Castlebridge A GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water bodies	Associated terrestrial ecosystems	Area (km^2)
12 – Slaney Wexford Co Co	Corbally Stream, Sow, Tinnokilla Stream, Slaney	Wexford Slobs and Harbour, Slaney River Valley, Screen Hills.	264

Topography		The topography in this are is quite variable. To the east in the area of the Screen Hills the landscape is dominated by hummocky hills and an erratic drainage pattern. To the west of this there is the River Sow catchment which is an isolated catchment within Hydrometric Area 12 which does not flow into the river south, but discharges into the north of Wexford Harbour. There are areas of higher elevations of about 70m OD separating the Sow from the Slaney and the Screen area. The River Sow appears to cut significantly steep narrow valleys about 20m deep south of Redgate. To the west there is the River Slaney catchment proper with its broad meanders dominating the topography. To the extreme southwest there is Forth Mountain which is the highest elevation in the groundwater body at 237m OD. Drainage from this area flows off the mountain towards Wexford Harbour in a number of small streams.
Geology and Aquifers	Aquifer type(s)	**Ll** : Moderately Productive only in local zones **PL**: Generally unproductive except for local zones. There are some small areas of limestone, which would represent a karstic aquifer but are so small they are not classified as such.
	Main aquifer lithologies	Cambrian Metasediments Devonian Old Red Sandstones Dinantian (early) Sandstones, Shales and Limestones Dinantian Lower Impure Limestones Dinantian Pure Bedded Limestones Granites & other Igneous Intrusive rocks Ordovician Metasediments
	Key structures.	The majority of this area is apparently free from major structural features except around the River Slaney where there is some intense faulting and also in the Cambrian rocks around Wexford Town.
	Key properties	There is no information available on the hydrogeological properties of this groundwater body. Estimated transmissivities can be considered to range 1 – 10m^2/d.
	Thickness	The effective thickness of this aquifer may only be about 15 to 30m.
Overlying Strata	Lithologies	There are a variety of subsoil types in this groundwater body. In the west is the Clogga Till, which is of inland origin and was deposited first among the subsoils. Above this to the east is the Macamore Marl which is of Irish Sea origin and was deposited as the Irish Sea glacier retreated. Finally on top of these to the extreme east are the Screen Gravels which are marine in origin and are considered as a separate groundwater body. There are also significant sand and gravel deposits along the course of the Slaney.
	Thickness	Thickness increases from <5m in the north to generally over 10m in the south especially over the Cambrian rocks, except for at the higher elevations of Forth Mountain. There is some speculation that the bedrock surface may not be a direct reflection of the surface topography and that underground valleys exist which are oriented in a different direction to the current surface water drainage pattern.
	% area aquifer near surface	*[Information will be added at a later date]*
	Vulnerability	*[Information will be added at a later date]*
Recharge	Main recharge mechanisms	Most recharge is likely to occur in the sandier parts of the Clogga Till to the west. The Macamore Marl seals the bedrock from direct recharge over most of the body. Over the area of the Screen Gravels there is likely to be limited recharge to the bedrock because the Macamore Marl underlies much of these deposits. Recharge may also enter the body from the fractured aquifers to the north via water flowing south in fractures that cross both groundwater bodies. It is likely there is also some recharge on Forth Mountain where the subsoil thickness is lower at high elevations.
	Est. recharge rates	*[Information will be added at a later date]*
Discharge	Springs and large known abstractions (m^3/d)	Boolavogue H.S., Oilgate, Ballyhogue (50), Glynn (50), Killurin Co-op (109), Sow RWSS, Castlebridge, Ballymorris (25), Elwex Ltd (Clonard Little - wells), Celtic Laundry Ltd (Wexford - 36), Springs Ltd (Wexford - 11), Clover Meats (Wexford – 11), Wexford Gas Co (218)
	Main discharge mechanisms	Discharge from this groundwater body will be focused towards the Slaney River and Wexford Harbour. There are areas of sand and gravel deposits along the Slaney River, which may allow for a better hydraulic connection between the bedrock and the river. There may also be discharge along the River Sow where the steep valleys cut through the thick Irish Sea Till.

	Hydrochemical Signature	The bedrock strata of this groundwater body are **Siliceous**. Chemical analyses of water from wells in the area show moderately soft waters with low electrical conductivity of about 270 μs/cm. The Durov plot shows some indication of ion exchange and the water has magnesium bicarbonate signature. This may imply the water is not freshly recharging and there may be the possibility that water confined below the almost impermeable marl is not able to discharge to the overlying rivers as soon as would be expected.
Groundwater Flow Paths		There is a degree of uncertainty involved in the interpretation of this groundwater body. Poor aquifers typically have short flow paths, recharging and discharging within small areas. The chemical analyses indicate there may be ion exchange occurring which may indicate older groundwater. Groundwater may be recharging from the sandier parts of the marl, from outcrop or from the aquifer to the north along fractures and then become trapped under the thicker areas of the Irish Sea Till.
Groundwater & surface water interactions		The interaction between groundwater and surface water is uncertain due to the thickness of subsoil. If there is a large thickness of impermeable subsoil there will be little or no interaction. If the river cuts through the overlying subsoil to the bedrock there will be discharge from the groundwater body to the river, this will provide baseflow in the winter. The sandy alluvium mapped along the Slaney (Cullen 1980) may allow groundwater to discharge at these locations. There is a marked difference between the hydrographs of the River Sow and the Castlebridge River that flows through the Screen Hills. The Castlebridge River has low delayed flood peaks and baseflow remains rather constant. There is significant flow to this river from the sand hills to the west where springs are found which occur not far from the banks where there is an outcrop of a till layer beneath coarse sandy deposits. The River Sow has high peak floods and appears to be a flashier river although there is a significant baseflow, which appears to be provided by the sandier deposits on the eastern bank of the river. The main catchment area of the river consists of the less permeable marl deposits giving the river a flashier appearance. It is important to note that the surface water flow is controlled by the variety in the overlying strata as opposed to the bedrock itself. Therefore such indicators as baseflow index cannot be interpreted as a parameter relating to the water bearing abilities of the bedrock strata.
Conceptual model		This groundwater body is defined to the north by the boundary between the volcanic aquifers of the Duncannon Group and the Ribband Group. To the east and west the boundary is defined by the catchment boundary of the Slaney and to the south by the limestone aquifer that supplies Fardystown RWSS. A full appreciation of the groundwater flow in this aquifer would require more study. There may be significant interactions between neighbouring groundwater bodies e.g. Enniscorthy GWB and Screen Hills GWB. Recharge to the bedrock strata may occur from various areas, the general flow direction is to the south. There are also numerous areas where discharge is possible along the surface water bodies or to the sea at Wexford Harbour.
Attachments		Figure 1 – Durov Diagram Table 1 – Chemical analysis results
Instrumentation		Stream gauge: 12062, 12060, Borehole Hydrograph: none EPA Representative Monitoring boreholes: WEX044
Information Sources		van Putten, F.A.M. (1978) The Blackwater Screen Project. Free University, Amsterdam, M.Sc thesis. Cullen, K.T. (1980) Distribution of unconsolidated deposits in Co Wexford (Map). Wexford Co Co, Sanitary Services Dept.
Disclaimer		Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Formation Name	**Code**	**Description**	**Rock Unit Group**	**Aquifer Category**
Ballyhoge Formation	BH	Dark grey slates with siltstone laminae	Ordovician Metasediments	Pl
Ballynacarrig Member	PDbc	Pale grey quartzites in dark grey slates	Cambrian Metasediments	Pl
Ballynamuddagh Granite	Bm	Grey biotite granite	Granites & other Igneous Intrusive rocks	Pl
Ballysteen Formation	BA	Fossiliferous dark-grey muddy limestone	Dinantian Lower Impure Limestones	Rf
Cullenstown Formation	CN	Grey-green metagreywacke & slate	Cambrian Metasediments	Pl
Cullentra Formation	CU	Grey-green metagreywackes & slates	Cambrian Metasediments	Pl
Duncormick Formation	DC	Red, grey conglomerates & sandstones	Devonian Old Red Sandstones	Ll
Newtown Formation	NN	Grey-green greywackes & slates	Cambrian Metasediments	Pl
Polldarrig Formation	PD	Dark grey mudstones with thin quartzites	Cambrian Metasediments	Pl
Porters Gate Formation	PG	Sandstones, shales & thin limestones	Dinantian (early) Sandstones, Shales and Limestones	Ll
Shelmaliere Formation	SH	White, purple quartzites with slates	Cambrian Metasediments	Pl
Wexford Formation	WX	Pale grey limestones, often dolomitised	Dinantian Pure Bedded Limestones	Rf

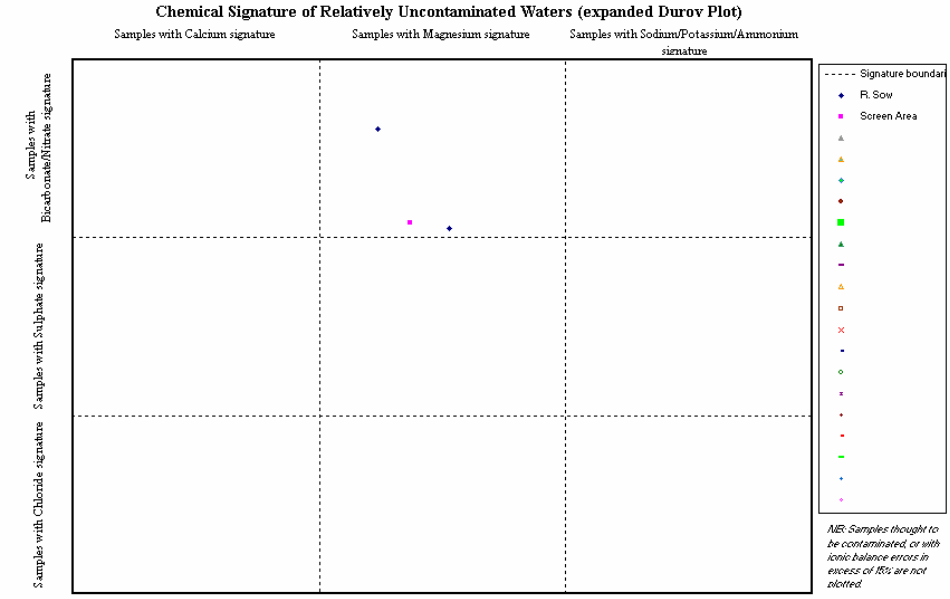

Table 1 - Chemical Data for the R. Sow and Screen Area (Van Putten 1978)

Location	T.D.S	pH	E.C.	Fe	Na	Ca	Mg	Al	K	NH^{+}_{4}	HCO^{-}_{3}	Cl^{-}	$SO^{=}_{4}$	$PO^{=}_{4}$	NO^{-}_{3}
R. Sow	199	7.8	235	0.2	17.73	26	5.0	1.19	2.27	0.18	106	21.1	8	0.06	12
R. Sow	120	6.9	173	0.36	15.29	11	6.1	0.07	0.94	0.2	34	29.8	7	0.00	15.8
Screen Area	288	7.6	395	0.61	33.34	41	6.3	0.18	6.8	0.3	100	66.3	20	0.02	13.8