

1st Draft Maam_Clonbur GWB Description July .2004

Maam_Clonbur GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
30 Galway, Mayo Co Co's	Rivers: Aille, Bealanabrack, Bunsooey, Camoge, Cornamona, Failmore, Finny, Folore, Fooley, Glenglosh, Glensaul, Joyce's, Knockbane, Lough Kip, Loughseacon, Owenbrin, Owenriff, Owenrren, Srahnalong, Sruffaunnagreeve, Bunowen, Cammanagh, Corrib, Dooghta, Drimneen. Lakes: Table 1.	Ballycuirke Lough (000228, Connemara Bog Complex (002034), Lough Carra/Mask Complex (001774), Lough Corrib (000297), Ross Lake and Woods (001312), Mweelrea/Sheeffry/Erriff Complex (001932) (O'Riain, 2004).	524
Topography	The land surface is characterised by steep slopes and mountainous terrain, flattening in an easterly direction toward the shores of L. Mask and L. Corrib. Elevations range from 10-700 mAOD. The Partry Mountains and the Maamturk Mountains are present in the GWB. The GWB stretches from Galway in the south to Killavally in the north. The location and boundaries of the GWB are given in Figure 1.		
Geology and Aquifers	Aquifer categories	The main aquifer category in this GWB is: PI: Poor aquifer which is generally unproductive except for local zones. It composes 99% of the GWB. In the vicinity of L. Nafooley, Toormakeady and Oughterard there are small areas of LI: Locally important aquifer which is moderately productive only in local zones. In the vicinity of Clonbur there is a small area which is: LM: Locally important aquifer which is generally moderately productive.	
	Main aquifer lithologies	This GWB is composed of Precambrian Quartzites, Gneisses & Schists, Ordovician Metasediments, Granites and other intrusive rocks and Silurian Metasediments and Volcanics. Table 1 presents a list of lithologies present.	
	Key structures	The rocks in the GWB have undergone several episodes of deformation, comprising intense folding and faulting. Bedrock strata tend to be steeply dipping. The main structural trend is E-W. (Long <i>et al.</i> , 2002).	
	Key properties	Well data are sparse in the GWB. Two boreholes located near Toormakeady have reported yields of 16 and 21 m ³ /d with specific capacities of 0.2 and 0.5 m ³ /d/m respectively. A third well located in the same area is reported to be a "failed" well. In the southeastern portion of the GWB, two wells have reported yields of 21 and 65 m ³ /d. The data indicate low transmissivities – in the range of 0.2-10 m ² /d. In the vicinity of faults, transmissivity may be higher. Storativity is expected to be low (<0.5%). Water levels are approximately 0-8m below ground level but the data are inadequate to calculate groundwater gradients, however, these are expected to be greater than 0.01.	
	Thickness	Most groundwater flux will 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. Deep water strikes are noted between 67-80 m and 33-49 m below ground level in the two boreholes near Toormakeady, however the quantities were low.	
Overlying Strata	Lithologies	The subsoils are dominated by Blanket Peat.	
	Thickness	Subsoil thickness data are sparse. Available data indicate that the thickness of the subsoils is generally less than 3 m over the GWB, however in one instance north of Toormakeady, the thickness is reported to be 4.6 m. Subsoils are thicker in the low lying flatter eastern areas of the GWB, however the data is restricted predominantly to the eastern edges of the GWB. 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 via outcrops. Due to the low permeability of much of the subsoil (blanket peat) and the aquifers in the GWB, a high proportion of the available recharge will discharge to the streams in the GWB. In addition, the steep slopes in the mountainous areas of the GWB promote surface runoff. The stream density is approximately 1.5 km/km ² in the GWB, indicating the high proportion of surface runoff.	
	Est. recharge rates	[Information to be added to and checked]	
Discharge	Large springs and large known abstractions (m³/d)	There are no known large springs or large abstractions in the GWB.	
	Main discharge mechanisms	The main groundwater discharges are to the streams, rivers and lakes found within the GWB. Small springs and seeps are likely to issue at the stream heads and along their course.	

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	Hydrochemical Signature	For two wells near Toormakeady, located in Silurian Metasediments and Volcanics: conductivity is 472 and 625 $\mu\text{S}/\text{cm}$; Alkalinity 166 and 244 mg/l (CaCO_3) and hardness 222 mg/l (CaCO_3). From available data for the granitic rocks across the country: Alkalinities range from 43-298 mg/l (CaCO_3) with a median of 184 mg/l (CaCO_3); Total Hardness ranges from 103-304 mg/l with a median 178 mg/l; and, conductivity ranges from 317-1017 $\mu\text{S}/\text{cm}$ with a median of 461 $\mu\text{S}/\text{cm}$.
	Groundwater Flow Paths	Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Generally, water levels are 0-8 m below ground level. Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to nearby streams and small springs. There are observed deep water strikes, indicating that there is a component of deep groundwater flow, however shallow groundwater flow is dominant. Groundwater flow directions are expected to follow topography – overall in an easterly direction.
	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"> • The GWB is bounded to the west, north and south by the surface water catchment divides. The eastern boundaries are L. Mask and L. Corrib. The terrain is characterised by mountainous areas, flattening toward the eastern boundary. • The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring typically less than 10m; and a zone of isolated fissuring typically less than 150m. • Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. • Recharge occurs diffusely through the subsoils and via outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams. • Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to nearby streams and small springs and flow directions are expected to follow topography. • Groundwater discharges rapidly to nearby small streams, lakes, small springs and seeps. Overall flow direction is eastwards.
Attachments		Table 1, 2, and Figure 1.
Instrumentation		Stream gauges: 30018, 30019, 30027, 30033, 30043, 30050, 30051, 30052, 30056, 30057, 30058, 30059, 30061, 30099. 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. Pracht, M., Lees, A., Leake, B., Feely, M., Long, B., Morris, J., McConnell, B., (2003). <i>A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 14, Galway Bay</i> . Unpublished Geological Survey of Ireland Map Series Report. Long, B., McConnell, B., Philcox, M.E. (2002). <i>A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 11, South Mayo</i> . Geological Survey of Ireland Map Series Report. Aquifer Chapters: The Granite, Ordovician, Precambrian and Ordovician Aquifers. 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

Table 1. Lakes in the GWB

Tawnaghbeg Lough, Shannaghree Lough, Maumwee Lough, Loughnacrevy, Loughaunnamuckmore, Loughaunierin, Loughaundran, Loughaphreaghau, Loughanshee, Loughanillaun, Loughanaduff, Lough Tealawaun, Lough Tawny, Lough Tawneybeg, Lough Seacon Lough Naweelion, Lough Namordeen, Lough Nambrackkeagh, Lough Nambrackboy, Lough Nagilky, Lough Nafooey, Lough Nadirkmore, Lough Mask, Lough Mall, Lough Kip, Lough Idir, Dha Loch, Lough Dale, Lough Cromlee, Lough Corrib, Lough Bofin, Lough Beg, Lough Ateann,, Lough Atavamore, Lough Atavabeg, Lough Agraffard, Lough Adrehid, Lough Adoreen, Lough Acogga, Lochanna na Caothai, Loch Seanadh Chuilinn, Loch na Tamhnaí, Arda, Loch Doirin Darach, Loch Cait, Loch Beag, Loch ar Easair, Loch an Droma, Loch an Amadain, Lettercraffroe Lough, L. Seanadh Chuilinn, Knocknageeragh Lough Knockaffrin, Lough Islandmore, Green Island, Dirkbeg Lough, Curraun Lough, Croagherom L., Coolin Lough, Carrowndulla Lough, Bunnagippaun Lough, Buffy Lough, Ballydoo Lough, An Loch Dubh

Table 2. Rock units GWB

RockUnit	aquifer type	%area GWB	Description	code	unit name
Dinantian Lower Impure Limestones	Poorly Productive Bedrock Aquifer	0.5%	Dolomitic limestone, shale	OUM	Waterfall Member
Dinantian Sandstones	Productive Fractured Bedrock Aquifer	0.7%	Red & grey sandstone, siltstone, shale	TW	Tonweerce Formation
Granites & other Igneous Intrusive rocks	Poorly Productive Bedrock Aquifer	23.2%	Undifferentiated	S	Shannapheasteen Granite
Ordovician Metasediments	Poorly Productive Bedrock Aquifer	27.5%	Siltstone, sandstone, conglomerate	TK	Tourmakeady Formation
Ordovician Volcanics	Poorly Productive Bedrock Aquifer	3.1%	Volcanic breccia, tuff, lava, chert	KK	Knock Kilbride Formation
Precambrian Quartzites, Gneisses & Schists	Poorly Productive Bedrock Aquifer	29.2%	Schists, mylonitic, possible olistoliths	ST	Streamstown Schist Formation
Silurian Metasediments and Volcanics	Poorly Productive Bedrock Aquifer	15.8%	Trachytic lava	SIL	Tonalee Member

Figure 1. Location and boundaries of GWB

