Newport Bay GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
30 Mayo and Galway Co. Co's.	**Rivers**: Moyour, Owennabrockagh, Rossow, Carrowsallagh, Carrowbeg. **Lakes**: Clogher, Doo, Ballin, Coolbarren, Gorteen, Broad, Cravey's, Carrowbeg, Cross.		75

Topography	The GWB occupies the area between Newport, Westport and Castlebar. The land surface is characterised by a drumlinoid landscape. The drumlins are often are longer than 3 km and less than 500 m wide. The trend of the drumlins is curved, running W-E and then S-N (Morris, *et al*, 1995). The GWB is relatively low-lying, with elevations ranging from 10-70 mAOD, sloping to the west. The GWB is bounded by the coastline to the west. To the east and south it is bounded by the Clifden-Castlebar GWB. To the north it is bounded by the Beltra Lough GWB.	
Geology and Aquifers	**Aquifer categories**	**Rk^c**: Regionally important karstified aquifer dominated by conduit flow. The 'c' signifies conduit flow.
	Main aquifer lithologies	This GWB is composed of Dinantian Pure Bedded Limestones.
	Key structures	Four major faults trending roughly E-W cross the GWB. The beds are dipping 2-15^o to the SW.
	Key properties	There are no data available. It is likely that the drumlin field masks the karst. There are no hydrogeological data to substantiate the classification, apart from lithology. Transmissivities are expected to range from 1 m^2/d to greater than 250 m^2/d. Storativity is likely to be low - approximately 0.01-0.02 (Daly, 1985). There are no data to calculate groundwater velocities, but these are expected to range from 10-100m/hr. Flow directions are likely to be from east to west under hydraulic gradients that are expected to be greater than 0.0005.
	Thickness	Most groundwater flow is likely 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.
Overlying Strata	**Lithologies**	Till is the dominant subsoil type, covering approximately 85% of the GWB. Bedrock at surface only accounts for 0.02% of the area. The presence of blanket peat/cutover peat is unexpected over the karstified limestone. It may be due to the presence of low permeability till. A full breakdown of the subsoil lithology is given in Table 1.
	Thickness	There are no subsoil thickness data. However, the thicknesses in interdrumlin areas are expected to be less than the thickness of the drumlins, which are up to 30m high.
	% 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**	There have been no hydrogeological studies on the area. The stream density is relatively high. Diffuse recharge occurs via rainfall percolating through permeable subsoil. However, the presence of peat indicates that low permeability till is present. There is no evidence that point recharge occurs though there may be unmapped karst features which allow recharge to the underlying aquifer.
	Est. recharge rates	*[Information to be added at a later date]*
Discharge	**Large springs and large known abstractions (m^3/d)**	No large springs nor good wells identified.
	Main discharge mechanisms	The main discharges are to the streams and rivers.
	Hydrochemical Signature	There are no data, however, the groundwater is expected to have a calcium bicarbonate signature, with high alkalinities and hardness (in the order of 300 and 350 mg/l $CaCO_3$). Electrical conductivity is also expected to be high, approximately 700 μS/cm.
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 coast, but the karstified nature of the bedrock means that locally, groundwater flow directions can be highly variable.

Groundwater & Surface water interactions	The area is principally drained by several rivers which originate to the west of the GWB. Generally, there is a high degree of interconnection between groundwater and surface water in karstified limestone areas. The stream density is relatively high, which is due to the relatively thick and possibly low permeability subsoils. Any contamination of surface water is rapidly transported into the groundwater system, and vice versa.
Conceptual model	• The GWB occupies the area between Newport, Westport and Castlebar. The land surface is characterised by a drumlinoid landscape, with elevations ranging from 10-70 mAOD, sloping to the west. • The GWB is bounded by the coastline to the west. To the east and south it is bounded by the Clifden-Castlebar GWB. To the north it is bounded by the Beltra Lough GWB. • The area is principally drained by several rivers that flow across the GWB to Clew Bay. • The GWB is composed primarily of karstified limestone (**Rk^{c}**), however there are no data to substantiate (apart from lithology) to the classification. Transmissivity is expected to be variable. Storativity is likely to be low. • Groundwater flows through a network of solutionally enlarged bedding planes, fissures and conduits. • Recharge occurs via diffuse and mechanisms. Point recharge may occur if there are karst features present. • Most of the groundwater flow occurs in the upper epikarstic layer and in a zone of interconnected solutionally enlarge bedding planes and fissures, generally extending to a depth of 30 m below ground. • In general, the degree of interconnection in karstic systems is high and they support regional scale flow systems. • The potential for contaminant attenuation in such aquifers is limited. • The main discharges are to the streams and rivers. • There is a high degree of interaction between surface water and groundwater. • The groundwater is expected to have a calcium bicarbonate signature.
Attachments	Table 1, 2 and Figure 1.
Instrumentation	**Stream gauges:** 32090, 32003 **EPA Water Level Monitoring boreholes:** none **EPA Representative Monitoring points:** none
Information Sources	Long, B., Mac Dermot, C.V., Morris, J.H., Sleeman, A.G., Tietzsch-Tyler, D., (1992). *A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 6, North Mayo.* Geological Survey of Ireland Map Series Report. Morris, J.H., Long, B., McConnell, B., Archer, J.B. (1995). *A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 10, Connemara.* Geological Survey of Ireland Map Series Report.
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 Rock units in GWB - All are Dinantian Pure Bedded Limestones:

Unit Name
Rockfleet Bay Limestone (RF)
Westport Oolite (AAwp)
Aille Limestone (AA)
Barney Limestone (AA)

Table 2 Subsoils in GWB

Parent Material	Code	% Area gwb
Alluvium undifferentiated	A	3.46
Alluvium undifferentiated Silty	Asi	1.40
cutover peat	Cut	5.81
Lake sediments undifferentiated	L	0.17
Lake sediments undifferentiated	Lake	0.22
Made ground	Made	3.09
Bedrock at surface	Rck	0.02
Sandstone till (Devonian)	TDCSs	1.36
Sandstone till (Devonian)	TDSs	22.19
Sandstone till (Lower Palaeozoic	TLPSs	1.17
Limestone till (Carboniferous)	TLs	59.09
Metamorphic till	TMp	2.03

Figure 1 Location and boundaries of GWB