

Claddagh-Swanlibar GWB: Summary of Initial Characterisation.

	Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
	Hydrometric Area 36 Cavan Co. Co. N.I.	Rivers: Claddagh, Swanlibar. Streams: 45 unnamed streams. Lakes: L.Cratty, L.Cam, L. Aliem and 2 unnamed lakes.	Cuilcagh-Anierin Uplands (O’Riain, 2004).	32
Topography	Elongated along a N-S axis, the Claddagh-Swanlibar GWB is bordered by more productive, karstic aquifers to the north and east, and less productive (Pu/PI/LI) aquifers to the south and west. Located on the lower eastern flank of the Cuilcagh Mountains, elevations increase from 150 mAOD in the southeast to 420 mAOD in the north, creating a hilly-mountainous terrain. Surface water flows downslope to the north, south and east, with channels radiating out from the Cuilcagh summit.			
Geology and Aquifers	Aquifer categories	This GWB is predominantly underlain by Lm: Locally important aquifer which is generally moderately productive, with a band of LI: Locally important aquifer, moderately productive only in local zones (25%), mainly along the eastern boundary as well as to the north of the body.		
	Main aquifer lithologies	Dinantian Sandstones are the main rock group (71.31%), occurring in the west and central areas. Dinantian Mixed Sandstones, Shales and Limestones (23.98%) are mainly located to the east, with a small pocket in the north. Small areas of Dinantian Pure Bedded Limestones constitute <1% of this GWB. Refer to Table 1 for details.		
	Key structures	The rock succession in this particular area are dipping predominantly to the west by between 3-10°, maximum of 15°. There are also a number of NW-SE/E-W orientated faults, that become more numerous towards the north of the GWB.		
	Key properties	No hydrogeological data are available for this GWB however, the dominant sandstone lithology of Dinantian Sandstones 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 ² /d, although they may be higher in the vicinity of faults (c.100-150 m ² /d). Transmissivity values for the remaining Dinantian rocks are expected to be <20 m ² /d, and possibly <10 m ² /d in the shale-dominated lithologies. Similarly, storativity in the Sandstones, which is expected to be reasonably good, is likely to be higher than in the Shales and Limestones. Groundwater gradients cannot be determined, although are likely to be steeper in the lower permeability rocks than in the Sandstones. The overall flow directions are expected to follow topography i.e. downslope to the east, north and south, to eventually discharge into the Lough Erne system. <i>(Dinantian Sandstones Aquifer Chapter)</i>		
	Thickness	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 mixed Sandstones, Shales and Limestones group.		
Overlying Strata	Lithologies	The main subsoil mapped is peat (c.40%), with a smaller proportion of till (10%). However, no subsoil data are available for approximately half of the GWB, which is within NI.		
	Thickness	From the available outcrop and topographic information (Cavan and Leitrim), subsoil is expected to be absent or thin (<3 m thick) over a large proportion of this GWB, especially at higher elevations. Toward the base of the slopes i.e. along the eastern border, deeper subsoil is more likely. This is also likely to reflect the pattern of subsoil thickness in N.I., where data are absent.		
	% area aquifer near surface	<i>[Information will be added at a later date]</i>		
	Vulnerability	<i>No vulnerability maps are available for either Cavan or NI.</i>		
Fs Recharge	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 low permeability subsoil is present (till or peat). In addition, the steeper slopes will promote surface runoff. The stream density, which may be influenced by the upland topography, is lower than the adjacent Pu/PI/LI GWB (Anierin-Cuilcagh East).		
	Est. recharge rates	<i>[Information will be added at a later date]</i>		
Discharge	Large springs and high yielding wells (m³/d)	Springs: None identified. Excellent Wells: None identified. Good Wells: None identified.		

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Main discharge mechanisms	The main groundwater discharges are to the streams, rivers, lakes and any springs within the GWB. Given the generally 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 Pu/Pl/Ll GWB (Anierin-Cuilcagh East). Groundwater may also discharge to the adjacent, more productive aquifers (Rk ^c) along the northern and eastern boundaries.
Hydrochemical Signature	<p>There are no data available for this GWB.</p> <p>National classification: Dinantian Sandstones Calcareous. Generally Ca-HCO₃ 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)</p> <p>National classification: Dinantian Rocks (excluding Sandstones) Calcareous. Generally Ca- HCO₃ 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)</p> <p><i>(Calcareous/Non calcareous classification of bedrock in the Republic of Ireland report)</i></p>
Groundwater Flow Paths	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. 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 in the Sandstones although are likely to be shorter in less permeable Dinantian rocks (c.30-300 m). Groundwater flow directions are expected to follow topography i.e. radiating out from the mountain summits to the north, south and east.
Groundwater & Surface water interactions	Generally groundwater is expected to contribute a large proportion of baseflow to the streams and rivers flowing across this GWB due to the relatively high transmissivity of the aquifer.
Conceptual model	<ul style="list-style-type: none"> • The GWB is bounded by differing aquifer types; more productive to the north and east; less productive to the west and south. Being located in the Cuilcagh Mountains, the topography in this body is steep, with elevations ranging from 150-420 mAOD. • Dinantian Sandstone is mapped in the western and central parts of the GWB, which is considered to have the potential for relatively high fissure permeability. Dinantian mixed Sandstones, Shales and Limestones underlie a band along the eastern boundary and a small area to the north (totalling c.25%). These rocks 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 mixed Sandstones, Shales and Limestones – and a zone of isolated fissuring typically less than 150m. • Transmissivity values are thought to be higher in the Sandstones: 10-50 m²/d (or as high as 100-150 m²/d faults zones) as opposed to <20 m²/d in the mixed Sandstones, Shales and Limestones. Storativity is likely to be good in the Sandstones. • High fissure permeability aquifers (Sandstones) can generally support regional scale flow systems, with flow paths up to 2000 m. Flow paths in the remaining rocks are likely to be short (30-300 m), with groundwater discharging rapidly to the streams crossing the aquifer, and to small springs and seeps. • Recharge will occur diffusely through the subsoil and rock outcrops although is limited by any thicker low permeability subsoil and bedrock. Most of the effective rainfall over the mixed Sandstones Shales and Limestones is not expected to recharge the aquifer. • The main discharges are to the streams and rivers within the GWB, although groundwater may also discharge to the adjacent, Rk^c aquifers (northern and eastern boundaries). Overall, the flow direction is likely to be to the north, south and east, as determined by the topography.
Attachments	Figure 1. Table 1.
Instrumentation	<p>Stream gauges: None identified.</p> <p>EPA Water Level Monitoring boreholes: None identified.</p> <p>EPA Representative Monitoring points: None identified.</p>
Information Sources	<p>MacDermot, C.V. Long C.B. and Harney S.J (1996) <i>Geology of Sligo-Leitrim: A geological description of Sligo, Leitrim and adjoining parts of Cavan, Fermanagh, Mayo and Roscommon, to accompany bedrock geology 1:100,000 scale map, Sheet 7, Sligo - Leitrim</i>. With contributions from K. Carlingbold, G. Stanley, D. Daly and R. Meehan. Geological Survey of Ireland, 100pp.</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>
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 Claddagh-Swanlinbar GWB

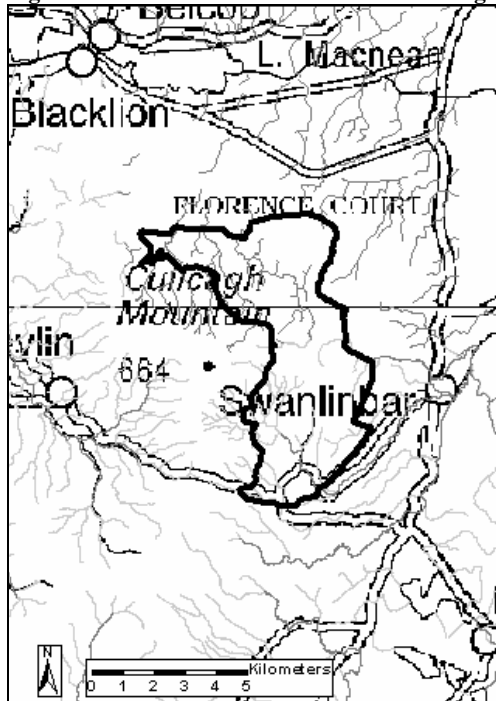


Table 1. List of Rock units in Claddagh-Swanlinbar GWB

Rock Unit Name	Code	Description	Rock Unit Group	Aquifer Class.	% Area
Glenade Sandstone Formation	GD	Pale orthoquartzitic sandstone	Dinantian Sandstones	Lm	75.31%
Meenymore Formation	ME	Shale, laminated carbonate, evaporite	Dinantian Mixed Sandst., Shales and Limestones	Ll	23.98%
Dartry Limestone Formation	DA	Dark fine-grained cherty limestone	Dinantian Pure Bedded Limestones		0.71%