



Groundwater Management Information Fact Sheet 1: Groundwater and the Sydney Coastal Region

This fact sheet is one of five fact sheets developed from the information contained in the Sydney Coastal Councils Group *Groundwater Management – A Guide for Local Government*. For further information about the other facts sheets of the Sydney Coastal Councils Group please visit www.sydneycoastalcouncils.com.au

The drought conditions across eastern Australia combined with a greater demand on resources from an increasing population, have seriously depleted the water supplies on which Sydney depends. In response to restrictions placed on the use of mains water, there has been a significant interest amongst the community in accessing and using groundwater.

What is Groundwater

Groundwater in the broad sense is all water that occurs below the land surface. Water below the ground may be considered subsurface water, interstitial water or vadose water (Figure 1). In terms of management, only water contained in the voids or spaces of rocks and soils in the saturated or phreatic zone is known as “groundwater”.

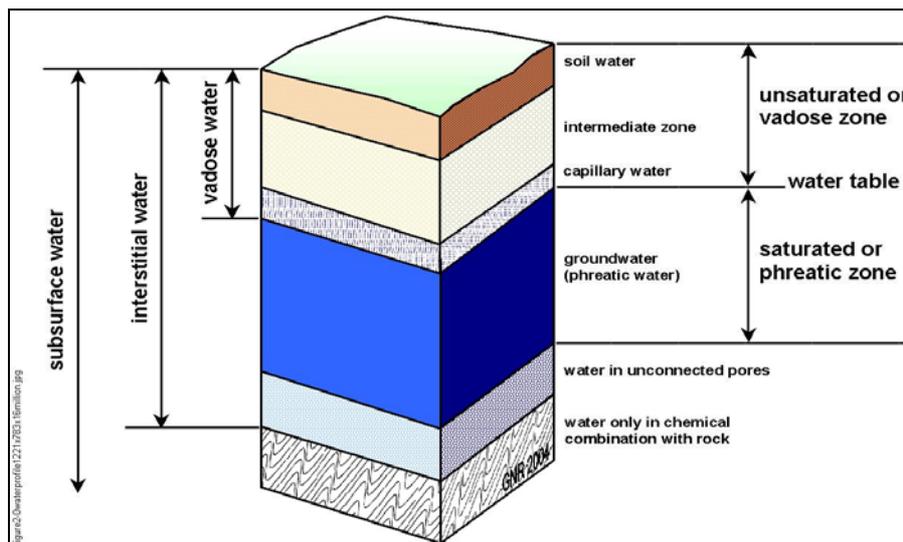


Figure 1: The water profile (modified from: Driscoll 1986, Domenico and Schwartz 1990)

Groundwater moves due to the influence of gravity and eventually reaches a discharge point where it is released to surface waters. Such surface waters in the Sydney coastal region include but are not limited to wetlands, rivers and bays. The rate at which water moves through the groundwater phase of the cycle varies considerably, from tens of metres a day, to less than a metre a year.

How is Groundwater accessed

Groundwater that is used by councils, residents and industry is accessed from groundwater aquifers.

Groundwater Aquifers

A groundwater aquifer is a geologic formation that can store and transmit groundwater in useable quantities. Aquifers generally occur within three broad groups of geological formations: unconsolidated sediments; porous rocks and fractured rocks.

The geological units and their soil types of the Sydney coastal region can be classified as follows:

- Unconsolidated sediments - Coastal sand bed deposits and alluvium.
- Porous rock - Hawkesbury Sandstone Formation and Narrabeen Group sandstones.
- Fractured rock - Wianamatta Group shale.

- From these geological formations the following aquifer types are formed:
 - **Unconfined aquifers**, these have a saturated zone below the atmospheric pressure level defined by the water table. It is representative of the level at which the groundwater and atmospheric pressures are equal.
 - **Confined aquifers**, that contain groundwater under pressure imparted by the weight of both overlying impermeable materials (overburden pressure) and water elsewhere in the aquifer at higher elevation (hydraulic pressure).
 - **Perched aquifers**, which are a type of aquifer of generally limited extent that occurs where an impermeable layer prevents the downward infiltration of groundwater.

Groundwater aquifers in the Sydney Coastal Region

Within the Sydney coastal region the following types of aquifers exist:

Coastal sand bed aquifers are readily recharged by direct rainfall infiltration. These aquifers generally have a relatively shallow water table. The Botany Sand Beds aquifer south of the Sydney CBD is a major example of this type of system.

Alluvial aquifers in the Sydney coastal region are generally of limited extent and of minor significance. In the Sydney coastal region this mostly relates to the Botany Sand Beds aquifer. However, there are smaller localised areas along the Sydney coastline, such as Double Bay, Rose Bay, Coogee, Collaroy and Manly, where such management issues also apply.

Porous rock aquifers in the Sydney coastal region contain limited quantities of groundwater because of the manner in which the water bearing zones formed.

Springs resulting from the **perched aquifer systems** may be numerous and significant on local scales in preserving a variety of vegetation and therefore the amenity of many suburban areas. The member Council areas of Hornsby, Leichhardt, Manly, Mosman, North Sydney, Pittwater, Sutherland, Warringah, Waverley, Willoughby and Woollahra are dominated by porous rock (sandstone) aquifers.

Only limited exposure of **Wianamatta Group shales** occur within the Sydney Coastal region, these aquifers are not well understood in the Sydney Coastal region, and therefore they should not necessarily be discounted as unimportant. Council areas with minor exposures of Wianamatta Group shales are in the Sydney region are Hornsby, Leichhardt, North Sydney, Rockdale, Sydney, Warringah and Willoughby.

Conclusion

Because groundwater remains mostly unseen, there is generally little understood of the potential for it to be used as an alternative water supply and the effects of its extraction of surrounding environments. Additionally, within the Sydney coastal region there are a diverse range of aquifers whose characteristics need to be fully understood before groundwater extraction occurs.

Recommendation

Based on the information contained in this fact sheet and the *Groundwater Management – A Guide for Local Government*, the SCCG recommends that councils, industry and residents familiarise themselves with the groundwater characteristics and the impacts of their activities on groundwater systems. This will assist in ensuring that the use of groundwater resources adheres to the principles of Ecological Sustainable Development.

For more information on groundwater management please see the other fact sheets in the series. All fact sheets are available at www.sydneycoastalcouncils.com.au.

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