

Bundoran GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
Hydrometric Area 36 Donegal Co. Co. Leitrim Co. Co. NI (small area)	Rivers: Bradoge, Erne, Drowes. Streams: 43 unnamed streams. Lakes: None identified.	None identified (O’Riain, 2004)	18
Topography		Extending between Bundoran and Beleek, this narrow elongated GWB is bounded by a more productive karstified aquifer to the north and a more productive fractured aquifer to the south. The western boundary comprises and short length of coastline and the eastern boundary is a topographic divide. Elevations gently increase further inland from <10 AOD at the coast to 90 mAOD along the north-eastern boundary. Surface water generally flows in a westerly direction towards the coast.	
Geology and Aquifers	Aquifer type(s)	This GWB comprises L1 : Locally important aquifer, moderately productive only in local zones.	
	Main aquifer lithologies	Dinantian Shales and Limestones are the sole bedrock group underlying the GWB. Refer to Table 1 for details.	
	Key structures.	The rock succession dips to the south by 5-10°.	
	Key properties	Only one yield is available for this GWB: 109 m ³ /d. 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. Only one groundwater level is available: 2.4 m below ground level. Groundwater gradients 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.	
Overlying Strata	Lithologies	Data are available for just over 70% of the GWB, which show that till is the dominant subsoil (51% of GWB).	
	Thickness	From the available borehole and outcrop data, the subsoil in this GWB is generally quite thick (>3 m) although there are some areas where subsoil is thin or absent at the peripheries of the body.	
	% area aquifer near surface	<i>[Information will be added at a later date]</i>	
	Vulnerability	From the Donegal GWPS, the central area is classified Moderate vulnerability, which is surrounded by High. This is likely to be pattern in the unmapped areas of Sligo and Northern Ireland.	
Recharge	Main recharge mechanisms	Diffuse recharge occurs via rainfall percolating through the thinner/more permeable subsoil and rock outcrops. Due to any low permeability subsoil deposits and the aquifers themselves, a high proportion of the effective rainfall will discharge to the streams in the GWB. The relatively high stream density is likely to be influenced by the low permeability rock, as well as the low-lying coastal nature of this area i.e. a discharge zone.	
	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: Bundoran (109 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 and Rk GWBs. Seepages will develop on the coastline.	
	Hydrochemical Signature	No available data within this particular GWB. National classification: Dinantian Rocks (excluding Sandstones) Calcareous. Generally Ca- HCO 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. Unconfined flow paths are likely to be short (30-300 m), with groundwater discharging rapidly to nearby streams and small springs. Groundwater flow directions are expected to follow topography – to the west.	

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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 bounded by differing types of aquifer to the north and south, coastline to the west, and a topographic divide to the east. Elevations range from sea level to 90 mAOD. The GWB is composed 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 west, as determined by the topography.
Attachments	Figure 1. Table 1.
Instrumentation	Stream gauges: None identified. EPA Water Level Monitoring boreholes: None identified. EPA Representative Monitoring points: None identified.
Information Sources	<p>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.</p> <p>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.</p> <p>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.</p>
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 Bundoran GWB.

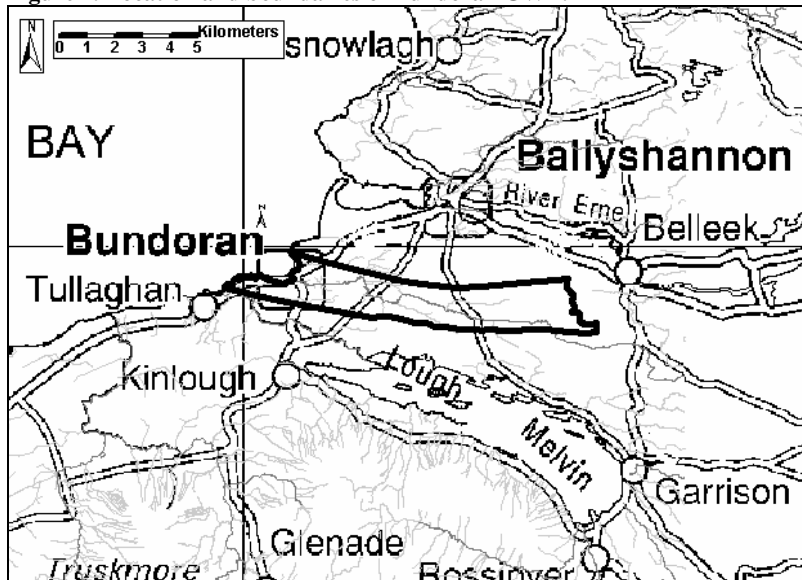


Table 1. List of Rock units in Bundoran GWB

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	100.00%