### Cushina GWB: Summary of Initial Characterisation

<table>
<thead>
<tr>
<th>Hydrometric Area Local Authority</th>
<th>Associated surface water bodies</th>
<th>Associated terrestrial ecosystems</th>
<th>Area (km²)</th>
</tr>
</thead>
</table>

**Topography**

This GWB is located in eastern Co. Offaly but also extends into counties Laois and Kildare. The topography in the area is extremely low lying to the north with some small hills in the south. In general the land surface slopes to the centre and south of the body towards the River Figile.

**Aquifer type(s)**

LI: Locally important aquifer which is moderately productive only in local zones

**Main aquifer lithologies**

- Dinantian Pure Bedded Limestones
- Dinantian Upper Impure Limestones

**Key structures.** The area is relatively free of intense structural deformation. The rocks of this GWB are faulted against the Pure bedded Allenwood Limestone formation. Faults occur in both a NE SW direction and NW SE direction.

**Key properties**

In the Calp Formation, permeability would be expected to be low, e.g. 1 m/d (Wright 2000).

**Thickness**

The depth to which open fractures are encountered below ground will determine the depth of significant groundwater flow in the aquifer since it is not considered that the rock has any primary porosity. In such low permeability rocks it is considered that the majority of groundwater flow will occur in the upper 3m and groundwater flow in fractures does not typically occur below 10m.

**Lithologies**

The area is generally underlain by moderately permeable limestone till. Smaller areas of lower permeability peat deposits are present as are local deposits of high permeability gravels.

**Thickness near surface**

Subsoil appears to be thicker in the north where the topography is flatter and reduces to the south.

**% area aquifer near surface**

Low

**Vulnerability**

Generally Moderate in the north and High in the South.

**Main recharge mechanisms**

Diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then 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**

[Information will be added at a later date]

**Springs and large known abstractions**

- **GSI Source Report:** Lough PWS
- Killinard GWS,

**Main discharge mechanisms**

Discharge from this aquifer will be towards the overlying rivers where they are in hydraulic continuity with the aquifer. Drainage density in the south is quite low and this may indicate a higher permeability of the limestones here. Since there are an absence of streams in the area the aquifer discharges via springs, a number of karstic springs have been recorded in this southern area south east of Emo.

**Hydrochemical Signature**

The groundwater samples from the Lough PWS indicate a hard (350-400 mg/l CaCO₃) water with a calcium-bicarbonate hydrochemical signature. This reflects the fact that the groundwater feeding the boreholes has passed through limestone rock and limestone (Wright 2000).

**Groundwater Flow Paths**

The majority of groundwater flow in this aquifer is considered to occur in the upper 3m of the bedrock where the rock is more broken and weathered. Beneath this groundwater flow in through a connected network of fractures, some of which may become enlarged due to solution of the limestone. Isolated deep groundwater flow may be found to depths of 50m below the top of the rock. Groundwater flow paths are typically medium length (hundreds of meters) in locally important aquifers although the low drainage density in the area may suggest longer groundwater flow paths (e.g. in the order of Kilometers) are possible.

**Groundwater & surface water interactions**

There are a number of Karst springs and boreholes located in the southern area of the GWB
Conceptual model

This GWB is located in eastern Co. Offaly but also extends into counties Laois and Kildare. The topography in the area is extremely low lying to the north with some small hills in the south. In general the land surface slopes to the centre and south of the body towards the River Figile. The boundaries of this GWB are defined by the extent of the Calp and Ballyadams Formations in this area. The boundary to the north is the topographic boundary between the SE & E RBDs. The groundwater body is composed primarily of low permeability rocks, although localized zones of enhanced permeability do occur. It appears likely from investigation of the Lough area that the pure bedded limestones can be encountered beneath the Calp. Recharge occurs diffusely through the subsoils and via outcrops. The aquifers within the GWB are generally unconfined, but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the effective thickness of this aquifer is likely to be about 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep water strikes in more isolated faults/ fractures can be encountered at 50-70 mbgl. Regional groundwater flow is from north to south, but on a local scale, groundwater discharges to the streams and rivers crossing the aquifer. Flow path lengths are variable and will depend on the degree of karstification of the limestone and hence its purity. Groundwater discharges to the numerous small streams crossing the aquifer, and to the springs and seeps.

<table>
<thead>
<tr>
<th>Formation Name</th>
<th>Code</th>
<th>Description</th>
<th>Rock Unit Group</th>
<th>Aquifer Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballyadams</td>
<td>BM</td>
<td>Crinoidal wackestone/packstone limestone</td>
<td>Dinantian Pure Bedded Limestones</td>
<td>Pending Classification</td>
</tr>
<tr>
<td>Calp</td>
<td>CD</td>
<td>Dark-grey to black limestone &amp; shale</td>
<td>Dinantian Upper Impure Limestones</td>
<td>Li</td>
</tr>
</tbody>
</table>

Attachments

**Instrumentation**
- Stream gauge: 14016, 14004, 14017, 14009, and 14006.
- Borehole Hydrograph: none
- EPA Representative Monitoring boreholes: None

**Information Sources**

Disclaimer

Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.