

1st Draft Doorin Point GWB Description – July 2004

Doorin Point GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
Hydrometric Area 37 Donegal Co. Co.	Rivers: Eglishe, Eany More, Eany Beg, Eske, Eany Water, Bunlacky. Streams: 347 unnamed streams. Lakes: 1 unnamed lake.	Donegal Bay (Murvagh) and Lough Eske Ardnamona Wood (O’Riain, 2004)	76
Topography	Almost fully surrounding the Frosses GWB, this particular body is approaching a ‘doughnut’ shape. The majority of the boundaries comprise productive aquifers – karstic to the east and west, and fractured to the north and in the centre. The southern boundary is coastline. Elevations gently increase from <10 AOD at the coast in the southwest, to 210 mAOD along the north-eastern boundary. SW-NE trending drumlins, of between 40-60 m in height, are a common feature throughout. Surface water generally flows in a south-westerly direction to the coast.		
Geology and Aquifers	Aquifer type(s)	The vast majority of the GWB comprises LI: Locally important aquifer, moderately productive only in local zones. There are 2 very small, isolated areas of PI: Poor aquifer which is generally unproductive except for local zones, which together cover <0.5 km ² .	
	Main aquifer lithologies	Dinantian Shales and Limestones underlie most of the GWB (99.34%). Granites & Other Igneous Intrusive Rocks are found in the south-eastern and central areas, although are very limited in extent (0.66%). Refer to Table 1 for details.	
	Key structures.	In this particular GWB, deformation has resulted in 3 approximately SW-NE trending faults (Mountcharles, Burns and Eglishe Faults). The rock succession predominantly dips by <10° to the east/southeast, although the rocks along the southeast boundary are dipping in the opposite direction i.e. to the northwest.	
	Key properties	Only one yield is available for this GWB: 270 m ³ /d, with an associated water strike of 46 m below ground level. Transmissivity values are unavailable but are expected to be <20 m ² /d, and possibly <10 m ² /d in the shale-dominated lithologies. Storativity is also expected to be low. All 25 available groundwater levels are 0-10 m below ground level, with 80% less than 5 mbgl. The data are inadequate to calculate groundwater gradients however, these are expected to be relatively steep, given the lower permeability of the rock. <i>(Dinantian Shales and Limestones Aquifer Chapter; Donegal GWPS)</i>	
	Thickness	Most groundwater flux is expected 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. Only one well is recorded in this GWB, with a water strike of 46 m bgl. This suggests that there are flows in the deeper part of the aquifer.	
Overlying Strata	Lithologies	The GWB is predominantly covered by till subsoil (80%) with a smaller proportion of peat (14%).	
	Thickness	Thin or absent subsoil is especially noted along the courses of rivers and streams throughout the GWB. Outside of these areas, deposits are generally thicker (>3 m) and each drumlin represent an area of deeper till, often >10 m thick. Generally, the deepest deposits are found in the south and southwest of the body.	
	% area aquifer near surface	<i>[Information will be added at a later date]</i>	
	Vulnerability	From the Donegal GWPS, the majority of the area is classified as Extreme or High vulnerability, with thicker drumlin deposits categorised as Moderate to Low. The northeast of the GWB appears to have a higher proportion of Extreme/High, with Moderate and Low vulnerability being more common in the southwest.	
Recharge	Main recharge mechanisms	Diffuse recharge occurs via rainfall percolating through the thinner/more permeable subsoil and rock outcrops. Due to the low permeability of the thicker drumlin and peat subsoil deposits and the aquifers, a high proportion of the effective rainfall will discharge to the streams in the GWB. In addition, the steeper drumlin slopes will promote surface runoff. The high stream density is likely to be influenced by the lower permeability rocks as well as the subsoil.	
	Est. recharge rates	<i>[Information will be added at a later date]</i>	
Discharge	Important springs and high yielding wells	Springs: None identified. Sources: None identified. Excellent Wells: None identified Good Wells: Ballymacahill (270 m ³ /d).	
	Main discharge mechanisms	The main groundwater discharges are to the rivers and streams crossing the GWB, reflecting short groundwater flow paths. Small springs and seeps are likely to issue at the stream heads and along their course. Groundwater may also flow into the adjacent higher permeability Lm GWB e.g. Inver-Banagher Hill, or to a greater extent, the Frosses GWB, which is down-gradient.	

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Hydrochemical Signature	No available data within this particular GWB. <i>National classification:</i> Dinantian Rocks (excluding Sandstones) Calcareous. Generally CaHCO ₃ signature. Alkalinity (mg/l as CaCO ₃): range of 10-990; mean of 283 (2454 data points) Total Hardness (mg/l): range of 10-1940; mean of 339 (2146 data points) Conductivity (µS/cm): range of 76-2999; mean of 691 (2663 data points) <i>(Calcareous/Non calcareous classification of bedrock in the Republic of Ireland report)</i>
Groundwater Flow Paths	In the absence of inter-granular permeability, groundwater flow is expected to be concentrated in upper fractured and weathered zones and in the vicinity of fault zones. Available groundwater levels are mainly 0-5 m below ground level. Unconfined flow paths are likely to be short (30-300 m), with groundwater discharging rapidly to nearby streams and small springs. Water strikes deeper than the estimated interconnected fissure zone suggest a component of deep groundwater flow, however shallow groundwater flow is dominant. Groundwater flow directions are expected to follow topography – to the southwest.
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	<ul style="list-style-type: none"> • The GWB is mainly bounded by differing types of aquifer. The southern boundary is coastline. Drumlins are a common feature throughout the body, generally trending SW-NE. Elevations range from sea level to 210 mAOD. • 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 3 m thick; a zone of interconnected fissuring typically less than 10-15 m; and a zone of isolated fissuring typically less than 150 m. • Recharge occurs diffusely through the thin/permeable subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and the bedrock itself. Therefore, most of the effective rainfall is not expected to recharge the aquifer. • Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps. Overall, the flow directions are expected to be to the southwest, as determined by the topography.
Attachments	Figure 1. Table 1.
Instrumentation	Stream gauges: 37001, 37013 EPA Water Level Monitoring boreholes: None identified. EPA Representative Monitoring points: None identified.
Information Sources	Lee M. and Fitzsimons V. (2004). <i>County Donegal Groundwater Protection Scheme</i> . Main Report. Draft Report to Donegal County Council. Geological Survey of Ireland 58pp. Long, C.B. and McConnell (1999) <i>Geology of South Donegal: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 3, South Donegal</i> . With contributions by G.I. Alsop, P. O'Connor, K. Carlingford and C. Cronin. Geological Survey of Ireland, 116pp. O' Riain, G. 2004. <i>Water Dependent Ecosystems and Subtypes (Draft)</i> . Compass Informatics in association with National Parks and Wildlife (DEHLG). WFD support projects.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.

Figure 1. Location and boundaries of Doorin Point GWB

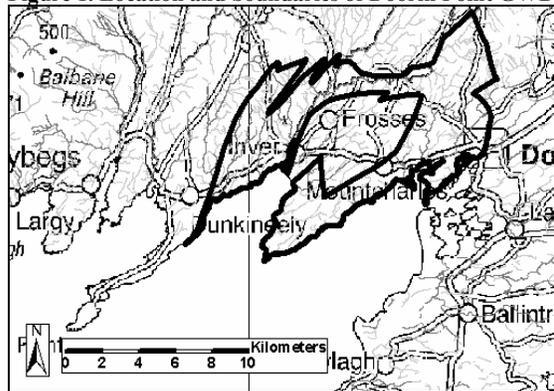


Table 1. List of Rock units in Doorin Point GWB

Rock Unit Name	Code	Description	Rock Unit Group	Aquifer Class.	% Area
Bundoran Shale Formation	BN	Dark shale, minor fine-grained limestone	Dinantian Shales and Limestones	L1	99.34%
Dolerite	D	basalt and gabbro	Granites & other Igneous Intrusive rocks	PI	0.66%