



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

Publication Date: June 2016

NVZ Name: Stewartby Lake

NVZ ID: EL111

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Evidence of eutrophication 2017

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>).

Section 1. Lake and catchment characteristics

WB ID: 39450

2013 NVZ status: Designate

Lake attributes

EA Area	Cambridgeshire and Bedfordshire
Lake grid co-ordinates (Easting/Northing)	500775 / 242326
Lake waterbody area (ha)	78.2
WFD Lake Typology	High alkalinity,shallow,large,lowland
Lake Alkalinity (ueq/L)	2649
Mean lake depth (m)	6.4
Is the lake heavily modified according to WFD?	No data
Does stratification occur?	Stratification likely most years
Is this waterbody a reservoir?	No

Natural or artificial lake:

Type of artificial lake:

Lake perimeter (% artificial)

(Lots of engineered margins: bricks etc.)

Significant changes in lake level due to seasonal drawdown:

Pumped storage or other reservoir:

n/a

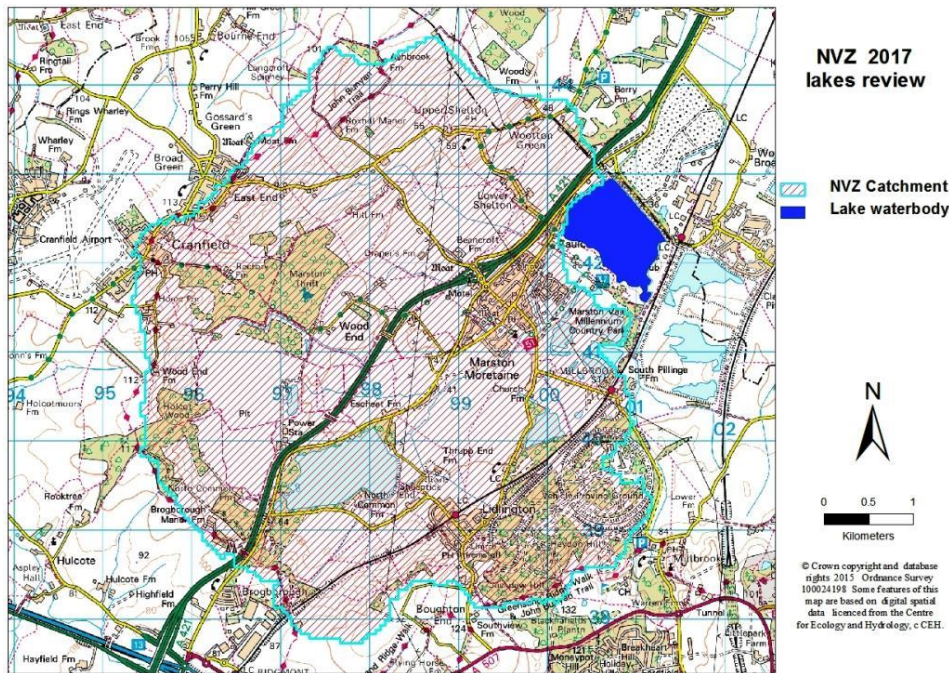
Information on abstraction (if available)

Lake catchment attributes

Lake catchment area (ha)	2780
If pumped, pumped catchment area (ha)	

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?

Yes --- 2011 Comment: Natural catchment should be a bit larger - should incorporate additional feeder tributaries to east of the lake.. 2015 Comment: 0

Section II - Waterbody uses

Water Supply:

Controlled water (Section 104 of Water Resources Act):

Public Water Supply:

Drinking Water Protected Area:

UWWTD designation

--- River Ouse downstream is designated as SA(E) and SA(N), therefore Marston Moretaine STW upstream of Stewartby lake has P and N removal.

Used for hydropower or flow regulation:

Recreational use:

Accessibility to public:

--- Part of Marston Vale Millennium park with visitor centre and café.. Amenity value likely to increase as park is developed. New major housing area proposed nearby.

Recreational fishing:

Contact watersports

Nature of watersports (if applicable):

Other public benefit visits:

- Bird watching, cycling.

Conservation status:

Conservation value of lake:

--- Freshwater fish directive designation for cyprinids.

Habitats Directive site:

SPA or SAC for aquatic interest features

SSSI or local conservation designation:

--- Forms part of Marston Vale Millennium Country Park, much of site managed for wildlife.

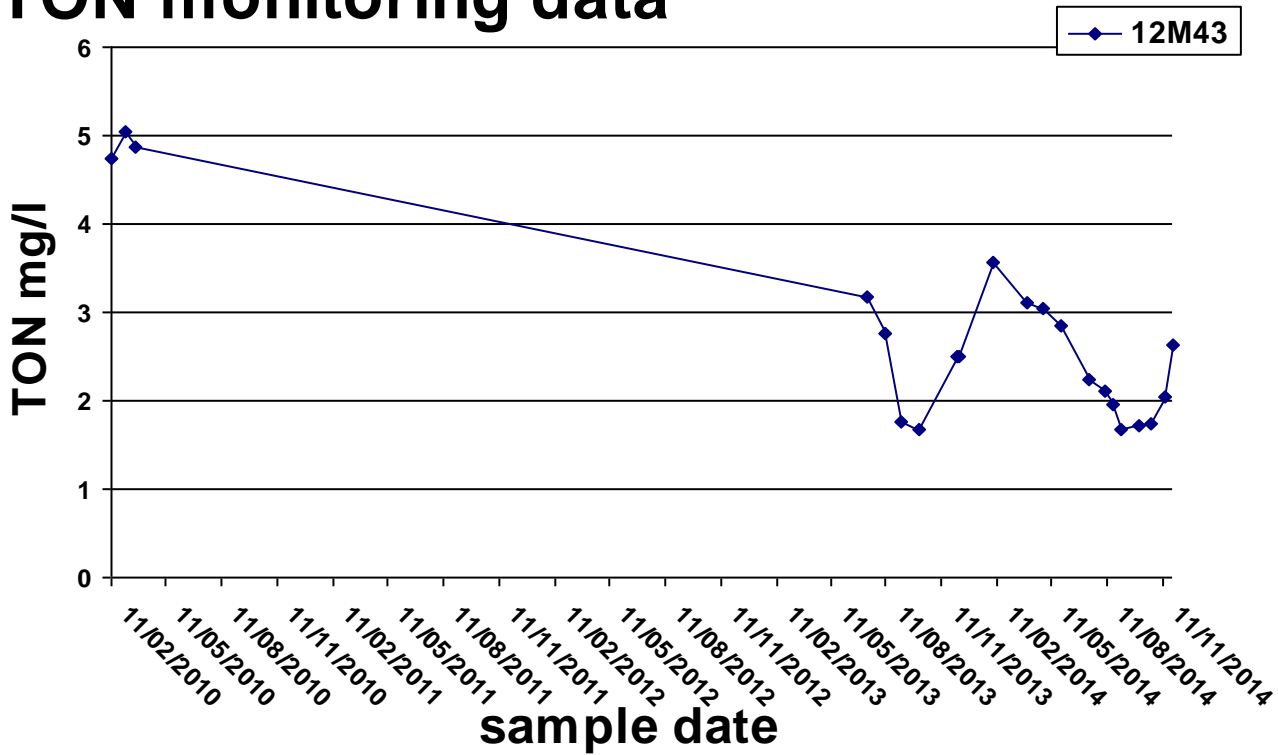
Description of Aquatic interest features:

Section III - Causes - Nutrients

Total oxidised nitrogen (TON) data

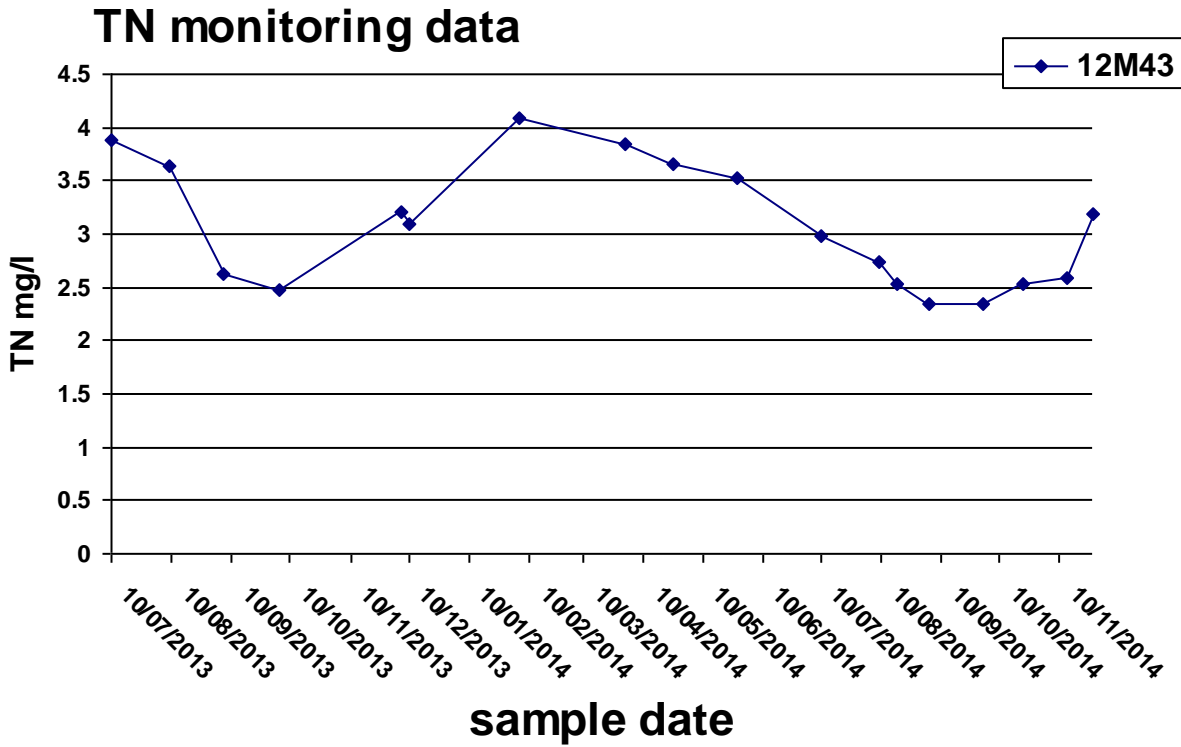
Mean summer TON (mg/l)	2.4
Total number of summer TON samples	9
75th percentile annual TON (mg/l)	3.1
Total number of TON samples	21
Confidence of annual 75th %ile TON exceeding 1 mg/l	High
Confidence of annual 75th %ile TON exceeding 2 mg/l	High
Date range of TON samples	2010 - 2014

TON monitoring data



Total nitrogen (TN) data

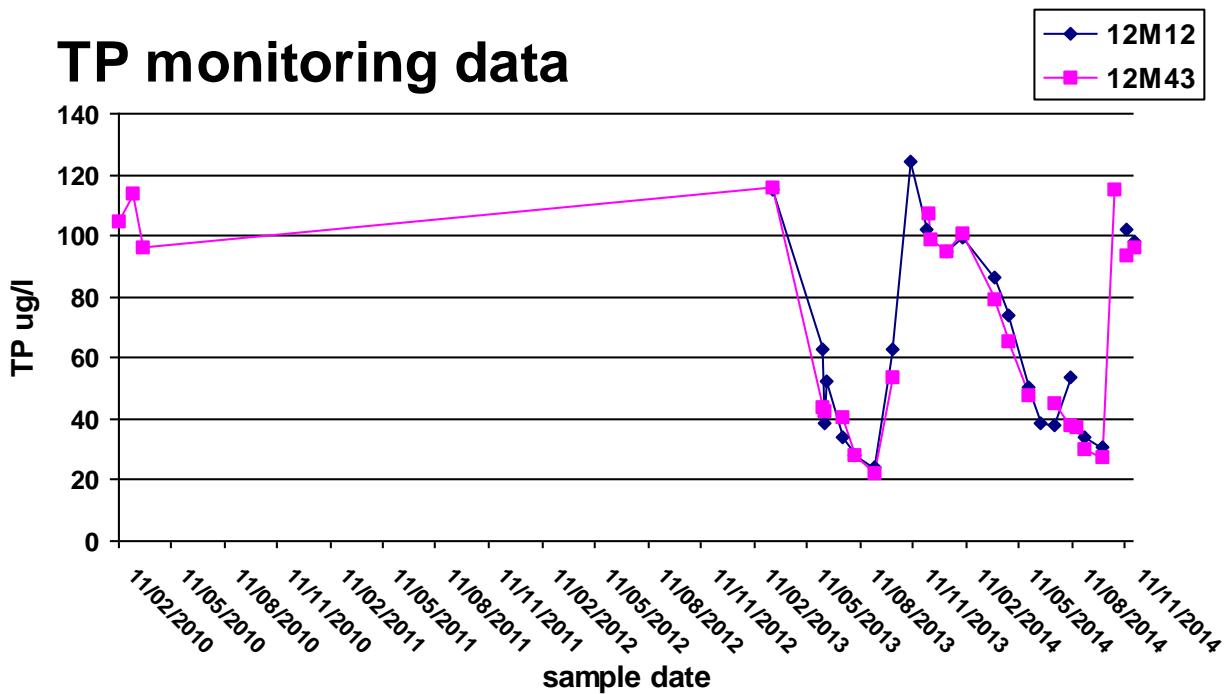
Mean annual TN (mg/l)	3.1
Total number of TN samples	18
Confidence of annual mean TN exceeding 1 mg/l	High
Confidence of annual mean TN exceeding 2 mg/l	High
Date range of TN samples	2013 - 2014



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

Total phosphorus (TP) data

Annual geometric mean TP (ug/l)	60
WFD face value TP class	Moderate
Confidence of moderate or worse TP status	96%
Date range of TP samples	2010 - 2014



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

Nitrogen loading estimates based on catchment map area

NEAP - N assessment 2014	Leached N (kgN/yr)	Conc. (mg/l)
From all agricultural sources	30599	7.3
From agricultural sources minus atmospheric deposition	27045	6.1
From urban sources	42178	10
From all sources	72777	17.3
From all sources (minus atmospheric deposition)	69223	16.4
Ranking based on nitrogen loading from agricultural sources		51

Local assessment 2015

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

--- The brook and tributaries drain agricultural areas.

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

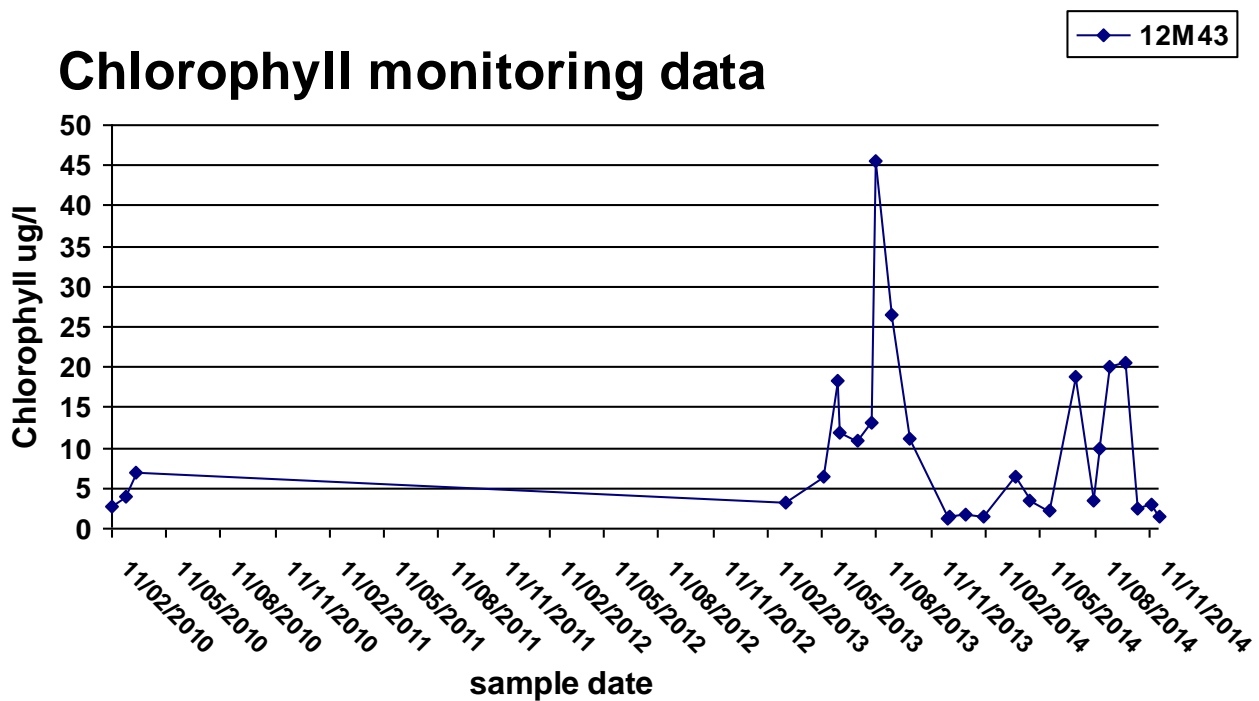
--- Marston Moretaine STW discharges to a Brook approx 500m upstream of lake. Large STW - DWF of 2300m³/d.

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

Section IV - Response - Plants/Algae

Chlorophyll data

Annual mean Chlorophyll (ug/l)	6
total number of Chlorophyll samples	30
WFD face value Chlorophyll class	Good
Confidence of moderate or worse status	39%
Chlorophyll Good/Moderate boundary value	10
Date range of Chlorophyll samples	2010-2014



Other responses

	Phytoplankton (Pluto EQR)	Macrophytes (EQR)	Diatoms (EQR)
EQR	0.36	0.3	No data
Total number of samples/surveys	8	1	No data
WFD face value class	Bad	Poor	No data
Confidence of moderate or worse status	100%	100%	No data
Date range of samples	2013 - 2013	2008 - 2008	-
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)

--- There have been major blue-green algal blooms annually.

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)

- Blue green algal blooms annually.

Strength of evidence (local judgement)

Local judgement on the evidence of eutrophic disturbance

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 : Poor

Confidence in WFD status : Very Certain

Current assessment of weight of evidence supporting designation in 2017

First national panel

Recommended action : Existing designation - check needed

Comments from first panel:

Existing designation - N remains >2 mg/l and there is evidence of ecological impact for eutrophication. Recommend continued designation.

Second national panel

Comments from second national panel :

Agreed with provisional decision to continue designation

Recommendation: Continued designation

Local summary and recommendation:

Nutrients - high concentrations of N no decrease in recent years. Effects - blue-green algae blooms every year. Sources - from large STW and some agricultural inputs. Marston STW has had P removal. Levels of P have dropped.

Final summary (2017)

2017 Recommendation: Continued designation

2013 Decision: Designate

2008 Decision: Designated

Lake Description:

Stewartby is a high alkalinity, shallow, stratifying lake created from a clay pit. Local EA staff classified it as artificial but the National Panel considered it likely to function as a natural lake. The lake does not enjoy conservation designation. It is Part of Marston Vale Millenium park with visitor centre and café. Amenity value is likely to increase as park is developed. A major new housing area proposed nearby.

Why the lake should be designated as a Polluted Water (eutrophic):

Stewartby Lake is an existing eutrophic waters NVZ designation. There are a number of discharge consents in the catchment and a treatment works next to the lake, however agriculture is still considered to make a significant contribution to nitrogen concentrations in the lake. Nitrogen levels continue to be well above those in the designation threshold range. Results for the biological elements show that they are impacted by high nutrient levels.

Nitrogen:

The 75th percentile TON concentration is 3.1 mg/l, and annual mean TN concentration is also 3.1 mg/l, both significantly above the 1-2mg/l threshold range. There is little evidence of any consistent change since the previous review, TON had reduced from 3.5 mg/l but TN was unchanged.

Phosphorus:

The WFD classification for total phosphorus is Moderate status.

Ecological response:

Overall phytoplankton is at Bad status for WFD, although chlorophyll alone is at Good status (the result may be impacted by a lack of records for 2011/12). Macrophytes are at Poor status. There is therefore evidence of a continuing eutrophic impact.

Supplementary evidence:

Local Environment Agency staff have noted annual algal blooms but have not formally recorded these.

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