MOTT MACDONALD

ATKINS
Member of the SNC-Lavalin Group

# River Great Ouse: Drought Permit for Offord Intake

## Anglian Water HRA Stage 2 Appropriate Assessment

27 March 2020

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
mottmac.com

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# Issue and Revision Record

| Revision | Date | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| A | 12/10/2018 | Chris McPake | Celia Figueira | Peter Ede | First Issue |
| B | 16/11/2018 | Chris McPake | Celia Figueira | Peter Ede | Revised following client comments |
| C | 28/02/2020 | Philippa Cross and Emma Lancaster | Megan Rogers | Peter Ede and Stuart Smith | Revised following further comments |
| D | 27/03/2020 | Philippa Cross and Emma Lancaster | Megan Shelton | Peter Ede and Stuart Smith | Revised following client's independent review |

**Document reference:** 399155 | 9 | D

The preparation of Rev C and Rev D of this report includes the contribution of Atkins, who worked alongside Mott MacDonald to respond to feedback received on Rev B.

**Information class: Standard**

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# Executive summary

Anglian Water Services (Anglian Water) currently abstract from the River Great Ouse at the Offord intake to fill Grafham Water. The current licence permits abstraction of up to 75% of flow in excess of the Minimum Residual Flow (MRF) of 136Ml/d, up to a maximum of 485Ml/d. In support of the 2019 Drought Plan, Anglian Water have proposed drought action to recharge Grafham Water, which will result in an increase in abstraction from the Offord intake. During drought conditions Anglian Water are seeking a drought permit in two stages:

- Stage 1: Maintaining the current MRF of 136Ml/d but increasing abstraction from 75% to 100% of the excess flow, or,
- Stage 2: Reducing the MRF to 68Ml/d and abstracting up to 75% of the excess flow.

Anglian Water would only be likely to consider applying for the drought permit in a severe, possibly multi-season drought, if there is a risk of compromising their ability to meet demands on Grafham Water.

The implementation of the drought permit has the potential to result in adverse impacts associated with the reduction in flows and water levels, and reduction in water quality downstream of the Offord intake. The Ouse Washes, located approximately 30km downstream of the intake, are designated as the Ouse Washes Special Area of Conservation (SAC), Ouse Washes Special Protection Area (SPA) and Ouse Washes Ramsar site for their international importance to nature conservation. Qualifying features include:

- Spined loach *Cobitis taenia*;
- Internationally important populations of breeding and over-wintering water birds;
- Internationally important assemblages of over-wintering waterbirds;
- Extensive wetland habitats represented by seasonally-flooding washland; and
- Several nationally scarce aquatic plants and invertebrates.

As part of this project, a Stage 1 Screening for the Assessment of Likely Significant Effects (LSE) was undertaken to assess the environmental effects of the proposed drought permit at Offord intake (Mott MacDonald, 2018). The Stage 1 Screening Assessment concluded that the implementation of the drought permit could lead to LSE to the Ouse Washes SAC, SPA and Ramsar sites due to a deterioration in water quality (notably ammonia and orthophosphate), especially if the proposed drought permit was to be applied under summer drought conditions. This report therefore details Stage 2 Appropriate Assessment of the HRA, which is required to investigate whether the drought permit would result in an adverse effect on the integrity of the Ouse Washes European Sites.

It is assumed that with the implementation of a robust monitoring protocol and mitigation measures, the proposed drought permit will not result in an adverse effect on the integrity on the Ouse Washes SAC, SPA or Ramsar site.

# 1 Introduction

## 1.1 Background

Anglian Water abstract from the River Great Ouse at the Offord intake to supply Grafham Water. The current licence permits abstraction of up to 75% of flow in excess of the Minimum Residual Flow (MRF) of 136Ml/d, subject to licence and pump capacity constraints. In support of the 2019 Drought Plan, Anglian Water have proposed drought action to recharge Grafham Water, which will result in an increase in abstraction from the Offord intake, either through a reduction in the MRF or an increase in the proportion of excess flow that is abstracted.

The Environment Agency's Water Company Drought Plan Guidance (Environment Agency, 2017) states that a water company must ensure that its plan meets the requirements of the Conservation of Habitats and Species Regulations (UK Government, 2017). As such, it must undertake a Habitats Regulations Assessment (HRA) on the effects of the drought permit on European sites, alone or in combination with other plans.

## 1.2 Habitats Regulations Assessment framework

In accordance with Article 63 of the Habitats Directive, an Appropriate Assessment is required where a plan or project not directly connected with or necessary to the management of a Natura 2000 site(s), may give rise to significant effects upon a Natura 2000 site(s). The requirement for an Appropriate Assessment has been transposed into UK law under Regulation 61 of the Conservation of Habitats and Species Regulations 2010 ('Habitats Regulations') (S.I. 2017/1012) (as amended) and is commonly referred to as a 'Habitats Regulations Assessment' (HRA).

Natura 2000 sites form a network of European protected sites, designated for their rare, vulnerable and/or endangered species and habitats. Natura 2000 sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). HRAs are also required, as a matter of UK Government policy, for potential SPAs (pSPA), candidate SACs (cSAC) and wetlands of international importance (Ramsar sites) for the purposes of considering plans and projects, which may affect them. Hereafter all of the above designated nature conservation sites are referred to as "European sites".

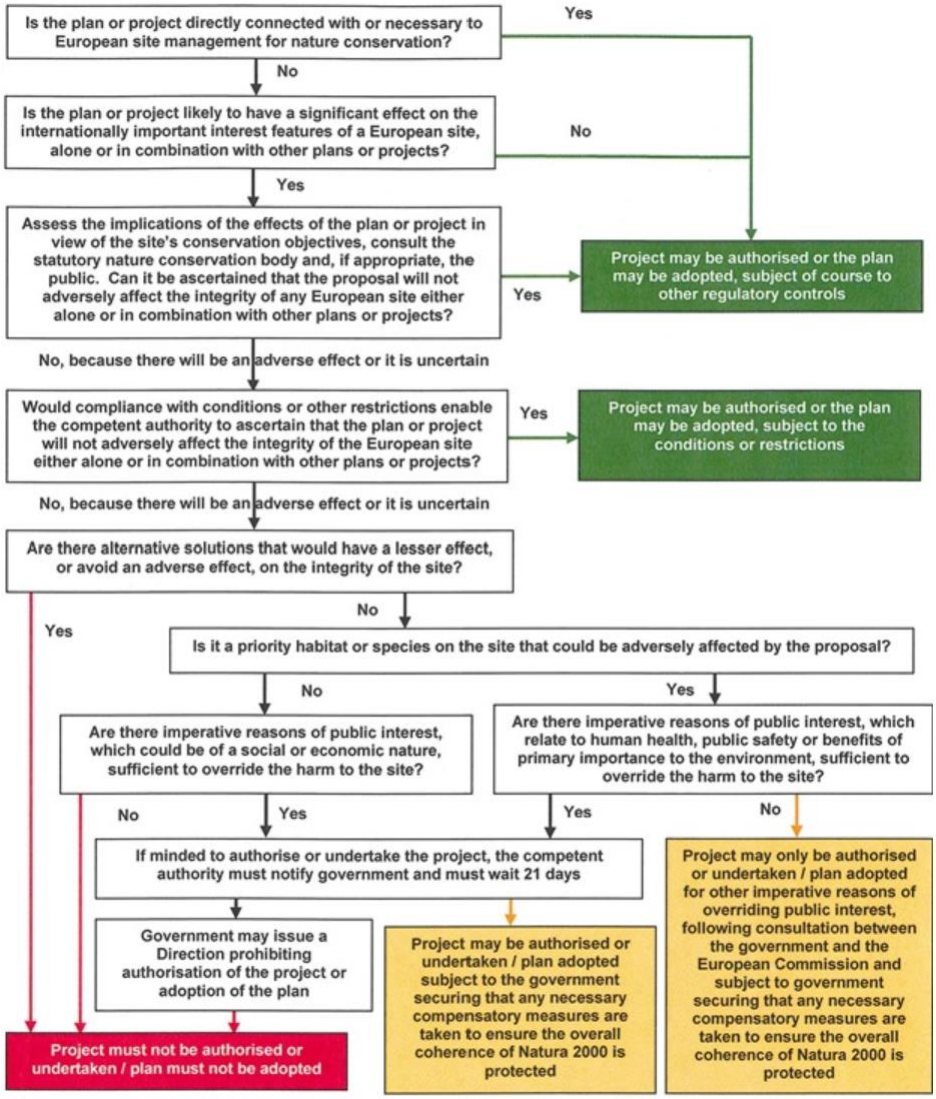
The HRA is undertaken in a series of steps, referred to as 'stages' in the case of the assessment of projects or 'tasks' in the case of the assessment of plans (Department for Communities and Local Government (DCLG, 2006). The series of stages correspond with the Assessments prescribed by the Habitats Regulations Assessment Handbook (Figure 1). This guidance has been followed for this assessment.

Each stage determines whether further stages in the process are required. The first stage identifies likely significant effects by identifying the presence or absence of significant indicators. If the conclusion of Stage 1 is that there will be no significant impacts on the European site(s), there is no requirement to undertake further stages.

Where a project or plan is likely to give rise to significant effects upon a European site(s), an assessment must be made of the implications on the integrity of that site in view of that site's structure, function and conservation objectives (Stage 2), either alone or in-combination. Furthermore, where there are adverse impacts, an assessment of potential mitigation measures will also be required in Stage 2. If it is concluded that adverse impacts are likely to remain after

mitigation, there must be an examination of alternative ways to complete the project that avoid adverse impacts on the integrity of the site (Stage 3). Where alternatives exist, these should be subjected to Stage 1 and/or Stage 2 assessments. Where no alternatives exist, it is necessary under Regulation 64 of the Habitats Regulations to identify if there are or are not Imperative Reasons for Overriding Public Interest (IROPI). If there are IROPI then compensatory measures must be assessed (Stage 4) under Regulation 68 of the Habitats Regulations.

**Figure 1: Assessments process**




## 1.3 Scope of the Stage 2 Appropriate Assessment

Under Regulation 63 of the Conservation of Habitats and Species Regulations 2010 (as amended) ("Habitat Regulations"), a competent authority must make an appropriate assessment of the implications of the plan or project.

As part of this plan, a Stage I Screening for the Assessment of LSE was undertaken to assess the environmental impacts of the proposed drought permit at the River Great Ouse Offord intake

(Mott MacDonald, 2018b). LSE in this context are any effects that may reasonably be predicted as a consequence of a plan or project, which may affect the conservation objectives of the features for which a site was designated (English Nature, 1994). The Stage I Screening determined that due to potential water quality deterioration, a Stage 2 assessment would be required.

This Appropriate Assessment therefore details Stage 2 of the HRA which is required to determine whether the plan will have adverse effects on site integrity. It specifically considers:

- Impacts of the project on the integrity of the Ouse Washes SPA/SAC/Ramsar, either alone or in combination with other projects and plans, with respect to the conservation objectives of the sites and their structure and function; and,
- Assess potential mitigation strategies where adverse impacts are identified, including setting out a timescale and identifying mechanisms through which the mitigation measures will be secured, implemented and monitored.

Potential impacts may be direct or indirect and are dependent on the relationship between the action (implementing the drought permit abstraction) and the receptor (the qualifying features of the European site). The significance of an impact is relative to the sensitivity, existing condition and conservation status of the qualifying features of the sites and the scale of the impact in space and time.

Potential impacts on the qualifying features of the Ouse Washes SPA/SAC/Ramsar are evaluated with respect to the scale, extent and nature of the impact of changes in water chemistry on, for example, the area of habitat affected, changes in hydrodynamics, potential changes in species distribution, and the duration of the impact. The sensitivities of each of the qualifying features are also assessed.

This report will be sent for consultation with the relevant nature conservation authorities and the public. If the competent authority considers that residual adverse effects remain, the next stage of HRA (Assessment of Alternative Solutions) would be required.

## 1.4 Methodology

This Stage 2 Assessment has been formulated using the following approach:

- Detailed assessment of the potential impacts of the proposed drought permit for the River Great Ouse (Offord Intake)
- Hydrological flow data for the River Great Ouse for the periods 1933-1935, 2004 – 2012, and 2012 – 2017
- Review of existing Environment Agency monitoring data for diatoms, fish, macroinvertebrates, and aquatic macrophytes within the River Great Ouse for the period 2005 – 2017
- Assessment of the European Sites' characteristics and identification of their conservation objectives.
- Identification of the aspects of the proposed drought permit that could significantly impact the conservation objectives of the European Sites.

This assessment has been undertaken in accordance with the following guidance:

- EC (2000) *Managing Natura 2000 Sites*. The provisions of Article 6 of the Habitats Directive 92/43/EEC

- EC (2001) *Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*
- Environment Agency (2002). *Ouse Washes Water Level Management Plan*
- Environment Agency (2017). *Drought plan guideline extra information. Environmental Assessments for Water Company Drought Plans.*
- Defra (2018). *Advice Before You Apply for A Drought Permit, Drought Order or Emergency Drought Order;*
- Tyldesley & Chapman (2013). *The Habitats Regulations Assessment Handbook; and*
- UKTAG (2013). *UK Environmental Standards and Conditions*, UK Technical Advisory Group on the Water Framework Directive.

## 1.5 Structure of the report

The structure of this report follows the recommended guidance for undertaking Appropriate Assessments as follows:

- **Section 2** presents a description of the proposed development and a summary of the HRA Stage I Screening Assessment;
- **Section 3** presents a description of the Ouse Washes SAC/SPA/Ramsar site, the qualifying features, conservation objectives and the sensitivity of these features;
- **Section 4** presents the predicted impacts of the proposed development on features of the European designated sites;
- **Section 5** presents mitigation measures and enhancement measures and monitoring requirements, and
- **Section 6** includes recommendations and presents conclusions of the assessment.

# 2 River Great Ouse: Offord Intake

## 2.1 Overview

Anglian Water abstract from the River Great Ouse at the Offord intake to fill Grafham Water. Anglian Water may seek a drought permit to recharge Grafham Water which will result in an increase in abstraction from the Offord intake. Anglian Water may seek a drought permit in a severe, possibly multi-season drought, if there is a risk of compromising Anglian Water's ability to meet demand on Grafham Water.

Anglian Water would only be likely to consider applying for the drought permit in a severe, possibly multi-season drought, if there is a risk of compromising Anglian Water's ability to meet demands on Grafham Water. It is recognised that a drought permit would only be valid for a six-month period, after which a new application would be required to cover an extension.

Under the most likely scenario, Anglian Water may seek a winter drought permit after a dry winter and summer, enabling Anglian Water to refill the Grafham Water during the following winter. Should drought conditions continue to present a significant risk to supply, Anglian Water may also seek a summer drought permit.

## 2.2 Proposed drought permit

The drought permit at Offord may take the form of a winter or summer authorisation to allow increased refilling of Grafham Water through a 50% reduction in the MRF or an increase in the proportion of flow above the MRF that can be abstracted.

The current licence allows abstraction of 75% of flow in excess of the MRF, subject to licence and pump capacity constraints. It is proposed that a drought permit would be considered in two stages:

Stage 1: Existing MRF, abstraction at up to 100% of the flow in excess of the MRF

Stage 2: Reduced MRF, abstraction at up to 75% of the flow in excess of the MRF.

Stage 2 allows greater abstraction than Stage 1 when the flow is below 340Ml/d (the crossover point at which either rule would allow abstraction of 204Ml/d), so would be likely to be applied for in the later stages of a drought. Usage would be expected to revert to Stage 1 when sufficient flow recovery has occurred. It has been assumed that instantaneous, hourly, daily and annual totals would remain unchanged from those currently licensed, as set out in Table 1.

**Table 1: Current Maximum licensed abstraction quantities at Offord**

| Time period | Licensed rate |
|---|---|
| Instantaneous ($m^3$ per second) | 5.614 |
| Hourly ($m^3$) | 20,208 |
| Daily ($m^3$) | 485,000 |
| Annual ($m^3$) | 150,000,000 |
| Minimum Residual Flow ($m^3$/day) | 136,383 |

Source: Atkins, 2015; Section 1.2.

Anglian Water would only be likely to consider applying for the drought permit in a severe, possibly multi-season, drought, if there is a risk of compromising their ability to refill Grafham

Water. Under the most likely scenario, a winter drought permit would be sought after a dry winter and summer, enabling Anglian Water to refill Grafham Water during the following winter. This typically corresponds to a natural increase in flows (and hence water available for abstraction) and a reduction in the sensitivity of physico-chemical and biological receptors to impact. However, should drought conditions continue to present a significant risk to supply, a summer drought permit may also be considered as an option. Note that summer is defined as April to September (inclusive) and winter as October to March (inclusive).

The natural River Great Ouse flow is significantly enhanced by upstream discharges from sewage treatment works. A winter or summer drought permit may therefore be considered to be acceptable, since flows would still be higher than they would be during a drought under natural conditions.

Hydrological and hydraulic modelling has been used to develop the proposed drought permit. The critical drought year of 1933-35 was used as a severe drought scenario to which a permit would be applied. In this scenario a drought permit would most likely be applied across summer 1934 (Apr-Sep inclusive) and winter 1934-35 (Oct-Mar inclusive). Further modelling has been used covering the two most recent low flow periods of 2005/2006 and 2011/2012.

This information has been used to understand the potential impact of the proposed drought permit on the River Great Ouse in terms of flow velocity, reduction in water levels, changes to hydro-morphology and water chemistry (Mott MacDonald, 2018a).

## 2.3 Summary of HRA Stage I Screening Assessment

The objective of the Stage I Screening was to determine whether implementation of the proposed permit will have a Likely Significant Effect (LSE) on the conservation objectives of European designated sites. This was achieved through a desk-based review of the following information:

- European site(s), their primary reasons for selection and qualifying features, conservation objectives and site vulnerabilities;
- The sensitivity of the primary reasons for selection and qualifying features to environmental change; and
- The assessment of potential impacts of the proposed drought permit on the hydrological regime, ecology and water quality of the River Great Ouse presented in the Drought Permit Environmental Assessment.

A search for European sites in hydrological continuity with the Offord intake was carried out using Defra's 'Multi Agency Geographic Information for the Countryside' (MAGIC) website (Defra, 2016). The European sites listed below were identified downstream of the Offord abstraction point along the River Great Ouse (in order of upstream to downstream they are):

- Portholme SAC[1];
- Ouse Washes SAC[2];
- Ouse Washes SPA[3];

[1] JNCC (2015). Portholme Natura 2000 - Standard Data Form. EU Code: UK0030054. Compilation date: June 1998.
[2] JNCC (2015). Ouse Washes SAC Natura 2000 - Standard Data Form. EU Code: UK0013011. Compilation date: January 1996.
[3] JNCC (2015). Ouse Washes SPA Natura 2000 - Standard Data Form. EU Code: UK9008041. Compilation date: March 1993.

- Ouse Washes Ramsar[4];
- The Wash and North Norfolk Coast SAC[5]; and
- The Wash SPA[6].

Figure 2 shows their location relative to the Offord intake.

The Stage I Screening Assessment determined that there are no mechanisms by which potential impacts arising from the proposed drought actions at Offord (e.g. flow, water level, flooding, water chemistry or habitat loss) could have a Likely Significant Effect (LSE) on Portholme SAC, The Wash and North Norfolk Coast SAC and the Wash SPA. However, water quality deterioration (notably ammonia and orthophosphate) arising from implementation of the drought permit under summer conditions may have a significant effect on some interest features of the Ouse Washes European designated sites.

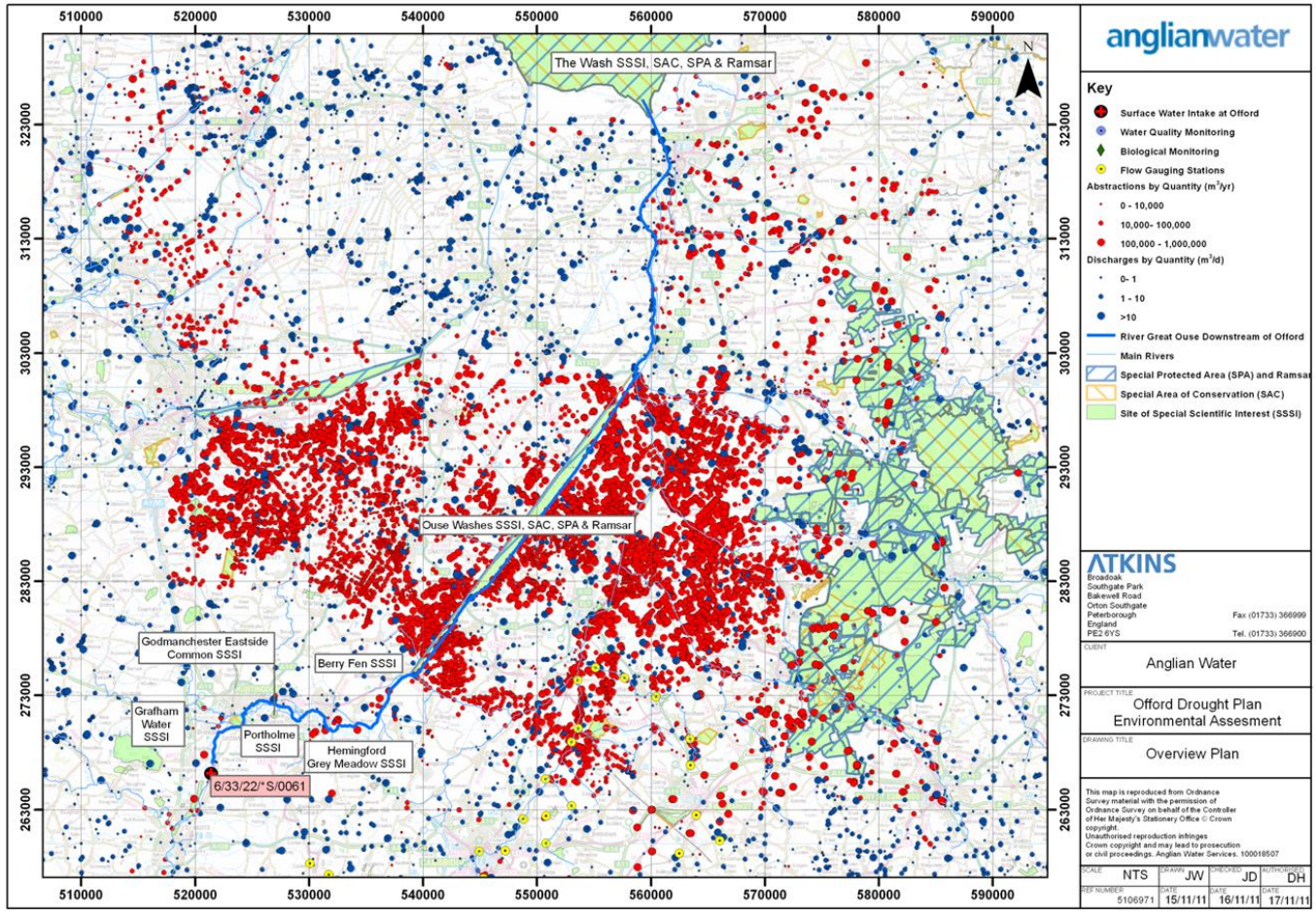
A Stage II Appropriate Assessment is therefore required to further investigate the potential impacts, and ultimately assess whether the proposed drought permit has the potential to adversely affect the integrity of the Ouse Washes European sites.

4 JNCC (2008). Information Sheet on Ramsar Wetlands: Ouse Washes. Site Code: UK11067. Completion date: January 1976.

5 JNCC (2015). The Wash & North Norfolk Coast SAC Natura 2000 - Standard Data Form. EU Code: UK0030222. Compilation date: January 1996.

6 JNCC (2015). The Wash SPA Natura 2000 - Standard Data Form. EU Code: UK0017075. Compilation date: October 1996.

**Figure 2: Overview of the study area and key environmental features**



# 3 Ouse Washes European designated sites

## 3.1 Site overview

The Ouse Washes covers three European sites, each designated for its own specific features. These include:

- Ouse Washes SAC[7]
- Ouse Washes SPA[8]
- Ouse Washes Ramsar[9]

The following sections provide an overview of each of the European sites. The conservation objectives of each of the sites and their known existing threats are summarised. The conservation status and sensitivities of those qualifying features which are assessed to be sensitive to changes in water chemistry are also included, including an assessment of the potential impacts upon those features.

## 3.2 Ouse Washes SAC

### 3.2.1 Overview and qualifying features

Covering a total area of approximately 311ha, the Ouse Washes Special Area of Conservation (SAC) lies between The Hundred Foot/New Bedford River to the south-east and the Old Bedford River/Counter Drain to the north-west. These rivers fall within the boundary of the Ouse Washes Site of Special Scientific Interest (SSSI). The SAC is located approximately 30km from the Offord intake. While located at a significant distance from the intake, it is hydrologically connected by its presence downstream of the intake on the River Great Ouse.

The Old Bedford River in particular is of national nature conservation importance in its own right. The primary reason for the SAC designation on the Ouse Washes is for its representative populations of spined loach. This species is found within the Old Bedford River and adjacent Counter Drain areas. Here the clear water and abundant macrophytes are present which are important for healthy populations of spined loach. The associated aquatic fauna is similarly diverse and includes spined loach. The Counter Drain, with its clear water and abundant aquatic plants, is particularly important, and a healthy population of spined loach is known to occur.

The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Spined loach: whilst spined loach has a broad European range, in the UK it appears to be restricted to just five east-flowing river systems in eastern England – the Rivers Trent, Welland, Witham, Nene and Great Ouse, with their associated waterways. The fish has limited means of dispersal, so UK populations are largely genetically isolated from each other.

[7] JNCC (2015). Ouse Washes SAC Natura 2000 - Standard Data Form. EU Code: UK0013011. Compilation date: January 1996
[8] JNCC (2015). Ouse Washes SPA Natura 2000 - Standard Data Form. EU Code: UK9008041. Compilation date: March 1993.
[9] JNCC (2008). Information Sheet on Ramsar Wetlands: Ouse Washes. Site Code: UK11067. Completion date: January 1976.

The species occurs in the Counter Drain, Old Bedford/River Delph areas of the Ouse Washes, which contains clear water and abundant macrophytes which are of particular importance to maintain healthy populations of this species.

### 3.2.2 Conservation objectives

The conservation objectives for the Ouse Washes SAC are outlined in '*European Site Conservation Objectives for Ouse Washes Special Area of Conservation Site Code: UK0013011* (Natural England, 2014). With regards to the SAC and the species for which the site has been designated and which are subject to natural change, the conservation objectives are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of the habitats of qualifying species
- The structure and function of the habitats of qualifying species
- The supporting processes on which the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

## 3.3 Ouse Washes SPA

### 3.3.1 Overview and qualifying features

The Ouse Washes SPA is located in eastern England on one of the major tributary rivers of The Wash. It is an extensive area of seasonally flooding wet grassland ('washland') lying between the Old and New Bedford Rivers, and acts as a floodwater storage system during winter months. It covers an area of 2447ha, overlapping that of the Ouse Washes SAC and corresponds with much of the area comprising the Ouse Washes SSSI. The SPA is located approximately 30km from the Offord intake, and is hydrologically connected, i.e. downstream on the River Great Ouse.

The cycle of winter storage of floodwaters from the river and traditional summer grazing by cattle, as well as hay production, have given rise to a mosaic of rough grassland and wet pasture, with a diverse and rich fauna and flora. The washlands support both breeding and wintering waterbirds. In summer, there are important breeding numbers of several wader species, as well as Spotted Crake *Porzana porzana.* In winter, the site holds very large numbers of swans, ducks and waders. During severe winter weather elsewhere, the Ouse Washes can attract waterbirds from other areas due to its relatively mild climate (compared with continental Europe) and abundant food resources. In winter, some wildfowl, especially swans, feed on agricultural land surrounding the SPA.

This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

- Ruff *Philomachus pugnax* (breeding)
- Spotted Crake *Porzana porzana* (breeding)
- Bewick's Swan *Cygnus columbianus bewickii* (over-wintering)
- Hen Harrier *Circus cyaneus* (over-wintering)
- Ruff *Philomachus pugnax* (over-wintering)
- Whooper Swan *Cygnus cygnus* (over-wintering)

This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- Black-tailed Godwit *Limosa limosa limosa* (breeding)
- Gadwall *Anas strepera* (breeding)
- Shoveler *Anas clypeata* (breeding)
- Black-tailed Godwit *Limosa limosa islandica* (over-wintering)
- Gadwall *Anas strepera* (overwintering)
- Pintail *Anas acuta* (over-wintering)
- Pochard *Aythya ferina* (over-wintering)
- Shoveler *Anas clypeata* (over-wintering)
- Wigeon *Anas penelope* (over-wintering)

The area qualifies as a wetland of international importance under Article 4.2 of the Directive (79/409/EEC) by regularly supporting an overwintering assemblage of at least 20,000 waterfowl.

Over winter, the area regularly supports 64,392 individual waterfowl (5-year peak mean between 1991/2 and 1995/6) including lapwing *Vanellus vanellus*, coot *Fulica atra*, tufted duck *Aythya fuligula*, mallard *Anas platyrhynchos*, teal *Anas crecca*, cormorant *Phalacrocorax carbo*, black-tailed godwit, pochard, shoveler, pintail, gadwall, wigeon, ruff, whooper swan and Bewick's Swan *Cygnus*.

### 3.3.2 Conservation objectives

The conservation objectives for the Ouse Washes SPA are outlined in '*European Site Conservation Objectives for Ouse Washes Special Protection Area Site Code: UK9008041* (Natural England, 2014). With regard to the SPA and the species for which the site has been designated and subject to natural change, the conservation objectives are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and,
- The distribution of the qualifying features within the site.

## 3.4 Ouse Washes Ramsar site

### 3.4.1 Overview and qualifying features

Largely located within the boundary of the Ouse Washes SPA and Ouse Washes SSSI, the Ramsar site consists of an area of 2514ha. This site is an area of seasonally-flooded washland habitat managed in a traditional agricultural manner. The washlands support nationally and internationally important numbers of wintering waterfowl and nationally important numbers of breeding waterfowl. The site is also of note for the large area of unimproved neutral grassland communities which it holds, and for the richness of the aquatic flora within the associated watercourses. Like the SAC and SPA, the Ouse Washes Ramsar is located downstream of the Offord intake, and is hydrologically connected to the River Great Ouse.

This site qualifies for classification as a Ramsar under the following Criteria:

**Ramsar Criterion 1**

- The site is one of the most extensive areas of seasonally-flooding washland of its type in Britain
- The site supports several nationally scarce plants, including: small water pepper *Polygonum minus*), whorled water-milfoil *Myriophyllum verticillatum*, greater water parsnip *Sium latifolium*, river waterdrop wort *Oenanthe fluviatilis*, fringed water-lily *Nymphoides peltate*, long-stalked pondweed *Potamogeton praelongus*), hair-like pondweed *Potamogeton trichoides*, grass-wrack pondweed *Potamogeton compressus*, tasteless water-pepper *Polygonum mite*), marsh dock *Rumex palustris*
- The site holds relict fenland fauna, including: large darter dragonfly *Libellula fulva* and rifle beetle *Oulimnius major*, and
- The site supports a diverse assemblage of nationally rare breeding waterfowl associated with seasonally-flooding wet grassland.

**Ramsar Criterion 5**

- Assemblages of international importance, and
- Species with peak counts in the winter: 59,133 waterfowl (5-year peak mean between 1998/99 and 2002/03).

**Ramsar Criterion 6**

- Species/populations occurring at levels of international importance
- Winter: Tundra swan (*Cygnus columbianus bewickii*), whooper swan, Eurasian wigeon, gadwall, Eurasian teal, northern pintail, northern shoveler, and
- Species identified subsequent to designation for possible future consideration: Mute swan, common pochard, black-tailed godwit.

### 3.4.2 Conservation objectives

There are currently no conservation objectives for Ramsar sites. The SAC & SPA conservation objectives will be used when the qualifying features are the same, and advice sought from Natural England in other cases if necessary.

## 3.5 Conservation status of qualifying features, site condition and threats to European sites

### 3.5.1 Conservation status of the main qualifying features

The main qualifying features of Ouse Washes SAC, SPA and Ramsar site are listed in Table 2 below with their corresponding conservation status.

**Table 2: Main qualifying features of Ouse Washes SAC/SPA/Ramsar site and conservation status**

| Qualifying feature | Site | Conservation status |
|---|---|---|
| Spined loach | SAC | Habitats Directive: Annex II<br>IUCN Status: Least Concern<br>UK BAP<br>Section 41 |
| Ruff | SPA | Birds Directive: Annex I<br>IUCN Status: Least Concern<br>BoCC 4: Red |
| Spotted Crake | SPA | Birds Directive: Annex I<br>IUCN Status: Least Concern<br>BoCC 4: Amber |
| Black-tailed Godwit | SPA | IUCN Status: Near Threatened Status<br>BoCC 4: Red<br>UK BAP<br>Section 41 |
| Gadwall | Ramsar, SPA | IUCN Status: Least Concern<br>BoCC 4: Amber |
| Northern shoveler | Ramsar, SPA | IUCN: Least Concern<br>BoCC 4: Amber |
| Northern pintail | Ramsar, SPA | IUCN Status: Least Concern<br>BoCC 4: Amber |
| Pochard | SPA | IUCN Status: Vulnerable<br>BoCC 4: Red |
| Eurasian Wigeon | Ramsar, SPA | IUCN Status: Least Concern<br>BoCC 4: Amber |
| Bewick's swan | SPA | IUCN Status: Least Concern<br>BoCC 4: Amber<br>UK BAP<br>Section 41 |
| Hen harrier | SPA | Birds Directive: Annex I<br>IUCN Status: Least Concern<br>BoCC 4: Red<br>Section 41 |
| Whooper swan | Ramsar, SPA | Birds Directive: Annex I<br>IUCN Status: Least Concern<br>BoCC 4: Amber |
| Tundra swan | Ramsar | IUCN Status: Least Concern<br>UK BAP<br>Section 41 |
| Eurasian teal | Ramsar | IUCN Status: Least Concern<br>Bocc 4: Amber |
| Small water pepper | Ramsar | IUCN Status: Least Concern |
| Whorled water-milfoil | Ramsar | IUCN Status: Least Concern<br>UK Status: Vulnerable |
| Greater water parsnip | Ramsar | IUCN Status: Least Concern<br>UK Status: Endangered<br>UK BAP<br>Section 41 |
| River water-dropwort | Ramsar | IUCN Status: Near Threatened |

| Qualifying feature | Site | Conservation status |
|---|---|---|
| | | UK Status: Least Concern |
| Fringed-water lily | Ramsar | UK Status Least Concern |
| Long-stalked pondweed | Ramsar | IUCN Status: Least Concern<br>UK Status: Near Threatened |
| Hair-like pondweed | Ramsar | IUCN Status: Least Concern<br>UK Status: Least Concern |
| Grass-wrack pondweed | Ramsar | UK Status: Endangered<br>UK BAP<br>Section 41 |
| Tasteless water-pepper | Ramsar | IUCN Status: Least Concern |
| Marsh dock | Ramsar | IUCN Status: Least Concern |
| Large darter dragonfly | Ramsar | IUCN Status: Least Concern<br>British Red Data Book Species |
| Rifle beetle | Ramsar | British Red Data Book Species |

### 3.5.2 Site condition

The Ouse Washes Ramsar, SPA and SAC are legally underpinned by the Ouse Washes SSSI. Natural England's SSSI site condition assessment based over 2009 and 2011 recognised that:

- 15.56% of the SSSI is assessed to be in *Favorable Condition*
- 3.57% *Unfavourable – recovering*, and
- 80.87% was recorded as *Unfavourable – no change*.

### 3.5.3 Sensitivities of the qualifying features

Site Improvement Plans (SIPs) have been developed for the Ouse Washes which cover both the SAC and SPA as part of the Improvement Programme for England's Natura 2000 site (IPENS) (Natural England, 2014). The prioritised issues for the Ouse Wash SAC and SPA are:

- **Inappropriate water levels** - Notified interests (including breeding birds, overwintering birds and supporting grassland communities) are being adversely affected by increased flooding on the Ouse Washes. Flooding during spring / early summer severely damages the breeding bird interest by flooding nests, drowning young and affecting habitat. Deep flooding during winter also impacts overwintering birds such as wigeon and impacts on the wetland fauna, especially invertebrate populations. Wetland flora is also affected through prolonged submersion, favouring swamp communities over the designated grassland species. Prolonged summer flooding disrupts essential management of the washland, affecting the condition of the grassland for breeding birds in subsequent spring/summer season(s).
- **Water pollution** - Inappropriate levels of nutrients from diffuse pollution in combination with inappropriate water levels from flooding have adversely affected the extent/composition of vegetation communities on the washes. Resulting changes to the grassland mosaic has potential to affect the notified bird interests by destroying habitat suitable for many of the birds that visit or breed at the site. Occasional incidences of low oxygen levels on River Delph and Counter Drain have potential to impact spined loach populations.

Site condition assessment[10] for Ouse Washes SSSI highlights that the majority of SSSI units which are classified as unfavourable correspond with areas of washland grassland habitats (neutral lowland grassland). This is based on the decline of the majority of breeding bird features, some wintering bird features, as well as the loss of extent and quality of MG11/MG13 neutral grasslands. The reasons for these adverse conditions are cited as a combination of inappropriate water levels, freshwater pollution and agriculture/run off.

Within *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features: Ouse Washes Special Area of Conservation (SAC) (UK0013011)* (Natural England 2015), the main pressures for the qualifying feature spined loach are noted to include:

- **Water quality (Nutrient enrichment) -** Nutrient enrichment can lead to a decline in substrate condition for spined loach due to benthic algal growth and associated enhanced siltation. It also increases the risk of impacts on the cover of the submerged plant community, which the spined loach uses for cover.
- **Water quality (organic and nonorganic pollution) -** The spined loach is susceptible to both episodic and chronic organic pollution. Episodic pollution causes direct mortalities whilst chronic pollution affects substrate condition through the build-up of sediment oxygen demand and excessive microbial populations. If the organic content of the substrate becomes too high, reduced oxygen availability near the sediment/water interface may lead to enhanced egg and juvenile mortality. Spined loach can be affected by a range of other pollutants. A wide range of pollutants may impact on habitat integrity depending on local circumstances.
- Additional threats to the species include changes to flow velocities, loss or reduction in biological connectivity, sedimentation, introduction of invasive non-native species and overgrazing.

A corresponding Supplementary Advice document for Ouse Washes SPA is not available at the time of writing this Stage 2 Appropriate Assessment.

[10] https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1000503&ReportTitle=Ouse Washes SSSI

# 4 Impact Assessment

## 4.1 Overview

Table 3[11] below provides a summary of the potential impacts of the proposed drought permit downstream of the Offord intake.

**Table 3: Potential impacts of the proposed drought permit for Offord intake**

| Impact | Details |
|---|---|
| Flow regime | Flows immediately downstream of the Offord intake are predicted to decrease by an average of 12% for Stage 1 and 22% for Stage 2 over a 12-month period under the drought permit scenario, with maximum reductions of up to 32%. However, variation in flows, including sporadic flushes, would help maintain hydrological function of the River Great Ouse. Discharges from Water Recycling Centres (WRCs) such as Buckden, Brampton, Huntingdon and St Ives WRCs will act to increase flows downstream of Offord. The combination of flushing events, WRC discharges and the accretion of flow from tributaries of the River Great Ouse means that the impact of reduced flows directly resulting from the implementation of drought permit actions lessens as downstream distance increases. |
| Water level | The River Great Ouse is navigable downstream from Bedford (which is upstream of Offord). The river is complex in terms of hydraulics and connectivity. In theory, the water levels should be maintained by management of the existing structural features providing that the volume of water used for locks to be operated and leakage downstream does not exceed the volume of water entering the reach above the lock. Water levels will not be significantly affected by the predicted reduction in flow. |
| Flooding | Since the drought permit is only for use in low flows, there are not expected to be any impacts on downstream flooding in terms of frequency or extent. |
| Water chemistry | Phosphate concentration and the associated low dissolved oxygen problems that result from eutrophication and algal blooms, as well as elevated ammonia levels, are the main water quality concerns in the River Great Ouse. During periods of low flow, the river will have a lower dilution capacity. As a result, the concentrations of nutrients, metals and biological oxygen demand are likely to increase slightly downstream of the Offord intake during implementation of a drought permit. The impact is predicted to be more pronounced in summer than in winter. However, WRC discharges and flow inputs from tributaries will increase the dilution capacity further downstream. |
| Salinity regime | A reduction in flow at Offord will only reduce flows during certain low flow conditions. Artificial influences downstream of the intake mean that the quantity of freshwater discharged to The Wash Estuary will not differ significantly under the implementation of a drought permit from ‘natural’ conditions. |
| Habitat loss | The main mechanism for habitat loss at European sites is indirectly through the occurrence of other potential impacts such as alterations to water levels and flow or chemical changes, as mentioned above. |

In summary, the following impacts to the Ouse Washes SAC/SPA/Ramsar have been screened out at the HRA Stage 1 Assessment (Mott MacDonald, 2018b). A number of potential impacts were assessed to have no potential to result in a likely significant effect on the Ouse Washes European designated sites, including:

- Flow regime;
- Water level;
- Flooding; and,
- Salinity regime.

Changes in flow regime and water depth are not expected to impact Ouse Washes European sites due to the distance downstream from the abstraction site, the effect of structural features and discharges from River Great Ouse tributaries and WRCs.

[11] Taken from Mott MacDonald (2018) Drought Permit Environmental Assessment, River Great Ouse: Offord Intake

Changes to the flow regime are only relevant to Ouse Washes Ramsar site during high flows, when the site is inundated. Since the Drought Permit is only for use in low flows, there are not expected to be any impacts on downstream flooding in terms of frequency or extent.

## 4.2 Results of reduction of water quality downstream of Offord intake

There is the possibility of impacts due to a deterioration in water quality (notably ammonia and orthophosphate), especially if the proposed drought permit was to be applied under summer drought conditions. These would require further consideration when assessing the overall effect upon the Ouse Washes SAC, SPA, Ramsar site.

The impacts of the proposed Stage 2 drought permit are considered to be more severe than those of the proposed Stage 1 drought permit due to the accentuated reduction in flows. A reduction in flow of up to 32% in a Stage 2 permit and 20% for a Stage 1 permit may reduce water quality downstream of the Offord intake (Mott MacDonald 2018b, Atkins 2015). Changes to water quality are likely to include the following:

- Increase in phosphates concentration;
- Increase in ammonia concentration;
- Increase in nitrates concentration;
- Increase in Biochemical Oxygen Demand (BOD) concentration; and,
- Increase in metal concentrations.

The Environment Agency monitors water quality within the River Great Ouse at various locations. The environmental assessment analysed the existing water quality baseline results at six locations including Offord (near the intake location), Brownhill Staunch and St Ives Road Bridge (upstream of the Ouse Washes SAC/SPA/Ramsar) and three sites along the Hundred Foot River including Welney Bridge (within boundary of SSSI/SPA/Ramsar). These are presented within Table 4 and Table 5 below. BOD at Hundred Foot River Welney Bridge remains non-compliant with Water Framework Directive (WFD) water quality standards (UKTAG, 2013), or Environmental Quality Standards (EQS). Also, orthophosphate fails to comply with the WFD EQS across the reach, including within sections within the European site boundary.

Modelling was conducted using the Source Apportionment GIS (SAGIS) software for the 2015 assessment to determine the impact of the drought permit on water quality (Atkins, 2015).

During a winter drought, phosphate levels are expected to increase marginally within the River Great Ouse. Phosphate loading predominantly comes from point sources such as Water Recycling Centres (WRCs).

As the phosphate WFD status is currently not achieving Good Ecological Potential, an increase in phosphate concentration could further compound the current trophic status of the impacted waterbodies downstream of the intake. The previous modelling demonstrated that under normal operating conditions, phosphate stripping that was in place to meet consents for the majority of larger WRCs limited the impact of drought condition impacts from orthophosphate (Atkins, 2015). There was still a significant increase under dry weather conditions, but this was almost entirely caused by the lower dry weather flows causing a reduction in dilution of inputs from the large works upstream of the abstraction, rather than any effects from works inputs downstream of Offord. In a stage one scenario reduced flows on average 12% for a 12-month period, accentuating in summer months with an average 16% reduction of flows would result in reduced dilution of nutrients for a sustained period and there is therefore a significant risk of deterioration of WFD classification for orthophosphates. With a Stage 2 scenario, these impacts are likely to

be more severe, as the average reduction in flows is 22% over the 12-month period and average flows reduce by 30% in summer months. In the previous modelling, the overall reduction in MRF was predicted to only affect the reach from Black Bridge Hemmingford site to the downstream end of the model and the impact was only predicted in the order of 0.025mg/l. This was around 6% of the concentration increase that the river would experience when changing from ‘normal’ to ‘dry’ weather conditions Atkins (2015). It was concluded that there was no feasible risk that conditions would breach the Poor/Bad WFD threshold, nevertheless, the entire modelled reach is already above the EQS, so any increase is potentially significant to river water quality.

**Table 4: Baseline water quality WFD EQS assessment for 2005-2012.**

| | Determinant: | DO Saturation (10%ile) | BOD (90%ile) | Ammonia (90%ile) | pH (5-95%ile) | Orthophosphate (AA*) | Iron (AA) | Copper (AA) | Zinc (AA) |
|---|---|---|---|---|---|---|---|---|---|
| | Units: | % | mg/l | mg/l | pH | mg/l | µg/l | µg/l | µg/l |
| | WFD 'Good' EQS: | 60 | 5 | 0.6 | 6-9 | 0.12 | 1000 | 28 | 75 |
| Environment Agency Monitoring Locations | Offord | 82.74 | 2.60 | 0.23 | 7.84-8.33 | 0.27 | 55.69 | 4.10 | 7.74 |
| | Hundred Foot River Earith Rd. Br. | 81.62 | 3.12 | 0.13 | 7.85-8.59 | 0.28 | 42.44 | 4.34 | 7.97 |
| | Hundred Foot River Mepal Rd. Br. | 79.10 | 3.20 | 0.13 | 7.79-8.58 | 0.25 | n/a | n/a | n/a |
| | Hundred Foot River Welney Br. | 77.20 | 5.77 | 0.24 | 7.75-8.58 | 0.23 | n/a | n/a | n/a |
| | Brownhill Staunch | 83.55 | 3.60 | 0.12 | 7.78-8.57 | 0.25 | n/a | 3.42 | 8.81 |
| | St. Ives Rd. Br. | 80.71 | 3.10 | 0.13 | 7.93-8.61 | 0.26 | n/a | n/a | n/a |

Source: Atkins (2015). **AA: Annual average.

**Table 5: Baseline water quality WFD EQS assessment for 2013-2017 Environment Agency monitoring data.**

| | Determinant: | DO Saturation (10%ile) | BOD (90%ile) | Ammonia (90%ile) | pH (5-95%ile) | Orthophosphate (AA*) | Iron (AA) | Copper (AA) | Zinc (AA) |
|---|---|---|---|---|---|---|---|---|---|
| | Units: | % | mg/l | mg/l | pH | mg/l | µg/l | µg/l | µg/l |
| | WFD 'Good' EQS: | 60 | 5 | 0.6 | 6-9 | 0.12 | 1000 | 28 | 75 |
| Environment Agency Monitoring Locations | Offord | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | Hundred Foot River Earith Rd. Br. | 86.42 | 3.81 | 0.12 | 7.91-8.50 | 0.23 | 36.87 | 2.756 | 6.23 |
| | Hundred Foot River Mepal Rd. Br. | 88.91 | 4.79 | 0.12 | n/a | 0.24 | n/a | n/a | n/a |
| | Hundred Foot River Welney Br. | 85.86 | 5.07 | 0.15 | 7.87-8.48 | 0.25 | n/a | n/a | n/a |
| | Brownhill Staunch | 90.34 | 4.92 | 0.12 | 7.73-8.37 | 0.22 | n/a | n/a | 5.26 |
| | St. Ives Rd. Br. | 85.38 | 3.01 | 0.12 | n/a | 0.15 | n/a | n/a | n/a |

Source: The Environment Agency open source data. *AA: Annual average.

| | |
|---|---|
| | Compliant with EQS |
| | Non-compliant with EQS |
| n/a | No/insufficient data available |

BOD at Hundred Foot River Welney Bridge (i.e. within the SPA and Ramsar boundary) remains non-compliant, albeit only marginally. Dissolved oxygen (DO) concentrations are most likely to be linked to the structure of the channel, which is artificially deep and flows more slowly than it would naturally to maintain a navigable draught.

Modelling using the Source Apportionment GIS (SAGIS) software for the 2015 showed BOD and metal concentrations would result in temporary deterioration during the drought permit scenarios, but they are not thought to deteriorate below the EQS for Good Ecological Potential. The WFD status for BOD in the waterbodies relevant to this assessment is currently High or Good.

Ammonia is currently classified as being of High status for the 'Ouse (Roxton to Earith)' and 'Old West River' waterbodies and Good in the 'Ely Ouse South Level' and 'Old Bedford River/River Delph' waterbodies. Likewise, SAGIS modelling in 2015 has suggested a risk of a change in classification, which may result in the waterbodies temporarily failing to achieve Good Ecological Potential under drought conditions and a reduced MRF (Atkins, 2015). There is also a risk of ammonia influx from combined sewage outfalls (CSOs) after storm conditions, which if occurring during a drought permit, would be less diluted and therefore pose a greater risk of water quality deterioration.

## 4.3 Considerations for ecological receptors

Impacts to ecology are perceived to be worse in summer months, where there are potential detrimental effects on water quality, which may exert pressures on fish and macrophyte communities. Increases in BOD and algal productivity may potentially impact fish and macro-invertebrate communities. Moreover, increased ammonia and temperature induced deterioration in water quality may further impact fish communities during summer months. When applying the 1934-35 drought scenario, flows are perceived to reduce for a sustained period of time, causing subsequent impacts on water quality which have the potential to impact fish communities downstream of the Offord intake. Furthermore, with a reduction of flows of around 30% for four months during a Stage 2 summer permit, there is a risk of stagnation and DO sags, which may have a significant impact on fish health in the River Great Ouse.

For a Stage 1 permit, impacts are thought to be less significant. Coarse fish species present in any of the backchannels would be likely to reflect those found in the main channel except in differing proportions. However, there is also potential for algal blooms and choking of river sections in low flows particularly in the summer, as well as impacts on fish migration in winter months.

The WFD waterbody at the Offord intake (Ouse – Roxton to Earith) is currently achieving Good status for macroinvertebrates. The 2015 Atkins report suggested that the macroinvertebrate community at Offord reduced in quality in response to a dry period between 2005/06, suggesting that the community present would respond to a reduction in flows. Therefore, decreases in flows of up to 20% for a Stage 1 permit and 32% for a Stage 2 permit could influence species composition and abundance, though being towards the bottom end of the fluvial River Great Ouse, such reductions in flow would not have a significant impact on channel morphology and hence supporting habitats. In winter, associated deterioration in water quality as a result of reduced flows would not afflict any permanent changes on the macroinvertebrate community.

During summer, a reduction in flows will have higher impact. A reduction in flows and an increase in pollutants such as orthophosphates and nitrates may cause increased algal growth and eutrophication, which in turn may increase the risk of DO sags, particularly in a Stage 2

drought scenario. If this situation arose it would be possible that there would be diurnal DO sags in the backchannels connected to the Great Ouse, which if prolonged could impact on macroinvertebrate species with a high oxygen demand.

Predicted increases in orthophosphate concentrations associated with decreases in flow have the potential to change the community structure of macrophytes and algae. A number of rare species known to occur downstream of the Offord intake such as frogbit and fringed water-lily exhibit a preference to mesotrophic – eutrophic waters. Based on the 1934-35 scenario which would likely require a drought permit to be in action over 12 months, a sustained reduction in flows may have a significant impact on macrophyte and phytobenthos communities downstream of the Offord intake. The prolonged reduction in flows increases the risk of algal blooms and potential choking of river segments.

## 4.4 Potential impacts on the qualifying features of the Ouse Washes European designated sites

### 4.4.1 Avian qualifying features of Ouse Washes SPA and Ramsar site

Inappropriate water levels form a primary impact to avian interests of the SPA and Ramsar due to excessive winter flooding, and summer flooding of nesting substrate. However, this impact is not considered to be relevant in relation to the proposed drought permit. Another pressure upon the avian interests within the Ouse Washes/Hundred Foot Washes is that of diffuse pollution, mainly from agricultural run-off (in combination with inappropriate water levels from flooding). These have been found to result in changes to the structure, extent and composition of the washland vegetation communities present. It is understood that successful breeding numbers, and overwintering numbers, have reduced in recent years.

Reduced flows have some potential to decrease the level of dilution of pollutants. In a worst-case scenario, the drought permit has the potential to compound habitat changes to the vegetation within the washland grassland habitats. This could negatively affect the structure and function of supporting habitats, further decreasing the extent and distribution of the habitats which would otherwise act against the conservation objectives of the Ouse Washes SPA.

Any deterioration in water quality would be expected to be most severe within the immediate area of the Offord intake. The southern boundary of the Ouse Washes SPA/Ramsar is located 30km downstream of the intake, and then projects for a further 32km northwards (downstream). Between the intake and the SPA/Ramsar there are multiple locations for accretion of flows from tributaries into the River Great Ouse. Discharges from WRCs such as Buckden, Brampton, Huntingdon and St Ives WRCs will act to increase flows downstream of Offord. Hydraulic modelling (Mott MacDonald, 2018a) also shows that even under drought conditions there will be a variation in flows, including sporadic flushes into the River Great Ouse. This means that the impact of reduced flows and resulting adverse impacts to water quality directly resulting from the implementation of drought permit actions lessens as downstream distance increases.

Furthermore, Anglian Water would be likely to only consider applying for the drought permit in a severe, possibly multi-season drought within a worst-case scenario. Therefore, the frequency of the resultant adverse changes to water quality is expected to be low.

Therefore no adverse effects on the qualifying feature are anticipated relating to reduced flows and deterioration of water quality within the Ouse Washes SAC and its qualifying features.

Any level of deterioration of water quality is expected to be temporary and reversible, with no long-term deterioration of the WFD classification of the downstream water bodies on the River Great Ouse.

### 4.4.2 Spined loach: Qualifying feature of Ouse Washes SAC

It is recognised that spined loach is vulnerable to changes in water quality, including nutrient enrichment and organic and non-organic pollution. Under the condition of the drought permit, there is potential for the anticipated changes to water quality to lead to an increase in algal growth, including algal blooms, and eutrophication of water bodies. This has the potential to be more pronounced in the backwater channels, such as the Counter Drain and associated side drains within the Ouse Washes.

In a worst-case scenario, the drought permit has the potential to result in benthic algal growth within the channels on the substrates that support the spined loach. This could lead to increased levels of associated siltation and also increases the risk of changes of aquatic macrophyte cover which the species is dependent on. Furthermore, eutrophication of water bodies can lead to build-up of sediment oxygen demand and excessive microbial populations. Increased BOD, and resultant reduced oxygen, can lead to physical stress and mortality to adults, as well as lead enhanced egg and juvenile mortality.

Were this to occur in the Counter Drain and Old Belford/Delph River, the impacts would have an adverse impact upon the structure and function of supporting habitats, the supporting processes on which the habitats of qualifying species rely, the populations of the qualifying species, and, the distribution of qualifying species within the SAC. This would otherwise act against the conservation objectives of the Ouse Washes SAC.

As outlined in Section 4.4.1 above, adverse impacts to water quality as a result of the drought permit will lessen with distance from the Offord intake due to accretion from tributaries and WRCs, anticipated variation in flows and sporadic flushes will act to increase flows and dilution of pollutants. The drought permit will be applied only in a severe drought, and therefore the frequency of increased abstraction will be low and temporary.

Therefore no adverse effects on the qualifying feature are anticipated relating to reduced flows and deterioration of water quality within the European site.

### 4.4.3 Aquatic macrophytes and invertebrates associated with the Ouse Washes Ramsar site

The Ouse Washes is recognised under Criterion 1 of the Ramsar convention for its diverse assemblage of aquatic plants, a number of which are nationally scare such as fringed water-lily frogbit. It also supports notable invertebrate species such as great darter dragonfly and rifle beetle. These are particularly notable in the backchannels such as the Counter Drain and associated ditches.

In a worst-case scenario, the drought permit has potential to result in elevated levels of eutrophication, algal blooms and increased level of pollutants such as orthophosphates within the Ouse Washes. If sustained over a prolonged period could lead to changes to community structure of aquatic macrophytes, while algal blooms could result in choking of segments. Such changes in water quality would likely lead to a deterioration of supporting habitats and mortality to macroinvertebrate communities.

As outlined in Section 4.4.1 above, adverse impacts to water quality as a result of the drought permit will lessen with distance from the Offord intake due to accretion from tributaries and WRCs, anticipated variation in flows and sporadic flushes will act to increase flows and dilution of pollutants. The drought permit will be applied only in a severe drought, and therefore the frequency of increased abstraction will be low and temporary.

Therefore no adverse effects on the qualifying feature are anticipated relating to reduced flows and deterioration in water quality within the European site.

## 4.5 Assessment of significance of effects

Alone, the proposed drought permit has been assessed to have no adverse effect on the integrity on the following European designated sites:

- Ouse Washes Ramsar;
- Ouse Washes SPA; or
- Ouse Washes SAC

It is noted however, that at this stage there has been no quantitative analytical assessment of the exact zone of impact of the effects of both Stage 1 and Stage 2 abstraction levels. No specific water quality modelling has been conducted to determine the anticipated changes under the drought scenarios specifically in relation to the Natura 2000 sites. Therefore, this assessment of no adverse effect on the integrity of the sites cannot be deemed to have a high confidence level.

For this reason, a suitable package of mitigation and monitoring has been devised to alleviate and further reduce the risk of downstream effects to the Ouse Washes SAC, SPA and Ramsar site. This is provided in the Drought Permit Environmental Assessment Report.

## 4.6 In-combination effects

Article 6(3) of the Habitats Directive requires that “any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives”. The likely impacts on the integrity of the Ouse Washes SAC, SPA and Ramsar arising from the combination of the proposed drought permit with other plans and projects relevant to the area must therefore be assessed.

### 4.6.1 Environment Agency drought plans

#### 4.6.1.1 East Anglia Area (Cambridgeshire and Bedfordshire)

The level of detail in the Environment Agency drought plan does not allow consideration of the effect on individual European Sites, however it is anticipated that they may need to make a drought order for the Ely Ouse to Essex Transfer Scheme and the Great Ouse Groundwater scheme. This could potentially result is in-combination LSEs with the drought permit for the Offord Intake for the Ouse Washes, Portholme SAC, and The Wash. This would need to be considered further.

#### 4.6.1.2 Lincolnshire and Northampton

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Lincolnshire and Northampton Environment Agency drought plan.

#### 4.6.1.3 East Anglia (East)

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the East Anglia (East) Environment Agency drought plan.

### 4.6.2 Other water company drought plans

#### 4.6.2.1 Cambridge Water

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Cambridge Water's drought plan.

#### 4.6.2.2 Affinity Water

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Affinity Water's drought plan.

#### 4.6.2.3 Yorkshire Water

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Yorkshire Water's drought plan.

#### 4.6.2.4 Severn Trent Water

The updated Severn Trent Water Drought Plan is not currently available. There is no expectation of any overlap in European sites considered for the Offord intake and Severn Trent drought plans.

#### 4.6.2.5 Essex and Suffolk Water

A screening exercise to determine if a SEA was required was undertaken and concluded that the supply-side actions would not have a significant effect on the environment. As a result, no in combination likely significant effects are anticipated between the Offord Intake, River Great Ouse and Essex and Suffolk Water drought plan.

#### 4.6.2.6 Anglian Water Water Resources Management Plan (WRMP) 2019

Anglian Water's final WRMP 2019 includes HRA screening assessment for three plans; the Best Value Plan (BVP), the Least Cost Plan (LCP) and the adaptive strategy. Six options across the three plans were identified as having a Likely Significant Effects on European sites and taken forward to Stage 2 appropriate assessment. These were: ESU1 Felixstowe Desalination, ESU2 Ipswich Water Reuse, NFN1 Kings Lynn Desalination, SHB2 Pyewipe Water Reuse for non-potable use, NFN2 Kings Lynn Water Reuse and NFN3 Fenland Reservoir.

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Felixstowe Desalination, Ipswich Water Reuse and Pyewipe Water Reuse options. Kings Lynn Desalination option (WRMP) considers the LSE on The Wash SPA, The Wash Ramsar and The Wash and North Norfolk Coast SAC as does the drought plan for the Offord Intake on the River Great Ouse. The level of detail in the WRMP does not allow detailed consideration of the effects on the European sites, however there is a likelihood for LSE during both construction and operation of the option. These are related to pollution events affecting water quality during construction and changes in salinity as a result of brine discharge during operation. It is assumed that appropriate mitigation can be developed to ensure there are no adverse effects on the European Sites. The Offord Intake has been assessed not to have the potential for adverse water quality and a robust mitigation strategy has been devised to ensure the integrity of the European Sites, therefore if appropriate mitigation is implemented for both Kings Lynn Desalination and the Offord intake there should be no in-combination likely significant effects.

The Kings Lynn Water Reuse option in the WRMP and the Offord Intake on the River Great Ouse consider the impacts on The Wash SPA, The Wash Ramsar and The Wash and North

Norfolk Coast SAC. he impacts of Kings Lynn Water Reuse on the European sites relates to pollution events during construction which may impact water quality. However, it is assumed appropriate mitigation will be put in place and therefore no likely significant effects are likely to occur. The Offord Intake has been assessed not to have the potential for adverse water quality and a robust mitigation strategy has been devised to ensure the integrity of the European Sites, therefore if appropriate mitigation is implemented for both Kings Lynn Water Reuse and the Offord intake there should be no in-combination likely significant effects.

The impacts of both Fenland Reservoir and Offord Intake, Great River Ouse on the Ouse Washes SAC/Ramsar Site/SPA have been considered. Both required Stage 2 Appropriate Assessments due to potential impacts on the European Sites. It was identified that the reservoir option could cause impacts relating to water pollution, through construction of transfer 02b-0321-ai, in the Ouse Washes; this is expected to be temporary during construction only. It was concluded in the Stage 2 appropriate assessment of the proposed drought permit at Offord Intake on the River Great Ouse that downstream impacts of reduced flow on water quality will not adversely affect the integrity of the European Sites. However, it is noted that no quantitative analysis has been undertaken and therefore the no adverse effect assessment cannot be deemed to have a high confidence level. In-combination LSEs could arise as a result of both plans being implemented, however, both the WRMP and Drought Plan have outlined plans for mitigation to be installed to ensure any effects of the plans do not adversely affect the European Sites.

### 4.6.3 Other water company WRMPs

#### 4.6.3.1 Affinity Water WRM19

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Affinity Water's WRMP.

#### 4.6.3.2 Severn Trent Water WRMP19

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Severn Trent Water's WRMP.

#### 4.6.3.3 Yorkshire Water WRMP19

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Yorkshire Water's WRMP.

#### 4.6.3.4 Cambridge Water WRMP19

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Cambridge Water's WRMP.

#### 4.6.3.5 Essex and Suffolk Water WRMP19

There were no supply schemes in Essex and Suffolk Water's WRMP19.

### 4.6.4 Other plans and projects

#### 4.6.4.1 Water Resources East (WRE)

The WRE programme is not due to start until 2045 as it is part on longer term planning and is an entirely non-statutory plan, whereas Anglian Water's Drought Plan is only active for another

year. There is currently no Habitat Regulations Assessment for the WRE plan therefore any in-combination effects cannot be assessed as this time.

#### 4.6.4.2 Anglian River Basin Management Plan (RBMP)

The level of detail in the plan does not allow consideration of the effect on individual European Sites, but the HRA determines that the RBMP is not likely to have any significant effects on any European sites, alone or in-combination with other plans and projects. Therefore, no in-combinations LSEs with Offord Intake are anticipated.

#### 4.6.4.3 National Policy Statement – Sizewell C

There is no overlap in European Sites considered for the Offord Intake, River Great Ouse and the Sizewell C construction or operation.

#### 4.6.4.4 A14 upgrade

Both the A14 upgrade HRA and Anglian Water's drought plan consider the impact of their works on Portholme SAC, Ouse Washes SAC, Ouse Washes SPA and Ouse Washes Ramsar. The A14 upgrade HRA concludes that there are no LSEs on the qualifying features on the above European sites. A Stage 2 appropriate assessment of the proposed drought permit at Offord Intake on the River Great Ouse was required for Ouse Washes SAC, Ouse Washes SPA and Ouse Washes Ramsar and concluded that downstream impacts of reduced flow on water quality will not adversely affect the integrity of the European Sites. However, it is noted that no quantitative analysis has been undertaken and therefore the no adverse effect assessment cannot be deemed to have a high confidence level. The effect of the drought plan on Portholme SAC was deemed to have no LSEs and was screened out in Stage 1. Due to the nature of the schemes and associated impacts and despite the uncertainties surrounding the effect of reduced flow on the Ouse Washes sites, no in-combination effects are anticipated.

#### 4.6.4.5 Cam-MK-Ox-corridor

No further details are available on this scheme at present

#### 4.6.4.6 East West Rail

There is no HRA for East West Rail as there are no European Sites that could be affected by the scheme.

# 5 Mitigation and Enhancement Measures

Anglian Water are committed to minimising any potential downstream impacts that could occur as a result of implementation of the drought permit. Detailed information of the monitoring requirements and proposed mitigation measures are provided in the Environmental Assessment Report.

# 6 Conclusions

A number of potential impacts have been identified as a result of the proposed drought permit. The HRA Stage 1 Screening Assessment identified the potential for adverse downstream impacts on water quality (particularly orthophosphates and ammonia) caused by reduced flows and decreased dilution of pollutants that have the potential to lead to likely significant effects on the Ouse Washes SAC, SPA and Ramsar site. These have been investigated within this Stage 2 Appropriate Assessment.

It is assessed that the implementation of the proposed drought permit will not result in an adverse effect on the integrity on the Ouse Washes SAC, SPA and Ramsar sites. A monitoring programme has been devised to ensure that in the event that effects on water quality parameters are recorded within the European designated sites, abstraction is stopped. Implementation of a robust mitigation package has also been devised to provide a high degree of confidence that no adverse effects to the integrity of the designated sites will occur.

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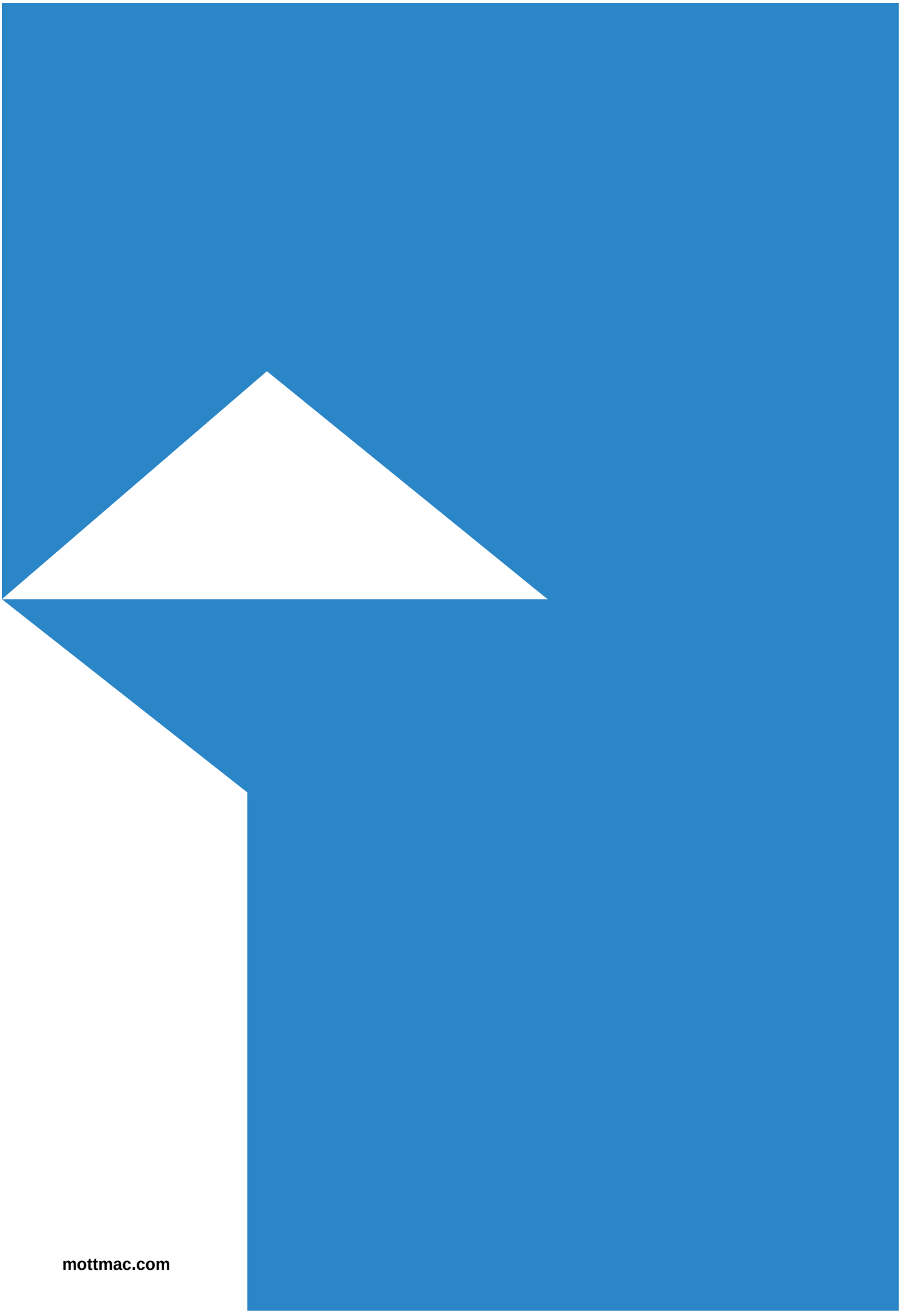

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