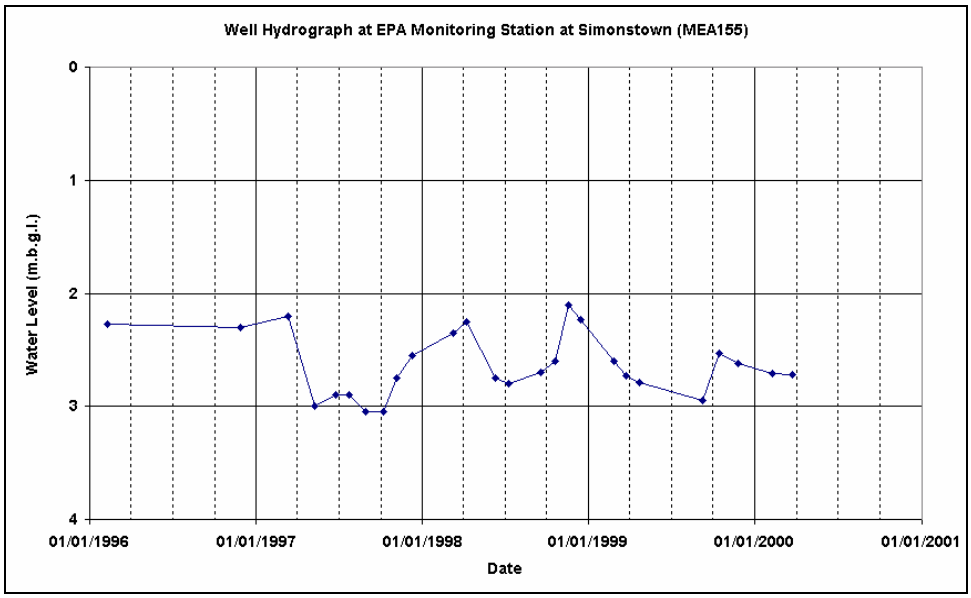
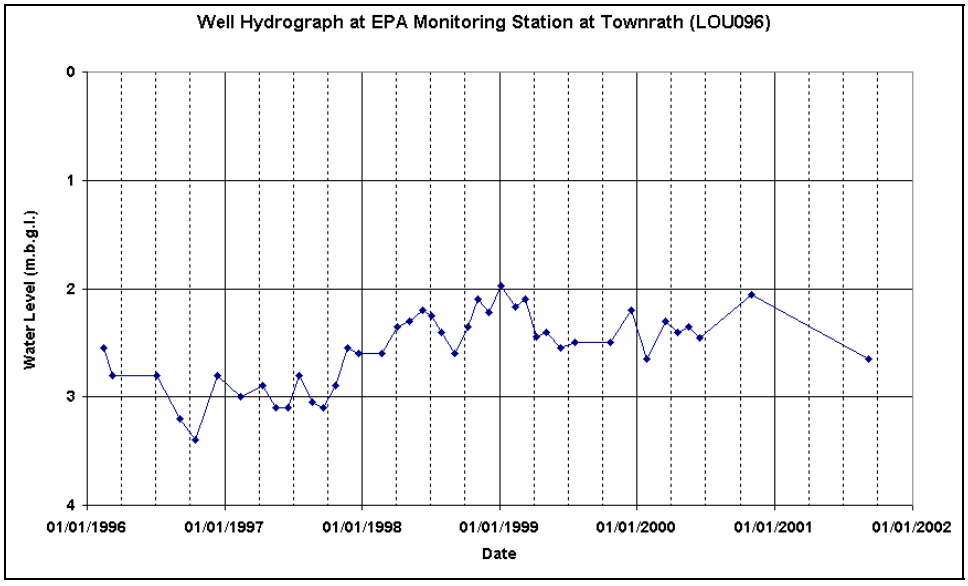
Wilkinstown GWB: Summary of Initial Characterisation.

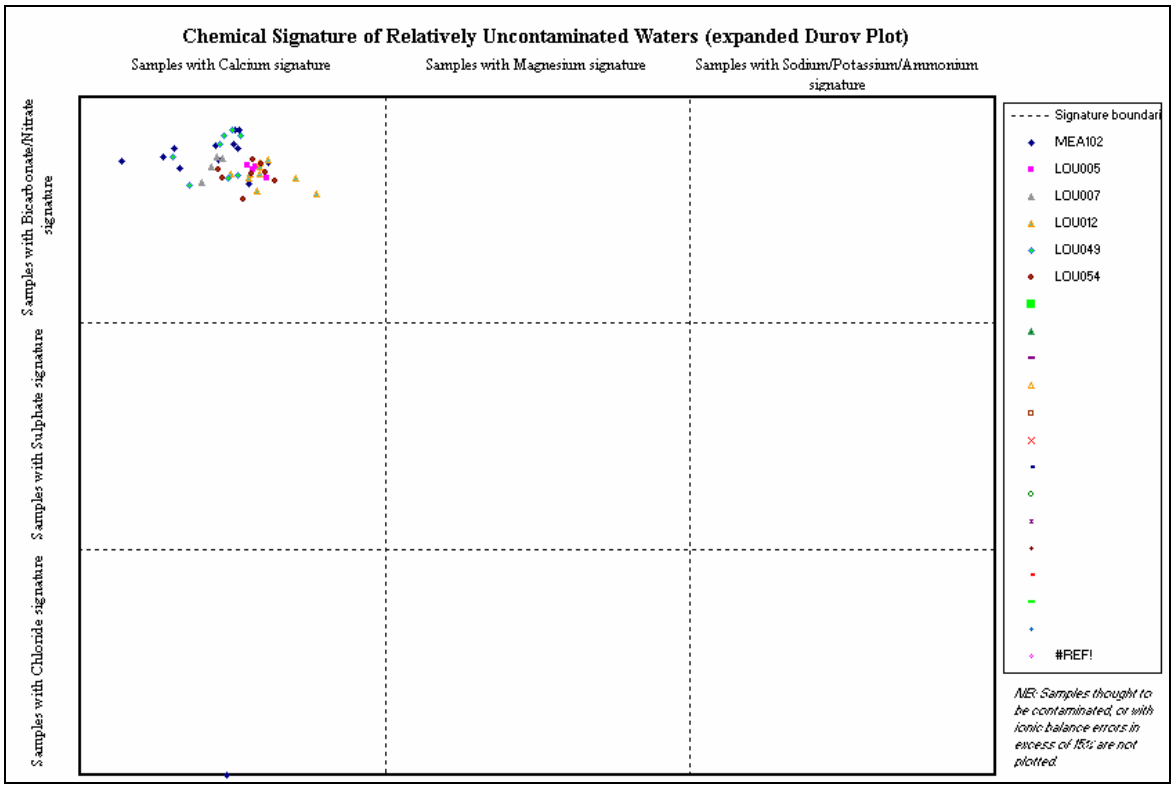
Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
Louth Co. Co. Meath Co. Co. Hydrometric Area 07		Mattock, Yellow, Devlin's, Blackwater	King Williams Glen (1804) & Mellifont Abbey Woods (1464)	201
Topography		This groundwater body is located north of Drogheda in the northeast of the Boyle catchment. The area is very hilly in most areas except to the west. There is a ridge of hills in a northeast-southwest direction, which appear to have been formed by the movement of rock along the Tinure Fault. These hills have a very steep face to the northwest and elevations drop off more gradually to the southeast. The remainder of the area is hilly but elevations do not rise above 200 m OD.		
Geology and Aquifers	Aquifer type(s)	**Pl:** Poor aquifer, generally unproductive except for local zones **Pu:** Poor aquifer, generally unproductive Small amounts of **Lm:** Locally important aquifer, generally moderately productive (0.4%)		
	Main aquifer lithologies	Silurian and Ordovician Metasediments. Ordovician Volcanics. Small amounts of Basalts.		
	Key structures.	This are has undergone intense structural deformation. The main fault directions are in a WSW to ENE direction. Superimposed on these are a series of SWS to NEN faults.		
	Key properties	There has been no hydrogeological investigation in this area, since it has been considered a poor location for groundwater development. It is presumed the transmissivity of the rocks is low (perhaps below $6m^2/d$) and there is secondary evidence (drainage densities, dry weather flow values) that the storativity in the aquifer is also low.		
	Thickness	The depth to which open fractures are encountered below ground will determine the depth of significant groundwater flow in the aquifer since the rock has no primary porosity. In such low permeability rocks it is considered that the majority of groundwater flow will occur in the upper 3m and groundwater flow in fractures does not typically occur below 10m.		
Overlying Strata	Lithologies	There are a variety of subsoil types overlying this aquifer The west there are some large gravel deposits to the north of Wilkinstown. In this area there are tills derived from Limestone. They are not seen further east from the ridge of hills, which run from Collon in the north to Wilkinstown in the west. Beyond these hills there are less gravels, more outcrop and peat. The main subsoil type in this are is till derived from Lower Paleozoic rocks.		
	Thickness	The variability in the topography influences the thickness of the subsoil. The thickness of the subsoil is more variable in the east where there is hilly topography and more uniform in the west where the area is flatter. In the hilly are the subsoils are thinnest at the top of the hills and thicker deposits are present in between hills.		
	% Area aquifer near surface	High in places.		
	Vulnerability	Vulnerability is very variable. Areas of Extreme vulnerability are seen at the tops of hills, while the intervening valleys are generally of Low or Moderate vulnerability. In the west where the area is more low-lying the general vulnerability is Moderate, and High where gravel deposits are present.		
Recharge	Main recharge mechanisms	Water will enter this aquifer by diffuse recharge. The potential recharge will be highest in areas of thin or permeable subsoil e.g. at the tops of the many hills which are present in the area. It must be noted that not all of the potential recharge will reach the water table, as some will be rejected because the permeability of the rocks is low. The rejected recharge will runoff to the nearest surface water bodies. This accounts for the high drainage density seen in this area.		
	Est. recharge rates	*[Information to be added at a later date]*		
Discharge	Springs and large known abstractions	Collon WS (660), Located in this GWB but one of the wells is located in the Drogheda GWB Tullyallen GWS (500), Located in the Drogheda GWB but one of the wells appear to be located in this groundwater body. Tullyallen GWS (150), Drybridge GWS (100), Killineer GWS (40), Sheepgrange GWS (35), Monleek GWS (27), Kilsaran Concrete (15), Roadstone Ltd (13)		
	Main discharge mechanisms	Discharge from this aquifer is to the over lying rivers and streams in the area. There may also be direct discharge to the limestone aquifers to the south. Dry Weather Flow values for the aquifer are very low. This indicates that the aquifer does not have a large storativity to maintain summer flows. Discharge to river systems will be rapid and most water will pass through an upper weathered zone straight through to the rivers. This will contribute to a "flashy" profile in the river hydrographs. Water from this GWB is abstracted at Lynch's Cross to feed into the Tullyallen WS in the Drogheda GWB.		
	Hydrochemical Signature	Hydrochemical analysis of water from EPA monitoring site in this aquifer show the water is Moderately to Very hard with a broad range of electrical conductivity values (450 – 800uS/cm). The Durov diagram shows the groundwater's have a calcium bicarbonate signature, which is typical of shallow groundwater systems. There is a large range in Alkalinity values from 30 to 300mg/l, most values are between 50 to 100mg/l. There are no recorded values of pH less than 6, although one third of all recorded values are below 7.		

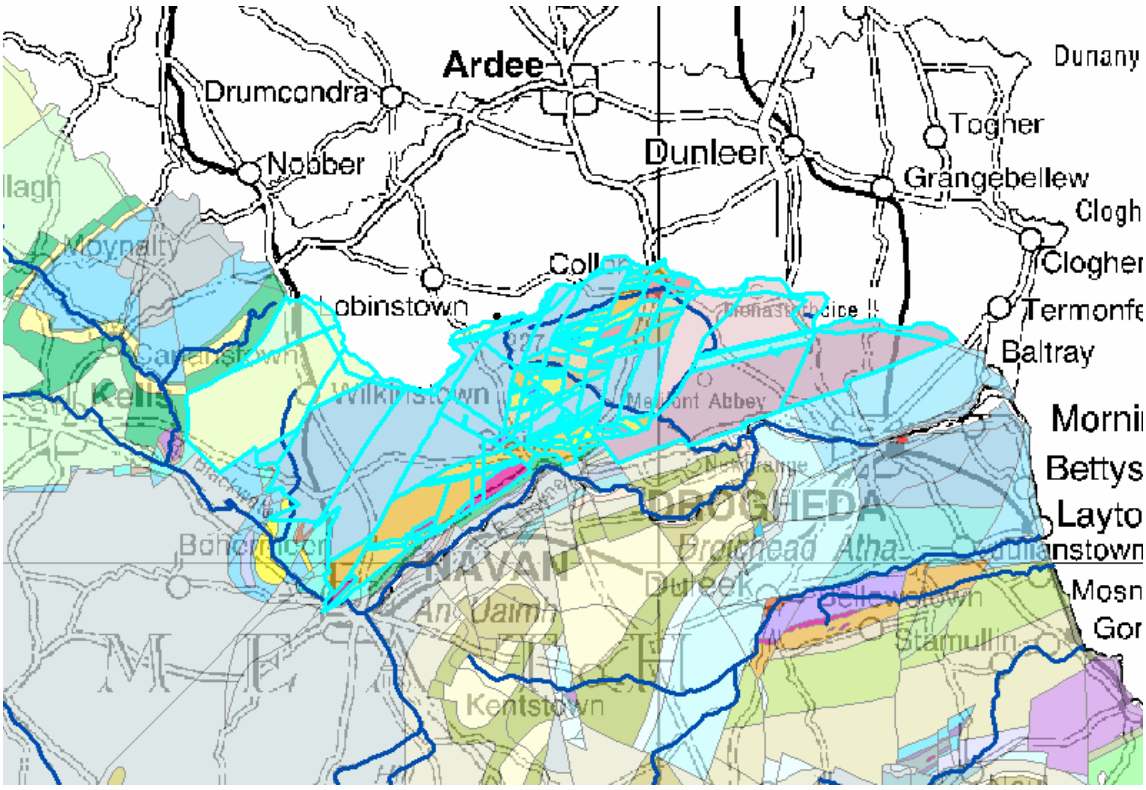
Groundwater Flow Paths	The majority of groundwater flow in this aquifer is considered to take place in an upper weathered zone. The Drainage Density calculations in this area suggest a high figure of 0.956km/km^2, this implies the maximum flow path length the aquifer can maintain is in the region of 500m. This is in agreement with the concept of the aquifer as a poor aquifer and regional flow paths, i.e. in the order of kilometers, do not develop.
Groundwater & surface water interactions	The groundwater body is unlikely to support large terrestrial ecosystems. There is rapid groundwater flow along steep hydraulic gradients in the shallow weathered zone. Surface water and groundwater are closely linked on a local level within a short time frame.
Conceptual model	This groundwater body is located north of Drogheda in the northeast of the Boyle catchment. The area is very hilly in most areas except to the west. The boundaries of this groundwater body are defined to the north and east by the extent of the Eastern RBD and Boyle catchment. To the south and west the boundary is defined by the extent of the Lower Paleozoic rocks in that area. The groundwater body is composed primarily of low permeability rocks, although localized zones of enhanced permeability do occur. The small areas of basalt rocks may have a higher permeability. Recharge occurs diffusely through the subsoils and via outcrops. It takes place mainly in the upland areas where subsoils are thinner and a certain amount of potential recharge may be rejected by the low permeability rocks. The aquifers within the GWB are generally unconfined, but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the majority of groundwater flow occurs in the upper 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep-water strikes in more isolated faults/ fractures can be encountered at 30 mbgl. Flow path lengths are relatively short, and in general are between 30 and 300 m. The direction of groundwater flow will be from areas of local recharge, i.e. the tops of hills, to local discharge points i.e. streams and rivers. The hydraulic gradients will be quite high in the hilly areas and groundwater velocity in the upper weathered lay can be considered quite fast. This rapid lateral flow means that in drier periods there is no water stored in the aquifer to provide a significant baseflow to rivers.
Attachments	
Instrumentation	Stream gauge: 07034, 07058, 07101, 07102, and 07105. Borehole Hydrograph: MEA155, LOU096. EPA Representative Monitoring boreholes: MEA102, LOU005, LUO049, LOU054, LOU007, LOU012.
Information Sources	McConnell B, Philcox M & Geraghty M, 2001. *Geology of Meath: A geological description to accompany the bedrock geology 1:100,000 scale map series, Sheet 13, Meath*. Geological Survey of Ireland. 77 p. Woods L, Meehan R & Wright G R, 1998. *County Meath Groundwater Protection Scheme*. Report to Meath County Council. Geological Survey of Ireland. 54 p.
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 Classification**
Brittstown Formation	BW	Coarse- to fine-grained tuff	Ordovician Volcanics	Pl
Broomfield Formation	BO	Black shale with chert	Ordovician Metasediments	Pl
Bryanstown Formation	BF	Crystal & lithic tuff	Ordovician Volcanics	Pl
Carrickdexter Formation	CX	Basalt & tuff	Basalts & other Volcanic rocks	Lm
Clogherhead Formation	CV	Thickly bedded calcareous greywacke	Silurian Metasediments and Volcanics	Pu
Clontail Formation	CL	Calcareous red-mica greywacke	Silurian Metasediments and Volcanics	Pl
Collon Formation	CM	Andesite breccia/conglomerate/sandstone	Ordovician Volcanics	Pl
Fieldstown Formation	FI	Olive to grey mudstone, tuff	Ordovician Metasediments	Pl
Glaspistol Formation	GP	Black mudstone & quartzose greywacke	Silurian Metasediments and Volcanics	Pl
Hill Of Slane Formation	HS	Massive lapilli tuff	Ordovician Volcanics	Pl
Knockerk Formation	KC	Tuffaceous sandstone, shale	Ordovician Volcanics	Pl
Little Harbour Formation	LT	Calcareous greywacke & mudstone	Silurian Metasediments and Volcanics	Pl
Oriel Brook Formation	OB	Grey pyritic mudstone	Ordovician Metasediments	Pl
Rathkenny Formation	RK	Black mudstone, siltstone, greywacke	Silurian Metasediments and Volcanics	Pl
Red Mans Cove Formation	RD	Red, green, black mudstone	Silurian Metasediments and Volcanics	Pl
Salterstown Formation	SA	Calcareous greywacke & banded mudstone	Silurian Metasediments and Volcanics	Pu
St. Marys Basalt	My	Augite-phyric basalt, commonly vesicular	Basalts & other Volcanic rocks	Lm
Syenite	Sy		Granites & other Igneous Intrusive rocks	Pl
White Island Bridge Formation	WI	Tuff, tuffaceous siltstone, mudstone	Ordovician Volcanics	Pl


Well Hydrograph at EPA Monitoring Station at Simonstown (MEA155)
Water Level (m.b.g.l.)
0
1
2
3
4
01/01/1996
01/01/1997
01/01/1998
01/01/1999
01/01/2000
01/01/2001
Date


Well Hydrograph at EPA Monitoring Station at Townrath (LOU096)
Water Level (m.b.g.l.)
0
1
2
3
4
01/01/1996
01/01/1997
01/01/1998
01/01/1999
01/01/2000
01/01/2001
01/01/2002
Date


Chemical Signature of Relatively Uncontaminated Waters (expanded Durov Plot)
Samples with Calcium signature
Samples with Magnesium signature
Samples with Sodium/Potassium/Ammonium signature
Samples with Bicarbonate/Nitrate signature
Samples with Sulphate signature
Samples with Chloride signature
Signature boundari
MEA102
LOU005
LOU007
LOU012
LOU049
LOU054
#REF!
NB: Samples thought to be contaminated, or with ionic balance errors in excess of 15% are not plotted


Ardee
Drumconda
Nobber
Dunleer
Dunany
Togher
Grangebellew
Clogh
Clogher
Termonfe
Baltray
Morni
Bettys
Layto
Mosn
Gor
Coll
Kells
Wilkinstown
Mellifont Abbey
DROGHEDA
NAVAN
An Uaimh
Kentstown
Stamullin