

# Anglian River Basin District - Phosphorus and Freshwater Eutrophication Strategic Overview

Freshwater eutrophication is when there is too much phosphorus in rivers and lakes, causing excessive algae and plant growth. This reduces water quality and damages local ecology affecting how we use water, it is an international problem. For European freshwaters the Water Framework Directive (WFD) requires member states to introduce phosphorus standards to address freshwater eutrophication with the aim of reaching good ecological status. In the Anglian Region currently, 51% of all water bodies do not meet the WFD phosphorus standard. The Anglian River Basin District is dominated by low altitude, high alkalinity rivers and lakes with sensitive headwaters and slow moving main rivers. These factors mean that eutrophication is a specific issue.

The Environment Agency set up a project to establish a focus on phosphorus within the Anglian River Basin District.

The project aimed to:

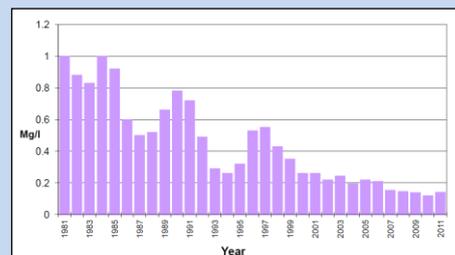
- Provide a framework for managing phosphorus and eutrophication to reduce the environmental risks and impacts in the River Basin District;
- Help deliver WFD and other directive requirements;
- Improve awareness of the issues around phosphorus and freshwater eutrophication.

This overview document summarises the main points from the strategic report produced as part of the project, and lists some of the main options required to reduce phosphorus and freshwater eutrophication in the Anglian River Basin District.

## Phosphorus and Freshwater Eutrophication in the Anglian River Basin District

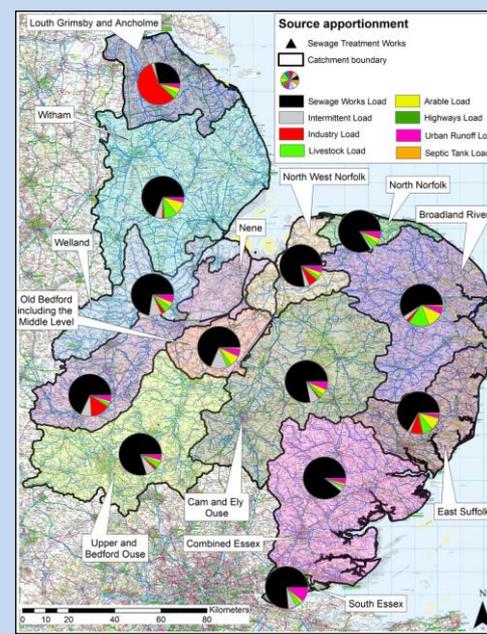
Excess phosphorus in the water environment has a number of negative impacts on water uses. Through a monitoring and designation process as part of the Urban Waste Water Treatment Directive (UWWTD) significant areas of the Anglian River Basin District have been designated as eutrophic, including rivers, lakes, and systems such as the Norfolk Broads.

Source control and the requirements of the UWWTD and the Habitats and Birds Directives have resulted in a significant decrease in phosphorus in Anglian water bodies. However there is still a long way to go to achieve the phosphorus standards and reduce the risks and impacts of eutrophication.



*Phosphorus concentrations in surface waters across Anglian Region*

Source apportionment modelling highlights waste water treatment, agriculture and industry as the main contributors to phosphorus in the Anglian River Basin District, but source apportionment varies at a catchment and water body scale.



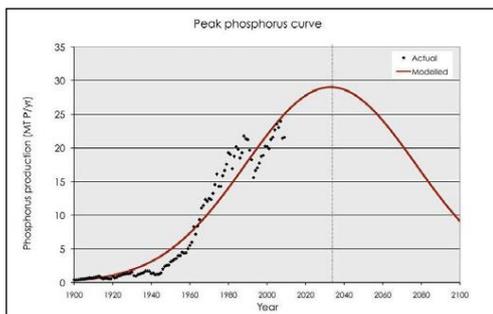
*Source Apportionment for 13 WFD Management Catchments*

## Phosphorus control – Options Appraisal

There are existing measures in place to reduce phosphorus from all of the contributing sectors but the success of these vary. There are also potential new measures which are not being utilised at this stage.

Targeted measures to reduce phosphorus at waste water treatment works have the potential for the greatest improvements in river P compliance. However, permit limits below 1 mg/l are likely to be needed at some waste water treatment works. Agricultural, small sewage discharge, industry and highways measures can also be effective at a water body scale. Source control measures, such as those to reduce P in detergents, would complement the targeted measures, bringing small but widespread improvements.

Phosphorus is a non-renewable resource and the sustainability (and security) of its supply, uses and disposal deserves great attention. A general change in thinking is needed. Phosphorus currently in the region, in the soil, animal wastes and waste water should start to be viewed as a potential resource.



*Peak phosphorus prediction in million metric tonnes per annum*

## Risk Assessments and Targeting

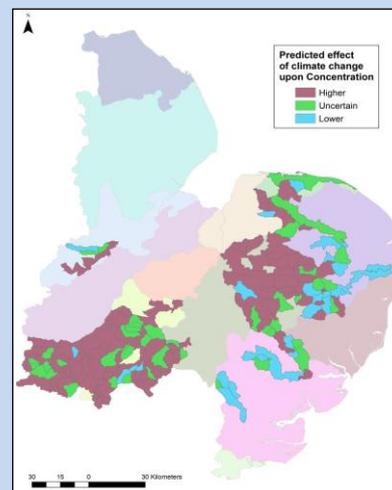
With limited resource, targeting is going to be key to achieving a reduction in phosphorus and freshwater eutrophication in the Anglian River Basin District.

National eutrophication guidance and assessments will be available to assist with identifying where to target measures. The modelled outputs from this report can be used to support this guidance and optimisation techniques are also being developed for modelling scenarios.

## Packages of Measures and Costs

The current limit of technology for phosphorus removal in waste water treatment is to reach 0.5mg/l. This has been modelled along with 0.1mg/l which is an aspiration for effluent discharge limits. To achieve greatest improvements in water quality, phosphorus removal at waste water treatment works is the most effective for the least cost on an annual operational cost basis for a single sector measure.

However single sector measures will not achieve WFD compliance and multi sector measures are more cost effective than single sector measures at a catchment scale.



*Modelled estimates of the impacts of climate change on river phosphorus concentrations (2050)*

The challenge of reaching at least good WFD status for phosphorus is made more difficult by growth and climate change. Growth is easier to plan for whereas climate change is difficult to predict and may exacerbate eutrophication through its influence on water temperature, water flow, sediment inputs and so on.

## Mechanisms for Implementing Phosphorus Reduction Measures

The effective delivery of phosphorus reduction measures through regulatory, fiscal or voluntary mechanisms is essential, careful planning and coordination is needed to ensure that they are targeted to achieve the greatest impact.

There are currently mechanisms in place for the main contributing sectors, agriculture and waste water treatment.

Effective management and targeting through these mechanisms is important to get the most effective measures in the right place.

The Catchment Based Approach is an effective way of identifying what needs to be done at a catchment level and engaging all the key stakeholders to assist with planning.

### **Actions and Recommendations**

Some of the main actions and recommendations required to reduce phosphorus and freshwater eutrophication in the Anglian River Basin District are:

**Targeting and implementing measures:** Establish Catchment Partnerships for each hydraulic catchment to involve key stakeholders and target measures.

**Reduce phosphorus in permitted discharges:** Discharge permit limits below 1mg/l of phosphorus will be required in some catchments.

**Recover phosphorus from waste water:** Increase the use of struvite recovery and research other techniques.

**Review trade effluent consents:** Reduce phosphorus loads to waste water treatment works which do not have phosphorus removal.

**Reduce potential losses of P to water from sludge disposal to land:** Increase land bank used for sludge disposal to prevent a build up of phosphorus in soils.



**Targeted advice for agricultural sectors:** Ensure agricultural sectors with the greatest potential for phosphorus losses are targeted with specialist advice.

### **Improve communication with land owners:**

Identify and use most appropriate methods for engaging farmers and promoting the implementation of successful phosphorus reduction measures.

### **Utilise existing manure management legislation:**

Environment Agency audits of manure management from permitted pig and poultry farms.

### **Use modelling tools and advice to implement the best land management measures:**

Use tools available to target implementation of phosphorus control measures at farm and sub-catchment level.



### **Implementation of key actions for farmers:**

- Manage nutrients well
- Manage soil sustainably
- Manage water use effectively
- Manage livestock so they do not freely access watercourses.

**Address regulated industry discharges:** Review and update phosphorus limits on regulated industry environmental permits.

### **Mitigate against the negative impacts of increased housing and development:**

Use payment for ecosystem services (PES) schemes to drive reductions from agriculture and waste water treatment.

### Reduce sediment entering water bodies:

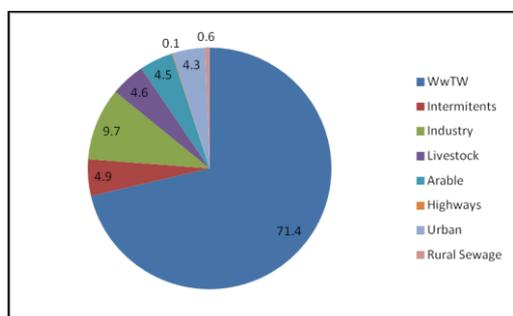
Implement mud on roads campaigns and sustainable drainage schemes on highways.



### Address problem in non-mains sewage areas:

Implement targeted, small sewage discharge campaigns.

**Reduce misconnections:** Emphasis should be on misconnection prevention but campaigns to reduce existing misconnections are also beneficial.



*Source Apportionment in the Anglian River Basin District*

**Continue to develop understanding of the effectiveness of measures:** a continual programme of evidence collection and research will assist with understanding the outcomes of implementing phosphorus reduction measures including biological recovery.

### High level actions by consumers can be carried out to reduce phosphorus emissions at source:

- Use less water – reduces phosphorus dosing of clean water supply
- Phosphorus is used to produce food and in food additives, so reducing food waste will assist in reducing this source
- Use low phosphorus detergents ahead of legal reduction requirements
- Address misconnections
- Use best practice for non-mains sewage disposal.



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