Cahersiveen GWB: Summary of Initial Characterisation.

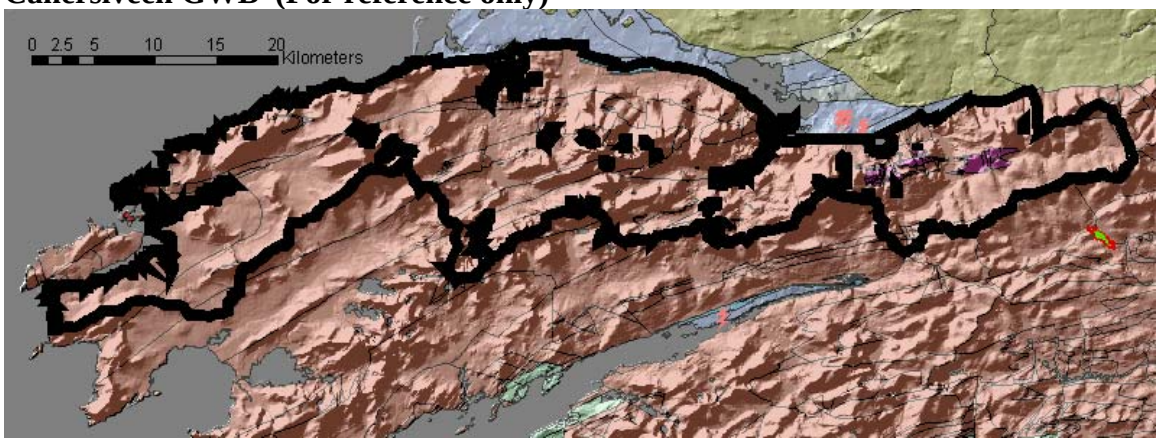
Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
22 Kerry Co. Co. Cork Co. Co.	**Rivers:** Ferta, Gleensk, Behy, Mealagh, Owenroe, Cottoners, Owbeg, Caragh, Gaddagh, Loe, Owengariff, Gearhameen, Galway's, Owenreagh, Clydagh, Cappagh, Derreen, Carhan, Oghermong, Gougane, Owenykeagh, Finglas, Beheenagh, Finow, Crinnagh, Flesk, Coomnacarrig, Loo. **Lakes:** Kells, Roads, Glendalough, Natanida, Licka, Cloomcloghaun, Cummernamuck, Coumnasillagh, Aleabaun, Nanoon, Naparka, Coomaglaslaw, Eighter, Coomloughra, Drombrane, Eagher, Beg, Brista, Coomnagrossaun, Curraley, Coomeeneragh, Coomnacullen, Loughacummeen, Caragh, Cappanalea, Owen, Nakirka, Nambrackdarrig, Coomnacronia, Acoose, Coosaun, Black, Cushnavally, Auger, Glas, Callee, Gouragh, Cummeenapeasta, Cummeenmore, Googh, Garagarry, Curraghmore, Crincaum, Managh, Devil's Punchbowl, Cummeenduff, Erhogh, Eskalougha, Reagh, Loch, Doo, Range, Upper, Nabeaghlecka, Glannafreaghaun, Nageeha, Guitane, Athooynastooka, Nabrean, Duff, Gal, Nabroda, Carrignamork, Croghane, Fineen, Rehil, Namweela, Cloon, Rea, Coom, Coomalougha, Looscaunagh, Akeama, Keamnabricka, Nahesknagirramy, Keal, Preaghaun, Triangle, Cummeenslaun, Naganee, Aclaurig, Inchincoosh.	Mullaghanish Bog (001890), Valencia River Estuary, (001383), Killarney National Park, MacGillycuddys Reeks and Caragh River Catchments (000365)	850

Topography	This GWB occupies uplands, slopes, sea cliffs and coastal sections on the Iveragh Peninsula. It is elongated east west along the north side of the ridge formed by the Macgillycuddy's Reeks Mountains. The topography of this body is mountainous, with ground level continually rising from the coast to the highest elevations in the south and east of the body. In the north of the body (just south of Kilgobnet and Beaufort) the topography is more subdued with a gentler slope in the vicinity of the Laune River Valley. Ground elevations range 10-1040 m OD. Drainage density is high, with many small channels incising valleys into the bedrock. This body also includes Valentia and other islands offshore from this GWB which are composed of similar bedrock units.	
Geology and Aquifers	**Aquifer categories**	**Ll:** Locally important aquifer, moderately productive only in local zones (91%) **Pl:** Poor aquifer, generally unproductive except for local zones (9%)
	Main aquifer lithologies	The principle aquifer lithology is Devonian Old Red Sandstones (98%). There are also some small areas of Basalts & other Volcanic rocks (2%), Dinantian (early) Sandstones, Shales and Limestones (0.3%), Igneous Intrusive Rocks (0.04%) and a tiny area (<1km^2) of Dinantian Lower Impure Limestones.
	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 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 can be up to several kilometres thick in this region (Pracht 1996). 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**	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. *Subsoil Types identified in Cahersiveen GWB by Teagasc Parent Material Mapping (Draft): Alluvium (A); Blanket Peat (BktPt); Lake sediments (undifferentiated) (L); Made Ground (Made); Beach/raised beach sand (Mbs); Estuarine sediments (silts/clays) (Mesc); Rock outcrop and rock close to surface (Rck); Till – Devonian Sandstone Till (TDSs); Blown Sand (Ws).*
	Thickness	A GWPS has not yet been prepared for Co. Kerry. Over most of the GWB subsoil is expected to be < 10 m thick. Outcrop and shallow rock are very common, particularly in the upland areas and near coastal cliff sections. Outside these areas subsoil thickness generally ranges 3-10 m, but deeper subsoils can be encountered, particularly in more low lying areas. Depth to bedrock data range 0-31 m.
	% area aquifer near surface	

	Vulnerability	There is no Groundwater Vulnerability Map for Co. Kerry 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.
Recharge	**Main recharge 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.
	Est. recharge rates	
Discharge	**Large springs and high yielding wells (m^3/d)**	*Note: The following data need to be checked and updated by RBD Project Consultants.* No large springs or high yielding wells.
	Main discharge mechanisms	The main discharges are to the rivers and streams crossing the GWB to small springs and seeps. Groundwater will also discharge at the coast. Localised seepages may develop on the cliff faces.
	Hydrochemical Signature	The Old Red Sandstone rocks largely contain calcium bicarbonate type water. Alkalinity ranges approximately 14-200 mg/l (as $CaCO_3$) and hardness ranges 50-250 mg/l. Groundwater in the Old Red Sandstone rocks ranges from moderately soft to moderately hard water. Conductivities are relatively low, ranging approximately 150-450 μS/cm. High iron (Fe) and manganese (Mn) concentrations can occur, due to the dissolution of Fe and Mn from the sandstone/shale where reducing conditions occur. It has been demonstrated that at low pumping rates water does not reside long enough in the well for oxidation to occur, thereby resulting in elevated Fe and Mn in small domestic supplies (Applin *et al*, 1989). A typical range for pH in groundwater from the Old Red Sandstone rock units is 6 –7, however low pH values sometimes occur. The pH of groundwater from Old Red Sandstone of the Gortanimill, Ballytrasna and Caha Mountain formations can be as low as 5.4. Background chloride concentrations will be higher than in the Midlands, due to the proximity to the sea. Where the influence of sea water incursion is responsible for high chloride levels pumping rates in such areas may need to be kept below a level with could cause sea water to be drawn into the boreholes. There are no EPA representative monitoring in this GWB.
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 northwest by the coast, to the northeast by the contact with karstic limestones of the Laune Muckross GWB. A topographic high and surface water divide that coincides with the groundwater divide, forms the southern boundary. This body includes Valentia and other offshore islands which are composed of similar bedrock units. • The topography of this body is mountainous, with ground level continually rising from the coast to the highest elevations in the south and east of the body. In the north of the body (just south of Kilgobnet and Beaufort) the topography is more subdued with a gentler slope in the vicinity of the Laune River Valley. • 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 north to the coast and more low lying areas away from the topographic highs in the south and east of the GWB. • Groundwater discharges to the numerous streams and rivers crossing the aquifer, which are gaining, and to springs. Seepage zones may exist on the cliff faces. A small volume of groundwater may cross-flow into the adjacent karstic Laune Muckross GWB.
Attachments	None
Instrumentation	**Stream gauges:** 22005, 22008, 22016, 22024, 22027, 22032, 22034, 22036, 22037, 22038, 22039, 22042, 22070, 22073, 22074, 22084. **EPA Water Level Monitoring boreholes:** none **EPA Representative Monitoring points:** none
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. 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

Cahersiveen GWB (For reference only)



List of Rock units in Cahersiveen GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
Ballymartin Formation (BT) (0.01km2)	*Limestone & dark-grey calcareous shale*	*Dinantian Lower Impure Limestones*	*Ll*
Lower Limestone Shale (LLS)	Sandstone, mudstone & thin limestone	Dinantian (early) Sandstones, Shales and Limestones	Pl
Gun Point Formation (GP)	Green-grey sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
Camillan Sandstone Formation (CN)	Sandstone, siltstone & shale	Devonian Old Red Sandstones	Ll
Ballinskelligs Sandstone Formation (BJ)	Purple sandstone & siltstone	Devonian Old Red Sandstones	Ll
Ballinskelligs Sandstone Formation & Conglomerate & pebbly sandstone (cgBJ)	Purple sandstone & siltstone	Devonian Old Red Sandstones	Ll
Ardnagluggen Sandstone Member (Bjag)	Pale-green cross-bedded sandstone	Devonian Old Red Sandstones	Ll
Doulus Head Conglomerate Member (BJdh)	Conglomerate & pebbly sandstone	Devonian Old Red Sandstones	Ll
Lough Acoose Sandstone Formation (LA)	Well-bedded grey sandstone	Devonian Old Red Sandstones	Ll
Lough Acoose Sandstone Formation & Conglomerate & pebbly sandstone (cgLA)	Well-bedded grey sandstone	Devonian Old Red Sandstones	Ll
St. Finans Sandstone Formation (SF)	Green sandstone & siltstone	Devonian Old Red Sandstones	Ll
St. Finans Sandstone Formation & Undifferentiated pyroclastic rocks (pySF)	Green sandstone & siltstone	Devonian Old Red Sandstones	Ll
Glenflesk Chloritic Sandstone Formation (GC)	Green sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
Doo Lough Pebbly Sandstone Member (GCdl)	Pebbly sandstone & conglomerate	Devonian Old Red Sandstones	Ll
Glenflesk Chloritic Sandstone Formation & Conglomerate & pebbly sandstone (cgGC)	Green sandstone & purple siltstone	Devonian Old Red Sandstones	Ll
Conglomerate & pebbly sandstone (cg)		Devonian Old Red Sandstones	Pl
Lough Guitane Rhyolites (GCr)	Rhyolitic lavas	Basalts & other Volcanic rocks	Ll
Lough Guitane Volcaniclastics (GCv)	Massive & bedded volcaniclastic deposits	Basalts & other Volcanic rocks	Ll
Valentia Slate Formation (VS)	Purple mudstone & siltstone	Devonian Old Red Sandstones	Pl
Beginish Island Intrusion (VhBg)	Tholeiitic dolerite & gabbro	Granites & other Igneous Intrusive rocks	Pl
Bealtra volcaniclastic rocks (VhBa)	Volcanic breccia	Basalts & other Volcanic rocks	Pl