

1st Draft Clifden Marbles GWB Description –August 2004

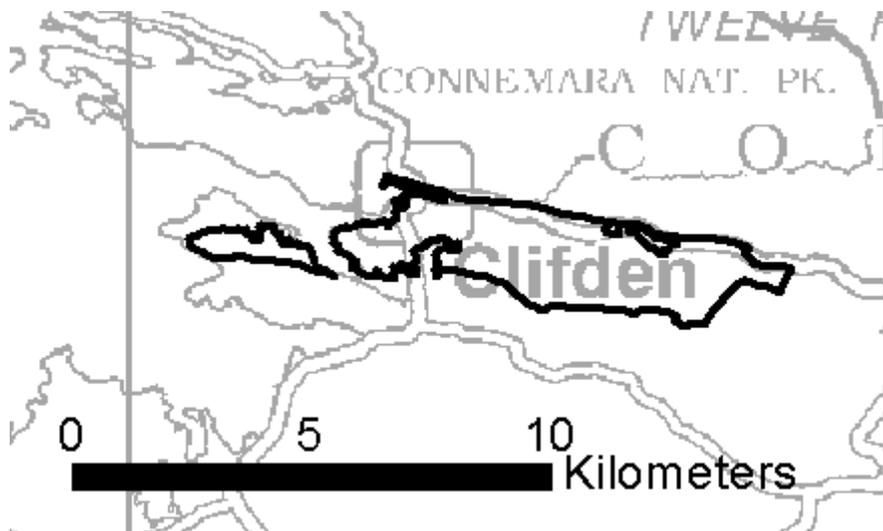
Clifden Marbles GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features		Associated terrestrial ecosystem(s)	Area (km ²)
Hydrometric Area 32 Galway Co. Co.	Rivers: Owenglin, Derryhorraun. Lakes: Island, Derryvraun, Derrywaking, Rusheen, Tonagh, Faul, Nakilla, Muingacurry, Drimeen, Derrylea, Loughaunarow, Adroma, Phreaghau.		The Twelve Bens / Garraun Complex (002031), Connemara Bog Complex (002034) (O’Riain, 2004).	14
Topography	This is a rectangular GWB orientated approximately E-W, stretching from Clifden toward the hydrometric divide between areas 31 and 32.. The topography rises to the north toward the Twelve Pins. To the south, the land surface is low lying and covered in blanket peat, thus the GWB marks the boundary between Connemara’s mountainous and boggy lowlands. Elevations range from sea level to 40 mAOD. The coastline forms the western boundary. The eastern boundary is a surface water catchment divide. Precambrian quartzites, gneisses and schists (Clifden-Castlebar GWB) form the boundaries to the north and south.			
	Geology and Aquifers	Aquifer categories	This is an independent GWB because it comprises mostly Precambrian Marbles, which are hydrochemically different from the Precambrian quartzites, gneisses and schists. PI: Poor aquifer which is generally unproductive except for local zones.	
Main aquifer lithologies		The GWB is composed predominantly of bands of Precambrian Marbles (Lakes Marbles Formation), interspersed with bands of schists (Cashel Schists).		
Key structures		The key structural trend is E-W, parallel to the northern and southern boundaries of the GWB. Faults trending NW-SE cross the GWB.		
Key properties		Data are sparse – one ‘Poor’ yielding well, with a productivity index of V is present (yield of 22 m ³ /d), and a specific capacity of approximately 2 m ³ /d/m. The data indicate low transmissivity. Precambrian Marbles in other parts of the country have variable transmissivities but in general are expected to be low. Transmissivity may be higher in the vicinity of fault zones. Storativity is expected to be low (<0.5%). The data are inadequate to calculate groundwater gradients, however, these are expected to be greater than 0.01. Karstification is reported in some marble units in Donegal, and it is possible that similar rocks in this GWB may be susceptible to this process..		
Thickness		Most groundwater flux is likely to be in the uppermost part of the aquifer; comprising a broken and weathered zone typically less than 3 m thick; a zone of interconnected fissuring 10-15 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m.		
Overlying Strata	Lithologies	The subsoils are dominated by blanket peat.		
	Thickness	There is only one data point, indicating a depth to bedrock of 0 m. The thickness of the blanket peat ranges from 0-6 m, depending on topography (Daly, 1985). Rock outcrops occur toward the western end of the GWB and along the coast.		
	% area aquifer near surface	[Further Information to be added at a later date]		
	Vulnerability	[Further Information to be added at a later date]		
Recharge	Main recharge mechanisms	Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of some subsoil deposits and the aquifers, a high proportion of the effective rainfall will quickly discharge to the streams. The stream density is relatively high, reflecting the high proportion of surface runoff.		
	Est. recharge rates	[Information will be added at a later date]		
Discharge	Large springs and high yielding wells (m³/d)	Sources: None identified. Excellent Wells: None identified. Good Wells: None identified. Springs: None identified.		
	Main discharge mechanisms	Shallow groundwater is likely to discharge to most streams in the GWB, but the limited bedrock transmissivity means that the baseflow component of the total streamflow will be low. Small springs and seeps are likely to issue at the stream heads and along their course.		
	Hydrochemical Signature	No available data within this particular GWB. National classification: Precambrian Marbles Calcareous. Generally CaHCO ₃ signature. Alkalinity (mg/l as CaCO ₃): range of 112-428; mean of 274 (22 data points) Total Hardness (mg/l): range of 180-436; mean of 311 (22 data points) Conductivity (µS/cm): range of 414-814; mean of 667 (22 data points)		

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Groundwater Flow Paths	In the absence of inter-granular permeability, groundwater flow is expected to be concentrated in upper fractured and weathered zones and in the vicinity of fault zones, which may have some degree of karstification. Flow paths are likely to be up to 150 m with groundwater discharging rapidly to nearby streams and small springs. Flow directions are expected to be in general to the west, toward the coast.
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 is a rectangular GWB orientated approximately E-W, stretching from Clifden toward the hydrometric divide between areas 31 and 32. The GWB occupies a low lying area in which the marble rock units are located. The topography rises to the north toward the Twelve Pins. To the south the land surface is low lying and covered in blanket peat. Elevations range from sea level to 40 mAOD. • It is bounded to the west by coastline. The eastern boundary is a surface water catchment. Precambrian quartzites, gneisses and schists form the northern and southern boundaries. • The GWB is composed primarily of low transmissivity rocks, although there may be more productive zones in the vicinity of faults. Most of the groundwater flux is likely to be in the uppermost part of the aquifer. • Recharge occurs diffusely through the subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and bedrock. Therefore, most of the effective rainfall is not expected to recharge the aquifer. • Flow paths are likely to be up to 150 m with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps. Overall, the flow directions are expected to be to the west, as determined by the topography. • The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.
Attachments	Figure 1.
Instrumentation	Stream gauges: None EPA Water Level Monitoring boreholes: None EPA Representative Monitoring points: None
Information Sources	Daly, D. (1985) <i>Groundwater in County Galway with particular reference to its Protection from Pollution</i> . Geological Survey of Ireland report for Galway County Council. 98pp. Aquifer Chapters: The Granite, Ordovician, Precambrian and Ordovician Aquifers. Faulkner, T. (2000) <i>Caves in Metamorphic Limestones of the Irish Dalradian Supergroup</i> . Limestone Research Group, Department of Geographical Sciences, University of Huddersfield, Queensgate, Huddersfield, HD1 3DH, UK. From <i>Irish Speleology</i> 17, 2000, pp43-49. Long, C.B. and McConnell (1995) <i>Geology of Connemara: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 10, Connemara</i> . Geological Survey of Ireland. O' Riain, G., (2004). <i>Water Dependent Ecosystems and Subtypes Draft Report</i> . WFD Support Projects. Compass Informatics in association with National Wildlife and Parks Service (DEHLG).
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 Location and boundaries of GWB



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