

Balbriggan GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
Dublin Co. Co. Hydrometric Area 08		Some small streams	None	16
Topography		This GWB is located in northern County Dublin around Balbriggan. The topography of the area slopes towards the coast with some small hills which act as sub-catchment divides.		
Geology and Aquifers	Aquifer type(s)	Lm: Locally important aquifer, generally moderately productive		
	Main aquifer lithologies	Ordovician Volcanic Rocks.		
	Key structures.	The dominant structural feature is the Balbriggan Inlier that contains faulting of approximate north-south and northeast-southwest trends. Evidence suggests 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	Pumping tests in the Ordovician volcanic rocks at Balbriggan (Belcamp Formation) have shown this formation to have higher transmissivity than the surrounding Lower Paleozoic rocks (Cullen 1994). Estimated values of transmissivity are between 20 and 30 m ² /d. Similar instances of permeable volcanic rocks are known in Wexford and Limerick.		
Thickness	The majority of groundwater flow is expected to occur in the upper weathered zone (typically around 3 m thick). Drilling evidence suggests that there is deep groundwater flow occurring through fractures in the aquifer to depths of 20 m below the top of the rock.			
Overlying Strata	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.		
	Thickness	The subsoil thickness is influenced by the topography, with tills thin or absent on the hills and thicker subsoils found between these hills and the coast, with subsoil thinning out towards the coast.		
	% Area aquifer near surface	There are some small areas of exposure in the centre of the body.		
	Vulnerability	There is currently no vulnerability mapping available for Dublin. However, there is an old (1979) map of subsoil thickness.		
Recharge	Main recharge mechanisms	The primary process for recharge to enter the aquifer is by diffuse recharge. The most recharge will occur in areas of thin and/or permeable subsoils in the central area of the GWB where there is a topographic high. There is a low drainage density in this area, which may suggest a significant proportion of the effective rainfall recharges the aquifer.		
	Est. recharge rates	<i>[Information to be added at a later date]</i>		
Discharge	Springs and large known abstractions	There are high yielding wells in the Ordovician volcanic rocks near Balbriggan. Pumping tests indicate that wells in this area are capable of supplying up to 900 m ³ /d. 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. There may be some transfer of groundwater to the limestones in the south, which 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	Analysis of a trial well in the volcanics at Stephenstown, near Balbriggan, indicates moderately hard water with electrical conductivity values of around 496 µS/cm. The data indicate a calcium bicarbonate signature.		
Groundwater Flow Paths		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 center of the body towards the coast and also to adjacent GWBs. Flow paths are not considered to extend further than the nearest surface water feature and will generally not be greater than 500 m. There is evidence of confined groundwater flow in the southern area of the GWB, at Stephenstown, where standing water levels in the rock rise above the top of the bedrock into the thick till that overlies this area.		
Groundwater & surface water interactions		The drainage density is quite low in the centre of this body, which suggests that in this area, which is elevated and has thinner subsoil (as indicated by the location of outcrops in the area) there is a higher rate of recharge and little runoff. Away from this central high there is evidence to suggest that the subsoil thickness increases and there is the emergence of surface channels. The GWB is mostly surrounded by Lower Paleozoic rocks, which are of lower permeability and will act as a barrier to groundwater flow. Hence this may cause groundwater to be forced to the surface along this geological boundary, facilitating the development of surface water streams along this boundary.		

Conceptual model	This GWB is located in northern county Dublin around Balbriggan. The topography of the area slopes towards the coast with some small hills contained within the GWB, which act as sub-catchment level drainage divides. The GWB is composed primarily of moderate permeability rocks, with localized zones of enhanced permeability. The extent of the GWB is defined by the location of the volcanic rocks around Balbriggan. The small areas of volcanic rocks may have a higher permeability. Recharge occurs diffusely through the subsoils and via outcrops. The aquifers within the GWB are generally unconfined, but they may be locally confined where the subsoil is thicker and/or less permeable. Most flow in this aquifer will occur in a zone near the surface. In general, majority of groundwater flow occurs in the upper 30 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. Flow path lengths are relatively short, and in general are between 30 and 300 m. Groundwater discharges to the numerous small streams crossing the aquifer and also directly to the coast.
Attachments	
Instrumentation	Stream gauge: None Borehole Hydrograph: None EPA Representative Monitoring boreholes: None
Information Sources	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</i> , Geological Survey of Ireland. 77 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
Belcamp Formation	BP	Andesite, pillow breccia, mudstone, tuff	Ordovician Volcanics	PI

