Ballyknock Lower GWB :Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
Waterford Co. Co. Hydrometric Area 17	Colligan, Glendine	None	6.72

Topography		This groundwater body lies on the northern slopes of the valley extending west from Dungarvan. The area is located at the steep drop from around 150m to 25m OD over a distance of about 400m. This change in topography is directly linked to the underlying geology.
Geology and Aquifers	Aquifer type(s) Main aquifer lithologies	Rf – Regionally Important Fractured Aquifer Kiltorcan Formation – KT – Yellow & Red Sandstones, green mudstones
	Key structures.	The groundwater body is part of a major syncline which has its axis running east to west along the Dungarvan valley. This major syncline also incorporates a number of smaller anticlines. The Kitlorcan rocks dip underneath the overlying limestones of the Dungarvan groundwater body. In plan view it appears as if the groundwater body is discontinous. This is because of the numerous North South trending faults seen on the map have displaced various sections of the rock.
	Key properties	Results of aquifer testing undertaken in the aquifer are very variable. Daly (1985) reports estimates of 5 m^2/day to 1850 m^2/day, and suggests that the highest values are likely to be associated with low-lying areas close to anticlines or faults. Daly suggests that sandstone permeabilities are in the order of 0.5 to 20 m/day, increasing up to 80m/day in localised areas. Transmissivity will be reduced at depth, where the Kiltorcan Formation is thinner in the center of the synclines and permeability is reduced by the deep burial. The pumping test analyses from a public supply in Cappoquin, which is located ~7km to the North West of the boundary of the SE & E RBDs provided transmissivities of 170 m²/d from the 2 hour pumping test and 157 m²/d from the 3.5 hour recovery test. A value of 160 m²/d is taken as the most reasonable figure.
	Thickness	Geophysical borehole logging data suggest that significant water movements occur at depths of over 60m where the aquifer is not confined by overlying shaly limestones. Where confined, active groundwater circulation is expected to be much more limited, but some deep flow has been inferred from mineral exploration boreholes at depths of over 200m (Daly, 1985). Kiltorcan Formation is thinner in the centre of the synclines and permeability is reduced by the deep burial.
Overlying Strata	Lithologies	Sandy limestone-derived tills are the most extensive deposits in the Dungarvan area. They are best observed in ditches and field cuttings, and contain small limestone and sandstone clasts. The matrix is predominately sandy but also contains some silt and clay.
	Thickness	Less than 10m and quite variable
	% area aquifer near surface	1%
	Vulnerability	EXTREME vulnerability in the west and HIGH vulnerability to the east.
Recharge	Main recharge mechanisms	Recharge to this aquifer occur from both inside and outside the area of the Groundwater body itself. Due to the topography of the area groundwater flow from groundwater bodies to the north will pass down gradient into this aquifer. This is in addition to recharge from rain, which falls directly on to the area of the groundwater body. It must also be considered that due to the steep gradients that the amount of recharge it this groundwater body may be reduced due to an increased velocity of interflow in the subsoils and shallower layers of the rock. The Ballysteen limestone, which is in contact with the Kiltorcan Sandstone to the south acts as a barrier to groundwater flow and will therefore act somewhat like a dam, holding back water in the Kiltorcan allowing it to fill up.
	Est. recharge rates	*[Information will be added at a later date]*
Discharge	Springs and large known abstractions	Ballyduff/ Ballylemon WS ($386m^3$/d)
	Main discharge mechanisms	Discharge from this aquifer is likely to be baseflow to the many streams foowing down the side of the valley. The Ballysteen limestone directly to the south of the aquifer is a barrier to groundwater flow and will force water levels to rise at the contact between itself and the Kiltorcan Sandstones forcing the water up and out into rivers.
	Hydrochemical Signature	Two raw water sample taken for chemical and bacterial analysis from the Cappoquin Public supply indicate a **'moderately soft'** water (71 - 75 mg/l $CaCO_3$) with a relatively low alkalinity (39 -43 mg/l $CaCO_3$). Conductivities were also relatively low (155 - 195 µS/cm). All the major cations, anions and trace elements are within EC limits, however levels of nitrate (29 - 42 mg/l) were higher than the expected background (approx. 5 mg/l).

Groundwater Flow Paths	Although the sandstones within the Kiltorcan Formation are sometimes slightly friable and may have a minor component of intergranular porosity. Permeability is therefore considered to be entirely secondary. This is reflected the groundwater flow which will be concentrated along fractures and joints in the rock. Groundwater flow is influenced by topography and a groundwater recharge mound is present to the north of the groundwater body. The general groundwater flow direction in the groundwater body is therefore south towards the valley.
Groundwater & surface water interactions	This groundwater body is considered to be closely linked to the surface water features. The course of the Colligan River is directly underlain by rock, as shown by the outcrop maps for the area. This is to be expected in a steep area where the river is incising into the rock. It must also be taken into consideration that the groundwater will discharge to the rivers since the Ballysteen limestone is a barrier to groundwater flow.
Conceptual model	
Attachments	
Instrumentation	Stream gauge: None Borehole Hydrograph: none EPA Representative Monitoring boreholes: None
Information Sources	Hudson, M. (1996) Cappoquin Public Supply, Groundwater Source Protection Zones. Final report to Waterford County Council. Geological Survey of Ireland. Hudson, M. Daly, D. Johnston, P. and Duffy, S. (1998) *County Waterford Groundwater Protection Scheme*. Main Report. Final report to Waterford County Council. Geological Survey of Ireland 87pp. Sleeman, A.G. and McConnell, B. (1995). Geology of East Cork - Waterford. A geological description of East Cork, Waterford and adjoining parts of Tipperary and Limerick, to accompany the Bedrock Geology 1:100,000 scale map series, Sheet 22, East Cork - Waterford. With contributions by K. Claringbold, P. O'Connor, W.P. Warren and G. Wright. Geological Survey of Ireland.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae