

Ballyhoura GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
18 Cork, Limerick, South Tipperary Co. Cos		Rivers: Behanagh, Funshion, Sheep, Farahy, Bregoge, Ogeen, Geeragh, Ahaphuca, Tooraleagan, Keale, Castlepook, Attychrane. Stream: Monaheanree	Mountrussell Wood (002088)	200
Topography	<p>This GWB comprises an upland area of rugged topography on the southern flank of the Ballyhoura Mountains. Elevations range from almost 800 m OD down to about 30 m OD at the foot of the hills.</p> <p>The GWB is bounded to the north by the boundary of the SWRBD with the Shannon RBD. To the south and northwest it is bounded by the Ballyhoura Kiltorcan GWB.</p> <p>The GWB includes rugged mountainous topography but also intervening valleys, with elevations ranging from a maximum of 525 metres OD on Seefin Mountain, down to about 80 metres OD in the valley of the Sheep River.</p> <p><i>Landfill site – see paper Donal found</i></p>			
	Aquifer categories	LI: Locally important aquifer which is moderately productive only in local zones		
	Main aquifer lithologies	Devonian Old Red Sandstones (65%), Silurian Metasediments and Volcanics (35%)		
	Key structures	<p>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.</p>		
Geology and Aquifers	Key properties	<p>Permeability generally decreases rapidly with depth. In general, the ORS transmissivities will be in the range 2-20 m²/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 m³/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. Silurian rocks will, in general, have similar or lower permeability.</p> <p>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.</p>		
	Thickness	While the rocks themselves are very thick, 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.		
	Lithologies	<p><i>Subsoil Types identified in Ballyhoura GWB by Teagasc Parent Material Mapping (Draft) – data for Counties Cork & Tipperary only, Limerick data not available at time of writing: Alluvium (A); Blanket Peat (BktPt); Rock outcrop and rock close to surface (Rck); Scree (Scree) Till – Devonian Sandstone Till (TDSs), Lower Paleozoic Sandstone and Shale Till (TLPSSs).</i></p> <p>This GWB is primarily covered by glacial till, of variable depth.</p>		
Overlying Strata	Thickness	The GWB has not been mapped for a GWPS, but there are probably many areas 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 probably common, although isolated points of deep and shallow subsoil may occur.		
	% area aquifer near surface			
	Vulnerability	The GWB has not been mapped for a GWPS, but by analogy with the South Cork area, this GWB probably has predominantly Extreme to High Vulnerability.		
Recharge	Main recharge mechanisms	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.		
	Est. recharge rates	<i>To be assessed.</i>		

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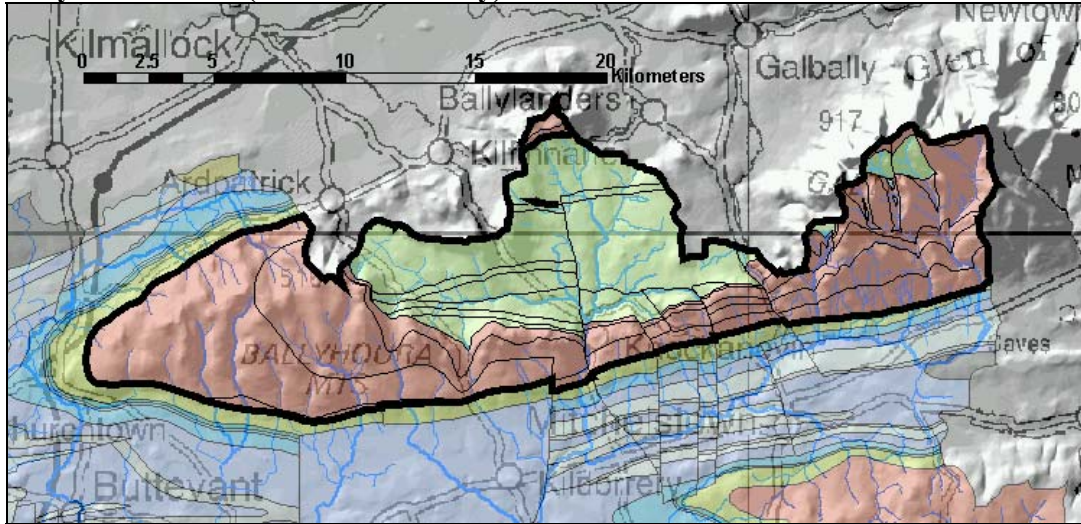
Discharge	Large springs and high yielding wells (m³/d)	<p><i>Note: The following data needs to be checked and updated by RBD Project Consultants.</i></p> <p>Data from GSI Well Database: Geeragh BH (439 m³/d) Coolboy BH (109 m³/d) Scrowmore BH (381 m³/d) Labbamolaga BH (164 m³/d)</p> <p>BHs with 'Good' Yields (exact figure unknown) are located in Moanmore, Kilcruaig, Geeragh, Glenacurrane, Glenosheen, Tulla, Ballincourty, Ballyfeerode, Ruppulagh*, Ballintober. Jamestown-Co. Limerick-spring with 'High' yield class, (636 m³/d) = abstraction rate</p> <ul style="list-style-type: none"> • 2 BH in Ruppulagh (Ruppulagh/Glenroe GWS) both have yields of (158 m³/d) <p>Additional data from EPA Groundwater Sources List:</p>
	Main discharge mechanisms	Groundwater discharges to springs within the GWB and to the rivers and streams crossing the GWB.
	Hydrochemical Signature	<p>In the Old Red Sandstone and Silurian rocks, Alkalinity generally ranges from 10 to 300 mg/l (as CaCO₃) 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>
Groundwater Flow Paths	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.	
Groundwater & Surface water interactions	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.	

Conceptual model	<ul style="list-style-type: none"> • This GWB occupies an upland area of rugged topography on the southern flank of the Ballyhoura Mountains in north Cork, south Limerick and South Tipperary. • The GWB is bounded to the south and west by the contact with the higher permeability sandstones of the Kiltoran Formation and to the north by the boundary of the River Blackwater catchment and the SWRBD. • The GWB is composed mainly of poorly permeable sandstones, although significantly higher permeabilities have been found in places. • 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). • 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. • Diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. Groundwater input as through-flow into this GWB from adjacent GWBs is probably negligible. • There are probably many areas of Extreme Vulnerability within this GWB, particularly on the higher ground. • 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. 	
Attachments		
Instrumentation	<p>Stream gauges: 18031, 18101.</p> <p>EPA Water Level Monitoring boreholes: none</p> <p>EPA Representative Monitoring points: none</p>	

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Information Sources	Pracht M (1997) <i>Geology of Kerry-Cork: a geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 21, Kerry - Cork</i> . Geological Survey of Ireland. 70pp 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.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Ballyhoura GWB (For reference only)



List of Rock units in Ballyhoura GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Ardane Formation (AE)	Resistate conglomerate & sandstone	Devonian Old Red Sandstones	L1
Poulgrania Sandstone Formation (PL)	Red sandstone & some conglomerate	Devonian Old Red Sandstones	L1
Slievenamuck Conglomerate Formation (SM)	Conglomerate & purple sandstone	Devonian Old Red Sandstones	L1
Slievreagh Conglomerate Formation (SH)	Thick purple conglomerate	Devonian Old Red Sandstones	L1
Lough Muskry Formation (LM)	Lithic conglomerate & purple mudrock	Devonian Old Red Sandstones	L1
Galtymore Formation (GS)	Thick-bedded pale-red sandstone	Devonian Old Red Sandstones	L1
Pigeon Rock Formation (PR)	Lithic conglomerate and sandstone	Devonian Old Red Sandstones	L1
Ballygeana Formation (BN)	Dark grey to black shale & greywacke	Silurian Metasediments and Volcanics	L1
Inchacomb Formation (IB)	Greywacke & dark green shale	Silurian Metasediments and Volcanics	L1
Assaroola Member (IBas)	Calcareous siltstone, grey shale	Silurian Metasediments and Volcanics	L1