

**Barrow Valley Sands and Gravels GWB: Summary of Initial Characterisation.**

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km <sup>2</sup> )
14 – Barrow Kildare Co Co Carlow Co Co		Barrow, Levitstown Stream, Greese, Lerr, Graney, Palatine Stream	Oakpark	127
<b>Topography</b>		The topography is flat or undulating with an altitude of approximately 50 to 60 m O.D. The general lie of the landscape is a very gentle dip toward the River Barrow. There is a series of hills approximately 10 km to the west in County Laois. The highest points in this range of hills are approximately 260 m O.D. The River Barrow is the largest surface water feature in the area. The land appears to be free draining with only occasional ditches.		
<b>Geology and Aquifers</b>	Aquifer type(s)	Rg: Regionally Important sand/gravel aquifer		
	Main aquifer lithologies	The aquifer consists of interbedded sands and gravels & sands and clays. There is considerable lateral and vertical variation as the deposit was laid down in an ice marginal situation. The sands and gravels are very coarse but poorly sorted and are similar to deposits in the Nore River Basin. There are frequent tills above and below individual sands and gravel units. South of Milford the amount of sand, silt and clay in the deposit increases (Daly 1981). Particle size analyses carried out on a number of samples taken from the sand & gravel deposits in Athy show that the fines account for less than 8% of the samples, suggesting the deposit will have a 'high' permeability.		
	Key structures.			
	Key properties	The aquifer has primary porosity. Transmissivity in this type of deposit usually ranges from 200-2000m <sup>2</sup> /d and the specific yield from 5-10% (Daly 1981). A borehole at Graysland was tested with a pumping rate of 736 m <sup>3</sup> /d with a drawdown of around 11 m giving a specific capacity of approximately 67 m <sup>3</sup> /d/m. Using salt tracer test information, Daly (1987) has estimated permeabilities to be in the order of 30 - 40m/d. The alluvial flats in the flood plain will confine the aquifer. Elsewhere, because of the variability of the deposit, both confined and unconfined conditions will exist depending on the topography in the area concerned (Daly 1981).		
	Thickness	Investigations and well surveys undertaken by the GSI in the 1980s (Daly, 1987) indicate that the gravel deposit is generally 5-15 m thick in the Athy area, and that the deposit generally thickens from west to east. Water levels appear to be generally less than 2 m below ground surface, indicating that the saturated thickness of the deposit is generally greater than 5 m. In the Barrow valley the deposit ranges from 10 to 25 m thick (Daly, 1981). Individual sand and gravel units can be up to 10m thick as at Oakport but they seem to thin considerably towards Milford.		
<b>Overlying Strata</b>	Lithologies	Coarse till may overlie the aquifer in some localities. The narrow stretch of alluvium along the floodplain is less than 2 m thick and the sands & gravels are continuous beneath the alluvium layer		
	Thickness	The depth of the alluvium over lying the gravel along the course of the river Barrow is considered to be less than 3 m. The thickness of the till which over lies the aquifer in some areas, most notably at the fringe of the area, can be up to 8m.		
	% area aquifer near surface	HIGH		
	Vulnerability	HIGH		
<b>Recharge</b>	Main recharge mechanisms	A high proportion of rainfall will be come recharge where the sand and gravel units come to the surface. The rainfall that lands in this area will percolate down to the water table within the sand and gravel aquifer. The proportion of effective rainfall that is run-off to surface streams will be quite low e.g. 10%.		
	Est. recharge rates	[Information to be added at a later date]		
<b>Discharge</b>	Springs and large known abstractions (m <sup>3</sup> /d)	Athy UDC (Infiltration Gallery - 1200), Castlemitchel Quarry (10), Greysland Bore (650)		
	Main discharge mechanisms	Discharge from this aquifer will mostly be as baseflow to the Barrow river. Where the alluvium restricts access to the river, groundwater will emerge as springs and seeps at the base of the river terrace. As the aquifer peters out south of Bagenalstown all water in the aquifer will be forced out into the river by this point. (Daly 1981)		
	Hydrochemical Signature	The sediments of this aquifer are <b>Calcareous</b> since they are derived from limestones. Sampling taken by Daly (1987) shows EC values (~700uS/cm) and also shows the water to be "Very Hard".		
<b>Groundwater Flow Paths</b>		This aquifer has intergranular porosity and groundwater flow will be diffuse. There will be a general groundwater flow south but also towards the overlying rivers.		

<b>Groundwater &amp; surface water interactions</b>	The thickness and permeability of the bed sediments will determine the connection between the gravel aquifer and the River Barrow. In the absence of this silt layer there will be a direction allowing the free movement of water between the bodies. The direction of movement of water (into or out of the river) will depend on the hydraulic regime in the locality and may change along the course of the river and also through the course of time. It is considered that the combination of pumping regime, the water levels and the nature of the river bed sediments can determine whether the aquifer is losing water to or gaining water from the river.
<b>Conceptual model</b>	The extent of this aquifer is determined by the area of sand and gravel deposits, which are situated in the Barrow River Valley from Athy to a few kilometres south of Bagenalstown. There is diffuse recharge to the aquifer from rainfall, percolating through the permeable sediments to the water table. The hydraulic gradient will be towards the River Barrow since the topographic setting is within a valley. Groundwater flow through the aquifer is diffuse, water will flow in the pores between the particles of sand and gravel. The discharge from the aquifer will be mostly baseflow to the river Barrow.
<b>Attachments</b>	
<b>Instrumentation</b>	Stream gauge: 14041, 14015, Borehole Hydrograph: none EPA Representative Monitoring boreholes:None
<b>Information Sources</b>	Daly EP (1981) <i>Nitrate Levels in the Aquifers of the Barrow Valley</i> . Internal GSI Report (2.11.1 (9+11)) Daly EP (1987) Water Sources for Athy, Co. Kildare: Possible contamination by a pollution incident in the River Barrow, August 1987. GSI report for Athy UDC. Kelly C, Fitzsimons V (2002) County Kildare Groundwater Protection Scheme. GSI report for Kildare County Council
<b>Disclaimer</b>	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae