Ballintogher GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
35 Leitrim / Sligo Co. Co.	River: Bonet, Skoanda, Owenmore, Killanummery. Lakes: Lee, Killaleen, Anarry, Carrigeencor.	None	20

Topography	The GWB occupies a relatively narrow rectangular area orientated NE-SW, stretching from Ballintogher to Manorhamilton. It thins considerably, from approximately 2 m wide at its western end to just over 200 m wide at its northeastern end. It is a continuation of the Ballygawley GWB. The land surface is low-lying, with elevations ranging from 20-60 mAOD, sloping from either end toward the centre. It is bounded to the west and east by topographic divides. It is bounded to the north and south by the poor aquifers of the Dromahair and Killarga GWB's. The rivers and streams in the western half of the GWB flow northeasterly parallel to the long axis of the GWB toward Dromahair where they turn north toward Lough Gill. Streams in the northeastern area flow southwest toward Dromahair and then north to Lough Gill. The location and boundaries are given in Figure 1.	
Geology and Aquifers	**Aquifer categories**	**Rk^c:** Regionally important karstified aquifer dominated by conduit flow. The 'c' signifies conduit flow.
	Main aquifer lithologies	Dinantian Pure Bedded Limestones dominate the GWB, with the Dargan, Oakport and Ballyshannon Limestones comprising the rock units.
	Key structures	The overall structural trend is NE-SW, with the beds dipping 2-15^o to the SE. Faults trending NW-SE cross cut the GWB.
	Key properties	Only one swallow hole and one cave are recorded. Transmissivities are expected to be variable, ranging from 1 to greater than 2000 m^2/d. Storativity is likely to be low - approximately 0.01-0.02. Annual water level fluctuations are approximately 2 m at Cloonlougher, as shown in Figure 2. There are no data to calculate groundwater velocities, but these are expected to range from 10-100m/hr. Flow directions are generally toward the river Bonet under hydraulic gradients that are expected to be greater than 0.0005.
	Thickness	Most groundwater flow is expected to be in an epikarstic layer a couple of metres thick and in a zone of interconnected solutionally-enlarged fissures and conduits that extends approximately 30 m below this. Deeper inflows can occur in areas associated with faults or dolomitisation.
Overlying Strata	**Lithologies**	There are few subsoil data available for the southwestern most tip of the GWB where till is the dominant subsoil type.
	Thickness	There are no depth to bedrock data available.
	% 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**	Both point and diffuse recharge occur in this GWB. Diffuse recharge occurs over the GWB via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of a swallow hole.
	Est. recharge rates	*[Information to be added at a later date]*
Discharge	**Large springs and high yielding wells (m^3/d)**	None identified
	Main discharge mechanisms	The main discharges are to the small springs, streams and rivers.
	Hydrochemical Signature	There are no data available, though it is expected to have a $CaHCO_3$ signature. Alkalinity, electrical conductivity and hardness are expected to be high.

Groundwater Flow Paths	These rocks are generally devoid of intergranular permeability. Groundwater flows through fissures, faults, joints and bedding planes. In pure bedded limestones these openings are enlarged by karstification which significantly enhances the permeability of the rock. Karstification can be accentuated along structural features such as fold axes and faults. Groundwater flow through karst areas is extremely complex and difficult to predict. As flow pathways are often determined by discrete conduits, actual flow directions will not necessarily be perpendicular to the assumed water table contours. Groundwater can flow across surface water catchment divides and beneath surface water channels. Flow velocities can be rapid and variable, both spatially and temporally. Overall groundwater flow will be towards the rivers and lakes, but the karstified nature of the bedrock means that locally, groundwater flow directions can be highly variable. Groundwater may be confined locally.
Groundwater & Surface water interactions	Generally, there is a high degree of interconnection between groundwater and surface water in karstified limestone areas. The karst features represent the close interaction between surface water and groundwater. The stream density is relatively high, which is due to the relatively low permeability subsoils. Any contamination of surface water is rapidly transported into the groundwater system, and vice versa.

Conceptual model	• The GWB occupies a relatively narrow rectangular area orientated NE-SW, stretching from Ballintogher to Manorhamilton. The land surface is low-lying, with elevations ranging from 20-60 mAOD. • It is bounded to the west and east by topographic divides. It is bounded to the north and south by the poor aquifers of the Dromahair and Kilarga GWB's. • The aquifer is a Regionally important karstified aquifer (**Rk^{c}**). • Only one swallow hole and one cave recorded, but is considered to represent only a fraction of existing features. • Transmissivities are expected to be variable, ranging from 1 to greater than 2000 m^2/d. Storativity is expected to be in the range of 1-2%. • Most groundwater flux is likely to be in the upper part of the aquifer. • Till is the dominant subsoil type. • Recharge occurs via point and diffuse mechanisms. Point recharge to the underlying aquifer occurs by means of swallow holes. • The main discharges are to the small springs, streams and rivers. • The groundwater is expected to have a calcium bicarbonate signature. • There is a high degree of interconnection between groundwater and surface water.
Attachments	Figure 1 and 2.
Instrumentation	**Stream gauges:** 35011, 35043. **EPA Water Level Monitoring boreholes:** (LEI 063). **EPA Representative Monitoring points:** None
Information Sources	MacDermot, C.V. Long C.B. and Harney S.J (1996) *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*. Geological Survey of Ireland, 100pp.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.

Table 1. List of Rock Units in GWB

StratCode	UnitName	Description	Aquifer Class
BS	Ballyshannon Limestone Formation	Pale grey calcarenite limestone	Rkc
DG	Dargan Limestone	Bioclastic limestone, sandy & oolitic	Rkc
OK	Oakport Limestone Formation	Pale grey massive limestone	Rkc

Figure 1 Location and Boundaries of GWB

Figure 2