

THE CORPORATION OF THE TOWN OF AMHERSTBURG

BY-LAW NO. 2009-76

A by-law to authorize the signing of an Amending Development Agreement.

WHEREAS Timberwolf Trading Inc. has proposed the redevelopment of property at 7781 Howard Avenue for use as a pallet manufacturing/recycling facility;

AND WHEREAS the Council of the Town of Amherstburg and owners of the said property have agreed to the terms and conditions of an Amending Development Agreement in the form annexed hereto;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF AMHERSTBURG HEREBY ENACTS AS FOLLOWS:

1. That the Mayor and Clerk be and they are hereby authorized to execute the original and copies of an Amending Development Agreement in the form annexed hereto and affix the Corporate Seal thereto.
2. That any bylaws inconsistent with this bylaw are hereby repealed.
3. This By-law shall come into force and effect on the date of final passage hereof.

Read a first, second and third time and finally passed this 26th day of October, 2009.

Certified True Copy of
the original document.

B. Percay
Clerk
Town of Amherstburg
Date: October 30, 2009

Wayne Hurst
Mayor- Wayne Hurst
B. Percay
Clerk- Brenda Percay

AMENDING DEVELOPMENT AGREEMENT

Registered _____, 2009

THIS AGREEMENT made in triplicate this 26th day of October, 2009.

BETWEEN: TIMBERWOLF TRADING INC.

hereinafter called the "OWNER"
OF THE FIRST PART

-and-

**THE CORPORATION OF THE TOWN OF
AMHERSTBURG**

hereinafter called the "CORPORATION"
OF THE SECOND PART

WHEREAS the lands affected by this Agreement are described in Schedule "A" attached hereto, and are hereinafter referred to as the "said lands";

AND WHEREAS the Owner warrants it is the registered owner of the said lands;

AND WHEREAS, in this Agreement the "Owner" includes an individual, an association, a partnership or corporation and, wherever the singular is used therein, it shall be construed as including the plural;

AND WHEREAS the Official Plan in effect designated parts of the area covered by the Official Plan as a Site Plan Control area;

AND WHEREAS the Corporation passed Bylaw 2000-11 on February 28, 2000 providing for the execution of a 'Development Agreement for a transport terminal on the subject property;

AND WHEREAS the Owner is requesting to amend the Development Agreement to redevelop the said lands for a pallet manufacturing/recycling facility and to construct a warehousing building on the said lands in accordance with the Site Plan attached hereto as Schedule "B" and hereafter referred to as the "Site Plan";

AND WHEREAS the Corporation as a condition of redevelopment of the said lands requires the Owner to enter into a Development Agreement;

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of other goods and valuable consideration and the sum of FIVE (\$5.00) DOLLARS of lawful money of Canada, now paid by each of the parties hereto to each of the other parties hereto, (the receipt of which is hereby acknowledged), the Owner hereby covenants and agrees with the Corporation as follows:

1. The following Schedules, which are identified by the signatures of the parties to this Agreement, and which are attached hereto, are hereby made a part of this Agreement as fully and to all intents and purposes as though recited in full herein:

SCHEDULE "A" – Legal description of the said lands
SCHEDULE "B" – Site Plan
SCHEDULE "C" – Stormwater Management Assessment

2. Schedule "A" hereto describes the lands affected by this Agreement.

3. Schedule "B" hereto shows:
 - (a) The location of all buildings and structures to be erected;
 - (b) The location and provision of off-street vehicular loading and parking facilities and access driveways including driveways for emergency vehicles;
 - (c) Walkways and all other means of pedestrian access;
 - (d) The location and provision for the collection and storage of garbage and other waste materials.
 - (e) Existing landscaped areas
 - (f) Outside storage for pallets and lumber
 - (g) Site servicing
4. Schedule "C" hereto shows;
 - (a) Stormwater Management Assessment Report
5. The Owner shall be responsible for consulting with and obtaining any necessary approvals from Hydro One, Union Gas and Bell Canada regarding any matters that relate to services provided by Hydro One, Union Gas and Bell Canada.
6. The Owner shall be responsible for consulting with and obtaining any necessary approvals from the Ministry of the Environment and the Essex Region Conservation Authority.
7. All parking or loading areas and lanes and driveways shall be paved with asphalt or a concrete Portland cement or other material capable of permitting accessibility under all climatic conditions, as shown on Schedule "B" and together with crushed stone, slag, gravel, crushed brick, tile, cinders or like materials, having a combined depth of at least 15.2 cm and with provisions for drainage facilities.
8. The Owner shall maintain a minimum of parking spaces, as designated on Schedule "B".
9. All walkways on the said lands, where so designated on Schedule "B", shall be constructed of either concrete or interlocking paving stone by the Owner to the satisfaction of the Corporation.
10. If any curbs, sidewalks, boulevards or highway surfaces of the Corporation are damaged during the development by the Owner, such damage shall be repaired or replaced by the Owner.
11. Snow removal from the parking or loading areas and lanes, driveways and walkways shall be the responsibility of the Owner.
12. The Owner shall install and maintain a system for the disposal of storm and surface water as indicated on Schedule "B" so that no such water will flow along the surface from the said lands onto any adjoining lands. All storm and surface water disposal systems shall be to the satisfaction of the Corporation's Engineer.
13. Any garbage or refuse that is stored outside shall be stored in a non-combustible container and maintained so that the garbage or refuse does not blow or fall out of the container.
14. Any and all lighting shall be installed and maintained so as to not, in the opinion of the Corporation, interfere with the use or enjoyment of adjacent properties or with the safe flow of traffic on abutting or adjacent streets.

15. The Owner shall maintain the existing plants and ground cover on those lands as shown on Schedule "B". The Owner agrees that the site will be inspected on an annual basis and any deficiencies will require immediate correction in accordance with the approved site plan.
16. All driveways for emergency vehicles shall:
 - (1) Be connected with a public thoroughfare;
 - (2) Be designed and constructed to support expected loads imposed by firefighting equipment;
 - (3) Be surfaced with concrete, asphalt or other material capable of permitting accessibility under all climatic conditions;
 - (4) Have a clear width of 3 metres at all times;
 - (5) Be located not less than 3 metres and not more than 15.2 metres measured horizontally and at right angles from the face of the building;
 - (6) Have an overhead clearance not less than 4.5 metres;
 - (7) Have a change in gradient of not more than 1 in 12.5 over a minimum distance of 15.2 metres; and
 - (8) Have approved signs displayed to indicate the emergency route.
17. If the Ontario Building Code requires that an architect or professional engineer or both shall be responsible for the field review of any new building or extension provided for in this Agreement, the Owner shall not occupy or use or permit to be occupied or used any said new building or extension until after an architect or professional engineer has given to the Corporation a letter addressed to the Corporation and signed by him certifying that all services on or in the said lands, required for this development or redevelopment, newly installed by the Owner in connection with this development or redevelopment and not contained within a building, have been installed and completed in a manner satisfactory to the architect or professional engineer.
18. The Corporation through its servants, officers and agents including its building inspector, plumbing inspector, fire chief, public works head and municipal engineer may from time to time and at any time enter on the premises of the Owner to inspect:
 - (1) The progress of development;
 - (2) The state of maintenance as provided for in this Agreement.
19. In the event of any servant, officer or agent of the Corporation determining upon inspection the development is not proceeding in strict accord with the plans and specifications filed, such servant, officer or agent shall forthwith place a notice requiring all work to be stopped upon the premises and forward a copy by registered mail to the Owner at his last address as shown by the revised assessment rolls, and the Owner shall forthwith correct the deficiency or deviation.
20. In the event of any servant, officer or agent of the Corporation upon inspection being of the opinion that the state of maintenance is not satisfactory, such servant, officer or agent shall forthwith forward notice of such opinion to the Owner by registered mail at his last address as shown from the revised assessment rolls, and the Owner shall forthwith correct the deficiency or appeal to Council of the Corporation as hereinafter provided.
21. In the event that an Owner should disagree with the opinion of the servant, officer or agent of the Corporation as to the state of maintenance, such Owner shall appear before Council of the Corporation, which after hearing the Owner, shall express its opinion as to whether the maintenance is satisfactory by resolution, which shall constitute a final determination of the matter.

22. In the event that an Owner should fail to obey a stop work order issued under Section 19 hereof, the Owner recognizes the right of the Corporation to apply to the Courts for a restraining order.
23. In the event that an Owner should fail to correct a deviation or deficiency after notice pursuant to Section 20 or after notice of an opinion, which Council of the Corporation determines is correct under Section 21; the Council of the Corporation may by law direct or default of the matter or thing being done by the Owner, after two (2) weeks notice to it by registered mail at the last shown address of the Owner pursuant to the revised assessment rolls of passage of such by-law, that such matter or thing be done by the Corporation at the expense of the Owner, which expense may be recovered by action or like manner as municipal taxes.
24. In the event of an Owner wishing to change at any time any of the buildings, structures or facilities described in the plans annexed or referred to in Section 3 hereof, it shall make application to Council of the Corporation for approval and shall not proceed with such change until approval is given by such Council, or in default by the Ontario Municipal Board, under the procedure set out in Section 41 of the Planning Act, R.S.O. 1990 herebefore referred to.
25. This Agreement and the provisions thereof do not give to the Owner or any person acquiring any interest in the said lands any rights against the Corporation with respect to the failure of the Owner to perform or fully perform any of its obligations under this Agreement or any negligence of the Owner in its performance of the said obligations.
26. In the event that no construction on the said lands has commenced within one (1) year from the date of registration of this Agreement, the Corporation may, at its option, on one month's notice to the Owner, declare this Agreement to be subject to re-negotiation, whereupon the Owner agrees that it will not undertake any construction on the said lands until this Agreement has been re-negotiated.
27. All facilities and matters required by this Agreement shall be provided and maintained by the Owner at its sole risk and expense to the satisfaction of the Corporation and in accordance with the standards determined by the Corporation and in default thereof and without limiting other remedies available to the Corporation, the provisions of Section 446 of The Municipal Act shall apply.
28. A financial guarantee (certified cheque or irrevocable letter of credit – self renewing without burden of proof) for 50% of the value of on-site improvements exclusive of buildings and structures is required as part of the site plan agreement. The Owner's engineer is required to provide a certified estimate of the cost of the on-site work for consideration and approval by the Town's Public Works Manager. Once the Town has inspected and approved the construction of the on-site works, the Owner will be required to provide security for a one year maintenance period in the amount of 15% of the cost of the on-site improvements.

29. This Agreement shall be registered against the land to which it applies, at the expense of the Owner, and the Corporation shall be entitled, subject to the provisions of The Registry Act and The Land Titles Act, to enforce its provisions against the Owner named herein and any and all subsequent owners of the land.

IN WITNESS WHEREOF the Owner executed this Agreement.

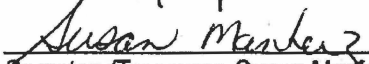
OWNER: TIMBERWOLF TRADING INC.



President/Director - Thomas Manherz



Vice-President/Director - Kevin Murray



Secretary/Treasurer - Susan Manherz

**THE CORPORATION OF THE
TOWN OF AMHERSTBURG**



Mayor - Wayne Hurst



Clerk - Brenda Percy


Authorized and approved by By-law No. 2009-76
enacted the 26th day of October, 2009.

SCHEDULE "A"

The following is a description of the land to which this instrument applies:

Part of Lot 11, Concession 7,
designated as Part 1,
Plan 12R-17827
(Geographic Township of Anderdon)
Town of Amherstburg
County of Essex
Province of Ontario

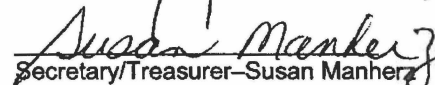
OWNER: **TIMBERWOLF TRADING INC.**



President/Director – Thomas Manherz

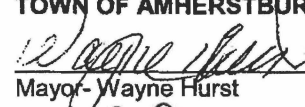


Vice-President/Director – Kevin Murray

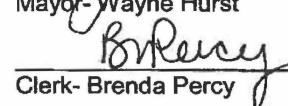


Secretary/Treasurer – Susan Manherz

**THE CORPORATION OF THE
TOWN OF AMHERSTBURG**



Mayor – Wayne Hurst



Clerk – Brenda Percy

ESSEX COUNTY ROAD 9 (HOWARD AVENUE)

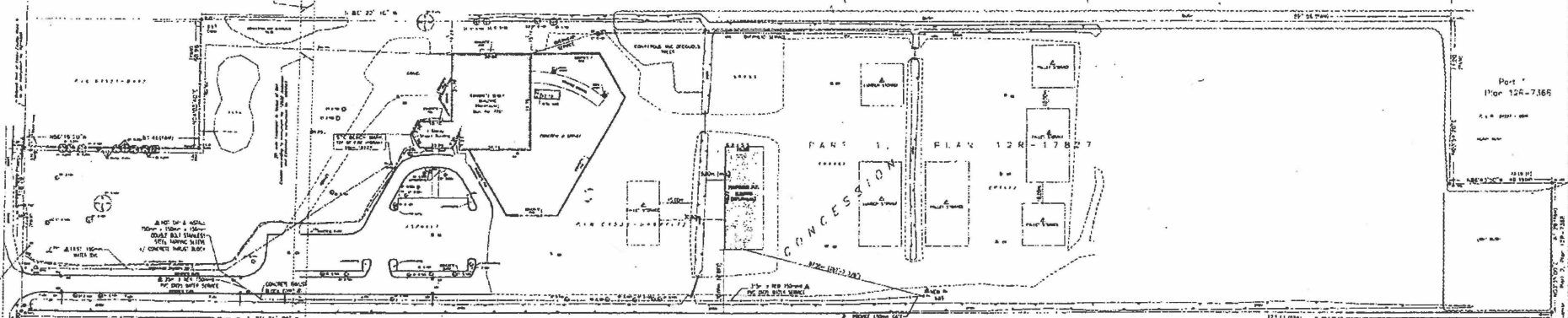
ELEVATIONS
 FINISHED GRADE ON THIS PLAN IS SHOWN IN DECIMAL FEET
BELOW - MARK
 GRADE OF ADJACENT PUBLIC HIGHWAY OR WATERWAY - ADJUSTED TO CORNER
 ELEVATION AS SHOWN ON MAPS, RECORDS, FIELD SURVEY AND
 RECORDS OF ADJACENT PROPERTY OWNERS
NOTE - SEE MAPS
 OF THIS PLAN

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PLAN 12R-1522



Page 1
Plan 12R-7365

CADASTRAL
 INFORMATION FOR THE PURPOSES OF THIS PLAN IS TAKEN FROM THE CADASTRAL MAPS OF THE TOWN OF AMHERSTBURG.

NOTICE
 THIS PLAN IS SUBJECT TO THE TOWN OF AMHERSTBURG ZONING BY-LAW 2009-76.

SCHEDULE "B" TO BY-LAW 2009-76

TIMBERWOLF TRADING INC.

Thomas Manherz
 President/Director - Thomas Manherz

Kevin Murray
 Vice-President/Director - Kevin Murray

Susan Manherz
 Secretary/Treasurer - Susan Manherz

TOWN OF AMHERSTBURG

Wayne Hurst
 MAYOR WAYNE HURST

Brenda Perry
 CLERK - BRENDA PERRY

PERSONAL SURVEY COMPLETED BY:
 VERHAEGEN STUBBERFF, D. HARTLEY/BREWER BEZARD INC.
 187 TALBOT STREET EAST, LAMINGTON, ONTARIO M5H 1L6
 TEL: (519) 322-2375
 FAX: (519) 322-7675
 PLAN FILE NO. - 449

APPROVAL	ISSUED FOR	DATE
CITY APPROVAL/BUILDING PERMIT	OPENED OPEN STORAGE	SEPT 2/09
COUNCIL	PROPOSED NEW FIRE HYDRANT	SEPT 14/09

AIRB
 AMERICAN INDEPENDENT REGISTERED BROTHERHOOD OF FIRE INSURERS
 1017 GERRARD STREET EAST, SUITE 100
 TORONTO, ONTARIO M4M 1B7
 TEL: (416) 461-1111
 FAX: (416) 461-1112

FOR
 TIMBERWOLF FOREST PRODUCTS

SEE PLAN

Y.C. LIU ENGINEERING
 40 SPADINA STREET
 TORONTO, ONTARIO M5S 2R2
 TEL: (416) 593-8822
 FAX: (416) 593-8822

DATE: 09/14/09
 DRAWN BY: YCL
 CHECKED BY: YCL
 SCALE: AS SHOWN
 PROJECT NO: 09-001



Y.C. LIU ENGINEERING

(c.o.b. 1147055 Ontario Inc.)

48 Centre Street, Chatham, Ontario Canada N7M 4W2

SCHEDULE "C" TO BY-LAW 2009-76

TIMBERWOLF TRADING INC.

President/Director - Thomas Manherz

Vice-President/Director - Kevin Murray

Secretary/Treasurer - Susan Manherz

TOWN OF AMHERSTBURG

MAYOR WAYNE HURST

CLERK- BRENDA PERCY

02 September 2009

Planning Department/Engineering Department
Town of Amherstburg
271 Sandwich Street South
Amherstburg, ON
N9V 2A5

RE: Stormwater Management for a new 891.5sq.m. Post Frame Building for Timberwolf Forest Products, located at 7781 Howard Avenue, Town of Amherstburg.

Dear Sir/Madam,

This report presents the results of a stormwater management assessment carried out for a new 891.5sq.m. Post Frame Building for Timberwolf Forest Products on a 9.1ha (22.5ac) property at the above-referenced site.

The existing site currently consists of a 1,952sq.m. main building and 52sq.m. accessory building. The main parking area closest to the existing main building is asphalted (6,133sq.m.), while the remainder of the parking on-site is gravelled (27,320sq.m.). The remainder of the lot is grassed landscaping, which comprises of approximately 60% of the entire lot (55,543sq.m.). The proposed changes to the lot are to add an 891.5sq.m. post frame building in one of the grassed areas near the centre of the lot.

Since the proposed building will be located on a portion of the existing grass, the total grassed area will be reduced to 54,651.5sq.m., while the building area will be increased to a total of 2,895.5sq.m. The gravelled area, as well as the asphalted area will remain unchanged.

The site currently has fourteen (14) catchbasins that collect the water and direct it to a perimeter swale. This perimeter swale collects all of the water from the site and directs it to the municipal drain. The perimeter swale runs nearly the entire length of the lot on the South side (680m), and runs well past the last gravel parking area on the North side (300m). All water on-site is directed towards these catchbasins and swales with the exception of a portion of the East side of the lot. This area is currently grassed and has not been altered in any way since the lot has been developed, and therefore has kept its original grading.

The modifications to the site have changed the weighted stormwater run-off coefficient from 0.45 to 0.46. These modifications increased the total required storage volume from 1,569cu.m. to 1,617cu.m. of water for the post-development 100-year design storm. The new development increased the total stormwater storage volume a total of 48cu.m., which is only a 3.0% increase

EXISTING STORMWATER CALCULATIONS

TABLE 1 - IDF CURVE DATA -WINDSOR AIRPORT AES DATA

WINDSOR AIRPORT AES DATA

Using the equation: $R=aT^b$

Return Period	Coefficients	
	a	b
2-Yr	25.0	-0.712
5-Yr	32.0	-0.712
10-Yr	36.7	-0.712
25-Yr	42.6	-0.712
50-Yr	47.0	-0.712
100-YR	51.4	-0.712

Time (min)	Time (T) (hrs)	Rainfall Intensity (R) (mm/hr)					
		2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5	0.08	146.7	187.7	215.3	249.9	275.7	301.5
10	0.17	89.5	114.6	131.4	152.6	168.3	184.1
15	0.25	67.1	85.9	98.5	114.3	126.1	137.9
20	0.33	54.7	70.0	80.2	93.1	102.8	112.4
30	0.50	41.0	52.4	60.1	69.8	77.0	84.2
35	0.58	36.7	47.0	53.9	62.5	69.0	75.4
40	0.67	33.4	42.7	49.0	56.9	62.7	68.6
45	0.75	30.7	39.3	45.0	52.3	57.7	63.1
50	0.83	28.5	36.4	41.8	48.5	53.5	58.5
55	0.92	26.6	34.0	39.0	45.3	50.0	54.7
60	1	25	32	36.7	42.6	47	51.4

TABLE 2 : C- Factor Weighting and Areas

PRE-DEVELOPMENT - assuming no existing development

Runoff Coefficient (C_g):	0.3	unitless
Total Area (m^2):	91005	m^2
Total Area (ha):	9.10	ha

POST-DEVELOPMENT

Grass Area (A_{g1}):	55543	m^2
Grass Runoff Coefficient (C_g):	0.25	unitless
Impervious (ie. Asphalt, Building, Concrete) Area (A_{it}):	8137	m^2
Impervious Runoff Coefficient (C_i):	1.00	unitless
Gravel Area (A_{gr1}):	27320	m^2
Gravel Runoff Coefficient (C_{gr}):	0.70	unitless
Weighted Runoff Coefficient (C_1):	0.45	unitless
	$C_1 = (A_{g1} * C_g + A_{gr1} * C_{gr} + A_{it} * C_i) / (A_{g1} + A_{gr1} + A_{it})$	
Total Area (m^2):	91005	m^2
Total Area (ha):	9.10	ha

TABLE 3 - PREDEVELOPMENT FLOW REQUIREMENTS (2-YR) & PIPE/ORIFICE SIZE

Using the 2-year Windsor Airport AES Data from Table 1

COMPOSITE AREA - PRE DEVELOPMENT (C = 0.30)

Runoff Coefficient = 0.30 for predevelopment

DURATION	INTENSITY (mm/hr)	QPRE A x C (COMPOSITE) (ha)	QPRE A x C x I (L/s)
5	147	2.73	1113.08
10	90	2.73	679.50
15	67	2.73	509.11
20	55	2.73	414.82
25	47	2.73	353.88
30	41	2.73	310.80
35	37	2.73	278.49
37	35	2.73	267.69
40	33	2.73	253.24
45	31	2.73	232.86
50	28	2.73	216.04
55	27	2.73	201.86
60	25	2.73	189.74
65	24	2.73	179.22
70	22	2.73	170.01
75	21	2.73	161.86
80	20	2.73	154.59
85	20	2.73	148.06

TIME OF CONCENTRATION Using FAA Method

$$T_c = 1.8(1.1 - C)L^{0.5} / (100 \cdot S)^{0.333}$$

L (longest flow path) =	375 ft
C =	0.01
Slope =	0.001 ft/ft or m/m
t _c =	81.8 min.

Assume Duration = Time of Concentration = 80 min, THEN, BASED ON ABOVE CHART, LIMIT OUTFLOW TO 154.59 L/s or less

TABLE 4 - FLOW STORAGE REQUIREMENTS (2 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C =0.45)

DURATION	INTENSITY (mm/hr)	QPOST A x C (COMPOSITE) (ha)	QPOST A x C x I (L/s)	STORM VOLUME (L)	OUTFLOW RATE (L/s)	RELEASE VOLUME (L)	REQUIRED STORAGE (L)	REQUIRED STORAGE m ³
5	147	4.095	1682	504487.3	154.59	46377	498110.3	458.1
10	90	4.095	1027	615952.0	154.59	92754	523198.0	523.2
15	67	4.095	769	692247.1	154.59	139131	553116.1	553.1
20	55	4.095	627	752044.5	154.59	185508	565536.5	566.5
25	47	4.095	535	801961.7	154.59	231885	570078.7	570.1
30	41	4.095	470	845198.7	154.59	278282	566934.7	566.9
35	37	4.095	421	883665.0	154.59	324639	558926.0	558.9
40	33	4.095	383	918206.1	154.59	371016	547190.1	547.2
45	31	4.095	352	949887.3	154.59	417393	532494.3	532.5
50	28	4.095	326	979152.3	154.59	463770	515382.3	515.4
55	27	4.095	305	1006401.7	154.59	510147	498254.7	498.3
60	25	4.095	287	1031940.0	154.59	556524	475416.0	475.4

TABLE 5 - FLOW STORAGE REQUIREMENTS (100 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C =0.45)

DURATION	INTENSITY (mm/hr)	QPOST A x C (COMPOSITE) (ha)	QPOST A x C x I (L/s)	STORM VOLUME (L)	OUTFLOW RATE (L/s)	RELEASE VOLUME (L)	REQUIRED STORAGE (L)	REQUIRED STORAGE m ³
5	302	4.095	3457	1037226.9	154.59	46377	990848.9	990.8
10	184	4.095	2111	1266397.4	154.59	92754	1173843.4	1173.8
15	138	4.095	1581	1423260.1	154.59	139131	1284129.1	1284.1
20	112	4.095	1289	1546203.4	154.59	185508	1380696.4	1380.7
25	96	4.095	1099	1648833.2	154.59	231885	1416948.2	1416.9
30	84	4.095	965	1737724.5	154.59	278282	1459482.5	1459.5
35	75	4.095	865	1816609.6	154.59	324639	1491970.6	1492.0
40	69	4.095	787	1887831.7	154.59	371016	1516815.7	1516.8
45	63	4.095	723	1952986.3	154.59	417393	1535575.3	1535.6
50	59	4.095	671	2013137.1	154.59	463770	1548367.1	1549.4
55	55	4.095	627	2069181.8	154.59	510147	1559014.8	1559.0
60	51	4.095	589	2121688.0	154.59	556524	1565144.8	1565.1
65	49	4.095	557	2171148.1	154.59	602901	1568245.1	1568.2
70	46	4.095	528	2217983.1	154.59	649278	1568705.1	1568.7
75	44	4.095	503	2262495.1	154.59	695855	1566840.1	1566.8
80	42	4.095	480	2304941.5	154.59	742032	1562909.5	1562.9
85	40	4.095	460	2346538.9	154.59	788409	1557128.9	1557.1
90	39	4.095	442	2384489.9	154.59	834788	1540683.9	1540.7
95	37	4.095	425	2421889.9	154.59	881183	1540728.9	1540.7
100	36	4.095	410	2457932.8	154.59	927540	1530392.8	1530.4

Therefore 1568.7 cubic meters of storage must be provided for th 1:100 year storm.

NEW STORMWATER CALCULATIONS

TABLE 1 - IDF CURVE DATA -WINDSOR AIRPORT AES DATA

WINDSOR AIRPORT AES DATA

Using the equation: $R=aT^b$

Return Period	Coefficients	
	a	b
2-Yr	25.0	-0.712
5-Yr	32.0	-0.712
10-Yr	36.7	-0.712
25-Yr	42.6	-0.712
50-Yr	47.0	-0.712
100-YR	51.4	-0.712

Time (min)	Time (T) (hrs)	Rainfall Intensity (R) (mm/hr)					
		2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5	0.08	146.7	187.7	215.3	249.9	275.7	301.5
10	0.17	89.5	114.6	131.4	152.6	168.3	184.1
15	0.25	67.1	85.9	98.5	114.3	126.1	137.9
20	0.33	54.7	70.0	80.2	93.1	102.8	112.4
30	0.50	41.0	52.4	60.1	69.8	77.0	84.2
35	0.58	36.7	47.0	53.9	62.5	69.0	75.4
40	0.67	33.4	42.7	49.0	56.9	62.7	68.6
45	0.75	30.7	39.3	45.0	52.3	57.7	63.1
50	0.83	28.5	36.4	41.8	48.5	53.5	58.5
55	0.92	26.6	34.0	39.0	45.3	50.0	54.7
60	1	25	32	36.7	42.6	47	51.4

TABLE 2 : C- Factor Weighting and Areas

PRE-DEVELOPMENT

Runoff Coefficient (C_g):	0.3	unitless
Total Area (m^2):	91005	m^2
Total Area (ha):	9.10	ha

POST-DEVELOPMENT

Grass Area (A_{g1}):	54652	m^2
Grass Runoff Coefficient (C_g):	0.25	unitless
Impervious (ie. Asphalt, Building, Concrete) Area (A_{i1}):	9029	m^2
Impervious Runoff Coefficient (C_i):	1.00	unitless
Gravel Area (A_{gr1}):	27320	m^2
Gravel Runoff Coefficient (C_{gr}):	0.70	unitless
Weighted Runoff Coefficient ($C1$):	0.46	unitless
	$C_1 = (A_{g1} * C_g + A_{gr1} * C_{gr} + A_{i1} * C_i) / (A_{g1} + A_{gr1} + A_{i1})$	
Total Area (m^2):	91005	m^2
Total Area (ha):	9.10	ha

TABLE 3 - PREDEVELOPMENT FLOW REQUIREMENTS (2-YR) & PIPE/ORIFICE SIZE

Using the 2-year Windsor Airport AES Data from Table 1

COMPOSITE AREA - PRE DEVELOPMENT (C = 0.30)

Runoff Coefficient = 0.30 for predevelopment

DURATION	INTENSITY (mm/hr)	QPRE A x C (COMPOSITE) (ha)	QPRE A x C x I (L/s)
5	147	2.73	1113.08
10	90	2.73	679.50
15	67	2.73	509.11
20	55	2.73	414.82
25	47	2.73	353.88
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37	35	2.73	267.69
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80	20	2.73	154.59
85	20	2.73	148.06

TIME OF CONCENTRATION Using FAA Method

$$T_c = 1.8(1.1 - C)L^{0.5} / (100 \cdot S)^{0.333}$$

L (longest flow path) = 375 ft
 C = 0.01
 Slope = 0.001 ft/ft or m/m
 t_c = 81.8 min.

Assume Duration = Time of Concentration = 80 min, THEN, BASED ON ABOVE CHART, LIMIT OUTFLOW TO 154.59 L/s or less

TABLE 4 - FLOW STORAGE REQUIREMENTS (2 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C=0.46)

DURATION	INTENSITY (mm/hr)	QPOST A x C(COMPOSITE) (ha)	QPOST A x C x I (L/h)	STORM VOLUME (L)	OUTFLOW RATE (L/s)	RELEASE VOLUME (L)	REQUIRED STORAGE (L)	REQUIRED STORAGE m ³
5	147	4.186	1719	515698.1	154.91	46473	469225.1	469.2
10	90	4.186	1049	629639.8	154.91	92946	536693.8	536.7
15	67	4.186	786	707630.4	154.91	139419	568211.4	568.2
20	55	4.186	641	768756.6	154.91	185892	582864.6	582.9
25	47	4.186	547	819783.0	154.91	232365	587418.0	587.4
30	41	4.186	480	863978.9	154.91	278836	585140.9	585.1
35	37	4.186	430	903199.7	154.91	325311	577886.7	577.9
40	33	4.186	391	938610.7	154.91	371784	566826.7	566.8
45	31	4.186	360	970995.9	154.91	418257	552738.9	552.7
50	28	4.186	334	1000911.2	154.91	464730	536181.2	536.2
55	27	4.186	312	1028766.1	154.91	511203	517563.1	517.6
60	25	4.186	293	1054872.0	154.91	557676	497196.0	497.2

TABLE 5 - FLOW STORAGE REQUIREMENTS (100 -YR)

COMPOSITE AREA - POST DEVELOPMENT (C=0.46)

DURATION	INTENSITY (mm/hr)	QPOST A x C(COMPOSITE) (ha)	QPOST A x C x I (L/h)	STORM VOLUME (L)	OUTFLOW RATE (L/s)	RELEASE VOLUME (L)	REQUIRED STORAGE (L)	REQUIRED STORAGE m ³
5	302	4.186	3534	1060275.4	154.91	46473	1013802.4	1013.8
10	184	4.186	2158	1294539.5	154.91	92946	1201593.5	1201.6
15	138	4.186	1617	1454888.1	154.91	139419	1315469.1	1315.5
20	112	4.186	1317	1580563.5	154.91	185892	1394871.5	1394.7
25	96	4.186	1124	1685473.9	154.91	232365	1453108.9	1453.1
30	84	4.186	987	1776340.6	154.91	278836	1497502.6	1497.5
35	75	4.186	884	1856978.7	154.91	325311	1531667.7	1531.7
40	69	4.186	804	1929783.5	154.91	371784	1557989.5	1558.0
45	63	4.186	739	1996367.6	154.91	418257	1578110.6	1578.1
50	59	4.186	686	2057873.5	154.91	464730	1593143.5	1593.1
55	55	4.186	641	2116143.2	154.91	511203	1603940.2	1603.9
60	51	4.186	602	2168816.8	154.91	557676	1611140.8	1611.1
65	49	4.186	569	2219393.8	154.91	604149	1615244.8	1615.2
70	46	4.186	540	2267271.6	154.91	650622	1616649.6	1616.6
75	44	4.186	514	2312772.7	154.91	697095	1615677.7	1615.7
80	42	4.186	491	2356162.5	154.91	743568	1612594.5	1612.6
85	40	4.186	470	2397662.0	154.91	790041	1607621.0	1607.6
90	39	4.186	451	2437458.1	154.91	836514	1600944.1	1600.9
95	37	4.186	434	2475709.7	154.91	882987	1592722.7	1592.7
100	36	4.186	419	2512553.5	154.91	929460	1583093.5	1583.1

Therefore 1616.6 cubic meters of storage must be provided for th 1:100 year storm.