Waitakere City Council
Te Taiao o Waitakere

V E R S I O N 1 . 0

Stormwater Solutions for Residential Sites

Section 5 – Roof Tanks

Prepared for

EcoWater Solutions

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5.1 Introduction

Roof tanks provide temporary storage and attenuation of stormwater flows generated on roof areas. Roof tanks can also be used to collect stormwater runoff for domestic use. In this regard use must be for non-potable purposes including toilet flushing and garden irrigation.

This section provides design details applicable to both attenuation and reuse.

5.2 Description

Stormwater is attenuated by holding stormwater within roof tanks during a rainfall event, and then controlling the release of stormwater through a small diameter orifice pipe. Roof tank sizes and orifice diameters given in this section are designed to control flows from roof areas to a rate similar to grass.

Stormwater discharging from the roof tank orifice must be connected into the drainage network or to an WCC approved drainage outlet.

The roof tank volume and the orifice outlet diameter depend on the area of the roof. The tank volume may also vary if it is proposed to reuse rainwater collected in the tank. In urban areas the Council does not support use of rainwater for potable water, however rainwater can be used for:

- Flushing toilets;
- Laundry cold tap;
- Laundry; and
- Garden uses.

The amount of storage provided in a tank for reuse depends on which of the above the water is to be used for.

5.3 Considerations

Consider the visual impacts of the building platform and tank for aesthetic reasons. The tanks can be supplied in a variety of colours, which will assist to blend in with the surrounding environment.

Runoff from other impervious surfaces, such as driveways or paving will need to be managed by other stormwater management methods.

Tanks should always be above ground unless approved otherwise by Council.

5.4 What to do?

In selecting a tank it is important to first establish if the tank is required for:

- Detention only; or
- Reuse and detention

Where it is intended to reuse water collected in the tank more detail is required with an application to show how the water from the tanks is to be linked into an existing water supply system. Design information covering both these situations follows.

5.5 Detention Tanks

5.5.1 What to do ?

Figure 5-1 shows a typical detail for a tank designed for detention only. Alternative fitting details must be submitted to WCC for approval. The tank is sized only to hold back stormwater during rainfall events and release all of this water stored over time.

Water is released from the tank through a small diameter orifice pipe from the base of the tank. Debris protection, such as screening mesh on the contributing spouting or a Rainwater Leafslide device on the downpipe to the tank should be installed to reduce the likelihood of blockage of the orifice pipe. If the orifice pipe becomes blocked it can be removed from the tank, cleaned and reinstalled. Flows exceeding the design rainfall event are discharged via an overflow pipe.

All roof tank overflows should discharge to a location approved by WCC.

5.5.2 Sizing Your Tank

The roof tank for the house is sized to accommodate the 20% AEP event with a maximum discharge not exceeding the discharge rate equivalent to a grass surface for this event. The orifice pipe diameter and limiting dimensions of the tanks required for roof areas up to 200 m^2 are shown in Table 5-1.

Table 5-1 - Orifice Pipe Diameter and Tank Sizing for Detention

Diameter. (mm)	897-910		1600-1785		2180		3555	
Vol. (litres)	450-1138		2499-4420		8475		25210	
Area (m^2)	d (mm)	H (mm)	d (mm)	H (mm)	d (mm)	H (mm)	d (mm)	H (mm)
<25	15	200	15	140	15	100	25	40
26-50	15	600	15	300	20	150	25	70
51-75	-	-	20	400	25	200	25	100
76-100	-	-	20	500	25	250	30	120
101-150	-	-	25	600	25	420	30	200
151-200	-	-	25	700	25	600	30	300

A typical arrangement for a detention roof tank is shown on Figure 5-1.

The orifice pipe diameters and fitting sizes identified on Figure 5-1 vary depending on the roof area served. Tank outlets in the capacities nominated are usually either 1.0 inch (25.4 mm) or 1.5 inch (32 mm) BSP. The orifice pipeline diameters and overflow diameters for these outlet diameters are listed in Table 5-2. Appropriate sized fittings should be sought for any other outlet diameters provided by tank manufacturers.

Table 5-2 - Orifice Pipe and Fitting Diameters for Detention Roof Tanks

Tank outlet diameter	Orifice Pipe Diameter	Identification on Figure 5-1	Orifice Pipe and Fitting Diameters
1 inch BSP	15 mm	A	25 x 15 PE reducing bush
		B	15 mm PVC valve socket
		C	15 mm PVC pipe
1 inch BSP	20 mm	A	25 x 20 PE reducing bush
		B	20 mm PVC valve socket
		C	20 mm PVC pipe
32 inch BSP	20 mm	A	32 x 20 PE reducing bush
		B	20 mm PVC valve socket
		C	20 mm PVC pipe
32 inch BSP	25 mm	A	32 x 25 PE reducing bush
		B	25 mm PVC valve socket
		C	25 mm PVC pipe

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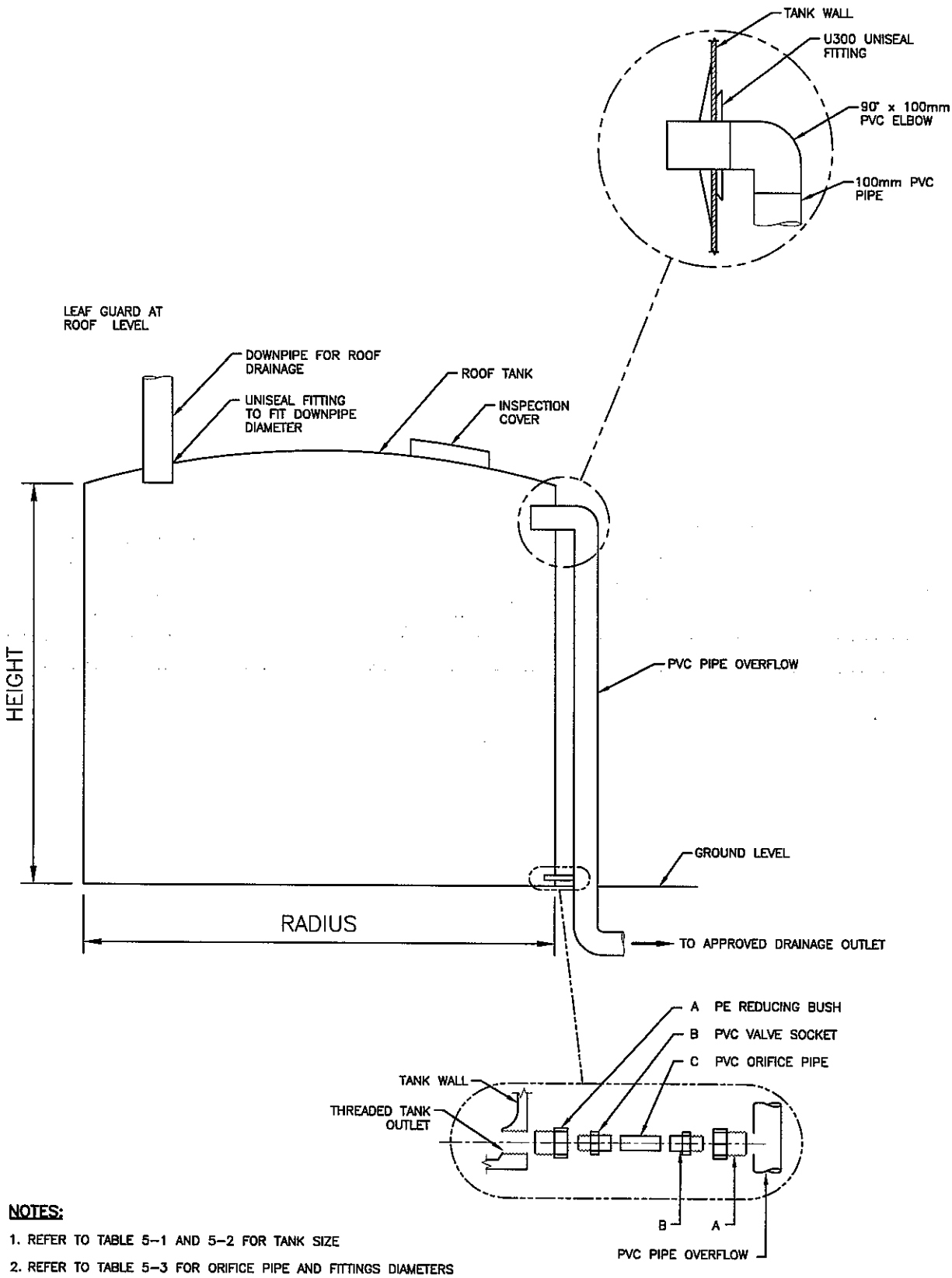

NOTES:

1. REFER TO TABLE 5–1 AND 5–2 FOR TANK SIZE
2. REFER TO TABLE 5–3 FOR ORIFICE PIPE AND FITTINGS DIAMETERS
3. ENSURE GROUND BENEATH TANK FOOTING MATCHES SUPPLIERS SPECIFICATIONS
4. FIT UNISEAL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION
5. FIT DEBRIS PROTECTION TO ROOF DRAINAGE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION
6. HOLES DRILLED THROUGH TANK WALL TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION
7. TANK MUST BE ABOVE GROUND UNLESS ECOWATER APPROVE OTHERWISE

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LAYOUT OF DETENTION ROOF TANK

Figure No. **5-1**

5.6 Water Reuse

5.6.1 What to do ?

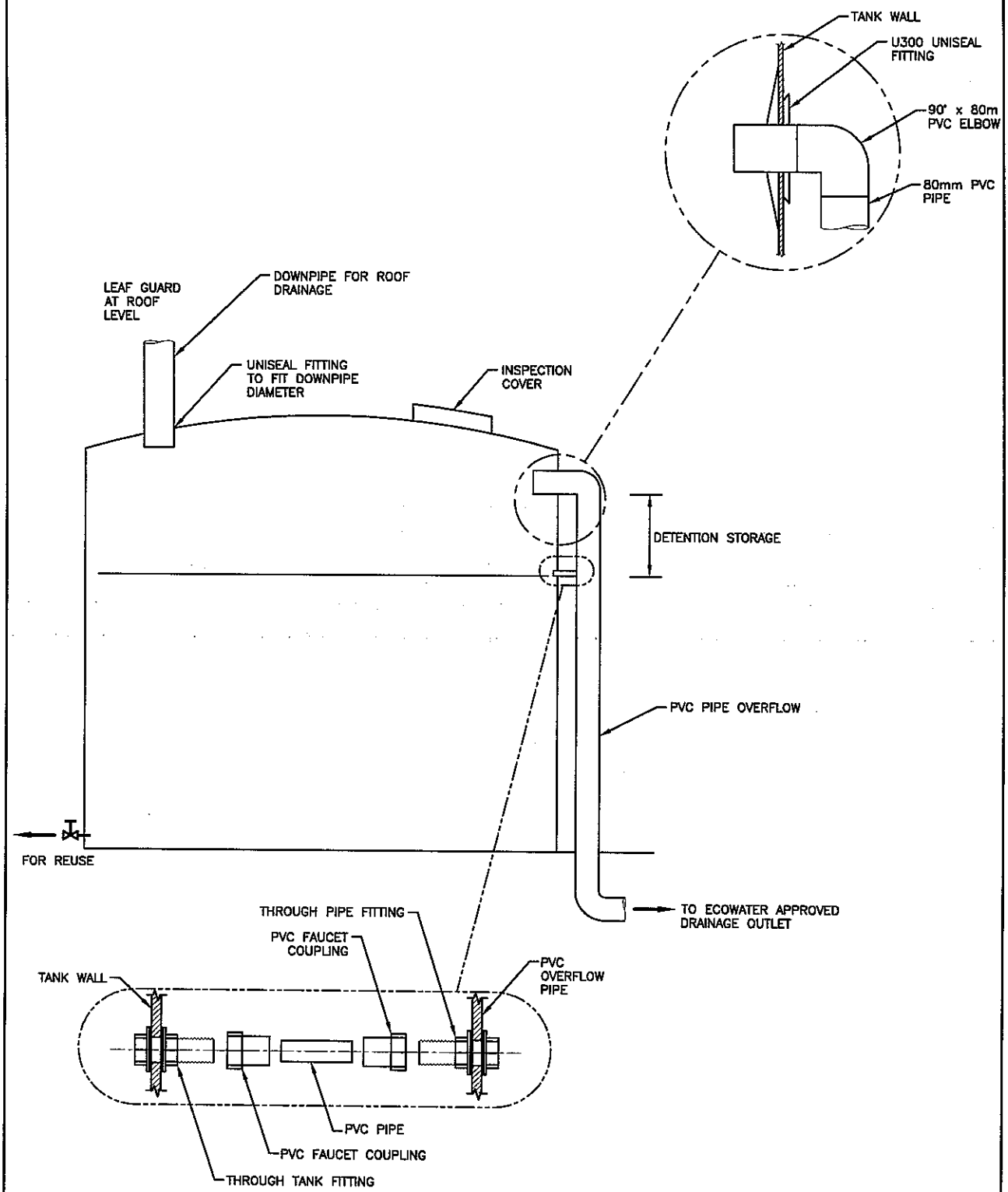
Water can be reused by installing a reuse tank that is separate from the detention tank, or by allowing for some detention at the top of the reuse tank as shown in Figure 5-2. Where a separate detention tank is used, the small bore pipe and orifice cap and associated fittings shown on Figure 5-2 can be removed and the reuse tank used for water supply only. All roof tank overflows should discharge to a location approved by WCC.

Water tanks for reuse would normally be the larger size needed to store water during dry periods i.e. typically 8 to 25 m^3 capacity. Debris protection, such as screening mesh on the contributing spouting or a Rainwater Leafslide device on the downpipe to the tank should be installed in accordance with the manufacturers specification to reduce debris into the tank. Other water quality issues to be considered when using rainwater for non-potable supply are the type of roof and spouting materials used and possibly filtration.

Should detention storage for roof runoff be incorporated into the reuse tank, the orifice diameter and detention storage head are shown in Table 5-3 for tank sizes in the range 8 to 25 m^3 capacity. These tanks have diameters of typically 2.18 to 3.55 m. As can be seen from the table the detention storage requirement is small compared to the total storage in the tank.

Table 5-3 – Orifice Diameter and Detention Storage Head incorporated with Reuse Tank

Roof Area (m2)	2.18 m Diameter Tank (8.475 m^3)		3.55 m Diameter Tank (25.2 m^3)	
	Orifice Diameter (mm)	Detention Storage (mm)	Orifice Diameter (mm)	Detention Storage (mm)
<25	20	110	25	40
26-50	25	150	25	70
51-75	25	200	25	100
76-100	30	350	30	120
101-150	30	420	30	200
151-200	30	600	30	300



NOTES:

1. REFER TO ARC TP No. 10 FOR REUSE TANK SIZE
2. REFER TO TABLE 5-4 FOR ORIFICE PIPE AND FITTINGS DIAMETERS
3. ENSURE GROUND BENEATH TANK FOOTING MATCHES SUPPLIERS SPECIFICATIONS
4. FIT UNISEAL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION
5. FIT DEBRIS PROTECTION TO ROOF DRAINAGE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION
6. HOLES DRILLED THROUGH TANK WALL TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION

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LAYOUT OF WATER REUSE AND DETENTION ROOF TANK

Figure No. **5-2**