Beara Sneem GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
21 Kerry Co. Co. and Cork Co. Co. (mainly Western Division)	**Rivers:** Ballynahown, Inny, Cummeragh, Finglas, Staigue, Behaghane, Owengarriff, Emlaghmore, Capall, Blackwater, Derreendarragh, Sneem, Owreagh, Bunnow, Owroe, Kealduff, Ardsheelhane, Cloonee, Owbeg, Cleady, Finnihy, Cleady, Reen, Sheen, Dromoghty, Beal-na-Shannin, Baurearagh, Ameen, Roughty, Slaheny, Owvane, Ccomhola, Lackavane, Coomnahorna, Glanmore, Glantrasna, Owenshagh, Glanrastel, Croanshagh, Drimminboy, Kealincha, Glengarriff, Coomarkane, Coomholla, Clashduff, Four Mile Water, Barony, Kerry, Cooleenlemane, Canrooska, Adrigole, Trawmacruha, Mealagh, Gortloughra, Owenbeg, Owngar, Tahilla, Ownagappul. **Stream:** Coomeelan, Kealgorm, Glashancummeen, Isknagahiny lough, lough fadda, Glan, Trafrasc. **Lakes:** Namona, Cloonaghlin, Iskanamacteery, Narava, Aphortbeg, Atoortaun, Termon, Isknagahiny, Coomrooanig, Dreenaun, Brin, Maulcore, Coombaha, Tooreenbog, Adoolig, Sallagh, Derriana, Coomanassig, Coomeen, Eagles, Coomnacronia, Keamaneigh, Coomavanniha, Nellinane, Coomeathcun, Dromtine, lomanagh, Black, Coomcurrane, Slievenashaska, Nambrackdarrig, Coomeenatierna, Gortagown, Coomcallee, Derreenaclaurig, Tobacco, Fadda, Derreenrickard, Tahilla, Clashnacree, Thaha, Askive, Dunkilla, Cloonee, Ross, Glan, Erik, Barfinnihy, Cummeenagross, Beg, Gortnaboul, Coomclogherane, Corlagh, Dromoghty, Cloonee Middle, Cloonee Upper, Cummer, Red Trout, Inchiqin, Napeasta, Cummeenaloughan, Cummenadillure, Boy, Nagarriva, Namaddra, Coomnalack, Aclearig, Doo, Nabirra, Coolnoohil, Nabuddoga, Coomyfaun, Akinkeen, Nambrackderg, Glas, Namrat, Narca, Naman, Curraghmore, Glanmore, Derryvegal, Derryvegal Upper, loughanunaghan, Glenbeg, Carbery, Coomadayallig, Coomarkane, Park, Pulleen, Pulleen Little, Atooreen, Nabirree, Carrignaneane, Cappnaboul, Reenydonagan, Drombrow, Agower, Cahernacrin, Raheen, Bofinna, Coolturtaun, Lahrandota, Akeen, Dun, Farranamagh, Lisscaha.	Ballagh Bog (001886), Ballinskelligs Bay and Inny Estuary (000335), Cloonee and Inchiquin Loughs, Uragh Wood (001342), Doughill Bog (001948), Dromlusk Bog (000352), Glanmore Bog (001879), Glanmore lake (001354), Knockroe Bog, (000366), Maulagowna Bog (001881), Roughty River (002092), Slaheny River Bog (000383), Sillahertane Bog (001882), Killarney National Park Macgillycuddys Reeks and Caragh River Catchment (000365).	1884

Topography	This large GWB comprises the southern part of the Iveragh Peninsula, the Beara peninsular, the Sheep's Head Peninsula and the northern side of the Mizen Head Peninsula, surrounding Kenmare River and Bantry Bay, together with numerous associated islands. It is an area of rugged topography, with ground elevations ranging from 10-830 m OD, and has a very indented coastline. It is an extensive area but is described together as the rocks types throughout the area have similar hydrogeological properties.	
Geology and Aquifers	**Aquifer categories**	**Ll:** Locally important aquifer which is moderately productive only in local zones (58%). **Pl:** Poor aquifer which is generally unproductive except for local zones (42%)
	Main aquifer lithologies	Devonian Old Red Sandstones (89%) Dinantian Mudstones & Sandstones (11%). There are also some very small areas of Basalts & other Volcanic rocks (0.04%), Dinantian Lower Impure Limestones (0.01%).
	Key structures	The widespread faulting and folding associated with the Variscan Orogeny in the south of Ireland has given rise to zones of enhanced permeability in the mudstones and sandstones. These can occur in the immediate vicinity of faults and near the axes of folds. The mainly fine-grained nature of the rocks however means that such zones are generally local.
	Key properties	Permeability generally decreases rapidly with depth in all aquifers in this GWB. In general, the ORS and Cork Group aquifer transmissivities will range 2-20 m^2/d, with median values occurring towards the lower end of the range. However, 'Excellent' yielding wells (>400 m^3/d) are known in some of the ORS units in other locations – these yields are usually associated with boreholes being situated on fault zones. Summer yields are sometimes unsustainable. Transmissivities in the small occurrences of other rock types in this GWB will be similarly low. Aquifer storativity will be low in all rock units. Groundwater gradients are likely to be in the range 0.01 to 0.04.
	Thickness	The Devonian ORS and overlying Cork Group rocks can be up to several kilometres thick in this region (Pracht 1996, 1997, 2002). However, in all aquifers within this GWB, most groundwater flow occurs within the top 15-20 m of the aquifer, in the layer that comprises a weathered zone of a few metres and a connected fractured zone below this. Deeper flows occur along generally isolated faults or significant fractures.

Overlying Strata	**Lithologies**	*Subsoil Types identified in Beara Sneem GWB by Teagasc Parent Material Mapping (Draft): Alluvium (A); Blanket Peat (BktPt); Sandstone sands and gravels (Devonian & Carboniferous) (GDCSs); Rock outcrop and rock close to surface (Rck); Till – Devonian & Carboniferous Sandstone & Shale Till (TDCSsS); Devonian Sandstone Till (TDSs).* A large proportion of this GWB consists of areas of shallow rock or outcrop and blanket peat. Glacial till is found at lower elevations. Undifferentiated Alluvium occurs in small patches along river courses throughout the body.
	Thickness	Subsoil thickness is expected to be small in most areas.
	% area aquifer near surface	
	Vulnerability	There is no Groundwater Vulnerability Map for Co. Kerry or West Cork at present. Due to the large areas of outcrop and shallow rock, a large percentage of the body will be designated as Extreme vulnerability. In areas where the subsoil cover is >3 m, vulnerability will range from High to Low, depending on the permeability and thickness of the subsoil. It is likely that most of the RBD will have either Extreme or High vulnerability.
Recharge	**Main recharge mechanisms**	Since there are no karstic areas and no aquifers with regional flow systems which might include losing streams, recharge will be diffuse, from rainfall.
	Est. recharge rates	
Discharge	**Large springs and high yielding wells (m^3/d)**	None known.
	Main discharge mechanisms	Diffuse recharge will occur via rainfall percolating through the subsoil or areas of outcropping rock. The proportion of the effective rainfall that will recharge the aquifer is determined by the permeability of the soil and subsoil, and by the slope. Due to the generally low permeability of the aquifers within this GWB and the high slopes, a high proportion of the recharge will discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing further the available groundwater resource in the aquifer.
	Hydrochemical Signature	Hydrochemical data are sparse. The main body of available data are from partial chemical analyses submitted on foot of applications for well grants, mainly from West Cork (Kerry data include very few parameters). EC ranges 100-700 µS/cm, averaging 370; TDS ranges 60-475, averaging 375 mg/l; Total Hardness ranges almost zero to 360 mg/l as $CaCO_3$, averaging 137; Total Alkalinity ranges 4-300 mg/l, averaging 110. The main problems are probably Fe, Mn and pH – 12% of pH values were below 6, and about one-third below the EU MAC of 6.5. Occasionally, in areas very near the coast, elevated chloride values were recorded, up to 144 mg/l Cl. Nitrate ranges up to 33 mg/l NO3, averaging 5.7 mg/l – with only three values above 20 mg/l. These data are supported by the limited data available from monitored public supplies, as reported by EPA. In summary, the groundwater is generally moderately soft to moderately hard, with low nitrate values, and low pH. Iron and Manganese can often be a problem. Due to low pH, peaty soils, and iron-rich sandstone rocks.
Groundwater Flow Paths		These rocks have no intergranular permeability; groundwater flow occurs in fractures and faults. Permeability is highest in the upper few metres but generally decreases rapidly with depth. In general, groundwater flow is concentrated in the upper 15 m of the aquifer, although deeper inflows from along fault zones or connected fractures can be encountered. Significant yields can be obtained where boreholes are drilled into known fault zones. However, yields are not necessarily sustainable, as the fracture networks are generally not extensive or well connected but primarily concentrated in the vicinity of the fault zones. Springs occur in some instances on fault zones. Groundwater levels are about 1.5-15 m below ground level, and will generally follow the topography. Close to the rivers and streams, water levels will be near ground level. Surface water features are considered to be in hydraulic continuity with the water table. Groundwater flow will be local. Groundwater flow paths are generally short, typically 30-300 m, 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. Groundwater is generally unconfined.
Groundwater & Surface water interactions		Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low.

Conceptual model	• The groundwater body is bounded to the west and south by the coast, to the north and east by the topographic high and surface water divide which forms the boundary with the Cahersiveen and other GWBs. This body includes various offshore islands which are composed of similar bedrock units, including Bear Island, Dursey Island, Clear Island, Sherkin Island, Whiddy Island, and Horse Island. • The topography of this body is mountainous, with ground level rising from the coast to the highest elevations. The coastline is very indented. • The groundwater body is comprised of rocks with low transmissivity and storativity, although localised zones of enhanced permeability occur along fault zones. • Flow occurs along fractures, joints and major faults. Flows in the aquifer are generally concentrated in a thin zone at the top of the rock, although deeper groundwater flows along faults and major fractures. • Diffuse recharge occurs across the GWB through the subsoils and rock outcrops. Due to the generally low permeability of the aquifers within this GWB and the high slopes, a high proportion of effective rainfall will runoff, or discharge rapidly to surface water courses via interflow and shallow flow. Where water levels within the unconfined aquifer are high, potential recharge will also be rejected. • The water table can vary between a few metres up to more than 10 m below ground surface, depending upon topography. Groundwater is generally unconfined. Flow path lengths are generally short, ranging 30-300 m. Local groundwater flow directions are controlled by local topography. Overall, groundwater flows to the coast and more low lying areas away from the topographic highs. • Groundwater discharges to the numerous streams and rivers crossing the aquifer, which are gaining, and to springs. Seepage zones may exist on cliff faces. A small volume of groundwater may cross-flow into the adjacent GWBs.
Attachments	
Instrumentation	**Stream gauges:** 21001, 21002*, 21003*, 21004, 21005*, 21006, 21007, 21008, 21009, 21010, 21011, 21012, 21013, 21014, 21015*, 21070, 21071, 21072, 21073, 21074. * Adjusted Dry Water Flow Data Available. **EPA Water Level Monitoring boreholes:** **EPA Representative Monitoring points:** Roughty Valley Pigs (KER 70) ***(not sure what aquifer this is abstracting from)***
Information Sources	Pracht M (1996) *Geology of Dingle Bay: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 20, Dingle Bay.* Geological Survey of Ireland. 58pp. Pracht M (1997) *Geology of Kerry-Cork: a geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 21, Kerry - Cork.* Geological Survey of Ireland. 70pp Pracht M, Sleeman AG (2002) *Geology of West Cork: A geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 24, West Cork.* Geological Survey of Ireland. 79pp. Wright GR, Conlon V (1998) *County Kerry Aquifer Classification.* Unpublished GSI report produced for Kerry County Council. Geological Survey of Ireland.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

List of Rock units in Beara Sneem GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Dinantian Limestones (undifferentiated) (DIN) (tiny area)	*Limestone*	*Dinantian Mudstones & Sandstones*	*Ll*
Ballysteen Formation (BA)	Fossiliferous dark-grey muddy limestone	Dinantian Lower Impure Limestone	Ll
Camillan Sandstone Formation (CN)	Sandstone, siltstone & shale	Devonian Old Red Sandstones	Ll
Reenydonagan Formation	Calcareous mudstone & thin limestone	Dinantian Mudstones & Sandstones	Ll
Ardnamanagh Member (Knam)	Dark-grey laminated mudstone	Dinantian Mudstones & Sandstones	Ll
Reenagough Member (KNrg)	Massive & flaser-bedded sandstone	Dinantian Mudstones & Sandstones	Ll
Ardaturrish Member (KNat)	Black mudstone & silt-lensed mudstone	Dinantian Mudstones & Sandstones	Ll
Pigs Cove Member (KNpc)	Sand-lensed mudstone	Dinantian Mudstones & Sandstones	Ll
Narrow Cove Member (KNnc)	Flaser-bedded sandstone & mudstone	Dinantian Mudstones & Sandstones	Ll
Bere Island Member (Ohbi)	Sandstone, bioclastic limestone lenses	Dinantian Mudstones & Sandstones	Ll
Old Head Sandstone Formation (OH)	Flaser-bedded sandstone & minor mudstone	Dinantian Mudstones & Sandstones	Ll
Toe Head Formation (TH)	Cross-bedded sandstone & minor mudstone	Devonian Old Red Sandstones	Ll
Castlehaven Formation (CE)	Purple mudstone & sandstone	Devonian Old Red Sandstones	Pl
Castlehaven Formation & sandstone (ssCE)	Purple mudstone & sandstone	Devonian Old Red Sandstones	Pl
Gun Point Formation (GP)	Green-grey sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
Caha Mountain Formation (CH)	Purple and green sandstone and siltstone	Devonian Old Red Sandstones	Pl
Caha Mountain Formation & sandstone (ssCH)	Purple & green sandstone & siltstone	Devonian Old Red Sandstones	Pl
Slaheny Sandstone Formation (SL)	Cross-bedded sandstone and siltstone	Devonian Old Red Sandstones	Ll
Bird Hill Formation (BH)	Purple siltsone & fine	Devonian Old Red Sandstones	Pl
Ballinskelligs Sandstone Formation (BJ)	Purple sandstone & siltstone	Devonian Old Red Sandstones	Ll
St Finans Sandstone Formation (SF)	Green sandstone & siltone	Devonian Old Red Sandstones	Ll
St. Finans Sandstone Form& Conglom & pebbly sandst	Green sandstone & siltstone	Devonian Old Red Sandstones	Ll
Valentia Slate Formation (VS)	Purple mudstone & siltstone	Devonian Old Red Sandstones	Pl
Glenflesk Chloritic Sandstone Formation (GC)	Green sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
GlenfleskChloriticSandstForm& Conglom&pebblysandst (cgGC)	Green sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
Doo Lough Pebbly Sandstone Member (GCdl)	Pebbly sandstone & conglomerate	Devonian Old Red Sandstones	Ll
Sandstone (SS)		Devonian Old Red Sandstones	Ll
Conglomerate and Pebbly Sandstone (cg)		Devonian Old Red Sandstones	Pl
Undifferentiated Pyroclastic Rocks (py)		Basalts & other Volcanic rocks	Ll
Basalts and other Volcanic Rocks (Bp)		Basalts & other Volcanic rocks	Ll
Trachyte (T)		Basalts & other Volcanic rocks	Ll

Beara Sneem GWB (For reference only)