Clonmel GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
16 – Suir S. Tipperary Co Co Kilkenny Co Co Waterford Co Co	Suir, Multeen, Fidaghta, Ara, Arglo, Clashawley, Outeragh Stream, Ballintemple Stream, Anner, Moyle, Thonoge, Tar, Burncourt, Shanbally, Duag, Glengalla, Glenboy, Lingaun, Blackwater (Kilmacow), Glasha (Waterford), Clodiagh (Portlaw)	Tibberaghny Marshes, Fiddown Island, Lower River Suir (Coolfinn, Portlaw), Lough Cullin, Kilsheelin Lake, River Suir Below Carrick-on-Suir, Marlfield Lake, Cahir Park Woodland, Mitchelstown Caves, Lizzy Smyth's Bog Rockwell College Lake	973

Topography	This groundwater body represents an area of low elevation surrounded on nearly all sides by higher mountains. To the east there is the peak of Slievenamon, to the southeast there are the Comeragh Mountains and to the southwest there are the Knockmealdown Mountains. In the east lie the Galty Mountains and Slievenamuck. To the northeast of Cashel lies Kill Hill and to the far northeast the southern extremities of the Slievefelim Mountains. The groundwater body itself is contained within the low-lying broad valley of the River Suir.	
Geology and Aquifers	Aquifer type(s)	**Rk**: Regionally Important Karstified Aquifer Some areas of aquitard have been included to avoid unjustifiable subdivision of groundwater bodies.
	Main aquifer lithologies	KS - Kilsheelan Fm – Limestone, occasionally cherty. RR - Rathronan Fm - Pale-grey massive fine grained pure limestone SU – Suir Limestone Fm - Pale cross-bedded oolitic limestone WA – Waulsortian Limestones – Massive unbedded limestone BM – Ballyadams Fm - Fossiliferous pure limestone CL - Clogrenan Fm - Cherty muddy coarse grained limestone
	Key structures.	The limestones in the southern area are extensively faulted and folded. Daly (2001) draws an analogy between the Dinantian limestones of the Carrick-on-Suir succession and the South Cork limestones. According to Wright (1979) such synclines may be treated for the most part as being one aquifer as the lithology appears to be of a lesser importance than the faulting.
	Key properties	Transmissivity values for the Carrick-on-Suir Syncline limestones are given as 100-2000m^2/d. To the north it is more representative to consider a range of 1-500 m^2/d, assigned to the Ballyadams Limestone.
	Thickness	Optimum well yields from the Dinantian limestones will be obtained from boreholes drilled into one of the major fault zones and penetrating at least 50-100 m of the aquifer.
Overlying Strata	Lithologies	The overlying subsoil over the Carrick-on-Suir syncline is mostly limestone-derived till. To the north of this there is a greater proportion of Limestone Gravel deposits, typically as 'islands' in a 'sea' of till which contains some gravel.
	Thickness	The subsoil thickness is low to the north (0-3m) but increases in thickness to the south to depths of over 10m.
	% area aquifer near surface	There appears to be a large number of outcrops over all areas of the groundwater body.
	Vulnerability	The area is mostly EXTREME to HIGH vulnerability. There are areas of LOW vulnerability in the southern syncline.
Recharge	Main recharge mechanisms	Most recharge to the aquifers in the north takes place through the Quaternary deposits of limestone gravel as described above. The Ballyadams Formation also receives recharge from runoff from the Namurian hills through the swallow holes at its margins, as well as direct recharge through the subsoil. The synclinal limestones to the south will undoubtedly receive indirect recharge from the north and south from the Lower Palaeozoic mountains.
	Est. recharge rates	*[Recharge estimates will be added at a later date]*
Discharge	Springs and large known abstractions (m^3/d)	Synone (280), Springmount (1820), Fawnagowan (3023), Mullenbawn (2290), Ballyporeen, Poulatar, Poulalee, Ardfinnan.
	Main discharge mechanisms	Most of the groundwater moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers.
	Hydrochemical Signature	Limestone dissolution is the principal hydrochemical process in the strata of this area. The bedrock strata of this aquifer are **Calcareous**. The waters are hard and have a high electrical conductivity.
Groundwater Flow Paths		Most of the groundwater moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers. Hydraulic gradients in the Waulsortian Limestone are typically low (0.003 – 0.007). Flow in the karstified systems tends to be conduit flow along the fault zones. There are considerable variations in the hydrogeological conditions in this aquifer unit, owing to the wide range in elevation of the outcrop areas and its karstic nature.

Groundwater and surface water interactions	The Ballyadams Formation is very susceptible to karstification, which is accentuated along structural features such as fold axes and faults and can result in very high permeability and throughput in relatively narrow zones. Some of the rivers have relatively high specific base flows.

Conceptual model

This groundwater body is defined by the extent of the limestone aquifers in the Suir catchment.
There are two distinct hydrogeological settings within this one groundwater body. To the south we find the limestones of the Carrick-on-Suir Syncline folded and faulted. The permeability of this aquifer and the way in which water flows though it are defined by the structural features as opposed to the lithology.
To the north there is less structural deformation but the aquifer lithology of pure limestones allows for the development of secondary permeability features of a karstic nature.
Conditions in the main limestone aquifers are predominantly unconfined, as the water table is generally less than 10m from the surface. The annual water table fluctuation is probably less than 5m in the better aquifers. There are considerable variations in the hydrogeological conditions in this aquifer unit to the north, owing to the wide range in elevation of the outcrop areas and its karstic nature. For example, in the upper part of the Ballyadams in the unsaturated zone there is a high degree of karstification, which will enhance the permeability of the formation. The middle part of the Ballyadams contains thin clay layers (wayboards), and outcrops on sloping ground, which limits the area exposed at surface. This will restrict groundwater circulation, and therefore the vertical development of permeability, to fairly small areas. Secondary permeability within the limestones has developed horizontally due to the presence of the clay wayboards. The extent of this horizontal development varies from 10-30m. The lower part of the formation is quite thick and a wide section of the aquifer is open to the surface and available for recharge. Solution processes are unhindered, and large groundwater circulation systems can develop, resulting in high permeability zones being formed.

Attachments	
Instrumentation	Stream gauge:16053, 16006, 16104, 16047, 16116, 16106, 16049, 16120, 16032, 16048, 16121, 16034, 16022, 16050, 16021, *16010*, 16027, *16012*, 16109, *16016*, 16031, *16009*, 16114, 16023, Borehole Hydrograph: none EPA Representative Monitoring boreholes: Springmount Hse. (spring) (#45- S006394), Cordangan (21) & Tipperary WS (26) (R904341), Laffansbridge (borehole) (#30- S191466), Coolmore Stud (Guiry's) (bore) (#25- S229400), Coolmore Stud (Heneghan) (bore) (#84- S203383), Prospect Henehans (Private) (#33- S203383), Coolmore Delahunty (Bore) (#37 - S218376), Prospect Stud (#32- S170355), Mullenbawn (Fethard RWSS)(spring) (#50- S244344), Kiltinin Castle (Spring)(#29- S231319), Kedrah (#06- S068278), Poulatar (spring) (#44 - S080140), Poulalee (spring)(#43- S080140), Crohan (spring) (#38- S108130), Kilsheelan A (#41- S290260),
Information Sources	Daly, D., Keegan, M., & Wright, G., (2001) Co. Tipperary (South Riding) Groundwater Protection Scheme. Wright, G.R. (1979) Groundwater in the South Munster Synclines. In *Hydrogeology in Ireland*, Irish National Committee of I.H.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