

## Nutrient pollution from agriculture

Questions:

- In addition to the proposed national target, we would like to set out ambitions for reducing nutrient pollution from agriculture in individual catchments. Do you agree or disagree that this approach would strengthen the national target? [Agree/Disagree/Don't know]

Agree.

*Why do you think ambitions for reducing nutrient pollution from agriculture in individual catchments will strengthen the national target?*

This would be beneficial as it accounts for heterogeneity across catchments in hydrogeological setting and land use, current nutrient loadings and the balance of different forms of nitrogen within the total nitrogen load. It is important to control the nutrient loading from different sources, especially from agricultural sources, as it will be difficult to remove nutrients once they enter the groundwater system, which can take decades to show the impacts of the pollutants on the quality of groundwater and hence surface waters that groundwater feeds. Therefore, it is crucial to explore feasible ways to reduce nutrient loadings from sources in individual catchments.

*What factors should the government consider when setting these ambitions?*

Although the water targets detailed evidence report mentioned the logic models for the development of this target and the potential policy pathways for delivering this target, it is important to consider these factors when examining the feasibility and implementation of this target:

- “As noted by the WEAG, a 50% reduction of phosphorus, nitrogen and sediment loads from agriculture would get us closer to achieving good ecological outcomes in many waterways”. However, there is pressure on both population growth and food security. Therefore, it is necessary to answer: Will the agricultural practices for reducing nutrient pollution affect food production? It would be helpful to explore ways for keeping the balance between food production and environmental protection. This also helps people better understand how the pollutants from different sources affect waters in a specific catchment, thus helping people to set feasible nutrient reduction targets for individual catchments. Apart from other methods, multidisciplinary modelling, such as BGS' soil nitrogen cycling model, would fit this purpose.
- When examining the nutrient reduction targets, it is also necessary to consider: What are the possible land-use change trends before 2037 under the likely political and economical development trends? BGS' Land-use change modelling can help answer this question and provide better land-use inputs for modelling work to evaluate the proposed nutrient reduction targets.
- It is worth noting that climate change can also affect water and nutrient cycling, therefore, it is useful to consider the climate change factors when examining the nutrient reduction targets.
- The evidence report mentioned that the surface water quality improvement has been slow. It is important to bear in mind that water quality in many rivers is affected by groundwater conditions. To help the regulator to set a realistic time

scale for expecting the improvement of water quality, it is crucial to understand how and when these nutrient loading changes affect the quality changes of groundwater, surface waters, and groundwater dependant ecological systems. Numerical models, including BGS' nitrate time bomb model, would be useful in answering this question.

## **Abandoned metal mines**

### *Questions:*

The “Abandoned metal mines” target proposed in the consultation is to “Reduce the length of rivers and estuaries polluted by target substances from abandoned mines by 50% by 2037 against a baseline of around 1,500km”.

BGS generally agrees with the level of ambition proposed for an abandoned metal mines target.

The target is coherent with the Water & Abandoned Metal Mines programme (WAMM), set up by the government; the proposed monitoring of “pollutant concentrations in rivers”, to measure progress in achieving the target, is consistent with the EA statutory monitoring of the River Basin Management Plans.

The level of target ambition is high, but the target is seen as achievable, if able to drive investment and innovation.

### Comments on achievable target:

- The proposed target comprises rivers and estuaries: It is not clear if the key dependencies of the two systems and remediation strategies, together with the associated risks of non-achievement, are clearly identified.
- The proposed deliver plans consider to use passive technologies and new technologies that focus on ongoing emissions from abandoned metal mines. With these remediations implemented, the metal load, both “particulate” or “dissolved” metal, contributing to the bed sediment, is expected to go down. This will be measured and proved by the proposed monitoring strategy. However, it is difficult to predict, based on current evidence, whether, once the metal content entering the rivers reduces, “physical” dilution will be sufficient for reducing exposure of river benthic organisms to the metals in the sediments; How long the river ecosystem will take to heal itself? Is the evidence sufficient to disregard the in-stream metal mine contaminated sediments as a more significant source of water contamination after remediation measures have been set up? In the worst case scenario, will this impair the benefits of any remediation? An integrated approach involving a variety of tools from different disciplines (ecology, geochemistry, biology, toxicology) is recommended to accompany the “pollutant concentration monitoring”, possibly targeting reaches where the particulate load was significant.

### General comment:

Where target areas correspond to new mineral prospecting areas, it is recommended to include other elements (such as lithium) in the monitoring to provide baseline assessment against future changes due to new mining activity.