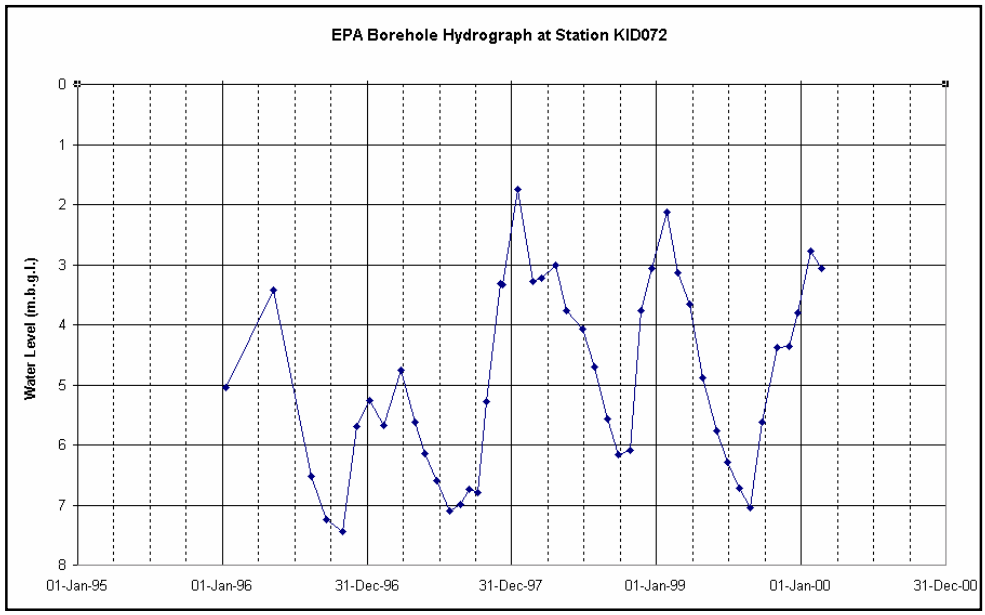
New Ross GWB: Summary of Initial Characterisation.

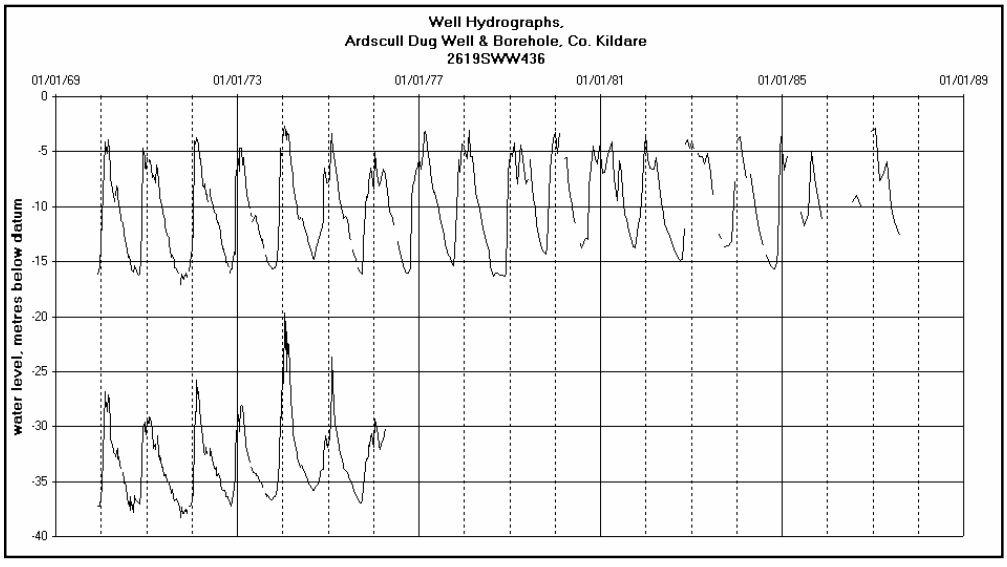
Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
14 – Barrow Kildare, Carlow, Wicklow, Kilkenny, Wexford Co Cos		Greese, Grangecon Stream, Athy Stream, Burtown Stream, Levitstown Stream, Bothoge, Lerr, Graney, Palatine Stream, Aghalona, Burren, Ballynaboley Stream, Barrow, Black (Borris), Mountain (Carlow), Aughnabrisky, Aughnabrisky, Duiske, Pollmounty, Aughnacrew,	Corballis Hill, Ardristan Fen, River Barrow and River Nore, Ballykelly Marsh	1059
Topography		This groundwater body is elongate in plan view, and includes several different topographic areas. In the south the Barrow River flows down the centre of the body from New Ross to Borris. Here the river has upland areas on both sides, the Blackstairs Mountains to the east and Brandon Hill at 575m OD to the west. North of Borris the Barrow flows from the west along the foot of the Castlecomer Plateau. From Borris to Bagenalstown the groundwater body topography is dominated by the Blackstairs Mountains. The surface drainage is towards the Barrow in the west, any flow from the mountains to the east enters the Slaney and the Ballyglass GWB. North of Bagenalstown there is a topographic divide within the body where the northern foothills of the Blackstairs Mts. diverge. The valley between this divergence contains the source of the Burren River. From Bagenalstown to Carlow there are two surface water flow directions: the Barrow flows south and the Burren to the north. The Burren flows west to join the Barrow at Carlow Town. North of Carlow the topography changes again with the foothills of the Wicklow Mountains to the east of the body and the undulating lowlands of Kildare to the west.		
Geology and Aquifers	Aquifer type(s)	**Ll** – Moderately productive only in local zones **Pl** - Generally unproductive except for local zones		
	Main aquifer lithologies	Granites & other Igneous Intrusive rocks Ordovician Metasediments Ordovician Volcanics Silurian Metasediments and Volcanics Devonian Kiltorcan-type Sandstones Devonian Old Red Sandstones Dinantian (early) Sandstones, Shales and Limestones Dinantian (early) Sandstones, Shales and Limestones Dinantian Lower Impure Limestones Devonian Old Red Sandstones		
	Key structures.	The granites have been subject to a variety of different tectonic stresses, resulting in faulting and fracturing. The southern boundary of a 'shear zone' (band of major structural deformation) is mapped to the north and south of the granites. The shear zone may be associated with increased rock fracturing and this feature might also be a focus for groundwater flow		
	Key properties	The transmissivity in the limestone aquifer is generally low but can increase depending on dolomitisation, the development of faults, fissures and fractures. Permeability of the limestone bedrock is derived from the transmissivity data and is estimated to be in the range of 0.4-1.1 m/d. Porosity is estimated to be in the range of 1.5%. Gradients are calculated from the observed water level data and are in the order of 0.002-0.005. The aquifer feeding the source at Tinoran may be a fault zone between the Pollaphuca Formation and the Butter Mountain Formation. Pumping test data indicated an apparent transmissivity of 150-160 m^2/d. The calculated specific capacity (extrapolated to 1 week) was around 72 m^3/d/m. A specific yield of 0.03 was calculated from the late data from the observation well and indicated that the aquifer is unconfined. Pumping test data at **Lathaleere** provided an apparent transmissivity of about 15 m^2/d (OW1) to about 4 m^2/d (PW2). The calculated specific capacity was around 8.7 m^3/d/m. A specific yield of 0.0004 was calculated and indicated that the aquifer may be confined. The GSI monitoring borehole indicates that the uppermost part of the aquifer is highly fractured and broken, particularly down to 30 m.		
	Thickness	Effective thickness is not expected to be large but the bedrock may permeable to depths of around 25m in some areas. The granites in this area are noted to have been extensively weathered to depths of 30m.		
Overlying Strata	Lithologies	There is a significant divide between the subsoil types covering this groundwater body. North of Bagenalstown Till derived from limestone is the main subsoil type. There are also areas where gravel deposits overlie this e.g. in the Barrow River and Burren River valleys. South of Bagenalstown there is a till derived from Granite. This also has various areas where there are gravels overlying the deposits, typically in river valleys.		
	Thickness	Thickness appears to be mostly less than 5m except in the river valleys. There are also large areas of rock close to surface along the topographic highs,		
	% area aquifer near surface	*[Information will be added at a later date]*		
	Vulnerability	*[Information will be added at a later date]*		
Rec	Main recharge mechanisms	Diffuse recharge occurs over most of the land surface through the sands & gravels, permeable till and outcrop.		

	Est. recharge rates	*[Information will be added at a later date]*
Discharge	Springs and large known abstractions (m^3/d)	KILDARE - Martinstown, Castlefarm (Kilrush – Spring), Ardellis (4), Kilmeade Housing WS (20), Kilkea (10), Ballyroe GWS (22), WICKLOW – Grangecon (18), Scurlogue (5), Baltinglass (Tinoran) WS (225) CARLOW – KNOCKBOWER (2), Ballyloo (16), NURNEY (15), BALLINKILLIN (30), Ballyellen GWS (19), Bunclody KILKENNY - Brandonvale Co-Op Ltd (Graiguenamanagh - 60) , Graiguenamanagh RWSS (570), WEXFORD - Ballywilliam GWS, Rathgarogue NS
	Main discharge mechanisms	It is thought that the regional groundwater flows toward and discharges to the River Barrow. There are a number of springs located in this aquifer particularly in elevated areas. The aquifer is most likely to discharge to the river via baseflow through the river bed.
	Hydrochemical Signature	There are both **siliceous** and **calcareous** bedrock strata in this groundwater body. The limited chemical data show elevated electrical conductivity values and low hardness values. The chemical analyses indicate a calcium bicarbonate water type which is moderately soft (82-94 mg/l as $CaCO_3$) with a low alkalinity (45-65 mg/l as $CaCO_3$) and conductivity varies from 210-260 µS/cm .The values of hardness and conductivity are higher in the limestone areas to the northwest.
Groundwater Flow Paths		Groundwater flow is probably confined to fractures, fissures, joints, bedding planes and the uppermost part of the bedrock as indicated by a series of inflows in the borehole logs. The hydrogeological data show that water levels are generally 4-5 m below ground level. The data suggest that the groundwater flow is to the south. This would support an assumption that the regional flow patterns were southwesterly toward the River Barrow. There are two distinct types of lithologies in this groundwater body i.e. limestones and granites, but both are considered to be poor aquifers and the flow of groundwater in both types will be limited to the upper weathered layer in the rock and its orientation and nature dominated by the fracturing of the rock on a local scale.
Groundwater & surface water interactions		In the north the sand & gravels contribute to abstractions from the limestones and provide storage for the underlying aquifer, possibly helping to maintain yields during dry weather. The River Greese and Glasna Stream are thought to be in close hydraulic connection with the groundwater. Since the groundwater levels are close to the surface in this body surface water levels will have a strong influence on them. There are also likely to be complex interactions in the Ardristan Fen, which will require close inspection.
Conceptual model		The groundwater body stretches from just south of Newbridge in Kildare to the Barrow Estuary in Co Wexford. The large area of the groundwater body does not imply a regional flow system spanning the entire length. In this poor aquifer groundwater will recharge and discharge in local areas. Groundwater is generally close to the surface, especially along the river. Groundwater flow is influenced by topography and mirrors the ground levels. Most groundwater flow is thought to be relatively shallow concentrating in the top 10 m to 30 m of the rock profile. The flow is therefore likely to follow local variations in topography.

Attachments	(Figure 1) EPA Borehole Hydrograph (Figure 2) GSI Borehole Hydrograph
Instrumentation	Stream gauge:14059, *14038*, 14058, 14057, 14035, 14048, 14040, 14036, *14024*, 14018, 14026, 14025, *14027*, 14049, 14051, 14029, *14023*, 14067, 14028, Borehole Hydrograph: EPA - Martinstown (KID072), GSI - 2619SWW436 EPA Representative Monitoring boreholes: KILDARE – Martinstown (#72 – N772064), Castledermot WS (#6 - S805860)
Information Sources	Buckley, R. & Fitzsimons, V. (2002) Graiguenamanagh Supply Scheme Groundwater Source Protection Zones. Kelly, C. & Fitzsimons, V. (2002) Kilkea Supply Scheme Groundwater Protection Zones. Woods, L. & Wright, G.R. (2001) Baltinglass Supply Scheme Groundwater Source Protection Zones.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Formation Name	Code	Description	Rock Unit Group	Aquifer Category
Ballybeg Member	MNbb	Dark grey semi-pelitic, psammitic schist	Ordovician Metasediments	Ll
Ballylane Formation	BY	Green & grey slate with thin siltstone	Ordovician Metasediments	Pl
Brownsford Member	MNbf	Dark grey semi-pelitic, psammitic schist	Ordovician Metasediments	Ll
Butter Mountain Formation	BZ	Dark slate-schist, quartzite & coticule	Ordovician Metasediments	Ll
Campile Formation	CA	Rhyolitic volcanics, grey & brown slates	Ordovician Volcanics	Rf
Carrighill Formation	CZ	Calcareous greywacke siltstone & shale	Silurian Metasediments and Volcanics	Pu
Carrigmaclea Formation	CI	Red, brown conglomerates & sandstones	Devonian Old Red Sandstones	Ll
Dolerite	D		Granites & other Igneous Intrusive rocks	Rf
Feighcullen Formation	FE	Skeletal, oolitic & micritic limestone	Dinantian (early) Sandstones, Shales and Limestones	Ll
Glen Ding Formation	GD	Chloritic, feldspathic greywacke	Silurian Metasediments and Volcanics	Pu
Graiguenamanagh Granite Gneiss	BsGg	Highly foliated, `gneissic granodiorite	Granites & other Igneous Intrusive rocks	Pl
Granite (undifferentiated)	Gr		Granites & other Igneous Intrusive rocks	Pl
Kilcarry Member	MNky	Often porphyritic andesitic amphibolites	Ordovician Metasediments	Ll
Kiltorcan Formation	KT	Yellow & red sandstones, green mudstones	Devonian Kiltorcan-type Sandstones	Rf
Maulin Formation	MN	Dark blue-grey slate, phyllite & schist	Ordovician Metasediments	Ll
Monaughrim Member	MNmo	Dark grey semi-pelitic, psammitic schist	Ordovician Metasediments	Ll
Oaklands Formation	OA	Green, red-purple, buff slate, siltstone	Ordovician Metasediments	Ll
Oldcourt Member	MNoc	Schists, garnet-quartzites (coticules)	Ordovician Metasediments	Ll
Palace Member	OApc	Greywacke sandstones with slates	Ordovician Metasediments	Pl
Pollaphuca Formation	PO	Coarse greywacke & shale	Silurian Metasediments and Volcanics	Pl
Porters Gate Formation	PG	Sandstones, shales & thin limestones	Dinantian (early) Sandstones, Shales and Limestones	Rf
Quinagh Formation	QU	Lenticular mudstone & coarse siltstone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Slate Quarries Formation	SQ	Slate & greywacke	Silurian Metasediments and Volcanics	Pu
Tipperkevin Formation	TK	Greywacke & shale	Silurian Metasediments and Volcanics	Pl
Type 1 Granite	Bs1	Fine-grained granodiorite to granite	Granites & other Igneous Intrusive rocks	Pl
Type 1 Granite	Tw1	Fine-grained granodiorite to granite	Granites & other Igneous Intrusive rocks	Pl
Type 2 Equigranular Granite	Bs2e	Pale, fine to coarse-grained granite	Granites & other Igneous Intrusive rocks	Pl
Type 2 Equigranular Granite	Tw2e	Pale, fine to coarse-grained granite	Granites & other Igneous Intrusive rocks	Ll
Type 2 Microcline Porphyritic Granite	Bs2m	Granite with microcline phenocrysts	Granites & other Igneous Intrusive rocks	Pl
Type 2 Microcline Porphyritic Granite	Tw2m	Granite with microcline phenocrysts	Granites & other Igneous Intrusive rocks	Pl
Type 2 Sparsely Porphyritic Granite	Tw2i	Granite, some microcline phenocrysts	Granites & other Igneous Intrusive rocks	Pl
Quinagh Formation	QU	Lenticular mudstone & coarse siltstone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Feighcullen Formation	FE	Skeletal, oolitic & micritic limestone	Dinantian (early) Sandstones, Shales and Limestones	Ll
Quinagh Formation	QU	Lenticular mudstone & coarse siltstone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Old Red Sandstone	ORS	Red conglomerate, sandstone & mudstone	Devonian Old Red Sandstones	Ll


EPA Borehole Hydrograph at Station KID072
Water Level (m.b.g.l.)
0
1
2
3
4
5
6
7
8
01-Jan-95
01-Jan-96
31-Dec-96
31-Dec-97
01-Jan-99
01-Jan-00
31-Dec-00


Well Hydrographs,
Ardscull Dug Well & Borehole, Co. Kildare
2619SWW436
01/01/69
01/01/73
01/01/77
01/01/81
01/01/85
01/01/89
water level, metres below datum
0
-5
-10
-15
-20
-25
-30
-35
-40