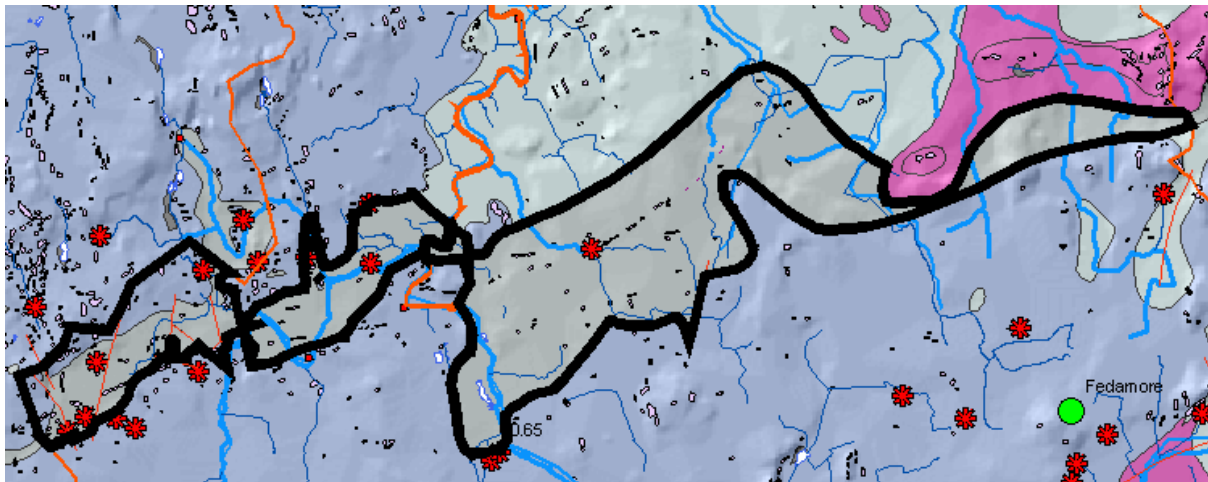


Patrickswell GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features		Associated terrestrial ecosystems	Area (km ²)
24 - Maigue Limerick Co. Co.	Rivers: Maigue, Ahanload, Barnakyle, Greanagh, Ballynaclough, Clonshire.		None groundwater-dependent.	44
Topography	The GWB is long and thin and has a very irregular outline. It is oriented ENE-WSW, in line with the geological structural grain of the area. The area is generally flat-lying, and most of the ground is 10-40 mAOD. The lowest areas are along the Maigue, Greanagh and Barnakyle River valleys. The highest areas, with elevations of approximately xx mAOD, are at the east and west boundaries, which are formed by catchment divides. Drainage densities are relatively high, and there are many springs in the area			
Geology and Aquifers	Aquifer category(ies)	The bulk of the GWB, which is underlain by impure limestones, is an LI : Locally important aquifer which is moderately productive only in local zones. In a small area in the northwest, the aquifer is an Rk^c : Regionally important karstified aquifer dominated by conduit flow.		
	Main aquifer lithologies	The dominant rock unit group is the Dinantian Upper Impure Limestones. In the NW of the GWB, karstified Dinantian Pure Unbedded Limestones are encountered.		
	Key structures	The rocks within the GWB are in the core of a ENE-WSW oriented major syncline. Strata are tilted at about 20-45°, with dip directions generally pointing inwards at right angles to the ENE-WSW fold axis orientation. There may be smaller, parasitic folds on the larger structure. Faults oriented NE-SW and NW-SW cross-cut the fold. These are mapped particularly in the west, but probably occur over the whole GWB. Fractures may be more open on the fold axes, and will be more numerous around the faults.		
	Key properties	Transmissivity in the Upper Impure Limestones will be in the range 5-20 m ² /d, with water table gradients of 0.005-0.01 in this low-lying area. In the Pure Unbedded Limestones, transmissivities will range from 2-2000 m ² /d; this aquifer is very heterogeneous and very high and low transmissivity zones can lie immediately adjacent to each other. Gradients in this aquifer will be low (<0.01). Specific yield in both aquifers is low.		
	Thickness	In the Upper Impure Limestone aquifer, flow is likely to be concentrated in a thin zone at the top of the rock. The weathered zone is on the order of a few metres, with a zone of well-fractured bedrock below this extending to about 15 m, and a final zone of poorly-fractured bedrock up to 60 m thick where significant inflows can sometimes be encountered. Within the pure unbedded limestones, an epikarst layer of a few metres thick at the top of the rock overlies karstified limestones in which flow takes place in conduits to about 30 m depth.		
Overlying Strata	Lithologies	<i>[Information to be added at a later date]</i>		
	Thickness	Depths to bedrock range between 2 m and 10 m. Existing data indicate that subsoil thickness is typically less than 4 m. Outcropping rock occurs in small areas that are scattered across the western 2/3 of the GWB.		
	% area aquifer near surface	<i>[Information to be added at a later date]</i>		
	Vulnerability	<i>[Information to be added at a later date]</i>		
Recharge	Main recharge mechanisms	Diffuse recharge will occur over the entire groundwater body via rainfall soaking through the subsoil. Where the water table is close to the surface, potential recharge may be rejected.		
	Est. recharge rates	<i>[Information to be added at a later date]</i>		
Discharge	Springs and large known abstractions (m ³ /d)	Patrickswell GWS (141 m ³ /d), Linen's Spring (?GWS) (unknown). <i>[More information to be added at a later date]</i>		
	Main discharge mechanisms	Groundwater discharges to streams and rivers crossing the GWB, and to the springs. Springs occur within the Upper Impure Limestone, and at the junction between the Pure Unbedded Limestones and Upper Impure Limestones.		
	Hydrochemical Signature	There are no data currently available for this GWB. By analogy with other GWBs, the upper impure limestone aquifers that form the bulk of the GWB have a calcium-bicarbonate signature, are hard (280-360 mg/l CaCO ₃) and alkaline (240-290 mg/l CaCO ₃), with high conductivities (630-660 µS/cm). Both iron and manganese can exceed allowable concentrations, with these components coming from the shales. The hydrochemistry of the Waulsortian limestone aquifer near Croom, 19 km southeast of Askeaton, shows a very hard (370-400 mg/l CaCO ₃), calcium-bicarbonate type water with high alkalinity (330-350 mg/l CaCO ₃). Background chloride concentrations will be higher than in the Midlands, due to proximity to the sea.		

Groundwater Flow Paths	<p>These rocks are devoid of intergranular permeability; groundwater flow occurs in faults, fractures and joints in the Ll aquifer, and along solutionally-enlarged fractures and cavities in the Rk^c aquifer. Over most of the GWB, flows in the aquifer are likely to be concentrated in a thin zone at the top of the rock; the weathered zone may be up to 3 m thick, with a connected fractured zone a further 10-15 m, below which is a generally poorly fractured zone. Within the karstified limestones, groundwater will flow from the epikarstic zone into a network of conduits.</p> <p>The aquifers are unconfined, and the water table is generally shallow. Water levels range between 0-10 mbgl, with most <3 mbgl; The groundwater lies in the subsoil or just below the base of the subsoil. Springs are noted in the GWB, particularly in the west. Groundwater flow is influenced by topography and most flow is of a local nature. Groundwater flow is also influenced by the contrast between the impure and karstified pure limestones in transmissivities. Groundwater flowing within the karstified limestones appears to be forced to the surface as springs at the contact between the two rock units. Groundwater flow paths are short (30-300 m), with groundwater discharging to the streams. Overall, groundwater flow directions within the GWB are to the larger rivers (e.g., Maigue, Greanagh, Barnakyle).</p>
Groundwater & Surface water interactions	<p>Groundwater discharges to the springs, and to the rivers and streams crossing the aquifers which are gaining. Due to the due shallow nature of the groundwater flow in this GWB and the shallow water table, groundwaters and surface waters are closely linked. In the karstified pure limestones, surface water can reach the water table very rapidly.</p>
Conceptual model	<ul style="list-style-type: none"> • The groundwater body is thin with an irregular outline, and is elongated ENE-WSW. It is bounded to the east, west and northwest by topographic highs that are catchment divides, and to the north and south by the contacts with the Askeaton and Fedamore GWBs respectively. The ground is flat-lying. • The groundwater body is composed primarily of low transmissivity rocks, although localised zones of enhanced permeability do occur along faults. Groundwater in this aquifer flows along fractures, joints and major faults. In the northwest corner of the GWB, the pure limestones are extremely karstified, with very high permeability pathways developed in discrete zones. Both aquifer types have low specific yields. • Recharge occurs diffusely through the subsoils and via outcrops. Point recharge may occur in the karstified limestones. Potential recharge may be rejected where the water table is at the surface. • The aquifers within this GWB are unconfined. The water table is generally from 0-3 m below ground level and follows topography. Most flow in this GWB will occur near the surface. The effective thickness of the upper impure limestone aquifer is likely to be about 10-15 m, comprising a weathered zone of a few metres and a connected fractured zone below this. The effective thickness of the karstified limestones is approximately 30 m. Flow path lengths are relatively short, and in general are between 30 and 300 m. Local flow directions are controlled by local topography. Overall, groundwater flow directions are to the larger rivers. • Groundwater discharges to the rivers and streams crossing the aquifer, and to the springs and seeps. The locations of the springs are controlled by topography (i.e., places where the water table intersects the ground surface) and also by the contrast between karstified pure limestone and fractured impure limestone transmissivities. • Due to the due shallow nature of the groundwater flow in this GWB and the shallow water table, groundwaters and surface waters are closely linked. The karst conduits provide rapid pathways for surface water to reach the water table, or for groundwater to reach the surface.
Attachments	None.
Instrumentation	Stream gauges: 24009.
Information Sources	Deakin, J., Daly, D. and Coxon, C. (1998) <i>County Limerick Groundwater Protection Scheme</i> . Geological Survey of Ireland Report to Limerick Co. Co., 72 pp. Aquifer chapters: Dinantian Upper Impure Limestones, Dinantian Pure Unbedded Limestones.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae



Rock units in GWB

Rock unit name and code	Description	Rock unit group
Rathkeale Formation (RK)		Dinantian Upper Impure Limestone
Undifferentiated Viséan Limestones (VIS)		Dinantian Upper Impure Limestone (*within this GWB)
Waulsortian Limestones (WA).		Dinantian Pure Unbedded Limestones