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

Publication Date: June 2016

NVZ Name: Marton Pool
NVZ ID: EL142
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).
### Lake attributes

<table>
<thead>
<tr>
<th>EA Area</th>
<th>Shropshire Herefordshire Worcestershire and Gloucestershire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>329486 / 302705</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>11</td>
</tr>
<tr>
<td>WFD Lake Typology</td>
<td>High alkalinity, very shallow, small, lowland</td>
</tr>
<tr>
<td>Lake Alkalinity (ueq/L)</td>
<td>3007</td>
</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>3</td>
</tr>
<tr>
<td>Is the lake heavily modified according to WFD?</td>
<td>No</td>
</tr>
<tr>
<td>Does stratification occur?</td>
<td>Well mixed</td>
</tr>
<tr>
<td>Is this waterbody a reservoir?</td>
<td>No</td>
</tr>
</tbody>
</table>

**Natural or artificial lake:**
- Natural

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

**Lake perimeter (% artificial):**
- Natural

**Significant changes in lake level due to seasonal drawdown:**
- N

**Pumped storage or other reservoir:**
- n/a

**Information on abstraction (if available)**
Lake catchment attributes

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake catchment area (ha)</td>
<td>567</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?

Yes

Is the map representative of the artificial catchment?

n/a
Section II - Waterbody uses

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

Public Water Supply:
No

Drinking Water Protected Area:
No

UWWTD designation
No

Used for hydropower or flow regulation:
n/a

Recreational use:
Accessiblity to public:
Easily accessible, many visits --- Holiday park surrounds lake

Recreational fishing:
Significant benefit --- Angling

Contact watersports
Significant benefit --- Boating

Nature of watersports (if applicable):
Other ---

Other public benefit visits:
Significant benefit

Conservation status:
Conservation value of lake:
National

Habitats Directive site:
Not SPA or SAC --- Ramsar, SSSI

SPA or SAC for aquatic interest features
--- It is among the most valuable of the Shropshire meres for aquatic plants and there is a rich invertebrate fauna in which water bugs are particularly well represented.

SSSI or local conservation designation:
SSSI --- Ramsar

Description of Aquatic interest features:
--- Marton Pool is a natural lake of moderate fertility, somewhat detached from the main series of Shropshire meres. There are extensive areas of reed swamp and carr. It is among the most valuable of the Shropshire meres for aquatic plants, and the flora includes fan-leaved water crowfoot Ranunculus circinatus, blunt-leaved pondweed Potamogeton obtusifolius and small pondweed P. berchtoldii. Water-lilies, both white, Nymphaea alba and yellow, Nuphar lutea are present, but not abundant

NVZ Name: Marton Pool
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## Total oxidised nitrogen (TON) data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean summer TON (mg/l)</td>
<td>1.5</td>
</tr>
<tr>
<td>Total number of summer TON samples</td>
<td>10</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>4</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>19</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

![Graph showing TON monitoring data from 2010 to 2014 with sample dates and TON mg/l values.]
### Total nitrogen (TN) data

<table>
<thead>
<tr>
<th>Mean annual TN (mg/l)</th>
<th>3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of TN samples</td>
<td>19</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

- **TN mg/l**: 3.33, 5.13, 1.80

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

No change
Total phosphorus (TP) data

<table>
<thead>
<tr>
<th>Annual geometric mean TP (ug/l)</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFD face value TP class</td>
<td>Poor</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?

No change
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>16651</td>
<td>8.5</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>16240</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>From all sources</td>
<td>16673</td>
<td>8.5</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>16262</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Ranking based on nitrogen loading from agricultural sources: 40

Local assessment 2015

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

Principal source --- Atkins modelling data indicates nitrate from pasture land and phosphate linked to sediment.

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

Minor source --- Caravan park septic tanks to soak away, suspected but not proven link. Discussions ongoing as to solutions, e.g. Connecting to foul sewer.

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

NVZ Name: Marton Pool
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### Chlorophyll data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual mean Chlorophyll (ug/l)</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>total number of Chlorophyll samples</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>WFD face value Chlorophyll class</strong></td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Confidence of moderate or worse status</strong></td>
<td>52%</td>
</tr>
<tr>
<td><strong>Chlorophyll Good/Moderate boundary value</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Date range of Chlorophyll samples</strong></td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

#### Chlorophyll monitoring data

![Chlorophyll monitoring data](image)

**Sample date**
- 20/07/2010
- 20/10/2010
- 20/01/2011
- 20/04/2011
- 20/07/2011
- 20/10/2011
- 20/01/2012
- 20/04/2012
- 20/07/2012
- 20/10/2012
- 20/01/2013
- 20/04/2013
- 20/07/2013
- 20/10/2013
- 20/01/2014
- 20/04/2014
- 20/07/2014
- 20/10/2014

**Chlorophyll ug/l**
- 33 35 13 80

**NVZ Name:** Marton Pool  
**NVZ ID:** EL142
### EQR

<table>
<thead>
<tr>
<th></th>
<th>Phytoplankton (Pluto EQR)</th>
<th>Macrophytes (EQR)</th>
<th>Diatoms (EQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.3</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Total number of samples/surveys</td>
<td>12</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>WFD face value class</td>
<td>Moderate</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>87%</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Date range of samples</td>
<td>2011 - 2013</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Number of years when algal blooms were observed based on reactive monitoring 2010-2015: 0

Does any other (e.g. EA non - WFD, or third party monitoring data for the lake provide improved evidence of eutrophication? (local judgement)

Weakens evidence

To which biological element(s) does it relate?

---

### 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)

---

Local judgement on the evidence of eutrophic disturbance

Y, maybe

---

**NVZ Name:** Marton Pool  
**NVZ ID:** EL142
Review of evidence and recommendations

Comments and decisions

WFD Weight of evidence for eutrophication:
Certainty of eutrophication problem based on core WFD tools: Quite 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

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 (>2mg/l), check if further evidence of eutrophic impact.

Second national panel

Comments from second national panel:
Unfavourable recovering condition (2011), some macrophytes present but species have been lost. Algal blooms recorded. Panel support designation.
Recommendation: Designate

Local summary and recommendation:
As with all meres, Marton Pool is naturally eutrophic. It has elevated N and P levels and historical problems with blue green algae, which is a regular problem. Therefore, taking into account blue green algae the public use of the site, and predominantly agricultural land use in the catchment, the local EA team recommend it should be a designated NVZ.

NVZ Name: Marton Pool
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## Final summary (2017)

<table>
<thead>
<tr>
<th>2017 Recommendation:</th>
<th>Designate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Decision:</td>
<td>Not Designated</td>
</tr>
<tr>
<td>2008 Decision:</td>
<td>Not Designated</td>
</tr>
</tbody>
</table>

### Lake Description:
Marton Pool is a mere and so is thought to have formed after the last ice age. It is a relatively small 11 hectare lake and is shallow with a mean depth of about 3m. It is designated as a Site of Special Scientific Interest and aquatic plants are particularly important in the designation. There is also a rich aquatic invertebrate fauna and the pool is bordered by extensive reed beds as well as reedmace and bulrush. The site is also important for breeding birds such as reed warbler, little grebe and water rail.

### Why the lake should be designated as a Polluted Water (eutrophic):
Marton Pool is not within any existing NVZ designation. Nitrogen levels in the mere are high and decrease in summer as chlorophyll concentrations increase indicating that phytoplankton are using much of the available nitrogen at that time and nitrogen may be limiting productivity, so a further reduction in nitrogen may further restrict phytoplankton growth. The catchment is predominantly agricultural. Designation as an NVZ is proposed.

#### Nitrogen:
The 75th percentile concentration of TON is 4mg/l, and mean annual TN is 3.2 mg/l, both significantly above the 1-2 mg/l threshold range.

#### Phosphorus:
The WFD classification for total phosphorus is Poor status.

#### Ecological response:
Chlorophyll status is Moderate WFD and the overall phytoplankton indicator is also classed as Moderate status.

#### Supplementary evidence:
Local reports of regular blue-green algal blooms.
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