Ballinamore-Swanlibar GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
Hydrometric Area 36 Cavan Co. Co Leitrim Co. Co.		***Rivers:*** Bawnboy, Claddagh, Swanlinbar, Owensallagh, Blackwater. ***Streams****:* 108 unnamed streams. ***Lakes:*** Brackley, Adorn, Glebe, Camagh, Corduff, Bolganard, Drumlonan, Corgar, Willowfield, Dromore.	Corduff Lough (001407), Cuilcagh-Anierin Uplands.	115
Topography		Elongated along a N-S axis, this GWB is bounded by different rocks to the south, east and west, and by a topographic divide to the north. Elevations gently increase from east to west: c.50-140 mAOD and drumlins occur throughout, although are irregularly in shape and alignment. Surface water generally flows from west to east across the body.		
Geology and Aquifers	**Aquifer type(s)**	This GWB entirely comprises **Ll:** Locally important aquifer, moderately productive only in local zones.		
	Main aquifer lithologies	All of the GWB is underlain by Dinantian age rocks. 97.58% are mapped as Shales and Limestones with the remaining area comprising Unbedded Limestones (1.38%, band along the north-eastern boundary) and Upper Impure Limestones (1%, north-western boundary). Refer to Table 1 for details.		
	Key structures.	In this area, deformation has resulted in 4 approximately E-W/SW-NE trending faults dividing the GWB into 5 main blocks. The rock succession dips by 2-20° in all directions.		
	Key properties	Yields for 8 available wells range from 24-130 m^3/d, averaging 96 m^3/d, although specific capacity values are only available for the 2 lowest yielding wells: 1.2 and 5.3 $m^3/d/m$. Transmissivity values are unavailable but are expected to be <20 m^2/d, and possibly <10 m^2/d in the shale-dominated lithologies. Storativity is also expected to be low. Of the 8 available groundwater levels, 7 are 0-15 m below ground level (5 are <10 mbgl). The data are inadequate to calculate groundwater gradients however, these are expected to be relatively steep, given the lower permeability of the rock. *(Dinantian Shales and Limestones Aquifer Chapter)*		
	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.		
Overlying Strata	**Lithologies**	No data are available for just over half of the GWB (Leitrim, NI). Where subsoil is mapped, till is dominant (c40% of the GWB), with small areas of alluvium (5%) and peat (3%).		
	Thickness	Mapped outcrops are more common over the southern half of the GWB, although are limited to the inter-drumlin areas. Each drumlin is likely to represent an area of deeper till, often >10 m thick, over the entire area. In the northern half, outcrop is only mapped along 2 river valleys, which may suggest that subsoil is generally thicker over this area.		
	% area aquifer near surface	*[Information will be added at a later date]*		
	Vulnerability	Although maps are not available, the vulnerability is likely to be extreme where subsoil is thin or absent (south, inter-drumlin areas, with the drumlins representing probable areas of moderate or low vulnerability.		
Recharge	**Main recharge mechanisms**	Diffuse recharge occurs via rainfall percolating through the thinner/more permeable subsoil and rock outcrops. Due to the low permeability of the thicker drumlin subsoil deposits and the aquifers, a high proportion of the effective rainfall will discharge to the streams in the GWB. In addition, the steeper drumlin slopes will promote surface runoff. The relatively high stream density is likely to be influenced by the lower permeability rocks.		
	Est. recharge rates	*[Information will be added at a later date]*		
Discharge	**Important springs and high yielding wells**	Springs: None identified. Sources: None identified. Excellent Wells: None identified . Good Wells: Corratillan (130 m^3/d); Cronery (130 m^3/d); Hawkswood (118 m^3/d); Stroke (109 m^3/d); Bellaleenan (109 m^3/d); Arderry (104 m^3/d).		
	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. Groundwater may also flow into the adjacent, higher permeability GWB (Rk^c), especially where these aquifers are located down-gradient.		

	Hydrochemical Signature	No available data within this particular GWB. ***National classification:*** Dinantian Rocks (excluding Sandstones) Calcareous. Generally $CaHCO_3$ signature. Alkalinity (mg/l as $CaCO_3$): 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) *(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. Available groundwater levels are mainly 0-10 m below ground level. Unconfined flow paths are likely to be short (30-300 m), with groundwater discharging rapidly to nearby streams and small springs. Groundwater flow directions are expected to follow topography i.e. eastwards.
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 likely to be relatively low.
Conceptual model		• The GWB is mainly bounded by differing types of rock. The northern boundary is a topographic divide. Drumlins are a common feature, although are irregular in shape and orientation. Elevations generally increase towards the west, ranging from c.50-210 mAOD. • The GWB is composed 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; and a zone of isolated fissuring typically less than 150 m. • Recharge occurs diffusely through the thin/permeable subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and the bedrock itself. Therefore, most of the effective rainfall is not expected to recharge the aquifer. • 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 directions are expected to be to the east, as determined by the topography.
Attachments		Figure 1. Figure 2. Table 1.
Instrumentation		**Stream gauges:** 36034, 36159. **EPA Water Level Monitoring boreholes:** (LEI 053). **EPA Representative Monitoring points:** (LEI 59).
Information Sources		Geraghty, M., Farrelly, I., Claringbold, K., Jordan, C., Meehan, R., and Hudson, M., 1997. *Geology of Monaghan-Carlingford. A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 8/9, Monaghan-Carlingford*. Geraghty, M. (ed.). Geological Survey of Ireland. 60 p. MacDermot, C.V. Long C.B. and Harney S.J (1996) *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*. With contributions from K. Carlingbold, G. Stanley, D. Daly and R. Meehan. Geological Survey of Ireland, 100pp. O' Riain, G. 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 Ballinamore-Swanlibar GWB

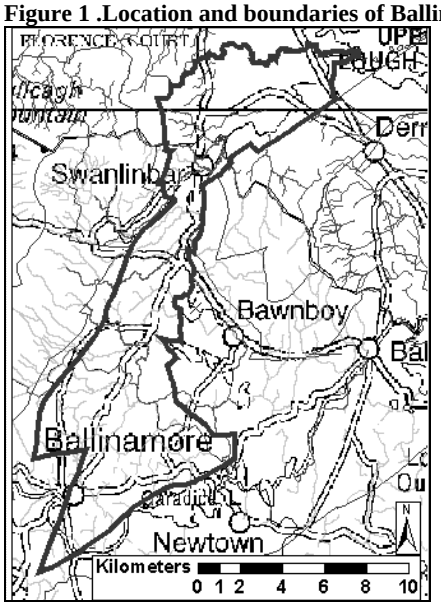

Table 1. List of Rock units in Ballinamore-Swanlibar GWB

Rock Unit Name	Code	Description	Rock Unit Group	**Aquifer Class.**	% Area
Drumgesh Shale Formation	DH	Dark shale, fine-grained limestone	Dinantian Shales and Limestones	Ll	65.87%
Benbulben Shale Formation	BB	Calcareous shale with minor calcarenite	Dinantian Shales and Limestones	Ll	31.08%
Mudbank Limestones	mk	Massive grey micritic limestone	Dinantian Pure Unbedded Limestones	Ll	1.38%
Glencar Limestone Formation	GC	Dark fine limestone & calcareous shale	Dinantian Upper Impure Limestones	Ll	0.83%
Bundoran Shale Formation	BN	Dark shale, minor fine-grained limestone	Dinantian Shales and Limestones	Ll	0.64%
Dartry Limestone Formation	DA	Dark fine-grained cherty limestone	Dinantian Pure Bedded Limestones		0.21%

Figure 2. Groundwater hydrographs (EPA Groundwater Level Monitoring)