Derrybrien/KilcreestGWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
29 Galway / Clare Co. Co.	**Rivers**: Annagh, Ballycahalan, Beagh, Boleyneendorrish, Derrywee, Gort, Owendalulleagh, Streamstown, Turnagh. **Lakes**: Annagh, Ballynakill, Ballyturin, Dirney's, Hanrahan's, Lahardaun, Lannaght, Lodgehill, Agannygal, Ahileleen, Atickippple, Avalla, Beg, Belsragh, Cutra, Nacreeva, Naneeve, Loughaniddaun, Loughaunlea, Namugga, Pickford's, Shanemore's.	Sonnagh Bog (001913), Slieve Aughty Bog/Moyglass and Woodford (001229), Lough Cutra (000299) (O'Riain, 2004).	230

Topography	The GWB occupies an area of south county Galway between L. Cutra and L. Rea. The land surface is characterized by a mountainous area (Slieve Aughty) in the eastern part of the GWB that flattens to the west. The GWB is bounded to the west by the Kinvara/Gort Lowlands. It is bounded to the east by an upland area which includes the catchment divide between the Shannon and the Western RBD areas. The GWB is also bounded in the south and north by surface water catchments. Elevations range from 30-360 m.	
Geology and Aquifers	**Aquifer categories**	**Pl:** Poor aquifer which is generally unproductive except for local zones **Ll:** Locally important aquifer, moderately productive only in local zones.
	Main aquifer lithologies	The Devonian Old Red Sandstones dominate the GWB. The other lithologies include Dinantian (early) Sandstones, Shales and Limestones, Dinantian Lower Impure Limestones, Ordovician Metasediments, Silurian Metasediments and Volcanics. See Table 1 for a full listing.
	Key structures	The beds dip 4-10^o, generally to northwest, west, southwest and south. The rocks form part of anticlines that comprise the Slieve Aughty range. Fold axes trend E-W and ENE-WSW. There are several major faults with the same orientation as the fold axes crossing the GWB. The most notable are the Derrybrown and Bohaboy Faults.
	Key properties	Yield data are sparse in this GWB. There is one specific capacity value available - 44 m^3/d/m. The data indicate low transmissivity. In the vicinity of faults, transmissivity may be higher. The transmissivity of the Devonian ORS aquifer will, on average, be better than that of the Silurian strata. Within the Dinantian Lower Impure Limestones, transmissivities are likely to be in the range 2-20 m^2/d, with most values at the lower end of the range. Data are inadequate to calculate groundwater gradients, however, these are expected to be greater than 0.01. Annual variations in water levels are typically greater than 5 m. This is illustrated in Figure 1.
	Thickness	Most groundwater flux is likely to be in the uppermost part of the aquifer; comprising a broken and weathered zone typically less than 3 m thick; a zone of interconnected fissuring 10-15 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m.
Overlying Strata	**Lithologies**	The upland areas in the eastern half of the GWB are dominated by blanket peat. On the lower slopes Devonian Till dominates, which in turn gives away to Limestone Till on the low lying areas.
	Thickness	The limited data indicate that the thickness are up to 6 m in places.
	% area aquifer near surface	*[Information to be added at a later date]*
	Vulnerability	*[Information to be added at a later date]*
Recharge	**Main recharge mechanisms**	Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of much of the subsoil (blanket peat) and the aquifers, a high proportion of the available recharge will discharge to the streams. In addition, the steep slopes in the mountainous areas promote surface runoff. The stream density is high in the GWB, indicating the high proportion of surface runoff.
	Est. recharge rates	*[Information to be added at a later date]*
Discharge	**Large springs and high yielding wells (m^3/d)**	One reported 'Good' well in the GWB – Rakerin (104 m^3/d)
	Main discharge mechanisms	The main groundwater discharges are to the streams, rivers and lakes. Small springs and seeps are likely to issue at the stream heads and along their course.

	Hydrochemical Signature	The groundwater has a calcium bicarbonate signature (Ca HCO_3). Data available in the GWB for the Devonian Old Red Sandstones at Kilchreest (GAL113) for selected parameters is as follows (n=12): Alkalinity (mg/l as $CaCO_3$): range 227-332, median 320. Total Hardness (mg/l): range 199-368, median 346 (Hard). Conductivity (μS/cm): range 602-711, median 662. There are no data available specific to the Limestones in the GWB but groundwater will be Hard to Very Hard (typically ranging between 350-450 mg/l), and high electrical conductivities are also observed. Alkalinity will also be high, but less than hardness. In the Impure Limestones iron and manganese concentrations frequently fluctuate between zero and more than the EU Drinking Water Directive maximum admissible concentrations (MACs). Hydrogen sulphide can also be problematic in shaly limestones (Aughrim GWB, Shannon RBD).
Groundwater Flow Paths		Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Generally, water levels are 0-8 m below ground level. Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to nearby streams and small springs. There are observed deep water strikes, indicating that there is a component of deep groundwater flow, however shallow groundwater flow is dominant. Groundwater flow directions are expected to follow topography – overall to the west.
Groundwater & Surface water interactions		Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low. Sonnagh Bog is an ecosystem that depends on groundwater (O'Riain, 2004).

Conceptual model	• The GWB occupies an area of south county Galway between L. Cutra and L. Rea. The land surface is characterized by a mountainous area (Slieve Aughty) in the eastern part of the GWB that flattens to the west. The GWB is bounded to the west by the Kinvara/Gort Lowlands. It is bounded to the east by an upland area dividing water draining to the west and east. The GWB is also bounded in the south and north by surface water catchments. Elevations range from 30-360 m. • The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is likely to be in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring typically less than 10m; and a zone of isolated fissuring typically less than 150m. • Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. • Recharge occurs diffusely through the subsoils and rock outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams. • Flow paths are likely to be short up to 300 m, with groundwater discharging rapidly to nearby streams and small springs and flow directions are expected to follow topography. • Overall flow direction is to the west.
Attachments	Figure 1, 2 and Table 1.
Instrumentation	**Stream gauges:** 29008. **EPA Water Level Monitoring boreholes:** (GAL 284) **EPA Representative Monitoring points:** (GAL 113)
Information Sources	Daly, D. (1985) *Groundwater in County Galway with particular reference to its Protection from Pollution.* Geological Survey of Ireland report for Galway County Council. 98pp. Drew D.P. and Daly D. (1993) *Groundwater and Karstification in Mid-Galway, South Mayo and North Clare.* A Joint Report: Department of Geography, Trinity College Dublin and Groundwater Section, Geological Survey of Ireland. Geological Survey of Ireland Report Series 93/3 (Groundwater), 86 pp Gately, S., Sommervill, I., Morris, J.H., Sleeman, A.G. and Emo, G., 2003. *Geology of Galway-Offaly. A Geological description of Galway-Offaly, and adjacent parts of Westmeath, Tipperary, Laois, Clare and Roscommon to accompany the bedrock geology 1:100,000 scale map series, Sheet 15.* Pracht, M., Lees, A., Leake, B., Feely, M., Long, B., Morris, J., McConnell, B., (2003*). A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 14, Galway Bay*. Unpublished Geological Survey of Ireland Map Series Report. Geological Survey of Ireland, Aquifer Chapters. Unpublished. Geological Survey of Ireland. Aughrim GWB report, initial characterisation. Shannon RBD. O' Riain, G., (2004). *Water Dependent Ecosystems and Subtypes Draft Report.* WFD Support Projects. Compass Informatics in association with National Wildlife and Parks Service (DEHLG).
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.

Figure 1: Groundwater hydrographs

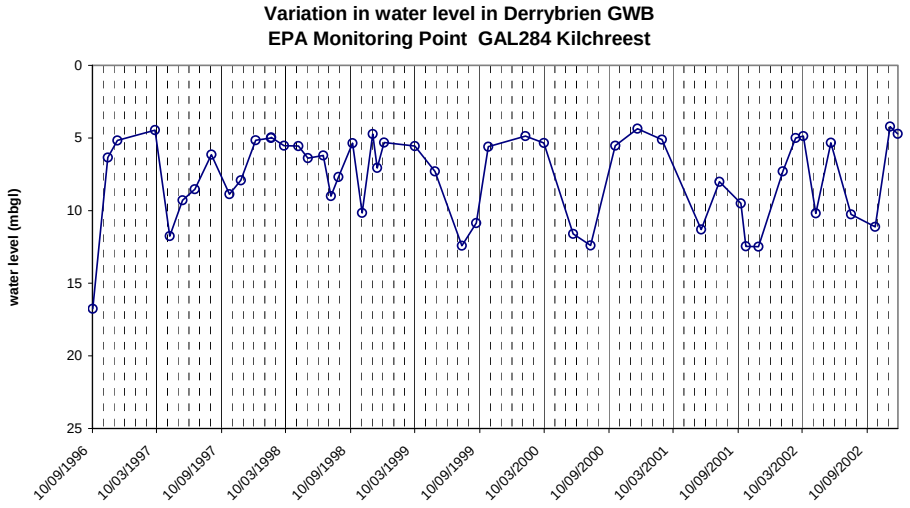

Table 1. List of Rock units in GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Ayle River Formation (AR)	Mudstone, siltstone, conglomerate	Devonian Old Red Sandstones	Pl
Ballysteen Formation (BA)	Fossiliferous dark-grey muddy limestone	Dinantian Lower Impure Limestones	Ll
Derryfadda Formation (DF)	Greywackes, siltstone and mudstone	Silurian Metasediments and Volcanics	Pl
Gortnagleav Formation (GV)	Siltstone, sandstone and shale with tuff	Ordovician Metasediments	Pl
Lower Limestone Shale (LLS)	Sandstone, mudstone & thin limestone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Toberelatan Formation (TL)	Shale, siltstone, sandstone and chert	Ordovician Metasediments	Pl
Waulsortian Limestones (WA)	Massive unbedded lime-mudstone	Dinantian Pure Unbedded Limestones	Ll

Figure 2 Location and boundaries of GWB