

Infiltration trench

How to construct an infiltration trench at a lot scale

Acknowledgement – the information in this fact sheet has been adapted from the practice notes prepared by Storm Consulting for the Little Stringy Bark Creek Project. For more information on this project please visit the project website - <u>http://www.urbanstreams.unimelb.edu.au/</u>

What is an infiltration trench?

Building an infiltration trench below ground is an easy way to protect the health of our local waterways without compromising the useable area within your property.

Infiltration trenches are gravel-filled and designed to receive stormwater. A trench can take water from a downpipe, overflow from tanks, or from pipes draining hard surfaces such as driveways or paving. Trenches are lined in non-woven geotextile and filled with gravel (such as scoria). The geotextile is wrapped over the top of the gravel and this can be covered by soil with a grass surface, or even a concrete driveway.

An infiltration trench helps protect our streams and rivers by replenishing groundwater and reducing stormwater flows. An infiltration trench can be any shape, though an elongated rectangle shape is the simplest and the best.

Please note: A certified plumber must be used for stormwater connections and modifications.



Figure 1. Completed infiltration trench (above) and trench during construction (right)



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Building your infiltration trench

Step 1- Getting Started

Location

While it is best to build your trench as close as possible to a water source such as a downpipe, rainwater tank overflow, or drainage pit, an infiltration trench should be positioned at least five metres away from any permanent structure (i.e. house, garage or shed). If you plan to build your trench within five metres of a permanent structure, it is recommended that a PVC liner be used on the vertical side of the trench closest to the structure. You should also avoid building an infiltration trench on a steep site, unless it is designed appropriately.

Size

You need to make sure that your infiltration trench is large enough to manage the amount of stormwater it will receive, or include an upstream treatment like a rainwater tank to reduce the volume the trench will receive. If your trench is going to capture run-off from the roof via a downpipe, determine the area of your roof that drains to that downpipe. Your infiltration trench may also be connected to the overflow of a rainwater tank. Table 1 below will help you determine how big you infiltration trench needs to be.

	Length of infiltration trench required (m)		
Impervious Area (m²)	3kL tank connected to to toilet, overflow to trench	3kL tank connected to toilet and washing machine, overflow to trench	Infiltration trench (with no tank)
10	1	1	1
50	2	1	3.5
100	4	2	7
150	9	3	11
200	13	5	15
250	17	7	19
300	22	9	21
350	29	13	25
400	35	19	29
450	41	25	33

Table 1: Length (m) of filtration trench required to meet standards, for various impervious areas and configurations



Your infiltration trench should be 800mm deep, and 450mm wide, as shown in Figure 2 below. To comply with the DTS table you must have 200mm of soil cover over your trench. Soil cover less or greater than 200mm will not perform as well and not meet the standard. Therefore, the minimum depth you need to excavate for your trench is 1000mm. You will require a permit to excavate any deeper than 1m. The length of your trench will vary depending on the impervious area it is treating, and whether you have a rainwater tank.





Figure 1. Completed infiltration trench (above) and trench during construction (right)

Underground services

Be aware of any underground services (gas, electricity, water) that run near your house or under your garden as this may determine where you can build your trench. To determine the location of underground services on your property, call Dial Before You Dig, on 1100, or visit <u>www.1100.com.au</u>. If your property is serviced by a septic system, you may need a licensed plumber to determine its location. Infiltration trenches should not be built over or in close proximity to a septic system.

Soil type

Areas with high groundwater tables should be carefully considered. If water appears in the trench during excavation (without rain) you should reconsider the location of the trench or consult a drainage engineer. It takes longer for water to infiltrate in clay soils than sandy soils. If you're unsure or concerned about groundwater, it may be an idea to dig a small hole to the same depth as your proposed trench and leave it open for a few days to see if it fills with water. This is best done with an auger, however, a small spade will work as well.





If the hole fills with water then this is most likely groundwater. Groundwater levels can fluctuate, so you might consider adjusting the depth of your trench so that the base is slightly above the groundwater level, or consider moving the trench to a higher location.

Handy Hint – Water infiltration into soils near permanent structures can cause the ground to shrink or swell which can cause cracking, subsidence or foundation failure. This can be avoided by locating your infiltration trench at least five meters away from any permanent structure or by using a PVC liner.

Materials and tools

Having all your equipment ready will make building the trench easier. The following tools are recommended for building a trench:

- Tape measure
- Shovels
- Rakes
- Spirit level
- Wood stakes
- String
- Small backhoe with caterpillar treads (optional)

Make sure you have your fill materials ready at hand before you begin construction. A materials list has been provided below in Table 2. Quantities shown are for a 2m infiltration trench. While item prices may vary depending on the materials you select, building a 2m trench is likely to cost between \$350 and \$450, plus the cost of a plumber.

Stormwater reconnection





Figure 3. Scoria and pipework in trench

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Step 2. Excavation and Pipe Infrastructure

Once you have determined the location and size of your infiltration trench mark it out using small wooden stakes and string. Excavate the trench as shown in the diagram. You may need an excavator or machinery to help with the excavation.

Note: Caution must be taken for trench excavations greater than 1.0m deep, as planning permits may be needed along with specific safety procedures.

- Ensure that the base of the trench is free of loose material.
- A licensed plumber should determine how and when to disconnect your downpipe to ensure that the area is not flooded during construction. A temporary diversion may be required.
- It's important that no leaf litter or debris enters the pipe to the infiltration trench as it will clog up the system.
- It's recommended that any down pipes or connections to the underground pipe system have a first flush diverter to capture this material (see Figure 4 at right). It may also be worthwhile installing mesh over your gutters to prevent leaf litter from entering them at all. Your plumber can advise on the potential options.
- Have a plumber place the inflow pipe into the infiltration trench so that the top of the pipe will have at least 50mm of gravel above it. Place the 90° bends as shown in Figure 2 and run the slotted pipe horizontally, 50mm above the base of the trench, with no grade. Install the last 90° bends to bring the stormwater back up as shown. The inlet/overflow should be at least 200mm below the finished ground surface. You can use two 45° bends in replace of a 90°bend.
- Place the geotextile on all sides to prevent any loose material falling into the trench. Ensure the inflow and overflow pipes are cut and sealed through the geotextile and the pipe running on the trench base sits 50mm above it.

Figure 4. Infiltration trench dugout

If your trench is positioned less than five metres away from a
permanent structure, you will need to line the vertical side of the trench closest to that structure with builders
plastic. To do this, place the builders plastic on the vertical face. Ensure that each new piece of builders plastic
overlaps by 200mm. Seal the joins with duct tape. Do not line the base of the trench with the builder's plastic
as this will prevent infiltration.

• Your plumber will then connect the infiltration trench overflow back into the existing stormwater system on the property.





Did you know the legal point of discharge is the point at which your property discharges to stormwater? This point is specified by council and should not be altered without council approval

Material	Quantity		
20mm drainage scoria or gravel	2.0m ³	Note: <i>l/m= linear metres</i> <i>m²= square metres</i> <i>m³= cubic metres</i> <i>mm= millimetres</i>	
90mm diameter uPVC 90° bend or 45° bends	4 or 8		
90mm diameter uPVC extension*	1 l/m	*Length subject to change depending on distance	
90/100mm diameter slotted uPVC pipe	2 l/m	from house **Length subject to change based on location of existing stormwater pipe	
90mm diameter uPVC grated end cap	1		
90mm diameter uPVC pipe	1 l/m		
Geotextile wrap	6.0 m ³		

Table 2. Material list for building an infiltration trench. Please note quantities shown are for a 2m trench

Step 3. Drainage Media

The infiltration trench should be filled with a clean (washed) drainage media, such as scoria or crushed rock. Scoria particles have a lot of space between them, allowing a scoria layer to store a large amount of water. Water is stored in the trench allowing it to slowly infiltrate into the surrounding soil.

Method:

- Add 20mm diameter drainage scoria or crushed rock (do not use recycled concrete) to the required depth below the surface, usually 200-300mm.
- Fold over the remaining geotextile so that the rockwork is covered.
- Top up the remaining 2300mm with fill material from the excavation. Make sure you mound it up slightly (30-50mm) to allow for consolidation.
- Finish your trench with either topsoil and grass or even the base and finish of concrete or permeable paving.

Maintenance

Once established, infiltration trenches are low maintenance, but there are some things to watch for including:

- 1. Check your gutters for leaves and debris. Remove them if necessary.
- 2. Clean out the first flush diverter if you have one.
- 3. Remove any sediment or build up from the downpipe.
- 4. Check to make sure water is still coming out the overflow pipe.



Figure 5: Scoria drainage media

