

SMALL TOWNHOUSE DEVELOPMENT ALTERNATE SOLUTION LEAST PREFERRED

ESD April 2019

This is an alternate solution, however is the least preferred method. Note that Civil Engineering details will be required at the planning stage if this solution is proposed.

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. Each unit has a 10 m² balcony. Rainwater tanks are used to treat as much roof area as possible. Permeable paving will be used for non-trafficable paving within the development. An in-ground raingarden will be used to treat runoff from the impervious driveway. Note: Civil Engineering details have been completed to confirm that the site’s legal point of discharge is a side entry pit in Small Street and that the side entry pit is one meter deep.

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 untreated (includes balcony)	20	Impervious
Unit 3 roof untreated (includes balcony)	20	Impervious
Unit 4 roof untreated (includes balcony)	20	Impervious
Unit 5 roof untreated (includes balcony)	20	Impervious
Unit 6 roof untreated (balcony only)	10	Impervious
Driveway to inground raingarden	150	Impervious
Paths (permeable paving)	100	Pervious
Garden beds	75	Pervious
TOTAL	735	

Stormwater runoff from the site will be treated using rainwater tanks and an inground raingarden.

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) In-ground raingarden

A shallow drain covered with a grate (grated trench) will be used to divert runoff from the driveway to a 1 m² raingarden located in the front garden. The raingarden will comprise of a small basin and have 100 mm extended detention depth (ponding depth) plus an additional 100 mm of storage depth as a contingency. The top of the grated trench will be 100 mm above the raingarden surface. During peak rainfall events, runoff will overtop the trench grate and flow overland into Small Street.

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 raingarden basin will have an impermeable liner comprising of HDPE plastic (because it is located within 5 m of the building foundations). The underdrain system will be configured to create a 300 mm deep saturated zone within the base of the basin, thus providing a permanent store of water. 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 raingarden will be discharged into an overflow pipe 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.

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.

Civil Engineering Requirements

As this solution requires an in-ground raingarden, in order for this solution to be accepted civil engineering design will be required at the Planning Stage demonstrating:

- The untreated water from the impervious surfaces the raingarden is treating can adequately drain into the raingarden
- The design of overland flow paths on site will not cause any flooding issues
- The raingarden overflow will not cause any flooding issues
- Treated water can adequately be discharged to the legal point of discharge (note Moreland will not accept pumping from a raingarden to the legal point of discharge)

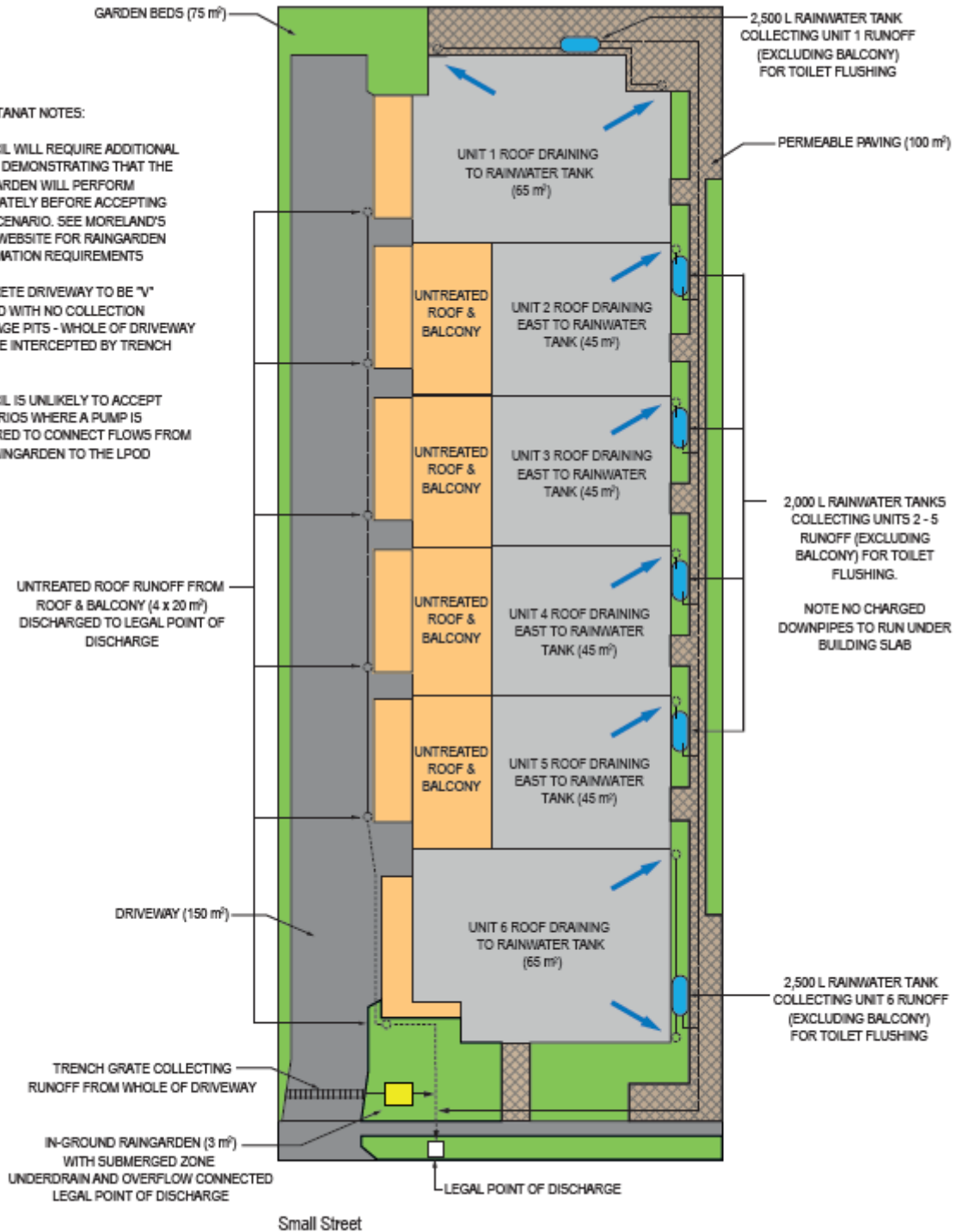
Site layout plan

IMPORTANT NOTES:

COUNCIL WILL REQUIRE ADDITIONAL DETAIL DEMONSTRATING THAT THE RAINGARDEN WILL PERFORM ADEQUATELY BEFORE ACCEPTING THIS SCENARIO. SEE MORELAND'S WSUD WEBSITE FOR RAINGARDEN INFORMATION REQUIREMENTS

CONCRETE DRIVEWAY TO BE "V" SHAPED WITH NO COLLECTION DRAINAGE PITS - WHOLE OF DRIVEWAY IS TO BE INTERCEPTED BY TRENCH GRATE

COUNCIL IS UNLIKELY TO ACCEPT SCENARIOS WHERE A PUMP IS REQUIRED TO CONNECT FLOWS FROM THE RAINGARDEN TO THE LPOD





STORM Report

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

STORM Rating Report

TransactionID: 760382
 Municipality: MORELAND
 Rainfall Station: MORELAND
 Address: Small Street

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Assessor:
 Development Type: Residential - Multiunit
 Allotment Site (m2): 735.00
 STORM Rating %: 120

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 untreated	20.00	None	0.00	0	0.00	0.00
Unit 3 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 4 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 5 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 6 roof untreated	10.00	None	0.00	0	0.00	0.00
Driveway to raingarden	150.00	Raingarden 100mm	1.00	0	98.50	0.00

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