Nitrate vulnerable zone designation (NVZ) 2017 Eutrophic waters (Lakes)

There are multiple waterbodies in this NVZ, please use the bookmarks on the left toolbar to navigate between waterbodies
Nitrate Vulnerable Zone (NVZ) designation, 2017 Eutrophication (lakes)

Publication Date: June 2016

NVZ Name: Trinity Broads NVZ (Filby Broad)
NVZ ID: EL150
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.

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NVZ Name: Trinity Broads NVZ (Filby Broad)
NVZ ID: EL150
### Section 1. Lake and catchment characteristics

**WB ID:** 47012  
**2013 NVZ status:** Not Designated

#### Lake attributes

<table>
<thead>
<tr>
<th>EA Area</th>
<th>Essex Norfolk and Suffolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>645795 / 313398</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>42</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>3093</td>
</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>1.8</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>No</td>
</tr>
</tbody>
</table>

- **Natural or artificial lake:** Natural
- **Type of artificial lake:** Natural
- **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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake catchment area (ha)</td>
<td>3368</td>
</tr>
<tr>
<td>If pumped, pumped catchment area (ha)</td>
<td></td>
</tr>
</tbody>
</table>

Hydrological character

Primarily surface water --- Small groundwater inputs, but a very minor source.

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?

NVZ Name: Trinity Broads NVZ (Filby Broad)

NVZ ID: EL150
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 --- Length of boardwalk along the northern shore. Recreational use, mainly sailing. Next to caravan and camping park.

Recreational fishing:
Significant benefit --- Large numbers of anglers visit the Broads to fish, this is a significant contribution to the local economy.

Contact watersports
Significant benefit --- Large sailing club based on the Broad which offers sailing courses

Nature of watersports (if applicable):
Sailing/wind surf ---

Other public benefit visits:
Moderate benefit

Conservation status:
Conservation value of lake:
National

Habitats Directive site:
SAC --- Part of THE BROADS SAC

SPA or SAC for aquatic interest features
---

SSSI or local conservation designation:
SSSI --- Part of the Trinity Broads SSSI

Description of Aquatic interest features:
--- SSSI: The site supports a rich assemblage of aquatic plants, wet carr woodland, swamp communities, breeding and wintering birds and invertebrates, including many which are nationally rare or scarce. SAC: 3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation. 7140 Transition mires and quaking bogs. 7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae. 7230 Alkaline fens. 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
### 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>0</td>
</tr>
<tr>
<td>Total number of summer TON samples</td>
<td>30</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>0.3</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>81</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 1 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 2 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Date range of TON samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

#### TON monitoring data

![TON monitoring data graph](graph.png)

**NVZ Name:** Trinity Broads NVZ (Filby Broad)  
**NVZ ID:** EL150
Total nitrogen (TN) data

<table>
<thead>
<tr>
<th>Mean annual TN (mg/l)</th>
<th>1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of TN samples</td>
<td>67</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>Not confident</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?

Strengthens --- The Trinity Broads Management Plan study has shown that large amounts of nutrient enter the system during significant rainfall events.
**Total phosphorus (TP) data**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual geometric mean TP (ug/l)</td>
<td>111</td>
</tr>
<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?**

Strengthens --- No recent Broads Authority data on macrophytes. In a 2013 report they state: "Algal species, although recorded at 63% of points, the lowest recorded in 2013 in all broads, made up less than 3% of the average biomass recorded in both surveys. "Evidence from our monitoring for the Water Framework Directive classification has found that ecological elements that indicate the eutrophication status are not achieving the targets expected for a lake of this type. Phytoplankton class is Moderate and Macrophyte class is Poor. This supports the weight of evidence for eutrophication. Natural England: The Trinity Broads have shown a continual improvement over a number of years from the top of the system. However, in 2012 declines were noted from the top of the system (particularly in biomass), with improvements at the bottom of the system (Filby B.). As a result, Ormesby Broad was just short of meeting the eutrophic lakes attributes, and significantly failed the Chara lakes attributes. For the time being, it can still be considered in the recovering state, but is inherently unstable due to the high, stable levels of phosphorus within the system, the potential impact of drought summers and the summer drawdown of water levels.
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>95476</td>
<td>18.2</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>86807</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>3127</td>
<td>0.6</td>
</tr>
<tr>
<td>From all sources</td>
<td>98602</td>
<td>18.8</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>89934</td>
<td>17.2</td>
</tr>
</tbody>
</table>

Local assessment 2015

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

Principal source --- Surrounding catchment is predominantly arable. A proportion will be from private sewage treatment plants and septic tanks. NEAP model has not predicted sources other than arable so unable to state proportion of total. Sources of nutrients in the catchment were assessed as part of the Environment Agency Review of Consents (RoC) for the Trinity Broads component Site of Special Scientific Interest of the Broads Special Area of Conservation/ Broadlands Special Protection Area. This work demonstrated that diffuse sources contribute 97% of the estimated phosphorus loads entering the SSSI, and point sources the remaining 3%.

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

Minor source --- No large centres of population but houses are not on main sewer. So there are small sources of N from septic tanks and private sewage treatment plants. There have been some sewer overflows in the Filby / Ormesby Little Broad area.

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

NVZ Name: Trinity Broads NVZ (Filby Broad)
NVZ ID: EL150
### Chlorophyll data

<table>
<thead>
<tr>
<th>Annual mean Chlorophyll (ug/l)</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>total number of Chlorophyll samples</td>
<td>59</td>
</tr>
<tr>
<td>WFD face value Chlorophyll class</td>
<td>Good</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>10%</td>
</tr>
<tr>
<td>Chlorophyll Good/Moderate boundary value</td>
<td>18</td>
</tr>
<tr>
<td>Date range of Chlorophyll samples</td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

#### Chlorophyll monitoring data

![Chlorophyll monitoring data graph](image_url)

**NVZ Name:** Trinity Broads NVZ (Filby Broad)

**NVZ ID:** EL150
### Other responses

<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>0.42</td>
<td>0.3</td>
<td>No data</td>
</tr>
<tr>
<td>Total number of samples/surveys</td>
<td>36</td>
<td>2</td>
<td>No data</td>
</tr>
<tr>
<td>WFD face value class</td>
<td>Moderate</td>
<td>Poor</td>
<td>No data</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>99%</td>
<td>100%</td>
<td>No data</td>
</tr>
<tr>
<td>Date range of samples</td>
<td>2011 - 2013</td>
<td>2009 - 2012</td>
<td>-</td>
</tr>
<tr>
<td>Number of years when algal blooms were observed based on reactive monitoring 2010-2015:</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

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

No change --- The Broads Authority does not have any recent macrophyte data for this Broad. The Trinity Broads Management Plan study mentioned that algal blooms are seen annually. SSSI condition information says that the Broad is unfavourable - no change.

To which biological element(s) does it relate?

---

**Palaeolimnology**

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

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

Affected

Strength of evidence (local judgement)

---

Local judgement on the evidence of eutrophic disturbance

---
Review of evidence and recommendations

Comments and decisions

WFD Weight of evidence for eutrophication:

<table>
<thead>
<tr>
<th>Certainty of eutrophication problem based on core WFD tools:</th>
<th>Very certain eutrophication problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certainty of eutrophication problem based on overall weight of evidence:</td>
<td>Very certain eutrophication problem</td>
</tr>
<tr>
<td>WFD overall ecological status</td>
<td>Poor</td>
</tr>
<tr>
<td>Confidence in WFD status</td>
<td>Very Certain</td>
</tr>
</tbody>
</table>

Current assessment of weight of evidence supporting designation in 2017

First national panel

Recommended action: Needs further investigation

Comments from first panel:

Consider as a single unit with Rollesby, Ormesby and Ormesby Little

Second national panel

Comments from second national panel:


Recommendation: Designate

Local summary and recommendation:

Macrophytes and phytoplankton, indicators of eutrophication, indicate that there is a eutrophication problem. The lake is of National conservation importance which is reflected by its designation as an SAC, SSSI. It is also important for recreational use for angling, sailing and tourism. There is evidence of some elevated N, mainly from agricultural sources. The conclusion is to support designation.
Final summary (2017)

2017 Recommendation: Designate
2013 Decision: Not Designated
2008 Decision: Not Designated

Lake Description:
Filby Broad is part of the Trinity Broads group and it should be considered alongside Rollesby, Ormesby and Ormesby Little Broad. These very shallow man made lakes are used for water supply by Essex and Suffolk Water and is in a SSSI, they are also important for angling, sailing and tourism.

Why the lake should be designated as a Polluted Water (eutrophic):
The Trinity broads catchment lies within an existing groundwater NVZ designation indicating that agricultural nitrogen input is a significant source. There is an excess of phosphorus available so restricting nitrogen availability is key to continued improvement in this system. Nitrogen concentrations are within the 1-2 mg/l range, and there is evidence of impact on the ecology.

Nitrogen:
The 75th percentile TON and mean TN concentrations are relatively low, with TN being just above the 1 mg/l threshold value. The mean summer TON is zero, providing evidence of nitrogen limitation within the system.

Phosphorus:
The WFD total phosphorus classification WFD is Poor. Phosphorus concentrations peak in summer and decrease in winter which suggests that there is a temperature related release of phosphorus from sediments.

Ecological response:
Chlorophyll status is Good, but overall phytoplankton status is Moderate and macrophyte status is Poor. There is clear evidence of nitrogen limitation to growth during the summer months, which may restrict the production on chlorophyll, but there is evidence of algal blooms occurring and the macrophyte community is adversely affected.

Supplementary evidence:
The Trinity Broads Management Plan study mentions annual algal blooms and the SSSI condition statement for the broad gives a status of unfavourable - no change.
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Nitrate Vulnerable Zone (NVZ) designation, 2017 Eutrophication (lakes)

Publication Date: June 2016

NVZ Name: Trinity Broads NVZ (Ormesby Broad)
NVZ ID: EL150
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- Nutrients
- Plants/algae
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NVZ Name: Trinity Broads NVZ (Ormesby Broad)
NVZ ID: EL150
Section 1. Lake and catchment characteristics

WB ID: 47009  2013 NVZ status: Not Designated

Lake attributes

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<thead>
<tr>
<th>EA Area</th>
<th>Essex Norfolk and Suffolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>646744 / 316095</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>55.9</td>
</tr>
<tr>
<td>WFD Lake Typology</td>
<td>High alkalinity, very shallow, large, lowland</td>
</tr>
<tr>
<td>Lake Alkalinity (ueq/L)</td>
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</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>1.8</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>
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</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>Lake catchment area (ha)</th>
<th>1855</th>
</tr>
</thead>
<tbody>
<tr>
<td>If pumped, pumped catchment area (ha)</td>
<td></td>
</tr>
</tbody>
</table>

**Hydrological character**

Primarily surface water --- A spring fed stream is also a source of water for the Broad from the East.

Comments on accuracy of lake catchment:

- Is the map representative of the natural catchment?
  - Yes

- Is the map representative of the artificial catchment?
  - 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)
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
No

Used for hydropower or flow regulation:

Recreational use:
Accessiblity to public:
Not easily accessible, few visits --- Only accessible to electric boats that may pass under bridge.

Recreational fishing:
Moderate benefit --- There is a pike fishing club which are allowed to fish in the Broad

Contact watersports
No activity --- Sailing is not allowed on Ormesby Broad

Nature of watersports (if applicable):
---

Other public benefit visits:
Little activity- Protected area, visitors are limited

Conservation status:
Conservation value of lake:
National

Habitats Directive site:
SAC --- Part of THE BROADS SAC, SSSI

SPA or SAC for aquatic interest features
---

SSSI or local conservation designation:
SSSI --- Part of Trinity Broads SSSI

Description of Aquatic interest features:
--- SSSI: The site supports a rich assemblage of aquatic plants, wet carr woodland, swamp communities, breeding and wintering birds and invertebrates, including many which are nationally rare or scarce. SAC: 3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation. 7140 Transition mires and quaking bogs. 7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae. 7230 Alkaline fens. 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
Section III - Causes - Nutrients

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>0.2</td>
</tr>
<tr>
<td>Total number of summer TON samples</td>
<td>30</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>0.8</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>81</td>
</tr>
<tr>
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</tr>
<tr>
<td>Date range of TON samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

TON monitoring data

NVZ Name: Trinity Broads NVZ (Ormesby Broad)
NVZ ID: EL150
Total nitrogen (TN) data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean annual TN (mg/l)</td>
<td>1.3</td>
</tr>
<tr>
<td>Total number of TN samples</td>
<td>67</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 1 mg/l</td>
<td>High</td>
</tr>
<tr>
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</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?

No change --- The Trinity Broads Management Plan study has shown that large amounts of nutrient enter the system during significant rainfall events. Data from Essex and Suffolk Water indicates low nitrate concentrations in the lake.
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 --- Evidence from our monitoring for the Water Framework Directive classification has found that ecological elements that indicate the eutrophication status are not achieving the targets expected for a lake of this type. Phytoplankton class is Moderate and Macrophyte class is Poor. This supports the weight of evidence for eutrophication. Natural England: The Trinity Broads have shown a continual improvement over a number of years from the top of the system. However, in 2012 declines were noted from the top of the system (particularly in biomass), with improvements at the bottom of the system (Filby B.). As a result, Ormesby Broad was just short of meeting the eutrophic lakes attributes, and significantly failed the Chara lakes attributes. For the time being, it can still be considered in the recovering state, but is inherently unstable due to the high, stable levels of phosphorus within the system, the potential impact of drought summers and the summer drawdown of water levels.
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>61050</td>
<td>20.1</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>56843</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>2338</td>
<td>0.8</td>
</tr>
<tr>
<td>From all sources</td>
<td>63388</td>
<td>20.8</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>59182</td>
<td>19.4</td>
</tr>
<tr>
<td>Ranking based on nitrogen loading from agricultural sources</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Local assessment 2015

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

Principal source --- Surrounding catchment is predominately arable Report from Trinity Broads Management Plan which included monitoring N and P inputs during rainfall events has shown that there is a significant input from a dyke that runs from Martham. This drains an arable area as well as the surface water from the village.

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

Minor source --- Some input from septic tanks and private sewage treatment plants

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

NVZ Name: Trinity Broads NVZ (Ormesby Broad)
NVZ ID: EL150
Chlorophyll data

<table>
<thead>
<tr>
<th>Annual mean Chlorophyll (ug/l)</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>total number of Chlorophyll samples</td>
<td>58</td>
</tr>
<tr>
<td>WFD face value Chlorophyll class</td>
<td>Good</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>45%</td>
</tr>
<tr>
<td>Chlorophyll Good/Moderate boundary value</td>
<td>18</td>
</tr>
<tr>
<td>Date range of Chlorophyll samples</td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

Chlorophyll monitoring data

NVZ Name: Trinity Broads NVZ (Ormesby Broad)
NVZ ID: EL150
### Other responses

<table>
<thead>
<tr>
<th></th>
<th>Phytoplankton (Pluto EQR)</th>
<th>Macrophytes (EQR)</th>
<th>Diatoms (EQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQR</strong></td>
<td>0.31</td>
<td>0.3</td>
<td>No data</td>
</tr>
<tr>
<td><strong>Total number of samples/surveys</strong></td>
<td>36</td>
<td>2</td>
<td>No data</td>
</tr>
<tr>
<td><strong>WFD face value class</strong></td>
<td>Moderate</td>
<td>Poor</td>
<td>No data</td>
</tr>
<tr>
<td><strong>Confidence of moderate or worse status</strong></td>
<td>100%</td>
<td>100%</td>
<td>No data</td>
</tr>
<tr>
<td><strong>Date range of samples</strong></td>
<td>2011 - 2013</td>
<td>2009 - 2012</td>
<td>-</td>
</tr>
<tr>
<td><strong>Number of years when algal blooms were observed based on reactive monitoring 2010-2015:</strong></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

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

Strengthens evidence --- The Broads Authority does not have any recent macrophyte data for this lake. In the recent Broads Lake Review conducted by a group of researchers for the Broads Authority, including Geoff Phillips, assessed all available evidence. They concluded that the Trinity Broads system is currently recovering but it is sensitive to eutrophication. SSSI condition information says that the Broad is unfavourable recovering, and that there is low risk to this condition. Essex and Suffolk Water have stated that algae monitoring is carried out but that there has not been any interruption to potable water supply caused by algae. Norfolk Wildlife Trusts' Trinity Broads Warden has said "we do suffer from some algal blooms although this year it was not too bad – it is primarily Enteromorpha but occasional "grass clippings" algae and there were some powdery blooms in places this year"

**To which biological element(s) does it relate?**

Macrophytes ---

### Palaeolimnology

<table>
<thead>
<tr>
<th></th>
<th>No data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change as Square Chord Distance</strong></td>
<td>No data</td>
</tr>
<tr>
<td><strong>Change in Diatom community</strong></td>
<td>No data</td>
</tr>
</tbody>
</table>

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

Likely to be affected -

**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: Needs further investigation

Comments from first panel:
This lake should be considered as a single unit with Ormesby Little, Rollesby and Filby Broads. In all sites TN is slightly above 1 mg/l but TON is not elevated. There is evidence of eutrophic impact on biological elements, and phosphorus is also raised. These sites have been subject to significant long term monitoring, a consideration of trends, if data are available, may be worthwhile, together with evidence from algal blooms etc.

Second national panel
Comments from second national panel:

Recommendation: Designate

Local summary and recommendation:
Macrophytes indicate that there is a eutrophication problem. The lake is of National conservation importance which is reflected by its designation as an SAC and SSSI. It is also important for recreational use for angling, sailing and tourism. SSSI condition: Broad is unfavourable recovering

The conclusion is to support designation as part of the Trinity Broads system.
Lake Description:
Ormesby Broad is part of the Trinity Broads group and it should be considered alongside Rollesby, Filby and Ormesby Little Broad. These very shallow man made lakes are used for water supply by Essex and Suffolk Water and is in a SSSI, they are also important for angling, sailing and tourism.

Why the lake should be designated as a Polluted Water (eutrophic):
The Trinity Broads catchment lies within an existing groundwater NVZ designation, indicating that agricultural nitrogen load is a significant source. Although TON is relatively low, TN is in the 1-2 mg/l threshold range, and there is evidence that further reducing nitrogen availability would increase the nitrogen limitation of the system and lead to a reduction in the eutrophic impact on the biological community.

Nitrogen:
Annual mean TN is 1.3 mg/l, in the 1-2 mg/l threshold range, the 75th percentile TON concentration is below this range at 0.8 mg/l. TON concentrations decline to very low levels in the growth season, suggesting the productivity of the system is limited by nitrogen availability.

Phosphorus:
The WFD classification for total phosphorus is Moderate status. Phosphorus concentrations peak in summer, indicating release of phosphorus from sediments.

Ecological response:
Chlorophyll status is Good, but overall phytoplankton status is moderate and macrophyte status is Poor. The ecological indicators respond to nutrient enrichment, and the status reflects a eutrophic impact.

Supplementary evidence:
The Trinity Broads Management Plan study mentions annual algal blooms and the SSSI condition statement for the broad gives a status of unfavourable - no change.
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Nitrate Vulnerable Zone (NVZ) designation, 2017 Eutrophication (lakes)

Publication Date: June 2016

NVZ Name: Trinity Broads NVZ (Ormesby Little Broad)
NVZ ID: EL150
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).

NVZ Name: Trinity Broads NVZ (Ormesby Little Broad)
NVZ ID: EL150
Section 1. Lake and catchment characteristics

WB ID: 47011 2013 NVZ status: Not Designated

Lake attributes

<table>
<thead>
<tr>
<th>EA Area</th>
<th>Essex Norfolk and Suffolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>646329 / 314124</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>41.3</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>3118</td>
</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>1.8</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>No</td>
</tr>
</tbody>
</table>

Natural or artificial lake:
Natural

Type of artificial lake:

Lake perimeter (% artificial)
Natural

Significant changes in lake level due to seasonal drawdown:
N

Pumped storage or other reservoir:
0

Information on abstraction (if available)
<table>
<thead>
<tr>
<th>Lake catchment area (ha)</th>
<th>2959</th>
</tr>
</thead>
<tbody>
<tr>
<td>If pumped, pumped catchment area (ha)</td>
<td></td>
</tr>
</tbody>
</table>

**Hydrological character**
Primarily surface water --- Small groundwater inputs, but a very minor source.

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?
**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:**

**Accessibility to public:**
Easily accessible, many visits --- Used for sailing, angling and boating

**Recreational fishing:**
Significant benefit --- Large numbers of anglers visit the Broads to fish, this is a significant contribution to the local economy.

**Contact watersports**
Significant benefit --- Used for sailing and boating

**Nature of watersports (if applicable):**
Sailing/wind surf ---

**Other public benefit visits:**
Significant benefit- Waterside attractions including bird watching, restaurant. Significant contribution to the local economy. Part of The Broads National Park

**Conservation status:**

**Conservation value of lake:**
National --- yes

**Habitats Directive site:**
SAC --- Part of THE BROADS SAC

**SPA or SAC for aquatic interest features**
---

**SSSI or local conservation designation:**
SSSI --- Part of Trinity Broads SSSI

**Description of Aquatic interest features:**
--- SSSI: The site supports a rich assemblage of aquatic plants, wet carr woodland, swamp communities, breeding and wintering birds and invertebrates, including many which are nationally rare or scarce. SAC: 3140 Hard oligomesotrophic waters with benthic vegetation of Chara spp. 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation. 7140 Transition mires and quaking bogs. 7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae. 7230 Alkaline fens. 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
Total oxidised nitrogen (TON) data

<table>
<thead>
<tr>
<th>Mean summer TON (mg/l)</th>
<th>0.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of summer TON samples</td>
<td>30</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>0.4</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>81</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 1 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 2 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Date range of TON samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

**TON monitoring data**

NVZ Name: Trinity Broads NVZ (Ormesby Little Broad)
NVZ ID: EL150
Total nitrogen (TN) data

<table>
<thead>
<tr>
<th>Mean annual TN (mg/l)</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of TN samples</td>
<td>67</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 1 mg/l</td>
<td>Moderate</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 2 mg/l</td>
<td>Not confident</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?

Strengthens --- The Tinity Broads Management Plan study has shown that large amounts of nutrient enter the system during significant rainfall events.

NVZ Name: Trinity Broads NVZ (Ormesby Little Broad)
NVZ ID: EL150
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?

Strengthens --- Evidence from our monitoring for the Water Framework Directive classification has found that ecological elements that indicate the eutrophication status are not achieving the targets expected for a lake of this type. Phytoplankton class is Moderate and Macrophyte class is Poor. This supports the weight of evidence for eutrophication. Natural England: The Trinity Broads have shown a continual improvement over a number of years from the top of the system. However, in 2012 declines were noted from the top of the system (particularly in biomass), with improvements at the bottom of the system (Filby B.). As a result, Ormesby Broad was just short of meeting the eutrophic lakes attributes, and significantly failed the Chara lakes attributes. For the time being, it can still be considered in the recovering state, but is inherently unstable due to the high, stable levels of phosphorus within the system, the potential impact of drought summers and the summer drawdown of water levels. Broads Authority: They have no recent data from plant surveys but in a 2013 report they sate: "Ormesby Little Broad failed the target of algal species being recorded at less than 50% of sample points. Algae species were recorded at over 80% of sample points and contributed 35% of biomass." Norfolk Wildlife Trust Trinity Broads Warden has said that "there is often a lot of filamentous algae in Ormesby Little Broad."
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>87582</td>
<td>18.7</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>80178</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>3022</td>
<td>0.6</td>
</tr>
<tr>
<td>From all sources</td>
<td>90605</td>
<td>19.4</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>83200</td>
<td>17.8</td>
</tr>
</tbody>
</table>

Ranking based on nitrogen loading from agricultural sources 3

Local assessment 2015

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

Principal source --- Surrounding catchment is predominantly arable. NEAP model has not predicted sources other than arable so unable to state proportion of total.

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

Minor source --- A proportion will be from private sewage treatment plants and septic tanks. No large centres of population but houses are not on main sewer. So there are small sources of N from septic tanks and private sewage treatment plants. There have been some sewer overflows in the Filby / Ormesby Little Broad area.

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

---

**NVZ Name:** Trinity Broads NVZ (Ormesby Little Broad)

**NVZ ID:** EL150
Section IV - Response - Plants/Algae

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>61</td>
</tr>
<tr>
<td>WFD face value Chlorophyll class</td>
<td>Good</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>34%</td>
</tr>
<tr>
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<td>18</td>
</tr>
<tr>
<td>Date range of Chlorophyll samples</td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

Chlorophyll monitoring data

NVZ Name: Trinity Broads NVZ (Ormesby Little Broad)
NVZ ID: EL150
### Other responses

<table>
<thead>
<tr>
<th>EQR</th>
<th>Phytoplankton (Pluto EQR)</th>
<th>Macrophytes (EQR)</th>
<th>Diatoms (EQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.34</td>
<td>0.3</td>
<td>No data</td>
</tr>
</tbody>
</table>

| Total number of samples/surveys | 36 | 2 | No data |

| WFD face value class | Moderate | Poor | No data |

| Confidence of moderate or worse status | 100% | 100% | No data |

| Date range of samples | 2011 - 2013 | 2009 - 2012 | - |

| 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)

No change --- No recent data from Broads Authority. SSSI condition information says that the Broad is unfavourable recovering, and that there is low risk to this condition. The Trinity Broads Management Plan study mentioned that algal blooms are seen annually in the Trinity broads.

To which biological element(s) does it relate?

---

### Palaeolimnology

<table>
<thead>
<tr>
<th>Change as Square Chord Distance</th>
<th>No data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Diatom community</td>
<td>No data</td>
</tr>
</tbody>
</table>

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

Likely to be affected-

Strength of evidence (local judgement)

---

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

Consider as a single unit with Rollesby, Ormesby Little and Filby

**Second national panel**

**Comments from second national panel:**


**Recommendation:** Designate

**Local summary and recommendation:**

WFD macrophyte class is moderate, there is no recent information from the Broads Authority. The lake is of National conservation importance which is reflected by its designation as an SAC, SSSI. It is also important for recreational use for angling, sailing and tourism. Little additional evidence for elevated N concentrations in the Broad, although agricultural inputs have been identified. There is evidence of eutrophication and raised N in the Trinity Broads as a whole, so as Ormesby Little Broad is considered as a group with the other Trinity Broads then designation is recommended.

---

**NVZ Name:** Trinity Broads NVZ (Ormesby Little Broad)
**NVZ ID:** EL150
**Lake Description:**
Ormesby Little Broad is part of the Trinity Broads group and it should be considered alongside Rollesby, Filby and Ormesby Broad. These very shallow man made lakes are used for water supply by Essex and Suffolk Water and is in a SSSI, they are also important for angling, sailing and tourism.

**Why the lake should be designated as a Polluted Water (eutrophic):**
The Trinity broads catchment lies within an existing groundwater NVZ designation, indicating that agricultural nitrogen load is a significant source. Although TON and TN are relatively low, there is evidence that further reducing nitrogen availability would increase the nitrogen limitation of the system and lead to a reduction in the eutrophic impact on the biological community.

**Nitrogen:**
Annual mean TN is 1 mg/l, at the lower limit of the 1-2 mg/l threshold range, the 75th percentile TON concentration is below this range at 0.4 mg/l. TON concentrations decline to very low or undetectable levels in the growth season, suggesting the productivity of the system is limited by nitrogen availability.

**Phosphorus:**
The WFD classification for total phosphorus is Moderate status. Phosphorus concentrations peak in summer, indicating release of phosphorus from sediments.

**Ecological response:**
Chlorophyll status is Good, but overall phytoplankton status is moderate and macrophyte status is Poor. The ecological indicators respond to nutrient enrichment, and the status reflects a eutrophic impact.

**Supplementary evidence:**
The Trinity Broads Management Plan study mentions annual algal blooms and the SSSI condition statement for the broad gives a status of unfavourable - no change.

**2017 Recommendation:** Designate

**2013 Decision:** Not Designated

**2008 Decision:** Not Designated
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Nitrate Vulnerable Zone (NVZ) designation, 2017 Eutrophication (lakes)

Publication Date: June 2016

NVZ Name: Trinity Broads NVZ (Rollesby Broad)
NVZ ID: EL150
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: 47010  2013 NVZ status: Not Designated

Lake attributes

<table>
<thead>
<tr>
<th>EA Area</th>
<th>Essex Norfolk and Suffolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake grid co-ordinates (Easting/Northing)</td>
<td>646128 / 314894</td>
</tr>
<tr>
<td>Lake waterbody area (ha)</td>
<td>26.1</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>2809</td>
</tr>
<tr>
<td>Mean lake depth (m)</td>
<td>1.8</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>No</td>
</tr>
</tbody>
</table>

Natural or artificial lake:
Natural

Type of artificial lake:

Lake perimeter (% artificial)
Natural

Significant changes in lake level due to seasonal drawdown:
N

Pumped storage or other reservoir:
0

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>2348</td>
</tr>
<tr>
<td>If pumped, pumped catchment area (ha)</td>
<td></td>
</tr>
</tbody>
</table>

**Hydrological character**

Primarily surface water --- Small groundwater inputs, but a very minor source.

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?**
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:

Recreational use:

Accessibility to public:
Easily accessible, many visits

Recreational fishing:
Significant benefit --- Large numbers of anglers visit the Broads to fish, this is a significant contribution to the local economy.

Contact watersports
Significant benefit --- Large sailing club based on the Broad which offers sailing courses

Nature of watersports (if applicable):
Sailing/wind surf ---

Other public benefit visits:
Moderate benefit

Conservation status:

Conservation value of lake:
National

Habitats Directive site:
SAC --- Part of THE BROADS SAC, SSSI

SPA or SAC for aquatic interest features

SSSI or local conservation designation:
SSSI --- Part of Trinity Broads SSSI

Description of Aquatic interest features:
--- SSSI: The site supports a rich assemblage of aquatic plants, wet carr woodland, swamp communities, breeding and wintering birds and invertebrates, including many which are nationally rare or scarce. SAC: 3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation. 7140 Transition mires and quaking bogs. 7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae. 7230 Alkaline fens. 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
### Section III - Causes - Nutrients

#### 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>0</td>
</tr>
<tr>
<td>Total number of summer TON samples</td>
<td>31</td>
</tr>
<tr>
<td>75th percentile annual TON (mg/l)</td>
<td>0.4</td>
</tr>
<tr>
<td>Total number of TON samples</td>
<td>81</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 1 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Confidence of annual 75th %ile TON exceeding 2 mg/l</td>
<td>Not confident</td>
</tr>
<tr>
<td>Date range of TON samples</td>
<td>2010 - 2014</td>
</tr>
</tbody>
</table>

#### TON monitoring data

- **NVZ Name:** Trinity Broads NVZ (Rollesby Broad)
- **NVZ ID:** EL150

![TON monitoring data graph](image-url)
Total nitrogen (TN) data

<table>
<thead>
<tr>
<th>Mean annual TN (mg/l)</th>
<th>1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of TN samples</td>
<td>67</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 1 mg/l</td>
<td>Moderate</td>
</tr>
<tr>
<td>Confidence of annual mean TN exceeding 2 mg/l</td>
<td>Not confident</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?

Strengthens --- The Trinity Broads Management Plan study has shown that large amounts of nutrient enter the system during significant rainfall events.
Total phosphorus (TP) data

<table>
<thead>
<tr>
<th>Annual geometric mean TP (ug/l)</th>
<th>83</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?

Strengthens --- No recent Broads Authority macrophyte survey data. In a 2013 report they state "Although algae did not contribute greatly to mean wet weights it was recorded at just over 40% of all sample points in both months." Evidence from our monitoring for the Water Framework Directive classification has found that ecological elements that indicate the eutrophication status are not achieving the targets expected for a lake of this type. Phytoplankton class is Moderate and Macrophyte class is Poor. This supports the weight of evidence for eutrophication. Natural England: The Trinity Broads have shown a continual improvement over a number of years from the top of the system. However, in 2012 declines were noted from the top of the system (particularly in biomass), with improvements at the bottom of the system (Filby B.). As a result, Ormesby Broad was just short of meeting the eutrophic lakes attributes, and significantly failed the Chara lakes attributes. For the time being, it can still be considered in the recovering state, but is inherently unstable due to the high, stable levels of phosphorus within the system, the potential impact of drought summers and the summer drawdown of water levels.
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>75496</td>
<td>19.6</td>
</tr>
<tr>
<td>From agricultural sources minus atmospheric deposition</td>
<td>69968</td>
<td>No data</td>
</tr>
<tr>
<td>From urban sources</td>
<td>2715</td>
<td>0.7</td>
</tr>
<tr>
<td>From all sources</td>
<td>78211</td>
<td>20.3</td>
</tr>
<tr>
<td>From all sources (minus atmospheric deposition)</td>
<td>72683</td>
<td>18.9</td>
</tr>
</tbody>
</table>

Local assessment 2015

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

Principal source --- Surrounding catchment is predominantly arable. A proportion will be from private sewage treatment plants and septic tanks. NEAP model has not predicted sources other than arable so unable to state proportion of total.

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

Minor source --- No large centres of population but houses are not on main sewer. So there are small sources of N from septic tanks and private sewage treatment plants.

Significance of any other sources of nutrient loading to the lake or its catchment
Section IV - Response - Plants/Algae

Chlorophyll data

<table>
<thead>
<tr>
<th>Annual mean Chlorophyll (ug/l)</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>total number of Chlorophyll samples</td>
<td>58</td>
</tr>
<tr>
<td>WFD face value Chlorophyll class</td>
<td>Moderate</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>93%</td>
</tr>
<tr>
<td>Chlorophyll Good/Moderate boundary value</td>
<td>18</td>
</tr>
<tr>
<td>Date range of Chlorophyll samples</td>
<td>2010-2014</td>
</tr>
</tbody>
</table>

Chlorophyll monitoring data

![Chlorophyll monitoring data chart]

NVZ Name: Trinity Broads NVZ (Rollesby Broad)
NVZ ID: EL150
### Other responses

<table>
<thead>
<tr>
<th>Phytoplankton (Pluto EQR)</th>
<th>Macrophytes (EQR)</th>
<th>Diatoms (EQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of samples/surveys</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>WFD face value class</td>
<td>Moderate</td>
<td>Poor</td>
</tr>
<tr>
<td>Confidence of moderate or worse status</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Date range of samples</td>
<td>2011 - 2012</td>
<td>2009 - 2012</td>
</tr>
</tbody>
</table>

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

---

SSSI condition information says that the Broad is unfavourable recovering, and that there is low risk to this condition. The Trinity Broads Management Plan study mentioned that algal blooms are seen annually. Evidence from our monitoring for the Water Framework Directive classification has found that ecological elements that indicate the eutrophication status are not achieving the targets expected for a lake of this type. Phytoplankton class is Moderate and Macrophyte class is Poor. This supports the weight of evidence for eutrophication.

#### 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)

Affected

**Strength of evidence (local judgement)**

---

Local judgement on the evidence of eutrophic disturbance

---

**NVZ Name:** Trinity Broads NVZ (Rollesby Broad)

**NVZ ID:** EL150
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

Current assessment of weight of evidence supporting designation in 2017

First national panel
Recommended action: Needs further investigation

Comments from first panel:
Consider as a single unit with Ormesby, Ormesby Little and Filby

Second national panel

Comments from second national panel:

Recommendation: Designate

Local summary and recommendation:
Macrophytes and phytoplankton, indicators of eutrophication, indicate that there is a eutrophication problem. The lake is of National conservation importance which is reflected by its designation as an SAC, SSSI. It is also important for recreational use for angling, sailing and tourism. The conclusion is to support designation.
Final summary (2017)

2017 Recommendation: Designate
2013 Decision: Not Designated
2008 Decision: Not Designated

Lake Description:
Rollesby Broad is part of the Trinity Broads group and it should be considered alongside Filby, Ormesby and Ormesby Little Broad. These very shallow man made lakes are used for water supply by Essex and Suffolk Water and is in a SSSI, they are also important for angling, sailing and tourism.

Why the lake should be designated as a Polluted Water (eutrophic):
The Trinity broads catchment lies within an existing groundwater NVZ designation, indicating that agricultural nitrogen load is a significant source. Although TON and TN are relatively low, there is evidence that further reducing nitrogen availability would increase the nitrogen limitation of the system and lead to a reduction in the eutrophic impact on the biological community.

Nitrogen:
The annual mean TN concentration is 1.1 mg/l, just within the 1-2 mg/l threshold range, although the 75th percentile TON concentration is below the range at 0.4 mg/l. However TON declines to undetectable levels in the summer, suggesting nitrogen is a limiting factor in the system.

Phosphorus:
The WFD classification for total phosphorus is Moderate status. Phosphorus concentrations peak in summer, indicating release of phosphorus from sediments.

Ecological response:
The WFD chlorophyll status for is Moderate, as is overall phytoplankton status, and macrophyte status is Poor. The ecology is showing evidence of being affected by eutrophication.

Supplementary evidence:
The Trinity Broads Management Plan study mentions annual algal blooms and the SSSI condition statement for the broad gives a status of unfavourable - no change.

NVZ Name: Trinity Broads NVZ (Rollesby Broad)
NVZ ID: EL150
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