Supporting document

Groundwater Draft Classification Methodology: Surface Water Quantitative Test 2020/2021

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NIEA Northern Ireland Environment Agency
www.daera-ni.gov.uk

An Agency within the Department of Agriculture, Environment and Rural Affairs
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Groundwater Classification Methodology: Surface Water Quantitative Test

Introduction

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

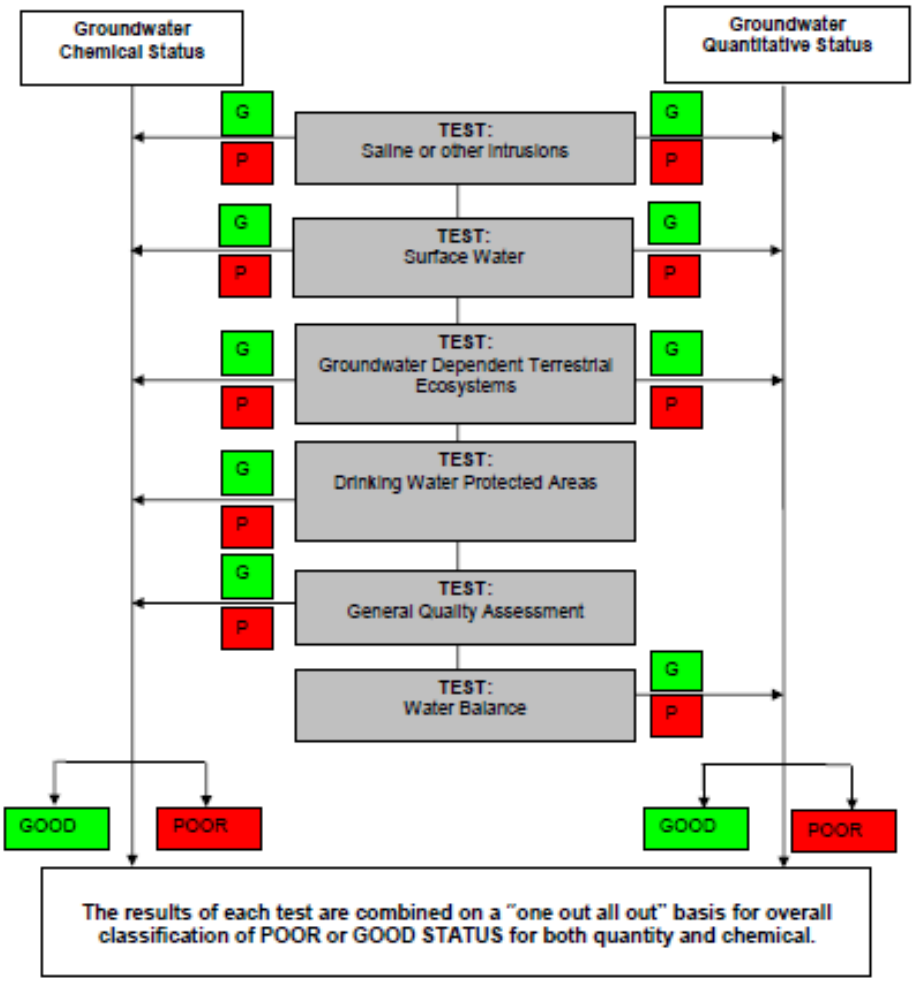

Figure 1: Overview of classification tests [from UK Technical Advisory Group paper 11b(i)].

Surface Water Quantitative Classification

The Surface Water Quantitative classification test evaluates whether an abstraction or set of abstractions are likely to lead to a deterioration in status of a surface water body. Abstracting groundwater reduces the volume of water that discharges into a surface water feature as base flow. Surface water features can include rivers, ponds, lakes and wetlands. If this reduction is too great, it can lead to the river, river flows and lake levels being threatened and ultimately the surface water feature may dry up for periods. This can have serious consequences for ecosystems dependent upon the water supply.

If a surface water body is found to be at 'poor' status due to groundwater abstractions, the groundwater body or bodies with which that surface water body is hydraulically connected will be characterised as being at 'poor' status.

Explanation of the method is given below, with specific detail given to the origin and processing of data required for the implementation of the method.

This method is derived from the UKTAG guidance for quantitative classification, updated for the second RBP cycle (UKTAG, 2012).

1. Identify all surface water bodies that are at less than 'good' quantitative status (on a scale from 'high' – 'good' – 'moderate' – 'poor') using LowFlows Enterprise.

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2. For the subset identified in step 1 only: identify those catchments where greater than 50 % of the allowable abstraction can be attributed to groundwater.
Classify the associated groundwater body or bodies as 'poor' status.

LowFlows Enterprise Model

The system estimates river flows for any river reach within Northern Ireland (NI) even where measured flow data are not available. LowFlows Enterprise is a regional NI model where it integrates within a GIS framework the latest hydrological models for predicting natural and artificially influenced river-flows within NI ungauged catchments.

Previous computer based flow models have applied methodologies adapted from elsewhere within the United Kingdom and have not necessarily been representative of NI river flow regimes. LowFlows Enterprise provides catchment characteristics and flow statistics for any specified catchment using spatial data sets from NI.

LowFlows Enterprise will have only licensed groundwater abstractions programmed into it. LowFlows Enterprise uses a Theim approximation method, which relies on aquifer properties derived by The Geological Survey of NI for six different hydrogeological typologies. The Theim approximation calculates a flow reduction plan for nearby river stretches and this is then applied to a river flow model to demonstrate the effect of the abstraction on that river stretch.

References

UKTAG Paper 11b(ii), (2012). *Groundwater Quantitative Classification for the purposes of the Water Framework Directive.* www.wfduk.org

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