

SMALL TOWNHOUSE DEVELOPMENT ALTERNATE SOLUTION LESS PREFERRED

ESD April 2019

The development site is 735 m². Six new residential units are proposed for the site. The townhouses will each have three stories and three bedrooms. The table below shows a breakdown of surface types within the site. Rainwater tanks are used to treat as much roof area as possible. Each unit has a 10 m² balcony. Planterbox raingardens will be used to treat the roof and balcony areas that do not drain to rainwater tanks. Permeable paving will be used for non-trafficable paving within the development and part of the driveway if required.

Surface type	Area (m ²)	Typology for purpose of stormwater quality assessment
Unit 1 roof to tank (2,500 L)	65	Impervious
Unit 2 roof to tank (2,000 L)	45	Impervious
Unit 3 roof to tank (2,000 L)	45	Impervious
Unit 4 roof to tank (2,000 L)	45	Impervious
Unit 5 roof to tank (2,000 L)	45	Impervious
Unit 6 roof to tank (2,500 L)	65	Impervious
Unit 1 roof untreated (balcony only)	10	Impervious
Unit 2 roof and balcony to planterbox raingarden	20	Impervious
Unit 3 roof and balcony to planterbox raingarden	20	Impervious
Unit 4 roof and balcony to planterbox raingarden	20	Impervious
Unit 5 roof and balcony to planterbox raingarden	20	Impervious
Unit 6 roof untreated (balcony only)	10	Impervious
Driveway untreated	150	Impervious
Paths (permeable paving)	100	Pervious
Garden beds	75	Pervious
TOTAL	735	

Stormwater runoff from the site will be treated using rainwater tanks, planterbox raingardens and permeable paving.

a) Rainwater tanks

Runoff from the roofs of Units 1 to 6 (excluding balcony) will be diverted to 2,000 L or 2,500 L above ground rainwater tanks. Rainwater will be used for toilet flushing and cold laundry taps within Units 1 to 6. Rainwater tank overflows will be directed to the legal point of discharge.

Note that some roof runoff from Units 2 to 5 will not drain to rainwater tanks due to constraints on draining the whole roof to the tank (i.e. charged stormwater pipes should not go under buildings).



b) Planter box raingardens

Runoff from the northern sloping roof of Unit 2 to 5 (i.e. 45 m² per unit) will be diverted to 0.6 m² planter box raingardens (i.e. one raingarden for each unit). Each raingarden will have 100 mm extended detention depth (ponding depth) plus an additional 100 mm of storage depth as a contingency.

Stormwater will infiltrate through the vegetated filter media where physical and biological processes will remove pollutants including fine suspended solids, phosphorus and nitrogen. Stormwater will pass through the filter bed into an underdrain pipe and be conveyed to the legal point of discharge (i.e. side entry pit in Small Street).

The planter box raingardens will have an impermeable liner comprising of HDPE plastic (because they are located within 5 m of the building foundations). The underdrain system will be configured to create a 300 mm deep saturated zone. The saturated zone will provide a water source for the plants during extended dry periods.

The extended detention depth above the filter media surface (100 mm) will allow temporary ponding of the stormwater during rainfall events. When the extended detention volume is full, additional inflows to the raingardens will be discharged into a small overflow pit and be conveyed to the legal point of discharge in Small Street.

The raingardens will be planted with a suite of native plant species in accordance with Council's [Raingarden Planting Palette](#).

c) Permeable paving

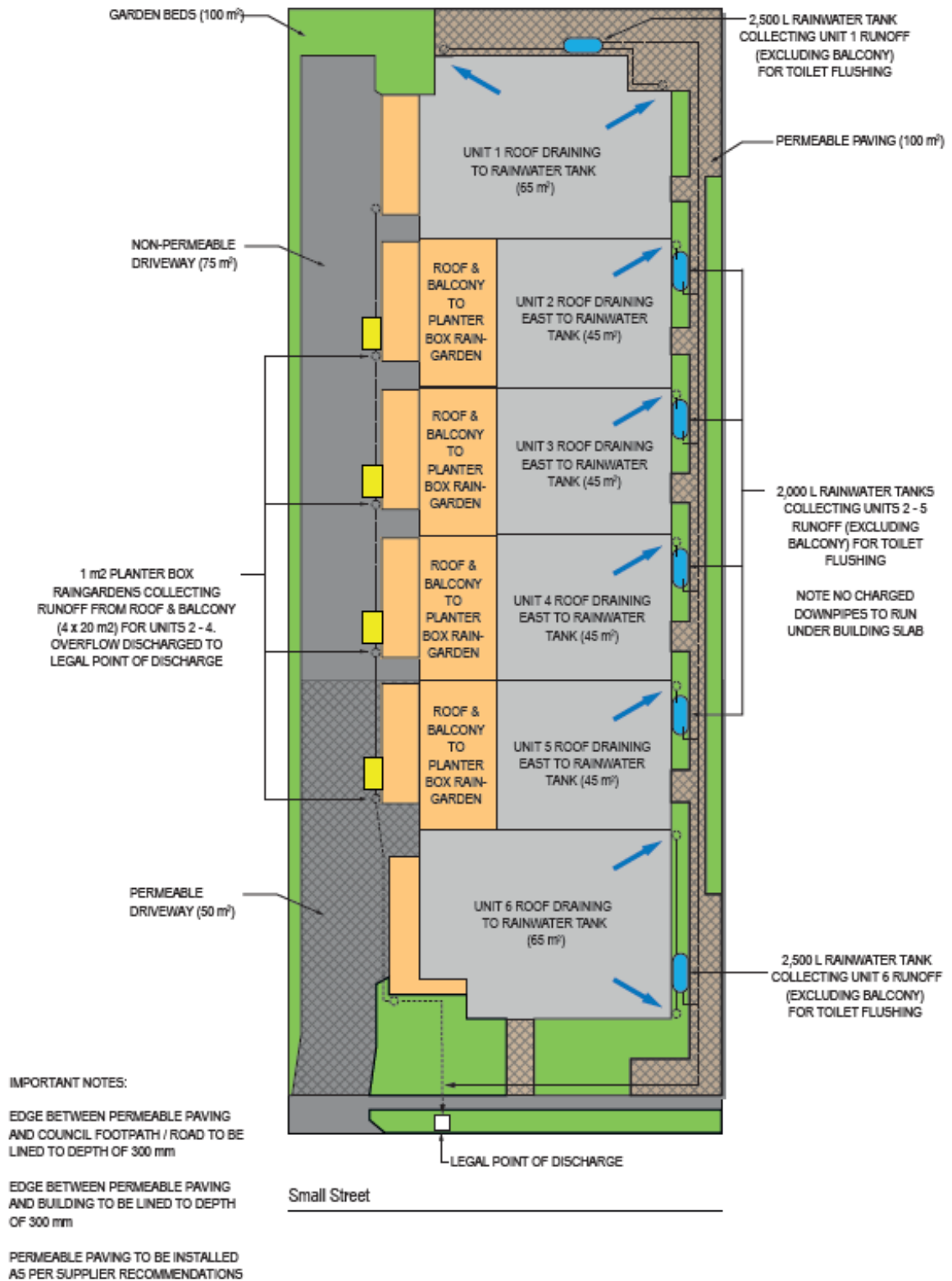
Stormwater runoff from the footpaths will be infiltrated to the underlying soils using permeable paving. During large rainfall events, stormwater that cannot be infiltrated via the pavers will flow overland to the legal point of discharge.

In other developments, the above combination of rainwater tanks and planterbox raingardens will still be insufficient to meet the required treatment standard. In these cases, part of the driveway may need to be changed from a standard construction to a permeable paving construction. It is possible for less than 100% of the driveway to be permeable paving.

d) Other catchment areas

No treatment will be provided for balconies and parts of the Unit 2 to 5 roofs that drain to the south. Rainfall on garden beds and turfed areas to the front and rear of the property will be directly infiltrated to the in situ soils.

Site layout plan





STORM Report

The STORM report is shown below. Note that only impervious surfaces are entered into the STORM tool.

STORM Rating Report

TransactionID: 760391
 Municipality: MORELAND
 Rainfall Station: MORELAND
 Address: Small Street

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Assessor:
 Development Type: Residential - Multiunit
 Allotment Site (m2): 735.00
 STORM Rating %: 112

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Unit 1 roof to tank	65.00	Rainwater Tank	2,500.00	3	166.00	82.00
Unit 2 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 3 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 4 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 5 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 6 roof to tank	65.00	Rainwater Tank	2,500.00	3	166.00	82.00
Unit 1 roof untreated	10.00	None	0.00	0	0.00	0.00
Unit 2 roof to planterbox raingarden	20.00	Raingarden 100mm	1.00	0	133.25	0.00
Unit 3 roof to planterbox raingarden	20.00	Raingarden 100mm	1.00	0	133.25	0.00
Unit 4 roof to planterbox raingarden	20.00	Raingarden 100mm	1.00	0	133.25	0.00
Unit 5 roof to planterbox raingarden	20.00	Raingarden 100mm	1.00	0	133.25	0.00
Unit 6 roof untreated	10.00	None	0.00	0	0.00	0.00
Driveway untreated	150.00	None	0.00	0	0.00	0.00

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