

1st Draft Killala South GWB Description July .2004

Killala South 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: Cloonaghmore. Lakes: Meelick.	Killala Bay / Moy Estuary (000458).	27
Topography	The GWB occupies the area around Killala and Killala Bay. The land surface of the GWB is generally low-lying, sloping in an easterly direction. The eastern area of the GWB is bounded by the coastline. The northern boundary is the surface water divide with hydrometric area 33 and is the boundary with the adjacent Killala North GWB. The southern and western boundary is a faulted contact with poorly productive sandstones. Elevations range from sea level to 50 mAOD.			
Geology and Aquifers	Aquifer categories	The main aquifer category in this GWB covering 89% of the area is: Lm: Locally important aquifer which is generally moderately productive. There is an area (2 km ²) that is: PI: Poor aquifer which is generally unproductive except for local zones. There is an area at Kilcummin (1.2 km ²), at the northeasternmost tip of the GWB that is: LI: Locally important aquifer which is moderately productive only in local zones		
	Main aquifer lithologies	This GWB is composed primarily of Dinantian Sandstones, however at the southern end of the GWB, east of Killala there are 3.5 km ² of Dinantian Pure Bedded Limestones. There is an area (2 km ²) crossing Lackan Bay that is composed of Granite. Dinantian Upper Impure Limestones are present at Kilcummin Head, occupying approximately 1 km ² of the GWB. Table 1 gives a full listing of lithologies present in the GWB.		
	Key structures	A faulted contact comprises the southern boundary of the GWB, trending NW-SE. The GWB is also cut by a NE-SW fault. Through the eastern end of the GWB there are 4 NW-SE trending folds. The bedding is generally dipping less than 5° to the east, however, in the easternmost part of the GWB, on the southern side of Rathfran Bay, the dip is between 10-20° to the north and northwest.		
	Key properties	In general, Dinantian Sandstones, given their dominant sandstone lithology, which generally results in higher fissure permeability, has the potential to be a transmissive aquifer. There is a reported artesian borehole, with a yield of 1100 m ³ /d, at Palmerstown –just west of Killala, which suggests confining conditions exist locally, however, there is no further information available for this borehole. One specific capacity value is available: 108 m ³ /d/m, which gives a transmissivity estimate of approximately 100-120 m ² /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%. Water levels are generally 0-6 m below ground level. Gradients are estimated from water level data available in the southern part of the GWB, in the vicinity of Meelick to be 0.004. One reported water level is 24 m below ground level at the easternmost tip of the GWB.		
	Thickness	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. Frequent water strikes up to 40 m below rock head are recorded within this GWB 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.		
Overlying Strata	Lithologies	The subsoils are a mixture of till, blanket peat and marine sand/gravel. Sandstone till dominates the northern half of the GWB, whilst Limestone till dominates the southern half and blanket peat is dominant in the western upland area.		
	Thickness	Available data indicate that the thickness is generally less than 3 m, however at Meelick there is a recorded thickness of 13 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 rock outcrops. A high proportion of the available recharge will discharge to the streams where there is blanket peat and low permeability till present.		
	Est. recharge rates	[Information to be added to and checked]		
Discharge	Large springs and large known abstractions (m³/d)	One well reported at Palmerstown with an artesian flow of 1100 m ³ /d. One ‘Good’ well at Ballycastle (109 m ³ /d)		
	Main discharge mechanisms	The main groundwater discharges are to the streams, rivers and lakes.		

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	Hydrochemical Signature	<p>There are limited data within this particular GWB [n=11]. It has a CaHCO₃ signature. Alkalinity (mg/l as CaCO₃): range 33-372, median 315. Total Hardness (mg/l): range 128-408, median 356 (very Hard). Conductivity (μS/cm): range 348-803, median 738. Iron (mg/l) 0.002-0.24. Manganese (mg/l) 0.002-0.2. Chlorides (mg/l) 26-40, however, the wells are close to the coastline.</p>
	Groundwater Flow Paths	<p>Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. There are frequent 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, and are likely to be up to 2000 m. Groundwater flow directions are expected to follow topography, generally toward the coast.</p>
	Groundwater & Surface water interactions	<p>Groundwater will contribute baseflow to the streams and rivers. Dune slacks at Meelick Lough are dependent on groundwater (Duchas National Heritage Data).</p>
Conceptual model		<ul style="list-style-type: none"> • The GWB occupies the area around Killala and Killala Bay. The land surface of the GWB is generally low-lying, sloping in an easterly direction. Elevations range from sea level to 50 mAOD. • The eastern area of the GWB is bounded by the coastline. The northern boundary is the surface water divide with hydrometric area 33 and is the boundary with the adjacent Killala North GWB. The southern and western boundary is a faulted contact with poorly productive sandstones. • The groundwater body is composed primarily of Dinantian Sandstone which is considered to have the potential for relatively high fissure permeability. Transmissivity is in the order of 100-150 m²/d. Storativity is approximately 2%. In the vicinity of faults, transmissivity may be higher. • Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. There are frequent water strikes up to 40 m in this GWB, indicating that there is a well connected fissured zone, enabling an element of regional groundwater flow. • Gradients are estimated to be 0.004. Water levels are generally 0-6 m below ground level. • Confining conditions may exist in parts of the GWB in the vicinity of Palmerstown. • Recharge occurs diffusely through the subsoils and rock outcrops. • It has a CaHCO₃ signature. • Flow paths can be expected to be relatively long, and are likely to be up to 2000 m. Groundwater flow directions are expected to follow topography, generally toward the coast. • Groundwater will discharge to and contribute baseflow to streams, rivers and lakes.
Attachments	Table 1, Figure 1 and 2.	
Instrumentation	<p>Stream gauges: 34030. EPA Water Level Monitoring boreholes: None EPA Representative Monitoring points: None</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. Geological Survey of Ireland. Aquifer Chapters: The Dinantian Sandstone Aquifers.</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

RockUnit	%area	Description	Code	Unit name
Dinantian Pure Bedded Limestones	14.7%	X-bedded sandy oolite and calc. Sandstone.	MUko	Killala Oolite Member
Dinantian Sandstones	74.0%	Sandstone, siltstone & shale	MU	Mullaghmore Sandstone Formation
Dinantian Upper Impure Limestones	4.7%	Dark fine-grained limestone & shale	BL	Ballina Limestone Formation (Lower)
Granites & other Igneous Intrusive rocks	6.6%	Dolerite & gabbro, commonly silica poor	D	Dolerite and Gabbro

Figure 1. Groundwater Hydrograph]

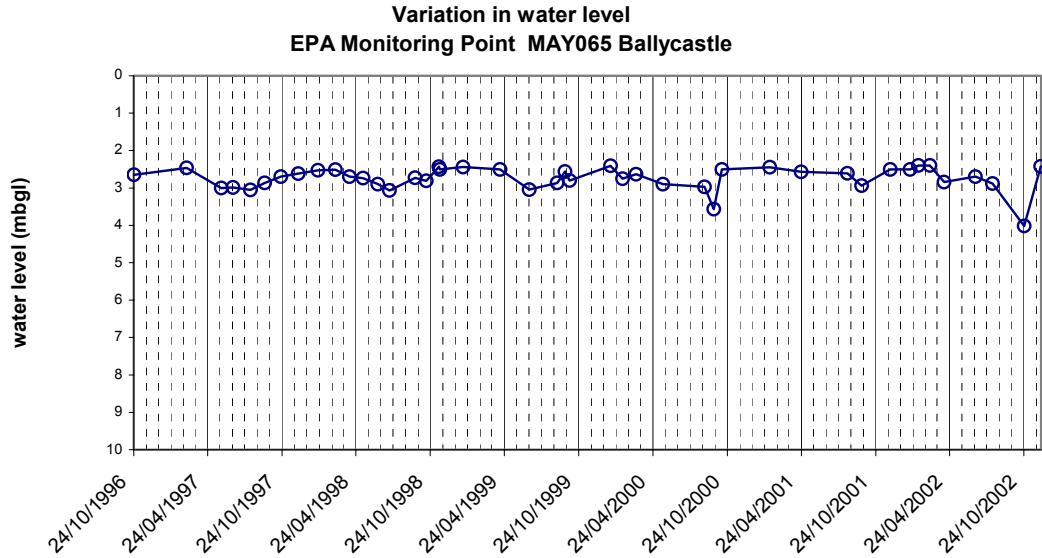


Figure 2 Location and boundaries of GWB

