

*1<sup>st</sup> Draft Killala North GWB Description July .2004*

**Killala North GWB: Summary of Initial Characterisation.**

Hydrometric Area Local Authority		Associated surface water features	Associated terrestrial ecosystem(s)	Area (km <sup>2</sup> )
33 Mayo Co Council		Rivers: Cloonalaghan, Heathfield, Ballinglen. Lakes: Curraghfin.	None	20
<b>Topography</b>	The GWB occupies the area around Killala and parts of Downpatrick Head. The land surface of the GWB is generally low-lying, sloping in an easterly direction. The northern and eastern parts of the GWB are bounded by coastline. The northwestern boundary is a faulted contact with poorly productive sandstones of the adjacent Bellmullet GWB. To the south is the surface water divide with hydrometric area 34. Elevations range from sea level to 50 mAOD.			
<b>Geology and Aquifers</b>	<b>Aquifer categories</b>	The main aquifer category in this GWB is: <b>Lm:</b> Locally important aquifer which is generally moderately productive. There is an area (0.3 km <sup>2</sup> ) at the southern boundary that is: <b>PI:</b> Poor aquifer which is generally unproductive except for local zones. There is an area at Kilcummin (0.1 km <sup>2</sup> ), at the northeasternmost tip of the GWB that is: <b>LI:</b> Locally important aquifer which is moderately productive only in local zones		
	<b>Main aquifer lithologies</b>	This GWB is composed of Dinantian Sandstones. There is an area (0.3 km <sup>2</sup> ) at the southern boundary that is composed of Granite.		
	<b>Key structures</b>	Faults are common in the Dinantian Sandstones. A faulted contact comprises the northwestern boundary of the GWB, trending NE-SW. The GWB is also cut by a NW-SE fault. The bedding is generally dipping less than 5° to the east.		
	<b>Key properties</b>	In general, Dinantian Sandstones, given their dominant sandstone lithology, which generally results in a higher fissure permeability, has the potential to be a transmissive aquifer. Generally, well yields are “moderate” in this aquifer type, however, there are no specific transmissivity data available for this GWB. In the adjacent Killala South GWB, transmissivity is estimated, from one well to be approximately 100-120 m <sup>2</sup> /d. In the vicinity of faults, transmissivity may be higher. A hydrograph, given in Figure 1, is available for a borehole located in the Dinantian Sandstones north of Ballycastle. The annual variation of the water level is generally less than 2 m. Storativity in the aquifer is expected to be relatively high, in the order of 2%. The data are inadequate to calculate groundwater gradients, but are expected to be greater than 0.001.		
	<b>Thickness</b>	Most groundwater flux is likely to be in the upper part of the aquifer, comprising three broad zones: a zone comprising a broken and weathered zone typically less than 3 m thick; a zone of interconnected fissuring up to 40 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m. Water strikes up to 40 m below rock head are recorded and indicate a well connected network within the rock mass. Fissure permeability is generally expected to be more developed in the top 20 to 30 metres of fractured weathered rock and close to fault zones.		
<b>Overlying Strata</b>	<b>Lithologies</b>	The subsoils are a mixture of till and blanket peat. There is a small area of estuarine sediments and aeolian sands at Lackan Bay where the Cloonalaghan river enters the sea.		
	<b>Thickness</b>	Subsoil thickness data are sparse but indicate that the thickness is usually less than 3 m.		
	<b>% area aquifer near surface</b>	[Further Information to be added at a later date]		
	<b>Vulnerability</b>	[Further Information to be added at a later date]		
<b>Recharge</b>	<b>Main recharge mechanisms</b>	Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. A high proportion of the available recharge will discharge to the streams where there is blanket peat and low permeability till present.		
	<b>Est. recharge rates</b>	[Information to be added to and checked]		
<b>Discharge</b>	<b>Large springs and large known abstractions (m<sup>3</sup>/d)</b>	No large springs or good wells identified.		
	<b>Main discharge mechanisms</b>	The main groundwater discharges are to the streams, rivers and lakes.		
	<b>Hydrochemical Signature</b>	Limited data (n=2) are available within this particular GWB and the data given below are similar to the national data available for the Dinantian Sandstones. It has a CaHCO <sub>3</sub> signature. Alkalinity (mg/l as CaCO <sub>3</sub> ): 236, 292; Total Hardness (mg/l): 286, 328; Conductivity (µS/cm): 648-765. Iron 0.1, 0.2 mg/l. Manganese 2.3, 2.4 mg/l. Chlorides 52, 56 mg/l, however, the wells are all within 1 km of the coastline.		

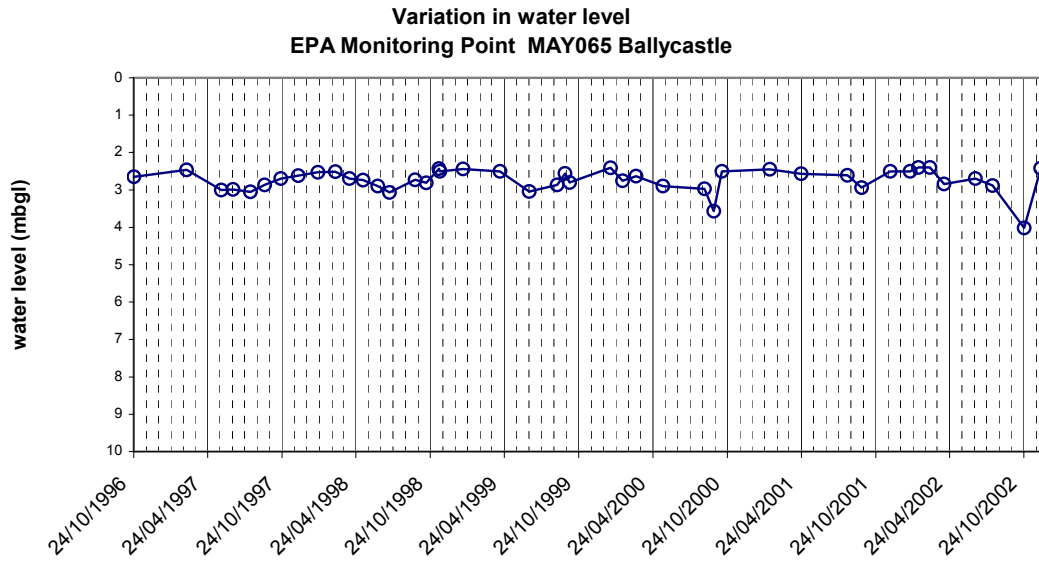
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<b>Groundwater Flow Paths</b>	Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. There are water strikes up to 40 m, indicating that there is a well connected fissured zone, enabling an element of regional groundwater flow. Flow paths can be expected to be relatively long - up to 2000 m. Groundwater flow directions are expected to follow topography, generally toward the coast.
<b>Groundwater &amp; Surface water interactions</b>	Groundwater will contribute baseflow to the streams and rivers.
<b>Conceptual model</b>	<ul style="list-style-type: none"> <li>• The GWB occupies the area around Killala and parts of Downpatrick Head. The land surface of the GWB is generally low-lying, sloping in an easterly direction. Elevations range from sea level to 50 mAOD.</li> <li>• The northern and eastern parts of the GWB are bounded by coastline. The northwestern boundary is a faulted contact with poorly productive sandstones of the adjacent Bellmullet GWB. To the south is the surface water divide with hydrometric area 34.</li> <li>• The groundwater body is composed primarily of Dinantian Sandstone which is considered to have the potential for relatively high fissure permeability. Transmissivity is estimated to be approximately 100-120 m<sup>2</sup>/d. In the vicinity of faults, transmissivity may be higher. Storativity expected to be in the order of 2%. The data are inadequate to calculate groundwater gradients, but are expected to be greater than 0.001.</li> <li>• Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. There are water strikes up to 40 m, indicating that there is a well connected fissured zone, enabling an element of regional groundwater flow.</li> <li>• Recharge occurs diffusely through the subsoils and rock outcrops.</li> <li>• It has a CaHCO<sub>3</sub> signature.</li> <li>• Flow paths are likely to be up to 2000 m. Groundwater flow directions are expected to follow topography, generally toward the coast.</li> <li>• Groundwater will discharge to and contribute baseflow to streams and rivers.</li> </ul>
<b>Attachments</b>	Table 1, Figure 1 and 2.
<b>Instrumentation</b>	<b>Stream gauges:</b> None <b>EPA Water Level Monitoring boreholes:</b> MAY065 <b>EPA Representative Monitoring points:</b> None
<b>Information Sources</b>	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. Geological Survey of Ireland. Aquifer Chapters: The Dinantian Sandstone Aquifers.
<b>Disclaimer</b>	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**

StratCode	UnitName	Descript	RockUnit	AquiferCat
D	Dolerite and Gabbro	Dolerite & gabbro, commonly silica poor	Granites & other Igneous Intrusive rocks	PI
MU	Mullaghmore Sandstone Formation	Sandstone, siltstone & shale	Dinantian Sandstones	Lm
BL	Ballina Limestone Formation (Lower)	Dark fine-grained limestone & shale	Dinantian Upper Impure Limestones	LI
MN	Minnaun Sandstone Formation	X-bedded sandstone and siltstone.	Dinantian Sandstones	Lm

**Figure 1. Groundwater Hydrograph]**



**Figure 2 Boundaries and location of GWB**

