GROUNDWATER AVAILABILITY IN THE HUNTER VALLEY CATCHMENT.

The following discussion of groundwater characteristics is largely based on information contained in the "Groundwater in New South Wales" 1984 report as well as the Geology maps for the 1:250 000 Tamworth, Sydney, Singleton and Newcastle sheets.

Unconsolidated Sediments

The most intensive use of groundwater is in the area from Glenbawn Dam to the confluence with the Goulburn River, including the lower reaches of the Pages River, Kingdon Ponds and Dart Brook. Alluvial depths are mostly in the range of 7 to 12 metres with yields from irrigation wells of 12 to 45 L/s. Particularly in the upstream sections, where gradients are higher, groundwater levels and yields are prone to vary with seasonal conditions, becoming lower in drought periods. Alluvium is mainly in the range of 12 to 15 metres thick in the upstream areas, increasing to about 24 metres near Denman. Saline groundwater, due to the influence of flanking rocks, is often a limiting factor in developing groundwater from marginal zones of the alluvium.

The alluvium of the major tributaries draining southwards from the Liverpool Range to the Goulburn River are influenced by the basaltic rocks of the catchments, although wells can often yield irrigation supplies of the order of 20 L/s. The tributaries draining northwards into the Goulburn and Hunter Rivers differ in that their alluvial infill is very sandy, being derived from sandstone catchments. Because of the instability of the sands, wells are usually unsatisfactory as an abstraction method and spear point or an artificially gravel packed bore is required to sure up a consistent water supply. Yields of up to 25 litres per second are often obtained from depths of 12 to 14 metres.

Reasonably favourable groundwater conditions are found further downstream in the Hunter Valley as far as the estuarine sediments just beyond Maitland. However, the alluvium tends to be restricted in width. Where it is extensive, such as in the Singleton area, much of it is shallow and low yielding with only the deeper zones 9 to 15 metres, being productive.

The extensive low lying flats in the area downstream of Maitland have limited groundwater potential. Shallow wells provide limited supplies suitable for stock, but in drought periods may be prone to diminished yields and deterioration in water quality. Because of their formation, beyond about six metres, the groundwater becomes brackish or saline. The levee banks along the river banks due to their greater elevation and more permeable sediment than the main flats, can provide better quality groundwater. Downstream of Maitland spear points in the levees provide supplies suitable for domestic and small scale irrigation use. Because of the proximity to the tidal regime, particular care to ensure that no over pumping occurs, else saline intrusion may result.

The Tomago sandbeds aquifer has supplied 5-10% of Newcastle's water supply in recent years and 100% of the supply for the Nelson Bay-Port Stephens area. Yields of up to 40 litres per second can be obtained from individual bores. However, because of their hydraulic connection with bodies of saline water, great care is required to avoid over-using the groundwater and causing saline intrusion. Direct hydraulic connection between the surface and the groundwater requires consideration in the type of surface activities permissible to avoid contamination of the groundwater resource.

Porous Rocks

The porous rock aquifers for the Hunter occur in two sedimentary basins: Sydney Basin, and Oxley Basin. The sedimentary rocks of sandstone, sandy shale, and shale in these basins have only been slightly disturbed by earth movements and often the original intergranular porosity is still present. Secondary porosity in the form of joints, particularly along the bedding planes, has also developed in some strata. Where the Mesozoic rocks are underlain by the older Permian strata, forming part of the basin structure, secondary porosity is usually dominant.

Sydney Basin

The Permian units comprise both marine and coal measure sequences and outcrop along the margins of the Basin, the valleys of the Goulburn and Hunter Rivers. Groundwater occurs in both the porous and fracture systems, but because of their depositional environment it is mostly brackish and sometimes too salty for stock. Because of this, the baseflow of streams draining these rocks tend to markedly increase in salinity in drought periods; the quality of groundwater in alluvium flanked by Permian rocks may also be adversely affected. Bores usually obtain water of stock quality at depths between 30 and 100 metres, and yields between 0.25 and 2 L/s.

Overlying the Permian formations in the south western portion of the river basin is the Narrabeen Sandstone of Triassic age. Bores usually obtain water of "marginal" quality at depths ranging form 40 to 100 metres and yields in the order of 0.2 –2 L/s can be expected.

Oxley Basin

The Oxley Basin situated between the Sydney Basin and the Great Artesian Basin is stratigraphically related to both but is not hydraulically connected to either. It consists mainly of sandstones and shales of Triassic and Jurassic age, which are overlain by a considerable thickness of Tertiary basalts forming the Liverpool Ranges. Bores into the Jurassic sandstone usually obtain household and stock water at depths ranging from 80 to about 160 metres.

High yielding "fresh" supplies are available from both the sandstone and fractured basalts near Merriwa and Cassilis. These supplies appear to be a localised feature and are confined to the dominant drainage lines close to the interface with the sandstone and basalt. Bores for the town water supplies of Merriwa and Cassilis obtain yields of greater than 8 litres per second in localised areas. Prospective bores should consider the potential for higher yields of good quality water available from deeper bores in similar hydrogeologic terrains.

Fractured Rocks

The north eastern part of the Hunter River Basin is occupied by metasediments of Paleozoic age. Aquifers within this area will vary in their groundwater potential being dependant upon topography and rock type. Bore depths vary from 15 to 90 metres with yields varying from 0.2 to 1.5 litres per second, occasionally higher yields can be expected where major fracture zones are intersected. The water quality is classified as "marginal" however water quality will vary from "fresh" to "brackish" or "saline" depending on the local geologic conditions. Topographic lows or valleys generally provide the most favourable groundwater conditions in these fractured rocks due to the shallower nature of the water table, fractures tend to be more open, and there is less seasonal variation in water table levels.

The basalts forming part of the Liverpool Ranges and overlying the Jurassic sandstones provide useful supplies of "fresh" to "marginal" quality groundwater. Yields of up to 1.0 litre per second are common, with higher yields found in localised areas, eg. Merriwa, and Cassilis. Depth of bores drilled into the basalt can be expected to be in the order of 50 metres. Yields,

water quality and depth to aquifer will be affected by local geologic and topographic conditions, with variations occurring even within the local catchment.

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