

### Tramore GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km <sup>2</sup> )
17 – Coastal Area Waterford Co Co	Dalligan, Tay, Mahon, Morrigen, Dunhill.	Stradbally Woods, Ballin Lough, Castlecraddock Bog, Lissaviron Bog, Fennor Bog, Carrickavrantry Reservoir, Islandtarsney Fen	251
<b>Topography</b>	The highest elevations are to the north and west of this groundwater body. Slievenamon is the highest peak in the north at 164m OD. To the west there are much higher peaks present in the Monavullagh Mountains but the groundwater body extends only to the foothills of this range. The highest elevations within the body are about 200m OD. The high elevations of the north and west fall rapidly to give way to a hummocky land surface over the remainder of the area. Regional drainage is towards the sea as reflected by the associated streams, which lie in valleys tens of metres deep.		
<b>Geology and Aquifers</b>	Aquifer type(s)	<b>Rf:</b> Regionally Important Fractured Aquifer. There is a small area of poorer aquifers within this groundwater body.	
	Main aquifer lithologies	CA: Campile Formation: Rhyolitic volcanics, grey & brown slates. This rock contains areas of felsic volcanic rock which are believed to be the main water bearing components. CARs – Ross Member - Dark grey slate with thin siltstones KI – Kilmacthomas Fm - Green, grey & purple slate, siltstone BI - Ballynaclogh Fm - Basaltic & andesitic volcanics, slates BM - Bunmahon Fm - Basalt to andesite volcanics and slate	
	Key structures.	The rocks were deformed during the Caledonian (Silurian-Devonian) mountain building episode, which affected the Lower Palaeozoic rocks of east Waterford, resulting in complex folding, faulting and low-grade metamorphism. The crystalline volcanic rocks are believed to have ruptured and broken rather than bent and folded under these stresses.	
	Key properties	Pumping tests on various public supplies from the Campile Formation show transmissivity values ranging from 2 to 290 m <sup>2</sup> /d but averaging 108 m <sup>2</sup> /d. There is very little information from Co. Waterford regarding storage coefficients for these rocks, however Daly (1982) suggests that in the unconfined state it will be less than 1% and in the confined state less than 0.01%. A well in the Kilmacthomas Formation at Fewes, used for public supply, has a yield of 200 m <sup>3</sup> /d with an approximate specific capacity and transmissivity of 38 m <sup>3</sup> /d/m and 47 m <sup>2</sup> /d respectively.	
	Thickness	Significant fractures have been logged at 50m below ground in Kilkenny. Effective thickness of this aquifer is probably no more than 100m.	
<b>Overlying Strata</b>	Lithologies	The Ballyvoyle Till occurs throughout Waterford and is seen to overlie the Irish Sea Till along the coast. The till is generally a massive, structureless, sandy-stony deposit with a well-defined fabric (usually aligned north to south). The composition of the matrix and clasts is variable and is largely controlled by the interaction of glacial processes and the underlying geology. In this groundwater body the till is a volcanic till. Up to 20% of the till was finer than 0.0065 mm (up to 50% finer than 0.065 mm). These tills are therefore considered to have a low permeability.	
	Thickness	Over the main area of the groundwater body subsoil thickness is 3 to 5m with local areas of less than 3 m and greater than 5m.	
	% area aquifer near surface	?	
	Vulnerability	Mostly HIGH with local areas of EXTREME and few areas of LOW. This reflects the hummocky land surface in the lowlands where subsoil thickness is variable. Areas of extreme vulnerability are most likely in the upland areas.	
<b>Recharge</b>	Main recharge mechanisms	Most recharge is likely to occur in the north where there is a thin subsoil, and in other areas of extreme vulnerability.	
	Est. recharge rates	[Recharge estimates will be entered at a later date]	
<b>Discharge</b>	Springs and large known abstractions (m <sup>3</sup> /d)	Fewes (10), Kilmacthomas (160) & Ballygarty (150).	
	Main discharge mechanisms	Discharge is most likely to associated streams and also along the coast. There may be a strong connection between the rivers and the underlying bedrock because the river valleys cut deep into the bedrock.	

	Hydrochemical Signature	The limited data suggest that the groundwater is of an intermediate type, where no one cation or anion is dominant. The groundwater analysed had roughly equal proportions of calcium, magnesium and sodium (cations) and bicarbonate and chloride (anions). The data do not indicate more than one water type although in some of the samples elevated levels of chloride are associated with high nitrate values (due to contamination). The calcium-magnesium-sodium cation composition is partly the result of the dissolution of minerals in the volcanic/sedimentary sequence and the overlying volcanic till (volcanic rocks can have a relatively high component of magnesium and sodium). Some of the sodium is also likely to be associated with elevated levels in precipitation in coastal areas. The strata of this aquifer are <b>Siliceous</b> . Water samples are moderately soft (51 - 100 mg/l as CaCO <sub>3</sub> ) to slightly hard (101-150 mg/l as CaCO <sub>3</sub> ), with a slightly acidic pH (generally between 6.0-6.8). Alkalinity ranges from 21-170 mg/l as CaCO <sub>3</sub> .
	<b>Groundwater Flow Paths</b>	Groundwater flow in the Ordovician volcanic sequence is considered to be entirely through fractures (there may be a very minor component of primary porosity as a result of vesicles (gas bubbles) in some lava flows).
	<b>Groundwater and surface water interactions</b>	Groundwater and surface water interaction are likely to be very important for the Islandtarnsey Fen. Such ecological sites are rare in Ireland and further investigation would be required to understand the dependence of this ecosystem on groundwater.
<b>Conceptual model</b>	This groundwater body is defined to the south by the Irish Sea coastline. To the east and west its boundary is defined by the extent of the volcanic aquifer formations, to the north the boundary is defined by the Hydrometric Area 17 boundary. Groundwater flow is from north to south. Flow is likely to occur in fractures, which were opened by the Caledonian mountain building phase. The vulnerability of the aquifer is highly variable in the lowlands towards the coast.	
<b>Attachments</b>	(Figure 1) Durov plot.	
<b>Instrumentation</b>	Stream gauge: 17004, 17002, 17005, 17001, 17006, Borehole Hydrograph: none EPA Representative Monitoring boreholes: Kilrossanty WS (#70 - S303009), Spring at Knockelyan (#73 - S324017), Fews WS (#45 - S366075), Dunhill WS (#42 - S503025)	
<b>Information Sources</b>	Hudson M., Daly D., Duffy S., & Johnston P., 1997. County Waterford Groundwater Protection Scheme. Daly, E. P. (1982) "The Groundwater Resources of the South East Industrial Development Region", Geological Survey of Ireland Report for the South East Regional Development Agency.	
<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	

### Chemical Signature of Relatively Uncontaminated Waters (expanded Durov Plot)

