

**Knockmealdown GWB: Summary of Initial Characterization.**

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km <sup>2</sup> )
18 Cork, South Tipperary and Waterford Co. Cos.	<b>Rivers:</b> Finisk, Glenboy, Glenshelane, Crinnaghtane, Douglas, Araglin, Glennafallia, Monavugga, Owennashad, Glenakeeffe, Farnane, Glenavoggagh <b>Streams:</b> Ballard, Glencorra, Glenfinisk,	Lismore Woods (000667)?, Glenmore Woods (001933)?, Blackwater River Callows (000073)	357
<b>Topography</b>	This GWB comprises an upland area of rugged topography on the southern flank of the Knockmealdown Mountains. Elevations range from almost 800 m OD down to about 30 m OD at the foot of the hills. The limestone and Kiltorcan Sandstone of the Araglin valley (Araglin GWB) forms a small enclave wholly surrounded by this GWB. The GWB is bounded to the south and west by the contact with the higher permeability sandstones of the Kiltorcan Formation and to the north and east by the boundary of the River Blackwater catchment.		
<b>Geology and Aquifers</b>	<b>Aquifer categories</b>	<b>Ll:</b> Locally important aquifer which is moderately productive only in local zones (99%). <b>Rf:</b> Regionally important fissured aquifer (1% - 4.8 km <sup>2</sup> )	
	<b>Main aquifer lithologies</b>	Devonian Old Red Sandstones (99% -352 km <sup>2</sup> ) and small areas of Devonian Kiltorcan-type Sandstones (4.8 km <sup>2</sup> ) and Basalts & other Volcanic rocks (0.06 km <sup>2</sup> ).	
	<b>Key structures</b>	During the Variscan Orogeny (mountain building episode), rocks in the South Munster region were compressed from the south into a series of folds on east-west axes. Subsequent erosion stripped the more soluble Carboniferous Limestones from the fold crests or ridges (anticlines) exposing the harder, more resistant sandstones underneath. The Carboniferous Limestones were preserved in the fold troughs (synclines) which today line elongate east-west trending valleys separated by the intervening sandstone ridges. Extensive fracturing and faulting accompanied the folding of the rocks. The ridges and valleys are cut by series of shear faults trending approximately north-south and a series of thrust faults with a general east-west trend. The major north-south shear faults are paralleled by a very well developed system of vertical or near-vertical north-south joints.	
	<b>Key properties</b>	Permeability generally decreases rapidly with depth. In general, the ORS transmissivities will be in the range 2-20 m <sup>2</sup> /d, with median values occurring towards the lower end of the range. However, significantly higher permeabilities have been found in places, and 'Excellent' yielding wells (>400 m <sup>3</sup> /d) are known in some of the ORS units – these yields are usually associated with boreholes being situated on fault zones. Summer yields are sometimes unsustainable. Aquifer storativity will be low in all rock units. Groundwater gradients are likely to be in the range 0.01 to 0.04, but may be enhanced by overlying sand and gravel deposits which are in continuity with the underlying sandstone and provide additional storage.	
	<b>Thickness</b>	Most groundwater flow probably occurs in an upper weathered layer of a few metres and a zone of interconnected fissures often not extending more than 15 -30 m from the top of the rock, although occasional deeper flows associated with major faults can be encountered.	
<b>Overlying Strata</b>	<b>Lithologies</b>	<i>Subsoil Types identified in Knockmealdown GWB by Teagasc Parent Material Mapping (Draft): Alluvium (A); Blanket Peat (BkPt); Cutover Peat (Cut); Sandstone sands and gravels (Devonian) (GDSs); Lake sediments (undifferentiated) (L); Made Ground (Made); Marsh (Marsh); Rock outcrop and rock close to surface (Rck); Scree (Scree); Till – Devonian Sandstone Till (TDSs).</i> This GWB is primarily covered by glacial till.	
	<b>Thickness</b>	There are many areas within this GWB with subsoils of <3m and where rock outcrop is common, particularly along the higher ridges and in the incised stream valleys. Elsewhere subsoil depths of 5-10m are frequently recorded, although isolated points of deep and shallow subsoil do occur.	
	<b>% area aquifer near surface</b>		
	<b>Vulnerability</b>	Vulnerability has not been mapped for a GWPS, but by analogy with the nearby South Cork area, this GWB probably has predominantly Extreme to High Vulnerability.	
<b>Recharge</b>	<b>Main recharge mechanisms</b>	In the GWB diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. In general, the probably generally 'moderate' permeability subsoils not restrict percolation of recharge. However, the lack of permeability in most of the aquifer will tend to restrict recharge.	
	<b>Est. recharge rates</b>	<i>To be assessed.</i>	

*1<sup>st</sup> Draft Knockmealdown GWB Description –.....2004*

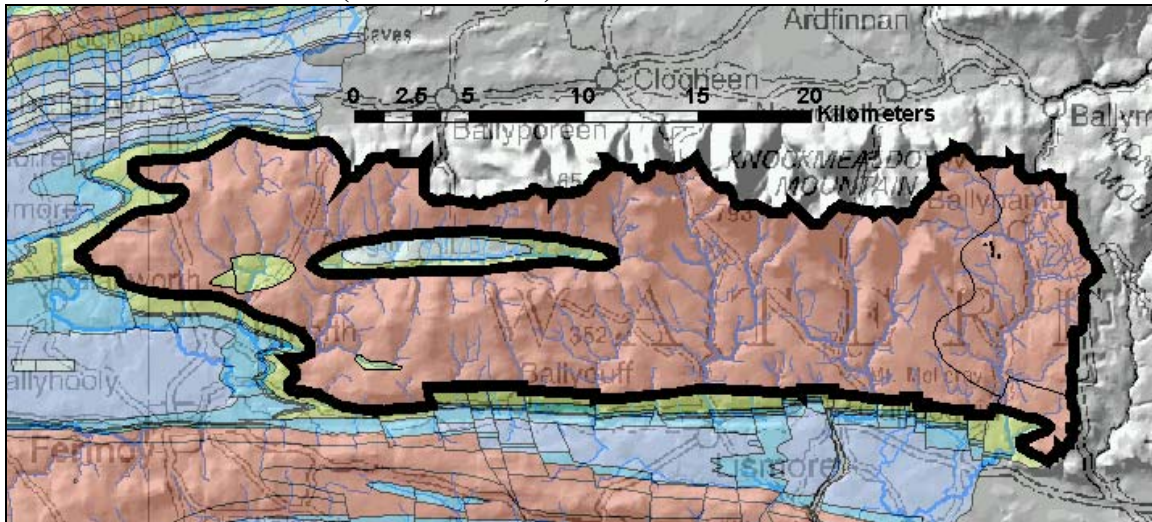
<b>Discharge</b>	<b>Large springs and high yielding wells (m<sup>3</sup>/d)</b>	<p><i>Note: The following data need to be checked and updated by RBD Project Consultants.</i></p> <p>Data from GSI Well Database:            Carrignagower BH (&gt;100 m<sup>3</sup>/d) ‘Good’ Yield            Coolagortboy BH (109 m<sup>3</sup>/d)            Tooraneena BH (140 m<sup>3</sup>/d)            Carraghalla South BH (218 m<sup>3</sup>/d)            Boolavonteen BH (&gt; 100 m<sup>3</sup>/d) ‘Good’ Yield            Mitchelstown WS- three BHs at Kiltrislane (1637 m<sup>3</sup>/d), (1231 m<sup>3</sup>/d), (565 m<sup>3</sup>/d)            Glenduff-Cork Co. Co. (327 m<sup>3</sup>/d)            Mitchelstown old WS-spring (545 m<sup>3</sup>/d)</p> <p>Additional data from EPA Groundwater Sources List:</p>
	<b>Main discharge mechanisms</b>	Groundwater discharges to springs within the GWB and to the rivers and streams crossing the GWB.
	<b>Hydrochemical Signature</b>	<p>In the Old Red Sandstone rocks and the sandstones and mudstones of the Cork Group, Alkalinity generally ranges from 10 to 300 mg/l (as CaCO<sub>3</sub>) and hardness ranges from 40 to 220 mg/l (moderately soft to moderately hard).</p> <p>The Old Red Sandstone formations largely contain calcium bicarbonate type water. This indicates that these groundwaters largely contain the more readily dissolved ions such as calcium and bicarbonate. Conductivities in these units are relatively low ranging from 125 to 600 µS/cm, with an average of 300 µS/cm. Conductivities in the Cork Group rocks are quite similar with an average of 380 µS/cm and a range from 160 to 430 µS/cm.</p> <p>Iron (Fe) and manganese (Mn) commonly occur in groundwater derived from sandstone and shale formations, due to the dissolution of Fe and Mn from the sandstone/shale where reducing conditions occur.</p>
<b>Groundwater Flow Paths</b>		These rocks have no intergranular permeability. Groundwater flow occurs in faults and joints. Most groundwater flow probably occurs in an upper shallow weathered zone. Below this in the deeper zones water-bearing fractures and fissures are less frequent and less well connected. The water table is generally within 10 m of the surface. Groundwater in this GWB is generally unconfined. Local groundwater flow is towards the rivers and streams, and flow path will not usually exceed a few hundred metres in length.
<b>Groundwater &amp; Surface water interactions</b>		Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low.

<b>Conceptual model</b>	<ul style="list-style-type: none"> <li>• This GWB occupies an upland area of rugged topography on the southern flank of the Knockmealdown Mountains in east Cork, west Waterford and South Tipperary.</li> <li>• The GWB is bounded to the south and west by the contact with the higher permeability sandstones of the Kiltorcan Formation and to the north and east by the boundary of the River Blackwater catchment. The limestone and Kiltorcan Sandstone of the Araglin valley (Araglin GWB) forms a small enclave wholly surrounded by this GWB.</li> <li>• The GWB is composed mainly of poorly permeable sandstones, although significantly higher permeabilities have been found in places.</li> <li>• The regional structural deformation that created the characteristic South Munster sandstone ridge (anticline)-limestone valley (syncline) topography was accompanied by intense fracturing and jointing (N-S jointing dominates).</li> <li>• Groundwater in this body is unconfined. The water table is generally less than 10 metres below the surface with an average annual fluctuation up to 6 metres. The poorly permeable aquifer can support only local scale flow systems. Groundwater flow paths can be up to a few tens or hundreds of metres long, and may be significantly shorter where the water table is very close to the surface. Overall groundwater flow is to the surface water channels of the body.</li> <li>• Diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. Groundwater input as through-flow into this GWB from the adjacent GWBs is probably negligible.</li> <li>• There are many areas of Extreme Vulnerability within this GWB, particularly on the higher ground..</li> <li>• There is a low degree of interaction between surface water and groundwater in this GWB. Groundwater discharges to surface as springs or as baseflow to rivers crossing the groundwater body.</li> </ul>
<b>Attachments</b>	
<b>Instrumentation</b>	<p><b>Stream gauges:</b> 16124, 18041, 18049</p> <p><b>EPA Water Level Monitoring boreholes:</b> Ballynacaheragh (CON 147)</p> <p><b>EPA Representative Monitoring points:</b> Kilmurry WS (CON 48), Mitchelstown (CON 83), Boolnavoonteen WS (WAT 22), Tooraneena WS (WAT 97).</p>

*1<sup>st</sup> Draft Knockmealdown GWB Description –.....2004*

<b>Information Sources</b>	<p>Sleeman AG, McConnell B (1995) <i>Geology of East Cork - Waterford. A geological description of East Cork, Waterford and adjoining parts of Tipperary and Limerick, to accompany the Bedrock Geology 1:100,000 scale map series, Sheet 22, East Cork - Waterford.</i> Geological Survey of Ireland.</p> <p>Wright G (1979) <i>Groundwater in the South Munster Synclines.</i> In: Hydrogeology in Ireland, Proceedings of a Hydrogeological Meeting and associated Field Trips held in the Republic of Ireland from 22 to 27 May, 1979. Published by the Irish National Committee of the International Hydrological Programme.</p>
<b>Disclaimer</b>	<p>Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae</p>

**Knockmealdown GWB (For Reference)**



**List of Rock units in Knockmealdown GWB**

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Kiltorcan Formation (KT)	Yellow & red sandstone & green mudstone	Devonian Kiltorcan-type Sandstones	Rf
Knockmealdown Sandstone Formation (KM)	Medium grained pink-purple sandstone	Devonian Old Red Sandstones	L1
Ballytrasna Formation (BS)	Purple mudstone with some sandstone	Devonian Old Red Sandstones	L1
Doon Lava Member (BSdl)	Green, fine-grained vesicular mugearite	Basalts & other Volcanic rocks	L1