

1st Draft Donegal Bay Gravel GWB Group Description May 2005

Donegal Bay Gravel GWB Group: Summary of Initial Characterisation.

Hydrometric Areas Local Authorities	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
36, 37 & 38 Donegal & Sligo Co. Cos.	Rivers: Erne, many unnamed streams and tidal creeks. Lakes: Durnesh, Bunduff Lough.	Bunduff Lough and Machair/Trawalua/Mullaghmore (IE0000625); Durnesh Lough (IE0000138); Donegal Bay (Murvagh) (IE0000133)	10 (total)
Topography	There are three sand/gravel deposits along Donegal Bay that are considered as a single gravel GWB group. The deposits are found at Mullaghmore Head (3.2 km ²) in the south, at Murvagh (4 km ²), about 27 km to the northeast, and in between, just west of Ballyshannon at Finner Camp (2.8 km ²). The location and boundaries of the sands/gravels are shown in Figure 1. The aquifers are considered together because they have a similar configuration, i.e., similar morphology and topographic setting. The deposits are adjacent to the coast, at elevations of a few metres to 61 m OAD. Rivers flow to the west, to Donegal Bay. Surface drainage is good.		
Geology and Aquifers	Aquifer categories	The sand/gravel deposits are classified as Locally Important Sand and Gravel Aquifers (Lg) (DELG/EPA/GSI (1999) or as potentially Lg aquifers (Donegal GWPS). The gravels overlie bedrock aquifers that are LI (Moderately Productive only in Local Zones), Lm (Generally Moderately Productive) and Rk (Karstified).	
	Main aquifer lithologies	The southernmost aquifer (Mullaghmore Head) comprises and Dune sand (Wsd) and Beach/raised beach sand (Mbs) (Meehan, 2004). The middle aquifer (west of Ballyshannon, at Finner Camp) comprises Windblown sand (Ws) and Raised beach/beach sand (Mbs). The northernmost aquifer (Murvagh) comprises Undifferentiated Alluvium, Ws, Wsd and Mbs.	
	Key structures	N/A	
	Key properties	A well in the Murvagh deposit can supply a 'good' yield with very small drawdown, indicating high productivity. Particle size analyses at the Finner Camp indicate that the deposit comprises 95% sand grade particles (Donegal GWPS), which indicate a high permeability deposit. Groundwater is unconfined. In flat, low-lying areas, water levels are generally close to ground surface. Under elevated areas, however, the water table can be much deeper. The groundwater gradient is likely to be 0.01 or less.	
	Thickness	The Finner Camp deposit is >5 m thick, and is likely to be >10 m (Donegal GWPS). Thicknesses are likely to be >10 m at the other two deposits also.	
Overlying Strata	Lithologies	N/A	
	Thickness	N/A	
	% area aquifer near surface	[Further Information to be added at a later date]	
	Vulnerability	[Further Information to be added at a later date]	
Recharge	Main recharge mechanisms	Diffuse recharge occurs via rainfall percolating through the unsaturated sand/gravel. Due to the high permeability of sand/gravel, a high proportion of the potential recharge will percolate down to the water table.	
	Est. recharge rates	[Information to be added to and checked]	
Discharge	Large springs and large known abstractions (m³/d)	Caravan park (??), Finner Military Camp (??), Murvagh Lower Golf Course (??).	
	Main discharge mechanisms	Groundwater discharges to the rivers/streams that flow through or adjacent to the deposits, and underneath the beaches to the sea.	
	Hydrochemical Signature	There are no data readily available to assess the hydrochemistry of this GWB.	
Groundwater Flow Paths	Groundwater flow path length depends on the size and dimensions of the sand/gravel deposit, and also upon the spacing of internal groundwater divides and the distance between streams. Due to the geometry of the bodies, flow path lengths are <1000 m, and will often be <500 m. Overall, groundwater will flow towards the coast. Groundwater flow directions may vary locally if groundwater discharges to rivers, streams or tidal inlets.		
Groundwater & Surface water interactions	Hydraulic connection between the groundwater in the aquifer and streams/rivers/lakes is expected to be very high, thus water will be able easily to move in and out of the aquifer depending on the relative water level in the surface water body.		

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Conceptual model	<ul style="list-style-type: none"> • The GWB Group consists of three sand/gravel deposits adjacent to Donegal Bay, in the vicinity of Ballyshannon and Bundoran. • The deposits are located next to the coast and adjacent to beach, and are situated at elevations ranging from a few metres to more than 60 mAOD. Overall, the surface drainage is westwards to the sea. Surface drainage is good. • The aquifers primarily are comprised of windblown sands and beach/raised beach deposits. In the central aquifer, alluvial sediments are included within the boundary of the gravel aquifer. Particle size analyses indicate that the aquifers are >95% sand. • Productivity and yield data indicate that the permeability of the deposits is high. • The sand/gravel aquifers are likely to be greater than 10 m thick, excepting at their margins. • Groundwater gradients are likely to be 0.01 or less. The groundwater is unconfined. • Diffuse recharge occurs via rainfall percolating through the unsaturated sand/gravel. Low drainage densities indicate that actual recharge is a high proportion of potential recharge. • Groundwater discharges to the streams that flow through the deposits, and to the sea. Groundwater flow is westwards towards the coast, except in areas of the aquifers where rivers/streams cross or neighbour the deposits, or the aquifers are adjacent to tidal inlets. • Due to the geometry of the deposits, groundwater flow paths are likely to be less than 1000 m, and frequently <500 m. • The hydraulic connection between the groundwater in the aquifer and streams/rivers/lakes is expected to be very high.
Attachments	Figure 1.
Instrumentation	None.
Information Sources	<p>DELG/EPA/GSI (1999) <i>Groundwater Protection Schemes</i>. Department of the Environment and Local Government, Environmental Protection Agency and Geological Survey of Ireland.</p> <p>Lee, M. and Fitzsimons, V. (2004) <i>County Donegal Groundwater Protection Scheme</i>. Volume 1 Main Report, Draft, July 2004. 58 pp. Geological Survey of Ireland.</p> <p>Meehan, R.T., (2004) <i>Subsoils Map for County Donegal</i>. Map produced as part of EPA Soil and Subsoil Mapping Project (formerly FIPS-IFS). Teagasc, Kinsealy.</p> <p>O' Riain, G., (2004). <i>Water Dependent Ecosystems and Subtypes Draft Report</i>. WFD Support Projects. Compass Informatics in association with National Wildlife and Parks Service (DEHLG).</p> <p>O'Suilleabhain, C., (2000). <i>Assessing the boundary between high and moderately permeable subsoils</i>. Unpublished MSc., University of Dublin. Department of Civil, Structural and Environmental Engineering, Trinity College Dublin.</p>
Disclaimer	Note that all calculations and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Figure 1 Location and extent of Donegal Bay Gravel Group

