FEBRUARY 5, 2021

Project No. 2020-090B

SELF STORAGE BUILDINGS
936577 AIRPORT ROAD
ENGINEERING DESIGN REPORT

TOWNSHIP OF MULMUR

CAPES ENGINEERING

355310 BLUE MOUNTAINS-EUPHRASIA TOWNLINE
CLARKSBURG, ON N0H 1J0

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1.0 Introduction

CAPES Engineering Ltd. has been retained by Mr. Daniel Tosello (Piaga Investments Ltd.) to prepare drawings, servicing design and a stormwater management report to support Site Plan approval for the 0.77 ha site located on the east side of County Road 18 (Airport Road) in the rural settlement area of Mansfield in the Township of Mulmur. The existing irregular lot currently has a residential building on it as well as several detached accessory buildings. One building is utilized for self storage and the remaining buildings are sheds for the residential building. An area along the south edge of the site is vacant containing a mix of treed and open field conditions.

It is proposed to initially construct a 445.91 m^2 (4,800 ft^2) self storage building in the open area in the south-west part of the site. It is proposed that future phases will add two buildings one at 390.31 sq. m (4,200 sq. ft) in size east of the initial building to be constructed followed by a third 278.59 sq. m (3,000 sq. ft) east of the 2nd building.

Access to the storage buildings will be provided by expanding the existing asphalt driveway from Airport Road. There will be no dedicated staff or office space for the proposed buildings, and they will not require electrical, water or sanitary connections. As per the Town request the site will require fire protection.

The site is currently zoned as Highway Commercial (CH) and no zoning alterations are required to support the proposed development. The site is not located within a regulated area of the Niagara Escarpment Commission or the Nottawasaga Valley Conservation Authority and approvals are not required from either the NEC or NVCA.

The proposed development is designed to meet the standards and guidelines of the Township of Mulmur and County of Dufferin. The purpose of this report is to provide support for Site Plan Approval from the Township of Mulmur for the proposed development.

Only the portion of the site south of the existing driveway is being considered for the proposed development and will be discussed in any detail within this report.

2.0 Existing Site Conditions

The lot is legally described as CON 7 EHS W PT LOT 10 PLAN;307 BLK B AND PT LOT 9 AND;RP 7R3069 PART 1 RP 7R5431;PART 1 in the Township of Mulmur, County of Dufferin. A full legal plan has not been provided for the site however a partial concept plan provided by the Owner which includes some legal boundary information is included in **Appendix A** for reference.

The site is irregular in shape with frontage of approximately 50 m along County Road 18. According to the Township of Mulmur zoning map, the immediately adjacent lots to the north, east and south are all zoned Hamlet Residential. There is also a parcel at the south-east corner of the site which is zoned as Open Space which we understand is a park area for the neighbouring subdivision and is maintained by the Municipality.

The site is currently accessed via an existing driveway from County Road 18 and has several buildings in the central part of the site with the north and south parts of the site largely open with some tree cover including a large row of cedar trees in the south part of the site and trees along the southern and

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eastern part of the site. There is a residential home on the property as well as a large (383 sq. m) existing self storage building along the eastern property line and a few small sheds and pole structures (produce stands).

The overall site slopes at an average of 2.8% south-east from the high point (314.472) along the south edge of the driveway to a low area near the south-east corner of the property (elevation 312.56). A small part (0.02 ha) of the existing asphalt driveway currently slopes towards the road at approximately 1%.

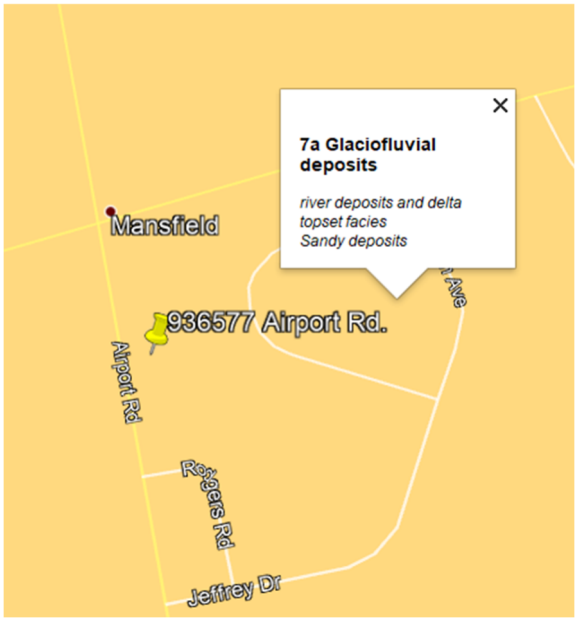
County Road 18 is a two-lane paved semi-urban road along the frontage with approximately 3.7 m wide lanes and asphalt shoulders with concrete curb and gutter. The curb and gutter starts just south of the existing driveway however the asphalt shoulder continues south along the entire frontage. There is no formal roadside ditch along the frontage of the site until south of the property line and it appears that runoff from a small portion of the ROW is currently allowed to sheet flow onto the site.

Hydro lines are located overhead on the west side of Airport Road and there are telecommunications cables buried along the frontage.

2.1 Geotechnical Information

There is currently no geotechnical investigation complete for this Site. The Ontario Geological Survey (OGS) has identified the area as glaciofluvial deposits with river deposits and delta topset facies with sandy deposits. Please see the excerpt from the OGS mapping below.

Ontario Geological Survey Mapping



Soil mapping for Dufferin County (Soil Map of Dufferin County, Soil Survey Report No. 38) from the Canada Department of Agriculture completed in 1963 identifies the area as Tioga Sand Loam with good drainage. The approximate site location is shown in the image below overlaying the soil mapping for reference. Please note that OGS mapping supersedes the older Department of Agriculture soil mapping

shown below. In general, the soil mapping supports the OGS mapping identifying the area as glaciofluvial deposits.

Dufferin County Soil Mapping

The MECP Well Record database shows a nearby shallow well completed in 1961 for 16 Maes Cres. We have included the well record in **Appendix B** for reference. The record indicates that the well was deepened and between 3.66 m and 8.8 m deep there was clay with water being found at a depth of approximately 3 m. The uper3.66 m of the stratigraphy were not listed as the well was lined to that depth.

There are no other nearby wells listed in the MECP database which could provide additional information regarding the near surface soils. For the purposes of this report, we have assumed a sandy loam near surface soil type.

2.2 Existing Water and Sanitary Servicing

There is an existing PVC 100 mm dia. raw water watermain on the east side of Airport Road as well as a 150 mm dia. PVC domestic watermain. The existing residence is connected to the domestic watermain and the water service size is assumed to be 19 mm. Please refer to the As-Built drawings included in Appendix B, prepared by RJ Burnside from July 2003 which shows the existing watermains.

There are no nearby Municipal Fire Hydrants and we understand from correspondence with RJ Burnside that neither watermain within the ROW were designed to provide fire flows or protection for the area.

The existing residence on the site is serviced by an on-site Class 4 septic system located east of the house. There is no Municipal sanitary sewer on Airport Road.

2.3 Existing Stormwater Infrastructure

There are currently no stormwater management controls on the site. Runoff from the site generally flows overland via sheet flow towards the south-east and discharges to private property. The flow (if any) appears to flow toward the rear yards of 16 & 18 Maes Crescent. It does not appear that there are

any formal swales or conveyance channels, but we believe all of the flow from the rear yards of Maes Crescent and from the development site is directed to the Open Space park area south of the site.

The eastern side of County Road 18 contains no ditch but does have curb and gutter which starts just south of the site driveway. A small portion of the ROW runoff appears to currently sheet flow into the site however the majority of the ROW runoff is directed north via the curb and gutter past the site.

Based on the available information it is anticipated that there is little runoff from pervious areas as infiltration likely occurs due to the soil type present.

2.3.1 Stormwater Management Approval Criteria

The site is within the NVCA jurisdiction (but not within a regulated area) and therefore we have generally followed the NVCA stormwater guidelines for the site, although we do not believe the NVCA will be providing review of this site due to the small size and nature of the development.

In general, the site needs to conform to the following stormwater criteria.

- Post Development peak flows must be controlled to Pre-Development levels for the 2-100 year storm events (inclusive).
- Quality control for 4 hr Chicago 25 mm storm must be provided to meet the MECP "Enhanced" level of protection (80% TSS Removal)
- Best efforts towards a water balance must be provided for the site.
- A minimum of 5 mm of rainfall must be retained on site through the use of LID.
- Pre-Development total phosphorous (TP) levels must be matched in the post development and best efforts to achieve an additional 20% TP reduction below pre-development.
- Erosion and Sediment Controls (ESC) must be provided for the site to reduce or eliminate sediment transport offsite during construction and until vegetation has been re-established.

2.3.2 Existing Condition Stormwater Modelling

We have utilized PCSWMM 2020 modelling software (Version 7.3.3095, SWMM version 5.0.013-5.1.015 to undertake the analysis of the existing site.

The contributing drainage area for the site was determined by using a combination of aerial imagery from County of Dufferin Mapping and a topographic survey of the site completed in 2020.

The site is 0.77 ha in size however a maximum of 0.49 ha of the existing site is involved in the current proposal and as such we have only focused on that part of the site for this report. The remainder of the site will not be altered as part of this proposal. The existing 0.49 ha of the property involved in this analysis has been calculated at 10% impervious area.

A loamy sand soil type will be used for modeling of existing conditions for the site per available soil type information as specified above. Please refer to **Appendix C** for the Existing Condition Catchment Plan as well as the PCSWMM output summary. Below are the selected Green Ampt Parameters for the Site.

Saturated Hydraulic Conductivity (K_{fs})= 59.8 mm/hr (Table 5.5.5 Handbook of Hydrology, 1993)

Suction Head = 61.3 mm (as per Rawls 1983)

Initial Deficit (fraction) = 0.312 (as per Rawls 1983)

Additional PCSWMM model input parameters for the Manning's roughness coefficient (*n*) and depression storage were determined from the USDA TR55 and UNESCO SWM Manual as follows:

Table 5.9: Manning Roughness Coefficients - Overland Flow

Cover	*n*
Impervious areas	0.013
Woods	
with light underbrush	0.4
with dense underbrush	0.8
Lawns	
Short grass	0.15
Dense grass	0.24
Agriculture Land	0.050-0.170

Ref: Adapted from Soil Conservation Service, Urban Hydrology for Small Watersheds, U.S. Dept. of Agriculture, Soil Conservation Service, Engineering Division, Technical Release 55, June 1986

10.2 Initial Abstraction/Depression Storage

Table 10.2: Initial abstraction/depression storage

Cover	Depth (mm)
Woods	10
Pasture/Meadow	8
Cultivated	7
Lawns	5
Wetland	12/16
Impervious areas	2

Ref: UNESCO, Manual on Drainage in Urbanized Areas, 1987.

Area A1 – 0.47 ha includes the majority of the development area and drains overland to the SE towards the Open Space south of the site. The impervious percentage of this catchment is 6.7% consisting of a small part of the driveway and a raised concrete area south of the driveway. The majority of the remainder of the area is grassed (58%) and treed (35.3%). The average slope is 2.8% and the flow length is 96 m. A weighted Manning roughness coefficient of 0.24 and a depression storage of 8 mm has been calculated. The impervious area is modeled with a Manning roughness coefficient of 0.013 and a depression storage of 2 mm per the tables above.

Area A2 – 0.03 ha includes the pervious part of the ROW where runoff will drain onto the site. The catchment is 100% pervious and has an average slope of 1%. A Manning n of 0.15 and a depression storage of 5 m has been assigned to the pervious area to reflect the grassed nature of the catchment.

Area A3 – 0.02 ha includes the portion of the driveway which drains out to the Airport Road ROW at 1% slope and is 100% impervious. A Manning roughness coefficient of 0.013 and a depression storage of 2 mm per the tables above.

IDF Curves were obtained of the rainfall data from the Ministry of Transportation IDF Curve Look-up Tool and have been included in **Appendix C.** The IDF curves were used to model the 2-100 year 4-Hour Chicago storms and the 2-100 year 24-Hour SCS Type II storms as per NVCA guidelines. The Regional Timmins storm and the 4-Hour 25 mm Chicago (quality control) storm events were also modeled.

Please refer to **Table 1** below for a summary of the results from the model.

Table 1 – Existing Condition Modelling Results

Storm Event	Peak Flow Onto Site (A2) (m^3/s)	Peak Flow Offsite to Airport Rd. (A3) (m^3/s)	Peak Flow Offsite to Open Space (A1 & A2) (m^3/s)	Peak Flow Offsite Total (m^3/s)
4 Hr Chicago				
2-year	0.00	0.01	0.00	0.01
5-year	0.00	0.01	0.00	0.01
10-year	0.00	0.01	0.00	0.01
25-year	0.00	0.01	0.00	0.01
50-year	0.00	0.01	0.00	0.01
100-year	0.00	0.01	0.00	0.01
24 Hr SCS				
2-year	0.00	0.00	0.00	0.00
5-year	0.00	0.00	0.00	0.00
10-year	0.00	0.01	0.00	0.01
25-year	0.00	0.01	0.01	0.02
50-year	0.00	0.01	0.02	0.03
100-year	0.01	0.01	0.04	0.05
25 mm	0.00	0.00	0.00	0.00
Timmins	0.00	0.00	0.00	0.00

The PCSWMM summary output file for the 100 year 24-Hour SCS Type II storm has been included in **Appendix C** for reference. The remaining output files can be provided upon request in either digital or hardcopy format.

Due to the topography of the site (flat), the vegetative cover (trees and grass) the runoff is largely all absorbed except for the largest storm events (25, 50 and 100 year 24-Hour SCS Type II design storms) which only discharge a very small amount of runoff. These results are generally consistent with the site conditions where there are no pronounced swales or channels caused by runoff flowing any significant distance.

3.0 Proposed Site Plan

The ultimate proposed development includes 3 new self storage buildings with slab on grade construction that are 445.91 m^2 (4,800 ft^2 - Building 1), 390.31 m^2 (4,200 ft^2 - Building 2), and 278.59 m^2 (3,000 sq. ft). The storage buildings will be accessed by widening the existing 5.5 m wide driveway to 9.0 m wide to accommodate emergency access. A 9.0 m wide platform will be provided around the majority of the buildings to allow for emergency vehicle access. The driving lanes between the buildings

will be the minimum 6.0 m required and we have used reduced lot grading on the proposed surface of the gravel to reduce runoff and minimize grade changes on the building slabs. The lanes between the buildings will have a reverse crown and will have an 0.8 m wide asphalt strip to minimize scour of the gravel from water flow and reduce on site grading maintenance.

It is proposed the buildings will be constructed in phases and at this time only the western-most building (Building 1) is to be constructed. This report includes design for the ultimate site condition, and we have provided a phasing plan on **Drawing C5**.

The site will not be staffed or include an office space. The buildings do not require electrical connections or water/sanitary connections.

The proposed stormwater infrastructure includes enhanced swales complete with subsurface infiltration trenches to direct flows south-east towards the Open Space Block where runoff currently discharges. It is proposed that the combine enhanced swales and infiltration measures will reduce the runoff to below existing condition levels and eliminate runoff completely.

3.1 Proposed Stormwater Management Plan

We have updated the existing condition PCSWMM model to reflect the post development conditions.

The Green Ampt infiltration parameters used for the proposed development will be the same as the pre-development condition. In the proposed conditions the pervious areas will be a combination of treed areas and grassed areas; therefore, the Mannings n value and depression storage are calculated with regard to the proposed conditions for each subcatchment.

Subcatchment A1 – 0.47 ha – This is the majority of the post development area in the model and contains the 3 proposed buildings and the majority of the associated driving lanes. The catchment is 73% impervious. The driving lanes are to be 9.0 m wide in a ring around the group of buildings, although there is on spot at the NE corner of Building 3 where the lane will reduce down to the minimum 6.0 m wide. In between the buildings the laneways will be 6.0 m and will have a reverse crown shape. Runoff will be directed away from the buildings towards a long vegetated swale along the west, south and east sides of the site. Any runoff not infiltrated by the swale will discharge into a small rain garden in the SE corner of the site. The rain garden provides additional storage volume and opportunity for infiltration. Any excess will discharge over a dissipation pad to the current discharge location to the Town owned open space area south of the site.

The proposed enhanced grassed swale and rain garden is generally designed with reference to the document produced by the CVC/TRCA titled Low Impact Development Stormwater Management Planning and Design Guide. Certain components of the swale and rain garden such as longitudinal slope, side slopes and grass cover are chosen to increase infiltration within the site. The western swale will be triangular in shape and transition to a trapezoidal shape along the south part of the site. The eastern swale will be trapezoidal in shape for the entire length to the rain garden in SE corner.

The trapezoidal portions of the swale will have a 0.5 m x 0.5 m stone filled subsurface infiltration trench to allow for additional storage volume and promote infiltration. The total length of the infiltration trench will be 118 m and provide a storage volume (assuming 43% void space) of 12.69 m^3. The

subsurface Ksat has been set to 23.92 mm/hr or a 2.5x reduction in the surface rate as per the NVCA guidelines.

The rain garden will provide 48 m^3 of additional storage volume and the overflow will be set at an elevation of 313.19 allowing for 0.3 m of pure infiltration below the outlet. Please refer to **Drawing C3** and **C7** for additional details on the rain garden.

Subcatchment A2 (0.03 ha) is unchanged from the existing condition model and represents the external drainage area in the ROW which drains onto the site.

Subcatchment A3 (0.02 ha) includes the portion of the driveway which drains out to the Airport Road ROW at 1% slope and is 100% impervious. A Manning roughness coefficient of 0.013 and a depression storage of 2 mm per the tables above.

Please refer to **Drawing C4** for a plan of the subcatchments detailed above and to **Drawing C6** for the staging plan and to the grading and stormwater details on the proposed Grading and Servicing Plan **Drawing C2**. Please refer to **Table 2** for a summary of the existing and post re-development Peak Flows.

Table 2 – Pre and Post Modelling Results

Storm Event	Existing Peak Flow Offsite Total (m^3/s)	Proposed Flow to Airport Road (m^3/s)	Proposed Flow to SE Corner of Site (m^3/s)	Proposed Peak Flow Offsite Total (m^3/s)
4 Hr Chicago				
2-year	0.01	0.01	0.00	0.01
5-year	0.01	0.01	0.00	0.01
10-year	0.01	0.01	0.00	0.01
25-year	0.01	0.01	0.00	0.01
50-year	0.01	0.01	0.00	0.01
100-year	0.01	0.01	0.00	0.01
24 Hr SCS Type II				
2-year	0.00	0.00	0.00	0.00
5-year	0.00	0.00	0.00	0.00
10-year	0.01	0.01	0.00	0.01
25-year	0.02	0.01	0.00	0.01
50-year	0.03	0.01	0.00	0.01
100-year	0.05	0.01	0.00	0.01
25 mm	0.00	0.00	0.00	0.00
Timmins	0.00	0.00	0.00	0.00

Proposed peak flows will be equal or lower than existing flows for the 2 through 100-year design storms for both the Chicago and SCS Type II storms. As well, the 25 mm 4-Hour Chicago quality storm peak flow is equal to the existing peak flow (0.00 m^3/s). The only flow discharging from the site is from the impervious area that drains to Airport road (as per the existing). All other flow is infiltrated though the use of the swales and rain garden.

Please refer to **Appendix E** for the 100 year 24-Hour SCS Type II storm PCSWMM output results.

3.1.1 Stormwater Quality Control

Stormwater quality has been analyzed using a 25 mm 4-hour Chicago design storm. The 25 mm design storm represents 95% of all rainfall activities in an average year. By basing quality controls off of the 25 mm design storm, quality measures will be effective for most rain events in a given year.

The grass swales and rain garden will reduce the peak outflow from the 25 mm design storm to 0.00 m^3/s for the proposed development of the site. Without outflow occurring, full treatment is achieved for TSS removal for the quality design storm (25 mm 4-Hour Chicago).

As per NVCA guidelines the elimination of the runoff during the 25 mm storm reduces the phosphorous discharge from the site to 0 and the TSS removal is 100%.

3.1.2 Enhanced Grass Swale

The enhanced grass swale used on site is designed to promote treatment of the stormwater. Per the Low Impact Development Stormwater Management Planning and Design Guide by the CVC, the following factors increase pollutant removal rates:

- Longitudinal slope <1%: The slope in the enhanced grass swale varies between 0.5% and 1.7% (average 0.7%)
- Soil infiltration rate is 15 mm/hr or greater: The existing sandy soil is very permeable and will promote infiltration. Additional soil testing may be required by the Town or NVCA to confirm the soil infiltration rate.
- Flow velocity within channel is 0.5 m/s or less during quality design storm: The maximum velocity occurring in the swale is 0.4 m/s for the 25 mm 4-Hour Chicago design storm.
- Side slopes 3:1 or less: Side slopes in the enhanced swale are 3:1 except for a small section of 2:1 near the NE corner of Building 3.

3.1.3 Rain Garden

It is proposed to implement a rain garden for the site., which is designed in general conformance with the CVC/TRCA LID Manual with 3:1 side slopes, 750 mm of filter medium (compost amended potting soil), 75 mm of mulch on the surface and will be planted with a mixture of long grasses and wildflowers to ensure an 80% TSS removal for any flow that is not infiltrated.

The rain garden is to be located in the south-east part of the site and will be 117 sq. m facility at a maximum 0.6 m deep. The available volume is 48 cu. m and will operate on pure infiltration for the bottom 0.3 m and have a 3 m wide dissipation pad set at 0.3 m above the bottom. Please refer to **Drawing C3 & C7** for additional details. The maximum water surface elevation occurs in the 100 yr SCS event where the water reaches 0.12 m deep (elevation 312.71) which provides 0.48 m of freeboard.

3.2 Fire Flow

As per the request of the Town we have calculated the fire flow water demand for the site based on the ultimate condition using the OBC (Office of the Fire Marshal, OFM Guideline, Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code (Oct 1999)). Please refer to **Appendix** E for the calculations.

Based on the calculations the Phase 1 building will require 81,000 L of stored water to fight a fire for 30 minutes. This value does not increase for Phase 2 or 3. It is proposed to implement a single 81,000 L tank in Phase 1 which will be suitable for all 3 phases of the development. Please refer to **Appendix E** for details of a possible subsurface storage tank and dry hydrant, although there are a number of manufacturers or alternative options that would be acceptable. The final tank configuration approval is subject to review of the Building Department.

3.3 Erosion and Sediment Control

We recommend that silt fence per OPSD 219.130 be installed along the exterior of the limit of development of the Site as shown in **Drawing C5.** These controls should remain in place and be maintained until the vegetation is re-established on the lot.

4.0 Conclusions

It is proposed to construct 3 mini self storage buildings on the 0.77 ha site located on the east side of County Road 18 (Airport Road) in the rural settlement area of Mansfield in the Township of Mulmur. The existing irregular lot currently has a residential building on it as well as several detached accessory buildings. One building is utilized for self storage and the remaining buildings are sheds for the residential building. An area along the south edge of the site is vacant containing a mix of treed and open field conditions.

It is proposed to initially construct a 445.91 m^2 (4,800 ft^2) self storage building in the open area in the south-west part of the site. It is proposed that future phases will add two buildings one at 390.31 sq. m (4,200 sq. ft) in size east of the initial building to be constructed followed by a third 278.59 sq. m (3,000 sq. ft) east of the 2nd building.

Access to the storage buildings will be provided by expanding the existing asphalt driveway from Airport Road. There will be no dedicated staff or office space for the proposed buildings, and they will not require electrical, water or sanitary connections. As per the Town request the site will require fire protection.

The site is currently zoned as Highway Commercial (CH) and no zoning alterations are required to support the proposed development. The site is not located within a regulated area of the Niagara Escarpment Commission or the Nottawasaga Valley Conservation Authority and approvals are not required from either the NEC or NVCA.

The site will be constructed in Phases with Building 1 being constructed first along with the proposed stormwater controls to service that building and associated driving lane. Additional stormwater management controls will be added at each phase. The primary stormwater quality and quantity controls for the site will be through the use of infiltration-based LID (swales and a rain garden) and the design ensures an enhanced level of treatment and a reduction in peak flows to existing levels. There will be no flows discharged to the SE of the site in the proposed condition as is the current drainage pattern.

The buildings will not require electricity, or a water or sewage connection and there will be no staff on-site. The site will not have external lighting (either street or on-building) and as such will primarily be used only by day.

A subsurface fire flow storage tank and dry hydrant is proposed to service all 3 buildings and will be located west of the buildings.

This report is intended to demonstrate the site can be constructed and serviced and will meet the County, Township and NVCA design criteria. The site will require Site Plan approval from the Township as well as approval from the County, however a permit is not required from the NVCA or NEC.

Report Prepared By:

Clayton Capes, MSc. P.Eng.

CAPES Engineering Ltd.

Drawings

Drawing C1 – Existing Condition Plan
Drawing C2 – Proposed General Plan
Drawing C3 – Grading and Servicing Plan
Drawing C4 – Post Development Drainage Plan
Drawing C5 – Erosion and Sediment Control Plan
Drawing C6 – Staging Plan
Drawing C7 – Standard Details

PIAGA INVESTMENTS LTD.

936577 AIRPORT ROAD SELF STORAGE

DRAWING INDEX

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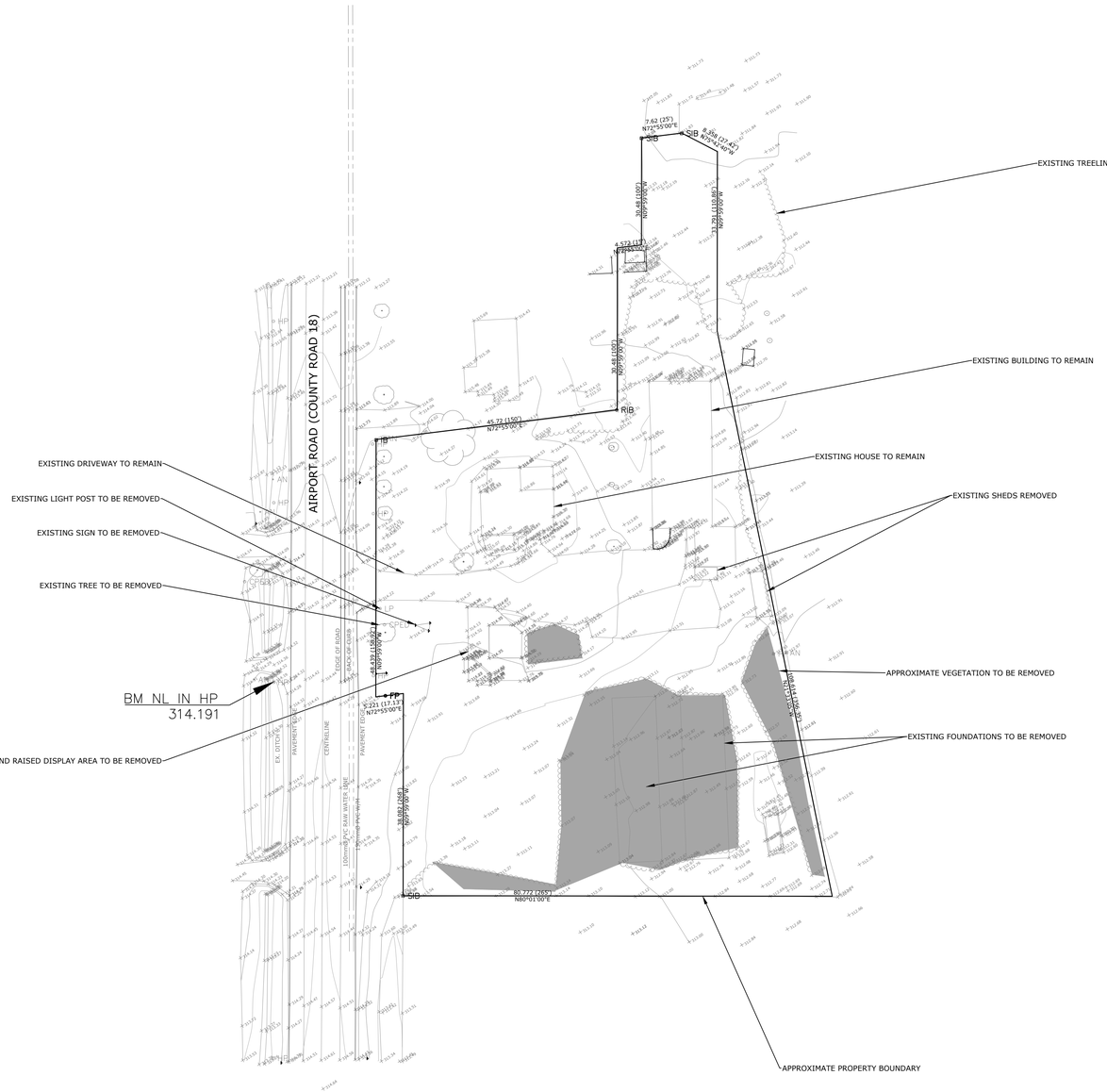
L4H 1A2

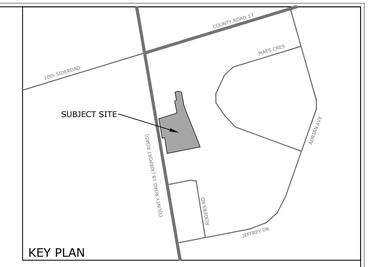
Project No. 2020-090

ISSUED FOR APPROVALS - 2021-02-05

CAPES ENGINEERING

2020-090 - 936577 AIRPORT ROAD SELF STORAGE - PIAGA INVESTMENTS LTD.
ISSUED FOR APPROVALS - 2021/02/05





LEGEND

× 221.21	PROPOSED ELEVATION
221.21	EXISTING ELEVATION
	MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED

RP 7R3069 PART 1, RP 7R5431 PART 1, AND PLAN 307, BLOCK B, PART LOT 9 CONCESSION 7 EHS W PT LOT 10 TOWNSHIP OF MULMUR

COUNTY OF DUFFERIN

Notes
1. This drawing is the exclusive property of CAPES Engineering Ltd. The reproduction of any part without express written consent of this Corporation is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to CAPES Engineering Ltd. prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

No	Revision	Date
1	ISSUED FOR APPROVALS	21/02/05

NOTES:

TOPOGRAPHICAL SURVEY COMPLETED BY SMC GEOMATICS INC. HORIZONTAL AND VERTICAL CONTROL ESTABLISHED USING LEICA SMARTNET RTK

LEGAL SURVEY INFORMATION PROVIDED BY OWNER. THE BEARINGS SHOWN ARE FOR REFERENCE ONLY. THIS IS NOT A LEGAL PLAN OF SURVEY AND SHALL NOT BE USED AS SUCH. BOUNDARY IS SHOWN APPROXIMATELY ONLY.

BENCHMARK:
NAIL IN HYDRO POLE WEST OF AIRPORT ROAD JUST SOUTH OF EXISTING ENTRANCE = 314.19

LICENSED PROFESSIONAL ENGINEER
C. CAPES
100056104
FEB. 05, 2021
PROVINCE OF ONTARIO

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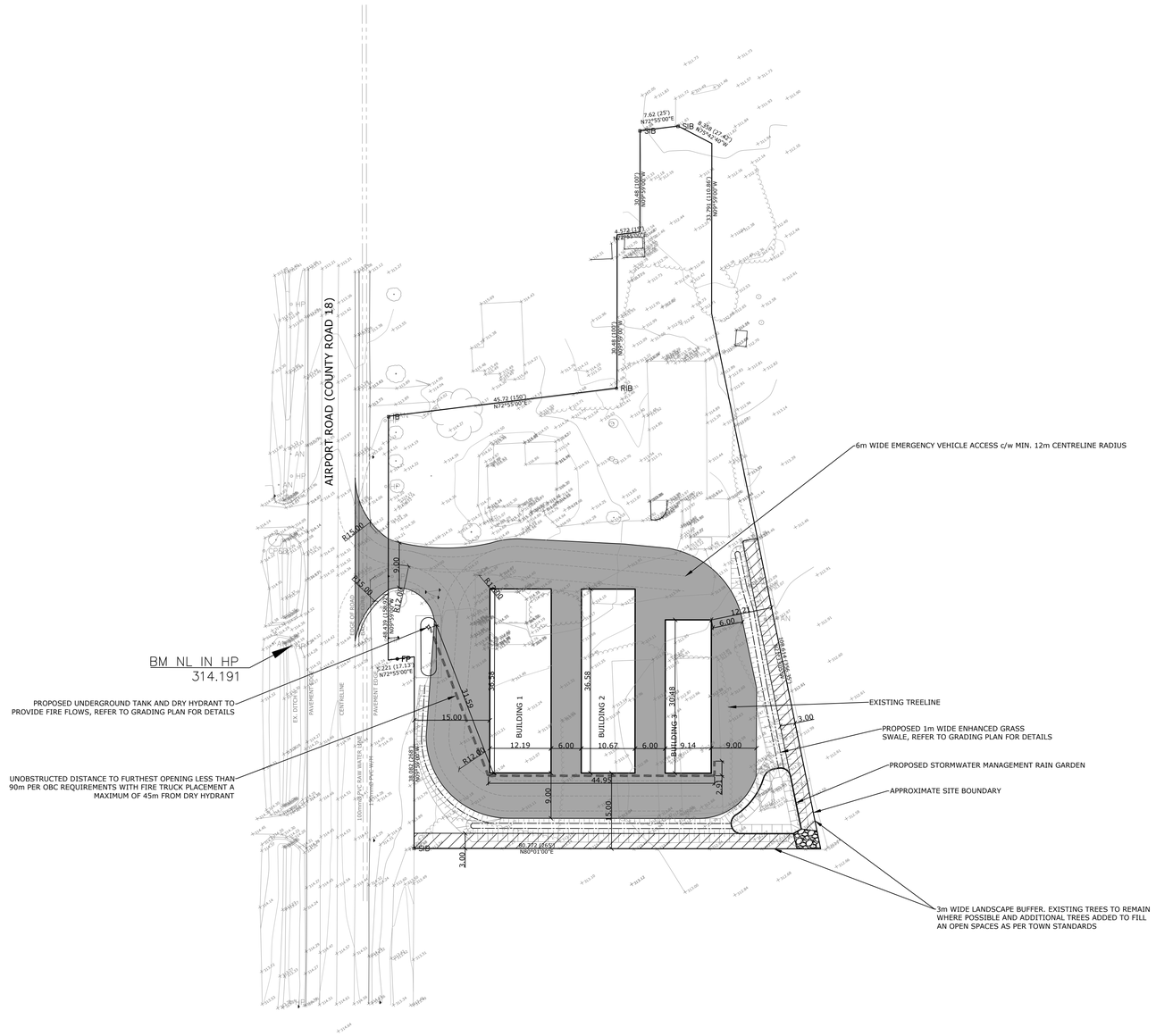
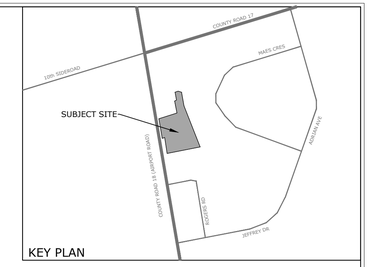
936577 AIRPORT ROAD SELF STORAGE

Exitsing Condition Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C1
Project No.		Rev No.	
2020-090		1	
Scale	0 5.0 10.0 20.0 30.0m		
1:500			

File: C:\CAPES Engineering Dropbox\Projects\2020\2020-090 Piaga Investments\2021-090 936577 Airport Rd\Drawings\01 Production\Dwg\2020-090 Ex Cond.dwg Date Plotted: February 5, 2021 - 1:53 PM





KEY PLAN

LEGEND

* 221.21	PROPOSED ELEVATION
221.21	EXISTING ELEVATION
	MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED

TOWNSHIP OF MULMUR ZONING TABLE HIGHWAY COMMERCIAL (CH) LOT PROVISIONS		
	REQUIRED	PROVIDED
MINIMUM LOT AREA (sq.m)	8,000	7,635 (APPROX.)
MINIMUM LOT FRONTAGE (m)	60.0	172
MINIMUM FRONT YARD (m)	15.0	15.0
MINIMUM EXTERIOR SIDE YARD (m)	15.0	N/A
MINIMUM INTERIOR SIDE YARD (m)	6.0	15.0 (PROP. ONLY)
MINIMUM REAR YARD (m)	7.5	12.2 (PROP. ONLY)
MAXIMUM HEIGHT (m)	10.5	3.0 (APPROX. PROP ONLY)
MAXIMUM LOT COVERAGE (%)	25	22 (INCL. EXIST.)
MINIMUM LANDSCAPED OPEN SPACE (%)	15	44 (INCL. EXIST.)

RP 7R3069 PART 1,
RP 7R5431 PART 1, AND
PLAN 307, BLOCK B, PART LOT 9
CONCESSION 7 EHS W PT LOT 10
TOWNSHIP OF MULMUR
COUNTY OF DUFFERIN

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No	Revision	Date
1	ISSUED FOR APPROVALS	21/02/05

NOTES:

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BENCHMARK:
NAIL IN HYDRO POLE WEST OF AIRPORT ROAD JUST SOUTH OF EXISTING ENTRANCE = 314.19

LICENSED PROFESSIONAL ENGINEER
C. CAPES
100056104
FEB. 05/2021
PROVINCE OF ONTARIO

Client
PIAGA INVESTMENTS LTD.
223 ROSELAWN DR.
WOODBRIDGE, ON
L4H 1A2

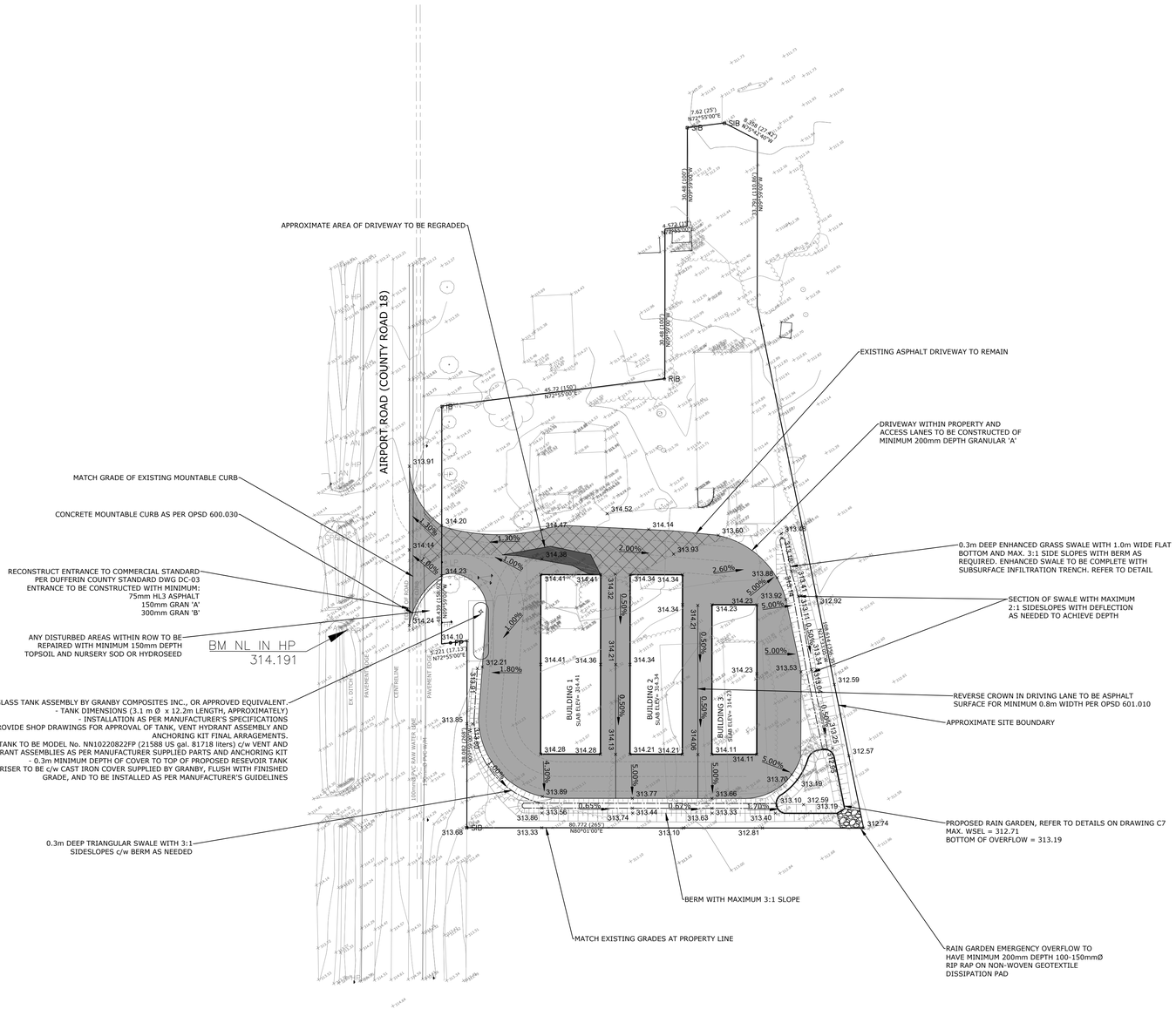
CAPES ENGINEERING
355310 BLUE MOUNTAINS - EUPHRASIA TOWNLINE
CLARKSBURG, ON N0H 1J0
WWW.CAPESENGINEERING.COM

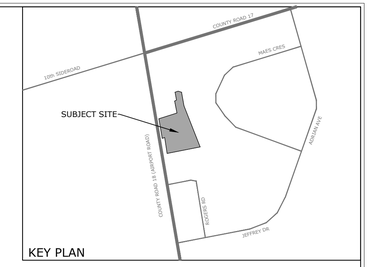
936577 AIRPORT ROAD SELF STORAGE

Proposed General Site Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C2
Project No. 2020-090		Rev No. 1	
Scale 1:500	0 5.0 10.0 20.0 30.0m		

File: C:\CES\Capes Engineering Dropbox\Projects\2020\2020-090 Piaga Investments\ASD-090 936577 Airport Rd\Drawings\01 Production\Dwg\2020-090 Overall Site Plan.dwg Date Plotted: February 5, 2021 - 11:54 AM





LEGEND

* 221.21	PROPOSED ELEVATION
221.21	EXISTING ELEVATION
	MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED

RP 7R3069 PART 1, RP 7R5431 PART 1, AND PLAN 307, BLOCK B, PART LOT 9 CONCESSION 7 EHS W PT LOT 10 TOWNSHIP OF MULMUR

COUNTY OF DUFFERIN

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No	Revision	Date
1	ISSUED FOR APPROVALS	21/02/05

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LICENSED PROFESSIONAL ENGINEER
C. CAPES
100056104
FEB. 05/2021
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CLARKSBURG, ON N0H 1J0
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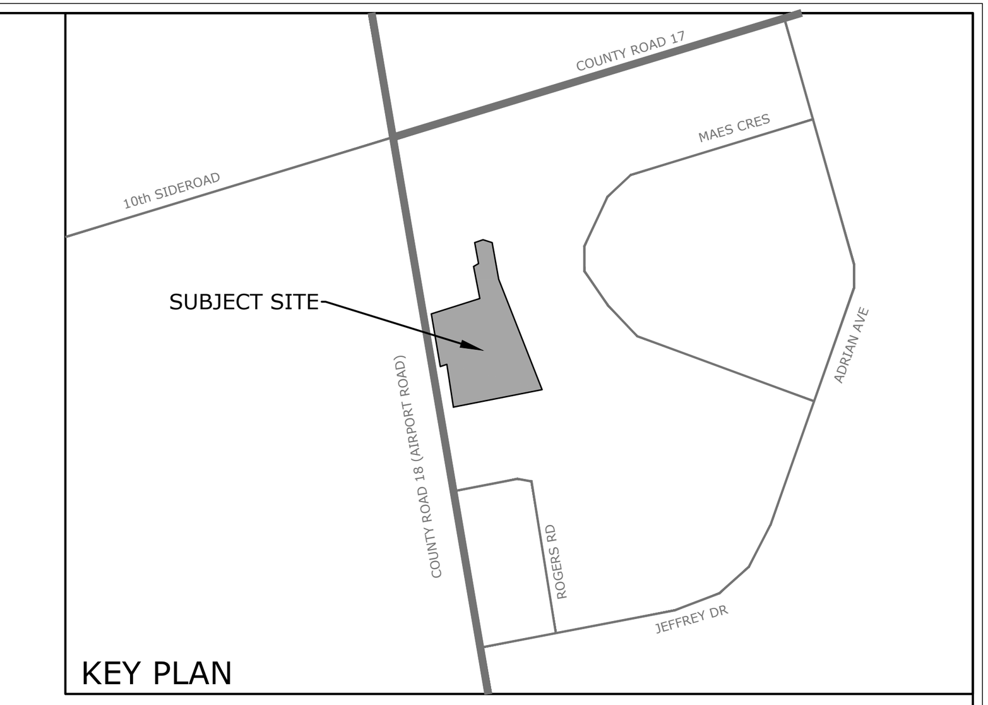
936577 AIRPORT ROAD SELF STORAGE

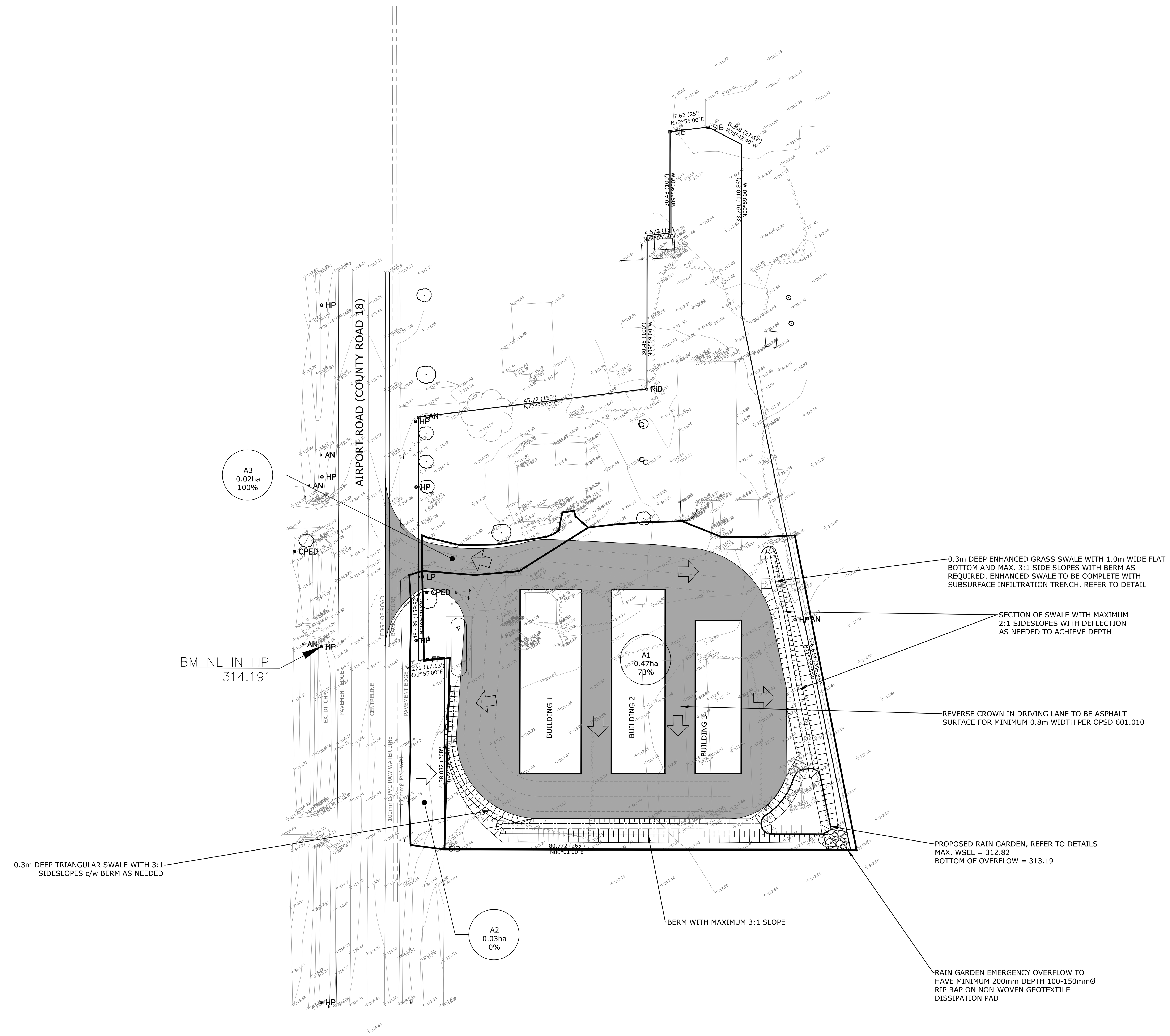
Grading & Servicing Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C3
Project No. 2020-090		Rev No. 1	
Scale 1:500	0 5.0 10.0 20.0 30.0m		



LEGEND

• 221.21	PROPOSED ELEVATION
221.21	EXISTING ELEVATION
	MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED
⇨	OVERLAND FLOW DIRECTION
S6 0.39ha 0%	SUBCATCHMENT NAME, AREA (ha) & % IMPERVIOUS



RP 7R3069 PART 1,
RP 7R5431 PART 1, AND
PLAN 307, BLOCK B, PART LOT 9
CONCESSION 7 EHS W PT LOT 10
TOWNSHIP OF MULMUR
COUNTY OF DUFFERIN

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No	Revision	Date
1	ISSUED FOR APPROVALS	21/02/05

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100056104
FEB. 05/2021
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936577 AIRPORT ROAD SELF STORAGE

Post Development Drainage Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C4
Project No. 2020-090		Rev No. 1	
Scale 1:500	0 5.0 10.0 20.0 30.0m		

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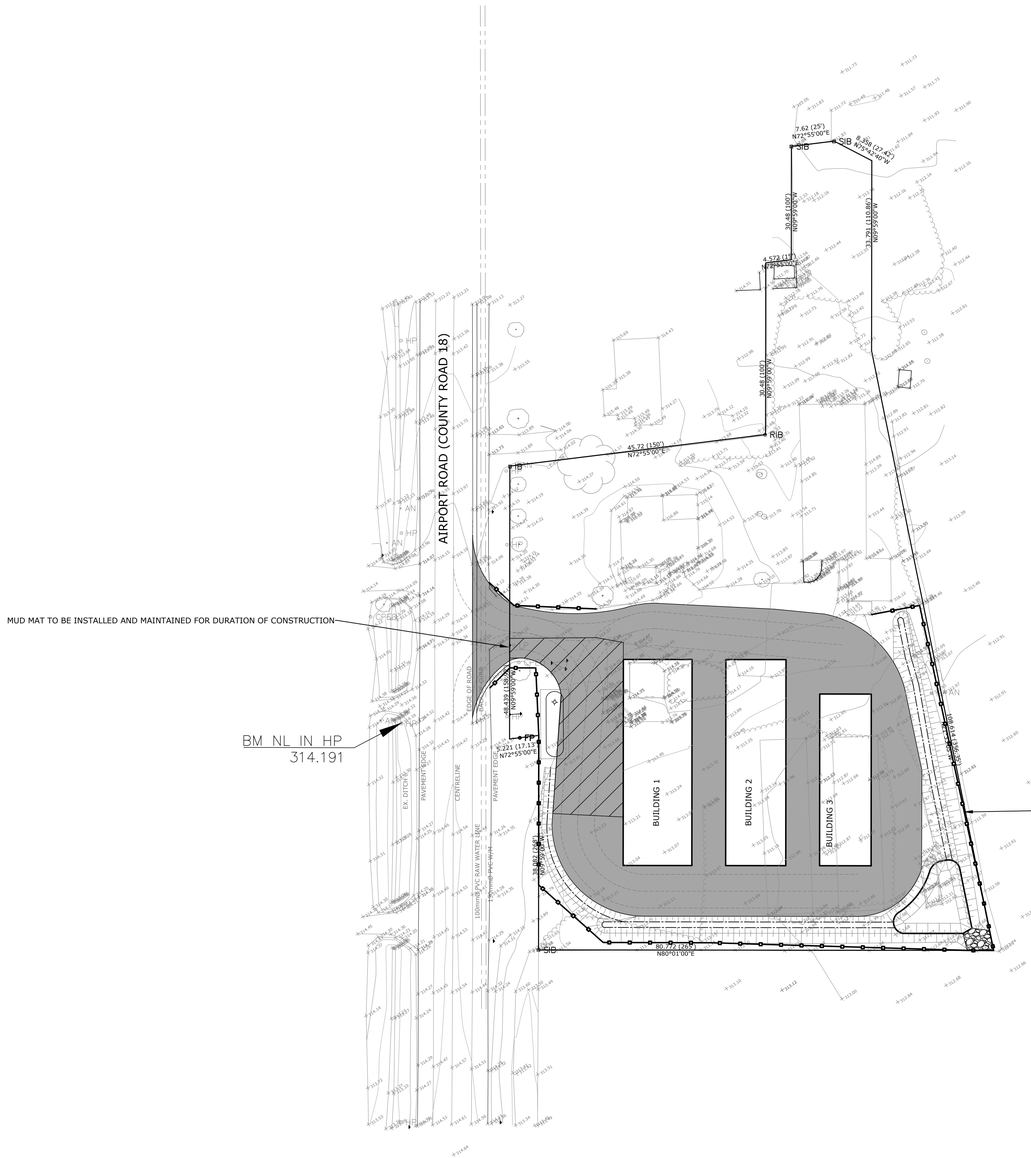

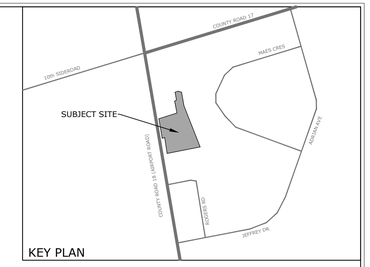

LEGEND

* 221.21	PROPOSED ELEVATION
221.21	EXISTING ELEVATION
	MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED
	SEDIMENT FENCE

RP 7R3069 PART 1, RP 7R5431 PART 1, AND PLAN 307, BLOCK B, PART LOT 9 CONCESSION 7 EHS W PT LOT 10 TOWNSHIP OF MULMUR

COUNTY OF DUFFERIN

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1	ISSUED FOR APPROVALS	21/02/05

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100056104
FEB. 05/2021
PROVINCE OF ONTARIO

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CLARKSBURG, ON N0H 1J0
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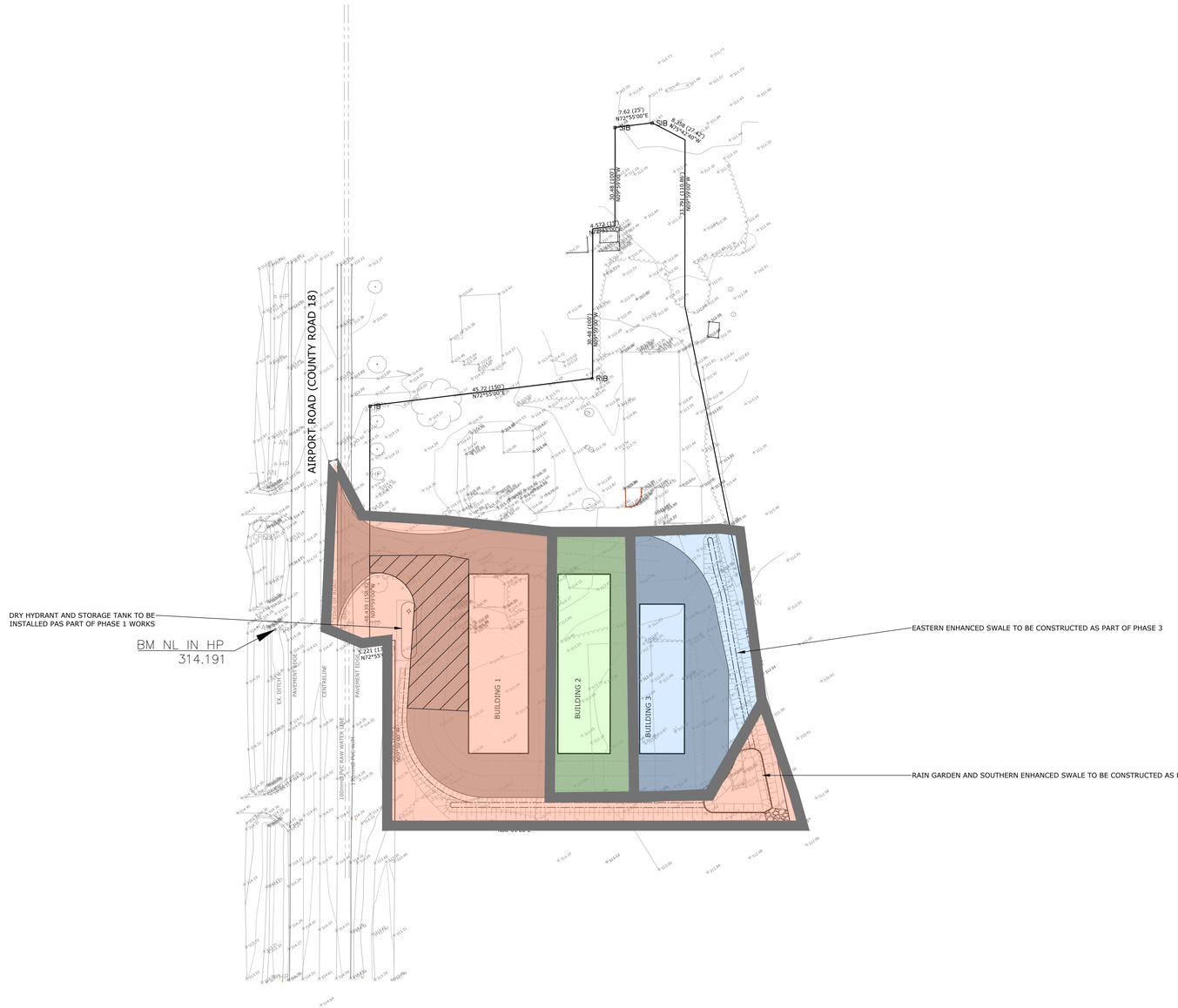
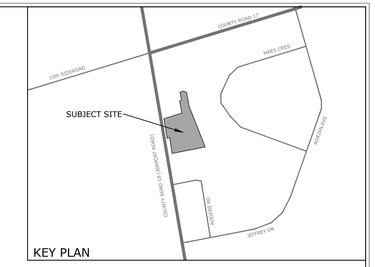
936577 AIRPORT ROAD SELF STORAGE

Erosion and Sediment Control Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C5
Project No. 2020-090		Rev No. 1	
Scale 1:500	0 5.0 10.0 20.0 30.0m		

File: C:\CAPES Engineering Dropbox\Projects\2020\2020-090 Piaga Investments\2020-090 936577 Airport Rd\Drawings\01 Production\Dwg\2020-090 ESC Plan.dwg Date Plotted: February 5, 2021 - 1:34 PM





LEGEND

- 221.21 — PROPOSED ELEVATION
- 221.21 — EXISTING ELEVATION
- MAXIMUM 3:1 SLOPE UNLESS OTHERWISE NOTED
- PHASE 1
- PHASE 2
- PHASE 3

RP 7R3069 PART 1, RP 7R5431 PART 1, AND PLAN 307, BLOCK B, PART LOT 9 CONCESSION 7 EHS W PT LOT 10 TOWNSHIP OF MULMUR

COUNTY OF DUFFERIN

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FEB. 05/2021
PROVINCE OF ONTARIO

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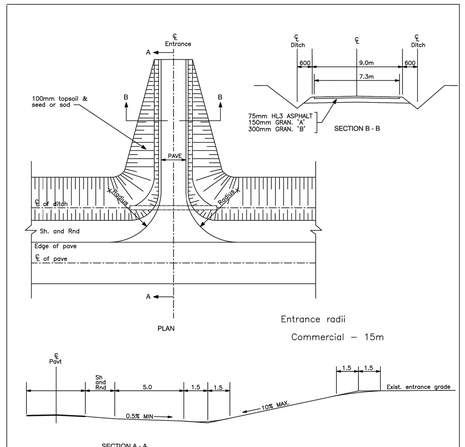
936577 AIRPORT ROAD SELF STORAGE

Staging Plan

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C6
Project No. 2020-090		Rev No. 1	
Scale 1:500	0 5.0 10.0 20.0 30.0m		



Culvert
Min. Dia. 450mm
Min. cover 300mm
Min. length 10m

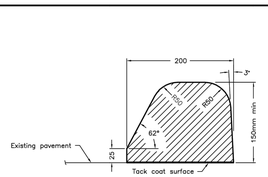
EARTH CUT

NOTE: All dimensions are in meters or millimeters unless otherwise specified.

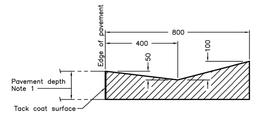
DUFFERIN COUNTY

ENTRANCE
COMMERCIAL/INDUSTRIAL/INSTITUTIONAL

SEPTEMBER 1999 DC - 03



ASPHALT BARRIER CURB
(MACHINE LAID)



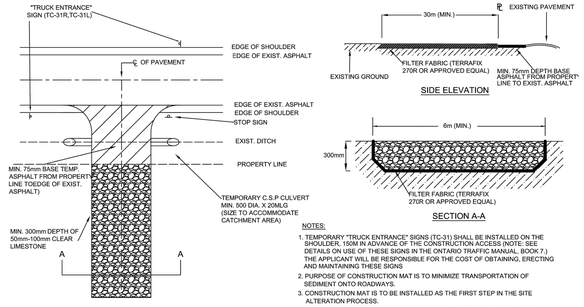
ASPHALT MOUNTABLE CURB WITH WIDE GUTTER

NOTES:
1 Depth of asphalt curb with gutter at pavement edge shall equal depth of new pavement, but in no case less than 130mm.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2013 | Rev 2

ASPHALT CURB AND
ASPHALT CURB WITH GUTTER

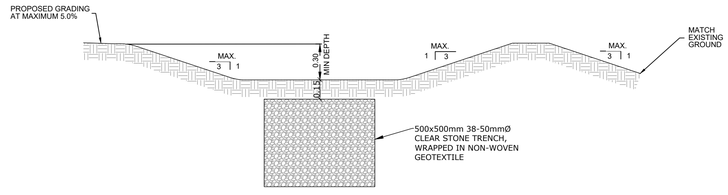
OPSD 601.010



SIDE ELEVATION

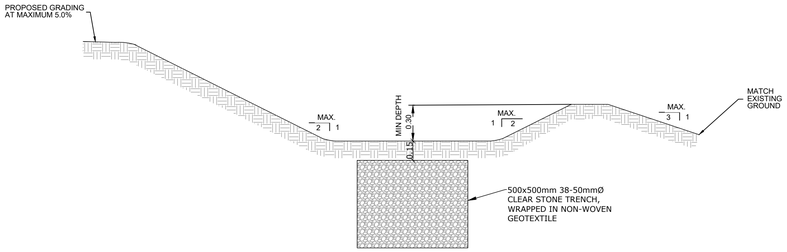
SECTION A-A

NOTES:
1. TEMPORARY "TRUCK ENTRANCE" SIGNS (TC-31) SHALL BE INSTALLED ON THE SHOULDER, 150M IN ADVANCE OF THE CONSTRUCTION ACCESS (NOTE: SEE DETAILS ON USE OF THESE SIGNS IN THE ONTARIO TRAFFIC MANUAL, BOOK 7.) THE APPLICANT WILL BE RESPONSIBLE FOR THE COST OF OBTAINING, ERECTING AND MAINTAINING THESE SIGNS
2. PURPOSE OF CONSTRUCTION MAT IS TO MINIMIZE TRANSPORTATION OF SEDIMENT ONTO ROADWAYS.
3. CONSTRUCTION MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ALTERATION PROCESS.
4. REGULAR MAINTENANCE (INCLUDING BUT NOT LIMITED TO: REMOVAL AND REPLACEMENT OF AGGREGATE) TO BE PROVIDED.



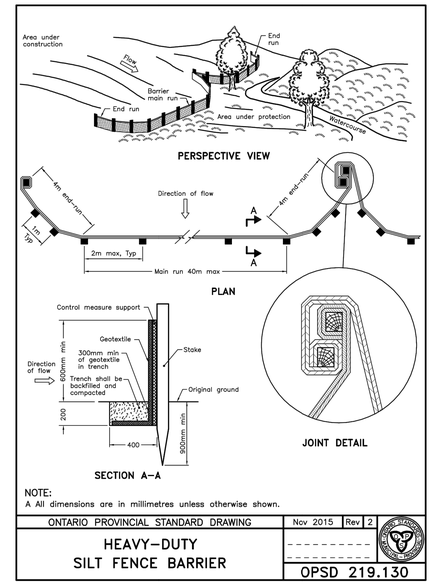
TYPICAL 0.3m DEEP ENHANCED SWALE c/w BERM AS NEEDED

NTS



TYPICAL 0.3m DEEP ENHANCED SWALE WITH 2:1 SIDESLOPES c/w BERM AS NEEDED

NTS

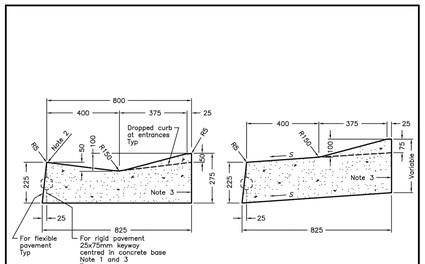


NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2

HEAVY–DUTY
SILT FENCE BARRIER

OPSD 219.130



LEGEND:
S – Rate of pavement superelevation in percent, %.

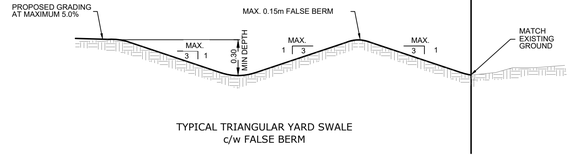
NOTES:
1 When curb and gutter is adjacent to concrete pavement or base, this drawing shall be used in conjunction with OPSD 552.010 and 552.020.
2 Flexible and composite pavement shall be placed 5mm above the adjacent edge of gutter.
3 For slipforming procedure a 5% batter is acceptable.

A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

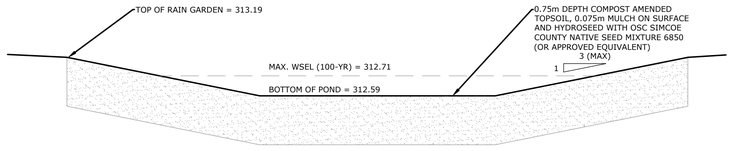
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2012 | Rev 2

CONCRETE MOUNTABLE CURB
WITH WIDE GUTTER

OPSD 600.030



TYPICAL TRIANGULAR YARD SWALE
c/w FALSE BERM



RAIN GARDEN DETAIL

NOT TO SCALE

PROPOSED RAIN GARDEN DETAILS

POND SIDESLOPES TO BE MAXIMUM 3:1 SLOPE

RAIN GARDEN BOTTOM AND SIDESLOPES TO BE CONSTRUCTED WITH
- 0.75m COMPOST AMENDED TOPSOIL
- 0.075mm MULCH ON SURFACE, AND HYDROSEED WITH OSC SIMCOE COUNTY NATIVE SEED MIXTURE 6850 (OR APPROVED EQUIVALENT)

TOP OF POND = 313.19
BOTTOM OF POND = 312.59
MAXIMUM WSEL, 100-YR = 312.71

RP 7R3069 PART 1, RP 7R5431 PART 1, AND PLAN 307, BLOCK B, PART LOT 9 CONCESSION 7 EHS W PT LOT 10 TOWNSHIP OF MULMUR

COUNTY OF DUFFERIN

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No	Revision	Date
1	ISSUED FOR APPROVALS	21/02/05

NOTES:

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LICENSED PROFESSIONAL ENGINEER
C/CAPES
100056104
FEB. 05/2021
PROVINCE OF ONTARIO

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CLARKSBURG, ON N0H 1J0
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936577 AIRPORT ROAD SELF STORAGE

Standard Details

Designed	Checked	Date	Drawing No.
B. COLLINS	C. CAPES	21/01/28	C7
Project No.		Rev No.	
2020-090		1	
Scale	0 5.0 10.0 20.0 30.0m		
1:500			

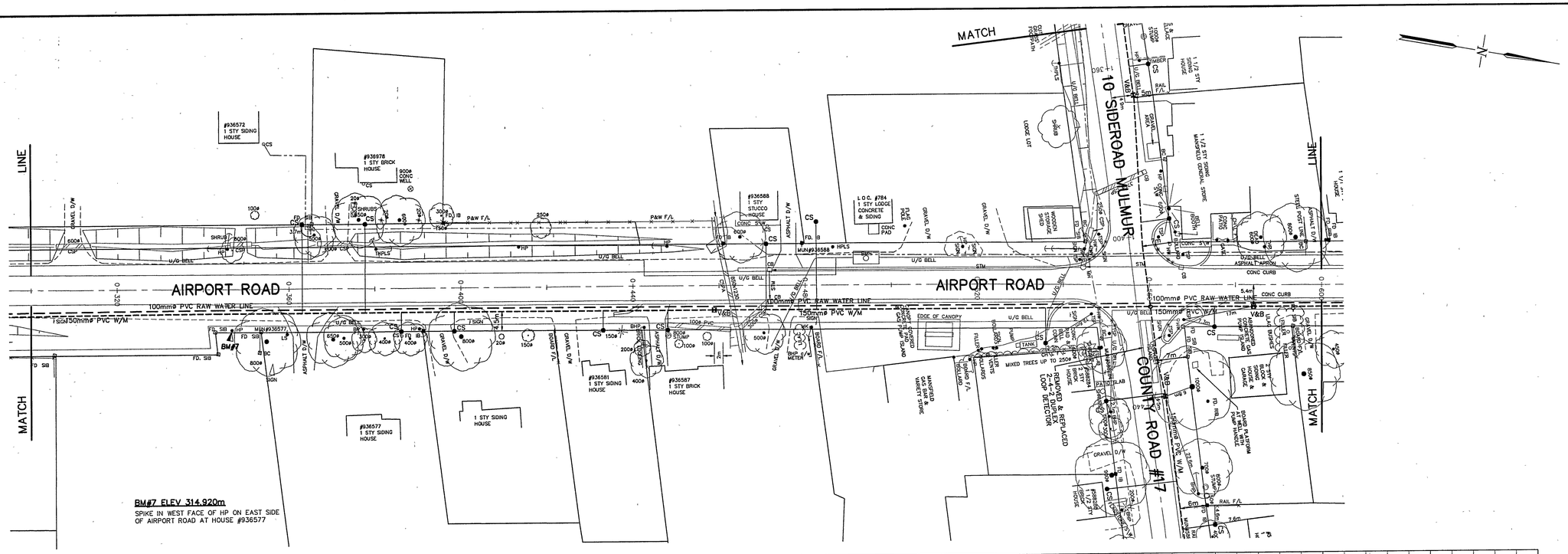
File: C:\SC\Capes Engineering Dropbox\Projects\2020\2020-090 Piaga Investments\2020-090 SC Plan.dwg Date Plotted: February 5, 2021 - 1:04 PM

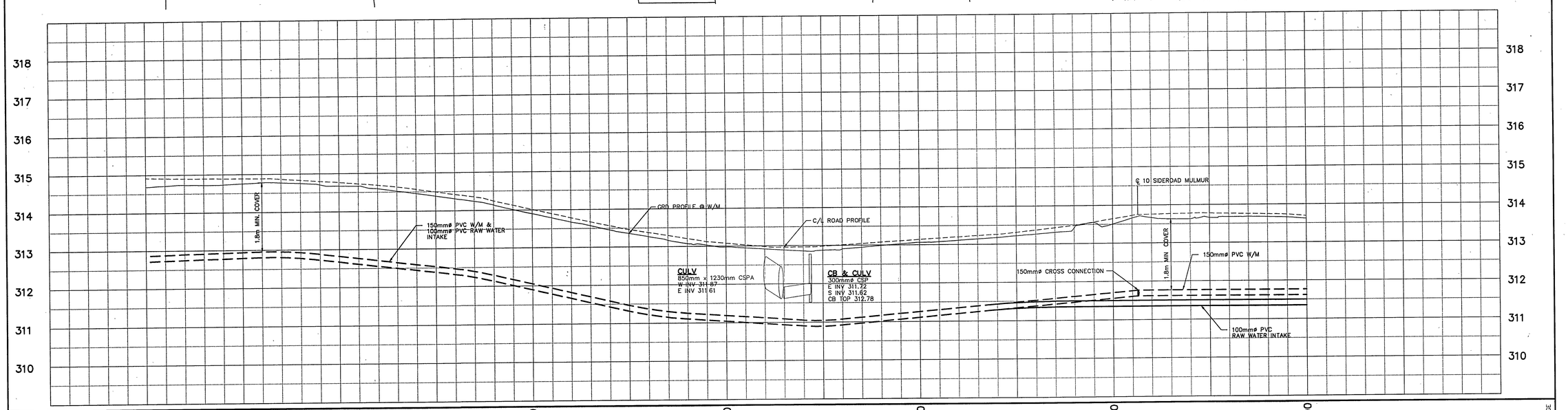
Appendices

Appendix A – Legal Plan

Legal Survey Provided for Owner for reference only.

Appendix B – Background Information





NOTES

REGISTERED PROFESSIONAL ENGINEER
W.J. BURNS
PROVINCE OF ONTARIO

NO.	REVISIONS	DATE	APP'D
1	ISSUED FOR MOE APPROVAL	JULY/04	M R
2	ISSUED FOR TENDER	OCT/04	M R.
3	REVISED AS CONSTRUCTED	NOV/06	P Bo.

MANSFIELD
WATER SUPPLY UPGRADE

CLIENT
TOWNSHIP OF MULMUR

TITLE
PLAN & PROFILE
AIRPORT ROAD
0+300 to 0+600

BURNSIDE
RJ Burnside & Associates Limited
15 Townline, Orangeville, Ontario L9W 3R4
telephone (519) 941-5331 fax (519) 941-8120

DRAWN D.B.	DRAWING NO. M-1346.2-6/P5
DESIGNED G.C.	SCALE HORIZ. 1:500 VERT. 1:50
DATE JULY 2003	ISSUED

XREF M1346-2-BASE.DWG M1346-2-P5.DWG

34

UTM Z E
5 R N
Elev. 5 R 1030
Basin 22
County or District Dufferin

The Ontario Water Resources Commission Act

WATER WELL RECORD

GROUND WATER BRANCH
17 No
DEC 19 1961
ONTARIO WATER RESOURCES COMMISSION

768

Township, Village, Town or City Mulmur
Con. VIII Lot 10 Date completed 10 (day) Oct (month) 1961 (year)
[redacted] dress Mansfield Ont.

Casing and Screen Record

Inside diameter of casing 30"
Total length of casing
Type of screen Well was Deeped using
Length of screen 22 inch Calvert stock.
Depth to top of screen
Diameter of finished hole

Pumping Test

Static level 10'
Test-pumping rate 1 G.P.M.
Pumping level
Duration of test pumping
Water clear or cloudy at end of test Clear
Recommended pumping rate 1 G.P.M.
with pump setting of feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Boxed H.L.E	0	12	10'	Fresh.
Sandy Brown Clay.	12	29		

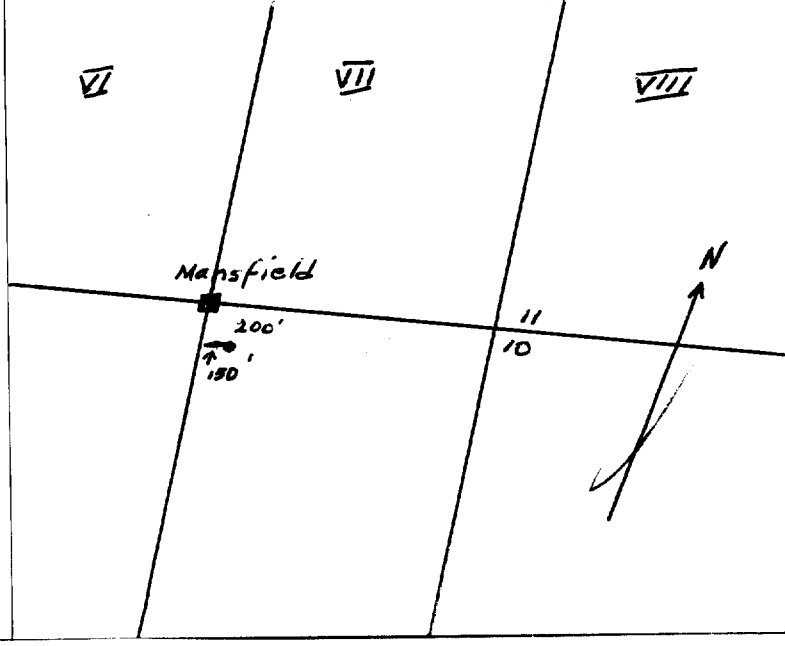
For what purpose(s) is the water to be used?
Greenhouse.
Is well on upland, in valley, or on hillside? Upland.
Drilling or Boring Firm Babuik Well Boring
Address 126 Laurel Ave. Islington, Ont.
Licence Number 8
Name of Driller or Borer Mike S. Babuik
Address Same as above.
Date Nov 30 1961
M S Babuik
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Appendix C – PCSWMM Existing Condition Model Output

Ontario IDF CURVE LOOKUP

Active coordinate

44° 15' 15" N, 80° 3' 14" W (44.254167,-80.054167)

Retrieved: Sat, 02 Jan 2021 23:27:13 GMT

Oops! Something went wrong.

This page didn't load Google Maps correctly. See the JavaScript console for technical details.

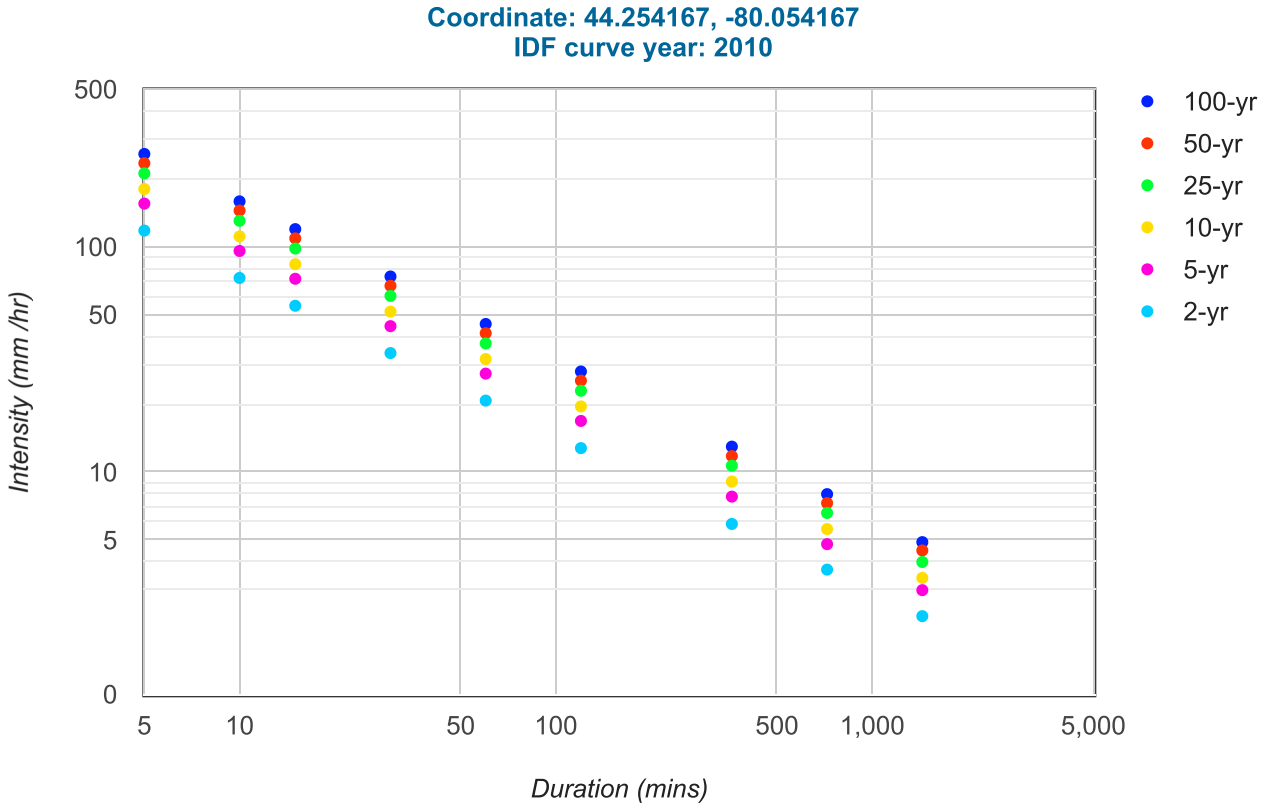
Location summary

These are the locations in the selection.

IDF Curve: 44° 15' 15" N, 80° 3' 14" W (44.254167,-80.054167)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 44° 15' 15" N, 80° 3' 14" W (44.254167,-80.054167)

Retrieved: Sat, 02 Jan 2021 23:27:13 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	20.8	27.4	31.8	37.3	41.4	45.5
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	118.1	72.8	54.8	33.8	20.8	12.8	5.9	3.7	2.3
5-yr	155.6	95.9	72.2	44.5	27.4	16.9	7.8	4.8	3.0
10-yr	180.6	111.3	83.8	51.6	31.8	19.6	9.1	5.6	3.4
25-yr	211.9	130.5	98.3	60.6	37.3	23.0	10.7	6.6	4.0
50-yr	235.2	144.9	109.1	67.2	41.4	25.5	11.8	7.3	4.5
100-yr	258.4	159.2	119.9	73.9	45.5	28.0	13.0	8.0	4.9

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	9.8	12.1	13.7	16.9	20.8	25.6	35.7	43.9	54.1
5-yr	13.0	16.0	18.1	22.2	27.4	33.8	47.0	57.9	71.3
10-yr	15.1	18.5	21.0	25.8	31.8	39.2	54.5	67.2	82.8
25-yr	17.7	21.8	24.6	30.3	37.3	46.0	64.0	78.8	97.1
50-yr	19.6	24.1	27.3	33.6	41.4	51.0	71.0	87.5	107.8
100-yr	21.5	26.5	30.0	36.9	45.5	56.1	78.0	96.1	118.4

Terms of Use

Existing Condition Catchment Plan - PCSWMM

Existing Condition - 100yr 24 hr SCS Type II Storm - PCSWMM Results

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 14
Number of subcatchments ... 3
Number of nodes ........... 4
Number of links ........... 2
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
------------------------------------------------------------------------
25mmChicago          25mmChicago                  INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr             INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr              INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr              INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr               INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr              INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr               INTENSITY    5 min.
SCS_Type_II_24hr_100yr SCS_Type_II_24hr_100yr       INTENSITY   15 min.
SCS_Type_II_24hr_10yr SCS_Type_II_24hr_10yr        INTENSITY   15 min.
SCS_Type_II_24hr_25yr SCS_Type_II_24hr_25yr        INTENSITY   15 min.
SCS_Type_II_24hr_50yr SCS_Type_II_24hr_50yr        INTENSITY   15 min.
SCS_Type_II_24hr_5yr SCS_Type_II_24hr_5yr          INTENSITY   15 min.
SCS_Type_II_24r_2yr  SCS_Type_II_24r_2yr           INTENSITY   15 min.
Timmins              Timmins                       CUMULATIVE  60 min.


********************
Subcatchment Summary
********************
Name                         Area     Width    %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
A1                           0.47     48.69      6.70    2.8000 SCS_Type_II_24hr_100yr J1
A2                           0.03     53.17      0.00    1.0000 SCS_Type_II_24hr_100yr A1
A3                           0.02      6.53    100.00    1.0000 SCS_Type_II_24hr_100yr J2
```

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	312.66	0.34	0.0	
J2	JUNCTION	314.21	0.29	0.0	
Airport	OUTFALL	314.20	0.00	0.0	
OF1	OUTFALL	312.65	0.00	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	4.8	0.2090	0.0100
C2	J2	Airport	CONDUIT	6.4	0.1572	0.0100

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C2	DUMMY	0.00	0.00	0.00	0.00	1	0.00

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES

```
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 01/02/2021 00:00:00
Ending Date .............. 01/04/2021 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.061	118.398
Evaporation Loss	0.000	0.000
Infiltration Loss	0.057	110.060
Surface Runoff	0.004	8.587
Final Storage	0.000	0.196
Continuity Error (%)	-0.377	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.004	0.045
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.004	0.045
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000

Final Stored Volume 0.000 0.000
Continuity Error (%) 0.000

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %
3.155 - 1.991 sec : 0.00 %
1.991 - 1.256 sec : 0.00 %
1.256 - 0.792 sec : 0.00 %
0.792 - 0.500 sec : 0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	118.40	0.58	0.00	114.59	7.84	4.63	4.63	0.02	0.04	0.039
A2	118.40	0.00	0.00	111.37	0.00	8.45	8.45	0.00	0.01	0.071
A3	118.40	0.00	0.00	0.00	116.87	0.00	116.87	0.02	0.01	0.987

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.00	0.00	312.66	0 00:00	0.00
J2	JUNCTION	0.00	0.00	314.21	0 00:00	0.00
Airport	OUTFALL	0.00	0.00	314.20	0 00:00	0.00
OF1	OUTFALL	0.00	0.00	312.65	0 00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	0.037	0.037	0 12:00	0.0217	0.0217	0.000
J2	JUNCTION	0.008	0.008	0 12:00	0.0229	0.0229	0.000
Airport	OUTFALL	0.000	0.008	0 12:00	0	0.0229	0.000
OF1	OUTFALL	0.000	0.037	0 12:00	0	0.0217	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J1	JUNCTION	48.00	0.000	0.340
J2	JUNCTION	48.00	0.000	0.290

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Airport	46.81	0.000	0.008	0.023
OF1	0.86	0.015	0.037	0.022
System	23.83	0.015	0.045	0.045

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	DUMMY	0.037	0 12:00			
C2	DUMMY	0.008	0 12:00			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

```
*************************
Conduit Surcharge Summary
*************************

No conduits were surcharged.


Analysis begun on:  Tue Feb  2 09:45:39 2021
Analysis ended on:  Tue Feb  2 09:45:39 2021
Total elapsed time: < 1 sec
```

Appendix D – PCSWMM Proposed Condition Model Output

Appendix E – Fire Flow Calculations and Tank Information

Post Development PCSWMM Model View

Post Development 25 mm 4 Hr Chicago Storm Event - PCSWMM Output

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link C6

*************
Element Count
*************
Number of rain gages ...... 14
Number of subcatchments ... 3
Number of nodes ........... 4
Number of links ........... 2
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
------------------------------------------------------------------------
25mmChicago          25mmChicago                  INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr             INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr              INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr              INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr               INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr              INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr               INTENSITY    5 min.
SCS_Type_II_24hr_100yr SCS_Type_II_24hr_100yr       INTENSITY   15 min.
SCS_Type_II_24hr_10yr SCS_Type_II_24hr_10yr        INTENSITY   15 min.
SCS_Type_II_24hr_25yr SCS_Type_II_24hr_25yr        INTENSITY   15 min.
SCS_Type_II_24hr_50yr SCS_Type_II_24hr_50yr        INTENSITY   15 min.
SCS_Type_II_24hr_5yr SCS_Type_II_24hr_5yr          INTENSITY   15 min.
SCS_Type_II_24r_2yr  SCS_Type_II_24r_2yr           INTENSITY   15 min.
Timmins              Timmins                       CUMULATIVE  60 min.


********************
Subcatchment Summary
********************
Name                         Area     Width    %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
A1                           0.47     48.96     73.00    1.0000 25mmChicago          RG1
A2                           0.03     53.17      0.00    1.0000 25mmChicago          A1
```

A3	0.02	5.73	100.00	1.0000	25mmChicago	J2	

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
A1	LID1	1	354.00	3.00	7.53	100.00	93.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J2	JUNCTION	314.21	0.29	0.0	
Airport	OUTFALL	314.20	0.00	0.0	
Open_Space	OUTFALL	312.74	0.30	0.0	
RG1	STORAGE	312.59	0.60	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C2	J2	Airport	CONDUIT	6.4	0.1572	0.0100
C6	RG1	Open_Space	CONDUIT	10.4	1.4469	0.0300

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C6	TRAPEZOIDAL	0.30	0.57	0.20	2.80	1	0.77

****
NOTE: The summary statistics displayed in this report are

based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/02/2021 00:00:00
Ending Date 01/04/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.001500 m

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.013	24.999
Evaporation Loss	0.000	0.000
Infiltration Loss	0.012	23.102
Surface Runoff	0.000	0.789
Final Storage	0.001	1.289
Continuity Error (%)	-0.724	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.004
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.000	0.004
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	4.50 sec
Average Time Step	:	5.00 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00
Time Step Frequencies	:	
5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	25.00	0.00	0.00	23.82	15.65	0.33	0.02	0.00	0.00	0.001
A2	25.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.000
A3	25.00	0.00	0.00	0.00	23.17	0.00	23.17	0.00	0.00	0.927

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
A1	LID1	29.10	0.00	29.10	0.00	0.00	0.00	0.00	-0.00

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J2	JUNCTION	0.00	0.00	314.21	0 00:00	0.00
Airport	OUTFALL	0.00	0.00	314.20	0 00:00	0.00
Open_Space	OUTFALL	0.00	0.00	312.74	0 00:00	0.00
RG1	STORAGE	0.00	0.00	312.59	0 01:50	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent

J2	JUNCTION	0.003	0.003	0	01:40	0.00399	0.00399	0.000	
Airport	OUTFALL	0.000	0.003	0	01:40	0	0.00399	0.000	
Open_Space	OUTFALL	0.000	0.000	0	00:00	0	0	0.000	ltr
RG1	STORAGE	0.000	0.000	0	01:50	0.000109	0.000109	-0.003	

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J2	JUNCTION	48.00	0.000	0.290

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
RG1	0.000	0	0	100	0.000	0	0 01:50	0.000

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CMS	CMS	10^6 ltr
Airport	6.49	0.000	0.003	0.004
Open_Space	0.00	0.000	0.000	0.000
System	3.25	0.000	0.003	0.004

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C2	DUMMY	0.003	0 01:40			
C6	CONDUIT	0.000	0 00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C6	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Feb 5 14:56:09 2021
Analysis ended on: Fri Feb 5 14:56:10 2021
Total elapsed time: 00:00:01

Post Development - 100 Year 24 Hr SCS Type II Storm - PCSWMM Output

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link C6

*************
Element Count
*************
Number of rain gages ...... 14
Number of subcatchments ... 3
Number of nodes ........... 4
Number of links ........... 2
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
------------------------------------------------------------------------
25mmChicago          25mmChicago                  INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr             INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr              INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr              INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr               INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr              INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr               INTENSITY    5 min.
SCS_Type_II_24hr_100yr SCS_Type_II_24hr_100yr       INTENSITY   15 min.
SCS_Type_II_24hr_10yr SCS_Type_II_24hr_10yr        INTENSITY   15 min.
SCS_Type_II_24hr_25yr SCS_Type_II_24hr_25yr        INTENSITY   15 min.
SCS_Type_II_24hr_50yr SCS_Type_II_24hr_50yr        INTENSITY   15 min.
SCS_Type_II_24hr_5yr SCS_Type_II_24hr_5yr          INTENSITY   15 min.
SCS_Type_II_24r_2yr  SCS_Type_II_24r_2yr           INTENSITY   15 min.
Timmins              Timmins                       CUMULATIVE  60 min.


********************
Subcatchment Summary
********************
Name                         Area     Width    %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
A1                           0.47     48.96     73.00    1.0000 SCS_Type_II_24hr_100yr RG1
A2                           0.03     53.17      0.00    1.0000 SCS_Type_II_24hr_100yr A1
```

A3 0.02 5.73 100.00 1.0000 SCS_Type_II_24hr_100yr J2

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
A1	LID1	1	354.00	3.00	7.53	100.00	93.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J2	JUNCTION	314.21	0.29	0.0	
Airport	OUTFALL	314.20	0.00	0.0	
Open_Space	OUTFALL	312.74	0.30	0.0	
RG1	STORAGE	312.59	0.60	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C2	J2	Airport	CONDUIT	6.4	0.1572	0.0100
C6	RG1	Open_Space	CONDUIT	10.4	1.4469	0.0300

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C6	TRAPEZOIDAL	0.30	0.57	0.20	2.80	1	0.77

****
NOTE: The summary statistics displayed in this report are

based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 01/02/2021 00:00:00
Ending Date 01/04/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	0.061	118.398
Evaporation Loss	0.000	0.000
Infiltration Loss	0.058	112.057
Surface Runoff	0.003	5.982
Final Storage	0.001	1.290
Continuity Error (%)	-0.787	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**********	---	---

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.003	0.031
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.002	0.020
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.001	0.011
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	4.50 sec
Average Time Step	:	5.00 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00
Time Step Frequencies	:	
5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	118.40	0.57	0.00	116.20	79.37	33.29	2.33	0.01	0.01	0.020
A2	118.40	0.00	0.00	111.37	0.00	8.45	8.45	0.00	0.01	0.071
A3	118.40	0.00	0.00	0.00	116.87	0.00	116.87	0.02	0.01	0.987

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
A1	LID1	529.46	0.00	529.46	0.00	0.00	0.00	0.00	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J2	JUNCTION	0.00	0.00	314.21	0 00:00	0.00
Airport	OUTFALL	0.00	0.00	314.20	0 00:00	0.00
Open_Space	OUTFALL	0.00	0.00	312.74	0 00:00	0.00
RG1	STORAGE	0.00	0.12	312.71	0 12:14	0.12

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent

J2	JUNCTION	0.007	0.007	0	12:00	0.0201	0.0201	0.000	
Airport	OUTFALL	0.000	0.007	0	12:00	0	0.0201	0.000	
Open_Space	OUTFALL	0.000	0.000	0	00:00	0	0	0.000	ltr
RG1	STORAGE	0.010	0.010	0	12:00	0.011	0.011	-0.020	

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J2	JUNCTION	48.00	0.000	0.290

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
RG1	0.000	0	0	100	0.007	13	0 12:14	0.002

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CMS	CMS	10^6 ltr
Airport	46.72	0.000	0.007	0.020
Open_Space	0.00	0.000	0.000	0.000
System	23.36	0.000	0.007	0.020

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C2	DUMMY	0.007	0 12:00			
C6	CONDUIT	0.000	0 00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C6	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Feb 5 14:41:27 2021
Analysis ended on: Fri Feb 5 14:41:27 2021
Total elapsed time: < 1 sec

CAPES ENGINEERING

Fire Protection Water Supply/Storage

Project: **Piaga Investments Ltd.**
936577 Airport Rd.

Prepared by:	C. Capes
Checked by:	C. Capes
Project No:	2020-090B
Date:	February 5, 2021

Fire Flow Calculations

Office of the Fire Marshal, OFM Guideline, Fire Protection Water Supply Guideline for Part 3 in the Ontarion Building Code (Oct 1999)
Subsection 3.2.2 of the Ontario Building Code, 2012

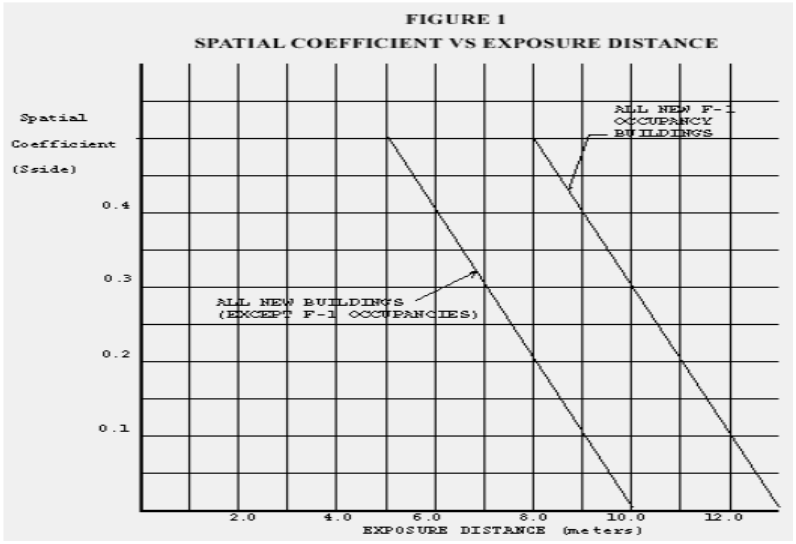
$Q=KVS_{Total}$ where

Q = Minimum supply of water in Litres (L)
K = water supply coefficient from Table 1
V = total building volume in cubic meters
S_{Tot} = total of the spacial coefficient values from the property line exposures on all sides as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + \ldots \text{etc.}]$$

where S_{Side} values are obtained from Figure 1, as modified by Sections 6.39(e) and 6.3(f) of the OBC Guideline
S_{Tot} need not exceed 2.0

FIGURE 1
SPATIAL COEFFICIENT VS EXPOSURE DISTANCE



1 Building Classification:

Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.

Water Supply Coefficient - K — Table 1 of OBC A.3.2.5.7

K = 17 — Type F2, OBC Table 3.1.2.1

2 Building Volumes

Bldg.	Area (m^2)	Height (m)	Volume (m^3)	
Bldg. 1	445.91	3.00	1337.7	Phase 1
Bldg. 2	390.31	3.00	1170.9	Future Phase
Bldg. 3	278.59	3.00	835.8	Future Phase
Total			**3344.4**	← Total Building Volume

3 Exposure Distances $S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + \ldots \text{etc.}]$

Bldg.	North	S_{Side} (N)	East	S_{Side} (E)	South	S_{Side} (S)	West	S_{Side} (W)	S_{Tot}	
	(m)		(m)		(m)		(m)			
Bldg. 1	>10 m	0.00	6.00	0.4	>10 m	0	>10 m	0	**0.4**	
Bldg. 2	>10 m	0.00	6.00	0.4	>10 m	0	6.00	0.4	**0.8**	← Max S_{Tot}
Bldg. 3	>10 m	0.00	>10 m	0	>10 m	0	6.00	0.4	**0.4**	

S_{Tot} = 1.80 — Max. Value = 2.0

4 **Minimum Fire Water Supply**

$Q=KVS_{Total}$ = **102339.558** Litres

5 **Fire Water Supply Flow Rate** = **2700** L/min — Table 2 Required Minimum Water Supply Flow Rate (L/min), provided in the OBC A.3.2.5.7

= **45.00** L/s

6 **Min. Tank Size @ 30 min. of Flow** = **81,000** L