Kilmaclenine GWB: Summary of Initial Characterisation.

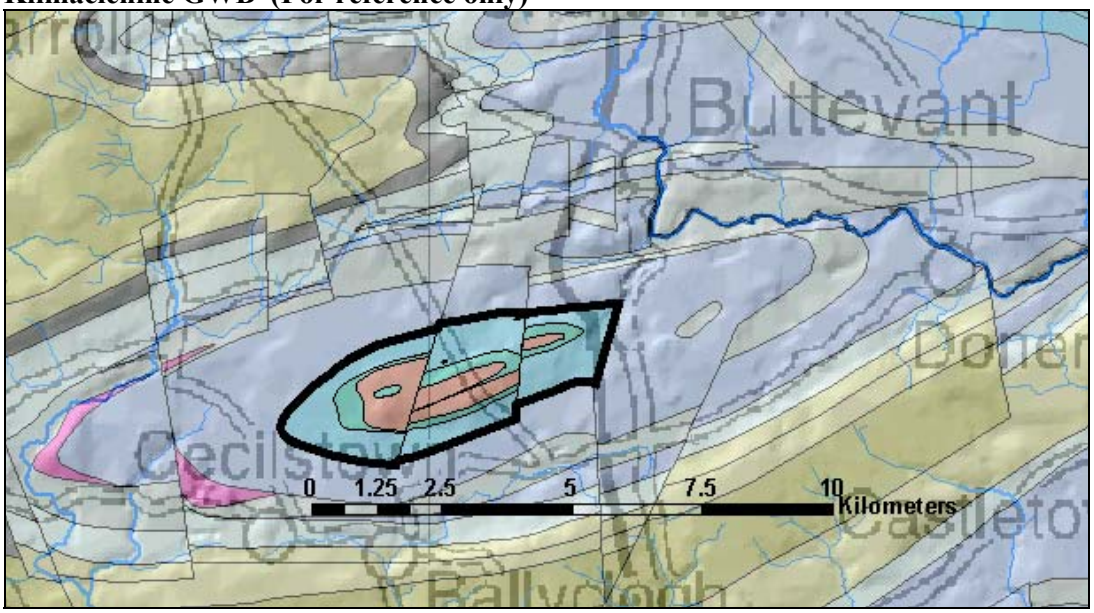
Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
18 Cork Co. Co.	None	None	11.5

Topography	Ground elevations range 90-146 m OD. The ground is highest along the axis of the Kilmaclenine Anticline which runs ENE-WSW across the body, and slopes gently downwards towards the outer boundary of the body.	
Geology and Aquifers	**Aquifer categories**	**LI:** Locally important aquifer, moderately productive only in local zones (84%) **PI:** Poor aquifer, generally unproductive except for local zone (16%)
	Main aquifer lithologies	Devonian Old Red Sandstones (22%), Dinantian (early) Sandstones, Shales and Limestones (16%), Dinantian Lower Impure Limestones (62%).
	Key structures	The widespread faulting and folding associated with the Variscan Orogeny in the south of Ireland has given rise to zones of enhanced permeability in the mudstones and sandstones. These can occur in the immediate vicinity of faults and near the axes of folds. The mainly fine-grained nature of the rocks however means that such zones are generally local. This GWB occurs at the core of the Kilmaclenine Anticline and is cut by a number of northeast southwest trending faults. The Devonian Old Red Sandstones , Dinantian (early) Sandstones, Shales and Limestones and the Dinantian Lower Impure Limestones dip underneath the overlying karstified limestones of the Mitchelstown GWB (Figure 1).
	Key properties	The Devonian ORS and Dinantian Lower Impure Limestones of this GWB are considered to be a relatively low permeability rock except where zones of higher permeability have been created as a result of structural deformation by folding and faulting. In general, the Devonian ORS and Dinantian Lower Impure Limestones aquifer transmissivities will be in the range 2-20 m^2/d. The Dinantian (early) Sandstones, Shales and Limestones (Lower Limestone Shales) are considered to be even less productive than the ORS or Lower Impure Limestones (Ballysteen Formation) due to the shaly nature of the rocks which results in a generally low permeability.The location of this GWB on the fold axis of the anticline may result in increased productivity due to more intense fracturing in this area. Aquifer storativity will be low in all rock units. Groundwater gradients are likely to be in the range 0.01 to 0.04.
	Thickness	The Devonian Old Red Sandstones are greater than a few hundreds of metres thick in this area. The overlying Dinantian (early) Sandstones, Shales and Limestones are often less than 100m thick. The Dinantian Lower Impure Limestones are 140 m thick in the Kilmaclenine Anticline (Pracht, 1997). Most groundwater flow in this GWB is expected to occur, within the top 15 m of the aquifer, in the layer that comprises a weathered zone of a few metres and a connected fractured zone below this. Deeper flows can occur along generally isolated faults or significant fractures.
Overlying Strata	**Lithologies**	This GWB is overlain by Devonian Sandstone and Namurian Sandstone & Shale Till. There are several areas of shallow rock and rock outcrop as well as a small area of cutover peat. A Groundwater Protection Scheme has not been prepared for this area and the permeability of the subsoil has not been mapped in this area. *Subsoil Types identified in Kilmaclenine GWB by Teagasc Parent Material Mapping (Draft): Cutover Peat (Cut); Rock outcrop and rock close to surface (Rck); Till – Devonian Sandstone Till (TDSs), Namurian Sandstone & Shale Till (TNSSs)*
	Thickness	There are no borehole data on depth to bedrock available for this GWB. There are several areas of shallow rock and rock outcrop and it is expected that subsoils are generally < 10 m deep. It is likely that much of the area of the GWB will have subsoils of <3 m.
	% area aquifer near surface	
	Vulnerability	There is no Groundwater Vulnerability Map available for North Cork at present. Areas around the rock outcrop and shallow rock will be designated as Extreme vulnerability, however identifying areas of High to Low Vulnerability will depend on the permeability and thickness of the subsoil.
Recharge	**Main recharge mechanisms**	Diffuse recharge will occur via rainfall percolating through the subsoil or areas of outcropping rock. The proportion of the effective rainfall that will recharge the aquifer is determined by the permeability of the soil and subsoil, and by the slope.
	Est. recharge rates	

Discharge	**Large springs and high yielding wells (m^3/d)**	*Note: The following data need to be checked and updated by RBD Project Consultants.* No known large springs or high yielding wells.
	Main discharge mechanisms	The main discharges from this small GWB will be to small springs or seeps within the body and as through flow down gradient to the surrounding more permeable Dinantian Pure Unbedded Limestones of the Mitchelstown GWB.
	Hydrochemical Signature	There are no hydrochemical data specific to this GWB currently available. The hydrochemical signature of groundwater in the centre of the GWB is expected to be similar to that of the Glenville GWB to the south, which is also underlain by Devonian ORS. The outer extents of this GWB underlain by Dinantian Lower Impure Limestone will have a hydrochemistry more similar to that in the surrounding limestones of the Mitchelstown GWB.
Groundwater Flow Paths		These rocks are devoid of intergranular permeability; groundwater flow occurs in fractures and faults. Groundwater flow in the ORS rocks is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. As this GWB occurs on the axis of the Kilmaclenine Anticline where deformation is likely to have been most intense, zones of high permeability may occur. Permeability is highest in the upper few metres but generally decreases rapidly with depth. In general, groundwater flow is concentrated in the upper 15 m of the aquifer, although deeper inflows from along fault zones or connected fractures can be encountered. Groundwater flow will be of a local nature with generally short groundwater flow paths. Groundwater flow will flow radially out from the high ground in the centre of the body. Groundwater is generally unconfined in this groundwater body.
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		• The groundwater body is bounded on all sides by the contact with the karstified limestones of the Mitchelstown GWB. • Ground elevations highest along the axis of the Kilmaclenine Anticline (146 m OD) which runs ENE WSW across the body, and slopes gently downwards towards the outer boundary of the body (90 m OD). • The groundwater body is comprised of rocks with low transmissivity and storativity, although localised zones of enhanced permeability occur along fault zones. The karstified productive limestones of the Mitchelstown GWB surround the body. • Flow occurs along fractures, joints and major faults. Flows in the aquifer are generally concentrated in a thin zone at the top of the rock, although deeper groundwater flows along faults and major fractures. • Diffuse recharge occurs across the GWB through the subsoils and rock outcrops. • Groundwater is generally unconfined. Flow path lengths are generally short, ranging from 30-300 m. Local groundwater flow directions are controlled by local topography. • The main discharges from this small GWB will be to small springs or seeps within the body and as through flow down gradient to the surrounding more permeable Dinantian Pure Unbedded Limestones of the Mitchelstown GWB.
Attachments		None
Instrumentation		**Stream gauges:** None **EPA Water Level Monitoring boreholes:** None **EPA Representative Monitoring points:** None
Information Sources		Kelly D, Leader U & Wright G (2002) *South Cork Groundwater Protection Scheme*. Report to Cork County Council (South). Geological Survey of Ireland. Pracht M (1997) *Geology of Kerry-Cork: a geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 21, Kerry - Cork.* Geological Survey of Ireland. 70pp
Disclaimer		Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Figure 1: Schematic Cross Section through the Kilmaclenine Anticline
(From Geology of Kerry-Cork Sheet 21. 1:100,000 GSI Bedrock Map Series)

Kilmaclenine GWB (For reference only)



List of Rock units in Kilmaclenine GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Ballysteen Formation (BA)	Fossiliferous dark-grey muddy limestone	Dinantian Lower Impure Limestones	Ll
Lower Limestone Shale (LLS)	Sandstone, mudstone & thin limestone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Old Red Sandstone (undifferentiated) ORS	Red conglomerate, sandstone & mudstone	Devonian Old Red Sandstones	Ll