

*1<sup>st</sup> Draft Clogher Head Gravel GWB Group Description May 2005*

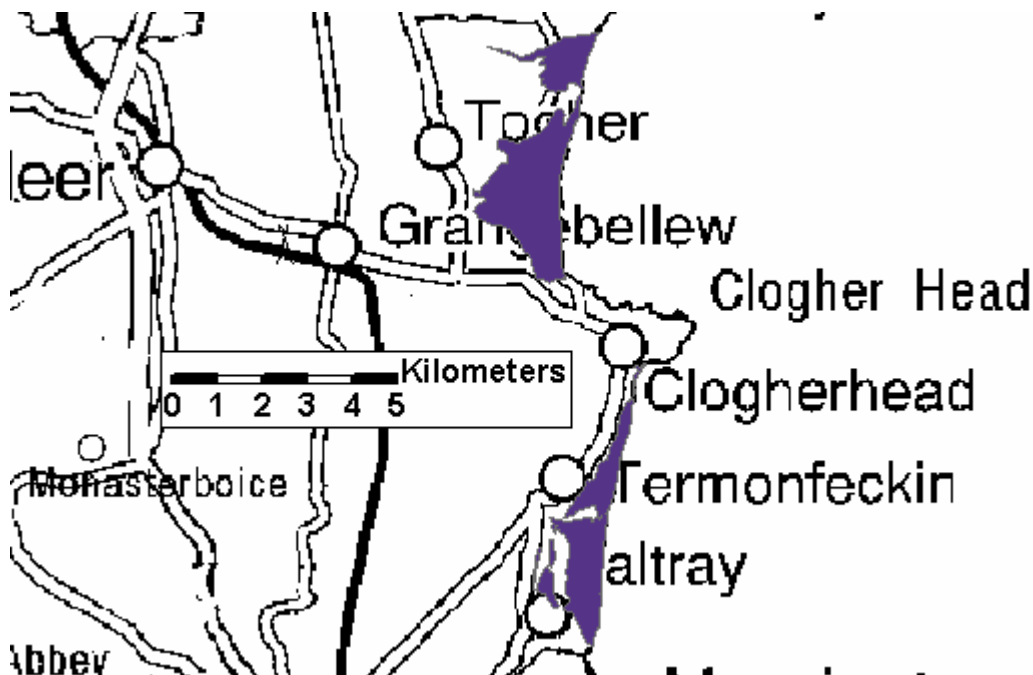
**Clogher Head Gravel GWB Group: Summary of Initial Characterisation.**

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km <sup>2</sup> )
06 Louth Co. Co.	<b>Rivers:</b> Termonfeckin and several unnamed streams.	Boyne Coast and Estuary (IE0001957)	9.2
<b>Topography</b>	There are two sand/gravel deposits that are considered as a single gravel GWB group, located immediately north (3.5 km <sup>2</sup> ) and south (5.7 km <sup>2</sup> ) of Clogher Head. 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 in flat, low-lying areas, at elevations of a few metres to just over 10 m OAD. Inland from the deposits, the ground rises gently to elevations of up to 40 mAOD in the north and 100 mAOD south of Clogher Head. Surface drainage is to the east, to the sea. Surface drainage is good.		
<b>Geology and Aquifers</b>	<b>Aquifer categories</b>	The deposits are between 1 and 10 km <sup>2</sup> , and the saturated thickness is unknown. Accordingly, the deposits are classified as <b>Locally Important Sand and Gravel Aquifers (Lg)</b> (DELG/EPA/GSI (1999). The sands/gravels overlie bedrock aquifers which are Generally Unproductive except for Local Zones (PI), except in the southernmost part, where karstified limestone (Rkd) underlie the gravels.	
	<b>Main aquifer lithologies</b>	The deposits north of Clogher Head comprise marine sands and gravels (MGs) (Meehan, 2004). South of Clogher Head, the deposits comprise marine sands and gravels (MGs), windblown sand (Ws), beach sand (Mbs); these deposits are described as being composed predominantly of fine-grained lagoonal and offshore silts and beach deposits, which are interbedded with sands and gravels (NERDO, 1981).	
	<b>Key structures</b>	N/A	
	<b>Key properties</b>	The deposits south of Clogher Head are described as being similar to those at Dundalk (NERDO, 1981). Here, sand and gravel deposits are known to be highly but variably productive, with transmissivities ranging from 3-1000 m <sup>2</sup> /d (NERDO, 1981). Windblown sands will have a low proportion of fines and are, therefore, likely to have high permeability. North of Clogher Head, the marine sands and gravels are also likely to have high permeabilities and transmissivity. Sand/gravel aquifers generally consist of unconsolidated coarse grained material, usually containing less than 8% fines (O'Suilleabháin, 2000). Storativity is expected to be high (0.1 to 0.2). There are no water level data, but from topographic considerations, groundwater gradients are likely to be on the order of 0.01 or less. Groundwater is unconfined.	
	<b>Thickness</b>	There are no thickness data for these deposits.	
<b>Overlying Strata</b>	<b>Lithologies</b>	N/A.	
	<b>Thickness</b>	N/A.	
	<b>% area aquifer near surface</b>	[Further Information to be added at a later date]	
	<b>Vulnerability</b>	[Further Information to be added at a later date]	
<b>Recharge</b>	<b>Main recharge mechanisms</b>	Diffuse recharge occurs via rainfall percolating through the unsaturated sand/gravel. Due to the high permeability of sand/gravel, a high proportion of the available recharge will percolate down to the water table. The streams flowing through the aquifers may also provide additional recharge.	
	<b>Est. recharge rates</b>	[Information to be added to and checked]	
<b>Discharge</b>	<b>Large springs and large known abstractions (m<sup>3</sup>/d)</b>	Baltray golf course (?); Termonfeckin golf course (?).	
	<b>Main discharge mechanisms</b>	Groundwater discharges to streams that flow through and adjacent to the deposits. Ultimately, groundwater discharges to the sea.	
	<b>Hydrochemical Signature</b>	Data available for four sampling points within this GWB indicate that the groundwaters have a calcium bicarbonate signature. Values are given below for certain parameters at four locations: Alkalinity (mg/l) (n=19) average = 233, range 114-346 Hardness (mg/l) (n=19) average =288, range 206-394 Conductivity (µS/cm) (n=19) average = 698, range 615-882.	
<b>Groundwater Flow Paths</b>	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 mainly be <500 m. Overall, groundwater flows eastwards towards the coast. Groundwater flow directions may vary locally if groundwater discharges to streams.		

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<b>Groundwater &amp; Surface water interactions</b>	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. The streams may be losing when they cross onto the sands/gravels and gaining further downstream.
<b>Conceptual model</b>	<ul style="list-style-type: none"> <li>• The GWB Group consists of two sand/gravel deposits in the vicinity of Clogher Head.</li> <li>• The deposits are located next to the coast, adjacent to the beach, and are situated at elevations ranging from a few metres to just over 10 mAOD. Overall, the surface drainage is eastwards to the sea. Surface drainage is good.</li> <li>• The aquifers are comprised primarily of marine sands and gravels and windblown sands. The thickness of the deposits is unknown.</li> <li>• The depositional processes of the sands/gravels indicate that the permeability of windblown deposits, and the deposits north of Clogher Head is likely to be high. Transmissivities are likely to be on the order of 1000 m<sup>2</sup>/d. South of Clogher Head, offshore and lagoonal fine-grained sediments may be interbedded with the sands and gravels. Transmissivities probably range from about 3-1000 m<sup>2</sup>/d. Storativities are likely to be about 0.1.</li> <li>• Ground surface data indicate that groundwater flows overall from west to east and that gradients are less than 0.01. The groundwater is unconfined.</li> <li>• 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.</li> <li>• Groundwater discharges to the streams that flow through and adjacent to the deposits, and to the sea. Groundwater flow is eastwards towards the coast, except in areas of the aquifers where rivers/streams cross or neighbour the deposits.</li> <li>• Groundwater-surface water interaction is likely to be high. Streams crossing the deposits may be losing when they cross onto the gravels and gaining further downstream.</li> <li>• Due to the geometry of the deposits, groundwater flow paths are likely to be less than 1000 m, and frequently &lt;500 m.</li> <li>• Groundwater is moderately to very hard and has a calcium bicarbonate type signature.</li> </ul>
<b>Attachments</b>	Figure 1 – Location map; Figure 2 – Hydrochemical signature.
<b>Instrumentation</b>	Stream gauges: none EPA Water Level Monitoring boreholes: none EPA Representative Monitoring points: LOU26, LOU33, LOU50, LOU55.
<b>Information Sources</b>	An Foras Forbartha & Geological Survey Office (1981) Groundwater Resources in the NE (RDO) Region. DELG/EPA/GSI (1999) <i>Groundwater Protection Schemes</i> . Department of the Environment and Local Government, Environmental Protection Agency and Geological Survey of Ireland. Meehan, R.T., (2004) <i>Subsoils Map for County Louth</i> . Map produced as part of EPA Soil and Subsoil Mapping Project (formerly FIPS-IFS). Teagasc, Kinsealy. 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). O’Suilleabháin, 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.
<b>Disclaimer</b>	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 Clogher Head Gravel**



**Figure 2 Durov Plot**

**Chemical Signature of Groundwater from Clogher Head Gravel GWB Group (expanded Durov Plot)**

