Gorteen GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
35 Sligo/Mayo/Roscommon Co. Co.	**Rivers**: Owenmore, Owenbeg, Cloneen, Unshin Liskeagh, Drumfin. **Streams**: Ballymote **Lakes**: Cloonakillina, Derrynagraug, Loughangrania, Arkedy, Feenagh, Ardrea Daven, Bellanscarrow.	Lough Arrow (001673), Feenagh and Bunnamuck Loughs (001905), Flughany Lough (000497), Cloonnakillina Lough (001899) (O'Riain, 2004).	145

Topography	The GWB occupies an area between L. Gara and Ballymote. The land surface is generally low-lying but there are areas of higher relief toward Boyle and along the road between Boyle and Ballymote. Elevations range from 80-240 mAOD. Gorteen is almost at the centre. The southern and western boundaries are topographic divides that include the boundary dividing the Shannon and Western RBD areas. The northern and eastern boundaries are with the karstified limestones of the Ballymote GWB. Figure 1 shows the location and boundaries of the GWB.	
Geology and Aquifers	**Aquifer categories**	**Ll:** Locally important aquifer, moderately productive only in local zones **Pl:** Poor aquifer, generally unproductive except for local zones **Rk^c:** Regionally important karstified aquifer (7 km^2) There are 4 rock units Pending Classification.
	Main aquifer lithologies	Dinantian Shales and Limestones dominate the GWB (125 km or 86% of the area). A list of rock units are given in Table 1.
	Key structures	The bedding is horizontal or dips up to 5^o to the south east. NW-SE trending faults cross cut the northeastern portion of the GWB. A major NE-SW trending fault (Killavil-Belhavel Fault) also cross cuts the GWB. The Curlews Fault, which is a major fault extending into the Shannon RBD, crosses this GWB, in a NW-SE direction.
	Key properties	There are no data specific to the GWB. Transmissivity is expected to be low across the majority of the GWB, however, in the vicinity of faults and purer limestones, transmissivity may be higher. Storativity is expected to be low (<0.5%). The data are inadequate to calculate groundwater gradients. These are expected to be greater than 0.005. Karstification is limited, with only a few features recorded: 1 turlough, 1 swallow hole and 2 enclosed depressions.
	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**	Till and 'Cutover' Peat dominate the GWB. A small portion of the eastern area of the GWB north of Boyle is described under the Roscommon Groundwater Protection Scheme (Lee and Daly, 2003). The till in this area is described as "CLAY" (BS 5930), and is classed as "Low" permeability.
	Thickness	Data are sparse. Depth to bedrock ranges from 0-13 m. Rock outcrops are more prevalent in the parts of the GWB where there is higher relief.
	% area aquifer near surface	*[Information to be added at a later date]*
	Vulnerability	The vulnerability for a small portion of the eastern area of the GWB north of Boyle is described in the County Roscommon Groundwater Protection Scheme (Lee and Daly, 2003). In this area the vulnerability classification is variable dependent on the depth to bedrock but is generally "extreme" to "high". For the rest of the area. *[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 much of the subsoil and the aquifers, a high proportion of the available recharge will discharge to the streams. In addition, the steep slopes in the higher relief areas promote surface runoff. The stream density is high, indicating the high proportion of surface runoff.
	Est. recharge rates	*[Information to be added at a later date]*
Discharge	**Large springs and high yielding wells (m^3/d)**	None identified

	Main discharge mechanisms	The main groundwater discharges are to the streams, rivers and lakes. Small springs and seeps are likely to issue at the stream heads and along their course. The generally poor aquifer properties indicate that the baseflow component of total streamflow is likely to be low.
	Hydrochemical Signature	Thorn (1986) summarised the range and mean of conductivity and hardness for 29 samples taken in the Gorteen area as follows: Total Hardness (mg/l): 104-400, 274. Conductivity (μS/cm): 120-750, 447. Groundwater has a calcium bicarbonate signature.
Groundwater Flow Paths		Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Water levels are generally 1-10 m below ground. Flow paths are likely to be short, up to 300 m, with groundwater discharging rapidly to nearby streams and small springs. Flow directions are expected to follow topography, generally to the north.
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 GWB occupies an area between L. Gara and Ballymote. The land surface is generally low-lying but there are areas of higher relief toward Boyle and along the road between Boyle and Ballymote. Elevations range from 80-240 mAOD. • The southern and western boundaries are topographic divides that include the boundary dividing the Shannon and Western RBD areas. The northern and eastern boundaries are with the karstified limestones of the Ballymote GWB. • The GWB is composed primarily of low transmissivity rocks. Transmissivities are low, ranging from 2-15 m^2/d. Most of the groundwater flux is likely to be in the uppermost part of the aquifer. • Storativity is expected to be low (<0.5%). The data are inadequate to calculate groundwater gradients, however, these are generally expected to be greater than 0.005. • Karstification is limited. • Recharge occurs diffusely through the subsoils and rock outcrops. Recharge is limited by peat, low permeability subsoils and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams and small springs. • Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Generally, water levels are 0-10 m below ground level. Flow paths are likely to be up to 300 m, with groundwater discharging rapidly to nearby streams and small springs. The overall flow direction is to the north. • The groundwater has calcium bicarbonate signature ($CaHCO_3$), and is hard.
Attachments		Table 1 and Figure 1.
Instrumentation		**Stream gauges:** 35004, 35015, 35022, 35079. **EPA Water Level Monitoring boreholes:** (SLI034) **EPA Representative Monitoring points:** None
Information Sources		Lee, M. & Daly D. (2003) *County Roscommon Groundwater Protection Scheme*. Main Report. Roscommon County Council & Geological Survey of Ireland, 54pp. Mac Dermot, C.V., Long, B., Harney, S.J. (1996). *A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 7, Sligo-Leitrim.* Geological Survey of Ireland Map Series Report. Thorn, R. (1986). *The Groundwater Resources of South County Sligo A preliminary appraisal.* Sligo Regional Technical College. ISBN 0 948870 01 X 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.

Table 1 List of Rock Units in GWB

Code	Unit Name	Description	Group Unit	Aquifer Class
BO	Boyle Sandstone Formation	Sandstone, siltstone, black mudstone	Dinantian Mixed Sandstones, Shales and Limestones	Ll
BK	Bricklieve Limestone Formation	Bioclastic cherty limestone	Dinantian Pure Bedded Limestones	Rkc
BKU	Bricklieve Limestone Formation (upper)	Bioclastic cherty limestone	Dinantian Pure Bedded Limestones	Pending Class
GF	Greyfield Formation	Sandstone / limestone breccia, micrite	Dinantian Mixed Sandstones, Shales and Limestones	Ll
KW	Keadew Formation	Sandstone & thin mudstone	Devonian Old Red Sandstones	Pl
KL	Kilbryan Limestone Formation	Dark nodular calcarenite & shale	Dinantian Lower Impure Limestones	Ll
LTG	Leitrim Group	Dark micrite, shale, evaporite	Dinantian Shales and Limestones	Ll
LG	Lisgorman Shale Formation	Thin-bedded calcareous shale, limestone	Dinantian Shales and Limestones	Ll
MG	Moygara Formation	Red conglomerate & pebbly sandstone	Devonian Old Red Sandstones	Pl
mk	Mudbank Limestones	Massive grey micritic limestone	Dinantian Pure Unbedded Limestones	Ll
OK	Oakport Limestone Formation	Pale grey massive limestone	Dinantian Pure Bedded Limestones	Pending Class
KWsh	Sheegorey Member	Andesitic pyroclastics, tuff, mudstone	Basalts & other Volcanic rocks	Ll
SIL	Silurian (undifferentiated)	Grey-green sandstone, siltstone	Silurian Metasediments and Volcanics	Pl

Figure 1. Location and Boundaries of GWB