WSUD 03

Residential development – compliance with the InSite Water Tool

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Guide for water sensitive urban design – stormwater management

A WSUD approach can be applied at a range of scales from the individual allotment to townhouse developments and apartment buildings. To meet stormwater runoff volume reduction, peak flow, and quality and water use efficiency targets, solutions may include the use of raingardens, infiltration pits, rainwater (retention and re-use) tanks, small water tank-based and underground detention systems, green roofs, swales and permeable paving.

InSite Water Tool provides a mechanism to demonstrate compliance of your development with South Australia's WSUD performance-based planning policy objectives, for residential development with site areas up to 5000 m^2.

Please note that InSite Water does not provide a detailed design and layout for the piping and general drainage system in your development, which should be prepared by a qualified civil engineer or hydrologist. In addition, InSite Water does not guarantee compliance for footing protection (as per Minister's Specification SA 78AA September 2003 – *On-site retention of stormwater*), which needs to be provided by a qualified geotechnical or structural engineer.

All four WSUD performance-based policy objectives must be met to achieve a complying development.

Table 1: Typical stormwater management solutions that can meet the performance objectives

	 VOLUME	 FLOW	 QUALITY	 EFFICIENCY
Objective	Harvest or infiltrate stormwater	Control peak discharge flows	Improve stormwater runoff water quality	Increase drought resilience
Target	No increase in annual average runoff volume (post-development compared with pre-development) (a 10% increase is allowed as a margin of error in the tool)	Increase in peak discharge flows (post-development compared with pre-development) less than or equal to zero.	Achieve a pollution reduction score of 100[1] or more [1]A score of 100 is equivalent to achieving a 45% reduction in nitrogen runoff	Greater than 25% potable water use reduction
Typical solutions				
Rainwater (retention) tanks	✓	✓	✓	✓
On-site detention (OSD)		✓		
Permeable paving	✓	✓	✓	
Infiltration systems	✓	✓	✓	
Unlined swales	✓		✓	
Biofiltration, e.g. raingardens			✓	
Water efficient fixtures with high WELS ratings				✓
Recycled water plumbed to toilets and outdoor uses				✓
Water efficient irrigation systems				✓

A development application to your local Council using the InSite Water Tool:

- should be undertaken by a suitably qualified professional
- must include:
  - an InSite Water compliance certificate and associated report
  - drawings showing the WSUD features of the design and how they are integrated into the site.

Refer to *Water Sensitive SA Fact Sheet WSUD 01* for a comprehensive list of WSUD features to consider when integrating your stormwater management with your overall site design.

Site examples

The following case studies have been provided to show compliant WSUD approaches for:

Example 1. 2 townhouses on a lot
Example 2. 3 townhouses on a lot
Example 3. 8 townhouses on a lot

Examples of WSUD solutions for commercial developments can be found in the *Water Sensitive SA Fact Sheet WSUD 04*.

Infiltration – special considerations

Infiltration system design should comply with the Minister's specification SA 78AA September 2003 – *On-site retention of stormwater* or be certified by a qualified geotechnical or structural engineer, including but not limited to:

- Take into account local conditions such as slope topography and soils (type, reactivity, permeability, water table level, salinity, dispersiveness, acid sulphate soils, etc.).
- Ensure that soil moisture and building clearance is considered in areas of reactive clays or where varying soil moisture levels could damage buildings.
- For steeper sites, ensure the design includes geotechnical considerations such as slope stability with varying soil saturation levels.

Table 1: General tips for achieving stormwater targets in the InSite Water Tool

Stormwater criteria	VOLUME	FLOW	QUALITY	EFFICIENCY
Stormwater objective	Harvest and re-use or infiltrate stormwater	Control peak stormwater discharge	Improve stormwater runoff water quality	Increase drought resilience
Stormwater target	No increase in annual average runoff volume (post-development compared with pre-development) (a 10% increase is allowed as a margin of error in the Tool)	Increase in peak discharge flows (post development compared with predevelopment) = 0 If greater than zero this is the additional site storage requirement (SSR) volume required. If less than zero, the development complies	Achieve a score of 100 or more	Achieve greater than 25% potable water use reduction
Notes	This is annual average volume, which is not the same as a peak flow rate. Reducing annual average runoff volumes has great broader catchment and river health outcomes.	This section uses the modified rational method to determine how the development behaves during a major storm event. The required storage is reduced by 1/3 of any entered rainwater retention tank volume, plus all entered detention volume. E.g. the below tank sizes would provide a 1700L reduction in required detention storage for the site. **Rainwater tank size (L)**: 3000 (Connected rainwater tank size (if applicable)) **Detention tank size (L)**: 700 (Connected detention tank size (if applicable))	A score of 100 is equivalent to achieving a 45% reduction in nitrogen runoff. As nitrogen is the hardest pollutant to remove, it is an indicator that the site is meeting stormwater quality best practice targets.	Water efficiency is a combination of the efficiency of the fittings and fixtures, and also how much potable water is substituted with retained rainwater (or alternative non-potable) water sources).
Tips to improve your score	Increase tank size, area connected to your roof, and number of rainwater end uses. Infiltration systems are also helpful to manage surface runoff volumes or reduce impervious areas using pervious paving.	To pass this section increase rainwater tank size or add dedicated detention volume. Infiltration system volumes will also help achieve this target, provided site soils are suitable.	Increase the amount of rainwater that is harvested and used on site. Alternatively treat rainwater with other WSUD treatments like raingardens and swales.	Increase the amount of rainwater that is harvested and used on site. Choose fittings and appliances to increase efficiencies beyond the default settings.

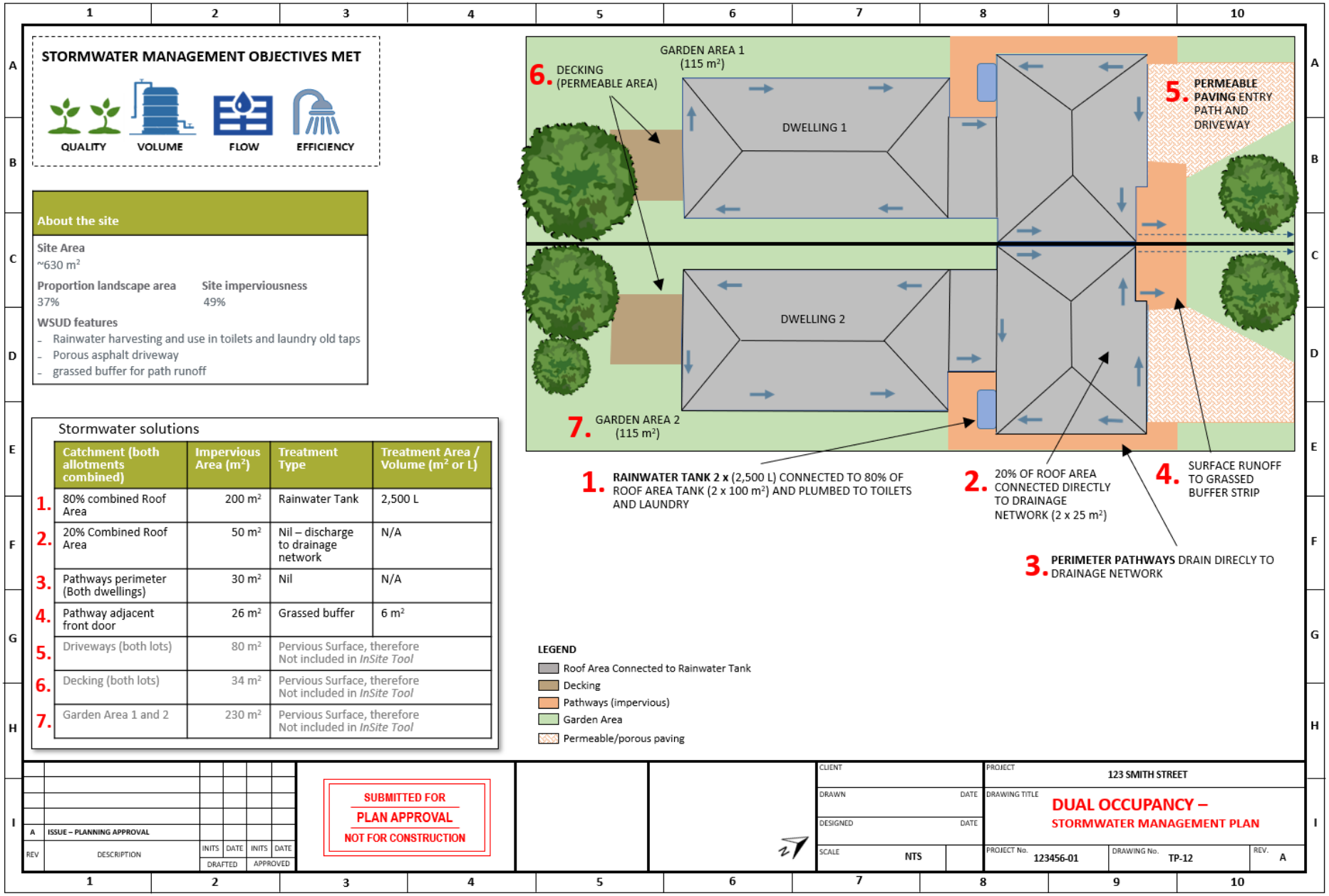


Figure 1: Dual occupancy – this diagram shows a WSUD strategy where the entire roof of both units is connected to rainwater tanks. Permeable paving is used for driveways to reduce the impermeable surface area of the development.

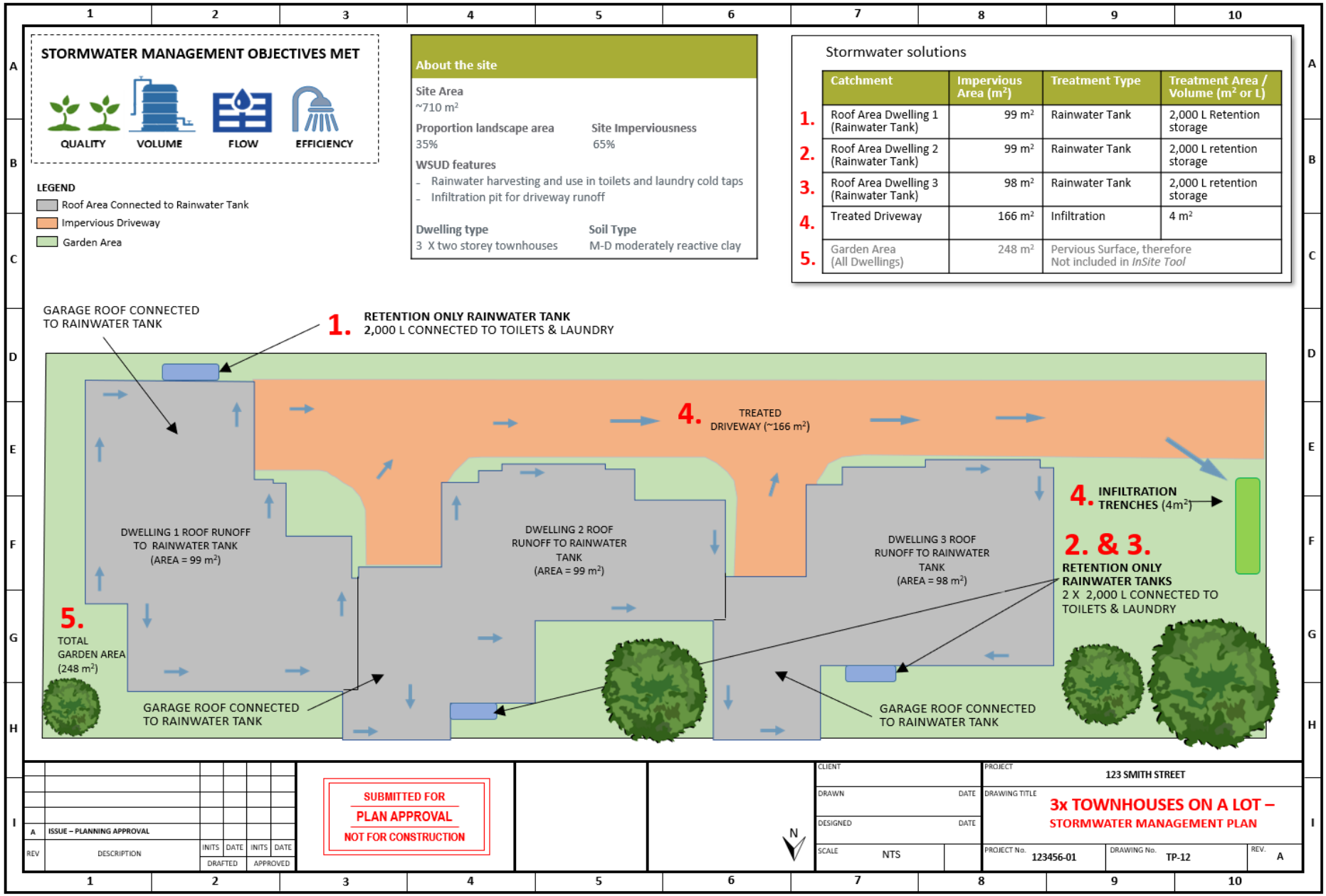
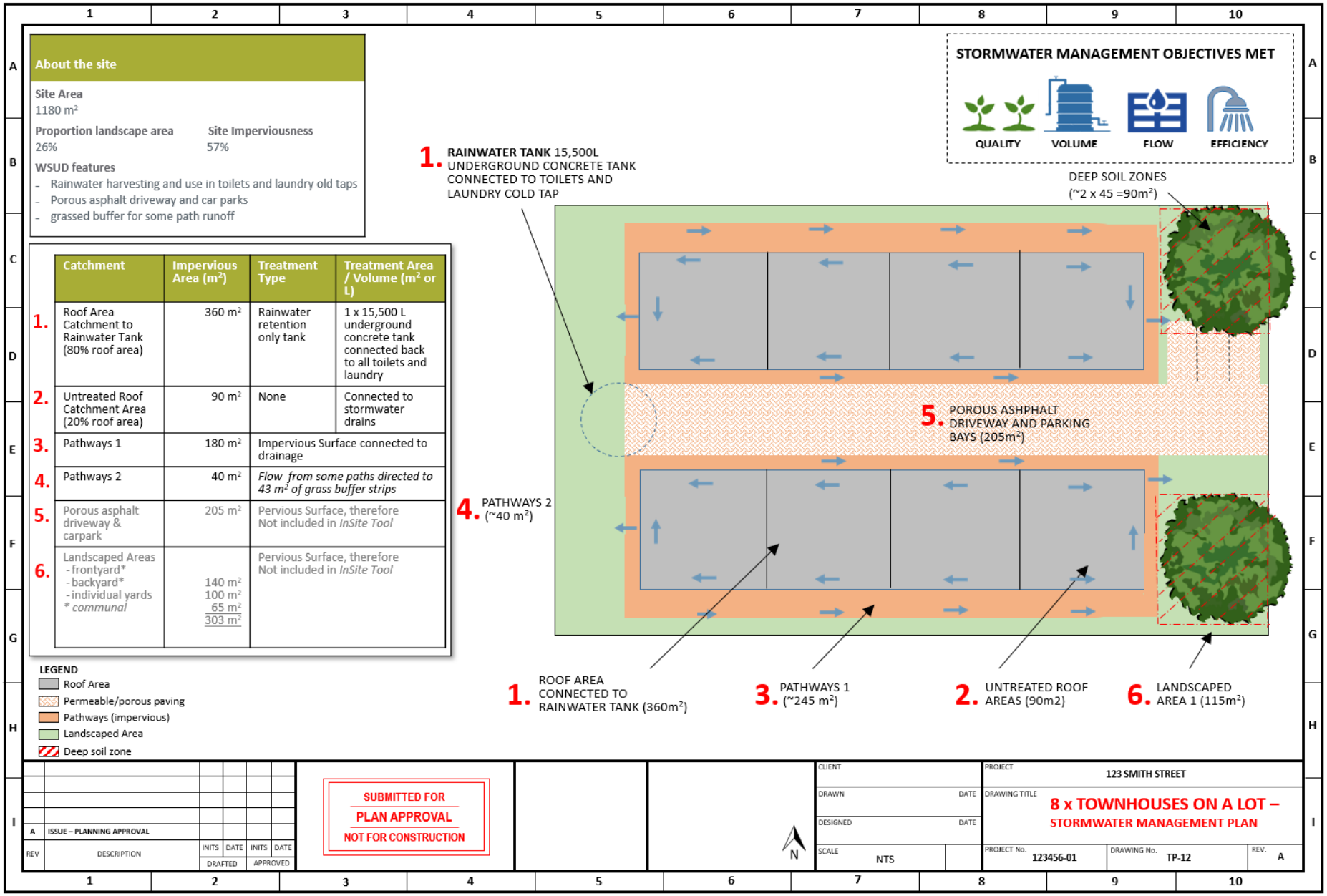


Figure 2: 3 townhouses on a lot – this development has used an infiltration system to treat driveway runoff, and rainwater tanks to collect the roof runoff. The water tanks are connected via a charged pipe system to all downpipes. Internally, rainwater used for all toilets and washing machine cold water taps.



	Catchment	Impervious Area (m²)	Treatment Type	Treatment Area / Volume (m² or L)
1.	Roof Area Catchment to Rainwater Tank (80% roof area)	360 m²	Rainwater retention only tank	1 x 15,500 L underground concrete tank connected back to all toilets and laundry
2.	Untreated Roof Catchment Area (20% roof area)	90 m²	None	Connected to stormwater drains
3.	Pathways 1	180 m²	Impervious Surface connected to drainage	
4.	Pathways 2	40 m²	*Flow from some paths directed to 43 m² of grass buffer strips*	
5.	Porous asphalt driveway & carpark	205 m²	Pervious Surface, therefore Not included in *InSite Tool*	
6.	Landscaped Areas - frontyard* - backyard* - individual yards * *communal*	 140 m² 100 m² 65 m² 303 m²	Pervious Surface, therefore Not included in *InSite Tool*	

Figure 3: 8 townhouses on a lot – this development has connected just over half of the roof area to a communal rainwater tank. In addition, the driveway is constructed of porous asphalt