

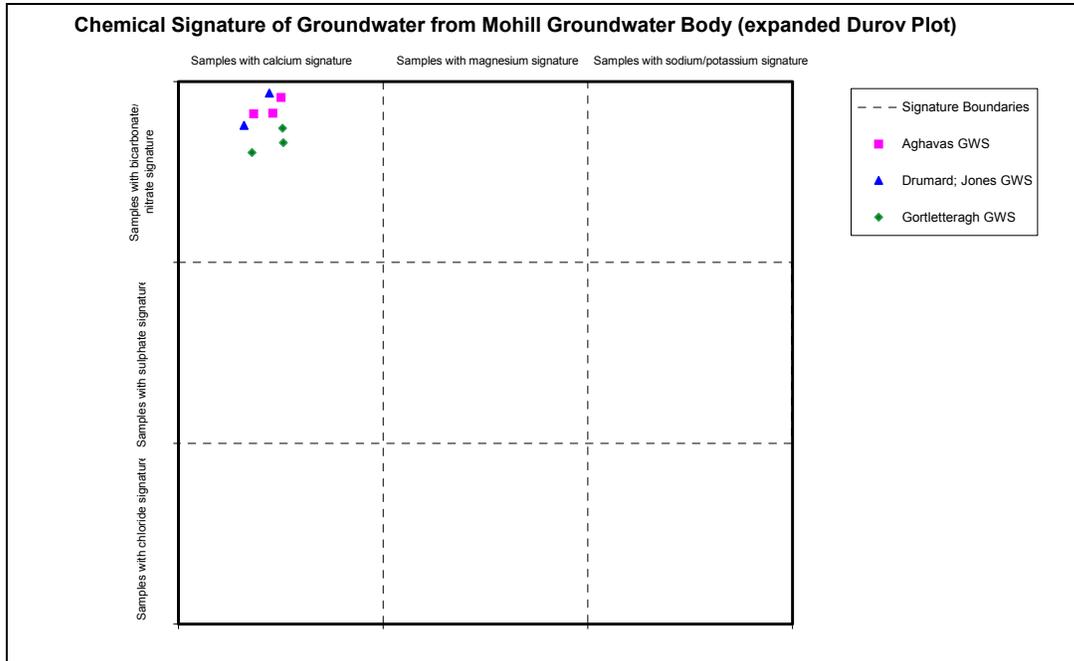
Mohill Groundwater Body: Summary of Initial Characterisation.

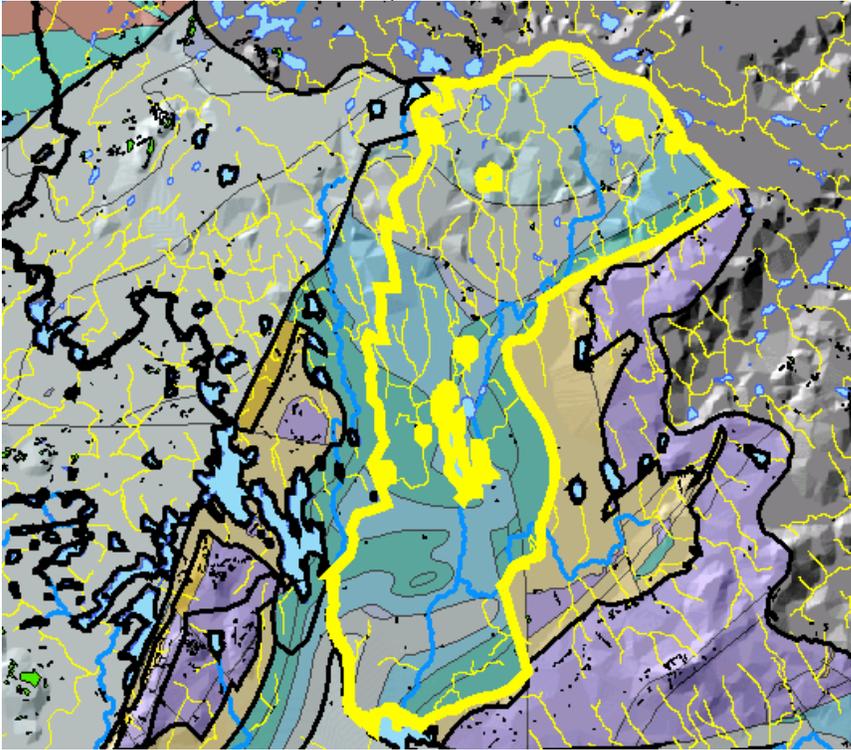
Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
26 – Camlin/Rinn Leitrim & Longford Co. Co's	Rivers: Relagh, Cloone (LoughRinn), Black, Rinn, Errew. Streams: Arderry. Loughs: Drumroosk, Little, Donogher, Seltan, Black, Fort, Agueeneen, Cam, Cloone, Adoon, Naman, Killylea, Annaghmacconway, Curraun, Annaghmacullen, Creenagh, Sallagh, Drumard, Roosky, Errew, Rinn, Clooncoe, Forbes.	(001420) Corracramph Bog; (001405) Cashel Bog; (001405) Rinn River; (00422) Aghnamona Bog; (001423) Cloonageeher Bog; (001808) Lough Sallagh; (001417) Lough Rinn; (001807) Lough Errew; (001642) Lough Boderg and Lough Bofin; (00424) Clooncoe Wood and Lough; (00445) Clooneen Bog; (001818) Lough Forbes Complex.	180
Topography	This groundwater body lies to the east of the River Shannon. In the south of the body the ground is mainly low lying and relatively flat with ground elevations of 40-50 mAOD, lowest in the vicinity of the River Shannon and the River Rinn. Ground elevations rise towards the north of the groundwater body where the topography is dominated by drumlins. The tops of these small hills typical rise to 70-90 mAOD. The highest point in the body is 120 mAOD at the top of a drumlin in the extreme north of the body. Numerous small lakes occur within the body as well as the larger Lough Rinn in the centre of the body. The Cloone River flows south through the body to Lough Rinn. The River Rinn flows south from Lough Rinn towards Lough Forbes and the River Shannon. The River Shannon forms part of the southwestern boundary of the body.		
Geology and Aquifers	Aquifer categories	The main aquifer category is: Ll: Locally important aquifer which is moderately productive only in local zones There is one tiny area (0.07 km ²) with an aquifer category of Lm: Locally important aquifer which is generally moderately productive And in the north of the body there is a small area (5.3 km ²) with an aquifer category of Rkc: Regionally important karstified aquifer dominated by conduit flow	
	Main aquifer lithologies	The main aquifer lithologies are Dinantian (early) Sandstones, Shales and Limestones, Dinantian Lower Impure Limestones, Dinantian Upper Impure Limestones, Dinantian Pure Unbedded Limestones and Dinantian Shales and Limestones. There is a tiny area of Dinantian Sandstones (0.07 km ²) in the north of the body and a small area of Dinantian Pure Bedded Limestones (5.3 km ²) in the extreme north of the body. These are included in this GWB as they are too small to be separated out as individual GWBs.	
	Key structures	This groundwater body occurs to the east of the northeast trending anticline that is the Strokestown Inlier. There are number of faults mapped in the east of the body some of which offset the Dinantian (early) Sandstones, Shales and Limestones against the Dinantian Sandstones of the Annaghmore/Fearnaght GWB. The body is separated from the Ordovician Metasediments of the Longford/Ballinalee GWB by a thin layer of Dinantian Sandstones which unconformably overly the Ordovician rocks	
	Key properties	No data on hydrogeological properties specific to this groundwater body are available. 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. Dinantian (early) Sandstones, Shales and Limestones aquifer properties are expected to have similarly low permeabilities however more frequent areas of enhanced permeability could be encountered in the Meath Formation (ME), a limestone which is generally described as having a lower shale content than other Dinantian (early) Sandstones, Shales and Limestones. Transmissivities in Dinantian Pure Bedded Limestones can be over 100 m ² /d.	
	Thickness	In the low permeability rocks which make up this groundwater body most of the groundwater flow is expected to be within 15 m of the top of the rock, comprising a weathered zone of a few metres and a zone of interconnected fissures below this of about 10 m thick. Deeper flow can occur in areas that have undergone a high degree of structural deformation and faulting, where the resulting fissures have remained open. The small area of pure limestone in the north of the body (Dartry Limestone and Ballymore Limestone Formation) has the potential to develop fissure permeability to a greater depth given the pure nature of the limestone and its consequent susceptibility to karstification.	
Overlying Strata	Lithologies	The Teagasc Parent Material Map was not available for County Leitrim at time of writing. In the south of the body in County Longford (for which a map of subsoil lithologies is available) there are large areas of cut peat interspersed with glacial till. In the north of the body drumlins are common. <i>[More information to be added at a later date]</i>	
	Thickness	There are some small infrequent areas of rock outcrop within the body. Two depth to bedrock data points of 6 m and 9 m are recorded. <i>[More information to be added at a later date]</i>	
	% area aquifer near surface	<i>[More information to be added at a later date]</i>	
	Vulnerability	There are no Groundwater Vulnerability Maps currently available for Counties Longford or Leitrim. It is probable that there are a few areas of Extreme Vulnerability present; however, categorizing areas of High, Moderate and Low is not possible. <i>[More information to be added at a later date]</i>	

Recharge	Main recharge mechanisms	Diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Percolation of recharge will be restricted in parts of the body due to the extensive covering of peat and the typically associated underlying lacustrine clay or clayey till. Subsoil permeability has not currently been mapped in detail in County Longford or County Leitrim but the sub peat subsoil would be expected to be of 'low' permeability. <i>Note: Subsoil permeability has not currently been mapped in detail in County Longford or County Leitrim.</i> <i>[Information to be added at a later date]</i>
	Est. recharge rates	<i>[Information to be added at a later date]</i>
Discharge	Large springs and high yielding wells (m ³ /d)	There are no major abstractions or large springs currently recorded in this groundwater body. A number of small group schemes with yields of > 100 m ³ /d are listed in the GSI database. Drumard Group Scheme (109m ³ /d); Drumdiffer Group Scheme (109m ³ /d) – GSI Well Database <i>[More information to be added at a later date]</i>
	Main discharge mechanisms	The main discharges will be local, to the main rivers and their tributaries crossing the groundwater body, and to Lough Forbes in the southwest.
	Hydrochemical Signature	There are four EPA Representative Monitoring Points in this groundwater body. Groundwater from this body has a calcium-bicarbonate signature. Hardness, alkalinity and electrical conductivities vary between the different rock unit group aquifers, however. In the Dinantian (early) Sandstones, Limestones and Shales and the Lower Impure Limestones, groundwaters are Hard to Very Hard (typically ranging between 380–450 mg/l), and high electrical conductivities (650–800 µS/cm) are often observed. Alkalinity is also high, but less than hardness (250-370 mg/l as CaCO ₃). Within 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 often reach unacceptable levels. These components come from the muddy parts of these rock units and reflect both the characteristics of the rock-forming materials and the relatively slow speed of groundwater movement through the fractures in the rock allowing low dissolved oxygen conditions to develop. The hydrochemical signature of groundwater from several wells in this GWB is demonstrated in an expanded Durov plot in Figure 2 below.
Groundwater Flow Paths	These rocks are devoid of intergranular permeability; groundwater flow occurs in fractures and faults. Permeability is highest in the upper few metres of bedrock, but decreases rapidly with depth. In general groundwater flow is concentrated in the upper 15 m of the aquifer. Local zones of high permeability can be encountered near fault zones and in areas of intensive fracturing. Groundwater flow in this body will be of a local nature. Groundwater flow paths are generally short, with groundwater discharging to small springs, or to the streams and rivers that traverse the aquifer. Flow directions are expected to approximately follow the local surface water catchments. Overall, groundwater flow is towards the Cloone and Rinn Rivers in the centre of the body and towards the River Shannon and Lough Forbes in the south and southwest of the body. In general groundwater is unconfined in this groundwater body. Dinantian Pure Unbedded Limestones, which occur in a small area (5.3 km ²) in the extreme north of the body, are susceptible to karstification. Groundwater will flow in fissures and joints which can be enlarged by solution to form conduits. Flow velocities can be rapid and variable and flow paths can be unpredictable, often determined by discrete conduits.	
Groundwater & Surface water interactions	Groundwater and surface water interactions require special attention where terrestrial ecosystems are dependant on a sustainable balance between the two. A number of fens, bogs and lakes are recorded in this groundwater body which may have varying dependence on groundwater.	

Conceptual model	<ul style="list-style-type: none"> • The body is bounded in the north and west by topographic highs and groundwater divides that coincide with surface water catchment boundaries. In the south and east the body is bounded by contact with the Dinantian Sandstones of the Annaghmore GWB. The River Shannon forms part of the southwestern boundary of the body. • The Rivers Cloone and Rinn flow southwards through the centre of the body. The terrain in the south of the body is mainly low lying and relatively flat. Ground elevations rise towards the north of the groundwater body where the topography is dominated by drumlins • This groundwater body is composed primarily of low permeability rocks, although localised zones of enhanced permeability can occur along faults and in the vicinity of fault zones. Groundwater flows along fractures joints and major faults. • Recharge occurs diffusely over the entire GWB via rainfall percolating through the subsoil. Percolation of recharge can be restricted due to the extensive covering of peat and the typically associated underlying lacustrine clay or clayey till. • In general groundwater is unconfined in this groundwater body. Most groundwater flow will occur within the top 15 m of the bedrock, comprising a weathered zone of a few metres and a connected fractured zone below this. Deep-water strikes in more isolated faults/fractures can be encountered. Groundwater flow in this body will be of a local nature. Groundwater flow paths will generally be short. • A small area (5.3 km²) of Dinantian Pure Bedded Limestones occurs in the extreme north of the body included in this GWB as it is too small to comprise a separate GWB. Groundwater flow characteristics within this area will be those of a karstified aquifer. • Groundwater will discharge to the streams and rivers crossing the body and to the River Shannon in the southwest. Overall, groundwater flow is towards the Cloone and Rinn Rivers in the centre of the body and towards the River Shannon and Lough Forbes in the south and southwest of the body. • A number of fens, bogs and lakes are recorded in this groundwater body which have varying dependence on groundwater.
Attachments	Hydrochemical signature (Figure 1).
Instrumentation	Stream gauges: 26008 Rinn, Johnston's Bridge; 26009 Black, Bellantra Bridge; 26010 Cloone, Riverstown; 26042 Stream, Mohill; 26131 Rinn, Derryinch; 26159 Lurge (Rinn), Rynn House; 26242 Cloone, Aughnagleas; 26255 Stream, Cornulla. EPA Water Level Monitoring boreholes: None EPA Representative Monitoring points: Aghavas GWS (LEI 2), Drumard Jones (LEI 17), Gortletteragh GWS (LEI 24), M. Griffin (LEI 68).
Information Sources	Morris J.H., Somerville I.D. and MacDermot C.V. (2002). <i>Geology of Longford-Roscommon</i> . A Geological Description to Accompany the Bedrock Geology 1:100,000 Bedrock Series Sheet 12. With contributions by D.G. Smith, M. Geraghty, B. McConnell, K. Carlingbold, W. Cox, D. Daly. Geological Survey of Ireland, 121pp. (Publication pending). MacDermot, C.V. Long C.B. and Harney S.J (1996) <i>Geology of Sligo-Leitrim: A geological description of Sligo, Leitrim and adjoining parts of Cavan, Fermanagh, Mayo and Roscommon, to accompany bedrock geology 1:100,000 scale map, Sheet 7, Sligo - Leitrim</i> . With contributions from K. Carlingbold, G. Stanley, D. Daly and R. Meehan. Geological Survey of Ireland, 100pp. Aquifer Chapters: Dinantian (early) Sandstones, Shales and Limestones; Dinantian Upper Impure Limestones; Dinantian Lower Impure Limestones; Dinantian Pure Unbedded Limestones; Dinantian Pure Bedded 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

**Figure 1: Hydrochemical signature
(EPA Representative Monitoring)**



Mohill GWB (For Reference)**List of Rock units in Mohill Groundwater Body**

Rock unit name and code	Description	Rock unit group
Argillaceous Limestone (AL)	Dark limestone & shale, chert	Dinantian Upper Impure Limestone
Dartry Limestone Formation (DA)	Dark fine-grained cherty limestone	Dinantian Pure Bedded Limestone
Dartry Limestone Formation & Crinoidal Limestone	Dinantian (early) Sandstones, Shales and Limestones	Dinantian Pure Bedded Limestone
Ballymore Limestone Formation (BA)	Dark fine-grained limestone & shale	Dinantian Pure Bedded Limestones
Waulsortian Limestone (WA)	Massive unbedded lime mudstone	Dinantian Pure Unbedded Limestone
Ballysteen Formation (BA)	Dark muddy limestone, shale	Dinantian Lower Impure Limestone
Moathill Formation (MH)	Limestone, calcareous sandstone, shale	Dinantian (early) Sandstones, Shales and Limestones
Meath Formation (ME)	Limestone, calcareous sandstone	Dinantian (early) Sandstones, Shales and Limestones
Navan Beds (NAV)	Dark limestone, mudstone, sandstone	Dinantian (early) Sandstones, Shales and Limestones
Fearnaght Formation (FT)	Pale conglomerate & red sandstone	Dinantian Sandstones
Drumgesh Shale Formation (DH)	Dark shale, fine-grained limestone	Dinantian Shales and Limestones
Ulster Canal Formation (UC)	Calcareous sandstone, shale, micrite	Dinantian (early) Sandstones, Shales and Limestones
Cooldaragh Formation (CH)	Pale brown-grey flaggy, silty mudstone	Dinantian (early) Sandstones, Shales and Limestones