ARTHUR TOWNOMES

PERTH, ONTARIO

PREPARED FOR:

EKOBUILT CONSTRUCTION

STORMWATER MANAGEMENT REPORT

SERVICING BRIEF

EASTERN ENGINEERING GROUP INC.

APEX BUILDING

100 STROWGER BLVD, SUITE 207

BROCKVILLE, ON

K6V 5J9

JULY 2025

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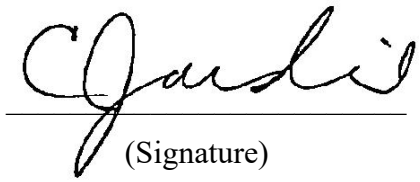
Prepared by 
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PROJECT BACKGROUND

Eastern Engineering Group Inc. was retained by EKOBUILT Construction (Jaison Dolvane) to design site works for a new townhouse project at the corner of Arthur and Cockburn in Perth. The site will consist of 6 townhomes with 2 storeys each. Parking in driveway and garage for each unit.

FIGURE 1: LOCATION
ARTHUR ST/COCKBURN ST
PERTH, ON

SUPPORTING INFORMATION

The Preliminary Servicing Report was developed using background information provided by the Owners and the Town of Perth.

Project Name:	Arthur St Townhouses
Owner:	Ekobuilt Construction
Contact:	Jaison Dolvane
	7 Bayview Station Road
	Ottawa, ON K1Y 2C5

The following documents were referenced in preparing the stormwater management design for the project:

- Stormwater Management Planning and Design Manual, Ministry of the Environment, 2003
- MTO Drainage management manual
- Low Impact Development Stormwater Management Planning and Design Guide, Version 1.0, 2010 Credit Valley Conservation/Toronto and Region Conservation
- Guidelines on Erosion and Sediment Control for Urban Construction Sites" Government of Ontario, May 1987

EXISTING CONDITIONS

The existing site is vacant and undeveloped. The site area is 1246 m^2. The site is grassed with a slope to the road way.

Existing Town of Perth services on both Cockburn Street and Arthur Street. The Cockburn services are very deep under the street and is not ideal for connection. The proposed servicing for sanitary, water and storm will be to Arthur Street. Arthur Street has a 300 mm dia storm sewer, a 200 mm dia sanitary sewer and a 150 mm dia watermain.

PROPOSED SITE SERVICING

The new development will require a 100 mm water service from the existing 150 mm water main on Arthur Street. This will be a new connection and will require a road cut on Arthur Street to install the service to the site. There will be a curb stop at property line. The depth of cover for water will be 2.00m.

The new building will require a 200 mm sanitary service lateral to the site from Arthur Street. There is an existing 200mm dia. sanitary main on Welland. The connection will be made at the rear of the townhomes and enter the new building at the rear of the buildings.

The storm requirements for the site are to match pre and post development flows for stormwater management. There is an existing storm service to the property line. The connection will be

made from the rear storm storage area top the existing structure. The existing service is 250 mm PVC pipe. The existing storm on Arthur is a 250 mm dia sewer. The proposed stormwater services are detailed in the report. All connections would be designed to meet the Ontario Building Code and Town of Perth regulations for water and sanitary services.

DOMESTIC WATER REQUIREMENTS

Based on the Ministry of Environment Design Guidelines for Drinking Water system, the domestic water demand for residential is 450 L/day/ person. A peaking factor of 4 is used for the peak hour.

WATER DEMAND AND SUPPLY

The estimated demand for each residence (4 persons per unit) = 450 x 4 x 6 units = 10,800 L/day (0.125 L/s) for the residential.

The Peak domestic flow is calculated using Q=Population in 1000s x flow x peak factor / 86.4
Q = 24/1000 persons x 450 L/d/p x 4/86.4 = 0.50 L/s

The Peak Extraneous flow is 0.28L/s/ha x the Area (1246 m^2) = 0.0311 L/s

The approximate total demand requirements for the site would be 0.531 L/s.

DOMESTIC SEWER DEMANDS

The domestic sewage flow from the site is calculated using Peak Population Flow, Peak Extraneous Flow, and peaking factor of 4.

LOCATION			INDIVIDUAL		Peaking Factor M	Peak Pop. Flow Q (p) (L/s)	Peak Comm. Flow Q (p) (L/s)	Peak extraneous flow Q (i) (L/s)	Peak design flow Q (d) (L/s)
STREET	FROM	TO	Pop.	Area A (hectares)					
Building 1	A	MH	24	0.1246	4	0.50	0.00	0.0311	0.531

The peak sewage flow from the development is expected to be 0.531 L/s.

SANTIARY SEWER FLOWS

The Arthur Street sanitary sewer is a 200mm dia line at 0.55 % which allows for a full flow of 23.2 L/s. This would easily accommodate the flows from the proposed development.

PRE-DEVELOPMENT FLOW

The water quantity objective for the storage areas is to not exceed the existing stormwater flows from the area. The flow is limited to the pre-development runoff rates. Please note that it is widely recognized that the rationale method typically overestimates peak runoff flows and as a result is an extremely conservative prediction method. Any facilities that are sized using results from the rationale method are expected to function in "real world" conditions.

The total area of the proposed site is 0.1246 ha which will be converted from grass to the asphalt and building surface. The site will feature the runoff from the hard surface roof and driveways. This will flow south to the rear of the lot where stormwater will be stored and directed to Arthur.

The predevelopment runoff coefficient using MTO Design Manual is 0.35 for grasses sloped surface with 0-5% slopes. The runoff coefficients from the MTO design manual are based on the Land use and topography. The post-development runoff coefficient is calculated based on surfaces shown on engineering plans.

The pre-development flow for the drainage area is calculated using the Rational Method.

$Q = 2.78\ C\ i\ A$

where Q = flow volume, L/s

C = runoff coefficient

i = rainfall intensity, mm/hr.

A = drainage area, ha.

Area of the site = 0.1246 ha

POST-DEVELOPMENT FLOW

The post development flows are calculated using Modified Rationale method for various times and rainfall intensities, to determine how much storage is required for each drainage area.

The post development runoff coefficient is calculated to be 0.35 for the grass surface, 0.6 for the gravel surface, and 0.9 for the building/paved surface.

Runoff Coefficient Calculation:			
PRE DEVELOPMENT			
Surface	**C**	**Area (m2)**	**Area (ha)**
Gravel	0.60	0.000	0.00
Grass	0.35	1246.000	0.12
Asphalt/Concrete	0.90	0.00	0.00
Building	0.90	0.00	0.00
Pasture Lands	0.28	0.00	0.00
Average C = 0.35		SUM:	0.12
POST DEVELOPMENT			
Surface	**C**	**Area (m2)**	**Area (ha)**
Gravel	0.60	108.00	0.01
Grass	0.35	540.00	0.05
Asphalt/Concrete	0.90	598.00	0.06
Building	0.90	0.00	0.00
Pasture Lands	0.28	0.00	0.00
Average C = 0.64		SUM:	0.12

Time of Concentration (mins)		
Area:	0.12	ha
Watershed Length:	65.00	m
Watershed Slope:	1.25	%
Runoff Coefficient:	0.35	
If C is less than 0.4:		
T_c =	18.31	
If C is greater than 0.4:		
T_c =	4.36	
Location:	PERTH	
	PERTH|2 YEAR	
	PERTH|5 YEAR	
	PERTH|10 YEAR	
	PERTH|100 YEAR	

Drainage Area for Qpost		
Post Runoff C =	0.73	
Area =	0.09	ha

2 YEAR						Allowable Release		
Time (min)	mm*ha/hr to L/s	C	I (mm/hr)	A (ha)	Q (L/s)	Allowed Discharge	Net Runoff	Storage Reqd (m3)
5	2.78	0.734	115.90	0.094	22.254	5.512	16.742	5.023
10	2.78	0.734	71.40	0.094	13.710	5.512	8.198	4.919
15	2.78	0.734	53.80	0.094	10.330	5.512	4.818	4.336
20	2.78	0.734	44.00	0.094	8.449	5.512	2.937	3.524
25	2.78	0.734	37.65	0.094	7.229	5.512	1.717	2.575
30	2.78	0.734	33.10	0.094	6.356	5.512	0.844	1.518
35	2.78	0.734	29.76	0.094	5.714	5.512	0.202	0.424
40	2.78	0.734	27.11	0.094	5.205	5.512	-0.307	-0.738
45	2.78	0.734	24.96	0.094	4.793	5.512	-0.719	-1.941
50	2.78	0.734	23.19	0.094	4.453	5.512	-1.059	-3.177
55	2.78	0.734	21.70	0.094	4.166	5.512	-1.346	-4.442
60	2.78	0.734	20.40	0.094	3.917	5.512	-1.595	-5.742

5 YEAR						Allowable Release		
Time (min)	mm*ha/hr to L/s	C	I (mm/hr)	A (ha)	Q (L/s)	Allowed Discharge	Net Runoff	Storage Reqd (m3)
5	2.78	0.734	153.40	0.094	29.455	5.512	23.943	7.183
10	2.78	0.734	94.50	0.094	18.145	5.512	12.633	7.580
15	2.78	0.734	71.20	0.094	13.671	5.512	8.159	7.343
20	2.78	0.734	58.24	0.094	11.183	5.512	5.671	6.806
25	2.78	0.734	49.83	0.094	9.568	5.512	4.056	6.084
30	2.78	0.734	43.80	0.094	8.410	5.512	2.898	5.217
35	2.78	0.734	39.39	0.094	7.563	5.512	2.051	4.307
40	2.78	0.734	35.88	0.094	6.889	5.512	1.377	3.304
45	2.78	0.734	33.04	0.094	6.345	5.512	0.832	2.247
50	2.78	0.734	30.70	0.094	5.894	5.512	0.382	1.146
55	2.78	0.734	28.72	0.094	5.514	5.512	0.002	0.007
60	2.78	0.734	27.00	0.094	5.184	5.512	-0.328	-1.180

10 YEAR						Allowable Release		
Time (min)	mm*ha/hr to L/s	C	I (mm/hr)	A (ha)	Q (L/s)	Allowed Discharge	Net Runoff	Storage Reqd (m3)
5	2.78	0.734	178.90	0.094	34.351	5.512	28.839	8.652
10	2.78	0.734	110.20	0.094	21.160	5.512	15.648	9.389
15	2.78	0.734	83.00	0.094	15.937	5.512	10.425	9.383
20	2.78	0.734	67.89	0.094	13.035	5.512	7.523	9.028
25	2.78	0.734	58.08	0.094	11.153	5.512	5.641	8.461
30	2.78	0.734	51.10	0.094	9.812	5.512	4.300	7.740
35	2.78	0.734	45.91	0.094	8.815	5.512	3.303	6.937
40	2.78	0.734	41.82	0.094	8.030	5.512	2.518	6.042
45	2.78	0.734	38.51	0.094	7.395	5.512	1.883	5.084
50	2.78	0.734	35.78	0.094	6.870	5.512	1.358	4.074
55	2.78	0.734	33.47	0.094	6.427	5.512	0.915	3.020
60	2.78	0.734	31.50	0.094	6.048	5.512	0.536	1.931
100 YEAR						Allowable Release		
Time (min)	mm*ha/hr to L/s	C	I (mm/hr)	A (ha)	Q (L/s)	Allowed Discharge	Net Runoff	Storage Reqd (m3)
5	2.78	0.734	256.70	0.094	49.290	5.512	43.778	13.133
10	2.78	0.734	158.10	0.094	30.358	5.512	24.845	14.907
15	2.78	0.734	119.10	0.094	22.869	5.512	17.357	15.621
20	2.78	0.734	97.37	0.094	18.697	5.512	13.185	15.822
25	2.78	0.734	83.31	0.094	15.997	5.512	10.485	15.727
30	2.78	0.734	73.40	0.094	14.094	5.512	8.582	15.447
35	2.78	0.734	65.85	0.094	12.644	5.512	7.132	14.978
40	2.78	0.734	59.98	0.094	11.517	5.512	6.005	14.413
45	2.78	0.734	55.24	0.094	10.607	5.512	5.095	13.757
50	2.78	0.734	51.32	0.094	9.854	5.512	4.342	13.026
55	2.78	0.734	48.01	0.094	9.219	5.512	3.707	12.233
60	2.78	0.734	45.20	0.094	8.679	5.512	3.167	11.401
					ASSUMES 5 YEAR ALLOWABLE DISCHARGE			

Therefore, based on Modified Rationale Method, the storage requirement for the site for 2 year event is **5.02 m^3**, 5 year is **7.58 m^3**, 10 year **9.39 m^3** and for 100 year **15.82 m^3**..

STORAGE PROVIDED

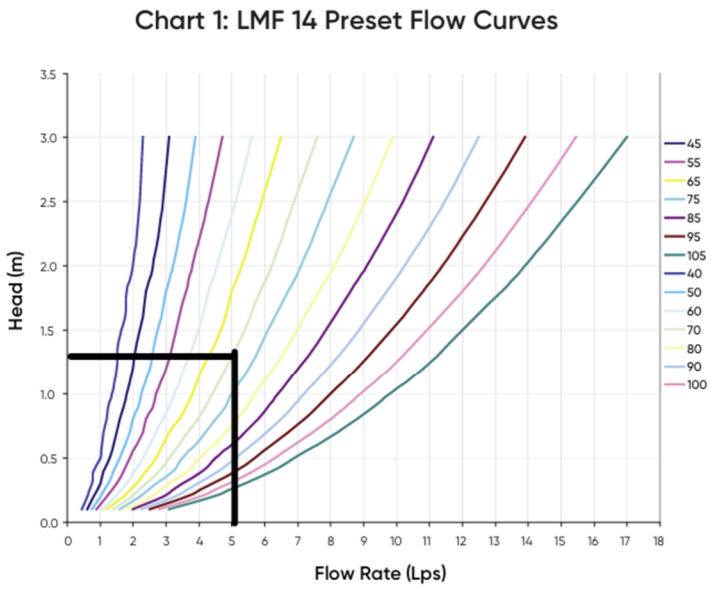
The site storage requirements are achieved with the use of landscaped basin and below grade storage on the south part of the lot. The surface storage for the 100 year even will be in the south east corner which has 4.12 m3 of storage. Below grade, there is pipe storage in the 250mm dia pipe which gives 2.00 m3. There will be a stone French drain around the storm sewer which is a 900mm wide approximately 1.2 m high stone layer that provides 9.73 m3. The total storage available is 15.85 m3.

The emergency overflow from the basin is overland at an elevation of 138.81 m on the east side of the property. Overflow is to the north towards Cockburn Street.

CONTROL STRUCTURE

The control structure outlet is an outlet flow control device by IPEX. The Tempest LMF70 is designed for a flow rate of approximately 5 L/s at a head of 1.3m. This matches our storm flow and depth of storage.

TEMPEST LMF ICD



SEDIMENT AND EROSION CONTROL

The following erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987).

- Before proceeding with any area grading the silt fence must be constructed where indicated.
- Silt control fence shall be installed where shown and maintained until the completion of the landscaping.
- Accumulated silt to be removed off site prior to removal of the silt control fence.

- Contractor to clean adjacent roads on a regular basis to the satisfaction of the Municipality and Counties.
- The silt fence must be inspected weekly and immediately after rainfall events for rips or tears, broken stakes, blow outs (structural failure) and accumulation of sediment. The silt fence must be fixed and/or replaced immediately when damaged. Sediment must be removed from silt fence when accumulation reaches 50% of the height of the fence.
- Upon completion of landscaping all sediment and erosion control measures shall be removed.
- No construction activity or machinery shall be beyond the silt fence.
- All earth or topsoil stockpiles shall be surrounded with a sediment control fence.

The Contractor shall be responsible for monitoring and maintaining the sediment and erosion control facilities until re-vegetation is complete.

The Sediment and Erosion Control Plan shall be considered a 'living document' that may need to be changed or adjusted during the life of the project to be effective.

MAINTENANCE

The owner will have maintenance staff review the site periodically during routine maintenance. Catch basins will need to be cleaned out as required in the sumps.

The maintenance plans and forms must address the following:

• inspection frequency
• maintenance frequency
• data collection/ storage requirements (i.e. during inspections)
• detailed cleanout procedures (main element of the plans) including:
  − equipment needs
  − maintenance techniques
  − occupational health and safety
  − public safety
  − environmental management considerations
  − disposal requirements (of material removed)

– access issues

Routine Maintenance and Operation

Routine inspection and maintenance activities as shown in Table 4.5.6 are necessary for the continued operation of infiltration areas.

Table 4.5.6 Suggested routine inspection and maintenance activities

Activity	Schedule
Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.	After every major storm event (>25 mm), quarterly for the first two years, and twice annually thereafter.
Regular watering may be required during the first two years until vegetation is established;	As needed for first two years of operation.
Remove trash and debris from pretreatment devices, the infiltration area surface and inlet and outlets.	At least twice annually. More frequently if desired for aesthetic reasons.
• Remove accumulated sediment from pretreatment devices, inlets and outlets; • Trim trees and shrubs; • Replace dead vegetation, remove invasive growth; • Repair eroded or sparsely vegetated areas; • Remove accumulated sediment on the bioretention area surface when dry and exceeds 25 mm depth (PDEP, 2006); • If gullies are observed along the surface, regrading and revegetating may be required.	Annually or as needed

Annual Inspection and Maintenance

The annual spring cleaning should consist of an inspection and corrective maintenance tasks described in Table 4.5.7

Table 4.5.7 Suggested inspection items and corrective actions

Inspection Item	Corrective Actions
Vegetation health, diversity and density	• Remove dead and diseased plants. • Add reinforcement planting to maintain desired vegetation density. • Prune woody matter.

	• Check soil pH for specific vegetation. • Add mulch to maintain 75 mm layer.
Sediment build up and clogging at inlets	• Remove sand that may accumulate at the inlets or on the filter bed surface following snow melt. • Examine drainage area for bare soil and stabilize. Apply erosion control such as silt fence until the area is stabilized. • Check that pretreatment is properly functioning. For example, inspect grass filter strips for erosion or gullies. Reseed as necessary.
Ponding for more than 48 hours	• Check underdrain for clogging and flush out. • Apply core aeration or deep tilling • Mix amendments into the soil • Remove the top 75 mm of bioretention soil • Replace bioretention soil

The owner will have maintenance staff review the site periodically during routine maintenance.

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July 17, 2025