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CONSULTING ENGINEERS

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I CIVIL & STRUCTURAL DESIGN I BUILDING REPORTS & CERTIFICATION I
I ROAD & DRAINAGE DESIGN I RESIDENTIAL, COMMERCIAL AND INDUSTRIAL DESIGNS I
FLOOD REPORTS

WATER SENSITIVE URBAN DESIGN (WSUD)

At 6-8 Edgar Street, St Marys

For Wayne and Debbie Aspinall

My reference - 15946

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1. Proposed Development

The proposed development consists of a total of 6 units (multi-unit housing) to be constructed on two (2) existing lots, both of which have existing residence, which will be demolished. The two (2) lots, which the development is proposed, are numbers 6 and 8 Edgar Street, St Marys. The total lot sizes of both blocks is 1380 metres squared, of which 970 metres squared will be impervious (70.0%).

The land use will be for residential use only.

2. USUD Objectives

The objectives of the Water Sensitive Urban Design (WSUD) is to ensure that the stormwater quality being discharged from the proposed development to the councils existing infrastructure meets the requirements of Penrith's Water Sensitive Urban Design (WSUD) policy.

3. Water Conservation

Refer Basix Certificate.

4. Stormwater Quality

Each unit will have a minimum 2000 liter rainwater tank located within the backyards and the overflow from the rainwater tanks will be diverted to the raingarden located to the front of the development via stormwater pipes.

A 12 meter squared raingarden is proposed to be located to the front boundary of number 8 Edgar Street St Mary's. Due to the insufficient difference in levels to drain the water to the existing kerb a raingarden with a submerged zone will be adopted. This results in less visual impact from the street and within the development.

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5. Music Modeling (or equilivant)

Due to the site being less than 5000 meters squared, the "Deemed to Comply Toolkit" will be utilised to determine the required water quality treatment devices sizes.

5.1. Deemed to Comply Toolkit Calculations

The following calculations have been undertaken using figure 3.2 of Penrith City Council Deemed to Comply Toolkit.

ITEM	Area (m2)	
Roofs	570	*6 x 95m2*
Driveway	340	
Backyard Hardstand	60	*6 x 10m2*
Grass / Garden	410	
TOTAL	**1380**	

Table 1 - Proposed Areas

SITE PERCENTAGES	Area (m2)	PERCENTAGE
IMPERVIOUS	970	**70.3%**
PERVIOUS	410	**29.7%**

Table 2 - Proposed Percentages

RAINGARDEN TREATMENT CALCULATIONS	
Driveway By-Pass	3.10%
Raingarden Size to Impervious Area	1.20%
Minimum Raingarden Size	11.64
Design Raingarden Size	**12**

Table 3 - Raingarden Calculations

5.2. Treatment Devices

As a result of the above calculations each unit (6 off) is to have a minimum 2000 liter rainwater tank connected to the toilet and a 12 metre square raingarden, see engineering drawings for details.

6. Operation and Maintenance

Operation and maintenance of stormwater treatment systems is a straight forward procedure, and not any more complex than that of maintaining an ordinary garden. It is critical that the maintenance schedule below be carried out to ensure that treatment quality is achieved.

RAINGARDEN MAINTENANCE PLAN		
LOCATION: No. 6-8 Edgar Street, St Marys		
INSPECTION ITEMS	FREQUENCY	ACTIONED REQUIRED
Mulch	3 Months	Replace mulch as needed with a material that will not float away
Surface Vegetation	6 Months	Inspect health of plants and trim where necessary Remove and replace diseased/dead plants with same species Remove weeds
Debris / Sediment	6 Months	Inpsect & clean debris/sediment build-up from surface, inlet area and overflow.
Ponding	6 Months	If ponding occurs for more than 3 days after storms, check whether underdrain or filter media is blocked
Outlet / Overflow Pit	Yearly	Repair where cracking or spalling of concrete surfaces is identified
Underdrainage	5 Years	Flush underdrainage
Filter Media	>30 Years	Replace filter media

Figure 1 - Raingarden (Maintenance Schedule)

RAINWATER TANK MAINTENANCE PLAN		
LOCATION: No. 6-8 Edgar Street, St Marys		
INSPECTION ITEMS	FREQUENCY	ACTIONED REQUIRED
First flush device	1-3 Months	Inpect and clean first flush device from debris
Contamination (Mosquito/vermin breeding or algae growth)	1-3 Months	Disinfection of tank
Inlet/Outlet Screen	6 Months	Remove leaves and debris on surface
Roof gutters	6 Months	Remove leaves and debris in gutters
Pump/strainer	6 Months	Inspect and clean pump/strainer from debris
Tank Structure	2 Years	Check footings and fittings for signs of corrosion
Depth of sediment within tank	5 Years	Desludge tank by engaging a professional tank cleaner

Figure 2 - Rainwater Tank (Maintenance Schedule)

Should any of this be unclear please contact the engineer who prepared this report.

Yours Faithfully,

Kris Grono

B.E. Civil and Structural

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7. Appendix A - Checklist

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WSUD DEVELOPMENT ASSESSMENT CHECKLIST

1. SITE INFORMATION

Address: No. 6-8 Edgar St, St Marys.

Development Type: Multi-Unit.

DA No:	Total Site Area (m^2): 1380
Impervious Ground Area (m^2):	Roof Area (m^2): 570
Reduction in Impervious area (m^2):	Net Impervious Area (m^2): 970

2. WATER MANAGEMENT CONTROLS

a) Proposed treatment measures:

☒ Raingarden ☒ Rainwater Tank ☐ Buffer Strip ☐ Permeable paving ☐ Other

b) Proposed treatment measures shown on plan? (Y) / N

3. TREATMENT OPTIONS

Proposed Treatment Measure	Catchment (%)	Catchment Size (m^2)	Treatment Measure Size (m^2)
a) Rainwater Tanks.	Min. 50%	285	2000 L
b) Raingarden.	98 %	1350	12
c)			
d)			

3. DOCUMENTATION

a) Design checklist submitted for each treatment measure? (Y) / N

b) Operation and Maintenance Plan submitted for each treatment measure? (Y) / N

COMMENTS

High flows from larger storm events will be diverted to the street by not being able to enter the drainage network.

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RAINWATER TANK DESIGN CHECKLIST	
Location: 6-8 Edgar St. St Marys	DA No:
Catchment Area (ha): 0.135	Rainwater Tank Capacity (L):

1. RAINWATER TANK CONFIGURATION	
a) Rainwater tank capacity specified?	(Y) / N
b) At least 50% of the roof area diverts runoff to rainwater tank?	(Y) / N
c) Connected to the following for internal re-use: ☒ No of toilets: 6 ☐ Laundry ☐ Other: _____	(Y) / N
d) Fitted with a first-flush device?	(Y) / N
e) Connection to mains water has been installed to supply water to tank when empty?	(Y) / N
e) Will not exceed 3 metres in height above ground level (including stand)?	(Y) / N
f) Will not rest on a footing of any building or other structure on the property including retaining wall?	(Y) / N

COMMENTS

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RAINGARDEN DESIGN CHECKLIST		
Location: No. 6-8 Edgar St.	DA No:	
Catchment Area (ha): 0.135	Filter Media Area (m^2): 12.	
1. INFLOW SYSTEM		
a) Roof area and at least 80% of the impervious ground area treated by the standard raingarden or raingarden with submerged zone at the front setback?		(Y) / N
b) Inlet scour protection provided at inflow locations?		(Y) / N
2. RAINGARDEN CONFIGURATION		
a) Top water level ≥50mm below surrounding area?		(Y) / N
b) Extended detention depth ≤300mm for standard raingarden or raingarden with submerged zone?		(Y) / N
c) Mulch layer depth ranges from 50-75mm comprised of non-floatable stone aggregate mulch sized 10-20mm?		(Y) / N
d) Filter media depth ranges from 450-1000mm for standard raingarden, from 300-1000mm for raingarden with submerged zone?		(Y) / N
e) Filter media is comprised of loamy sand with a permeability of 100-300 mm/hr under compaction and a minimum orthophosphate content of 40mg/kg?		(Y) / N
f) Transition layer depth ≥100mm and comprised of clean well graded sand/coarse sand?		(Y) / N
g) Slotted 90-100mm dia pipes provided within drainage layer?		(Y) / N
h) Drainage layer ≥ 350mm for raingarden with submerged zone or ≥ 150mm for standard raingarden?		(Y) / N
i) Liner type selected is impermeable?		(Y) / N
j) Flushing point provided?		(Y) / N
k) Overflow pit provided?		(Y) / N
3. VEGETATION DESIGN		
a) Species selected in accordance with Section 6.1 of Council's WSUD Technical Guidelines?		(Y) / N
b) Planting density ≥ 8 plants / m^2? (Shrubs or trees may be included)		(Y) / N
COMMENTS		

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