

1st Draft Dundalk GWB Description – November 2004

Dundalk GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
Hydrometric Area 06 Louth Co. Co.	Rivers: Flurry, Castletown, Raskeagh, Big, Ballymascanlan. Lakes: 16 un-named water bodies.	Carlingford Mountain, Dundalk Bay and Carlingford Shore (O’Riain, 2004)	52
Topography	This ‘U’-shaped GWB (Figure 1) lies between Carlingford Mountain and the coast, which provide its eastern and southern borders. Less productive aquifers constitute the northern and western boundaries. The topography is gently sloping with elevations generally less than 50 mAOD. The main surface water flow direction is eastwards across the GWB, to eventually discharge into Dundalk Bay.		
Geology and Aquifers	Aquifer type(s)	This GWB is underlain by Lm : Locally important aquifer which is generally moderately productive.	
	Main aquifer lithologies	Dinantian Mixed Sandstones, Shales and Limestones are the sole rock group in the GWB. Refer to Table 1 for details.	
	Key structures.	Although structural data area limited, the rocks in the western portion of the GWB are dipping to the east by up to 60°. In the east, the rocks dip north by c.10°.	
	Key properties	<p>The dominant sandstone lithology of this GWB will generally results in a higher fissure permeability and therefore, the potential to have moderate-high transmissivity values – 10-50 m²/d at the lower end of the scale to c.100-150 m²/d in the vicinity of faults. Discharge data are only available for 1 well, – 1036 m³/d, with a specific capacity of 230 m³/d/m. These data also suggest that the rocks are capable of sustaining good yields. Storativity is also expected to be reasonable.</p> <p>Of the 9 available groundwater water level locations, 5 are less than 5 m below ground level and the deepest 2 are between 10-13 m below ground. Groundwater gradients cannot be calculated although groundwater flow directions are likely to be mainly southwards to discharge into Dundalk Bay.</p> <p><i>(Dinantian Sandstones Aquifer Chapter)</i></p>	
Thickness	Most groundwater flux is likely to be in the upper part of the aquifer, comprising three broad zones: broken and weathered rock, typically less than 3 m thick; interconnected fissuring up to c.20-30 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m. Fissure permeability is generally expected to be significantly more developed in the top 20-30 m of fractured weathered rock and close to fault zones. Only two water strikes have been recorded – 14 m and 20 m below ground.		
Overlying Strata	Lithologies	The GWB is predominantly covered by till (67%), with a smaller proportion of sand/gravel (20%).	
	Thickness	From the available outcrop and depth to bedrock data, subsoil cover is thin (<3 m) or absent on the higher areas i.e. to the northwest and northeast. The subsoil appears to rapidly thicken towards the coast with deposits of greater than 10 m thickness in the central-eastern portion of the GWB.	
	% area aquifer near surface	<i>[Information will be added at a later date]</i>	
	Vulnerability	No specific vulnerability data are available for County Louth. The vulnerability is likely to be Extreme where the subsoil is thinner on the higher ground (northwest/northeast). In the east, where subsoil deposits are thicker, vulnerability is likely to range from High if the material is highly permeable (sand/gravel) to Moderate for moderate permeability material.	
Recharge	Main recharge mechanisms	Diffuse recharge occurs via rainfall percolating through the more permeable subsoil and rock outcrops. The stream density is relatively low, which may be due to highly/moderately permeable subsoil and/or the relatively permeable aquifer. Both factors would generally allow a reasonable proportion of recharge, especially in the north and west, away from the main zones of discharge.	
	Est. recharge rates	<i>[Information will be added at a later date]</i>	
Discharge	Important springs and high yielding wells	Sources: None identified Springs: None identified Excellent wells: Rampark (1036 m ³ /d) Good wells: None identified	
	Main discharge mechanisms	The main groundwater discharges are to the streams and rivers, lakes and any springs or seeps within the GWB. Given the 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 Pl/Pu GWB. However, it is noted that frequency and location of surface water may be associated with the position of the GWB i.e. a coastal discharge zone.	

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	Hydrochemical Signature	<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) <i>(Calcareous/Non calcareous classification of bedrock in the Republic of Ireland report)</i></p>
	Groundwater Flow Paths	<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 recorded water levels are mainly 0-10 mbgl. Groundwater flow is thought to be unconfined and possibly of a regional scale i.e. long flow path lengths (up to 2000 m) are potentially achievable. However, a large proportion of the GWB is likely to be a discharge zones, which are generally associated with shorter flow paths (c.100-300 m). Overall, the flow direction will be eastwards, with waters discharging into Dundalk Bay.</p>
	Groundwater & surface water interactions	<p>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 and location of the GWB i.e. predominantly within a coastal discharge zone. Groundwater is also expected to discharge directly into the sea along the coastline.</p>
Conceptual model	<ul style="list-style-type: none"> • The GWB is bordered by lower permeability aquifers to the north and west, and by coastline to the east and south. The topography is gently sloping with elevations generally less than 50 mAOD. • The sole rock group in this body is Dinantian Mixed Sandstones, Shales and Limestones, which is considered to have the potential for relatively high fissure permeability. Most of the unconfined 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 typically less than c.20-30 m, and potentially, a zone of isolated fissuring typically less than 150 m. • Transmissivity values are generally expected to be from 10-50 m²/d, to 100-150 m²/d, especially in the vicinity of the frequent faults. Storativity is also likely to be good. • High fissure permeability aquifers can generally support regional scale flow systems. Long flow paths (e.g. 2000 m) can be expected although are likely to be shorter in this instance (c.100-300 m) as a large proportion of the GWB is likely to be in a discharge zone. Generally, recharge will occur diffusely through the subsoil and rock outcrops. A high proportion of the effective rainfall is expected to be able to recharge the aquifer to the north and west, away from the main discharge zones. • The main discharges are to the streams, rivers and lakes within the GWB, and directly to the sea along the coastline. Overall, the flow direction is towards the coast (generally southwards). 	
Attachments	Figure 1. Figure 2. Table 1.	
Instrumentation	<p>Stream gauges: 06042 EPA Water Level Monitoring boreholes: (LOU 83), (LOU 091), (LOU 092), (LOU 095). EPA Representative Monitoring points: (LOU 22), (LOU 37), (LOU 43)</p>	
Information Sources	<p>Geraghty, M., Farrelly, I., Claringbold, K., Jordan, C., Meehan, R., and Hudson, M., 1997. <i>Geology of Monaghan-Carlingford. A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 8/9, Monaghan-Carlingford</i>. Geraghty, M. (ed.). Geological Survey of Ireland. 60 p.</p> <p>McConnell, B., Philcox, M. and Geraghty, M., 2001. <i>Geology of Meath: A geological description to accompany the bedrock geology 1:100,000 scale map series, Sheet 13, Meath</i>. With contributions from J. Morris, W. Cox, G. Wright, and R. Meehan. Geological Survey of Ireland. 77 p.</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> <p>Swartz, M and Daly, D. (2002) <i>County Monaghan Groundwater Protection Scheme Report</i>. Main Report. Final Report to Monaghan County Council. Geological Survey of Ireland</p> <p>Woods, L., Meehan, R. and Wright, G. R., 1998. <i>County Meath Groundwater Protection Scheme</i>. Main report. Final report to Meath County Council. Geological Survey of Ireland. 54 p.</p>	
Disclaimer	<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 GWB.

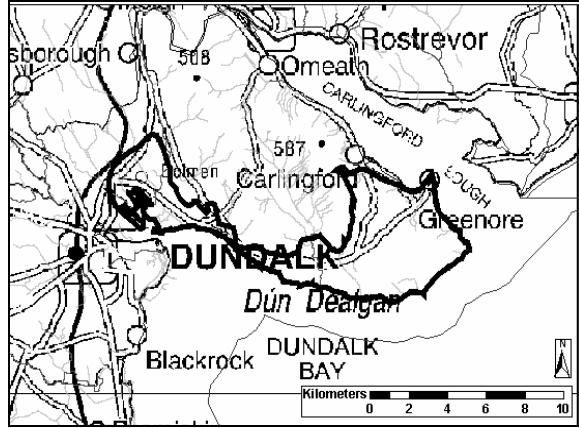
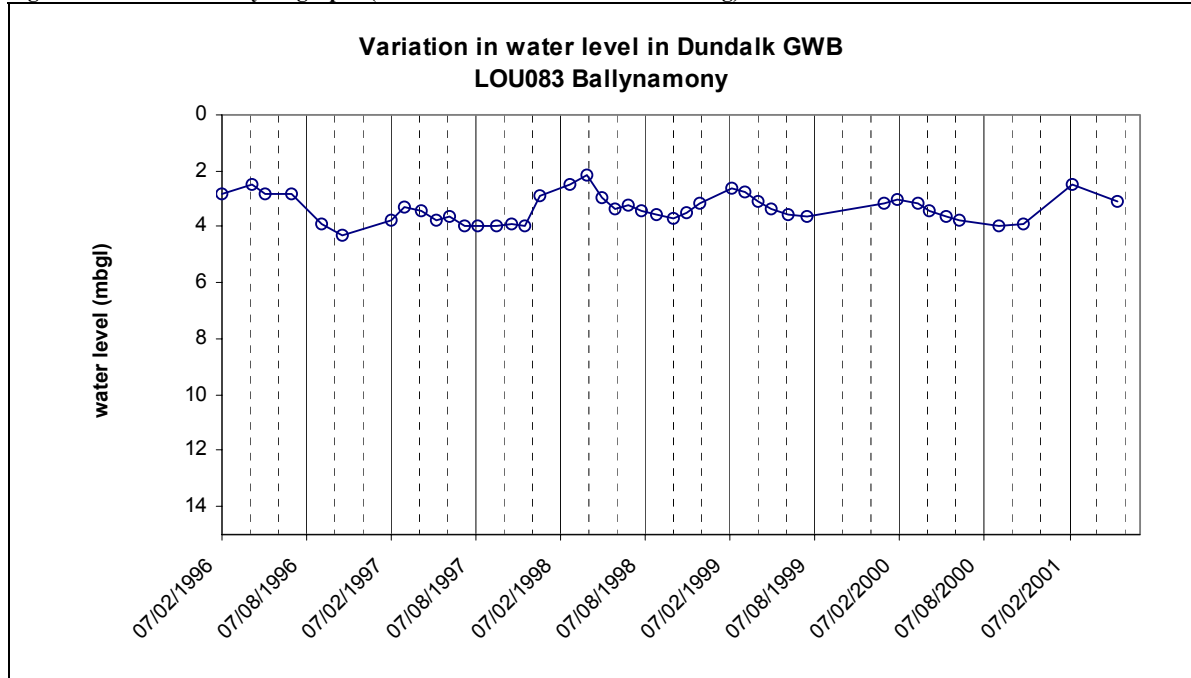


Table 1. List of Rock units in GWB

Rock Unit Name	Code	Description	Rock Unit Group	Aquifer Class.	% Area
Dinantian Limestones (undifferentiated)	DIN	Limestone	Dinantian Mixed Sandstones, Shales and Limestones	Lm	100.00%

Figure 2: Groundwater hydrographs (EPA Groundwater Level Monitoring)



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