

Cushina GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
Offaly Co. Co. Laois Co. Co. Kildare Co. Co. Hydrometric Area 14		Figile, Slate, Cushina & Barrow.	The Long Derries(925), Derries Wood (416), Emo Court (865), The Great Heath of Portlaoise (881)	170
Topography		This GWB is located in eastern Co. Offaly but also extends into counties Laois and Kildare. The topography in the area is extremely low lying to the north with some small hills in the south. In general the land surface slopes to the centre and south of the body towards the River Figile.		
Geology and Aquifers	Aquifer type(s)	L1: Locally important aquifer which is moderately productive only in local zones		
	Main aquifer lithologies	Dinantian Pure Bedded Limestones Dinantian Upper Impure Limestones		
	Key structures.	The area is relatively free of intense structural deformation. The rocks of this GWB are faulted against the Pure bedded Allenwood Limestone formation. Faults occur in both a NE SW direction and NW SE direction.		
	Key properties	In the Calp Formation, permeability would be expected to be low, e.g. 1 m/d (Wright 2000).		
	Thickness	The depth to which open fractures are encountered below ground will determine the depth of significant groundwater flow in the aquifer since it is not considered that the rock has any primary porosity. In such low permeability rocks it is considered that the majority of groundwater flow will occur in the upper 3m and groundwater flow in fractures does not typically occur below 10m.		
Overlying Strata	Lithologies	The area is generally underlain by moderately permeable limestone till. Smaller areas of lower permeability peat deposits are present as are local deposits of high permeability gravels.		
	Thickness	Subsoil appears to be thicker in the north where the topography is flatter and reduces to the south.		
	% area aquifer near surface	Low		
	Vulnerability	Generally Moderate in the north and High in the South.		
Recharge	Main recharge mechanisms	Diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing further the available groundwater resource in the aquifer.		
	Est. recharge rates	<i>[Information will be added at a later date]</i>		
Discharge	Springs and large known abstractions	GSI Source Report: Lough PWS Killinard GWS,		
	Main discharge mechanisms	Discharge from this aquifer will be towards the overlying rivers where they are in hydraulic continuity with the aquifer. Drainage density in the south is quite low and this may indicate a higher permeability of the limestones here. Since there are an absence of streams in the area the aquifer discharges via springs, a number of karstic springs have been recoded in this southern area south east of Emo.		
	Hydrochemical Signature	The groundwater samples from the Lough PWS indicate a hard (350-400 mg/l CaCO ₃) water with a calcium-bicarbonate hydrochemical signature. This reflects the fact that the groundwater feeding the boreholes has passed through limestone rock and limestone (Wright 2000).		
Groundwater Flow Paths		The majority of groundwater flow in this aquifer is considered to occur in the upper 3m of the bedrock where the rock is more broken and weathered. Beneath this groundwater flow in through a connected network of fractures, some of which may become enlarged due to solution of the limestone. Isolated deep groundwater flow may be found to depths of 50m below the top of the rock. Groundwater flow paths are typically medium length (hundreds of meters) in locally important aquifers although the low drainage density in the area may suggest longer groundwater flow paths (e.g. in the order of Kilometers) are possible.		
Groundwater & surface water interactions		There are a number of Karst springs and boreholes located in the southern area of the GWB		

Conceptual model	<p>This GWB is located in eastern Co. Offaly but also extends into counties Laois and Kildare. The topography in the area is extremely low lying to the north with some small hills in the south. In general the land surface slopes to the centre and south of the body towards the River Figile. The boundaries of this GWB are defined by the extent of the Calp and Ballyadams Formations in this area. The boundary to the north is the topographic boundary between the SE & E RBDs. The groundwater body is composed primarily of low permeability rocks, although localized zones of enhanced permeability do occur. It appears likely from investigation of the Lough area that the pure bedded limestones can be encountered beneath the Calp. Recharge occurs diffusely through the subsoils and via outcrops. The aquifers within the GWB are generally unconfined, but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the effective thickness of this aquifer is likely to be about 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep water strikes in more isolated faults/ fractures can be encountered at 50-70 mbgl. Regional groundwater flow is from north to south, but on a local scale, groundwater discharges to the streams and rivers crossing the aquifer. Flow path lengths are variable and will depend on the degree of karstification of the limestone and hence its purity. Groundwater discharges to the numerous small streams crossing the aquifer, and to the springs and seeps.</p>
Attachments	
Instrumentation	<p>Stream gauge: 14016, 14004, 14017, 14009, and 14006. Borehole Hydrograph: none EPA Representative Monitoring boreholes: None</p>
Information Sources	<p>Deakin, J., Fitzsimons, V., Gately, C., Wright, G. 2002. <i>Laois Groundwater Protection Scheme</i>. Geological Survey of Ireland. McConnell, B., Philcox, M., A.G. Sleeman, G. Stanley, A.M. Flegg, E. P. Daly and W.P. Warren. 1994. <i>A Geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 16, Kildare-Wicklow</i>. B. McConnell (ed) Geological Survey of Ireland, 70 pp. Wright, G. (2000) <i>Lough Public Water Supply: Portarlinton Water Supply Scheme & Killenard Group Water Scheme</i>. Laois Groundwater Protection Scheme. GSI Report to Laois Co. Co.</p>
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Formation Name	Code	Description	Rock Unit Group	Aquifer Category
Ballyadams Formation	BM	Crinoidal wackestone/packstone limestone	Dinantian Pure Bedded Limestones	Pending Classification
Calp	CD	Dark-grey to black limestone & shale	Dinantian Upper Impure Limestones	LI