Lahardaun GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
34 Mayo Co Council	**Rivers**: Adergool, Deel, Bar Deela, Glasheens. **Lakes**: Namara, Nalaghan, Nacapduff, Cloylea Brack, Ayoosy, Athancallin, Glasheens, Drumleen, Black.	Bellacorick Bog Complex (001922), Lough Conn and Lough Cullin (000519), Altaconey Bog (000459), Drumleen Lough (001499) (O'Riain, 2004).	70

Topography	The GWB is located on the northerneastern slopes of the Nephin Beg Range. Lahardaun is located in the easternmost part of the GWB. The land surface is characterised by steep slopes and mountainous terrain (Nephin Beg range) in the southern portion of the GWB, flattening in a northeasterly direction toward Crossmolina. Elevations range from 70-804 mAOD.	
Geology and Aquifers	**Aquifer categories**	The main aquifer category in this GWB is: **Pl:** Poor aquifer which is generally unproductive except for local zones. There are 4 km^2 along the eastern limb of the GWB bordering the Ballina GWB that is: **Lm:** Locally important aquifer which is generally moderately productive. There is 14 km^2 along the northern limb of the GWB that is: **Ll:** Locally important aquifer which is moderately productive only in local zones.
	Main aquifer lithologies	This GWB is composed of: Precambrian Quartzites, Gneisses & Schists; Dinantian Sandstones; Dinantian Upper Impure Limestones; and thin bands (approximately 100 m wide) of Precambrian Marble which trend NW-SE across the western side of the GWB and NE-SW across the eastern side of the GWB. Table 1 presents the lithologies present in the GWB.
	Key structures	The rocks in the GWB have undergone several episodes of deformation, comprising folding and faulting. At the western side of the GWB, the rocks are located on the northern limb of a NW-SE trending anticline which is bisected by NE-SW faults. The beds dip steeply to the northeast. In the middle of the GWB, the trend of the anticline changes to E-W and the faults trend N-S. There are also older anticlines and synclinal features on the eastern side of the GWB trending SW-NE and N-S. The beds are steeply dipping but direction is variable.
	Key properties	Specific capacity of 0.2 $m^3/d/m$ is recorded for one well in the northeastern part of the GWB, which indicates low transmissivity. In the adjacent Belmullet GWB, transmissivities are estimated to be in the range of 1-5 m^2/d. In the vicinity of faults, transmissivity may be higher. Storativity is expected to be low (<0.5%). Data are inadequate to calculate groundwater gradients, however, are expected to be greater than 0.01.
	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**	Blanket Peat and Metamorphic Till dominate the GWB.
	Thickness	Subsoil thickness data are unavailable. Outcrops are frequent on the steeper slopes and it is expected that subsoil thickness is greater on the lower slopes toward Crossmolina.
	% 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 much of the subsoil (blanket peat) and the poor productivity of the aquifers, a high proportion of the available recharge will discharge to the streams. In addition, the steep slopes in the mountainous areas promote surface runoff. The stream density is high in the GWB.
	Est. recharge rates	*[Information to be added to and checked]*
Discharge	**Large springs and large known abstractions (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	It has a $CaHCO_3$ signature [n=7]. Alkalinity (mg/l as $CaCO_3$): n=8, range = 82-106, median = 93; Total Hardness (mg/l): range 100-134, median 108 (slightly Hard); Conductivity (μS/cm): range 254-302, median 277.

Groundwater Flow Paths	Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Flow paths are likely to be up to 100 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 a northeasterly 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. Altaconey Bog is dependent on groundwater (O'Riain, 2004).
Conceptual model	• The land surface is characterised by steep slopes and mountainous terrain (Nephin Beg range) in the southern portion of the GWB, flattening in a northeasterly direction toward Crossmolina. Elevations range from 70-804 mAOD. • 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 up to 100m, 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 northeastwards. • The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.
Attachments	Table 1 and Figure 1.
Instrumentation	**Stream gauges:** 34037. **EPA Water Level Monitoring boreholes:** None **EPA Representative Monitoring points:** (MAY 91).
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. Pracht, M., Lees, A., Leake, B., Feely, M., Long, B., Morris, J., McConnell, B., (2003*). A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 14, Galway Bay*. Unpublished Geological Survey of Ireland Map Series Report. Long, B., McConnell, B., Philcox, M.E. (2002). *A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 11, South Mayo*. Geological Survey of Ireland Map Series Report. Geological Survey of Ireland. Aquifer Chapters: The Precambrian Aquifers. Unpublished 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 Rock units in GWB

Unit name	Code	Description	Rock unit	Aquifer class
Addergoole River Formation	AG	Banded pelitic and psammitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
Altered Fault Rock (igneous?)	R		Precambrian Quartzites, Gneisses & Schists	Pl
Ballina Limestone Formation (Lower)	BL	Dark fine-grained limestone & shale	Dinantian Upper Impure Limestones	Ll
Birreen Formation	BI	Igneous-clast conglomerate, sandstone	Devonian Old Red Sandstones	Pl
Birreencorragh Schist Formation	BH	Grey graphitic schists, grey quartzites	Precambrian Quartzites, Gneisses & Schists	Pl
Buckoogh Formation	BO	Schists, aluminous schists, pebbly grits	Precambrian Quartzites, Gneisses & Schists	Pl
Bunaveela Lough Formation	BV	Mixed schists, minor basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
Downpatrick Formation	DK	X-bedded sandstone and siltstone.	Dinantian (early) Sandstones, Shales and Limestones	Pl
Felsite	F	Felsite, lamprophyric?	Granites & other Igneous Intrusive rocks	Pl
Glenlara Volcanic Formation	GV	Basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
King's Hill Formation	KH	Conglomerates	Devonian Old Red Sandstones	Pl
Lough Doo Formation	LD	Calcareous and graphitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
Maam Formation	MM	Red sandstone, conglomerate & mudrock	Dinantian Sandstones	Ll
Minnaun Sandstone Formation	MN	X-bedded sandstone and siltstone.	Dinantian Sandstones	Lm
Mount Eagle Formation	ME	Pale quartzites, pebbly grits	Precambrian Quartzites, Gneisses & Schists	Pl
Nephin Formation	NE	Quartzites and psammitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
Skerdagh River Volcanic Formation	SV	Basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
Srahmore Lodge Dolomite Formation	SD	Dolomitic marble, quartzites, schists	Precambrian Marbles	Pl

Figure 1. Location and boundaries of GWB