Kiltyclogher GWB: Summary of Initial Characterisation.

<table>
<thead>
<tr>
<th>Hydrometric Area</th>
<th>Associated surface water bodies</th>
<th>Associated terrestrial ecosystems</th>
<th>Area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Authority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rivers: 3 unnamed rivers</td>
<td></td>
<td>None identified (O’Riain, 2004)</td>
<td></td>
</tr>
<tr>
<td>Streams: 12 unnamed streams.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakes: None identified.</td>
<td></td>
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</tr>
</tbody>
</table>

### Topography
This GWB is located in the north-eastern slopes of Dough and Thur Mountains, extending down into the middle of the County River valley. The north and western boundaries comprise more productive (karst) aquifers, and the southern and eastern boundaries are topographic divides. The topography is mountainous (maximum of 460 mAOD) in the southern half of the body but becomes flatter and lower-lying in the valley area to the north (c.70 mAOD). Surface water flows downslope, in an north-easterly direction, to the valley.

### Aquifer type(s)
The upper mountain slopes are underlain by alternating bands of Pi: Poor aquifer, unproductive except for local zones, and Pu: Poor aquifer, generally unproductive (totalling 36%), which is flanked by a thin band of Li: Locally important aquifer, moderately productive only in local zones. Li aquifers are also located along the eastern boundary. The remaining northern area comprises Lm: Locally important aquifer, generally moderately productive (45%).

### Main aquifer lithologies
Layers of Namurian Shales (18.28%) and Namurian Sandstones (4.36%) cover the uppermost mountain areas, with Dinantian rocks underlying the remaining areas: Shales and Limestones (13.44%) and mixed Sandstones, Shales and Limestones (12.55%) on the lower slopes; Sandstones (44.62%) under the northern portion of the valley; and Pure Unbedded Limestones (6.48%) along the eastern boundary. Refer to Table 1 for details.

### Key structures.
The deformation in this region has resulted in a number of SW-NE faults cutting through and delineating the GWB, and the rocks mainly dipping to the SSW by 5-10°.

### Key properties
No hydrogeological data are available for this GWB although transmissivity values for the Pu/Pl and Ll aquifers are expected to be <20 m²/d, and possibly <10 m²/d in the shale-dominated lithologies (e.g. Namurian Shales). Storativity is also expected to be low. Sandstones (Lm aquifer) generally have a higher fissure permeability and therefore, the potential to have relatively high transmissivity values – in the order of 10-50 m²/d, although they may be higher in the vicinity of faults (c.100-150 m²/d). Accordingly, storativity is also expected to be higher. In the low permeability rocks (Pu, Pl), groundwater gradients are expected to be greater than c.0.01, especially given the mountainous terrain. Less steep gradients are expected in the more productive Lm aquifers.

### Thickness
Most groundwater flux in all of the rock groups is expected to be in the uppermost part of the aquifer. This is thought to comprising a broken and weathered zone typically less than 3 m thick, a zone of interconnected fissuring, and a zone of isolated poorly connected fissuring less than 150 m.

The zone of interconnected fissuring is likely to be in the region of 10-15 m thick in most of the rock groups however, fissure permeability is generally expected to be more developed in the Sandstone rock group. Therefore, this zone may extend to between 30-40 m thick. The deeper zone of isolated, poorly connected fissuring is less likely to be associated with the Pu aquifers.

### Lithologies
No subsoil data are available for this GWB.

### Overlying Strata
From the available outcrop and topographic information (Leitrim), subsoil is expected to be absent or thin (<3 m thick) over a large proportion of this GWB, especially at higher elevations. Deeper subsoil is often found in valley, however there are no data to substantiate this.

### % area aquifer near surface
[Information will be added at a later date]

### Vulnerability
Although vulnerability data are not available, areas of extremely vulnerability are expected over the higher areas, where subsoil.

### Main recharge mechanisms
Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of some subsoil deposits and the aquifers, a high proportion of the effective rainfall will discharge to the streams in the GWB. In addition, the steep mountainous slopes will promote surface runoff. The high stream density is likely to be influenced by the low permeability rocks.

### Ext. recharge rates
[Information will be added at a later date]

### Important springs and high yielding wells
Springs: None identified.
Sources: None identified.
Excellent Wells: None identified.
Good Wells: None identified.
The main groundwater discharges are to the rivers and streams crossing the GWB, reflecting generally short groundwater flow paths in the lower permeability aquifers. Small springs and seeps are likely to issue at the stream heads and along their course. Groundwater may also discharge into the adjacent, higher permeability karstic GWB.

### Hydrochemical Signature

**National classification:** Namurian Rocks
- Calcareaous. Generally CaHCO₃ signature, although also ranges from MgHCO₃, Na/KHCO₃, Na/KSO₄ to MgNa/KCl where groundwater has longer residence time.
- Alkalinity (mg/l as CaCO₃): range of 4-436; mean of 107 (107 ‘non-limestone subsoil’ data points)
- Total Hardness (mg/l): range of 11-473; mean of 173 (108 ‘non-limestone subsoil’ data points)
- Conductivity (µS/cm): range of 76-869; mean of 418 (112 ‘non-limestone subsoil’ data points)

**National classification:** Dinantian Sandstones
- Calcareaous. Generally CaHCO₃ signature.
- Alkalinity (mg/l as CaCO₃): 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)

**National classification:** Dinantian Sandstones
- Calcareaous. Generally CaHCO₃ signature.
- Alkalinity (mg/l as CaCO₃): range of 5-524; mean of 153 (65 ‘non limestone subsoils’ data points)
- Total Hardness (mg/l): range of 5-502; mean of 162 (67 ‘non limestone subsoils’ data points)
- Conductivity (µS/cm): range of 39-1184; mean of 408 (69 ‘non limestone subsoils’ data points)

(Calcareaous/Non calcareaous classification of bedrock in the Republic of Ireland report)

### Groundwater Flow Paths

In the absence of inter-granular, 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 from the Pu/Pl and Ll aquifers. In the Sandstones (Lm aquifer), flow is 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). Groundwater flow directions are expected to follow topography i.e. downslope from the mountain summits to the valley.

### 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 most 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, although might be higher across the Lm aquifers.

**Conceptual model**

- The southern and eastern boundaries of this GWB are topographic divides. The remaining boundaries comprise more productive karst aquifers. The topography is steep and mountainous to the south, but flattens to a valley along the northern boundary. Elevations ranging from c.70-460 mAOAD.
- 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 in the Pu/Pl and Ll aquifers, although up to 30-40 m in the Lm aquifers; and a zone of isolated fissuring typically less than 150 m, although this third zone is less likely to be associated with the Pu aquifers.
- Higher transmissivity (10-50 m²/d – although may be as high as 100-150 m²/d in the vicinity of faults) and storativity values are expected in the Sandstones.
- Recharge occurs diffusely through the subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and bedrock itself. Most of the effective rainfall over the Pu/Pl and Ll aquifers is not expected to recharge the aquifer.
- Flow paths are likely to be short (30-300 m) in the lower permeability rocks, with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps. Longer flow paths (up to 2000 m, although shorter in discharge areas) would be expected in the Sandstones rock group. Overall, the flow directions are expected to be northwards, towards the valley.

### 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


### 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 Kiltyclogher GWB**

![Map of Kiltyclogher GWB](image)

**Table 1. List of Rock units in Kiltyclogher GWB**

<table>
<thead>
<tr>
<th>Rock Unit Name</th>
<th>Code</th>
<th>Description</th>
<th>Rock Unit Group</th>
<th>Aquifer Class</th>
<th>% Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenade Sandstone Formation</td>
<td>GD</td>
<td>Pale orthoquartzitic sandstone</td>
<td>Dinantian Sandstones</td>
<td>Lm</td>
<td>44.62%</td>
</tr>
<tr>
<td>Dergvone Shale Formation</td>
<td>DE</td>
<td>Shale &amp; minor turbiditic sandstone</td>
<td>Namurian Shales</td>
<td>Pu</td>
<td>18.28%</td>
</tr>
<tr>
<td>Carraun Shale Formation</td>
<td>CN</td>
<td>Grey/black shale with minor limestone</td>
<td>Dinantian Shales and Limestones</td>
<td>Pl</td>
<td>13.44%</td>
</tr>
<tr>
<td>Bellavally Shale Formation</td>
<td>BE</td>
<td>Grey micrite, shale, laminite evaporite</td>
<td>Dinantian Mixed Sandstones, Shales and Limestones</td>
<td>Ll</td>
<td>7.14%</td>
</tr>
<tr>
<td>Mudbank Limestones</td>
<td>mk</td>
<td>Massive grey micritic limestone</td>
<td>Dinantian Pure Unbedded Limestones</td>
<td>Ll</td>
<td>6.48%</td>
</tr>
<tr>
<td>Meenymore Formation</td>
<td>ME</td>
<td>Shale, laminated carbonate, evaporite</td>
<td>Dinantian Mixed Sandstones, Shales and Limestones</td>
<td>Ll</td>
<td>5.35%</td>
</tr>
<tr>
<td>Lacoon Flagstone Member</td>
<td>DEln</td>
<td>Interbedded sandstone &amp; thin shale</td>
<td>Namurian Sandstones</td>
<td>Pl</td>
<td>3.87%</td>
</tr>
<tr>
<td>Briscloonagh Sandstone Formation</td>
<td>BR</td>
<td>Fine-grained sandstone, minor shale</td>
<td>Namurian Sandstones</td>
<td>Pl</td>
<td>0.76%</td>
</tr>
<tr>
<td>Doobally Sandstone</td>
<td>BEdo</td>
<td>Medium-grained sandstone</td>
<td>Dinantian Mixed Sandstones, Shales and Limestones</td>
<td>Ll</td>
<td>0.06%</td>
</tr>
</tbody>
</table>