**Inver-Banagher Hill GWB: Summary of Initial Characterisation.**

| Hydrometric Area<br>Local Authority | Associated surface water features | Associated terrestrial ecosystem(s) | Area ($km^2$) |
|---|---|---|---|
| Hydrometric Area 37<br>Donegal Co. Co. | ***Rivers:*** Bunlacky, Clady, Eany Beg Water, Eany More Water, Eglish, Oily.<br>***Streams****:* 348 unnamed streams.<br>***Lakes:*** Banagher, Camlargy, Coltame, Croagh, Avaddy, Cam, Creen, Eske, Fad, Muilt, Sallagh, Meenaguse, Sand. | Lough Eske and Ardnamona Wood and Meenaguse/ Ardbane Bog (O'Riain, 2004) | 79 |

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| **Topography** | | This irregularly arc-shaped GWB stretches from north of Donegal Town to Dunkineely. The body is predominantly bounded by differing aquifer types – mainly of lower permeability although aquifers along the part of the southwest and southeast boundaries are karstified. A very small proportion of the southwest boundary is coastline. The topography becomes increasingly hilly/mountainous to the north of the GWB, with elevations ranging from <10 AOD in the southwest to 380 mAOD in the northeast (Bluestack Mountains). Drumlins cover a small proportion of the area in the south of the GWB. Surface water generally flows south to south-westwards across the GWB to the coast. |
| **Geology and Aquifers** | **Aquifer categories** | This GWB is underlain by **Lm:** Locally important aquifer which is generally moderately productive. |
| | **Main aquifer lithologies** | Dinantian Sandstones are the sole rock group in the GWB. Refer to Table 1 for details. |
| | **Key structures** | There are a small number of faults both delineating (e.g. Boundary and Burns Faults) and cutting (e.g. Eglish Fault) this GWB. Rocks dips at generally less than 10°, predominantly to the east and southeast. |
| | **Key properties** | Although there are no hydrogeological data specific to this GWB, the dominant sandstone lithology will generally result in a higher fissure permeability. Therefore this aquifer has the potential to have relatively high transmissivity values – in the order of 10-50 $m^2$/d, and possibly higher in the vicinity of faults (100-150 $m^2$/d). A specific capacity value of 22 $m^3$/d/m had been recorded in the Frosses GWB (c.4 km to the south), which is also a Dinantian Sandstone/Lm body. Storativity is also expected to be reasonable.<br>The limited water levels (6) are all 0-6 m below ground level. Although these data are inadequate to calculate groundwater gradients, they are expected to be less than in the adjacent Ll GWBs.<br>*(Dinantian Sandstones Aquifer Chapter; Donegal GWPS*) |
| | **Thickness** | Most groundwater flux is likely to be in the upper part of the aquifer, comprising three broad zones: broken and weathered rock, typically less than 3 m thick; interconnected fissuring up to 30-40 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m. A limited number of deeper water strikes (43 m; 55 m below rock head) are recorded in the nearly Frosses GWB, which may suggest that the well connected fissured network extends to at least c.40 m bgl. However, fissure permeability is generally expected to be more developed in the top 20-30 m of fractured weathered rock and close to fault zones. |
| **Overlying Strata** | **Lithologies** | The majority of the GWB is covered by peat (63%), especially over the northern, more upland part of the GWB. There is a smaller proportion of till (28%), which are more prevalent in the southern part of the GWB. |
| | **Thickness** | From the Donegal GWPS, subsoil is absent or thin over most of the higher ground in the north of the GWB. Thicker deposits are located in the centre of the GWB, ranging from >3 m to >10 m. |
| | **% area aquifer near surface** | *[Information will be added at a later date]* |
| | **Vulnerability** | A large proportion of the GWB is classed as Extremely vulnerable, with areas of deeper deposits in the central area rated as High, Moderate or Low vulnerability. |
| **fsRecharge** | **Main recharge mechanisms** | Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. A proportion of the effective rainfall will discharge to the streams in the GWB, especially where thick, low permeability subsoil is present (till or peat). In addition, the steep slopes of drumlins and more mountainous areas will promote surface runoff. The stream density is relatively high, especially over central and eastern areas. |
| | **Est. recharge rates** | *[Information will be added at a later date]* |
| **Discharge** | **Large springs and high yielding wells ($m^3$/d)** | Springs: None identified.<br>Excellent Wells: None identified.<br>Good Wells: None identified. |
| | **Main discharge mechanisms** | The main groundwater discharges are to the streams, rivers and any springs within the GWB. Seepages will also develop on the small area of coastline. Given the higher transmissivities associated with Lm aquifers, the baseflow proportion of the total streamflow is expected to be higher in this GWB than for the adjacent Ll GWBs. |

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|---|---|---|
| | **Hydrochemical Signature** | There are no data available for this GWB.<br>***National classification:*** Dinantian Sandstones<br>Calcareous. Generally $CaHCO_3$ signature.<br>Alkalinity (mg/l as $CaCO_3$): range of 5-524; mean of 153 (65 'non limestone subsoils' data points)<br>Total Hardness (mg/l): range of 5-502; mean of 162 (67 'non limestone subsoils' data points)<br>Conductivity ($\mu$S/cm): range of 39-1184; mean of 408 (69 'non limestone subsoils' data points)<br>*(Calcareous/Non calcareous classification of bedrock in the Republic of Ireland report)* |
| **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. The limited water level data are 0-6 mbgl. Groundwater flow is thought to be mainly unconfined and of a regional scale i.e. long flow path lengths (up to 2000 m) would be expected although are likely to be shorter in discharge areas (c.100-300 m). Overall, the flow direction will be southwards towards the coastline, as determined by topography. |
| **Groundwater & Surface water interactions** | | The main groundwater discharges are to the streams, rivers and any springs within the GWB. The baseflow proportion of the total streamflow is expected to be relatively high in this GWB due to the higher transmissivities that are generally associated with Lm aquifers. |
| **Conceptual model** | | • The GWB is mainly bounded by differing types of aquifer. A small portion of the SW boundary is coastline. The topography ranges from gently sloping to hilly/mountainous, with a small area of drumlins in the south. Elevations range from sea level to 380 mAOD in the northeast.<br>• The groundwater body is composed of Dinantian Sandstone, which is considered to have the potential for relatively high fissure permeability. Most of the unconfined groundwater flux is in the uppermost part of the aquifer comprising a broken and weathered zone typically less than 3m thick, a zone of interconnected fissuring up to c.40m, and a zone of isolated fissuring typically less than 150m.<br>• Transmissivity values are expected to be 10-50 $m^2/d$ although may be as high as 100-150 $m^2/d$, especially in the vicinity of faults. Storativity is likely to be reasonable.<br>• High fissure permeability aquifers can generally support regional scale flow systems. Long flow paths (e.g. 2000 m) can be expected although are likely to be shorter is discharge areas (100-300 m).<br>• Recharge will occur diffusely through the thinner and/or more permeable subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and bedrock.<br>• The main discharges are to the streams, rivers and lakes within the GWB, and seeps along the coastline. Overall, the flow direction is to the south, as determined by the topography. |
| **Attachments** | | Figure 1. Table 1. |
| **Instrumentation** | | **Stream gauges:** None identified.<br>**EPA Water Level Monitoring boreholes:** None identified.<br>**EPA Representative Monitoring points:** None identified. |
| **Information Sources** | | Lee M. and Fitzsimons V. (2004). *County Donegal Groundwater Protection Scheme.* Main Report. Draft Report to Donegal County Council. Geological Survey of Ireland 58pp.<br>Long, C.B. and McConnell (1999) *Geology of South Donegal: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 3, South Donegal*. With contributions by G.I. Alsop, P. O'Connor, K. Carlingford and C. Cronin. Geological Survey of Ireland, 116pp.<br>O' Riain, 2004. *Water Dependent Ecosystems and Subtypes (Draft)*. 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 Inver-Banagher Hill GWB**

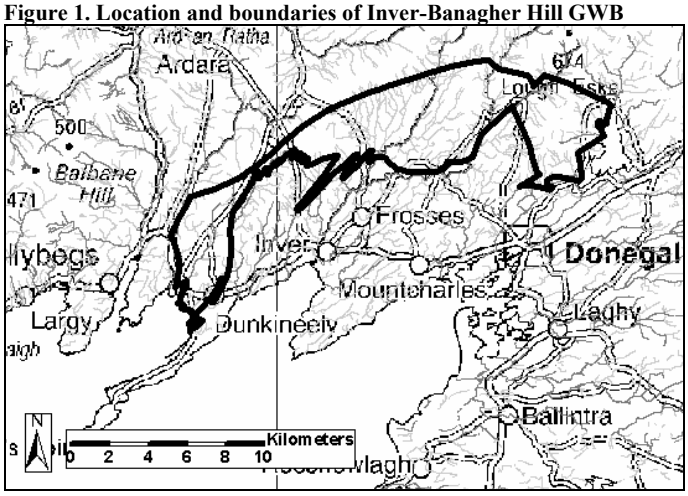


**Table 1. List of Rock units in Inver-Banagher Hill GWB**

| **Rock Unit Name** | Code | Description | Rock Unit Group | **Aquifer Class.** | % Area |
|---|---|---|---|---|---|
| Killin Formation | KG | Coarse feldsp. sandstone & conglomerate | Dinantian Sandstones | Lm | 47.80% |
| Banagher Sandstone Formation | BG | Feldspathic sandstone & conglomerate | Dinantian Sandstones | Lm | 43.49% |
| Ballyshannon Limestone Formation | BS | Pale grey calcarenite limestone | Dinantian Pure Bedded Limestones | Rk | 8.72% |