

**Duleek GWB: Summary of Initial Characterisation.**

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km <sup>2</sup> )
Dublin Co. Co. Meath Co. Co. Hydrometric Area 08		Delvin, Mosney, Nanny, Hurley.	Cromwell's Bush Fen (1576), Laytown Dunes / Nanny Estuary (554).	114
<b>Topography</b>		This GWB is located in north Dublin and extends into the east of Co. Meath. There are two areas of hilly topography, to the northwest at Bellewstown and to the south at Fourknocks. There is a sub catchment level drainage divide running roughly north south through this GWB. Water east of this divide enters the Irish Sea within the area of the GWB. Water to the west of this divide enters the River Nanny, which ultimately discharges to the Irish Sea in the adjacent Bettystown GWB.		
<b>Geology and Aquifers</b>	Aquifer type(s)	<b>Pi:</b> Poor aquifer, generally unproductive except for local zones <b>Pu:</b> Poor aquifer, generally unproductive <b>Lm:</b> Locally important aquifer, generally moderately productive Silurian and Ordovician Metasediments.		
	Main aquifer lithologies			
	Key structures.	The dominant structural feature within the Balbriggan Inlier is faulting of approximate north-south and northeast-southwest trends. There is evidence to suggest that the faulting along the southern boundary of the GWB has intensely deformed the rocks in this area, which may lead to local areas of more permeable rocks.		
	Key properties	This aquifer is comprised of Lower Paleozoic rocks, which are commonly considered to be poor aquifers and transmissivities are presumed to be generally low (<10m <sup>2</sup> /d).		
	Thickness	The majority of groundwater flow will take place through the upper 3m of the aquifer in the broken and weathered rock zone. Major groundwater flows are not expected to be encountered below 10m of the surface. The majority of groundwater flow will take place in this upper section where the rocks is weathered and fractured.		
<b>Overlying Strata</b>	Lithologies	There are a complex variety of subsoil lithologies in this area. The dominant type of subsoil is till: Irish Sea till in the east, which is surrounded in places by till derived from Lower Paleozoic rocks. These become less prevalent in the west where limestone-derived tills are more common. There is a large gravel deposit in the northeastern of this GWB at Gormanstown. Smaller sand and gravel deposits are mapped in the area of Skerries.		
	Thickness	The subsoil thickness is influenced by the topography with thin or absent tills on the hills and thicker subsoils in between.		
	% Area aquifer near surface	There is a large area to the west, in the hillier areas where the aquifer is close to the surface.		
	Vulnerability	Vulnerability is Extreme in areas of higher elevations and generally Moderate inbetween these hills. There is a large area of High vulnerability in the northeast where the gravel deposits exist.		
<b>Recharge</b>	Main recharge mechanisms	Diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively <u>reducing further the available groundwater resource in the aquifer.</u>		
	Est. recharge rates	<i>[Information to be added at a later date]</i>		
<b>Discharge</b>	Springs and large known abstractions	There are no known large abstractions in this area. It is likely that in the near future a well in the Limestone to the south of this GWB may be used for public supply by Fingal Co. Co. Until long term monitoring is in place it is uncertain if this will have any impact on this GWB.		
	Main discharge mechanisms	This aquifer will discharge to the overlying rivers and streams in the area as baseflow. The low permeability rocks in the area will no sustain large summer baseflows and it is more likely that the majority of groundwater flow will discharge to the rivers after a short lag time in the weathered zone of the aquifer. Additional discharge may enter the gravels located in the northeast of the area; more information is required to fully understand the relationship between the two aquifers. There may be some transfer of groundwater to the limestones in the south, this may increase in the future if large scale pumping of the limestone aquifer is commenced. The GWB will also discharge directly to the Irish Sea in some areas.		
	Hydrochemical Signature	There is little hydrochemical analysis available for this GWB as there are no EPA monitoring sites located within it.		
<b>Groundwater Flow Paths</b>		The majority of groundwater flow in this area is considered to take place in the upper weathered zone of the aquifer. Groundwater will flow from the recharge mounds in the north and south of the body towards the east and west of the area. Flow paths are not considered to extend further than the nearest surface water feature and will generally not be greater than 500m. Water level data suggest that the water table is generally within 5m of the surface.		

<b>Groundwater &amp; surface water interactions</b>	Cromwells Bush Fen Natural Heritage Area (NHA) is a small wetland lying some 6km southwest of Duleek in a pastoral/arable setting over poorly draining glacial drift. Large inland wetland areas are not a typical feature of the east midlands. Although small, this wetland contains a diversity of wetland habitats in transition that are unusual in the locality. Drainage and major nutrient input from adjacent land should be avoided on this site.
<b>Conceptual model</b>	This GWB is located in North Dublin and extends into the east of Co. Meath. There are two areas of hilly topography, to the northwest at Bellewstown and to the south at Fourknocks. The extent of the GWB is defined by the contact between the Lower Paleozoic rocks and the Limestone or in the southeast the volcanics. There is a sub catchment level drainage divide running roughly north south through this GWB. The GWB is composed primarily of low permeability rocks, although localized zones of enhanced permeability do occur. Rocks along the southern boundary of the GWB are expected to be highly deformed. There is evidence to suggest that the small area of volcanic rocks at balbriggan has a higher permeability than the other Lower Paleozoic Rocks. Recharge occurs diffusely through the subsoils and via outcrops. It takes place mainly in the upland areas where subsoils are thinner. 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 30-50 mbgl. Flow path lengths are relatively short, and in general are between 30 and 300 m with groundwater discharging to the closest surface water feature.
<b>Attachments</b>	
<b>Instrumentation</b>	Stream gauge: 08016, 08017, 08020, Borehole Hydrograph: None EPA Representative Monitoring boreholes: None
<b>Information Sources</b>	K T Cullen & Co Ltd (1994) <i>Report on the Hydrogeological Investigation at the Bog of the Ring</i> . North County Dublin Groundwater Project. McConnell B, Philcox M & Geraghty M, 2001. <i>Geology of Meath: A geological description to accompany the bedrock geology 1:100,000 scale map series, Sheet 13, Meath</i> . Geological Survey of Ireland. 77 p. Woods L, Meehan R & Wright G R, 1998. <i>County Meath Groundwater Protection Scheme</i> . Report to Meath County Council. Geological Survey of Ireland. 54 p.
<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

Formation Name	Code	Description	Rock Unit Group	Aquifer Classification
Carnes Formation	CC	Volcaniclastic greywacke and mudstone	Ordovician Volcanics	Pl
Clashford House Formation	CF	Mudstone & siltstone, andesite	Ordovician Metasediments	Pl
Clatterstown Formation	CW	Thinly bedded siltstone, sandstone	Silurian Metasediments and Volcanics	Pl
Denhamstown Formation	DD	Greywacke sandstone & siltstone	Silurian Metasediments and Volcanics	Pu
Diorite	Di		Granites & other Igneous Intrusive rocks	Pl
Fournocks Formation	FK	Banded red & green mudstone & siltstone	Ordovician Metasediments	Pu
Herbertstown Formation	HB	Andesite, tuff & mudstone	Ordovician Metasediments	Pu
Hilltown Formation	HT	Lapilli tuff, mudrock	Ordovician Volcanics	Pl
Kennetstown Formation	KT	Greywacke sandstone & siltstone	Silurian Metasediments and Volcanics	Pu
Mullaghfin Formation	MF	Pale peloidal calcarenite	Dinantian Pure Bedded Limestones	Lk
Old Red Sandstone (undifferentiated)	ORS	Red conglomerate, sandstone, mudstone	Devonian Old Red Sandstones	Ll
Prioryland Formation	PI	Green & purple mudrock, slump breccia	Ordovician Metasediments	Pu
Snowtown Formation	SW	Banded grey mudstone & siltstone	Ordovician Metasediments	Pl

