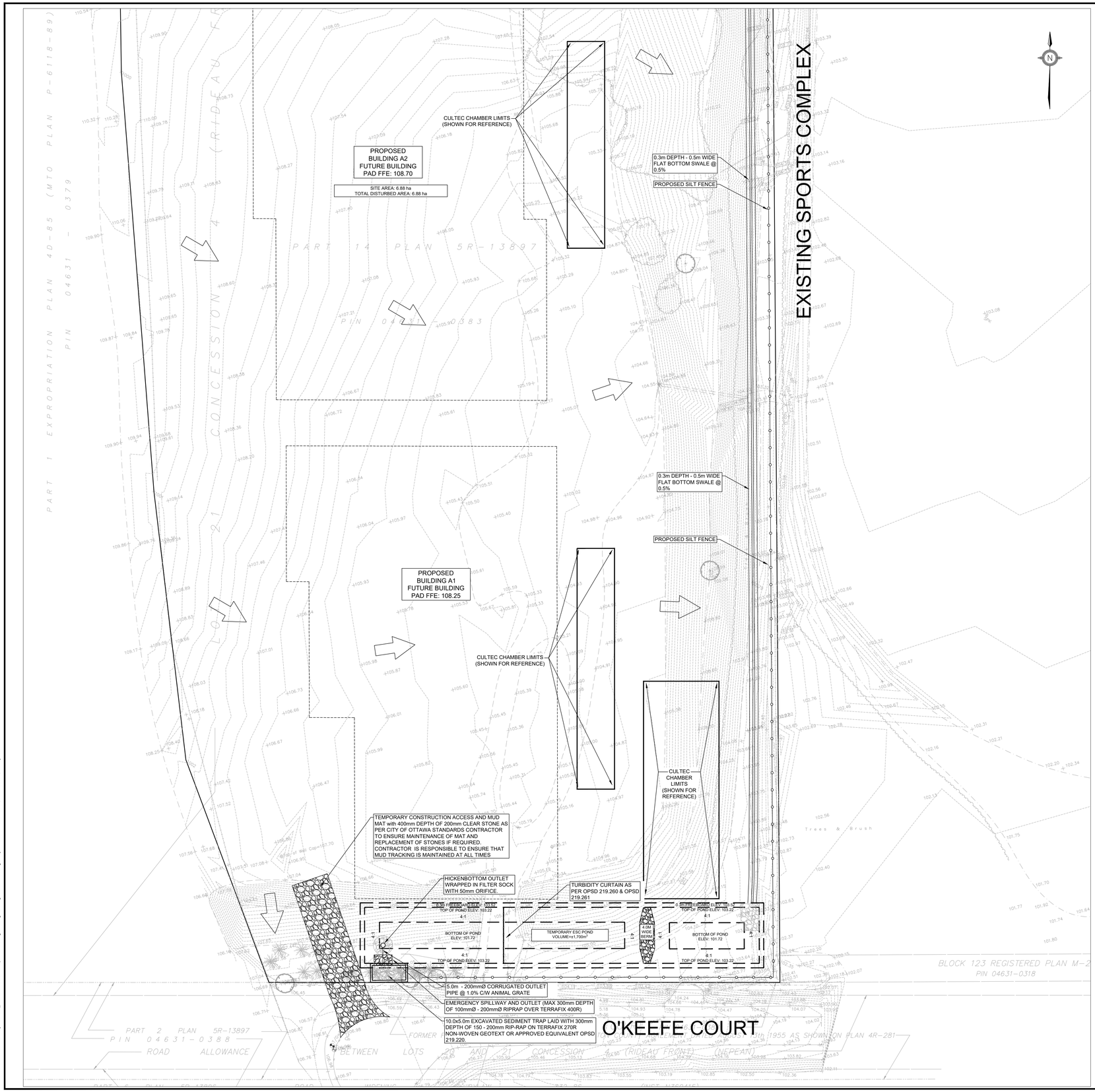
KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

SERVICING PLAN

SCALE:	1:500 (10m)
DATE:	JANUARY 2025
DRAWN BY:	T.G.
DESIGNED BY:	T.G.
CHECKED BY:	T.F.
PROJECT #	21684
DRAWING #	S2



GENERAL NOTES:

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6. ALL WORK TO BE DESIGNED AND COMPLETED AS PER OPSS, OPSD, AND MTOD.
7. NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.

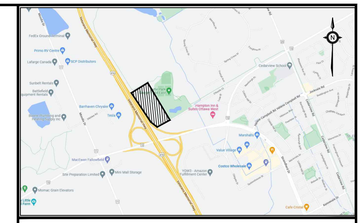
CVC STANDARD NOTES: EROSION & SEDIMENT CONTROL:

SECTION 1: SITE MANAGEMENT:

- BE ADVISED THAT THE CREDIT VALLEY CONSERVATION AUTHORITY MAY, AT ANY TIME, WITHDRAW THIS PERMISSION, IF, IN THE OPINION OF THE AUTHORITY, THE CONDITIONS OF THE PERMIT ARE NOT BEING COMPLIED WITH. THIS APPROVAL DOES NOT EXEMPT THE PROPERTY OWNER/APPLICANT/AGENT FROM THE PROVISIONS OF ANY OTHER FEDERAL, PROVINCIAL OR MUNICIPAL STATUTES, REGULATIONS OR BY-LAWS, OR ANY RIGHTS UNDER COMMON LAW.
- FOLLOWING INSTALLATION OF THE PROPOSED ESC MEASURES, A QUALIFIED AGENT OF THE PROPONENT, PREFERABLY AN ENVIRONMENTAL MONITOR, WILL CONDUCT REGULAR SITE VISITS TO MONITOR ALL WORKS, PARTICULARLY THE CONDITION OF THE ESC MEASURES, DEWATERING, AND IN- OR NEAR-WATER WORKS. SHOULD CONCERNS ARISE, THE ENVIRONMENTAL MONITOR WILL CONTACT THE PROPONENT, CVC, AND ANY OTHER APPROPRIATE PARTIES.
- ALL CONSTRUCTION ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF DEBRIS, SEDIMENTS, OR OTHER DELETERIOUS PRODUCTS TO THE WATERCOURSE OR WETLAND. EQUIPMENT MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATERCOURSE/WETLAND.
- SEDIMENT LADEN RUNOFF FROM DISTURBED AREAS TO THE WATERCOURSE OR NATURAL FEATURE IS NOT ALLOWED. ALL DEWATERING SHALL BE TREATED AND THEN RELEASED 30 METRES FROM A WATERCOURSE OR WETLAND. DISCHARGE IS TO BE RELEASED TO AN UNDISTURBED NATURAL AREA. THESE CONTROL MEASURES SHALL BE MONITORED AND MAINTAINED OR REVISED TO ENSURE WATER QUALITY TARGETS ARE BEING ACHIEVED.
- PLEASE REFER TO THE ESC GUIDE FOR URBAN CONSTRUCTION (2019) FOR THE DESIGN AND DESIGN ALTERATION OF ESC MEASURES.
- ESC MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATERCOURSE/NATURAL AREAS. ESC MEASURES ARE TO BE EVALUATED ON A WEEKLY BASIS AND AFTER ANY STORM EVENT. ANY REPAIRS REQUIRED ARE TO BE RECTIFIED IMMEDIATELY.
- THE EROSION AND SEDIMENT CONTROL (ESC) PLAN IS A DYNAMIC DOCUMENT, WHICH MAY BE SUBJECT TO CHANGE OR MODIFICATIONS AS A RESULT OF SITE DEVELOPMENTS OR CHANGES ON SITE. ANY DEVIATION FROM APPROVED PLANS MUST BE DESIGNED BY A QUALIFIED PROFESSIONAL.
- ADDITIONAL ESC MATERIALS (I.E. SILT FENCE, FILTER SOCKS, STRAW BALES, CLEAR STONES, ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
- THE PROJECT PROPONENT OR THEIR REPRESENTATIVE IS ULTIMATELY RESPONSIBLE FOR CONTROLLING SEDIMENT AND EROSION WITHIN THE CONSTRUCTION SITE FOR THE TOTAL PERIOD OF THE CONSTRUCTION.
- DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES. ALL DISTURBED GROUND LEFT INACTIVE FOR MORE THAN 30 DAYS SHALL BE STABILIZED USING APPROPRIATE EROSION CONTROL MEASURES AND AN APPROPRIATE NATIVE NON-INVASIVE SEED MIX OR WITH THE FINAL APPROVED RESTORATION PLAN.
- ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO MINISTRY OF ENVIRONMENT (SPILL ACTION CENTER) AT 1-800-268-6060.
- IF EXCESSIVE SILTATION RESULTS FROM THE CONSTRUCTION ACTIVITIES, THE ONSITE SUPERVISOR/INSPECTOR AND/OR CVC RESERVE THE RIGHT TO REQUEST ADDITIONAL ESC MEASURES WHICH WOULD BE INSTALLED PRIOR TO FURTHER CONSTRUCTION ACTIVITIES.

EROSION AND SEDIMENT CONTROL NOTES

1. THE PAVED STREETS AND PARKING FIELDS SURROUNDING THE SITE ARE TO BE INSPECTED DAILY AND SWEPT AS NECESSARY TO REMOVE MUD, EXCESS MUD, OR ROCK TRACKED FROM SITE.
2. GOOD HOUSEKEEPING PRACTICES ARE TO BE FOLLOWED ON SITE DURING CONSTRUCTION AND MONITORED ON A DAILY BASIS. THIS INCLUDES BUT IS NOT LIMITED TO
   - 2.1. APPROPRIATE STORAGE AND DISPOSAL OF CONSTRUCTION MATERIALS.
   - 2.2. APPROPRIATE STORAGE AND DISPOSAL OF GARBAGE AND DEBRIS.
   - 2.3. APPROPRIATE DISPOSAL OF CONCRETE WASTE TO AN APPROVED DISPOSAL FACILITY, AND
   - 2.4. SECONDARY CONTAINMENT OF PETROLEUM-BASED PRODUCTS (JERRY CANS, OIL, ETC.).
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF WORK, MAINTAINED THROUGHOUT CONSTRUCTION, AND ONLY REMOVED UPON STABILIZATION OF THE DISTURBED AREAS.
4. INSPECTIONS SHALL OCCUR AT A MINIMUM FREQUENCY OF:
   - 4.1. ON A WEEKLY BASIS
   - 4.2. BEFORE AND AFTER EVERY RAINFALL EVENT (>12MM)
   - 4.3. AFTER SIGNIFICANT SNOWMELT EVENTS
   - 4.4. MONTHLY DURING INACTIVE PERIODS (> 30 DAYS), AND
   - 4.5. DAILY DURING EXTENDED RAIN OR SNOWMELT PERIODS.
5. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE STORM SEWER SYSTEM. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTIONS OR BOTH.
6. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORALLY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
7. PROVIDE TERRAFIX SILT SACK (OR APPROVED EQUIVALENT) ON ANY EXISTING CATCHBASINS IN PAVED AREAS WITHIN THE INFLUENCE OF THE CONSTRUCTION AREAS INCLUDING ALONG THE PROPERTY'S FRONTAGE.
8. THE SITE IS TO BE INSPECTED DAILY AND SWEPT AS NECESSARY



KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

- PROP ITEMS
- EX ITEMS
- LIMIT OF PROPERTY LINE
- LIMIT OF CONSTRUCTION
- LIMIT OF BUILDING STRUCTURE
- SILT FENCE
- TREE PROTECTION FENCE
- CONSTRUCTION HOARDING
- CONSTRUCTION ENTRANCE/ MUDMAT

BENCHMARK:	ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CGVD28 GEODETIC DATUM		
SITE PLAN:	KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10		
SURVEY:	ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23		
1	SITE PLAN APPROVAL - SUBMISSION 1	250221	T.F.
NO.	ISSUE	DATE	BY

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3. THIS DRAWING IS NOT TO BE ISSUED FOR CONSTRUCTION UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, INVERTS AND DATA ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO KWA 48 HOURS PRIOR TO ANY CONSTRUCTION.

KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

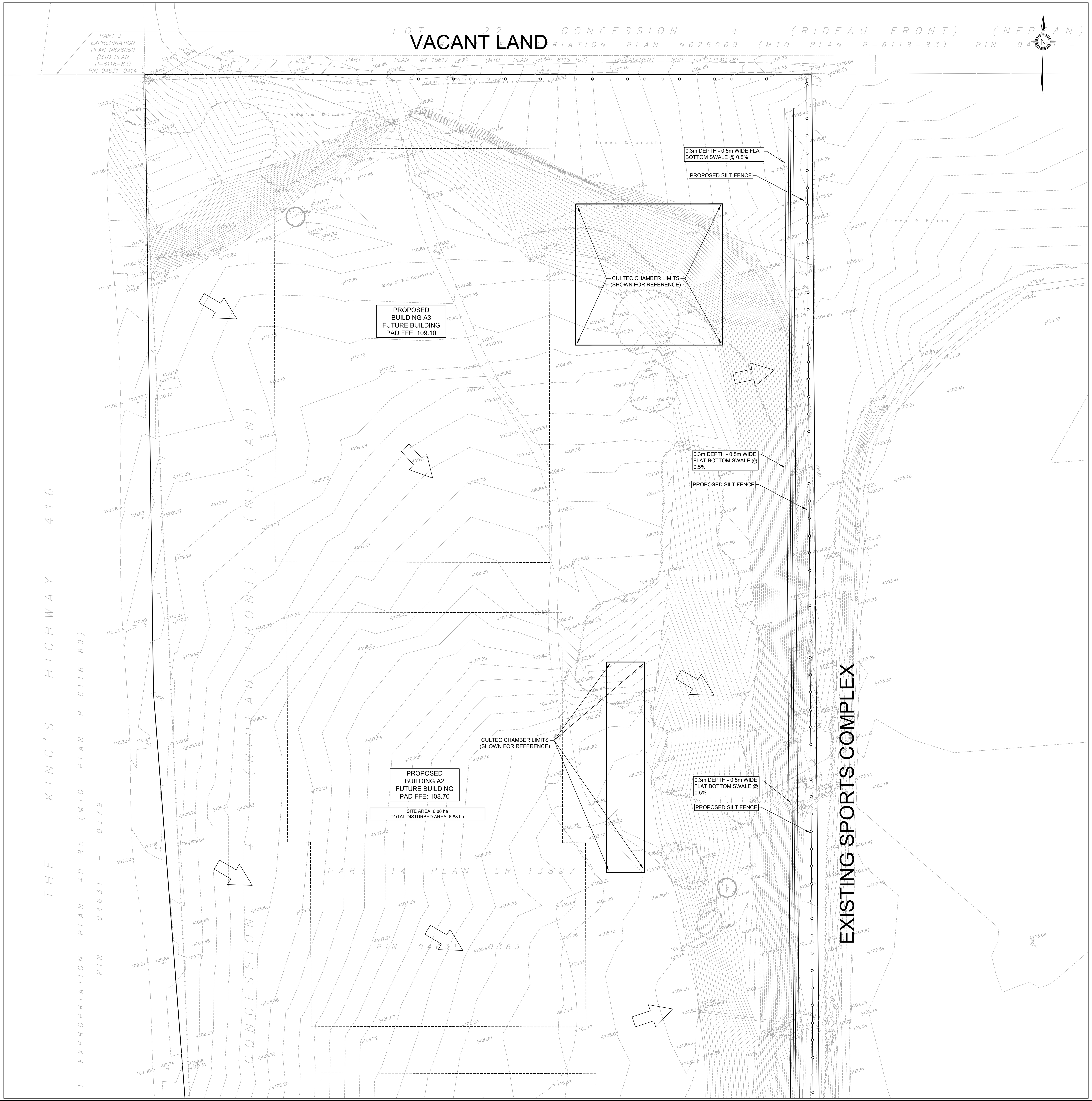
THE PROPERTIES GROUP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

EROSION & SEDIMENT CONTROL PLAN - 1

SCALE:	1:500 (10m)	PROJECT #	21684
DATE:	JANUARY 2025		
DRAWN BY:	T.G.	DRAWING #	ESC-1
DESIGNED BY:	T.G.		
CHECKED BY:	T.F.		

File: \\kwa-ds02\Common\Projects\21684_TPG O'Keefe Court - Nepean\4. Drawings\3. Design Drawings\21684-4 - ESC.dwg Layout: ESC-1 Date: Feb 21, 2025 - 9:22am, Edit By: Luan



GENERAL NOTES:

1. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
2. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.
3. ALL THE CONSTRUCTION WORK FOR THIS PROJECT SHALL COMPLY WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF THE CITY , THE REGION AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
4. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH ALL OTHER CONTRACTORS AND PREVENT CONSTRUCTION CONFLICTS.
5. THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
5. PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR OR DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT-OF-WAY MANAGEMENT UNIT. ROAD OCCUPANCY/ACCESS PERMIT MUST BE OBTAINED 48 HOURS PRIOR TO COMMENCING ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOW.
6. ALL WORK TO BE DESIGNED AND COMPLETED AS PER OPSS, OPSD, AND MTOD.
7. NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.

CVC STANDARD NOTES: EROSION & SEDIMENT CONTROL:

SECTION 1: SITE MANAGEMENT:

- BE ADVISED THAT THE CREDIT VALLEY CONSERVATION AUTHORITY MAY, AT ANY TIME, WITHDRAW THIS PERMISSION, IF, IN THE OPINION OF THE AUTHORITY, THE CONDITIONS OF THE PERMIT ARE NOT BEING COMPLIED WITH. THIS APPROVAL DOES NOT EXEMPT THE PROPERTY OWNER/APPLICANT/AGENT FROM THE PROVISIONS OF ANY OTHER FEDERAL, PROVINCIAL OR MUNICIPAL STATUTES, REGULATIONS OR BY-LAWS, OR ANY RIGHTS UNDER COMMON LAW.
- FOLLOWING INSTALLATION OF THE PROPOSED ESC MEASURES, A QUALIFIED AGENT OF THE PROPONENT, PREFERABLY AN ENVIRONMENTAL MONITOR, WILL CONDUCT REGULAR SITE VISITS TO MONITOR ALL WORKS, PARTICULARLY THE CONDITION OF THE ESC MEASURES, DEWATERING, AND IN- OR NEAR-WATER WORKS. SHOULD CONCERNS ARISE, THE ENVIRONMENTAL MONITOR WILL CONTACT THE PROPONENT, CVC, AND ANY OTHER APPROPRIATE PARTIES.
- ALL CONSTRUCTION ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF DEBRIS, SEDIMENTS, OR OTHER DELETERIOUS PRODUCTS TO THE WATERCOURSE OR WETLAND. EQUIPMENT MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATERCOURSE/WETLAND.
- SEDIMENT LADEN RUNOFF FROM DISTURBED AREAS TO THE WATERCOURSE OR NATURAL FEATURE IS NOT ALLOWED. ALL DEWATERING SHALL BE TREATED AND THEN RELEASED 30 METRES FROM A WATERCOURSE OR WETLAND. DISCHARGE IS TO BE RELEASED TO AN UNDISTURBED NATURAL AREA. THESE CONTROL MEASURES SHALL BE MONITORED AND MAINTAINED OR REVISED TO ENSURE WATER QUALITY TARGETS ARE BEING ACHIEVED.
- PLEASE REFER TO THE ESC GUIDE FOR URBAN CONSTRUCTION (2019) FOR THE DESIGN AND DESIGN ALTERATION OF ESC MEASURES.
- ESC MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATERCOURSE/NATURAL AREAS. ESC MEASURES ARE TO BE EVALUATED ON A WEEKLY BASIS AND AFTER ANY STORM EVENT. ANY REPAIRS REQUIRED ARE TO BE RECTIFIED IMMEDIATELY.
- THE EROSION AND SEDIMENT CONTROL (ESC) PLAN IS A DYNAMIC DOCUMENT, WHICH MAY BE SUBJECT TO CHANGE OR MODIFICATIONS AS A RESULT OF SITE DEVELOPMENTS OR CHANGES ON SITE. ANY DEVIATION FROM APPROVED PLANS MUST BE DESIGNED BY A QUALIFIED PROFESSIONAL.
- ADDITIONAL ESC MATERIALS (I.E. SILT FENCE, FILTER SOCKS, STRAW BALES, CLEAR STONES, ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
- THE PROJECT PROPONENT OR THEIR REPRESENTATIVE IS ULTIMATELY RESPONSIBLE FOR CONTROLLING SEDIMENT AND EROSION WITHIN THE CONSTRUCTION SITE FOR THE TOTAL PERIOD OF THE CONSTRUCTION.
- DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES. ALL DISTURBED GROUND LEFT INACTIVE FOR MORE THAN 30 DAYS SHALL BE STABILIZED USING APPROPRIATE EROSION CONTROL MEASURES AND AN APPROPRIATE NATIVE NON-INVASIVE SEED MIX OR WITH THE FINAL APPROVED RESTORATION PLAN.
- ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO MINISTRY OF ENVIRONMENT (SPILL ACTION CENTER) AT 1-800-268-6060.
- IF EXCESSIVE SILTATION RESULTS FROM THE CONSTRUCTION ACTIVITIES, THE ONSITE SUPERVISOR/INSPECTOR AND/OR CVC RESERVE THE RIGHT TO REQUEST ADDITIONAL ESC MEASURES WHICH WOULD BE INSTALLED PRIOR TO FURTHER CONSTRUCTION ACTIVITIES.

EROSION AND SEDIMENT CONTROL NOTES

1. THE PAVED STREETS AND PARKING FIELDS SURROUNDING THE SITE ARE TO BE INSPECTED DAILY AND SWEPT AS NECESSARY TO REMOVE MUD, EXCESS MUD, OR ROCK TRACKED FROM SITE.
2. GOOD HOUSEKEEPING PRACTICES ARE TO BE FOLLOWED ON SITE DURING CONSTRUCTION AND MONITORED ON A DAILY BASIS. THIS INCLUDES BUT IS NOT LIMITED TO
   - 2.1. APPROPRIATE STORAGE AND DISPOSAL OF CONSTRUCTION MATERIALS,
   - 2.2. APPROPRIATE STORAGE AND DISPOSAL OF GARBAGE AND DEBRIS,
   - 2.3. APPROPRIATE DISPOSAL OF CONCRETE WASTE TO AN APPROVED DISPOSAL FACILITY, AND
   - 2.4. SECONDARY CONTAINMENT OF PETROLEUM-BASED PRODUCTS (JERRY CANS, OIL, ETC.).
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF WORK, MAINTAINED THROUGHOUT CONSTRUCTION, AND ONLY REMOVED UPON STABILIZATION OF THE DISTURBED AREAS.
4. INSPECTIONS SHALL OCCUR AT A MINIMUM FREQUENCY OF:
   - 4.1. ON A WEEKLY BASIS
   - 4.2. BEFORE AND AFTER EVERY RAINFALL EVENT (>12MM)
   - 4.3. AFTER SIGNIFICANT SNOWMELT EVENTS
   - 4.4. MONTHLY DURING INACTIVE PERIODS (> 30 DAYS), AND
   - 4.5. DAILY DURING EXTENDED RAIN OR SNOWMELT PERIODS.
5. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE STORM SEWER SYSTEM. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTIONS OR BOTH.
6. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORALLY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
7. PROVIDE TERRAFIX SILT SACK (OR APPROVED EQUIVALENT) ON ANY EXISTING CATCHBASINS IN PAVED AREAS WITHIN THE INFLUENCE OF THE CONSTRUCTION AREAS INCLUDING ALONG THE PROPERTY'S FRONTAGE.
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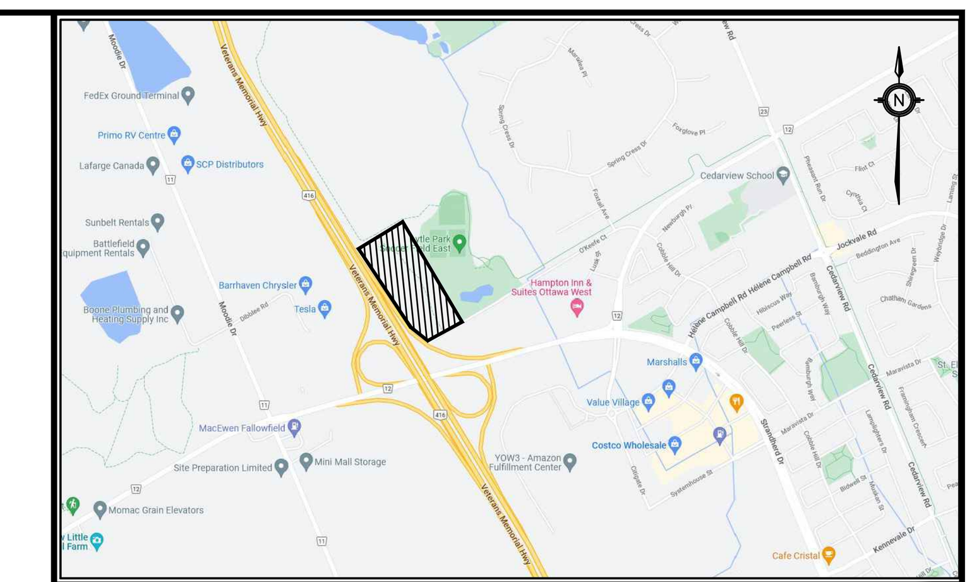

KEY PLAN
N.T.S.

ADDRESS:
PART OF LOT 21, CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

LEGEND

Symbol	Description
200.00 0.5% MH 1A	PROP ITEMS
200.00 0.5% EX MH 1A	EX ITEMS
	LIMIT OF PROPERTY LINE
	LIMIT OF CONSTRUCTION
	LIMIT OF BUILDING STRUCTURE
	SILT FENCE
	TREE PROTECTION FENCE
	CONSTRUCTION HOARDING
	CONSTRUCTION ENTRANCE/ MUDMAT

BENCHMARK: ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CGVD28 GEODETIC DATUM

SITE PLAN: KWA SITE DEVELOPMENT CONSULTING INC., 2024/10/10

SURVEY: ANNIS, O'SULLIVAN, VOLLEBEKK LTD., 2008/01/23

NO.	ISSUE	DATE	BY
1	SITE PLAN APPROVAL - SUBMISSION 1	250221	T.F.

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KWA SITE DEVELOPMENT CONSULTING
KWA SITE DEVELOPMENT CONSULTING INC.
2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

STAMP

THE PROPERTIES GROUP

THE PROPERTIES GROUP
O'KEEFE COURT (NEPEAN)

EROSION & SEDIMENT CONTROL PLAN - 2

SCALE: 1:500 10m
PROJECT # 21684
DATE: JANUARY 2025
DRAWN BY: T.G.
DRAWING # ESC-2
DESIGNED BY: T.G.
CHECKED BY: T.F.