

*1<sup>st</sup> Draft Haulbowline and Spike Island GWB Description September 2005*

**Haulbowline and Spike Island GWB: Summary of Initial Characterisation.**

<b>Hydrometric Area Local Authority</b>	<b>Associated surface water features</b>	<b>Associated terrestrial ecosystem(s)</b>	<b>Area (km<sup>2</sup>)</b>
19 Cork Co Co	No lakes or streams on the islands.	No groundwater dependent terrestrial ecosystems (O'Riain, 2004).	<1
<b>Topography</b>	Haulbowline and Spike Islands are located in Cork Harbour. The islands have a population greater than 50. Elevations range from 0-20m AOD. Figure 1 shows the location and boundaries of the GWB. A large proportion of both islands comprises made ground.		
<b>Geology and Aquifers</b>	<b>Aquifer categories</b>	The main aquifer categories are: <b>Lk:</b> Locally important karst aquifer and <b>Ll:</b> Locally important aquifer, moderately productive only in local zones.	
	<b>Main aquifer lithologies</b>	Dinantian Pure Unbedded Limestones and Dinantian Mudstones and Sandstones.	
	<b>Key structures</b>	The main structural trend is E-W.	
	<b>Key properties</b>	The pure unbedded limestones of South Munster are highly productive. Productive wells are recorded in the neighbouring Ringaskiddy GWB. Transmissivity in the pure unbedded limestones can range up to a few thousand m <sup>2</sup> /d. Pumping tests in the same rock type in the Cloyne GWB to the east of this body gave a range of transmissivity of 200 to over 2000 m <sup>2</sup> /day. Groundwater gradients within the pure unbedded limestones are low, around 0.001-0.002 (Wright & Gately 2002). The areal extent of the pure bedded limestones is such that the aquifer could not support a regionally important water supply, thus the locally important classification.  In the impure limestones, transmissivities are lower; they will generally be in the range 5-20 m <sup>2</sup> /d but may be higher where karstification has occurred. Storativity is low in all aquifers.	
	<b>Thickness</b>	Most groundwater flow may occur 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. However deeper flows can occur. Fissuring is recorded at approximately 41m below ground level in the Ringaskiddy GWB (Wright, 1979). In the past sea level is estimated to have been approximately 50-60m below present day O.D., the level to which the now infilled channel of the River Lee was eroded (Farrington, 1959) enabling karstification at depth. Today this region is an example of a drowned karst terrain. In the Impure Limestones that occur at the margins of this GWB, most groundwater flow occurs in an upper weathered layer of a few metres and a zone of interconnected fissures often not extending more than 15 m from the top of the rock, although occasional deep inflows associated with major faults can be encountered. Impure limestones are also much less susceptible to karstification.	
<b>Overlying Strata</b>	<b>Lithologies</b>	The islands comprise made ground and outcropping rock.	
	<b>Thickness</b>	Generally less than 3m.	
	<b>% area aquifer near surface</b>	[Further Information to be added at a later date]	
	<b>Vulnerability</b>	Extreme vulnerability.	
<b>Recharge</b>	<b>Main recharge mechanisms</b>	Most of Haulbowline comprises made ground, thus recharge is expected to be low. Diffuse recharge is expected to occur via rainfall percolating through the subsoil and rock outcrops.	
	<b>Est. recharge rates</b>	[Information to be added to and checked]	
<b>Discharge</b>	<b>Large springs and large known abstractions (m<sup>3</sup>/d)</b>	none	
	<b>Main discharge mechanisms</b>	Shallow groundwater is likely to discharge mainly to the sea.	
	<b>Hydrochemical Signature</b>	There are no data but the signature is expected to be similar to the neighbouring Ringaskiddy GWB – calcium bicarbonate. 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.	
<b>Groundwater Flow Paths</b>	Flow paths are likely to be short (30-300 m), limited by the small extent of the GWB, with groundwater discharging rapidly to the sea. Groundwater flow directions are expected to follow topography.		

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<b>Groundwater &amp; Surface water interactions</b>	The nature of the karstic system on Haulbowline and the northern half of Spike can lead to rapid interchanges of water between surface and underground. Swallow holes and caves receive surface water, and groundwater is discharged to the sea. It is unlikely that any major groundwater - surface water interactions occur in the Dinantian mudstones and sandstones.
<b>Conceptual model</b>	<ul style="list-style-type: none"> <li>• Haulbowline and Spike islands are located in Cork Harbour. Elevations range from 0-20m AOD.</li> <li>• The GWB is composed of low to high transmissivity rocks.</li> <li>• Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones.</li> <li>• Diffuse recharge is expected to occur via rainfall percolating through the subsoil and rock outcrops.</li> <li>• Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to the sea.</li> <li>• Flow directions are expected to follow topography.</li> </ul>
<b>Attachments</b>	Figure 1.
<b>Instrumentation</b>	<b>Stream gauges:</b> None <b>EPA Water Level Monitoring boreholes:</b> None <b>EPA Representative Monitoring points:</b> None
<b>Information Sources</b>	Sleeman AG, Pracht M (1994) <i>Geology of South Cork. A geological description of South Cork to accompany the Bedrock Geology 1:100,000 Map Series, Sheet 25</i> , Geological Survey of Ireland, 59pp. O' Riain, G., (2004). <i>Water Dependent Ecosystems and Subtypes Draft Report</i> . WFD Support Projects. Compass Informatics in association with National Wildlife and Parks Service (DEHLG). Farrington A (1959) The Lee Basin Part one: glaciation. <i>Proc. R. Ir. Acad.</i> 60B (3), 135-166. Wright GR (1979) Groundwater in the South Munster Synclines. In: <i>Hydrogeology in Ireland, Proceedings of a Hydrogeological Meeting and associated Field Trips held in the Republic of Ireland from 22 to 27 May, 1979</i> . Published by the Irish National Committee of the International Hydrological Programme.
<b>Disclaimer</b>	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.

Figure 1. Cork Harbour Islands

