

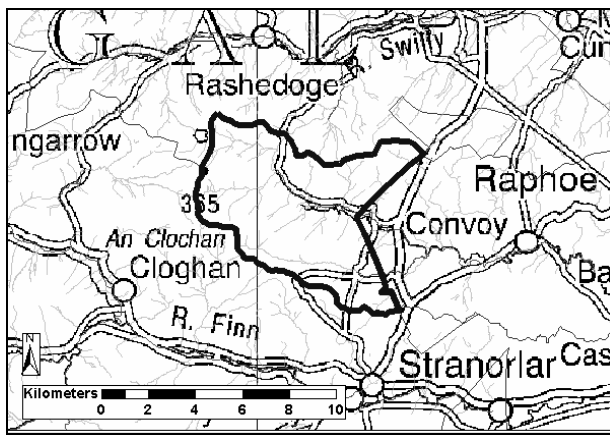
Upper Deele GWB: Summary of Initial Characterisation.

| Hydrometric Area Local Authority | Associated surface water bodies | Associated terrestrial ecosystems | Area (km ²) |
|--|--|---|-------------------------|
| Hydrometric Area 01 Donegal Co. Co. | Rivers : Deele, Cloghroe Streams : 70 unnamed streams. Lakes : None identified. | None identified (O' Riain, 2004) | 44 |
| Topography | Located halfway between Letterkenny and Ballybofey, this GWB (Figure 1) is bounded by topographic divides to the north/northwest (Hydrometric Area 39) and to the south/southwest (River Finn catchment), and by marbles to the east. The topography is generally upland although is cut by E-W aligned river valleys (Deele and Cloghroe). Elevations increase westwards from c.120 mAOD in the Deele valley to c.350 mAOD on Cark Mountain. Surface water flows to the east. | | |
| Geology and Aquifers | Aquifer type(s) | The GWB is underlain by PI : Poor aquifer which is generally unproductive except for local zones. | |
| | Main aquifer lithologies | Precambrian Quartzites, Gneisses & Schists is the sole rock group in this GWB. Refer to Table 1 for more details. | |
| | Key structures | The rocks in this part of Donegal have been significantly deformed, resulting in 5 approximately SW-NE faults cutting the GWB (e.g. Belshade Fault). The rocks generally dip to the NE by c.25-40°. | |
| | Key properties | Only two well yields are available: 16 and 24 m ³ /d. The lower yielding well has a specific capacity value of 6 m ³ /d/m. Although there are no transmissivity data for the GWB, they are likely to be low, with the possibility of higher values in faulted zones, especially in the coarser-grained rocks (quartzites and gneisses). Typical specific dry weather flows for this rock group across Donegal are low (0.41-1.1 l/s/km ² at 5 stations suggesting that this aquifer does not make a significant baseflow contribution to streamflow. Storativity is also expected to be low. The three available groundwater levels are less than 10 m below ground level, with 2 less than 3 mbgl. Although the data are inadequate to calculate groundwater gradients, these are expected to be relatively steep. <i>(Precambrian 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. Deeper water strikes are noted at 37 and 48 mbgl in the 2 low-yielding wells. | | |
| Overlying Strata | Lithologies | The GWB is predominantly covered peat (60%), with a lesser proportion of till (35%). | |
| | Thickness | From the Donegal GWPS, subsoil is absent or thin over the higher areas i.e. the higher areas between valleys. Deposits become thicker in the river valleys (3-10 m), with only 2-3 small areas of thick deposits (>10 m). | |
| | % area aquifer near surface | <i>[Information will be added at a later date]</i> | |
| | Vulnerability | The majority of this GWB is classified as Extremely vulnerability, due to the high percentage of thin subsoil and rock outcrops. Where subsoil is thicker, such as in the valleys, the vulnerability is mainly High, with the rare small areas of Moderate, which coincide with deeper zones of peat deposits. | |
| Recharge | Main recharge mechanisms | Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of the thicker peat deposits and of the aquifers, a high proportion of the effective rainfall will quickly discharge to the streams in the GWB. In addition, the steep slopes in the upland areas promote surface runoff. The relatively high stream density may be due to a combination of the lower permeability rocks and the high relief. | |
| | Est. recharge rates | <i>[Information will be added at a later date]</i> | |
| Discharge | Springs and large known abstractions | Sources: None identified. Springs: None identified. Excellent wells: None identified. Good wells: None identified. | |
| | 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. | |

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|---|---|
| Hydrochemical Signature | No data are available within this particular GWB. <i>National classification:</i> Non-calcareous with bi-modal alkalinity distribution, although the higher range is possibly caused by thin bands of marble. Alkalinity (mg/l as CaCO ₃): range of 14-400; mean of 168 (41 'non limestone subsoils' data points) Total Hardness (mg/l): range of 46-412; mean of 200 (39 'non limestone subsoils' data points) Conductivity (µS/cm): range of 160-752; mean of 446 (45 'non limestone subsoils' 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. The few available groundwater levels are <10 m below ground level. Unconfined groundwater flow paths are short (30-300 m), with groundwater generally following the topography and then discharging rapidly to seeps, small springs and streams. Water strikes are only marginally deeper than the estimated interconnected fissure zone and are associated with low yields. Shallow flow is more likely to be dominant. Overall, groundwater flow is eastwards, as determined by topography. |
| 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 relatively low, as suggested by the regional specific dry weather flow data. |
| Conceptual model | <ul style="list-style-type: none"> • GWB boundaries to the north, west, south and southeast are topographic divides. The eastern boundary represents a change in aquifer type. The topography increases in elevation from east to west, and is generally hilly to mountainous. The area is incised by the W-E trending Deele river valley. • 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 3m thick; a zone of interconnected fissuring 10-15m thick; and a zone of isolated fissuring typically less than 150m. • Recharge occurs diffusely through the subsoil and rock outcrops, although is limited by any thicker pockets of peat and the low permeability bedrock. Therefore, most of the effective rainfall is not expected to recharge the aquifers. • 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 direction is towards the east. |
| Attachments | Figure 1. Table 1. |
| Instrumentation | Stream gauge: None identified. EPA Water Level Monitoring boreholes: None identified. EPA Representative Monitoring boreholes: 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, 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 GWB.



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Table 1. List of Rock units in GWB

| Rock Unit Name | Code | Description | Rock Unit Group | Aquifer Class. | % Area |
|-------------------------------|-------------|---|--|-----------------------|---------------|
| Termon Formation | TE | Banded semi-pelitic & psammitic schist | Precambrian Quartzites, Gneisses & Schists | P1 | 74.12% |
| Lough Eske Psammite Formation | LE | Feldspathic psammite; quartzite, marble | Precambrian Quartzites, Gneisses & Schists | P1 | 14.53% |
| Killeter Quartzite Formation | KT | Slightly impure quartzite | Precambrian Quartzites, Gneisses & Schists | P1 | 11.15% |
| Metavolcanic green bed | vg | Metavolcanic green bed | Precambrian Quartzites, Gneisses & Schists | P1 | 0.12% |
| Metadolerite | Md | Hornblendic and sometimes schistose | Precambrian Quartzites, Gneisses & Schists | P1 | 0.09% |