

**Kildoney Point North GWB: Summary of Initial Characterisation.**

Hydrometric Area Local Authority		Associated surface water features	Associated terrestrial ecosystem(s)	Area (km <sup>2</sup> )
Hydrometric Area 37  Donegal Co. Co.		<b>Rivers:</b> None identified. <b>Lakes:</b> Durnesh Lake. <b>Streams:</b> 29 unnamed streams.	Lough Eske and Ardnamona Wood and Meenaguse/ Ardbane Bog (O’Riain, 2004)	18
<b>Topography</b>		This is an ‘L’ shaped GWB, which is bounded by karstified rock to the east, by coastline to the north and west, and by a topographic divide to the south (Hydrometric Area 36). The landscape gently rising inland from <10 mAOD at the coast to 140 mAOD in the southeast corner. E-W orientated drumlins occur in the northern half of the GWB. In the south, the surface water flows westwards, directly towards Donegal Bay. Local flow directions in the north are northwards towards Durnesh Lake.		
<b>Geology and Aquifers</b>	<b>Aquifer categories</b>	Just over half of the GWB is underlain by <b>Lm</b> : Locally important aquifer which is generally moderately productive. The remaining northern half comprises <b>Ll</b> : Locally important aquifer, moderately productive only in local zones.		
	<b>Main aquifer lithologies</b>	Dinantian Sandstones (56.44%) are mapped in the south of the GWB, with Dinantian Shales and Limestones (43.56%) mapped to the north. Refer to Table 1 for details.		
	<b>Key structures</b>	The rock succession is dipping predominantly to the south by between 4-12°.		
	<b>Key properties</b>	Only one data point is available for the rocks in this GWB: a yield 25 m <sup>3</sup> /d and specific capacity of 168 m <sup>3</sup> /d/m (Productivity category II) in the Dinantian Sandstones. The dominant sandstone lithology of these rocks will generally results in a higher fissure permeability and therefore, the potential to have relatively high transmissivity values – in the order of 10-50 m <sup>2</sup> /d, although they may be higher in the vicinity of faults (c.100-150 m <sup>2</sup> /d). Transmissivity values for the Shales and Limestones are expected to be <20 m <sup>2</sup> /d, and possibly <10 m <sup>2</sup> /d in the shale-dominated lithologies. Similarly, storativity in the Sandstones is likely to be reasonably good, and higher than in the Shales and Limestones.  All 3 groundwater levels available for the rocks in the body are 0-3 m below ground level. The data are inadequate to calculate groundwater gradients although overall flow directions are to the west and to the north, with groundwater discharging directly to the sea and to Durnesh Lake respectively.  <i>(Dinantian Aquifer Chapters; Donegal GWPS)</i>		
	<b>Thickness</b>	Most groundwater flux in both 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 typically less than 150 m.  Fissure permeability is generally expected to be more developed in the Sandstone rock group, with the zone of interconnected fissuring extending to between 30-40 m thick. This zone is likely to be in the region of 10-15 m thick in the Shales and Limestones group.		
<b>Overlying Strata</b>	<b>Lithologies</b>	Till is the predominant subsoil in this GWB (c.75%), with small proportions of alluvium (8%) and sand/gravel (5%). Approximately 9% of the GWB is recorded as rock outcrop/shallow soil/subsoil.		
	<b>Thickness</b>	Subsoil is thin or absent (<3 m thick) over much of the southern part of the GWB. In contrast, the northern area is generally covered with deeper deposits, with zones of >10 m deep in the northwest region.		
	<b>% area aquifer near surface</b>	<i>[Information will be added at a later date]</i>		
	<b>Vulnerability</b>	From the Donegal GWPS, the majority of Extreme vulnerability occurs in the south with areas of High, Moderate and Low vulnerability more evident in the north.		
<b>Recharge</b>	<b>Main recharge mechanisms</b>	Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of the thicker drumlin and any peat deposits and the lower permeability aquifers, a proportion of the effective rainfall will discharge to the streams in the GWB. In addition, the steeper drumlin slopes will promote surface runoff. The stream density, which is relatively high, is likely to reflect the coastal-zone nature of this body i.e. a discharge area. In discharge zones, much of the recharge is likely to be ‘rejected’.		
	<b>Est. recharge rates</b>	<i>[Information will be added at a later date]</i>		
<b>Discharge</b>	<b>Large springs and high yielding wells (m<sup>3</sup>/d)</b>	Springs: None identified Excellent Wells: None identified. Good wells: Rossnowlagh (153 m <sup>3</sup> /d).		
	<b>Main discharge mechanisms</b>	The main groundwater discharges are to the streams, rivers and any springs within the GWB. Seepages will also develop along the coastline. Given the higher transmissivities associated with Lm aquifers, the baseflow proportion of the total streamflow is expected to be higher than for the Ll aquifers.		

	<b>Hydrochemical Signature</b>	<p>There are minimal data available for this GWB.</p> <p><b>National classification:</b> Dinantian Sandstones                  Calcereous. Generally Ca-HCO<sub>3</sub> signature.                  Alkalinity (mg/l as CaCO<sub>3</sub>): 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)</p> <p><b>National classification:</b> Dinantian Rocks (excluding Sandstones)                  Calcereous. Generally Ca- HCO<sub>3</sub> signature.                  Alkalinity (mg/l as CaCO<sub>3</sub>): 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)</p> <p><i>(Calcereous/Non calcereous classification of bedrock in the Republic of Ireland report)</i></p>
	<b>Groundwater Flow Paths</b>	<p>In the absence of inter-granular permeability, groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. The limited water level data are 0-3 mbgl. Groundwater flow is thought to be mainly unconfined. Flow paths are likely to be shorter (30-300 m) in the Shales and Limestones rock group, with groundwater discharging rapidly to nearby streams and small springs. Groundwater flow in the Sandstones is often of a regional scale i.e. long flow path lengths (up to 2000 m) would be expected. In both rocks groups, flow paths are likely to be shorter in discharge areas, which is likely to constitute a reasonable portion of this GWB. Flow directions are likely to be westwards towards the coastline in the southern half of the GWB, and northwards in the northern half, as determined by topography.</p>
	<b>Groundwater &amp; Surface water interactions</b>	<p>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 as a) a large proportion of this GWB is likely to constitute a discharge zone, and b) higher transmissivities are generally associated with Lm aquifers. However, contributions to baseflow are expected to be less from the LI aquifers in the north of the GWB.</p>
<b>Conceptual model</b>		<ul style="list-style-type: none"> <li>• The GWB is bounded by more a productive aquifer to the east, coastline to the north and west and a topographic divide to the south (Hydrometric Area 36). Elevation gently increase inland from &lt;10 mAOD to 150 mAOD, although drumlins are a feature of the topography in the northern area.</li> <li>• Dinantian Sandstone is mapped in the south, which is considered to have the potential for relatively high fissure permeability. Dinantian Shales and Limestones underlie the northern area and are expected to have a lower transmissivity. In both groups, most of the unconfined 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 - less than c.30-40 m thick in the Sandstones and less than 10-15 m in the Shales and Limestones – and a zone of isolated fissuring typically less than 150m.</li> <li>• Transmissivity values are thought to be higher in the Sandstones: 10-50 m<sup>2</sup>/d although may be as high as 100-150 m<sup>2</sup>/d in faults zones, as opposed to &lt;20 m<sup>2</sup>/d in the Shales and Limestones. Storativity is likely to be relatively good in the Sandstones group.</li> <li>• High fissure permeability aquifers (Sandstones) can generally support regional scale flow systems. Long flow paths (e.g. 2000 m) can be expected although are likely to be shorter (100-300 m) as this GWB mainly constitutes a discharge area. Flow paths in the LI aquifers are also likely to be short (30-300 m), with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps.</li> <li>• Recharge will occur diffusely through the subsoil and rock outcrops although is limited by a) the discharge zone nature of the GWB (i.e. ‘rejected’ recharge), and b) any thicker low permeability subsoil and bedrock. Most of the effective rainfall over the Shales and Limestones is not expected to recharge the aquifer.</li> <li>• The main discharges are to the streams, rivers and lakes within the GWB, and seeps along the coastline. Overall, the flow direction is likely to be either to the west or north, as determined by the topography.</li> </ul>
<b>Attachments</b>	Figure 1. Table 1.	
<b>Instrumentation</b>	<p><b>Stream gauges:</b> None identified.  <b>EPA Water Level Monitoring boreholes:</b> None identified.  <b>EPA Representative Monitoring points:</b> (DON 024), (DON 028)</p>	
<b>Information Sources</b>	<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, 2004. <i>Water Dependent Ecosystems and Subtypes (Draft)</i>. Compass Informatics in association with National Parks and Wildlife (DEHLG). WFD support projects.</p>	
<b>Disclaimer</b>	<p>Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.</p>	

Figure 1. Location and boundaries of Kildoney Point North GWB

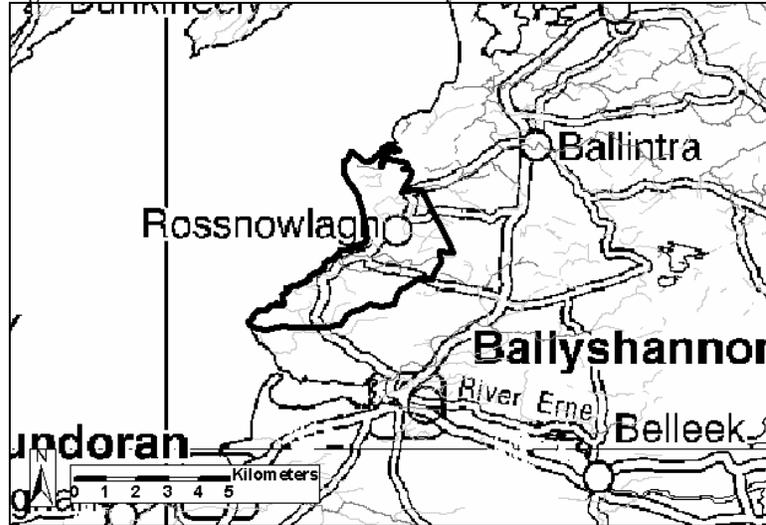


Table 1. List of Rock units in Kildoney North GWB

Rock Unit Name	Code	Description	Rock Unit Group	Aquifer Class.	% Area
Mullaghmore Sandstone Formation	MU	Sandstone, siltstone & shale	Dinantian Sandstones	Lm	56.44%
Bundoran Shale Formation	BN	Dark shale, minor fine-grained limestone	Dinantian Shales and Limestones	Ll	43.56%