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Case Reference: NVZ/2022/0013

**First-tier Tribunal
(General Regulatory Chamber)
Nitrate Vulnerable Zones**

**Decided without a hearing
Decision given on: 05 March 2024**

Before

**JUDGE NEVILLE
DR K AKANDE**

Between

MR STEPHEN WILLIAM TOWSE

Appellant

and

THE SECRETARY OF STATE FOR ENVIRONMENT, FOOD & RURAL AFFAIRS

Respondent

Decision: The appeal is dismissed.

REASONS

1. This appeal concerns land at Hall Farm, Holme on Spalding Moor, Yorkshire.
2. Regulation 4(2) of the Nitrate Pollution Prevention Regulations 2015 (“the regulations”) requires the Secretary of State to monitor the nitrate concentration in freshwaters to identify whether it may be affected by pollution (or could be if the controls provided by the regulations are not applied), and then to identify land which drains into those waters and that contributes to its pollution. Such land may then be designated as a “nitrate vulnerable zone” (“NVZ”).
3. The regulations define “a relevant holding” as land and any associated buildings used for growing crops in soil, or rearing livestock for agricultural purposes, that fall wholly or partly in an NVZ. The occupier of a relevant holding must comply with rules concerning the use of nitrogen fertilisers and the storage of organic manure. Before the Secretary of State revises or adds to the designation of NVZs, regulation 5 requires him to publicise his proposals and send written notice to anyone appearing to be the owner or occupier of a relevant holding.

Regulation 6 then affords such an owner or occupier a right of appeal to the Tribunal. So far as still applicable, the only permitted grounds of appeal are that the relevant holding (or any part of it):

(a) does not drain into water which the Secretary of State proposes to identify, or to continue to identify, as polluted or which has been similarly identified in Wales or Scotland, [or]

(b) drains into water which the Secretary of State should not identify, or should not continue to identify, as polluted.

The Secretary of State refers to these as Type A and Type B appeals, respectively.

4. Mr Towse appeals a notice served upon him by the Secretary of State, proposing to include the land he occupies as a relevant holding that falls within NVZ numbers S249 and S250. Both parties have consented to the appeal being decided without a hearing. We have considered the contents of a bundle prepared on behalf of the Secretary of State and subsequent written submissions by Mr Towse. While the Secretary of State is the decision-maker under the regulations, his decision is based on analysis produced by the Environment Agency. It is therefore the Environment Agency which has responded to this appeal on the Secretary of State's behalf.
5. Mr Towse raises a number of grounds, all of which relate to a Type B appeal. The introduction to them is helpful in understanding Mr Towse's overarching concerns.

Being a lifetime farmer as was my father before me I have a good understanding of our differing land types and soil health on the farm which given today's world of regulation becomes more difficult as one cap does not fit every occasion or field in the countryside.

It is all too easy for the office bound academics setting rules or directions within the written word, or by a straight line drawn with a ruler, but not so easy to implement, when allowing for imponderables as well as unpredictable weather patterns within the arena of outside working conditions.

The Agricultural Nitrates Directive with all its good intentions is an academic exercise, using algorithms, which not only brings further controls but higher costs on food production.

6. His more specific arguments are summarised as follows:

(1) NVZ Area S249 and S250 catchments should never have been included within a Nitrogen Vulnerable Zone. -and- (2) The zoned catchments are within what was the Market Weighton IDB area.

(3) The Weibull system is not an accurate system of measurement as it suffers from the Weibull Wobble.

(4) The contaminants from sewage systems outflowing into the drainage system are substantial.

(5) The 95th percentile can be unpredictably biased in its calculation.

- (6) *The calculation methods in [the Nitrate Leaching Tool (“NLT”)] do not simulate every detail of nutrient management.*
 - (7) *The area is through sandy soils with soil sample showing high phosphorus levels which are not readily available.*
 - (8) *Being a man-made system there are no visible mixing zones along the sandy length of the drainage system.*
7. To the above can be added an assertion that the designation is against Mr Towse’s human rights or is otherwise not in accordance with the law.
8. We shall provide context to those arguments and further details in these reasons where practicable, but only so far as is necessary ensure that the parties to the appeal know why they have won or lost. We have paid careful attention to all the evidence and arguments put forward by the parties, and independently assessed it applying the specialist expertise in our composition.
9. The Rule 23 Response to Mr Towse’s appeal begins as follows:

Surface water NVZ S249 and S250 are existing waterbody NVZs. The NVZ designations followed the published designation methodology. The entire Water Framework Directive (WFD) river catchments are designated based on the results of the worst water quality monitoring points in combination with the local land use model results. The surface freshwater methodology applies to the designated waterbodies within the River Foulness and Market Weighon Canal area.

Total Inorganic Nitrogen (TIN) concentrations along the River Foulness as well as along the Market Weighton Canal are predicted to exceed the threshold in the current and future TIN 95th percentile estimate at three monitoring points. The most polluted sample point in the designated catchment waterbody remains to be a monitoring point situated along the River Foulness (49100409NE). The WFD river catchment has consistently failed surface water NVZ criteria.

We contest this appeal because, the worst performing watercourses in both catchment waterbody type NVZs continue to fail and therefore the agreed method has been followed in this area.

10. A detailed report by the Environment Agency is then provided setting out the legal framework concerning NVZs, the testing that is done to identify them, and how the data from testing is analysed and the final designation reached. Mr Towse responded with providing an annotated copy setting out his observations, which we have also taken into account. We now turn to Mr Towse’s grounds of appeal (taking some of them together).

(1) NVZ Area S249 and S250 catchments should never have been included within a Nitrogen Vulnerable Zone -and- (2) The zoned catchments are within what was the Market Weighton IDB area.

11. The Environment Agency explains as follows:

We agree that the natural catchment drainage system and surface waterways within NVZ S249 and S250 designations have historically been modified. The area originally

consisted of a large area of marshland interspersed with many watercourses. These marshes were drained for the use as farmland through the creation of the Market Weighton Canal. The NVZ S249 designation protects the River Foulness from Black Beck to Market Weighton Canal. This waterbody (GB104026066690) is not designated to be artificial or heavily modified under the Water Framework Directive (WFD) waterbody hydromorphological classification.

Today, the River Foulness flows from above Holme on Spalding Moor down to its confluence with the Market Weighton Canal, which flows into the Humber Estuary. Both watercourses play (still today) a key role in draining the surrounding farmland.

Please note that Environment Agency amended the outline of WFD River Foulness from Black Beck to Market Weighton Canal river waterbody catchment designation GB104026066690 in Cycle 2 2019 classification (Map A). This has no implication on the appellants' land holdings situated within the designated nitrate vulnerable zones.

12. A table is then provided for the monitoring of the two NVZs.

Table 1: S249 and S250 water quality monitoring data (1990-2019)

Sample ID	2020 EA Data Review
	Current 95%ile TIN estimate [mg/L]
S249	
49100409NE	16.92 (6) (2014-2019)
49100406NE	13.34 (6) (2014-2019)
S250	
49100257NE	Monitoring ceased in 2012
49100259NE	11.85 (4) (2014-2017)

13. In the above, TIN stands for Total Inorganic Nitrogen and is the value obtained from Environment Agency monitoring of water pollution. In case the colours are not reproduced in the public copy of these reasons, the second and third entries are coloured red and the sixth entry is coloured yellow. The Response explains the methodology for determining the number of milligrams of nitrate per litre of water from the TIN figure, which is not disputed. The applicable threshold under the legislation is 50mg/l as NO₃ or 11.3mg/l as TIN.

14. The plotting data for the figures in the above table is provided. Nothing has been put forward that calls into question the reliability of this data, and significant evidence has been deployed to support it. We consider that the data and explanation above is capable of establishing that the relevant surface water is polluted within the meaning of the regulations, so turn to see if such a conclusion is undermined by any of the points put forward by Mr Towse.

(3) The Weibull system is not an accurate system of measurement as it suffers from the Weibull Wobble –and- (5) The 95th percentile can be unpredictably biased in its calculation

15. As well as the Weibull method, Mr Towse’s later submissions also criticise the Quantile Regression method. Both are statistical methods used by the Environment Agency in undertaking the following exercise:

We analyse each monitoring point with sufficient data to determine whether or not:

- *the current (2009 to 2014 or 2015) 95th percentile TIN concentration exceeds 11.3 mgN/l TIN as N (referred to as current TIN) or*
- *the future (2020) 95th percentile TIN concentration is likely to exceed 11.3 mgN/l TIN as N (referred to as future TIN)*

If either the current or future TIN exceeded 11.3 mgN/l, the monitoring site is considered to have failed the assessment. [...]

16. Either the Weibull method or the Quantile Regression method is used to calculate the current TIN, depending on the data held. The Quantile Regression method is used to estimate future TIN. The two methods are explained as follows:

The Weibull method uses the r th ranked value within the observation dataset to provide an estimate of the 95th percentile, where $r = 0.95(n + 1)$ and n is the number of samples. When r is not an integer, r is rounded down and up to the nearest whole number, and the corresponding concentration values for these ranks are interpolated to estimate the 95th percentile. Conservative 90% and 50% confidence intervals are calculated using binomial distribution theory, as described in the Environment Agency Codes of Practice for Data Handling (Ellis et al. 1993). A minimum of 28 and 59 samples are required to calculate the upper 50% and 90% confidence limits, respectively, so for some sites it was possible only to demonstrate with medium or low confidence that the 95th percentile was below the threshold. If the lower 90% confidence limit exceeds 11.3 mgN/l TIN as N, the monitoring point is deemed to have failed the test with high confidence; if the lower 50% confidence limit exceeds 11.3 mgN/l TIN as N, the monitoring point is deemed to have failed the test with medium confidence; if the 95th percentile estimate exceeds 11.3 mgN/l TIN as N, the monitoring point is deemed to have failed the test with low confidence.

Quantile regression (Koenker and Hallock 2001) is a statistical technique that explores how one or more independent variables influence a specified percentile value of the response variable, for example the median (the 50th percentile). In contrast to conventional linear regression, which seeks to explain variation in the mean of the response variable, quantile regression can explain variation in percentile values of the response variable (95th percentile TIN as N concentrations in this case).

Quantile regression is a robust technique that makes no assumptions about the underlying distribution of the data. It is also relatively insensitive to outliers.

17. We accept this as an accurate description. The use of the 95th percentile is explained as follows:

A percentile is a summary statistic that provides information about the distribution (spread) of values in a defined population; for example, the sample data over time from a particular monitoring location. If you measured 100 values from a population, the 95th percentile would be the value that was exceeded only 5% of the time. EC drinking water legislation stipulates a 95th percentile statistic. The 95th percentile is well-suited to standards where we need to be precautionary (where exceedence would risk harm to human health).

18. Mr Towse argues that the Weibull method “uses the Binominal Theory as well as that of Estimation of Probability as the statistical approach of measurement [and] it cannot measure unknown factors such as that from natural environmental pollution”. He cites some possible sources of such pollution. The Quantile Regression method is criticised by Mr Towse as “open to unpredictability, along with estimation of unknown factors [...] similar to ordinary linear regression, quantile regression creates a regression equation that predicts some value for an unknown variable.”

19. The Environment Agency’s response to Mr Towse’s point about the Weibull method is as follows:

The Weibull method is an established statistical technique for ranking data and calculating robust percentile estimates. [...] We use the Weibull method because it’s relatively insensitive to outliers and doesn’t require data to fit a particular distribution. The choice of a six year period (2009 to 2014) provides a good balance of responsiveness to change and lack of sensitivity to short term fluctuations.

20. We also take into account the further detailed explanation of how both methods are used. In addition, the Environment Agency describes a robust system of quality assurance whereby monitoring points are marked for manual checking if the data recorded raises concerns, fails to match previous data, or if there is a large discrepancy between the figures reached using the two statistical methods described.

21. Mr Towse’s criticisms of each statistical method are correct; neither is perfect. But that is in the nature of statistical models, and Mr Towse fails to identify any alternative model, nor does he point to any defect in the way that the Environment Agency has actually applied those it has selected. We reach the same view on the use of the 95th percentile, the use of which has been rationally explained by the Environment Agency.

22. The relevant ground of appeal requires Mr Towse to establish that the Secretary of State should not identify, or should not continue to identify, the relevant surface water as polluted. Nothing in the legislation requires that pollution be established with 100% certainty, even if that were possible or practicable. The Environment Agency is entitled to use appropriate statistical methodologies to draw a reasonable conclusion, and has provided a detailed and robust explanation of how and why it has done so. Nothing put forward by Mr Towse undermines its approach.

(4) The contaminants from sewage systems outflowing into the drainage system are substantial - and- (7) The area is through sandy soils with soil sample showing high phosphorus levels which are not readily available. -and- (8) Being a man-made system there are no visible mixing zones along the sandy length of the drainage system.

23. Mr Towse's grounds of appeal refer to a sewage plant above the monitoring point as well as several built up areas with a total of 5,191 dwellings. These are said to "call into question all forms of nitrates discharged into watercourses." In his annotations to the Response he has also raised the issue that:

...water levels in the Market Weighton Canal and River Foulness are under tidal control through the Humber Lock. This questions the agency's measurements and mixing zones as the water flow is stationary at high tide with only a slow water flow along their lengths due to flow velocity as you will realise the canal [...] provides [a] critical reservoir effect which needs a constant maintenance regime.

24. The Environment Agency argues as follows:

The failing monitoring points are not within 1km downstream of a major point source (Sewage Treatment Works) (Map B). We do not agree that the monitoring points are unduly influenced by consented discharges. None of the monitoring points are within the downstream mixing zone of consented effluent discharges.

We agree that mixing within waterbodies depends on physical water course properties, including the roughness of the river bed. However, we disagree that mixing of waters, in this case effluent discharge with stream flow in rivers, drains or canals, would not take place or not be noticeable due to sandy river beds. Physical processes that mix dissolved pollutants, like nitrogen compounds, within watercourses include advection, dispersion and diffusion. These processes take place in all river and river bed scenarios, including watercourses with sandy river beds. The applied methodology to calculate the mixing zone is conservative, and is based on the river width within the section between effluent discharge outlet and monitoring point.

25. A map has been provided to substantiate this. Mr Towse has provided no further explanation or evidence to support his factual assertions about upstream discharges. While we find that some upstream discharges may affect the data, as accepted by the Environment Agency, Mr Towse does not quantify the extent to which this could be so. In the absence of a quantifiable and substantial concern, we are unwilling to disagree with the Environment Agency's assessment that the monitoring points are not "unduly influenced". While further monitoring might shed light on this issue, there is no substantiated basis for finding that monitoring was insufficient in this case; it is insufficient for an affected person to simply assert that more should have been done.
26. We also accept that the slower flow velocity of a sandy river bed leads to less mixing and potentially higher concentrations when it is tested, and we accept the general point made in the annotation. Yet the effects of such features can be complex and, again, there is no quantification such as to cast doubt on the overall approach to designation.

(6) The calculation methods in [the Nitrate Leaching Tool (“NLT”)] do not simulate every detail of nutrient management.

27. Mr Towse complains as follows:

The calculation methods in the tool do not simulate every detail of nutrient management. It is intended to assess nitrate leaching under typical local climatic conditions, rather than provide a detailed, mechanistic calculation of soil nitrogen cycling, and losses throughout the year.

Furthermore the nitrate leaching tool does not assess or consider the effect of soil temperature or soil health (bacterial make-up) or earthworm effect along with the permeability and aeration of soils due to the natural decomposition within the soil structure.

It also does not take account of the yearly rise and fall of groundwater which is the whole purpose of our rivers and streams within the natural environment combined with land draining systems in order to bring a degree of control to the water table.

28. The Environment Agency essentially agrees, but makes similar points as those that concern its statistical models:

We agree that the nitrate leaching tool (NLT) does not simulate every detail of nutrient management, neither is every subsurface process incorporated.

The model applied in the NVZ designation methodology is the NEAP-N model; it incorporates a water balance and leaching algorithm. Input data into the leaching model are agricultural census, dominant soil type, mean annual rainfall and potential evaporation for the different crop types. We do not use NEAP-N to directly predict nitrate levels in surface waters. The results are used as part of the evidence supporting NVZ designations.

We use statistical modelling, alongside the analysis of monitored water quality data to assess whether a WFD river catchment is polluted or at risk of becoming polluted. The designation process relies on multiple lines of evidence.

29. We likewise reach the same view as we did with the choice of statistical models. The NLT is not perfect. But Mr Towse puts forward no alternative, and the Environment Agency is plainly justified in using it as contributing to the overall evidence.

Human rights and other issues

30. Mr Towse has put forward no argument capable of raising an arguable human rights case. To the extent necessary, we consider that any engagement of Article 1 of the First Protocol to the European Convention on Human Rights is justified by the need to prevent and control nitrate pollution.

31. Mr Towse next queries whether the legislative scheme survives the United Kingdom’s departure from the European Union, and if so whether it should have done. The first question can be answered in the affirmative, the relevant Directive being retained EU law. This is illustrated by its amendment at regulation 4(7). The second question is not a matter for the Tribunal.

Conclusion

32. We return to Mr Towse's introductory remarks. He has successfully identified some shortcomings in the way in which the Environment Agency approaches nitrate pollution. These points are well made and the Environment Agency and this Tribunal largely agree with them. Mr Towse has nonetheless failed to show how the Environment Agency ought to have approached its task differently. We find that the Secretary of State was entitled to rely upon its assessment and identify the relevant water as polluted. The appeal must be dismissed.

Signed

Date:

Judge Neville

4 March 2024