Nitrate Vulnerable Zone (NVZ) designation, 2017 Eutrophication (lakes)

Publication Date: June 2016

NVZ Name: Stanford Reservoir
NVZ ID: EL146
This document provides a summary of the evidence used in proposing an area of land as one which should be, or should continue to be, designated as a Nitrate Vulnerable Zone (NVZ) for the purposes of the Nitrate Pollution Prevention Regulations 2015.

A full description of the methods used in developing the NVZ proposals is set out in the detailed methodology for eutrophication-related NVZs, available via http://apps.environment-agency.gov.uk/wiyby/141443.aspx. These methods were developed under the guidance of a review group convened by the Defra for the last NVZ review (2011-2013), which included representatives from the farming and water industries as well as independent academic experts. Minor refinements to the methods have been made for the current review.

NVZs are areas of land that drain to polluted waters and which contribute to the pollution of those waters. Polluted waters include those which are eutrophic or may in the near future become so if the Regulations were not to apply there.

Eutrophication is defined as "the enrichment of water by nitrogen compounds, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned".

For both freshwaters and saline waters, a weight-of-evidence based approach to assessing the risks and impacts of eutrophication was employed. The evidence for individual water bodies was assessed against a national suite of criteria for eutrophication in the different categories/types of water for review. The criteria are both quantitative and qualitative and reflect scientific understanding of the process and effects of eutrophication. They are broken down in the same way for each water category as follows:

- Nutrients
- Plants/algae
- Secondary and other effects

For each designated or candidate water body which might meet the criteria for eutrophication, a datasheet such as this one was completed, bringing together information about the water body, its catchment, its uses, evidence of eutrophication and the sources of nitrogen input.

This document is a record of the evidence used in the designation process, including results from national monitoring and assessment programmes, and further information supplied by Area staff. The proposals for NVZ designation are made as a result of close working between Area and national Environment Agency teams, with further quality assurance for the eutrophication designations through the use of a national expert panel.

An accompanying guide to these datasheets is available, which provides an explanation of the contents, acronyms and technical terms.

Some features of the maps within this report are based on digital spatial data licensed from the Centre for Ecology and Hydrology, ©.

Please note that any maps shown here have not used detailed field boundaries and therefore represent the indicative 'soft' boundary only. The definitive NVZ area can be seen on the "What's in Your Backyard" (WIYBY) website (http://apps.environment-agency.gov.uk/wiyby/141443.aspx).

NVZ Name: Stanford Reservoir
NVZ ID: EL146
### Section 1. Lake and catchment characteristics

**WB ID:** 37864  
**2013 NVZ status:** Not Designated

#### Lake attributes

<table>
<thead>
<tr>
<th>EA Area</th>
<th>Staffordshire Warwickshire and West Midlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>460056 / 280413</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>54.5</td>
</tr>
<tr>
<td>WFD Lake Typology</td>
<td>High alkalinity, very shallow, large, lowland</td>
</tr>
<tr>
<td>Lake Alkalinity (ueq/L)</td>
<td>2896</td>
</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>2.8</td>
</tr>
<tr>
<td>Is the lake heavily modified according to WFD?</td>
<td>No data</td>
</tr>
<tr>
<td>Does stratification occur?</td>
<td>Well mixed</td>
</tr>
<tr>
<td>Is this waterbody a reservoir?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Natural or artificial lake:**
Artificial --- Pumped storage. The reservoir receives water from the River Avon with inlet and outlets and water is pumped to Draycote Reservoir by Severn Trent.

**Type of artificial lake:**
n/a

**Lake perimeter (% artificial)**
<20%

**Significant changes in lake level due to seasonal drawdown:**
Y

**Pumped storage or other reservoir:**
Pumped storage --- Water can be pumped to Draycote water from Stanford

**Information on abstraction (if available)**
- Licence number 18/54/10/0071  
  Grid ref SP59698027
Lake catchment attributes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake catchment area (ha)</td>
<td>5330</td>
</tr>
<tr>
<td>If pumped, pumped catchment area (ha)</td>
<td></td>
</tr>
</tbody>
</table>

**Hydrological character**

Primarily surface water --- .

Please note that the map above has not used the detailed field boundaries and is the indicative 'soft' boundary. The definitive NVZ area can be seen on the Environment Agency website (www.environment-agency.gov.uk)

Comments on accuracy of lake catchment:

Is the map representative of the natural catchment?

Is the map representative of the artificial catchment?
Section II - Waterbody uses

**Water Supply:**
Controlled water (Section 104 of Water Resources Act):
Yes

**Public Water Supply:**
Yes

**Drinking Water Protected Area:**
Yes

**UWWTD designation**
Used for hydropower or flow regulation:
Flow regulation --- Flow regulation for the Avon/Draycote

**Recreational use:**

**Accessibility to public:**
Not accessible, no visits --- Not accessible

**Recreational fishing:**
Little activity

**Contact watersports**
Little activity

**Nature of watersports (if applicable):**
n/k

**Other public benefit visits:**
Little activity

**Conservation status:**

**Conservation value of lake:**
None

**Habitats Directive site:**
Not SPA or SAC

**SPA or SAC for aquatic interest features**

**SSSI or local conservation designation:**
n/k

**Description of Aquatic interest features:**

---

**NVZ Name:** Stanford Reservoir

**NVZ ID:** EL146
### Total oxidised nitrogen (TON) data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean summer TON (mg/l)</td>
<td>1</td>
</tr>
<tr>
<td>Total number of summer TON samples</td>
<td>27</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>3.9</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>54</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 1 mg/l</td>
<td>High</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 2 mg/l</td>
<td>High</td>
</tr>
<tr>
<td>Date range of TON samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

### TON monitoring data

![TON monitoring data graph](image)

**Sample date**

- 28/07/2010
- 28/10/2010
- 28/01/2011
- 28/04/2011
- 28/07/2011
- 28/10/2011
- 28/01/2012
- 28/04/2012
- 28/07/2012
- 28/10/2012
- 28/01/2013
- 28/04/2013
- 28/07/2013
- 28/10/2013
- 28/01/2014
- 28/04/2014
- 28/07/2014
- 28/10/2014

**Sample TON mg/l**

- 0
- 1
- 2
- 3
- 4
- 5
- 6

**NVZ Name:** Stanford Reservoir  
**NVZ ID:** EL146
Total nitrogen (TN) data

<table>
<thead>
<tr>
<th>Mean annual TN (mg/l)</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of TN samples</td>
<td>54</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 1 mg/l</td>
<td>High</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 2 mg/l</td>
<td>High</td>
</tr>
<tr>
<td>Date range of TN samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

**TN monitoring data**

Does any other (e.g. EA non-WFD, or third party) monitoring data for the lake provide improved evidence of significantly elevated nutrient nitrogen?

n/k --- Severn Trent may hold WQ data for the site
Total phosphorus (TP) data

<table>
<thead>
<tr>
<th>Annual geometric mean TP (ug/l)</th>
<th>82</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFD face value TP class</td>
<td>Moderate</td>
</tr>
<tr>
<td>Confidence of moderate or worse TP status</td>
<td>100%</td>
</tr>
<tr>
<td>Date range of TP samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

TP monitoring data

Does any other (e.g. EA non-WFD, or third party) monitoring data for the lake provide improved evidence of significantly elevated nutrient phosphorus?

n/k --- Severn Trent may hold WQ data for the site

NVZ Name: Stanford Reservoir
NVZ ID: EL146
Nitrogen loading estimates based on catchment map area

<table>
<thead>
<tr>
<th>Source</th>
<th>Leached N (kgN/yr)</th>
<th>Conc. (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From all agricultural sources</td>
<td>110678</td>
<td>8.4</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>101689</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>2185</td>
<td>0.2</td>
</tr>
<tr>
<td>From all sources</td>
<td>112864</td>
<td>8.5</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>103874</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Ranking based on nitrogen loading from agricultural sources 41

Local assessment 2015

Significance of loading from agricultural sources to the catchment of the lake

Principal source

Significance of loading from human habitation to the catchment of the lake

Minor source

Significance of any other sources of nutrient loading to the lake or its catchment

NVZ Name: Stanford Reservoir

NVZ ID: EL146
### Chlorophyll data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual mean Chlorophyll (ug/l)</td>
<td>13</td>
</tr>
<tr>
<td>total number of Chlorophyll samples</td>
<td>53</td>
</tr>
<tr>
<td>WFD face value Chlorophyll class</td>
<td>Moderate</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>55%</td>
</tr>
<tr>
<td>Chlorophyll Good/Moderate boundary value</td>
<td>17</td>
</tr>
<tr>
<td>Date range of Chlorophyll samples</td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

#### Chlorophyll monitoring data

<table>
<thead>
<tr>
<th>Sample Date</th>
<th>Chlorophyll ug/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>28/07/2010</td>
<td>0</td>
</tr>
<tr>
<td>28/10/2010</td>
<td>0</td>
</tr>
<tr>
<td>28/04/2011</td>
<td>0</td>
</tr>
<tr>
<td>28/07/2011</td>
<td>0</td>
</tr>
<tr>
<td>28/10/2011</td>
<td>0</td>
</tr>
<tr>
<td>28/01/2012</td>
<td>0</td>
</tr>
<tr>
<td>28/04/2012</td>
<td>0</td>
</tr>
<tr>
<td>28/07/2012</td>
<td>0</td>
</tr>
<tr>
<td>28/10/2012</td>
<td>0</td>
</tr>
<tr>
<td>28/01/2013</td>
<td>0</td>
</tr>
<tr>
<td>28/04/2013</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
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</tr>
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<td>0</td>
</tr>
<tr>
<td>28/07/2014</td>
<td>0</td>
</tr>
<tr>
<td>28/10/2014</td>
<td>0</td>
</tr>
</tbody>
</table>

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### Phytoplankton (Pluto EQR)

- **EQR:** 0.29
- **Date range of samples:** 2011 - 2013
- **Number of years when algal blooms were observed based on reactive monitoring 2010-2015:** 0

### Macrophytes (EQR)

- **WFD face value class:** Moderate
- **Confidence of moderate or worse status:** 100%
- **Date range of samples:** 2010 - 2013

### Diatoms (EQR)

- **WFD face value class:** Moderate
- **Confidence of moderate or worse status:** 100%
- **Date range of samples:** 2010 - 2013

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**Other responses**

### Palaeolimnology

| Change as Square Chord Distance | No data |
| Change in Diatom community     | No data |

Evidence that designated aquatic interest features associated with the lake show evidence of eutrophic disturbance? (local judgement)

**Strength of evidence (local judgement):** n/k

**Local judgement on the evidence of eutrophic disturbance:**

Y, maybe --- Regular algae blooms occur at Stanford Reservoir with the occurrence of blue green algae

---

**NVZ Name:** Stanford Reservoir  
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Review of evidence and recommendations

**Comments and decisions**

**WFD Weight of evidence for eutrophication:**

- Certainty of eutrophication problem based on core WFD tools: Very certain eutrophication problem
- Certainty of eutrophication problem based on overall weight of evidence: Very certain eutrophication problem

**WFD overall ecological status:** Moderate

**Confidence in WFD status:** Very Certain

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**Current assessment of weight of evidence supporting designation in 2017**

**First national panel**

- Recommended action: Needs further investigation

**Comments from first panel:**

N is significantly elevated (>2 mg/l), evidence of eutrophic impact from phytoplankton and macrophytes, plus elevated P - check if macrophytes suitable assessment. Check if has natural catchment/water sources re. Defra guidance.

**Second national panel**

- Comments from second national panel:
  - Panel support designation, subject to confirmation of water sources. [Further check post-meeting confirmed input to reservoir from River Avon]

**Recommendation:** Designate

**Local summary and recommendation:**

The site is located in a NVZ zone which has annual occurrences of algae some of which are blue greens.

---

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Lake Description:
Stanford reservoir was made by constructing a dam across the river Avon around 85 years ago. There is a bypass channel around the northern perimeter which is controlled by sluice gates. Originally surrounded by rough pasture as the surrounding land was drained it has been used for more intensive arable crops.

Why the lake should be designated as a Polluted Water (eutrophic):
The catchment of Stanford Reservoir is within an existing surface water NVZ. There are a number of discharge permits within the catchment but the nitrogen load to the lake is predominately agricultural. Nitrogen concentrations are well above the 1-2 mg/l threshold range and the scores for monitored biological elements show that they are affected by high nutrient levels.

Nitrogen:
The 75th percentile TON concentration is 3.9 mg/l and annual mean TN is 3 mg/l. These concentrations are well above the threshold range set out in the method and would be expected to affect the ecology of the lake.

Phosphorus:
The WFD classification for total phosphorus is Moderate status.

Ecological response:
Chlorophyll, overall phytoplankton and macrophytes were all at Moderate status for WFD, indicating an eutrophic impact.

Supplementary evidence:
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