

Carrick-on-Suir GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
16 – Suir Waterford Co Co S. Tipperary Co Co Kilkenny Co Co		Duag, Glengalla, Glenboy, Nier, Glasha, Clodiagh (Portlaw), Blackwater (Kilmacow), Suir, Smartcastle Stream, Blackwater (Kilmacow), Lingaun,	Portlaw Woods, Fiddow Island, Lower River Suir	116
Topography		The outcrop area of the Kiltorcan Sandstone best defines the area of this aquifer. The Kiltorcan Sandstone is found along the foothills of Slievenamon, the Comeragh Mountains and the Knockmealdown Mountains. Therefore the land surface slopes up towards the contact with the Devonian rocks and falls towards the Carboniferous rocks.		
Geology and Aquifers	Aquifer type(s)	RF : Regionally Important Fractured Aquifer		
	Main aquifer lithologies	KT : Kiltorcan Formation – Yellow & red sandstone & green mudstone PG : Porters Gate Formation – Sandstones shales and thin limestones Daly (1988) described a gradual change from sandstone to shale moving upwards from the Kiltorcan and into the Porters Gate Formation, which means that separate aquifer classifications for each formation cannot be made		
	Key structures.	The rocks have undergone at least one major phase of structural deformation. The zone of cleaner sandstones around the contact with the two formations is likely to have reacted in a more brittle manner to the deformation, allowing the development of a denser network of fracturing and fracture permeability than in the shalier sandstones elsewhere in the aquifer. Significant faults are expected to cut the aquifer approximately every kilometre (Daly, 1988). Borehole logs have also shown regular jointing to be present, probably associated with faulting and folding (Daly, 1985). In the northern area the dip of the strata and the intensity of structural deformation decrease.		
	Key properties	Results of aquifer testing undertaken in the aquifer are very variable. Daly (1985) reports estimates of 5 m ² /day to 1850 m ² /day, and suggests that the highest values are likely to be associated with low-lying areas close to anticlines or faults. Daly suggests that sandstone permeabilities are in the order of 0.5 to 20 m/day, increasing up to 80m/day in localised areas. Transmissivity will be reduced at depth, where the Kiltorcan Formation is thinner in the center of the synclines and permeability is reduced by the deep burial.		
	Thickness	Geophysical borehole logging data suggest that significant water movements occur at depths of over 60m where the aquifer is not confined by overlying shaly limestones. Where confined, active groundwater circulation is expected to be much more limited, but some deep flow has been inferred from mineral exploration boreholes at depths of over 200m (Daly, 1985). Kiltorcan Formation is thinner in the centre of the synclines and permeability is reduced by the deep burial		
Overlying Strata	Lithologies	To the east of Slievenamon there are deposits of limestone-derived till which give way to sandstone-derived till which is the dominant type over the area. There are small patches of sand and gravel deposits around the area.		
	Thickness	The thickness is variable. This is because the Kiltorcan lies in a transitional landscape from mountains to river valley. Therefore depth to bedrock can vary from 1- 10m but is mostly between 3 and 5m.		
	% area aquifer near surface			
	Vulnerability	The vulnerability is also variable for the same reason as the subsoil thickness. HIGH vulnerability is most common.		
Recharge	Main recharge mechanisms	Most recharge occurs where the formation outcrops or is in hydrogeological continuity with overlying sands & gravel deposits that are scattered through out the area. There is probably considerable point recharge from the Devonian rocks.		
	Est. recharge rates	<i>[Information will be added at a later date]</i>		
Discharge	Springs and large known abstractions (m ³ /d)	Cloran (2509), Clogheen (136), Derrinlaur (5), Poulmagunoge (32), Coolnamuck, Piltown/ Fiddown (780) TOTAL = >3462		
	Main discharge mechanisms	There is no obvious discharge zone for groundwater moving at depth in this aquifer, but it probably flows via large faults and complex pathways into shallower groundwaters and from there to surface water bodies where outcrop areas are at the lowest elevations.		
	Hydrochemical Signature	Waters are 'soft' to 'moderately hard' in the sandstones and 'hard' to 'very hard' in the shales and limestones of the upper parts of the Porters Gate Formation. The hydrochemical signature varies between calcium bicarbonate and calcium-magnesium bicarbonate. Daly suggests that the signature depends on the thickness of overlying subsoil, with calcium-magnesium waters being associated with areas of thicker subsoil. The bedrock strata at the base of this aquifer are Siliceous , towards the upper parts of the Porters Gate Formation there are some Calcareous beds.		

Groundwater Flow Paths	Substantial artesian flows have been recorded in this aquifer due to the pressure of the water table in the elevated outcrop area. Evidence from drilling in the Kiltorcan Formation shows that the largest well yields are obtained at relatively low elevations, close to major structural features and where at least 40 m of the upper part of the Kiltorcan is penetrated.
Groundwater and Surface water interactions	The balance of abstraction with recharge will require careful attention, particularly if considering portions of the aquifer which are confined and/or which occur as isolated faulted blocks.
Conceptual model	The Kiltorcan & Porters Gate formations define the extent of this groundwater body in the area of Carrick-on-Suir. In plan, one meandering continuous and mostly unbroken line represents the outcrop of the rock, but this groundwater body must be viewed in three dimensions. The rocks in question extend underground underneath the Carrick-on-Suir Syncline limestones from the foothills of Slievenamon to Clonmel and Carrick-on-Suir. Down-dip towards the middle of the synclines, the aquifer becomes progressively more confined by an increase in thickness of the overlying beds. There is considerable groundwater flow through the bedrock, which is considered a major aquifer.
Attachments	
Instrumentation	Stream gauge: 16013, 16054, 16102, 16062, 16061 Borehole Hydrograph: none EPA Representative Monitoring boreholes: Waterford - Poulavanogue (#86 - S229124), Derrinlaur (#40 - S249225), S. Tipperary - Coolnamuck (#48 - S383214), Clonmel East (Kilcash) WS(#18 - 310282), Cloran (Fethard RWSS @ spring)(#47 - S280335),
Information Sources	Daly, D., Keegan, M., & Wright, G., (2001) Co. Tipperary (South Riding) Groundwater Protection Scheme. Daly, E.P. (1985). Groundwater Resources of the Nore River Basin: Hydrogeology of the Kiltorcan Aquifer System. Unpublished internal GSI report. Daly, E.P. (1988). The Kiltorcan Sandstone Aquifer. Paper presented at the 8 th Annual Groundwater Seminar held in Portlaoise, on: The future of Groundwater Development in Ireland.. Published by: IAH (Irish Group). Fitzsimons V, Buckley, R., & Hegarty, S. (2002) Co. Kilkenny Groundwater Protection Scheme Hudson M., Daly D., Duffy S., & Johnston P., (1997). County Waterford Groundwater Protection Scheme.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae