PECK'S MARINA BOAT STORAGE
CORNER OF FITZSIMMONS AND GRANITE RD,
LANSDOWNE, ON

STORMWATER MANAGEMENT REPORT

EASTERN ENGINEERING GROUP INC.
CONSULTING ENGINEERS

EASTERN ENGINEERING GROUP INC.
APEX BUILDING
100 STROWGER BLVD, SUITE 207
BROCKVILLE, ON
K6V 5J9

JUNE 2024

REVISION RECORD					
REV	DESCRIPTION	PREPARED BY		REVIEWED BY	
0	ISSUED FOR SITE PLAN APPLICATION	CJ		CJ	
1	COMMENTS FROM TOWNSHIP	CJ			

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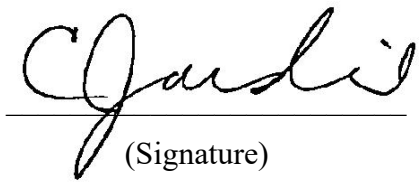
Prepared by 

(Signature)

Colin A. Jardine, P. Eng

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1.0 PROJECT BACKGROUND

Eastern Engineering Group Inc. was retained by Mr Greg Robichaud, Owner of Pecks Marine to prepare a site grading and stormwater management brief in support of the application for two new storage building construction at the intersection of Fitzsimmons and Granite Rd, Lansdowne, ON. The project consists of two new storage buildings with gravel outdoor yard. The existing site is disturbed with some areas of trees and grass. The lot is undeveloped with bedrock near the surface. The site is shown below in Figure 1.

FIGURE 1: LOCATION

2.0 SUPPORTING INFORMATION

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

Project Name:	Peck's Marina Boat Storage
Owner:	Pecks Marina
Contact:	Greg Robichaud
	505 Thousand Islands Parkway,
	Lansdowne, ON K0E 1L0
Phone Number:	613-5659-3185

The following documents were referenced in preparing the stormwater management design for the Peck's Marina Boat Storage lot development:

- Stormwater Management Planning and Design Manual, Ministry of the Environment, 2003
- MTO Drainage management manual

EXISTING DRAINAGE CONDITIONS

The existing site drainage pattern is divided into three regions. The eastern portion of the site is draining uncontrolled as an overland flow into the grassed area. The northeast portion of the site is draining uncontrolled into the existing ditch along Granite Ridge Rd. The northwest and southwest portion of the site currently has a general drainage pattern from north to south towards an existing ditch on Fitzsimmons Rd. This flow path will not be changed.

PROPOSED CONDITIONS

Two new storage buildings each of 2898.2 sqm (79.25m X 36.57m) is proposed on the site. There will be a gravel fire lane around the storage buildings and a storm detention basin in the south

corner of the site to store the first 10 mins of rainfall from the controlled region of the site. A new entrance is proposed on Fitzsimmons Rd. The total site area 2.5 ha approximately however only 1.7 ha area is developed and the rest of approximately 0.8 ha area will be green space as shown in the civil drawings as limit of construction.

LOW IMPACT DEVELOPMENT

Based on the type of proposed development and the existing geotechnical information, downspout disconnections are the most suitable LID features for the site, as shown in the figure below. Downspout disconnection involves directing the runoff from roof leader downspouts to a pervious area, which drains away from the building. This gives an opportunity for the runoff to infiltrate before it reaches the municipal road ditch. This also prevents the stormwater runoff from flowing across a "connected" impervious surface such as driveways.

Additionally, enhanced grass swales will be implemented in the development to provide both quantity and quality control of stormwater. They will be constructed at gentle gradient to promote absorption and infiltration, as well as providing some opportunity for particle filtration.

The gradient of the system will be enough to ensure the continuous flow of stormwater, minimizing standing water. Outlet flow controls will are provided to attenuate the flows and meet the quantity control objectives. Details regarding the outlet controls are included in this report, with the placement, sizing, and elevations.

STORM WATER MANAGEMENT

The normal requirement for a site is to match pre-development to post-development conditions. The intention of the design in this report does not aim for pre to post as the increase we feel is negligible and presents a minimal risk to the surrounding properties. As determined by a topographic survey, the natural drainage of the controlled area of site is generally from north to south. This drainage pattern will not be modified.

The runoff is flowing as a sheet flow over the surface from northwest to southwest of site. The change in the pre and post runoff coefficient C is negligible for the site. There will be a small storm detention basin created along the south corner of property line to collect and direct all runoff from the site to the roadside ditch on Fitzsimmons Rd. The swale will have 3 sediment traps as per OPSD 219.220, which are designed to intercept sediment runoff from the gravel area. There is a rock check dame at the outlet which also acts as a sediment removal method. All runoff to be controlled via single point outlet to the existing ditch through a 300mm culvert to the roadside ditch.

Straw bale check dams, and silt fence will be installed and remain in place until vegetation has been established in the swale and roadside ditch.

QUALITY – BEST MANAGEMENT PRACTICES

The developed portion of site is 1.7 ha, as defined in the MOE stormwater design manual, section 4.1.1, the amount of land being developed, we treat this as a smaller developable site and recommend Lot Level and Conveyance Controls should be allowed for the site.

The flow from the site will follow natural drainage paths from the north of the property to the south corner near Fitzsimmons Rd. To help with water quality, Best Management Practices and Low Impact Development strategies are addressed by the nature of the development which includes the following factors:

Preserve areas of undisturbed soil and vegetation

Areas that can retain their natural soils and current conditions should be included in the planning.

Fit design to terrain

The parking lot will be constructed to match existing grades. The natural drainage path below the gravel surface will be maintained. The undeveloped grass land area will be utilized to promote infiltration and sediment removal.

Lot level Controls

It is now standard practice to direct roof leaders onto grassed areas, as opposed to a hard surface. Discharge from any roof drains be implemented wherever possible, increasing the likelihood of particle filtration and runoff re-absorption.

At the lot level, the effects of runoff reduction measures are enhanced by minimizing lot grades to promote natural infiltration. Due to the natural topography or relief of the site, the existing grading of the entire site will be maintained and thus allowing natural filtration and absorption to continue while maintaining base flows and reducing TSS levels.

Conveyance Control

The use of low gradient grassed waterways having minimal side slopes is one of the best conveyance controls available. The flat grades help to reduce flow velocities, reducing erosion potential.

QUANTITY

There are no quantity controls proposed for this development at this time. The subsurface of the site is blasted rock which will allow full infiltration into the subgrade and minimal water will ever leave the site. Calculations are below for Stormwater calculations.

PRE-DEVELOPMENT FLOWS

The total allowable flow from the site is determined using the following criteria:
Cpre – 0.6
Area – 1.70 ha
Using MTO IDF Curve lookup website, it was determined for this site, the following:
I_{2year} is 54.31 mm/hr
I_{5year} is 71.2 mm/hr
$I_{100year}$ is 120.43 mm/hr

Tc is assumed to be 15 mins as the area of flow and flow path are being modified from north to south to flow east to west. The existing drainage flow is to the rear of the property whereas the proposed flow is to the west. Local Municipalities (Brockville) have accepted an assumed Tc of 15 mins for small localized projects similar in size to this.

Q_{2pre} = 2.78 * A*i* C

= 2.78 * 1.70 * 54.31 * 0.60

= **154.01 L/s**

The total allowable from the site is **154.01 L/s** total.

The post development runoff coefficient is calculated as below.
This was calculated with 5796.4 m^2 (building) @ 0.90 and 641 m^2 (asphalt) @ 0.9, 6931 m^2 (gravel) @ 0.6. and grassed surfaces of 3631.6 m^2 @ 0.3.

Cpost = 5796.4*0.9 + 641 x 0.9 + 6931*0.6 + 3631.6*.3 / 17000 = 0.645

I_{2year} is 54.31 mm/hr

I_{5year} is 71.2 mm/hr

$I_{100year}$ is 118.6 mm/hr

POST DEVELOPMENT FLOWS

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 0.645 for 2 year event. The allowable release rate is controlled to 154.01 L/s.

2 Year Storage – A=1.70 ha, c=0.645 Q allowable 154.01 L/s

Tc (min.)	I (mm/hr.)	Q (L/s)	Qallow (L/s)	Net Runoff (L/s)	Storage (m^3)
5	117.0	356.65	154.01	202.63	**60.79**
10	72.10	219.78	154.01	65.77	39.46
15	54.30	165.52	154.01	11.51	10.34
30	33.40	101.81	154.01	-52.20	-93.96

5 Year Storage – A=1.70 ha, c=0.645 Q allowable 154.01 L/s

Tc (min.)	I (mm/hr.)	Q (L/s)	Qallow (L/s)	Net Runoff (L/s)	Storage (m^3)
5	155.6	472.787	154.01	318.773	**95.632**
10	95.9	291.110	154.01	137.096	82.258
15	71.90	219.171	154.01	65.157	58.641
30	44.5	135.038	154.01	-18.975	-34.155

100 Year Storage – A=1.70 ha, c=0.645 Q allowable 154.01 L/s

Tc (mn.)	I (mm/hr.)	Q (L/s)	Qallow (L/s)	Net Runoff (L/s)	Storage (m^3)
5	259.60	791.331	154.01	637.317	191.195
10	159.90	487.418	154.01	333.405	**200.043**
15	120.40	367.012	154.01	212.998	191.698
30	74.20	226.182	154.01	72.168	72.168

Therefore, based on Modified Rationale Method, the storage requirement for the site for 2 year is 60.79 m^3 ,5 year is 95.63 m^3, and for 100 year 200.04 m^3.

STORAGE PROVIDED

The storage will be provided in a stormwater basin controlled via outlet control device, in the south east corner of the site.

The average area of the basin is 331 m^2 and the average depth of the structure is 0.47m deep. The basin will hold approximately 156 m^3 of stormwater in the basin. Below the basin will be the same area of blast rock to a depth of 2m with a void ration of 0.40. This would permit an additional 264 m^3 of storage. The site has more than the required storm storage.

SEDIMENT AND EROSION CONTROL

To control sediment and erosion during construction the Contractor shall install silt fences on the site as per OPSD 219.110 as needed around the construction site.

Sediment and erosion control barriers shall be monitored daily and maintained, as necessary. The Contractor shall remove the sediment and erosion control measures upon completion of construction and after re-vegetation has occurred. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of.

The owner shall be responsible for monitoring and maintaining the stormwater facilities.

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.

CONCLUSION – LOW RISK SITE

The area of the site being developed is a portion 1.7 ha of a 2.5 ha lot approximately.

Stormwater runoff from the developed area of the site will flow overland to the south corner of the lot, following natural drainage paths and filter into the rock shatter below the surface of the site. Along the south property line, a new swale and storm detention basin will be created to collect and direct all runoff from the site to the roadside ditch on Fitzsimmons Rd. The water will be directed towards Fitzsimmons Rd by a 300mm dia outlet culvert which will control the water and flow into the existing roadside ditch.

As the site being less than 2 ha, as defined in the MOE stormwater design manual, section 4.1.1, the amount of land being developed is much smaller and Lot Level and Conveyance Controls should be allowed for this site. The site has controls for Lot Level controls naturally on the site with reduced grading, and large areas of grassed, vegetated land.

The site as proposed, is a low risk with regards to stormwater runoff affecting neighboring properties due to the location of the site, the amount of area for dispersion and infiltration of runoff from the developed portion. The increase in runoff is negligible when considering the wide sheet flow and very low flow velocities of the stormwater.

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