Mallaranny GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
32 Mayo Co Council	**Rivers:** Newport, Owengarve, Bunahowna, Glenamong, Skerdagh, Srahmore, Crumpaun, Goulaun, Altaconey, Buncladdy, Boghadoon, Carrowsallagh, Glendahurk, Glenthomas, Murrevagh, Newport, Srahevagh, Strahrevagh, Yellow. **Lakes:** Beg, Tawnawoggaun, Awillan, Sanaloy, Strikeen, Skahaghadranton, Pollagowly, Navrosky, Navroony, Nambrackkeagh, Namaroon, Gall, Feeagh, Fadda, Ellinore, Doo, Connor, Aroher, Ard Beg, Ard, Letter, L.Aleen, Graffy, Furnace, Doontrusk, Derrykill West, Derryhillagh, Derryhill East, Derrybrock, Derrintaggert, Carheenbrack, Bunnamucka, Bunaveela		256

Topography	The GWB is bounded by Newport Bay along the part of the southern boundary and by the Nephin Beg range along the northern and western boundary. The eastern and part of the southern part of the GWB is bounded by a band of productive fractured bedrock, described in the Beltra Lough GWB. The land surface is characterised by steep slopes and mountainous terrain (Nephin Beg range) in the northern and western portion of the GWB, flattening in a southerly direction toward Newport Bay. Elevations range from 0-680 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. It composes 99% of the GWB.
	Main aquifer lithologies	This GWB is composed of Precambrian Quartzites, Gneisses & Schists, Dinantian Sandstones and thin bands of Precambrian Marble which trend N-S across the GWB. Table 1 presents the rock units present in the GWB.
	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 subparallel to the faults. There are two fault trends present in the GWB: NE-SW and NW-SE.
	Key properties	Data available for two wells located 200 m apart in the northeastern part of the GWB have recorded yields of 4.6 m^3/d and a specific capacity is 0.2 m^3/d/m for one of them. The data indicate 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%). Generally, water levels are 0-8 m below ground level. 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. Water strikes in the two boreholes located in the north east of the GWB are 3, 5 and 15 m below rock head.
Overlying Strata	**Lithologies**	Metamorphic Till, Sand/gravel (metamorphic) and Blanket Peat dominate the northern half of the GWB, underlain by the steeper slopes of the Nephin Beg range. The lower slopes and the flatter areas of the GWB toward the south are dominated by sandstone & shale Till (Devonian/Carboniferous).
	Thickness	Subsoil thickness data are sparse. The two boreholes in the northeast part of the GWB are located in a sand/gravel pocket where the subsoil thickness is greater than 22 m.
	% 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, 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, indicating the high proportion of surface runoff.
	Est. recharge rates	*[Information to be added to and checked]*
Discharge	**Large springs and large known abstractions (m^3/d)**	There are no known large abstractions or springs.
	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	Limited data to two samples 200 m apart within this particular GWB. Alkalinity (mg/l as $CaCO_3$): 162-188. Total Hardness (mg/l): 184-212. Conductivity (μS/cm): 418-475. High iron (1-2 mg/l) and high manganese (1 mg/l) were reported in the available samples.
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 a southerly 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		• The GWB is bounded by the coast along the part of the southern boundary and by mountains along the northern and western boundary. The eastern and part of the southern part of the GWB is bounded by a band of productive fractured bedrock. The land surface is characterised by steep slopes and mountainous terrain in the northern and western portion of the GWB, flattening in a southerly direction toward Newport Bay. • 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 south toward the coast. • 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:** 32001, 32002, 32070. **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. 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. Aquifer Chapters: The Precambrian and Ordovician Aquifers.
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 GWB

Code	Unit name	Description	Rock unit	Aquifer Class
MM	Maam Formation	Red sandstone, conglomerate & mudrock	Dinantian Sandstones	Ll
AN	Anaffrin Formation	Psammitic schists, quartzites	Precambrian Quartzites, Gneisses & Schists	Pl
ANgm	Glennamong Member	Pelitic & semi-pelitic schists	Precambrian Quartzites, Gneisses & Schists	Pl
ANrd	Old Road Member	Feldspatic pelitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
BH	Birreencorragh Schist Formation	Grey graphitic schists, grey quartzites	Precambrian Quartzites, Gneisses & Schists	Pl
BHqz	Birreencorragh Quartzite Member	Quartzites, gritty quartzites, schists	Precambrian Quartzites, Gneisses & Schists	Pl
Bl	Birreen Formation	Igneous-clast conglomerate, sandstone	Devonian Old Red Sandstones	Pl
BO	Buckoogh Formation	Schists, aluminous schists, pebbly grits	Precambrian Quartzites, Gneisses & Schists	Pl
BV	Bunaveela Lough Formation	Mixed schists, minor basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
CM	Croaghmoyle Formation	Quartzite-clast conglomerate	Devonian Old Red Sandstones	Pl
CP	Capnagower Formation	Grey sandstone and siltstone	Dinantian Sandstones	Lm
CS	Cullydoo Formation	White quartzites, psammitic schists	Precambrian Quartzites, Gneisses & Schists	Pl
CSsh	Srahmore Quartzite and Schist Member	White quartzites, semi-pelitic schists	Precambrian Quartzites, Gneisses & Schists	Pl
CSsq	Srahmore Quartzite Member	White quartzites, pale psammitic schists	Precambrian Quartzites, Gneisses & Schists	Pl
F	Felsite	Felsite, lamprophyric?	Granites & other Igneous Intrusive rocks	Pl
GH	Buckoogh Formation	Schists, aluminous schists, pebbly grits	Precambrian Quartzites, Gneisses & Schists	Pl
GV	Glenlara Volcanic Formation	Basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
H	Metadolerite or amphibolite	Intrusive metadolerite, often schistose	Precambrian Quartzites, Gneisses & Schists	Pl
LD	Lough Doo Formation	Calcareous and graphitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
ME	Mount Eagle Formation	Pale quartzites, pebbly grits	Precambrian Quartzites, Gneisses & Schists	Pl
MEps	Mount Eagle Schist Member	Massive psammitic/semi-pelitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
MM	Maam Formation	Red sandstone, conglomerate & mudrock	Dinantian Sandstones	Ll
NE	Nephin Formation	Quartzites and psammitic schists.	Precambrian Quartzites, Gneisses & Schists	Pl
NG	Middle Nephin Group (Undifferentiated)	Grits, meta-igneous rocks, schist, marb.	Precambrian Quartzites, Gneisses & Schists	Pl
SD	Srahmore Lodge Dolomite Formation	Dolomitic marble, quartzites, schists	Precambrian Marbles	Pl
SV	Skerdagh River Volcanic Formation	Basic metavolcanics	Precambrian Quartzites, Gneisses & Schists	Pl
SVma	Glenlara Marble Member	Dolomitic marble and basic metavolcanics	Precambrian Marbles	Pl

Figure 1. GWB [reference only]