

River Basin Management Plans – Groundwater Classification

Surface Waters

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1.0 Purpose

This paper describes the method used to assess the Water Framework Directive (WFD) quantitative status of groundwater bodies with respect to deterioration of dependent surface water body ecological status related to groundwater abstraction.

2.0 Background

The WFD requires that groundwater bodies be classified as good or poor for both chemical status (in relation to a large range of pollution pressures) and quantitative status (in relation to groundwater abstraction pressures).

The deterioration of dependent surface water body status is one of four tests that have been developed for groundwater body quantitative classification, based on WFD requirements and guidance provided at an EC and UK level¹. The four tests consider the impacts of groundwater abstraction both on the groundwater body itself, and on the ecological receptors which depend on it. The worst result from all four tests is taken as the overall quantitative status result for each groundwater body.

Actual impact from groundwater abstraction on local surface water features has not been widely reported for Northern Ireland to date. However with environmental flow indicators (EFIs) being defined for surface water bodies as part of surface water classification under the WFD, the significance of groundwater abstraction in surface water body catchments can now be considered further.

The relationship between groundwater and surface waters is complex. Surface water systems represent one of the main discharge routes for groundwater. In a natural system it can be broadly assumed (ignoring storage effects) that abstraction of groundwater for consumptive use removes a volume of water from the catchment that would otherwise have reached a surface water body as groundwater discharge (or as surface water drainage where abstraction results in enhanced recharge). Determining where the groundwater actually discharges into surface water systems is difficult unless detailed flow records and other data are available. For the purposes of this test it is assumed that the impacts from groundwater abstraction are related to the surface water body in which catchment the abstraction is located. Modifications were made in some cases where more information was available on the local hydrogeological setting.

3.0 Classification

This assessment has been undertaken to support the following element of classification:

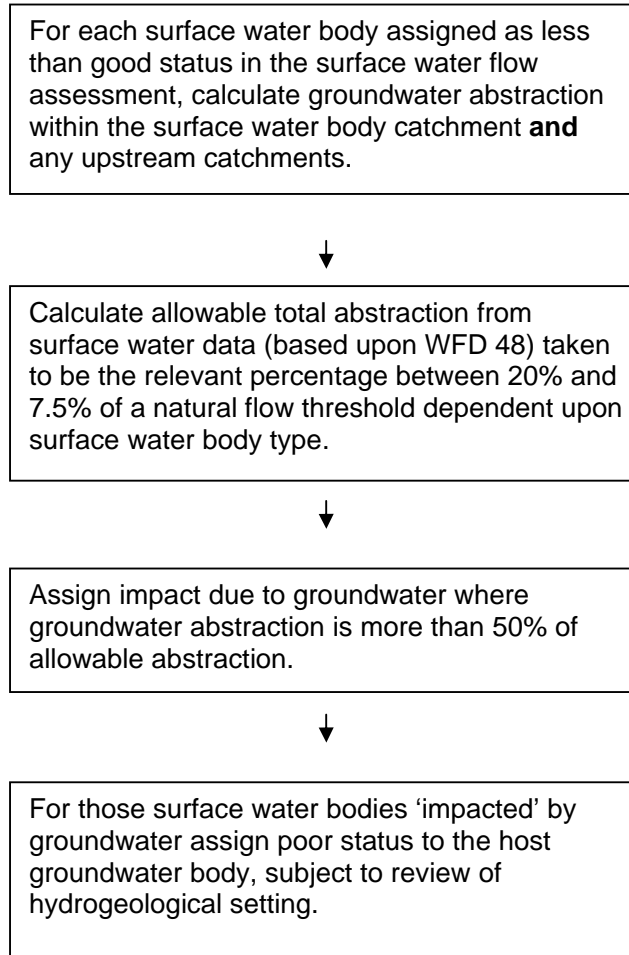
Quantitative Classification

- Surface waters

¹ UK Technical Advisory Group on the Water Framework Directive. Paper 11b(ii): Groundwater Quantitative Classification for the purposes of the Water Framework Directive. This paper can be downloaded from the www.wfduk.org web site.

4.0 Assessment Process

The following assessment process was undertaken, managed within a GIS-based project.



Surface water bodies (rivers) which were at less than 'good' status for the flow assessment (undertaken by NIEA hydrologists) were identified for each groundwater body. For each of these groundwater bodies the flow standard (volume available for abstraction after taking into account ecological flow needs) as defined by NIEA hydrologists (based upon Sniffer WRD 48 methodology) was compared with the total estimated groundwater abstraction within the surface water body catchment. This was taken as the total volume of abstractions that are licensed by NIEA under the Water Abstraction and Impoundment (Licensing) Regulations (NI) 2006. This was the same dataset that was used for the surface water body assessments. The allowable abstraction was calculated assuming flow at Q_{95} . Where groundwater abstraction exceeded 50% of the allowable abstraction the surface water body was identified as being impacted by groundwater abstraction.

For such impacted surface water bodies a review of the hydrogeological setting and groundwater abstraction distribution was made to confirm or otherwise the assessment of impact. This also included consideration of future water abstraction

strategies for large abstractors. Where a surface water body impact (failing to achieve at least good surface water flow criteria) was considered to potentially be the result of groundwater abstraction, the associated groundwater body was determined as being at poor status.

There is a relatively limited understanding of the interaction between groundwater and surface water in Northern Ireland. Reasons for this include:

- the widespread occurrence of glacial deposits;
- the complex bedrock geology pattern; and
- the limited availability of detailed surface water flow records in mid-to-upstream parts of the main catchments.

In addition there is no high quality dataset of groundwater abstraction volumes currently available for Northern Ireland. The recent introduction of abstraction licensing should however help address this during this River Basin Management Plan (RBMP) period.

The impact of reduction in flow on the overall ecological status of a surface water body is also relatively poorly understood and the surface water assessments of flow can only be seen as a screening mechanism for assessing potential impact.

5.0 Outcome

No groundwater bodies were found to be at poor status. The test did identify four groundwater bodies where confidence in the results was reduced. This was due to the abstractions within the surface water body being from quarry sumps and therefore being a combination of groundwater, incident rainfall and possibly surface water ingress.

Confidence in the assessment in groundwater bodies where there are no surface water bodies attaining at least good surface water flow status or where smaller surface water bodies have not yet been assessed can only be placed in the low category.

6.0 River Basin Planning Cycle

There remains uncertainty over the distribution of groundwater abstractions and volumes abstracted. In addition, more work is required to understand local hydrogeological settings with particular consideration of the hydraulic connection between aquifers and surface waters and the significance of flow with respect to ecological requirements. With the recent introduction of abstraction licensing and the proposal to develop a new low flow model for Northern Ireland a greater degree of understanding should be available for the next RBMP.

References

SNIFFER WFD48 Report, 2006: Development of Environmental Standards (Water Resources). www.sniffer.org.uk

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