

1st Draft Bellacorick-Killala GWB Description July .2004

Bellacorick-Killala GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
34 Mayo Co Council	<p>Rivers: Bar Deela, Deel, Shanvolahan, Fiddaunoran, Owenmore, Duvowen, Cloonaghmore, Owenmore, Breaghwy, Rathroe, Cloonaghmore.</p> <p>Lakes: Steelaun Loughs, Ranny Loughs, Loughs Gall, Loughs Aleen, Loughagenowan Loughs, Lough Thim, Lough Naweela, Lough Nagilliaghduff, Lough Naforra, Lough Nacrumpaun, Lough Nacrom, Lough Nacaghram, Lough Duff, Lough Cuagh, Lough Callog, Lough Beg, Illan Loughs, Doobehy Lough, Derrynaherriva Lough, Cosanima Loughs.</p>	Killala Bay / Moy Estuary (000458), Ummerantary Bog (001570), Bellacorick Bog Complex (001922) (O'Riain, 2004).	192
Topogra phy	The GWB comprises a relatively low lying area between Bellacorick and Killala. The western boundary and part of the northern comprise an upland area that acts as surface water catchment divide and include the catchment boundary with hydrometric area 33. The eastern boundary is bounded by the coastline. The eastern section of the northern boundary and the southern boundary comprise the Ballina, Deel and Killala South GWB's. Elevations range from sea level to 230mAOD.		
Geology and Aquifers	Aquifer categories	<p>The main aquifer categories in this GWB are:</p> <p>Pl: Poor aquifer which is generally unproductive except for local zones. It comprises the western side of the GWB.</p> <p>Ll: Locally important aquifer which is moderately productive only in local zones. It comprises the eastern side of the GWB.</p> <p>There are two small areas that are (West of Killala (0.3 km²); between Owenmore and the Duvowen (3 km²)):</p> <p>Lm: Locally important aquifer which is generally moderately productive .</p>	
	Main aquifer lithologies	This GWB is composed mainly of Dinantian (early) Sandstones, Shales and Limestones and Dinantian Upper Impure Limestones. Table 1 presents a full list of aquifer lithologies.	
	Key structures	Bedrock strata tend to be sub-horizontal. The key structural trend is NE-SW, as evidenced by major faults and slides that separate the Dinantian (early) Sandstones, Shales and Limestones from the Dinantian Upper Impure Limestones.	
	Key properties	<p>There are no hydrogeological data in this GWB specific to the Dinantian (early) Sandstones, Shales and Limestones, but are available for the adjacent Belmullet GWB. The data suggest low transmissivities – in the range of 1-5 m²/d. In the vicinity of faults, transmissivity may be higher. Storativity is expected to be low (<0.5%).</p> <p>Aquifer properties are expected to be higher in the limestone area of the GWB.</p> <p>The available data indicates water levels are approximately 1-9 m below ground level. The data are inadequate to calculate groundwater gradients but are expected to be greater than 0.01 on the western side of the GWB, and are expected to be greater than 0.005 on the eastern side of the GWB.</p>	
	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; and a zone of isolated poorly connected fissuring typically less than 150 m thick.	
Overlying Strata	Lithologies	West of a line joining Ballina – Ballycastle, the subsoils are dominated by blanket peat, with isolated pockets of sand/gravel and metamorphic till. To the east, the subsoils are dominated by limestone till. Table 2 presents a list of the subsoils in the GWB.	
	Thickness	Available data indicate the thickness are generally less than 3 m.	
	% area aquifer near surface	<i>[Further Information to be added at a later date]</i>	
	Vulnerability	<i>[Further Information to be added at a later date]</i>	
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 aquifers, a high proportion of the available recharge will discharge rapidly to nearby streams. The stream density is high (1.35 km/km ²) indicating a high proportion of surface runoff.	
	Est. recharge rates	<i>[Information to be added to and checked]</i>	
Discharge	Large springs and large known abstractions (m³/d)	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. The generally poor aquifer properties indicate that the baseflow component of total streamflow is likely to be low.	

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	Hydrochemical Signature	<p>The groundwater has a calcium bicarbonate (Ca HCO₃) signature. The available data (n=7) are sparse and are restricted to the Dinantian Upper Impure Limestones. Alkalinity (mg/l as CaCO₃): range 150-408, median 372. Total Hardness (mg/l): range 200-420; median 398. Conductivity (μS/cm): range 700-824; median 767.</p> <p>There are no data for the Dinantian (early) Sandstones, Shales and Limestones, however in the neighbouring Belmullet GWB, there are data available for a well near Bellacorick and Ceide [n=8]. Alkalinity (mg/l as CaCO₃): range 190-312, median 296. Total Hardness (mg/l): range 212-376; median 320. Conductivity (μS/cm): range 540-718; median 714.</p>
	Groundwater Flow Paths	<p>Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Water levels are generally 1-9 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 in a westerly direction.</p>
	Groundwater & Surface water interactions	<p>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.</p>
Conceptual model		<ul style="list-style-type: none"> • The GWB comprises a relatively low lying area between Bellacorick and Killala. Elevations range from sea level to 230m AOD. • The western boundary and part of the northern comprise an upland area that acts as surface water catchment divide and include the catchment boundary with hydrometric area 33. The eastern boundary is bounded by the coastline. The eastern section of the northern boundary and the southern boundary comprise the Ballina, Deel and Killala South GWB's. • The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is likely to be in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring 10-15m; and a zone of isolated, poorly connected fissuring typically less than 150m. • Recharge occurs diffusely through the subsoils and rock outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams and small springs. • The groundwater has a calcium bicarbonate (Ca HCO₃) signature. • Groundwater flow occurs near the surface (10-15 m), although deep water strikes have been observed. The water table is from 1-9 m below ground level and follows topography. Flow paths are likely to be up to 300 m, with groundwater discharging rapidly to nearby streams and small springs. Overall flow direction is in a westerly direction. • 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, 2, and Figure 1.
Instrumentation		<p>Stream gauges: None EPA Water Level Monitoring boreholes: None EPA Representative Monitoring points: (MAY 089), (MAY 090)</p>
Information Sources		<p>Long, B., Mac Dermot, C.V., Morris, J.H., Sleeman, A.G., Tietzsch-Tyler, D., (1992). <i>A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 6, North Mayo</i>. Geological Survey of Ireland Map Series Report.</p> <p>Geological Survey of Ireland Aquifer Chapters: The Dinantian (early) Sandstones, Shales and Limestones, The Dinantian Upper Impure Limestones Aquifer Chapters. Unpublished.</p> <p>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).</p>
Disclaimer		<p>Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.</p>

Table 1. Rock units GWB

StratCode	UnitName	Descript	RockUnit	AquiferCat
BL	Ballina Limestone Formation (Lower)	Dark fine-grained limestone & shale	Dinantian Upper Impure Limestones	LI
DK	Downpatrick Formation	X-bedded sandstone and siltstone.	Dinantian (early) Sandstones, Shales and Limestones	PI
MUko	Killala Oolite Member	X-bedded sandy oolite and calc. Sandstone.	Dinantian Pure Bedded Limestones	Lm
MU	Mullaghmore Sandstone Formation	Sandstone, siltstone & shale	Dinantian Sandstones	Lm

Table 2 Subsoils in GWB.

Parent Material	Code	%GWB
Alluvium	A	1.25%
Blanket peat	BktPt	50.44%
Cutover Peat	Cut	9.63%
Gravel (sandstone & shale) Devonian/Carboniferous	GDCSs	1.86%
Limestone sands and gravels (Carboniferous)	GLs	0.63%
Lakes	Lake	0.10%
Made Ground	Made	0.13%
Estuarine sediments	Mesc	0.00%
Bedrock at surface	Rck	2.78%
Sandstone till (Devonian)	TDCSs	5.44%
Limestone till (Carboniferous)	TLs	27.74%

Figure 1. Location and boundaries of GWB

