

E10 – Salinity

The following information sheet is based on the Salinity Code of Practice - Western Sydney Regional Organisation of Councils (WSROC) 2002.

Description

Urban salinity

Salinity occurs when salts naturally found in soil or ground water move by capillary action towards the surface. Evaporation causes the salt to concentrate at the ground's surface.

In urban areas the processes which cause salinity are intensified by the increased volumes of water added to the natural system in urban areas. Additional water comes from the irrigation of gardens, lawns, and parks, from leaking underground pipes and pools, and from the concentrated infiltration of stormwater. Urban salinity can also be related to sub-surface water flows being impeded by structures such as roads, and by poor drainage conditions on a site.



(Photos: WSROC files, Western Sydney Sites)

Over the last decade there has been a widespread reliance on a single model to explain salinity process, based on Northern Victorian studies. This model uses the concept that the removal of vegetation from hills and slopes results in an increased flow of water to saline groundwater ('recharge'). This groundwater which then begins to rise, emerging at lower lying areas in the landscape discharge.

The Problem

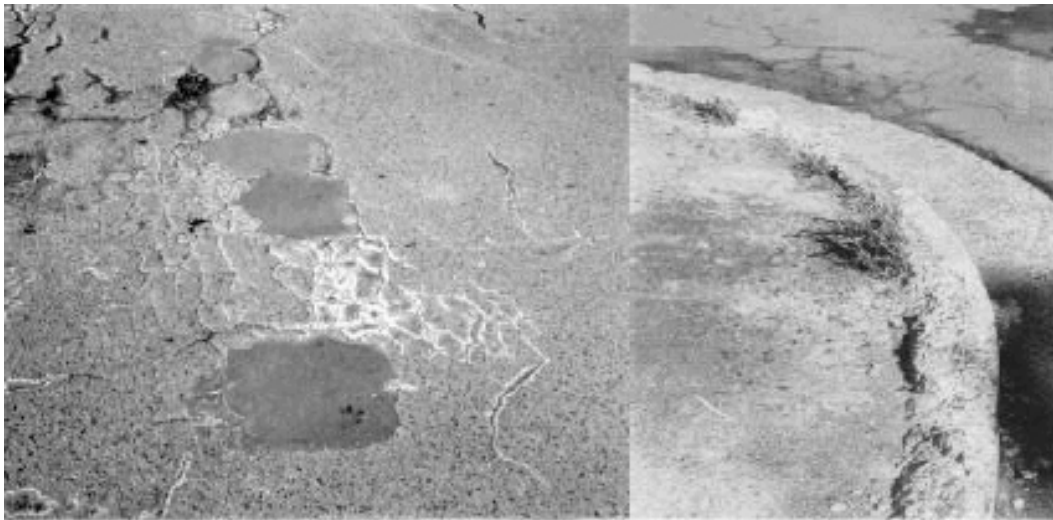
Salinity has long been recognised in Western Sydney, with references being made to saline groundwater and brackish creeks in historical accounts from the early 1800s (Mitchell 2000). The number of salt tolerant native vegetation species present suggests that the region has naturally high levels of salt in the groundwater, and that in places this groundwater is naturally close to the surface.

The surface impacts of urban salinity include damage to vegetation and may affect lawns, playing fields, and private and public gardens. Potentially salinity in urban areas could also place additional stress on remnant natural areas such as bushland, wetlands, rivers and creeks.



(Photos: WSROC files, Western Sydney Sites)

Urban salinity affects buildings, due to the chemical and physical impact of salt on concrete, bricks and metal. The salt moves with water into the pores of bricks and concrete when they are exposed to damp, salt-laden soils. As the water is evaporated from the material, the salt concentrates, and over time this can be substantial enough to cause corrosion and damage the materials structure. This is seen as crumbling, eroded or powdering mortar or bricks, the flaking of brick facing, and the cracking or corrosion of concrete. The salt within the material can also have a corrosive effect on steel reinforcing. The long-term consequences can be structural damage.



(Photos: WSROC files, Western Sydney Sites)

Underground service pipes, such as those used for sewer or water supplies may also be damaged. Increased leakage from the pipes and corroded joints can drive the salinisation processes further. Additionally the waterlogging and salts associated with urban salinity have a considerable impact on roads and pavements. The road base can be physically and chemically degraded, becoming more susceptible to cracking, pot-holing and eventual failure.

In Western Sydney urban development may contribute to salinity problems in the following ways:

By exposing sodic or saline sub-soils.

When areas are developed the processes of cut and fill, particularly for slab on ground construction, the upper layers of soils are removed or disturbed. If the lower soil profile has saline or sodic properties, this can result in the occurrence of salinity problems, and erosion.

By increasing the level of regional groundwater

Urban development tends to increase the amount of water entering the natural system. This is due to the irrigation of parks and gardens, leaking stormwater and sewer pipes, and changed stormwater flows and concentrations.

By changing soil groundwater flow

This can result in sub-soil salinity being expressed on the surface at these points. For example where roads, house slabs, retaining walls or trenches intercept the soil water flow, or create hydraulic pressure that raised groundwater.

By disturbing areas sensitive to salinity

Some areas exist in a delicate balance that, once disturbed, is difficult to restore, and rapidly deteriorates. For example, removing established salt resistant vegetation in riparian corridors could increase erosion and down stream disturbances.

Management Solutions

The Regional Salinity Working Party hosted by WSROC, was established in 1999. This group has representatives from each of the 13 Councils in Greater Western Sydney, as well as agency and development industry representatives. The Working Party is raising the awareness of urban salinity problems in Western Sydney, and is a forum where the stakeholders involved can discuss management options and the opportunities for regional cooperation.

Approaches to urban salinity management need to be pro-active and precautionary, with efforts focused on avoiding potential salinity problems when development occurs, rather than trying to treat salinity problems once they are identified. The following checklist is a guide to good practice that will minimise the risks of salinity.

Water inputs

- Infiltration of stormwater eliminated
- Water features lined to eliminate infiltration
- Underground water carrying pipes properly installed to eliminate leaks
- Existing pipes checked for damage/ leaks
- Swimming pools designed and installed to eliminate leakage and a maintenance management plan developed.

Drainage

- Disturbance of natural drainage patterns avoided
- Areas of cut and fill on sites restricted to building envelop
- Necessary slab, foundations, and retaining walls all must be designed for good drainage and to avoid water logging
- Existing areas of waterlogging and poor drainage avoided or remediated, with consideration of shrink swell hazard
- Stormwater management eliminates infiltration and considers in-house re-use opportunities
- Design and layout of driveways and service connections avoids cut, minimises impediment of natural ground water flows, and provides for good drainage
- Guttering and down pipes properly connected and maintained

Vegetation

- Areas of established vegetation maintained, and where appropriate enhanced
- Erosion/ disturbance minimised and revegetated with appropriate species
- Gardens not installed directly against property
- Irrigation properly installed to avoid leakage, and 'smart' sprinkler systems used.

Building/ Engineering

- Damp Proof Courses properly installed, and maintained throughout construction, landscaping, and finishing.
- Damp Proof membrane installed under slab (according to the BCA SA variations)
- Reduce the exposure of materials to corrosive soils, eg. raised slab or pier and beam designs, with consideration of shrink swell hazard
- Construction techniques minimise site disturbance and the exposure of sensitive soil material
- Soil management plan addresses the management of saline and sodic soil
- Susceptible construction materials avoided, eg. Seconds, porous material
- Utilise appropriate salt resistant bricks and construction materials
- Design and layout of drives and service connections minimises disturbance and exposure of susceptible soil and uses corrosive resistant material
- Disturbance of site minimised or properly rehabilitated

Further Information & Links

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