

Draft River Basin Plans – Groundwater Classification

# WFD-GW-9 Chemical pressures – drinking water protected areas (DWPA's)

22 December 2008

Water Framework Directive - Groundwater	Classification	
Chemical pressures – Drinking Water Protected Areas	Reference WFD-GW-9	
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	Version:1	Draft River Basin Plan

## 1.0 Purpose

This paper describes the approach taken to assess the Water Framework Directive (WFD) chemical status of groundwater bodies with respect to Drinking Water Protected Areas (DWPA's).

## 2.0 Background

The WFD requires that groundwater bodies must 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).

Determining whether significant potable sources are being unacceptably impacted by groundwater pollution is one of the five tests developed for groundwater body chemical classification, based on WFD requirements and guidance provided at an EC and UK level<sup>1</sup>. The five tests consider groundwater chemical composition with respect to impacts on the groundwater body (including significant potable supplies) as well as on the ecological receptors which depend on it. The worst result from all five tests is taken as the overall chemical status result for each groundwater body.

Under the WFD initial characterisation, all groundwater bodies in Northern Ireland with the exception of one have been designated as drinking water protected areas on the basis of their existing or potential future use as a source of potable water.

Historically in Northern Ireland, directly abstracted groundwater has represented a relatively minor component of the entire potable water supply volume. Abundant surface water sources, a high average rainfall and the localised nature of aquifer systems has resulted in rivers, reservoirs and lakes being the principle source of potable water, mainly for public water supply. Nevertheless groundwater has played an important role in certain areas of Northern Ireland, providing water for public supply as well as for the bottled drinks and food production industry and private agriculture and domestic supply.

Previously groundwater is thought to have contributed ~10% of public water supply but this proportion has been declining in recent years to a current level of ~5%. At present it is understood the water undertaker proposes to phase out all regular use of groundwater sources within the public water supply system within the short to medium term.

There remains however a modest number of moderate volume (100-1000 m<sup>3</sup>/d) groundwater sources being used for bottled drinks and food production. Such sources are regulated under the Private Water Supplies Regulations (Northern Ireland) 1994. In addition generally smaller volume dairy sources also fall under this same legislation (constituting ~ 90% of all sources regulated).

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<sup>1</sup> UK Technical Advisory Group on the Water Framework Directive. Paper 11b(i): Groundwater Chemical Classification for the purposes of the Water Framework Directive. This paper can be downloaded from the [www.wfduk.org](http://www.wfduk.org) web site.

## Water Treatment

There is little treatment of water undertaken at any of the identified potable groundwater sources. Chlorination is undertaken as standard for public water supply. In the limited number of circumstances where elevated levels of specific pollutants have been identified (e.g. nitrates) the quality of the final supply has been managed through blending with water from other lower concentration sources.

Similarly with non-public water supply potable sources, treatment is minimal other than for a very few exceptions where local pollution impacts require a specific form of treatment. Treatments used fall into three categories:

- Disinfection by either chlorination or ultraviolet light treatment
- Filtration through rapid gravity, slow sand, carbon or cartridge filters
- Softening by ion exchange.

### 3.0 Classification

An assessment of available chemical data and treatment practices at significant 'potable' sources (non-agricultural) monitored by the Northern Ireland Drinking Water Inspectorate (DWI) and/or the Northern Ireland Environment Agency Water Management Unit (WMU) has been undertaken. This assessment has been undertaken to support the following element of classification:

#### Chemical Classification

- Impact on Drinking Water Protected Area's

The review of data also considered identification of upward trends as required under the WFD.

### 4.0 Assessment Process

- i) Monitoring Data

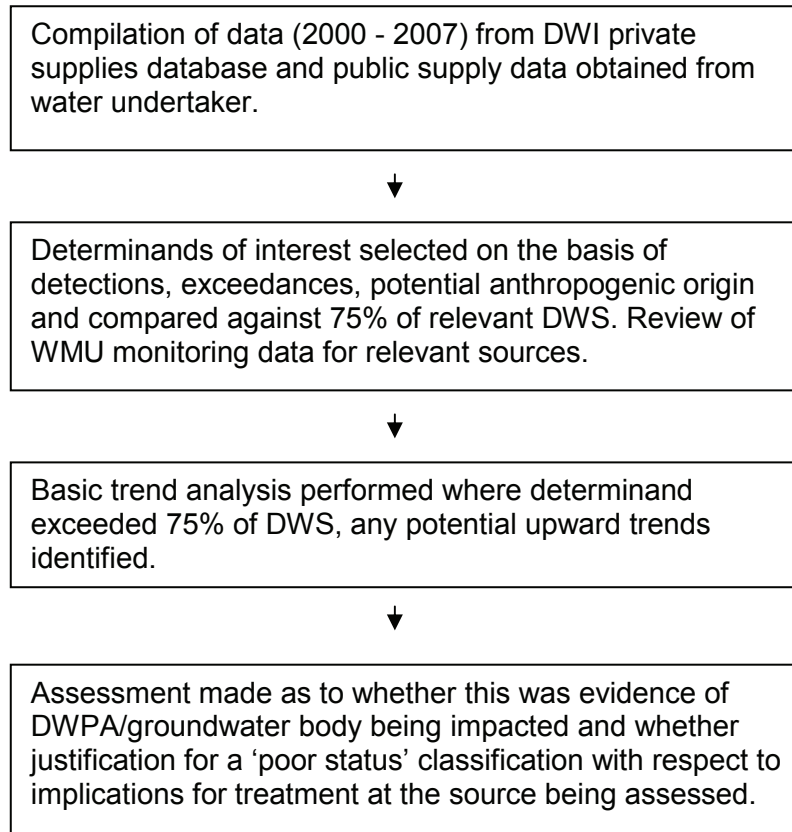
Raw water quality and supply water quality data has been obtained for known significant volume potable supplies including public water supply sources. The data has been reviewed for evidence of anthropogenic impacts by comparing against threshold values (default 75% of relevant Drinking Water Standard (DWS)). The main parameters considered following screening were (subject to data availability);

Aluminium	MCPA
Ammonium	MCPP (Mecoprop)
Arsenic	Nitrate/ Nitrite
Asulam	Phosphorus
Atrazine	Polycyclic aromatic hydrocarbons
Chloride	Tetrachloroethene
Chlortoluron	Trichloroethene
Fluoranthene	
Glyphosate	
Isoproturon	

## ii) Trends

Where any chemical parameter considered to be of likely anthropogenic origin has been detected above its relevant threshold value (default 75% of relevant DWS standard) a review of mean values and whether there is any evidence of an upward trend has been undertaken.

A summary of the assessment process is given below.



## 5.0 Confidence and Risk

Confidence in the assessment is influenced by a number of factors including:

- the incomplete nature of datasets from third party sources;
- generally insufficient data to undertake statistically robust trend assessment;
- DWI data mostly post treatment (although note that few sources have any significant treatment in place);
- uncertainty over whether all significant potable sources have been identified as abstraction licensing regime only recently introduced in Northern Ireland (although unlikely to be many, if any, not already known about); and
- uncertainty over pumping regime (and hence representativeness of data) at time of sampling for third party datasets.

Because of the above factors only a low confidence can be assigned to the assessment for diffuse anthropogenic pollutants such as nitrate. For groundwater bodies with no currently identified significant potable sources a 'not at risk' high confidence determination was made for DWPA diffuse anthropogenic pollutant impact.

Groundwater bodies with no known significant potable sources and no significant urban or industrial areas were given a high confidence and 'not at risk' determination with respect to point source/urban type anthropogenic pollutants such as chlorinated solvents. Groundwater bodies with a significant urban or industrial area were given a low confidence determination irrespective of whether potable sources were identified or not. Generally a 'not at risk' low confidence was assigned to all remaining groundwater bodies except where monitoring data from potable sources indicated an exceedance of the relevant threshold, taken as 75% of the relevant Drinking Water Standard (DWS). For pollutants associated with point sources such as chlorinated solvents there was generally insufficient data to determine any trend. In such cases an 'at risk' low confidence determination was assigned.

## **6.0 Outcome**

The assessment identified that very few potable sources had any form of treatment installed other than basic chlorination or UV for microbial management. The review of available monitoring data identified few exceedances of threshold values.

For reporting purposes two bodies (GBNI4NB002 and GBNI4NB003) have been identified as at "good status" but 'at risk' due to detections of solvents above the threshold value on occasion, for one DWPA source in each body. Insufficient raw water data is available for trend assessment; hence it was considered that the data was not adequate to justify a poor status assessment. Two bodies were identified as being at poor status due to elevated mean nitrate concentrations and rising trends at DWPA sources.

Based upon the above assessment two groundwater bodies have been classified as being at poor status for DWPA (nitrate).

## **7.0 River Basin Planning Cycle**

To improve confidence in this assessment before the next review period there is a need to:

- update the DWPA source dataset and collate relevant monitoring data from representative sources;
- visit relevant source sites (where not being sampled under the NIEA WFD groundwater monitoring programme) to gain further information on the source and sampling point; and
- engage further with the Drinking Water Inspectorate (DWI) and Northern Ireland Water (NIW) with aim of optimising collection of relevant groundwater quality data suitable for classification assessment and trend analysis.