

Suffolk Coast and Heaths AONB

# Farm Reservoir Design Guide

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*A guide to good planning and design of  
farm reservoirs in the Suffolk Coast and  
Heaths Area of Outstanding Natural Beauty*



## Introduction

The Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) has been designated for its special, nationally important landscape qualities. Any development within the Area, including farm reservoirs, should respect its distinctive character and ought to contribute towards maintaining or enhancing that character. This guide describes what can be done to conserve and enhance the AONB. Most of the guidance in this publication is voluntary but we hope that farmers and reservoir designers will follow it when they can.

The AONB is in one of the driest, most water-stressed parts of the UK and water conservation is high up the list of priorities for planners as well as farmers using irrigation. In such areas winter storage reservoirs are one of the best solutions for farmers. In the AONB, we would like to make sure that reservoir developments are designed to safeguard the special character of the landscape, maintaining and enhancing wildlife as well as enabling the production of high-value cash crops.

Careful thought about the siting, shape, design and landscaping of storage reservoirs will be of benefit in the planning process. Schemes that do not adequately understand and minimise their impact on landscape and wildlife and seek to enhance these, can be delayed by objections and revisions.

This booklet explains how to mitigate the impact of a proposed farm reservoir on local landscape and wildlife. It also summarises the steps of the planning process. It is designed for use in the Suffolk Coast and Heaths AONB, but it may also be relevant to other parts of the UK.

Suffolk Coast and  
Heaths AONB nationally  
protected landscape.  
© Mike Page.



## The Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) A distinctive area ...

The Suffolk Coast and Heath AONB contains well defined landscape types such as Coastline and Coastal Valleys, River and Stream Valleys, Estuaries and the 'Sandlings' Plateau. Development proposals should reflect and enhance the character of these landscapes and the local distinctiveness of the area.

The Suffolk Coast and Heaths is also important for its wildlife, with many internationally and nationally important habitats, including heathlands, reedbeds, grazing marshes and saline lagoons that are home to protected species. Farm reservoirs may impact on wildlife by altering habitat and drawing on vital water resources.

Not least, the AONB hosts a thriving local economy and many businesses ground their success in the high environmental quality of the area. Development proposals that are well thought out and sympathetic are better for business and can benefit the protected landscape.

As an aid to conserving and enhancing local character, the Suffolk Coast and Heaths Unit has published a set of 'Landscape Character Guidelines'. This is a useful reference for anyone owning or managing land in the AONB (see page 18 for further details).

Information on the wildlife of the AONB can be found in the Suffolk Coast and Heaths Natural Area Profile, published by Natural England (see page 18 for further details).



Water abstraction from a river catchment may affect estuaries miles away: the availability of freshwater flows is thought to play an important role in mudflat ecology. Research by the Environment Agency has shown that reduced river flows may affect invertebrate food for estuarine species such as shelduck.

# Suffolk Coast and Heaths AONB



## Design principles for farm reservoirs

Farm reservoirs are a potentially intrusive addition to the landscape, but with suitable design, can enhance it and provide wildlife value as well as supply water for irrigation. Wildlife and landscape friendly features can be incorporated into reservoir design for a little extra cost, will gain 'additionality' in the planning process and may help to placate objectors amongst statutory consultees.

### Designing for the landscape

From a landscape point of view, the most important impact of a new reservoir is its visibility. Different parts of the landscape are vulnerable in different ways:

Landscape Element	Vulnerability
Sandlings Plateau	Level areas with large vistas, meaning long-distance visibility.
Estuary Valley Sides	Visibility against skyline from within and along valley and from other side of estuary.
Estuary Valley Floor and Coastal Valley	Visibility from above, and against skyline from valley floor.

There are ways to safeguard the distinctive quality of the local landscape and mitigate any negative impact. This will involve integrating the reservoir's footprint and profile with the local topography, blending it in rather than trying to mask it by planting.

The Landscape Character Assessment profile for the Suffolk Coast and Heaths provides a useful guide to the elements of local distinctiveness in the AONB (see 'Further Information' on page 18 for more details).



Sandlings open landscape

## Siting

In the case of reservoirs that do not use a butyl or similar sheet liner, the availability of clay is likely to determine the general location of the reservoir. However, the specific location should be chosen to make the best use of pre-existing features, such as changes in landform and existing hedges, woods and trees. Field patterns and associated features can be very ancient and you should avoid disrupting them.

The key principles are:

- Avoid breaking the skyline: always site a reservoir away from the crest of a slope.
- Make use of landforms to help set the reservoir in its locality.
- Naturally, water bodies are more likely to be found in the lower parts of the landscape and a reservoir may sit more comfortably here.

Take care when siting a reservoir on a floodplain. Reservoirs with large, raised banks may increase the risk of flooding downstream because their footprint deprives the floodplain of valuable storage capacity. Reservoirs which do not hold water above ground level and which have their excavated spoil removed from the floodplain have a neutral effect on floodwater storage, and so are more acceptable for planners. The Environment Agency may require a Flood Risk Assessment to ensure that the development does not increase flood risk.

Take care to avoid Public Footpaths and other Public Rights of Way when siting a reservoir. Having to re-route Public Rights of Way will cause additional delays in the planning process.

Pastoral valley  
scenery



## Shape and profiles

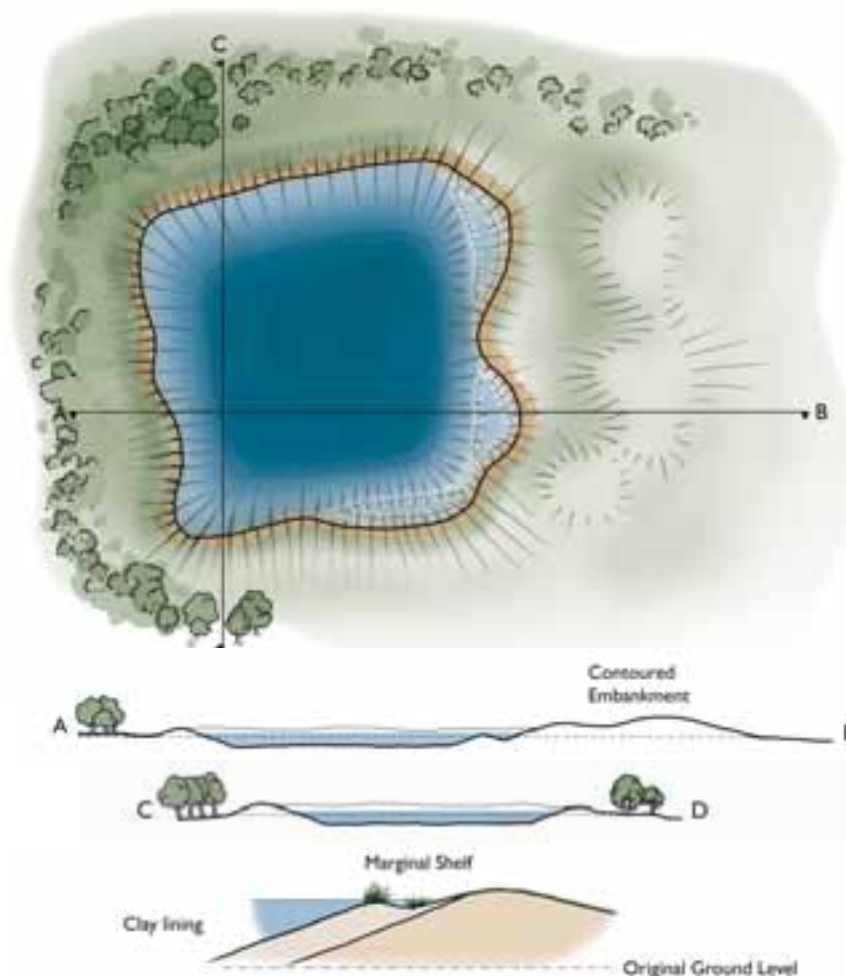
From a water-holding point of view, a circular reservoir shape is most economical because it has a low bank / water volume ratio. A rectangular shape is worst, but cheapest to construct. From a landscape impact point of view, an irregular outline is best. It is rare to find straight lines in nature!

Even if the internal shape of the reservoir is rectangular, the embankment can be irregular. The boundary outline can be modified as well as the angle of the slope and the profile of the crest. Gentle slopes, with angles no greater than 1 in 4, are less intrusive and also permit easy access for vegetation management. A hummocky surface may also re-create the natural curves of the landform and help the reservoir look less intrusive.



**If your project includes a ditch, consider a 'beaded ditch' as this will have greater wildlife value. Use low clay bunds, logs or raise the bed of the ditch with gravel to create the 'beads'.**

### An irregular outline reservoir



A curved or irregularly shaped margin can soften the shape of a lined reservoir.



An embankment may harmonise with existing treelines.



In locations where a high embankment is inappropriate, the reservoir needs to be over-deepened. The excess spoil can be used to contour the site, reducing slope angles, chamfering edges and creating wildlife features such as nesting banks and raised planting areas.

In cases where there is insufficient material for the embankment, your borrow pits may be landscaped for wildlife, to create ditches, ponds, boggy areas or south facing slopes that will greatly benefit invertebrates.

Good fencing is essential to reservoir safety



## Fencing

If fencing is required to keep people and animals out of your reservoir, carefully consider where fencing can be located. If fencing is located off the crest there will be far less impact on the landscape. A fence sited half way up the embankment is more difficult for deer to jump. A suitable fence might be two metres high, with chicken wire at the bottom (dug into the ground and turned outwards to impede rabbits) and sheep netting above.



## ■ Designing for wildlife

The wildlife of the Suffolk Coast and Heaths is dependent on a mosaic of habitats, many of them developed through farming activity over hundreds, even thousands, of years. The Sandlings heaths, for example, have existed since at least the Iron Age, over 2,000 years ago. Farm reservoirs are just one more form of human development that alters existing habitat, but may also provide important new opportunities for plants and animals.

The main principles to follow are:

- Seek to link habitats together to allow wildlife to migrate through the area.
- Build on the typical habitats and species already found in the locality.
- Plan for the ongoing maintenance of the site as a wildlife habitat (a management plan for wildlife may be requested as part of gaining planning permission).

## ■ Grassland and wildflower areas

The embankment and its associated graded areas provide an opportunity to establish grassland habitat. Avoid using topsoil from the field, as it will be overfertile and likely to be colonised by aggressive weed species. By mixing topsoil and subsoil the fertility can be reduced, giving an opportunity to establish a lower maintenance grass and wildflower mix. Other wildlife-friendly options such as green hay, log piles (for amphibians, reptiles and invertebrates) or some areas left as rough grassland could also be considered. Contact your wildlife adviser for advice about soil conditions, suitable plant species and how to establish them.

Any dells and hummocks created will vary the micro-climate and enable a wider range of species to thrive. Appropriate grading of the slopes will allow machinery to be used to help the establishment and maintenance of such areas, which are likely to benefit from annual or biannual cutting and removal of the cut material.



**New grassland established on a sandy embankment.**



**This marginal shelf is ready to receive reeds transplanted from ditches on the farm.**

## Inside the reservoir

Reservoirs lined with butyl or other sheeting have less wildlife value than those lined with clay because of their sterile, slippery lining. By contrast the banks of clay lined reservoirs can be colonised gradually by plants and animals.

A reservoir may be full for at least six months of the year, so it will benefit from marginal shelves and a lip or berm close to the maximum water level. The marginal zone should be as wide and as gently sloping as possible to allow the widest range of

vegetation to colonise, which will in turn attract a wide range of invertebrates and amphibians. Reeds, sedges and other water plants from the local area can be introduced and will shield the banks from wave erosion. Ideally these marginal features will be supplied with water on a dripfeed bled off from the irrigation system, so that when the water level drops in the summer months the plants can survive. They should be sited on the northern to eastern quadrant of the reservoir to take full advantage of sunlight and to oppose the prevailing wind.

When the water level falls, previously submerged banks are exposed. This 'draw-down zone' in a clay lined reservoir can make a significant contribution to wildlife value, as open areas are colonised by plants and insects and are exploited by birds. Gentler slopes are more easily colonised and the banks of the northern to eastern quadrant of the reservoir can be given a shallower profile and maybe even step terraces. You can vary the topography of the draw-down zone by creating bays and inlets, hummocks and hollows.

Water levels in the reservoir may well stay at a very low level for several months until they can be restored in winter. The temperature, chemistry and volume of this residual water

may be adverse to aquatic life. A deep hole or 'wildlife sump' in the bottom of the reservoir below the abstraction level will provide a pool of cool water and a refuge for wildlife. However, you will need to make sure there is sufficient depth of clay to maintain such a hole.

**Wandering Snail *Lymnaea peregra* may quickly colonise the draw-down zone of a reservoir.**



## Islands

Creating islands is one possibility for breaking up the blank expanse of water in a farm reservoir. Earth islands may not be a good idea because they reduce the water volume, can look unsightly, are subject to wave erosion and become less accessible when water levels drop. Anchored floating islands perhaps based on wooden rafts can be more attractive and useful for wildlife. Islands may encourage nesting birds, depending on the type of surface. Terns may be attracted to open areas with shingle; wild ducks will prefer areas of shrub or sedge.

## Pumping equipment

Sheds and shelters will be needed to house pumping equipment and associated electrical installations. If possible, these could be incorporated within an existing farm complex or linked to existing hedges, shrubs and copses. Alternatively, they may be screened by planting suitable species of native trees and shrubs (of local provenance).



Use native trees and shrubs to landscape installations.

## Hedges, trees and shrubs

Pre-existing hedges, trees and shrubs are a precious resource when landscaping a farm reservoir. They can be supported with new planting to soften corners, to close up gaps and left-over field space, and to provide a structural link with the existing landscape. When choosing species and locations, look at what is already growing in the local area: similar species are likely to grow better and will retain local character. Avoid planting trees and shrubs in single lines (unless creating a hedge) as this is likely to draw the eye to the reservoir. The idea is to make your reservoir blend in with the landscape.

Be very careful about planting trees and shrubs on the bank of the reservoir. They are likely to spread or topple over and rupture the bank with their root-plate. Never plant invasive, thirsty trees like alder, willow and poplar. If you must plant, only do it on the lowest 30% of the outer bank. You will need to make provision for regular mowing to prevent gradual colonisation of the bank. Specialist advice on what to plant and where to plant it is available from landscape and conservation advisers (see page 19 for details).

## Archaeology

When considering a potential site for a reservoir, it is important to seek early information and advice about the archaeological interest in the area. Specific evidence about the location may be limited but that may not mean the site is not significant. As a first step there will be a need to assess the archaeological potential of the site, through a variety of techniques, such as desktop study or trial trenching. If significant archaeological remains are identified, you may have to find another site for the proposed reservoir, or undertake excavation that may add significantly to the cost of your project. (See page 19 for details of who to contact.)

## Associated features

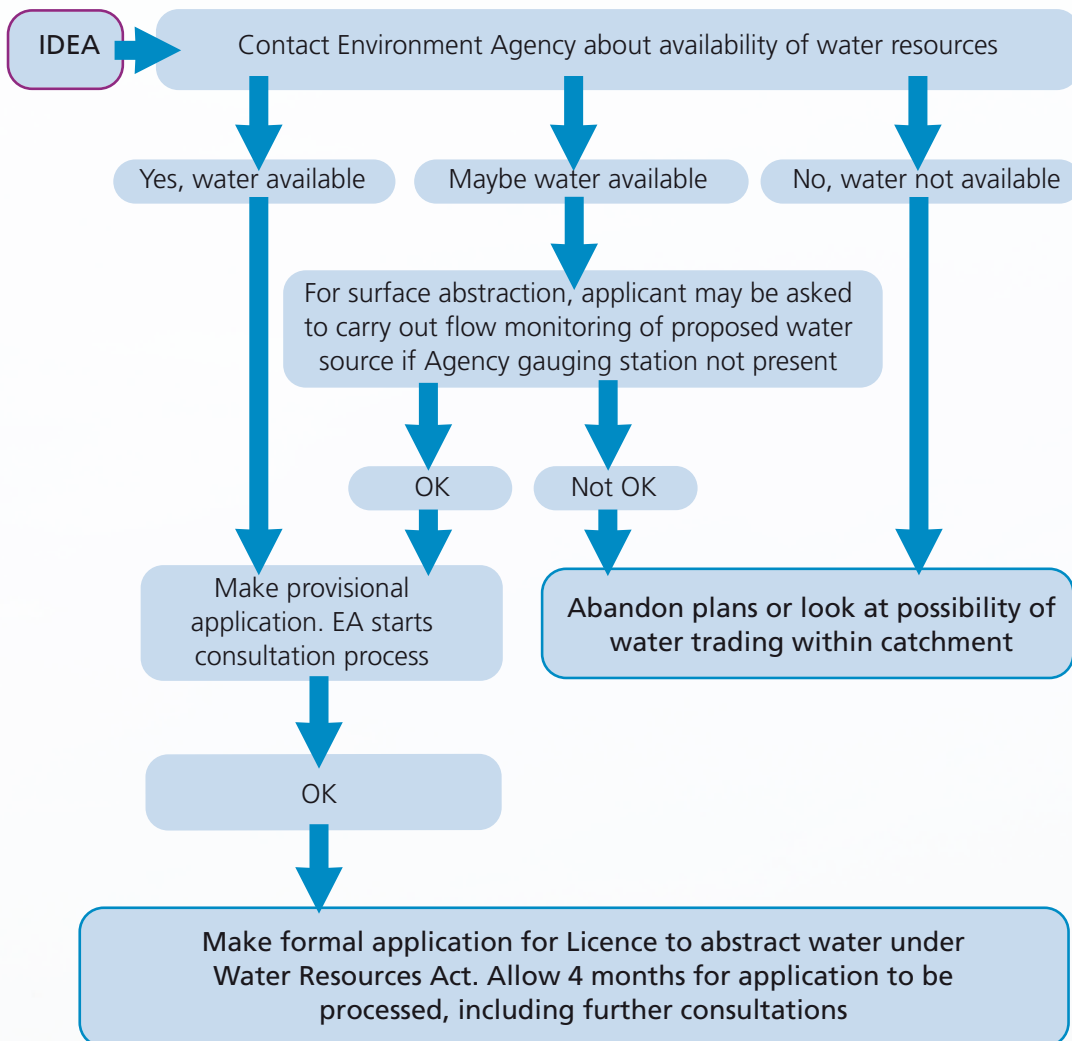
As part of your overall project, you may wish to consider positive management of associated landscape features such as ditches, hedges and ponds. Restoration or enhancement of these features for landscape and wildlife value can be undertaken as part of a package mitigating the impact of your proposals and help ensure that planning permission is granted. Site-specific advice is likely to be available (see page 19 for details).

## Planning your farm reservoir

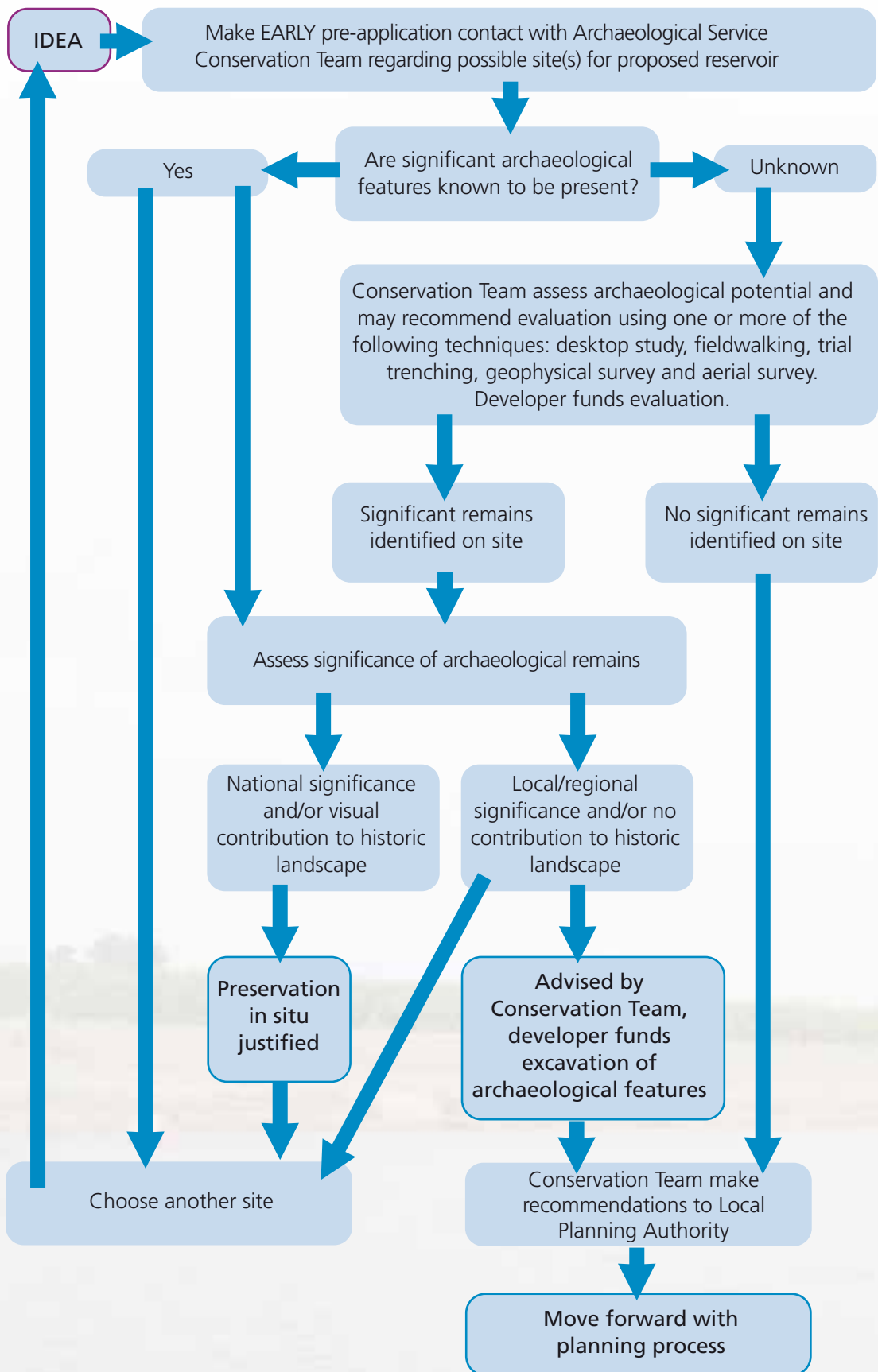
The following flow diagrams show the necessary steps in obtaining the main permissions to build a reservoir. The first step is checking with the Environment Agency that water resources are available for your project. In addition you may wish to seek guidance on specific topics such as landscape or archaeology from the relevant advisers (see page 19 for details)



## Reservoir Planning Process Chart – Environment Agency

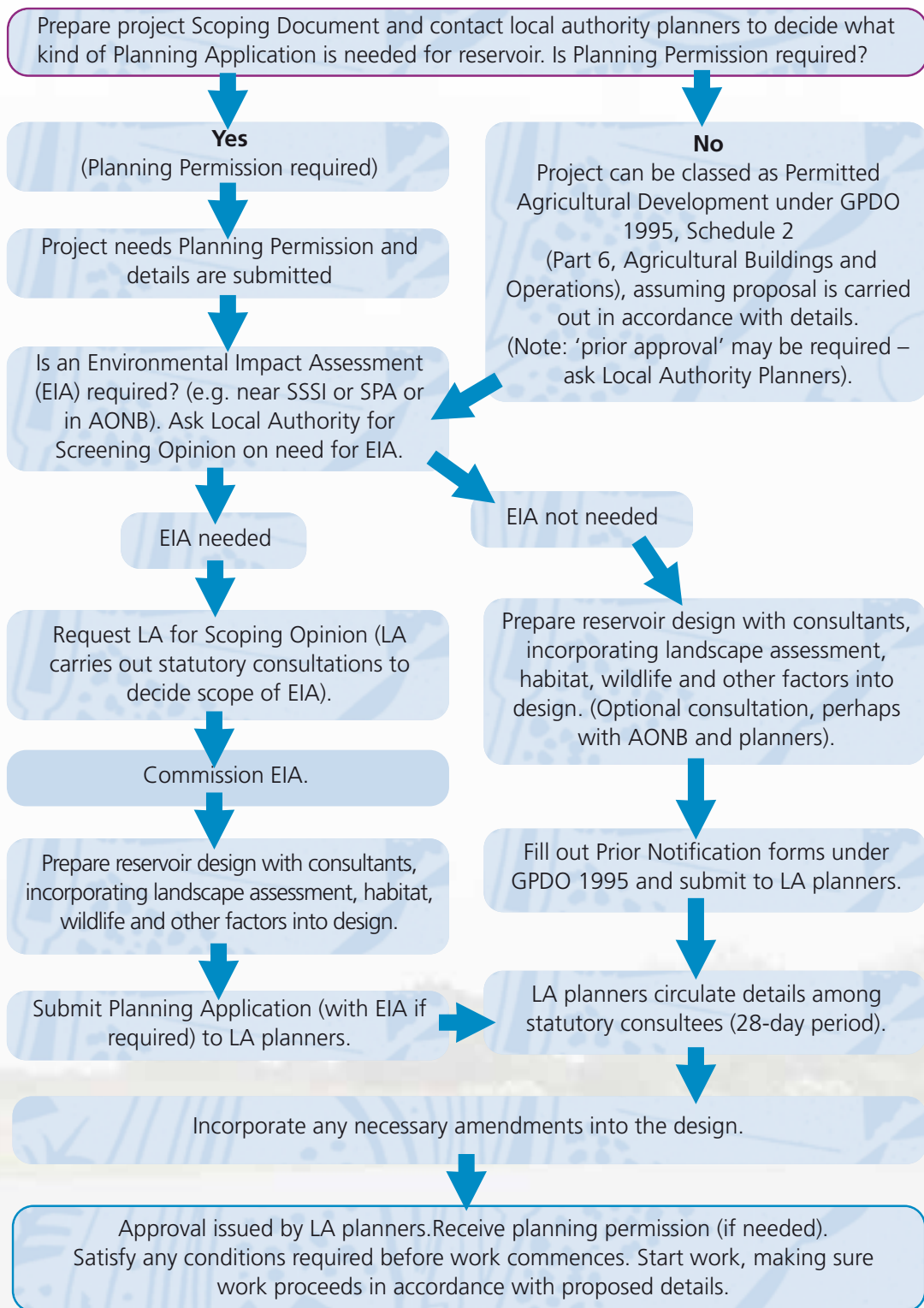


## Reservoir Planning Process Chart – County Archaeologists



# Reservoir Planning Process Chart

## Local Authority Planning Department.



## Legislation affecting farm reservoirs

A range of legislation is relevant to land owners wishing to construct farm reservoirs. The following is a summary, but is not intended as a comprehensive statement. You should find the text of the legislation on Government websites.

### **The Reservoirs Act 1975**

The Act ensures the public safety of reservoirs that hold at least 25,000 cubic metres of water above natural ground level.

**Affects:** The design and engineering of farm reservoirs.  
**Administered by:** The Environment Agency and requires annual inspection.

### **The Water Resources Act 1991**

#### **The Water Act 2003**

This legislation provides a management framework for water resources, including abstraction licenses, impounding of water and drought orders and the placement of structures such as weirs and sluices.

**Flood Defence Consent:** Under the terms of The Water Resources Act 1991 and the Anglian Region Land Drainage and Sea Defence Byelaws, the prior written consent of the Environment Agency is required for any proposed works or structures, in, under, over or within 9 metres of the top of the bank of any designated 'main river'.

**Affects:** The ability of farmers to abstract and impound water resources.  
**Administered by:** The Environment Agency.

### **The Flood and Water Management Act 2010**

This legislation aims to provide better, more comprehensive management of flood risk for people, homes and businesses. Defines large raised reservoirs as 'structures capable of holding 10,000 cubic meters of water above the natural level of any part of the surrounding land'. Such structures need to be registered with the Environment Agency. Consideration will need to be given to the impact on people downstream in the event of a reservoir failing and a flood plan may be required. The implications of any emergency draw-down on the flood risk in receiving watercourses will need consideration.

**Affects:** The ability of farmers to abstract and impound water resources.  
**Administered by:** The Environment Agency.

### **The Land Drainage Act 1991**

This legislation provides a consenting mechanism for works affecting the flow of ordinary watercourses (drains, ditches and minor watercourses). This may include sluices, weirs, dams, culverts or diversions.

**Affects:** The ability of farmers to set up flow control works to feed reservoirs or to divert/culvert drains, ditches and minor watercourses.  
**Administered by:** The Internal Drainage Board and/or the Environment Agency.



### The Countryside and Rights of Way Act 2000

Building on earlier legislation, the Act has enhanced protection for Areas of Outstanding Natural Beauty in England and Wales, including the Suffolk Coast and Heaths.

**Affects:** The impact of farm reservoirs on sensitive landscapes and biodiversity in the AONB.

**Administered by:** Natural England.

### The Wildlife and Countryside Act 1981

The Act is the primary legislation which protects animals, plants and certain habitats in the UK. It includes provision for designating Sites of Special Scientific Interest.

**Affects:** The impact of farm reservoirs on protected species and habitats.

**Administered by:** Natural England.

### The Town and Country Planning Act 1990

The Town and Country Planning (General Permitted Development) Order 1995

The Town and Country Planning (Environmental Impact Assessment) Regulations 1999

This legislation controls the planning of farm reservoirs under the planning control system and the system of General Permitted Agricultural Development rights.

**Affects:** The planning and statutory consultation process involved in constructing farm reservoirs.

- Most reservoirs will need planning permission.
- Reservoirs in or impacting on environmentally sensitive sites will require Environmental Impact Assessments (under EU Directive 85/337 Environmental Impact Assessment). Sensitive sites include SSSIs, SPAs, SACs, County Wildlife Sites.
- A heritage asset assessment will be needed in line with Planning Policy Statement 5. This may involve desktop studies and field evaluation, followed by appropriate mitigation, which could involve preservation of the remains or further archaeological investigation.
- The site of a planned reservoir may be affected by a Tree Preservation Order.

**Administered by:** The local planning authority and statutory consultees, including Natural England and the County Archaeological Service.



## Further information

### Publications and online resources

- Countryside Commission (1993): The Suffolk Coast and Heaths Landscape CCP406. A short introduction to the special qualities of the AONB and the perceived forces for change.  
See: [www.snh.org.uk/wwwo/sharinggoodpractice/CCI/cci/eastofengland/082.htm](http://www.snh.org.uk/wwwo/sharinggoodpractice/CCI/cci/eastofengland/082.htm).
- English Nature (1997): Suffolk Coast and Heaths Natural Area Profile NA49. This book explains the wildlife of the Area and the priorities for its conservation.  
See: [www.naturalareas.naturalengland.org.uk/Science/natural/NA\\_Details.asp?NA\\_ID=49&S=&R=8](http://www.naturalareas.naturalengland.org.uk/Science/natural/NA_Details.asp?NA_ID=49&S=&R=8)
- Environment Agency (2007): Living on the Edge. A Guide to the Rights and Responsibilities of Riverside Occupation. A booklet for people who own land or property alongside a river or other watercourse.  
Downloadable from <http://publications.environment-agency.gov.uk/pdf/GEHO0407BMFL-e-e.pdf>
- Environment Agency (2008): The East Suffolk Catchment Abstraction Management Strategy. A book summarising and explaining water resource availability for the local catchment, including the AONB. Includes a CD of technical information.  
Can be obtained by emailing [cams.angeastern@environment-agency.gov.uk](mailto:cams.angeastern@environment-agency.gov.uk) or downloadable from <http://www.environment-agency.gov.uk/cy/ymchwil/cynllunio/33550.aspx>
- Natural England (undated): Suffolk Coast and Heaths Joint Character Area Profile JCA82. A short guide to the landscape, settlement and land use of the Area.  
See: [www.naturalengland.org.uk/Images/jca82\\_tcm6-5413.pdf](http://www.naturalengland.org.uk/Images/jca82_tcm6-5413.pdf)
- Stour and Orwell Estuaries Management Group. Online resources related to managing development and its impact on estuarine wildlife. See: [www.suffolkcoastandheaths.org/text.asp?PageId=93](http://www.suffolkcoastandheaths.org/text.asp?PageId=93).
- Suffolk Coast and Heaths Management Plan (2008). Sets out public policy for managing the AONB.  
See: [www.suffolkcoastandheaths.org/downloads.asp?PageId=161](http://www.suffolkcoastandheaths.org/downloads.asp?PageId=161).
- Suffolk Coast and Heaths AONB website, with news, information and contacts.  
See: [www.suffolkcoastandheaths.org.uk/](http://www.suffolkcoastandheaths.org.uk/).
- Suffolk Coast and Heaths Unit (2001): Landscape Character Guidelines for the Suffolk Coast and Heaths Area of Outstanding Natural Beauty. Includes Guidance Cards showing ideal priorities for conserving and enhancing the character of different facets of the landscape in the AONB.  
See: <http://www.suffolkcoastandheaths.org/uploads/SCH%20Landscape%20guidelines.pdf>
- Suffolk Landscape Character Assessment: online maps of Suffolk's landscape typology, including the AONB.  
See: [www.suffolklandscape.org.uk](http://www.suffolklandscape.org.uk).
- Suffolk Wildlife Trust 'Water for Wildlife' project, includes information on species and farm advisory visits.  
See: <http://85.158.158.143/ca/gi/water%20for%20wildlife.htm>
- 'The Pond Book' by P. Williams and others (Ponds Conservation Trust; 1999; ISBN 0-953797-10-4). A guide to the principles of managing and creating ponds, particularly in the countryside.  
See: [www.pondconservation.org.uk/advice/Buythepondbook/](http://www.pondconservation.org.uk/advice/Buythepondbook/)
- 'Sandlands: The Suffolk Coast and Heaths' by Tom Williamson (Windgather Press; 2005; ISBN 1-905119-02-X). An in-depth explanation of how the distinctive landscape of the Suffolk Sandlings has evolved over the centuries.
- 'Thinking About an Irrigation Reservoir?' A guide to planning, designing, constructing and commissioning a water storage reservoir (Environment Agency and Cranfield University).  
See: [www.ukia.org/ebooklets/EA%20Reservoir%20booklet\\_final.pdf](http://www.ukia.org/ebooklets/EA%20Reservoir%20booklet_final.pdf)

## Organisations

- Environment Agency: **08708 506506** / [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)
- Local Authority Planning Departments
  - Babergh District Council : **01473 825858** / [www.babergh.gov.uk](http://www.babergh.gov.uk)
  - Suffolk Coastal District Council: **01394 444423** or **403** or **428** / [www.suffolkcoastal.gov.uk](http://www.suffolkcoastal.gov.uk)
  - Waveney District Council: **01502 523024** (Lowestoft and northern parishes); **01502 523020** (other parishes) / [www.waveney.gov.uk](http://www.waveney.gov.uk)
- Natural England: **01284 762218** / [www.natural-england.org.uk](http://www.natural-england.org.uk)
- Suffolk Archaeological Service: **08456 066067**  
[www.suffolk.gov.uk/Environment/Archaeology](http://www.suffolk.gov.uk/Environment/Archaeology)
- Suffolk Coast and Heaths Unit: **01394 384948** / [www.suffolkcoastandheaths.org](http://www.suffolkcoastandheaths.org)
- Suffolk FWAG: **01473 652800** / [www.fwag.org.uk/contact](http://www.fwag.org.uk/contact)
- Suffolk Wildlife Trust: **01473 890089** / [www.suffolkwildlife.co.uk](http://www.suffolkwildlife.co.uk)

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**Michael Hyde-Parker** - Natural England

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**Tim Holt-Wilson**

The opinions and design guidelines in this booklet are purely the responsibility of the Suffolk Coast and Heaths Unit. If you wish to suggest any improvements or corrections please contact us at the address overleaf.

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**Suffolk Coast  
& Heaths**

Area of Outstanding Natural Beauty

