

Form HR01: Proforma for new applications within Stage 2 criteria.



ENVIRONMENT
AGENCY

ENVIRONMENT AGENCY RECORD OF ASSESSMENT OF LIKELY SIGNIFICANT EFFECT ON A EUROPEAN SITE (STAGE 2)
The Oxford Flood Alleviation Scheme, detailed below, is within the Stage 1 criteria that, in accordance with Environment Agency policy, should be subject to Appropriate Assessment under the Conservation of Habitats and Species Regulations (the Habitats Regulations) 2010 (as amended). In order to progress the plan a Stage 2 assessment and consultation with Natural England is required.

PART A: *To be completed by relevant technical/project officer in consultation with Conservation/Ecology section and Natural England*

1. Type of permission/activity:	Flood risk reduction works comprising: (1) Excavation of a new two-stage river channel from A420 Botley Road/West Way, south-easterly to downstream of the A423 (southern ring road), to reduce flood water levels along the parallel River Thames; (2) new culverts and bridges to maintain access routes across the new channel; and (3) new flood defences (embankments and walls) in urban areas of western Oxford. See Description of Proposal.
2. Agency reference no:	THC040E/000A/015A
3. National Grid reference:	SP491 068 (upstream limit) to SP520 032 (downstream limit)
4. Site reference:	Oxford Flood Alleviation Scheme (OFAS) - The study area for the Scheme encompasses areas of the River Thames' floodplain to the west of Oxford's city centre, that are susceptible to flooding. It extends from north of the A420 Botley Road to south of the A423 ring road, running predominantly between the A34 to the west and the Weirs Mill Stream and Oxford to London railway line to the east.

5. Description of proposal:

The city of Oxford has a long history of flooding, being located at the confluence of the Rivers Cherwell and Thames. Since 2000, there have been several notable flood events, resulting in inundation of properties, closure of roads and railway infrastructure. An estimated 2,500 properties and businesses in Oxford could be affected by a 1% flood event (i.e. 1 in 100 chance of flooding in any given year) increasing to over 3,400 properties in 50 years' time, as a result of climate change which is predicted to cause more frequent and more intense rainfall events (Environment Agency). We have therefore designed a scheme (for which funding has now been approved) to reduce the flood risk to Oxford over the next 100 years, reducing the frequency of flooding by improving the flow conveyance past the city.

The proposed Scheme (due to be constructed between Winter 18/19 and 2021) is summarised below and shown on Scheme Overview Drawings in Appendix A.

- Construction of a new two-stage channel running from the A420 Botley Road/West Way, south-easterly to downstream of the A423 (southern ring road). For the main part, the channel will run approximately parallel to the A34 to the west and the railway to the east. The new channel will carry flood flows from the Seacourt Stream, Bulstake Stream and Hinksey Stream with the aim of reducing the water levels in the main River Thames and surrounding channels during flood events and so reducing the frequency of flooding in built-up areas. The channel will comprise two stages:
 - First stage channel, which will carry water flowing all of the time; and
 - Second (or 'two-stage') channel, which will be dry for most of the time, and will fill during flood flows, along with the surrounding existing floodplain. A proportion of the second stage channel, north of Botley Road and south of Willow Walk, will have shallow water in it for most of the winter, drying out in summer. Other areas will be dry most of the year, under water only when the River is unusually high.
- Provision of new culverts and bridges to maintain access routes across the new channel.
- Provision of new flood defences (embankments and walls) to defend houses, which would otherwise continue to flood even with the reduced river levels.
- Habitat creation, including ponds, scrapes and backwaters within the second stage channel, woodland planting to replace trees and hedges removed and creation of new meadow to compensate for approximately 2ha of MG4a meadow lost from a County Wildlife Site within the Scheme area.

The closest international conservation site to the Scheme is Oxford Meadows Special Area of Conservation (SAC). The closest parts of the Scheme (i.e. a proposed woodland mitigation area to the north of Botley Road,

and flood gates at Helen Road and Henry Road) lie at a minimum approximate distance of 800m from the nearest part of Oxford Meadows SAC including component Port Meadow Site of Special Scientific Interest. Elements of the OFAS will therefore be delivered at a distance where potential indirect impacts could occur, particularly via lowering of the groundwater table in summer months but also via air quality effects from construction vehicles.

6. European site names and status:

Oxford Meadows designated Special Area of Conservation (SAC), UK0012845

7. List of interest features:

Oxford Meadows SAC:

Annex I habitats that are a primary reason for selection of this site

- 6510 Lowland hay meadows *Alopecurus pratensis*, *Sanguisorba officinalis*
Oxford Meadows represents lowland meadows in the Thames Valley. This site includes vegetation communities that are relatively unique, reflecting the influence of long-term grazing and hay-cutting on lowland meadows. The site has benefitted from the survival of traditional management, which has been undertaken for several centuries, and so exhibits good conservation of structure and function.

Annex II species that are a primary reason for selection of this site

- 1614 Creeping marshwort *Apium repens*
Port Meadow is the larger of only two known sites in the UK supporting this species.

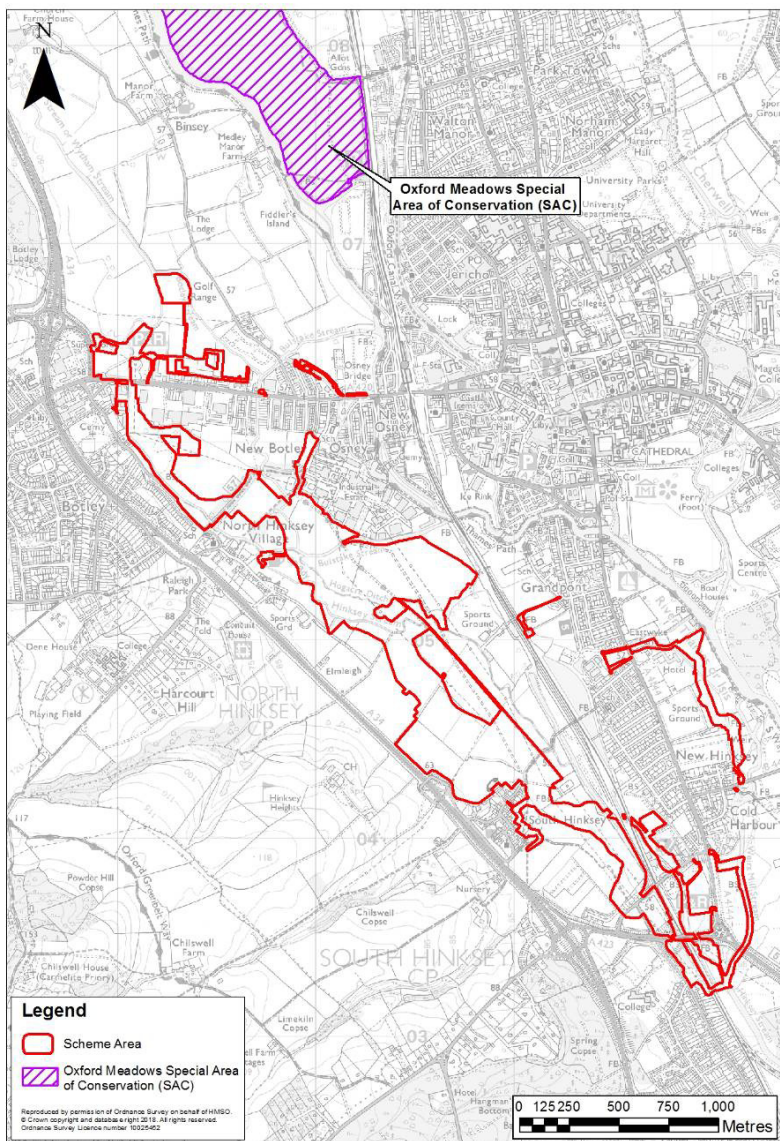


Figure 1.1: Oxford Meadows SAC in relation to Scheme area

8. Is the proposal directly connected with or necessary to the management of the site for nature conservation?

No		
9. What potential hazards are likely to affect the interest features? Are the interest features potentially exposed to the hazard?		
Sensitive Interest Features:	Potential hazards:	Potential exposure to hazards and mechanisms of effect/impact if known:
<p>6510 Lowland hay meadows <i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i></p> <p>1614 Creeping marshwort <i>Apium repens</i></p>	<p>Habitat loss/damage and change in habitat distribution due to changes in hydrological regime</p>	<p>A recent survey (Natural England August 2014) indicates that the <i>Apium repens</i> population in Port Meadow has significantly declined in size. It is considered that this change may be associated directly or indirectly with hydrological changes resulting from more prolonged and frequent flood episodes. Local adjustment of the water level management adjacent to the meadows was proposed as a means to help mitigate for these changes. The proposed Scheme is not considered to affect the hydrological regime at Oxford Meadows SAC, as described below.</p> <p>Work on Port Meadow (Dixon 2004; Gowing and Youngs, 2005) suggests that the groundwater under the designated site drains in a south-westerly direction to discharge to the Seacourt Stream (which flows approximately 0.7km to the west of the SAC). This work also identifies that groundwater flow, bypasses the River Thames, which is assumed to have isolated itself from the surrounding aquifer through deposition of fine silts in the base of the river, reducing connectivity between the Thames and underlying groundwater. On this basis, groundwater levels beneath the SAC are considered to be dictated by the rate of discharge to the Seacourt Stream.</p> <p>Groundwater modelling was undertaken by ESI (for the Environment Agency) for this Scheme in 2016 and 2017 to simulate groundwater levels in the sands and gravels beneath Oxford and the surrounding area (including the SAC). The model has been calibrated against observed groundwater levels in the gravel aquifer at a number of observation wells across the Scheme area (including two observation wells within the SAC itself). The model simulates the effect of recharge from surface waters and from rainfall, and determines the influence these have on groundwater levels and flow in the underlying gravels. The model also suggests that discharge to the Seacourt Stream is an important mechanism although, in contrast to the earlier work, calibration of the model suggests a reasonable connection between the River Thames and groundwater.</p> <p>A number of future scenarios have been investigated using the model, including the low flow of a typical dry year and floods of varying severity and “before” and “after” Scheme scenarios to see whether groundwater levels change, and if so, by how much.</p> <p>Groundwater modelling suggests that during flood flows of 10, 20 or 100 year return period (i.e. a 10%, 5% or 1% probability of occurrence in any given year), the proposed Scheme will generally result in a slight lowering (by up to about 600mm) of peak</p>

		<p>groundwater levels in the vicinity of the new channel and within the Scheme area shown on Figure 1.1. However, during these events, the river levels in most of the watercourses in the area (including the River Thames and Seacourt Stream) are out of bank with inundation of the surrounding floodplain. There is therefore relatively little change in the frequency of groundwater flooding even within the Scheme area. During a 5% probability flood event, the model suggests groundwater levels in parts of Oxford Meadows could be up to 100mm lower than they would be without the Scheme.</p> <p>During a dry year (though not an extreme drought year), represented by a dry year rainfall pattern and low river flows (Q95, representing a dry summer), the model simulates a negligible change (lowering) in groundwater levels at Oxford Meadows (less than 1cm under “low flow” conditions). To set up the dry year model run, it was preceded by a model run for an “average” year, more representative of typical conditions within the aquifer. This average year model run also showed, throughout the year, a negligible difference in groundwater levels at Oxford Meadows SAC between the baseline (without Scheme) and the ‘with Scheme’ model runs.</p> <p>The modelling results therefore indicate that the Scheme will not affect the hydrological conditions required to sustain the lowland hay meadows and Creeping marshwort, and will not increase or decrease the flood duration, depth or frequency at the meadows, under all flood events modelled.</p> <p>Surface water modelling work has shown that the Scheme will maintain the existing water levels in the Seacourt Stream to the north of Botley Road at pre-Scheme levels in both modelled mean monthly flows and dry weather (Q95) scenarios, while lowering the stream level by approximately 400mm during a 20% annual probability flood. This therefore maintains the level of the stream further upstream, near Oxford meadows. During dry and average (mean monthly flow) years, as surface water levels are maintained in Seacourt Stream, groundwater levels in this area will also be maintained, and discharges to the Seacourt stream will not increase. As groundwater levels are maintained, the effect of ground lowering adjacent the Seacourt Stream (albeit that this occurs south of Botley Road) will not lead to an increase in discharge to the Seacourt Stream or an increase in the drainage of groundwater from Oxford Meadows.</p> <p>The results show that the slight changes to groundwater levels (general lowering by up to 600mm) as a result of the Scheme in the immediate Scheme area will not extend to the SAC, and therefore no effects are anticipated on the lowland hay meadows at the SAC.</p> <p>No significant effects on designated habitat due to changes in groundwater</p>
	Nutrient enrichment	As part of a statutory EIA for the Scheme, we have

	<p>from NOx deposition from construction including temporary changes in traffic flows and volumes.</p> <p>The nitrogen critical load range for lowland hay meadows is 20 – 30kg/N/ha/year (www.APIS.ac.co.uk).</p>	<p>carried out air quality modelling, based on the Institute of Air Quality Management (IAQM) guidelines. The guidance considers the distance of ecological receptors from the affected road network, construction sites and access roads.</p> <p>Based on a 440 working day construction period between late 2018 and 2021, with movements restricted to off peak periods (10:00 to 16:00), there will be a need to remove 890m³ per day. Given a typical three axle HGV can transport 8m³ of material per load, this equates to 111 HGV movements in each direction per day, an average of 19 per hour. An analysis of traffic flows was undertaken as part of the Environmental Impact Assessment, based on the likely traffic flows in the horizon year period of 2021, with traffic growth figures obtained from the Department for Transport TEMPRO database for VoWH District (reflecting larger traffic growth that is expected to occur on the outskirts of Oxford). It is recognised that certain elements of the Scheme will be completed before 2021 but this year represents the likely maximum traffic growth on the highway network. The analysis reveals that the proportion of construction HGVs will be low against the total traffic flow and existing HGV flows. The highest increase in HGVs is predicted at Old Abingdon Road where 0.65% of the 24hour Annual Average Daily Traffic (AADT) flow will comprise construction related traffic from the Scheme. In all other parts of the affected road network, the construction related traffic will comprise less than 0.25% of the 24hour AADT. Additionally, all roads have been estimated to have less than 160 construction related HGVs daily, and the affected road network lies at a minimum distance of 750m from the SAC.</p> <p>Based on distance from the Scheme and the small volume and short duration of traffic generated by the Scheme's construction as a proportion of the overall traffic volume in the area, the change in concentrations of pollutants within the lowland hay meadows has been assessed to be imperceptible and therefore no significant impacts are envisaged.</p> <p>No significant effects on designated habitat due to changes in air quality</p>
	<p>Loss of population and change in distribution of creeping marshwort and other sensitive species due to water pollution during construction</p>	<p>The implementation of appropriate procedures for the storage and handling of materials during the construction works, and adherence to measures for the prevention of water pollution outlined in the DMRB Volume 11 Part 10, all legislation and the Environment Agency's pollution prevention guidelines, will ensure that the risk of a pollution incident is low.</p> <p>As the Scheme is located almost 1km from the SAC, and downstream of it, any potential pollution incident within the Scheme area will have no discernible pollution pathway to the SAC, with no significant impact on Oxford Meadows SAC.</p> <p>No significant effects on designated habitat due to water pollution.</p>

	Habitat loss due to increased recreational pressure	The Scheme is not increasing access to Oxford Meadows, and lying at a distance of almost 1km from the site, is envisaged to have no recreational impact on Oxford Meadows SAC. No significant effects on designated habitat due to recreation or trampling.
10. Is the potential scale or magnitude of any effect likely to be significant?		
a) Alone?	Oxford Meadows SAC No The Scheme will not affect groundwater levels or flooding within the designated site located almost 1km upstream, and thus will not result in any direct habitat loss. There will be no indirect impacts on the SAC from air quality changes (potentially related to nutrient enrichment) or water quality changes (potentially resulting from pollution incidents) during the construction of the Scheme.	
b) In combination with other Environment Agency permissions and/or other plans or projects?	No In parallel with the proposed OFAS, the Environment Agency is also developing a separate scheme on land to the west of the A34 to the south of Hinksey Heights, for the disposal of some surplus soils excavated during the construction of the OFAS. As the proposed land raising area (which will be the subject of a separate planning application) lies at a distance of approximately 3.5km from the SAC, and is situated hydrologically downstream of the SAC (as well as being elevated above the river valley), it is not considered to have any significant cumulative or in-combination impacts (with the OFAS) on the SAC. The Environment Agency is also working with Thames Water to implement a scheme at the head of the Seacourt Stream, to the west and upstream of the SAC, to provide fish passage into the Thames, which will complement the objectives of the Oxford FAS to improve fish habitat and connectivity. This scheme is being designed to maintain the existing flow split between the Thames and the Seacourt Stream, and will not change the mean flow distribution at high, low or average flows. It will therefore not have any significant or cumulative impacts on the SAC.	
c) In combination with permissions and/or plans/projects of other Competent Authorities?	No The following plans are considered to have the potential to interact and indirectly complement the fully integrated biodiversity improvements, associated with the OFAS: <ul style="list-style-type: none"> • Proposed Oxfordshire Minerals and Waste Local Plan Part 1 – Core Strategy (adopted September 2017) • Saved policies of the Oxford Local Plan 2001-2016 (2006) (Oxford City Council) • Oxford Core Strategy 2026 (adopted 2011) (Oxford City Council) • Vale of White Horse District Council Local Plan 2011 Saved Policies • Adoption of Local Plan 2031 Part 1: Strategic Sites and Policies (Vale of White Horse District Council 2016) and Part 2: Detailed policies and additional sites • Vale of White Horse District Council Local Plan 2031(adopted 2016) In all cases, it is considered that any-in combination effects would not be significant, as each plan contains policies that seek to protect and enhance biodiversity. This should ensure that there are no significant effects on the Oxford Meadows SAC. There are other proposals in development that have also been considered <ul style="list-style-type: none"> • Expansion of car park at Seacourt Park and Ride (planning application by Oxford City Council awaiting determination) - The park and ride scheme together with the OFAS have the potential to generate a cumulative air 	

	<p>quality impact along Botley Road as result of the increase in HGVs traffic during construction of the OFAS and additional traffic generated by the P&R scheme. However, neither scheme has been assessed as significantly impacting on air quality locally in the long-term and therefore the cumulative impacts are not considered to be significant locally. Lying at a distance of over 1km from the designated site, the proposed schemes at Botley Road will therefore not affect air quality at the SAC.</p> <ul style="list-style-type: none"> • Redbridge Waste Transfer and Reconfiguration of Car Park (planning proposal – application not yet submitted by Oxford City Council) and therefore details unknown. Based on currently available information, the potential for a cumulative impact on air quality is considered to be not significant as the Scheme is expected to have a negligible impact even within its local area. • Hinksey Hill Interchange ((planning proposal – application not yet submitted by Oxford City Council) - Considering that the Hinksey Hill Interchange should have a positive effect on air quality by generating a modal shift from private cars to public transport, and considering that the impact of HGVs traffic emissions associated with the Scheme has been assessed to be negligible, the potential for a cumulative impact on local air quality is not considered to be significant (based on the current information available). <p>These developments, have the potential for in-combination nutrient deposition as a result of construction traffic. However, these are not anticipated to be significant, even in the event that one of these developments were to proceed at the same time as the Scheme and would not affect the SAC due to their distance of over 1km from the designated site.</p>	
<p>11. Conclusion: Is the proposal likely to have a significant effect ‘alone and/or in combination’ on a European site?</p>	<p>Oxford Meadows SAC: No</p>	
<p>12. Justification for Reduced Consultation review process:</p>	<p>The Scheme is subject to statutory Environmental Impact Assessment and its development has included a thorough consultation process with a wide range of statutory and non-statutory stakeholders.</p>	
<p>13. Environment Agency Officer:</p>	<p>Penny Burt</p>	<p>Date:</p>
<p>14. Natural England comment on assessment:</p> <p>(If the Natural England officer disagrees with the conclusion of 10c, please include details of the other Competent Authorities which should be consulted)></p>	<p>For use when the Appendix 11 is to be sent to Natural England for consultation.</p>	
<p>15. Natural England Officer</p>	<p>Rebecca Micklem</p>	<p>Date:</p>