New WAter Ways

www.newwaterways.org.au

Water sensitive urban design

Infill stormwater quantity management in strata/multi-dwelling developments

Summary

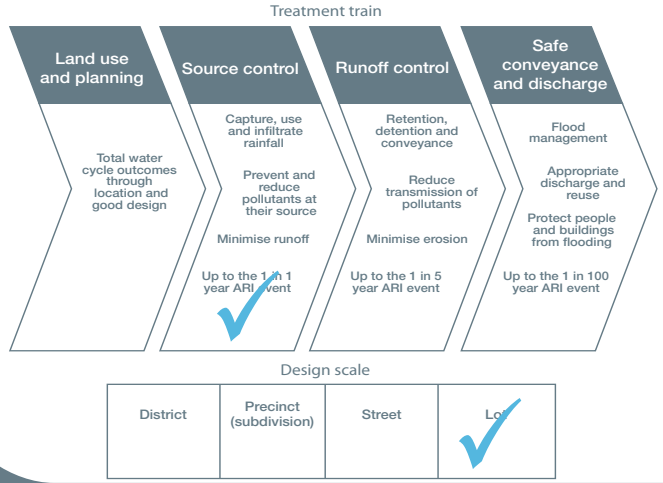
Development that increases the proportion of land that is covered by roof and/or hardstand areas also increases the amount of runoff.

Increased runoff from higher density infill developments can create issues on and off site, including flooding, erosion, property damage and reduced water quality.

Suitable stormwater management for strata and multi-dwelling developments is dependent on the capacity of local drainage systems, groundwater levels and soil characteristics.

Improved outcomes can be achieved where infiltration devices incorporate vegetated assets such as tree pits, roof gardens and biofilters.

Consultation with Local Government is required for all infill developments. This will determine the extent of on-lot or in road reserve retention/detention that is required or establish the extent of local drainage system upgrades required to accommodate any runoff increases.



Main benefits

- Reduced run-off
- Management of rainfall within the lot
- Reduced flooding of buildings and roads
- Improved water quality management
- Reduced impacts on receiving environments including waterways, wetlands and beaches
- Increased urban amenity and reduced urban heat where combined with vegetated stormwater infrastructure

Design criteria

- Retain/detain the first 15 mm of rainfall on-lots (or in-road reserve).
- Protect people and property from flooding by constructing building floor levels at least 0.3 m above the 1% AEP flood level of the local drainage system.
- Install water quality treatment infrastructure for the first 15 mm of rainfall where on-lot (or in-road reserve) retention/ detention cannot be achieved.

Design factors

- Avoid cut and fill on the block when preparing the building foundations. Attempt to maintain the existing topography and drainage pattern.
- Retain and plant vegetation, particularly deep-rooted trees which lower the watertable, bind the soil, filter nutrients, decrease runoff volumes and velocities, capture sediment and reduce urban temperatures.
- Direct stormwater to vegetated areas including garden beds, lawn, biofilters and tree pits.
- Maximise the capture of rainwater for re-use at or near the source.
- Minimise the area of impervious surfaces such as paved areas, roofs and concrete driveways.
- Install pervious paving in driveways and carparks as an alternative to impervious surfaces and green roofs as an alternative to conventional roofs.
- Reduce potentail for erosion on site by reducing exposure of unstable surfaces through timing and management of site works. Employ sediment traps and divert ‘clean’ stormwater around the disturbed site.
- Use overland flow wherever practical when stormwater runoff is conveyed from a lot.
- Where there is limited capacity for local drainage systems to accept increased runoff, additional on-lot (or within road reserve) retention/detention may be required as specified by the relevant Local Government.
- Where extensive infill development is proposed, it may be more cost-effective to upgrade the local drainage system than to provide increased on-lot (or within road reserve) retention/ detention throughout the catchment.
- Where effective infiltration is limited by soil type or shallow groundwater, detention systems should be designed to discharge at a rate that can be accommodated by the downstream drainage system.

Sources:

- http://www.boddington.wa.gov.au/profiles/boddington/assets/clientdata/document-centre/local_planning_policy_17_stormwater_management_2.pdf
- http://www.armadale.wa.gov.au/sites/default/files/assets/documents/docs/Design_and_Construction/Stormwater%20Management%20Handbook%202014.PDF
- http://www.yourhome.gov.au/water/stormwater
- https://www.arrb.com.au/admin/file/content13/c6/SR34_StormDrainageDesign.pdf
- http://www.waterbucket.ca/rm/sites/wbcrm/documents/media/55.pdf

New WAter Ways

www.newwaterways.org.au

Water sensitive urban design

Infill stormwater quantity management in strata/multi-dwelling developments

Legend:

- 15 mm retention/detention on-site
- 20% AEP retention/detention on-site
- 1% AEP retention/detention on-site
- Example site - Sand
- Example site - Sandy clay
- Example site - Heavy clay
- Reference site - showing 15 mm retention/detention on-site in infiltration cells

Assumptions and parameters:

Minimum 1.5 m clearance from groundwater to provide sufficient depth for infiltration systems including minimum cover requirements and 0.3 m from base to groundwater.

Infiltration rates assumed for various soil conditions:
- Sandy - 4.3 m/day
- Sandy clay - 2.5 m/day
- Heavy clay - 0.5 m/day

1.2 m deep, 1.2 m diameter soakwells applied to reference site.

Modular underground infiltration systems applied elsewhere, with dimensions:
- Detention depth = 0.7 m
- Base area - 2.98 m^2

Traditional residential lots (reference site):
Two lots = 2,000 m^2, R10
- 20% roof
- 60% garden
- 20% hardstand

Multi- residential lots/dwellings:
8 dwellings = 2,000 m^2,
approx. R35/R40
- 75% roof
- 10% garden
- 15% hardstand

Mixed use/apartments:
60 apartments = 4,000 m^2, R100+
- 70% roof
- 10% garden
- 20% hardstand

Scale 1 : 1,500 @ A4

0 60m

N

New WAter Ways
info@newwaterways.org.au
www.newwaterways.org.au