Alternative Objectives: Time Extensions and Less Stringent Objectives

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Introduction

The Water Framework Directive (2000/60/EC) (WFD) establishes a suite of environmental objectives for groundwater. In implementing the Directive and producing the first River Basin Management Plans, Member States have had to identify whether the these objectives are being met. If this assessment has shown that one or more of the objectives for groundwater is not being met, or is at risk of being failed, programmes of measures must be implemented to ensure that all relevant environmental objectives are met within six years – the publication date of the next River Basin Management Plan (22nd December, 2015).

In reality, especially for groundwater, achieving all the relevant objectives in such a short timescale may not be possible or practical. The WFD recognises this and allows for an extension of the deadline (beyond 2015) for the purposes of a phased achievement of the environmental objectives. This is provided that there is no further deterioration in status (Article 4.4). Any such extension is limited to a maximum of two further river basin cycles (12 years) except where natural conditions mean that objectives can still not be achieved.

A further provision is made for the situation where a water body is so badly affected by human activity or where natural conditions mean that achievement of the objectives(s) would be infeasible or disproportionally expensive. In these cases less stringent objectives (relative to those defined in Article 4.1) can be set, provided that there is the least possible deviation from good status conditions.

Where extended deadlines or less stringent objectives have been proposed, Member States must provide an explanation and justification in the River Basin Management Plan. In the case of extended deadlines, a timetable for implementation of measures and the achievement of objectives must also be provided.

This paper provides an overview of the approach used in England and Wales for identifying programmes of measures for groundwater, predicting outcomes and setting alternative objectives in relation to groundwater quality. Similar approaches were used for quantitative (water resource) aspects and also for surface water bodies.

Environmental objectives for groundwater quality

The WFD contains the following environmental objectives for groundwater quality:

Prevent or limit inputs of pollutants to groundwater - This applies at the point of discharge to groundwater. If comprehensive measures to meet the prevent or limit objective (PoL) are put in place they should, in time, result in achievement of all other environmental objectives for groundwater.

No deterioration in status - This will be achieved through the effective implementation of PoL measures. Groundwater bodies that are currently at good status, but where there is evidence of significant deterioration in quality that could eventually lead to poor status, are a high priority for action.

Restoring bodies to good chemical status - Where a groundwater body is at poor chemical status, effective PoL measures should eventually restore the body to good chemical status. However, where historical (often unregulated) activities have resulted in land contamination and have affected groundwater, additional remedial measures are required. The ability to achieve this objective, although not necessarily the most challenging, is likely to be one of the principal indicators used to measure success.

Reversal of trends - A significant and sustained upward trend in pollutant concentrations is one which is statistically and environmentally significant. For a trend to be environmentally significant it must be one that, if not reversed, could lead to a failure of one or more environmental objectives, e.g. deterioration in status. PoL measures will be used to achieve reversal of trends, but this reversal may not be immediate due to the delayed response in groundwater.

Protected Areas - There are two Protected Areas of particular concern for groundwater quality: 1) Drinking Water Protected Areas (DrWPA) and; 2) Nitrate Vulnerable Zones (NVZs) – EC Nitrates Directive. Achieving the objectives for DrWPAs is also a requirement for meeting good chemical status for groundwater bodies.

Prioritisation of objectives

There is an inherent priority in the groundwater quality objectives based on the timescales for implementation, spatial scale of application and the ability to use time extensions, less stringent objectives and exemptions. This determines their significance for protecting groundwater quality, and therefore the priorities for meeting them. A prioritised list of the groundwater quality objectives is set out in Table 1. The highest priority objective is first.

Table 1. Groundwater quality objectives, exemption options and priorities.

Groundwater Objectives	Alternatives available	Time scale for achieving	Spatial scale for action
1. Prevent or limit	None, but some exemptions	Short	Local (all groundwater)
2. Protected Area Objectives	Possible time extensions where not set by other Directives	Other directives - Short DWPA – Medium	Medium - the protected area
3. No deterioration in status	None	Medium	Large (groundwater bodies)
4. Trend reversal	None – Measures must be implemented and working by 2015	Long	Medium
5. Achieve good status by 2015	Time extensions, Less stringent objectives	Medium	Large (groundwater bodies)

Current compliance with the status objective in England and Wales

There are 304 groundwater bodies in England and Wales and each has been assessed for status. The approach used for status assessment can be found in UKTAG guidance (UKTAG, 2007). It is based on the approach recommended in the WFD CIS Guidance document (European Commission, 2008) and comprises five chemical status tests and four quantitative status tests. Each test addresses one of the quality elements that defines good groundwater status (chemical and quantitative).

The results below show the number of groundwater bodies that are at poor chemical status for each of the tests:

- Saline Intrusion = 11
- Surface Water Ecological Status = 54
- General Chemical Assessment = 48
- Drinking Water Protected Area = 53
- Groundwater Dependent Terrestrial Ecosystem = 2

After combining these results, 124 groundwater bodies (41%) are at poor chemical status. There are also 81 groundwater bodies (27%) that have an environmentally significant upward trend in pollutant concentrations.

The main pressures affecting groundwater quality in England and Wales, and contributing to the status failures and trends are significant point sources of pollution (from a range of chemicals)

and diffuse pollution from nutrients, mines and minewaters, pesticides, and urban sources. There are also abstraction pressures which have caused saline intrusion.

Development of measures

In England and Wales there is already an effective strategy for protection and improvement of groundwater quality – the Environment Agency's Groundwater Protection: Policy (GP3) (Environment Agency, 2008). For deliberate discharges permitting regimes are applicable, in particular, Environmental Permitting Regulations permits. For non-deliberate inputs of pollutants to groundwater the controls are both regulatory and advisory, the main measures being Environmental Permitting Regulations notices, Anti-pollution Works notices, Nitrate Vulnerable Zones, Local Authority land use planning, codes of practice, guidance notes, memoranda of understanding/operating agreements, Voluntary Initiative (for pesticides), England Catchment Sensitive Farming Delivery Initiative and day to day site specific pollution prevention advice.

These are all targeted using a risk-based approach that is supported by groundwater quality monitoring.

As a general guide, the measures that are adopted address the objectives and priorities noted in Table 1. Whilst measures are needed to address poor status, it is equally important to consider measures in groundwater bodies that are currently good but which are deteriorating in quality. Such deterioration will compromise both the no deterioration in status and trend reversal objectives. It may also indicate that existing PoL measures are not being effective and need to be improved.

Programmes of Measures and outcomes

The first step in the measures appraisal process was to centrally collate a list of specific existing and planned national measures. Technical experts then considered the effectiveness of these national measures in meeting the WFD objectives. They then identified what additional local measures could be put in place to fill any gaps using expert judgement. All programmes of measures were then further reviewed nationally to ensure consistency across River Basin Districts and then sent out for public consultation (draft River Basin Management Plans).

As part of the measures appraisal process the predicted outcome for each measure and the timescale for restoring the groundwater body to good status (if it was currently at poor status) was determined. This took into account the effectiveness of existing and planned local and national measures, and the recovery time of each groundwater body. The approach used for

groundwater quality is shown in the Groundwater Quality Decision Tree in Figure 1 (Environment Agency, 2009).

Because groundwater generally has a long residence time, groundwater bodies take a long time to respond to measures and return to good status. In many cases this means that good status will not be achieved by 2015 and in some cases it may take longer than 2027. Wherever there is significant uncertainty about how long recovery will take because of hydrogeological conditions an initial assumption has been made that the body will be good by 2027. In the second RBMP a more robust assessment of likely recovery time will be made as there will be more monitoring data and more knowledge of the effectiveness of the measures.

Five groundwater bodies are also expected to take longer than 2027 to recover because there is currently no known technical solution to deal with the problem that has caused the status failure.

Justification of time extensions and less stringent objectives

It has been predicted that it will be disproportionately expensive to get many poor status groundwater bodies to good status by 2015. This is because groundwater quality responds very slowly to most measures in most groundwater bodies, particularly with respect to diffuse pollutant sources – the largest cause of failures. Although it is technically feasible to implement a solution, measures to directly remediate groundwater quality are normally disproportionately expensive or have other undesirable environmental outcomes. By extending the deadline to 2021 or 2027, less costly measures can be used that utilise land use change in place of direct groundwater remediation schemes (e.g. pump and treat schemes). Therefore over a longer time period the cost of meeting good status is much lower, and therefore the benefits are likely to outweigh the costs in many groundwater bodies.

The justification used in these cases was - ‘disproportionately expensive – unfavourable balance of costs and benefits’. This justification was used to justify time extensions to 2021 or 2027 on groundwater bodies that had been impacted by a wide range of pressures, including high nitrate concentrations.

There were also a significant number of groundwater bodies where it was technically infeasible to get to good status by 2015. This was particularly the case for groundwater bodies where further investigations are needed. In these cases the justification used was – ‘technically infeasible - cause of adverse impact unknown’. For example, this justification was used where elevated phosphate concentrations had caused a groundwater body to go to poor status, but where further investigation is needed to improve the understanding of the Source-Pathway-Receptor conceptual model.

For a small number groundwater bodies that are at poor status we used the justification of 'technically infeasible - no known technical solution is available' to extend the deadlines or set less stringent objectives. In these cases the problem causing the status failure was either as a result of historical widespread impacts (e.g. from mining or widespread industrially contaminated land) or it could not be identified despite extensive investigation.

The justification of 'natural conditions - groundwater status recovery time' was used on a small number of groundwater bodies that could not be restored to good status by 2015. An example of where this has been used is in groundwater bodies where the failure is due to widespread impact of pesticides that are now banned, e.g. atrazine. Despite the ban the groundwater body will take more than six years to recover and no further cost-effective measures can be taken.

Finally, the 'disproportionately expensive – disproportionate burdens' justification was also used on a small number of groundwater bodies that were not expected to be restored to good status by 2015. This justification was only used where a measure is planned but its implementation is being phased over a reasonable period of time to avoid a disproportionate economic and technical burden.

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Keywords

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Figure 1 Groundwater Quality Decision Tree for Alternative Objectives