Letterfrack 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**: Davros, Treheen, Kylemore, Moyard, Mweelin, Owennabaunoge, Polladirk. **Streams**: Owengarve. **Lakes**: Ballynakill, Courhoor, Kylemore, Beg, Bunnaboghec, Maladrolaun, Nahoomin, Nawarawaun.	Leagaun Machair (001289), The Twelve Bens / Garraun Complex (002031) (O'Riain, 2004).	25

Topography	This GWB occupies an area in the vicinity of Letterfrack and includes an area in the vicinity of Cleggan, due to the proximity and similarity of the rock units. The land surface is characterised by the steep slopes and mountainous terrain of the Twelve Pins, with elevations ranging from 0-470 mAOD. It is bounded to the north and south by Precambrian quartzites, gneisses and schists (Clifden-Castlebar GWB). The coastline bounds the GWB to the west, around Letterfrack and Cleggan. Surface water catchments bound the GWB to the east. The main drainage pattern is to the northwest, toward Letterfrack. Figure 1 shows the location and boundaries of the GWB.	
Geology and Aquifers	**Aquifer categories**	This is an independent GWB because it comprises Precambrian Marbles, which are hydrochemically different from the adjacent Precambrian quartzites, gneisses and schists. **Pl:** Poor aquifer which is generally unproductive except for local zones.
	Main aquifer lithologies	The GWB is composed of Precambrian Marbles (Lakes Marbles Formation).
	Key structures	The key structural trend is NW-SE, with a major NE-SW trending fault set cutting the GWB.
	Key properties	There are no data available. However, one 'Poor' yielding well (33 m^3/d), with a specific capacity of approximately 1 m^3/d/m is present in the Clifden Marbles GWB. 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 also 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	The thickness of the blanket peat ranges from 0-6 m, depending on topography (Daly, 1985).
	% 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 (m^3/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 streams and lakes, 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	It has a calcium bicarbonate signature. 2 samples are available from one location. Total Hardness (mg/l): 368, 280. Conductivity (μS/cm): 674, 686. Iron (mg/l): 8.7, 0.1. Manganese (mg/l): 1.8, 0.1. These data are similar to those available from the national classification given below. 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)

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	• This GWB occupies an area in the vicinity of Letterfrack. The land surface is characterised by steep terrain, with elevations ranging from 0-470 mAOD. • Precambrian quartzites, gneisses and schists of the Clifden-Castlebar GWB form the northern and southern boundaries. The coastline bounds the GWB around Letterfrack and Cleggan. Surface water catchment divides bound the GWB to the east. The main drainage is to the northwest toward Letterfrack. • 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 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. • 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) *Groundwater in County Galway with particular reference to its Protection from Pollution*. Geological Survey of Ireland report for Galway County Council. 98pp. Aquifer Chapters: The Precambrian Aquifers. Long, C.B. and McConnell (1995) *Geology of Connemara: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 10, Connemara*. Geological Survey of Ireland. O' Riain, G., (2004). *Water Dependent Ecosystems and Subtypes Draft Report.* 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