

LESSON 1 SCOPE AND NATURE OF WATER MANAGEMENT

Water is great to have in a building, a farm, park, or garden; provided it is kept where you want it. Wherever you have water, you need waterproof membranes to keep it confined. When water escapes it is going to be soaked up by the nearest absorbent material, and when that material becomes saturated, it will move on, overflowing into other places.

When is water a problem?

- When it leaks from ponds, pipes, downpipes, guttering, drains, tanks, or anything else intended to hold it.
- When it makes the ground wet and slippery.
- When it creates moisture that causes mould, fungi, algae etc to grow – making paths slippery, indoor environments unhealthy.
- When it makes the soil too wet for plant growth.
- When it creates moisture where moisture can cause deterioration (e.g. moist metal can rust, moist wood can rot, moist buildings can breed mould, wet ground can become difficult to walk or drive a vehicle on and may kill some plants).
- When it reduces access to places.



Improving drainage in a vegetable patch can be as simple as creating mounds and gullies between, and growing vegetables on the mounds.

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column.

Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.

WHAT NEEDS TO BE WATERPROOFED IN THE BACKYARD?

Roofs (Greenhouse, Garden Shed, Carport, Gazebo, Summer House)

There are several things that can cause leaks allowing water to enter through roofs:

- Cracked flashing – Flashings are pieces of metal installed under shingles and on roof joints to create a waterproof barrier. Tar used for sealing a flashing can corrode, exposing the flashing to the elements causing it to crack.
- Damaged shingles – Heavy winds and rain can damage shingles.
- Improperly sealed valleys – A valley is where two roof planes meet. This area is usually sloped. If it is not sealed properly, water can easily enter as it runs down the roof. This may occur where the valley has not been sealed correctly in the first place, or where it has cracked due to being stepped upon or where heavy rain or ice have caused it to erode.
- Clogged gutters – Gutters are meant for draining water from the roof. When they are clogged with leaves and debris, this drainage is interrupted, causing rainwater to pool on the roof, increasing its chance to seep through cracks.
- Incorrectly sealed greenhouse roof – When greenhouse roof panels and roof vents are not installed and

sealed correctly, water can leak into the greenhouse. This can create an overly humid environment promoting mould and mildew which can negatively affect the health of plants and people within the greenhouse.

A leaky roof can cause a range of problems:

Mould and Mildew

Water entering through leaks in the roof can create a humid environment inside the building which promotes the growth of fungi, such as mould and mildew. Mould may not only compromise the structural integrity of the building, it may also cause health problems for people entering the building. Certain strains of mould, such as black mould, are toxic and may cause respiratory and neural problems. Mildew can also cause health problems by triggering allergic reactions.



Poor drainage behind a brick wall can be indicated by salt deposits left behind by salty water seeping through the wall.

Structural Damage

Water entering through leaks in the roof slowly seeps down and is absorbed by building materials, such as wood and concrete. Once these materials have absorbed a certain amount of water, they begin to lose their shape and strength. Wooden frames and beams become soft and warp. Concrete walls and foundations begin to soften and crack.

Constant exposure to water can also cause the building material to decompose and rot. A wooden frame, for example, then becomes soft and spongy, reducing its ability to carry weight. If the wooden frame of the roof begins to rot, this can cause the roof to cave and collapse.

Roof Damage

Before water damage spreads to other areas of the building, the roof itself is affected. In metal roofs, water may enter into seams and bolts. This can cause rusting and deterioration of roof materials. In wooden roofs, water damage can cause the frame to deteriorate and lose its ability to hold weight. It can also cause problems with roof tiles and shingles on top of the roof.

Electrical Problems

It is well known that water and electricity do not mix. Water dripping through the roof to parts of the building with electrical wiring can cause problems. Water in electrical wiring can generate an electrical charge within the wire that can cause the fuse to blow and may inflict serious harm on anyone coming in contact with it. It can also initiate sparks which can cause the building to catch fire.

Rooftop Gardens (eg. on a veranda)

Rooftop gardens (also called green roofs) can be constructed on pitched or flat roofs, or verandas. They consist of vegetation growing on a substrate layer containing landscaping materials and drainage. Below the substrate layer is a protective waterproofing membrane to prevent seepage of water into the building below.

The waterproofing membrane must be strong enough to support the weight of the garden and robust enough to withstand gardening chemicals and various weather conditions. It must also be flexible enough to allow expansion to accommodate thermal or physical movements of the structure.

The waterproofing membrane must furthermore be root proof. Plant roots penetrating into the waterproofing material in search for nutrients can cause damage resulting in water leakage. Synthetic waterproofing materials are generally less likely to be penetrated by plant roots than organic materials, such as Asphaltic Bitumen which was often used for waterproofing rooftop gardens in the past.

Retaining Walls

Retaining wall materials such as concrete blocks, masonry and bricks are porous by nature, allowing water to penetrate from the adjacent soil to the interior space. Water in the wall can cause various problems, such as concrete cancer: Steel supporting rods exposed to water corrode; the steel then expands resulting in spalling (the cracking of surrounding concrete), further exposing the steel to the elements, accelerating corrosion.

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Suggested Tasks

Take a short stroll around your neighbourhood (or your property).

Observe the roofs of buildings. See if you can notice any damage to roof coverings. Look at the flashings. Pay attention to gutters and downspouts.

Can you see any evidence of water damage? Consider what has caused the damage. How might it have been prevented? What is needed to fix it?

Waterproofing membranes can help prevent water migration. The materials must be able to withstand ponding water, i.e. water pooling on a surface. This is particularly relevant for waterproofing material below ground, as water tends to pool at the footings. Waterproofing materials that cannot withstand ponding water will deteriorate over time and leak water. Damage can also result from sharp materials (e.g. gravel) puncturing the waterproofing membrane during backfill.

In addition to waterproofing, effective drainage is also important to avoid the build-up of water pressure (also known as hydrostatic pressure) behind the wall causing cracking or bulging. Drainage can be achieved by using a minimum of 300 mm granular material in the backfill (e.g. gravel). Perforated pipe (i.e. agricultural drainage pipe, also known as ag pipe) may also be used to carry water away from the wall and feed it into a storm drain.

Ponds

Tree roots may damage concrete ponds causing them to leak. Cracks may also occur due to temperature fluctuations. Waterproofing or liner replacement are required.

Pond waterproofing membranes should be durable, UV stable and resistant to plant root penetration. They usually have a lifetime of approximately 5-10 years. Excessive exposure to the sun and poor installation can however speed up deterioration. For example, if there is a lack of padding installed between the liner and the rocks beneath, water pressure can cause the liner to tear against the rocks.

Poor pool design resulting in additional water pressure can also reduce waterproofing efficiency. Pond shapes, such as sharp turns, can cause weak spots.

Swimming Pools/Spas

Swimming pools may leak water for various reasons.

Exposure to the elements may cause joint sealants to dry out and harden, resulting in loss of elasticity and effectivity.

Swimming pool materials such as tiles, concrete or gunite are porous and prone to water penetration. Swimming pools therefore require waterproofing, in order to keep pool water in the pool and ground water out. The material used for waterproofing must be able to withstand the prevalent water pressure. It must also be able to resist the chemicals used in the water. If the waterproofing material is damaged, cracks may appear, causing water to leak from the pool. Water loss can cause damage to the surrounding area and cause the finish coat to deteriorate. It can also cause damage to the reinforcing steel in the concrete or gunite pool.

Ground water accumulating outside the pool shell may cause deterioration of the pool finish. For this reason, waterproofing materials need to not only withstand water pressure from the pool itself, but also from surrounding ground water.

Floors

It is particularly important that floors in rooms with active plumbing, such as bathrooms and laundries, are waterproofed properly. Not only burst