Drainage requirements

When undertaking site preparation, consideration must be given to all stormwater and overflow disposal to protect the building and adjoining properties from adverse effects during and after construction. In practice, surface drainage must be designed to drain water away from buildings.

A summary of the [Building Code of Australia](http://www.masterbuilders.asn.au/laws-codes-and-regulations/building-act/building-code-of-australia) (BCA) requirements relating to drainage is provided below. Members can also [contact Master Builders](http://www.masterbuilders.asn.au/contact-us) for further guidance and advice.

Building Code of Australia requirements

The BCA requires surface water resulting from a storm, which is collected or concentrated by a building or site work, to be disposed of in a way that avoids the likelihood of damage or nuisance to any other property.

Under the BCA, Volume Two (Section 3, Part 3.1.2.3 *Surface water drainage*), surface water is required to be diverted away from Class 1 buildings as follows:

* The finished ground level adjacent to buildings must be drained to move surface water away from the building and graded to give a slope of not less than 50mm over the first one metre from the building.
* Finish slab heights for slab-on-ground must not be less than 150mm above finished ground level or 100mm above sandy, well-drained areas or 50mm above paved or concreted areas that slope away from the building.
* The ground beneath suspended floors must be graded so that the area beneath the building is above the adjacent external finished ground level and surface water is prevented from ponding under the building.

If compliance with the BCA ‘deemed-to-satisfy’ cannot be achieved, a drainage system for the disposal of surface water must be constructed and be capable of channelling stormwater to an appropriate outfall, which will avoid entry of water into a building and avoid water damaging the building.

To minimise any problems to properties resulting from ground surface and roof water runoff, contractors should refer to [AS/NZS 3500.3:2003 *Plumbing and drainage – Stormwater drainage*](http://infostore.saiglobal.com/store/Details.aspx?productID=373023).

AS/NZS 3500.3 is a deemed-to-satisfy document for the design and installation of stormwater drainage associated with Class 1 and 10 buildings where drains can be made directly to a nominated discharge point.

Discharge of storm water

The legal discharge point for storm water from a building site is generally determined by local government, and the point varies according to the location of the site. For example, in the city it may be the curb or inter-allotment drainage system, whereas in a rural environment it may be a rubble pit or, in rare instances, an overland flow.

[Rainwater tank requirements](http://www.masterbuilders.asn.au/building-and-planning/technical-information/water-tanks) also need to be considered.

In most cases the local authority will have a specific detail for each situation.

Storm water drainage is not a closed system, nor is it under pressure. The best way to think of it is as a funnel, and like a funnel, the drainage system will accommodate the overflow, but it will need a reservoir to manage the excess capacity. Additional drainage such as yard gullies may need to be considered to manage this effectively.

The prime consideration is the head of the drain and the relationship to the finished floor level to the structure. Depending on the design, if the drain backs up, the highest point is where the most effect will be noticed.

The amount of hard surfaces incorporated into the landscaping should also be considered, as this will increase the requirements for drainage.

If the structure is located on the lower side of the roadway, the driveway will most likely ramp to the garage. This will cause difficulties if the construction of the driveway is not designed to accommodate the surface water. A grated drain at the garage door as a ‘last line of defence’ is good practice; however, if it is the only defence, then it is suggested that additional thought be given to surface drainage.

Control of surface water

Where [retaining walls](http://www.masterbuilders.asn.au/building-and-planning/technical-information/retaining-walls) or stabilised cut and fill construction methods are employed the discharge of overflow disposal must be considered. For example, damming of water adjacent to structures and concentrated flow from drains when discharged at the outfall may cause a nuisance.

It must be remembered that all soils are affected by water and this moisture can migrate around and under buildings. The use of suitable ground covers such as paths and patios can help lessen excessive moisture variation in soils around buildings and reduce extreme seasonal influences on the founding soils.

It is common practice in residential developments for natural drainage to be used as much as possible. This achieves cost effective design and housing layout. Natural drainage methods often allow water to percolate into the soil and recharge the groundwater system.

Design of surface drainage

Surface drainage may be provided by adjusting around slopes to allow for run-off of stormwater to discharge away from permanent structures.

The design of this form of surface drainage system is based on the amount of rainfall that needs to be carried away at any given time. The run-off is the portion of rain that finds its way into natural or artificial channels, either as surface flow during the storm period or as subsurface flow after the storm has subsided.

It is important to consider all these factors when planning and siting a building, because when a foundation is constructed, it covers or protects an area of bearing soil.

The causes of moisture imbalance around and within the foundation area can be subject to variations in natural ambient conditions (rain, heat, wind) and/or human-created conditions such as planting of vegetation adjacent to the building.

Changes in soil moisture around and under the foundation contribute to substantial forces which may ultimately cause foundation deflections and failure – particularly in residential or light commercial construction.

It is essential that all environmental factors are considered in the design and construction process, and that the structure is maintained for its life.

This is achievable by:

* Footings designed by an engineer
* Adequate site drainage (surface and subsurface)
* Keeping of gardens and trees away from the structure
* Maintaining all in ground services.

Foundation movement

Another important factor to consider is the likelihood of foundation movement associated with reactive clays which shrink and swell as their moisture content changes. Such movement can cause serious cracking in buildings.

Therefore, it is important to place drains uphill of the footings so as to divert water around the footings and away from the site.

Need more information?

Footing systems should be designed and constructed in accordance with [AS 2870-2011*Residential slabs and footings*](http://infostore.saiglobal.com/store/Details.aspx?ProductID=1445846). The Commonwealth Scientific and Industrial Research Organisation (CSIRO) also produce a useful guide on what can be expected from a footing system in [*Foundation Maintenance and Footing Performance*](http://www.publish.csiro.au/pid/7076.htm).