Supporting document

Groundwater Draft Classification Methodology: Drinking Water Protected Area Test 2020/2021

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Northern Ireland Environment Agency
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Groundwater Classification Methodology: Drinking Water Protected Area Test

Introduction

All groundwater bodies in Northern Ireland are classified in 2020 to establish whether they are at 'good' or 'poor' status utilising monitoring data for the past 6 years (January 2014 – December 2019). Status is divided into qualitative and quantitative status and a number of tests are carried out for each, see Figure 1.

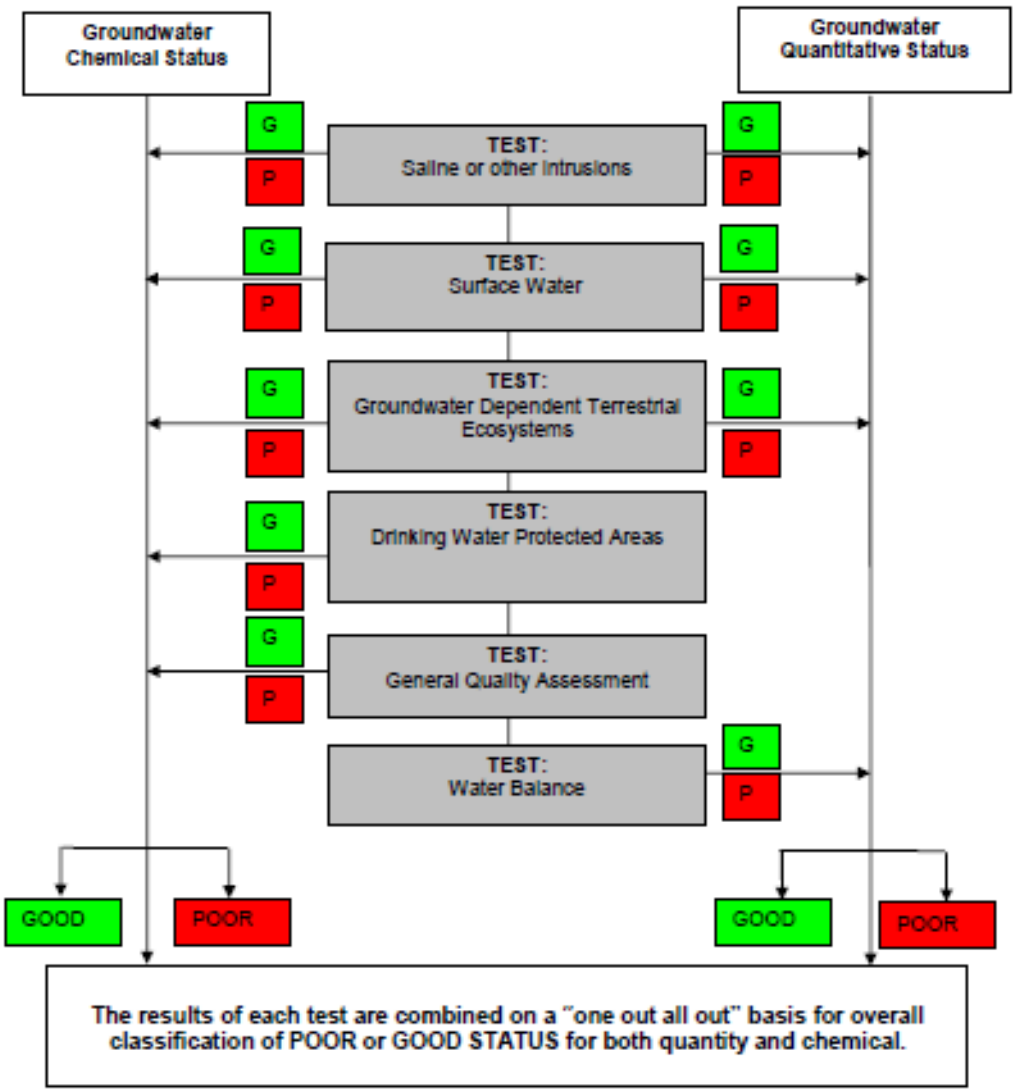

Figure 1: Overview of classification tests [from UK Technical Advisory Group paper 11b(i).

Drinking Water Protected Area Classification

The Drinking Water Protected Area (DWPA) test determines whether significant potable sources are being unacceptably impacted by groundwater pollution and is one of the five tests developed for groundwater body chemical classification based on Water Framework Directive (WFD) requirements and guidance provided at an EC and UK level (UKTAG, 2012a). The test comprises two basic elements, firstly an assessment of whether existing untreated water quality exceeds a threshold and secondly whether there is a deterioration (increasing trend) that could result in the need for new or additional purification treatment.

All groundwater bodies except one (Neagh) are defined as drinking water protected areas.

The method for DWPA classification is given below and was derived from the UKTAG guidance for chemical classification, updated for the 2nd RBMP cycle (UKTAG, 2012a).

1. Identify if there is any site specific studies relevant to this test.
If yes, the following process applies to regional monitoring as well as data monitoring from the site specific study.

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2. Compile all monitoring data from the regional groundwater monitoring datasets.

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3. Export all data for the relevant determinands

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4. Calculate the annual mean for the past 6 years (one mean over six years) for each monitoring site.

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5. Data Analysis: Do any annual means (one mean over six years) from each monitoring point exceed the screening value? (50 % of the drinking water standard) If no, groundwater body is at 'good' status, otherwise continue to step 6.

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6. Data Analysis: Do any annual means (one mean over six years) from each monitoring point exceed the threshold value? (75 % of the drinking water standard) If yes, then look for further lines of evidence – groundwater body might be at 'poor' status.

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7. For any monitoring points that exceed the screening value and/ or threshold value, perform a trend assessment using six to ten years raw data and forward projection to 2026. Does the forward projection exceed the relevant threshold value (75 % of DWS) by 2026?

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8. If screening value is exceeded (50 % of DWS – see step 4) and the trend assessment (step 6) indicates a trend that will exceed the relevant threshold value by 2026, then groundwater body is at 'poor' status.

Monitoring Data

Groundwater quality in Northern Ireland is measured through the collection of water samples from boreholes and springs that are mostly owned and operated by third parties. Hence NIEA rely on the co-operation of land/ property owners to continue sampling from their groundwater sources for the chemical monitoring. This means that the network can change due to businesses closing or changing their groundwater usage and datasets for trend assessments are often small. The network consists mainly of industrial boreholes where groundwater is utilised for manufacturing or food/ drinks production. A small number of springs or boreholes purpose-installed by NIEA, which are purged prior to sampling, are also monitored. Regional monitoring of groundwater across Northern Ireland began in 2000. The monitoring frequency and selection of determinands follows UKTAG guidance.

Monitoring data form the Drinking Water Inspectorate (DWI) can be used as an additional line of evidence. This has not been considered for draft classification but will be for final classification.

Threshold Values

New threshold values for classification were introduced by UK Technical Advisory Group who consulted on them in 2012. Threshold values used for classification can also be found in the Groundwater (Amendment) Regulations (Northern Ireland) 2014.

The determinands for which this assessment is to be applied are:

Deteminand	DWS	TV	Screening Value (50%of DWS)
Aluminium µg/l	200	150	100
Arsenic µg/l	10	7.5	5
Atrazine µg/l	0.1	0.075	0.05
Cadmium µg/l	5	3.75	2.5
Chloride µg/l	250	187.5[1]	125
Lead µg/l	25	18.8	12
MCPA µg/l	0.1	0.075	0.05
MCPP (mecoprop) µg/l	0.1	0.075	0.05
Mercury µg/l	1.0	0.75	0.5
Nitrate mg/l NO_3	50	37.5	25
Polycyclic Aromatic Hydrocarbons µg/l	0.1	0.075	0.05
Simazine µg/l	0.1	0.075	0.05
Sulphate mg/l	250	187.5	125
Tetrachloroethene µg/l	10	7.5	5
Trichloroethane µg/l	10	7.5	5
Total Pesticides µg/l	0.5	0.375	0.25

[1.] Note: a separate threshold value applies for the saline intrusion test.

As recommended by the UKTAG (2012b), screening values (risk assessment concentrations) should be 50 % of the relevant DWS. This is so that there is ample time to take action to prevent a future exceedance of the threshold value which would require further investigation.

Trend Assessment

Identifying significant and sustained upward trends of certain parameters is important for ensuring that objective IV of the WFD is met. An upward trend is indicative of an anthropogenic pressure on a groundwater body. Analysing monitoring data for a significant and sustained upward trend is therefore important.

The Northern Ireland Environment Agency (NIEA) commissioned the British Geological Survey to review methods of trend assessment applicable to small datasets. The recommendation made by the review was to combine several methods like Sen and Man-Kendall to increase confidence in the trend assessment. The trend assessment has been carried out using the inbuilt function of the AquaChem software package. This was designed by Schlumberger Water Services in conjunction with the Environment Agency of England specifically to assess trends within groundwater monitoring data collected for the purposes of WFD classification and characterisation. The software also includes a forward projection capability to predict concentration levels for the next river basin planning cycle.

Further information on the trend assessment method can be found in Stuart (2012)

References

Council Directive (EC) 2006/118/EC of 12 December 2006 on the protection of groundwater against pollution and deterioration

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