

Pear Tree Roundabout

Assessment of potential hydrological regime of Oxford Meadows SAC and other nearby
wildlife sites
July 2009

^A Worton Rectory Park
Oxford OX29 4SX
United Kingdom

^T +44 (0) 1865 887050

^F +44 (0) 1865 887055

^W www.lda-design.co.uk

LDA Design Consulting LLP
Registered No: OC307725
17 Minster Precincts, Peterborough PE1 1XX

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July 2009

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Comment First Draft

This document has been prepared and checked in accordance with ISO 9001:2000.

1.0 Introduction

The ‘Northern Gateway’ also known as ‘Peartree Roundabout’ is included in the Oxford Local Development Framework Core Strategy 2026, which is now in its Examination Phase. This states that “‘The Northern Gateway is allocated as a strategic location to provide a modern employment-led site with supporting infrastructure and complementary amenities...”. The Peartree Roundabout site lies approximately 70m from the Oxford Meadows Special Area of Conservation (SAC) at its nearest point; 15m from Unit 3 of Port Meadow with Wolvercote Common and Green Site of Special Scientific Interest (SSSI); and is adjacent to Oxford Canal Marsh County Wildlife Site (CWS). The SAC and SSSIs are shown on Figures 2 and 3. The CWS is shown of Figure 1.

Policy NE18 of Oxford Local Plan 2001-2016 (replaced by Policy CS13 Biodiversity in the Core Strategy) states that:

“Planning permission will not be granted for development that will have a significant adverse impact, either directly or indirectly, upon a Special Area of Conservation (SAC) or a Site of Special Scientific Interest (SSSI).”

Natural England issued a Core Strategy Examination Statement which expresses concerns about the potential impact of the proposed development on the maintenance of a ‘balanced hydrological regime’ at of the Oxford Meadows SAC. Similarly, the Oxford Wildlife Trust have stated in their submission that further detail is required as the likelihood of development impacting on water quality and quantity at Oxford Meadows SAC.

LDA have been commissioned to investigate the potential impacts on the hydrological regime of the SAC and other nearby designated sites that could result from the proposed development.

1.1. Site Description

‘Peartree Roundabout’ hereafter referred to as ‘the proposed development site’ or ‘the site’, is situated to the south of Peartree roundabout in Oxford. It is approximately 50ha in extent and is composed of agriculturally improved fields bordered by hedgerows, with areas of tall ruderal vegetation, marshy grassland and swamp. The site is divided in two by the A40, and is bounded by the A34 and the A44 to the north and Godstow Road and the railway and Oxford Canal to the south. The red line boundary is shown on Figure 1. The hatched area at Goose Green has been proposed for removal from the boundary, but as this has not yet been agreed, the area is included for the purposes of this assessment.

1.2. Proposed Work

The masterplan for the site is currently in development, but the proposal is to develop a science and business park with associated residential areas. Development is likely to be concentrated to the north of the site, with the south-west corner (Goose Green) retained as green space and the south west boundary retained as a green lane and cycle route and ‘soft frontage’ to the development to the north.

1.3. Aims of Study

This study has the following aims:

- Clarify the type and location of the various nearby designated sites in relation to the proposed development.
- Establish the qualifying features for designation of these sites and their current condition.

- Using the available information, establish the potential impacts on the hydrological regime of the designated sites that might occur as a result of the proposed development, and assess the likelihood of these occurring.

2.0 Methodology

A desk study of available data, information and guidance was carried out. The following were consulted:

- 1) Oxford Peartree: Masterplanning Baseline Report. Draft 28 April 2009. LDA.
- 2) Peartree Northern Gateway, Oxford: Preliminary Hydrological Review. June 2009. PBA.
- 3) Pear Tree, Oxford: Phase 1 Habitat Survey April 2007. WSP
- 4) Oxford Core Strategy Habitats Regulations Assessment. September 2008. Oxford City Council.
- 5) Wheeler, B.D., Gowing, D.J.G., Shaw, S.C., Mountford, J.O. & Money, R.P. (2004) Protecting and Enhancing Wetlands: Ecohydrological Guidelines for Lowland Wetland Plant Communities. (Eds. Brooks, A.W., Jose, P.V. & Whiteman, M.I.) Environment Agency (Anglian Region).
- 6) Rodwell, J.S. (Ed.) (1992) British Plant Communities. Volume 3: Grasslands and Montane Communities. CUP, Cambridge.
- 7) Nature on the map website: <http://www.natureonthemap.org.uk>
- 8) Multi-agency Geographic Information for the Countryside website: <http://www.magic.gov.uk>
- 9) SSSI citations and condition assessments: <http://www.sssi.naturalengland.org.uk>
- 10) SAC selection criteria: <http://www.jncc.gov.uk/protectedsites/sacselection>
- 11) Flood Meadows Partnership website: <http://www.floodplainmeadows.org.uk>
- 12) Personal Communication with PBA: emails dated 6th and 7th July 2009.
- 13) Submission to Oxford Core Strategy from Natural England: <http://www.oxford.gov.uk/planning/Examination>
- 14) Wildlife Site Descriptions. Thames Valley Environmental Records Centre.

These numbered references can be cross-referenced with superscript numbers in the text.

3.0 Designated Sites

3.1. Statutory Designated Sites

The following statutory designated sites lie within 2km of the proposed development (see Figures 2 and 3, which are extracts from the Natural England 'Nature on the Map' website and Table 1, which shows the distances of each of the designated sites described below from the proposed development site.

Oxford Meadows Special Area of Conservation (SAC).

This is designated for:

- a) a) Presence of the Annex I habitat 'Lowland Hay Meadows'. The SAC citation states that:

"...the site includes vegetation communities that are perhaps unique in the world in reflecting the influence of long-term grazing and hay-cutting on lowland hay meadows. The site has benefited from the survival of traditional management, which has been undertaken for several centuries, and so exhibits good conservation of structure and function."
- b) Presence of Annex II species creeping marshwort *Apium repens*. The site is the larger of only two known sites for this species in the UK.

Oxford Meadows SAC is comprised of four SSSIs. These are listed below along with the reason for notification.

- Cassington Meadows SSSI. This SSSI is a cluster of neutral haymeadows and fen comprising one management unit in favourable condition. 'Favourable condition' means that the features for which the site are in good condition and are being managed appropriately.
- Pixey and Yarnton Meads SSSI. This SSSI is composed of floodplain meadows on alluvium over calcareous gravel. The meadows are considered to be one of the best examples of lowland neutral grassland in England. The SSSI is composed of three units, all of which are included in the SAC and are in favourable condition.
- Wolvercote Meadows SSSI. This SSSI is composed of neutral lowland pasture and meadows on alluvium over calcareous gravel. It is composed of two units, which both lie within the SAC and are in favourable condition.
- Port Meadow with Wolvercote Common and Green SSSI. This SSSI is composed of neutral lowland pasture on alluvium over calcareous gravel. It is the site within the SAC that supports the Annex II species creeping marshwort. It is composed of four management units. Units 1,2 and 4 are in 'unfavourable recovering' condition and are within the SAC, Unit 3 is in 'unfavourable recovering' condition and lies outside the SAC. 'Unfavourable recovering' means that the features for which the site is designated are in unfavourable condition, but management is in place to rectify this.

Other SSSI near the development but not included in the SAC:

- Port Meadow with Wolvercote Common and Green SSSI Unit 3. See above for general description.
- Hook Meadows and the Trap Grounds SSSI. This is composed of a series of unimproved neutral meadows. It has 2 management units. Unit 1 is in 'unfavourable no change' condition, Unit 2 is in 'unfavourable recovering condition. 'Unfavourable no change' means that the features for which the site is designated are in unfavourable condition,

and management to rectify this is not in place. The reason for unfavourable status is given as ‘undergrazing’ on the Natural England website.

3.2. Non-statutory Designated Sites

Oxford Canal Marsh County Wildlife Site (CWS) lies immediately adjacent to the south-west boundary of the development site (see Figure 1). The CWS is a wet meadow grading into sedge-dominated fen, and is also important for birds.

Table 1: Designated sites within 1km of the proposed development site

| Designated Site | Within SAC? | Distance from proposed development site |
|--|--------------------|--|
| Oxford Meadows SAC | | 70m |
| Port Meadow with Wolvercote Common and Green SSSI Unit 3 | No | 15m |
| Port Meadow with Wolvercote Common and Green SSSI Units 1,2, 4 | Yes | 70m |
| Cassington Meadows SSSI | Yes | 280m |
| Pixey and Yarnton Mead SSSI | Yes | 850m |
| Wolvercote Meadows SSSI | Yes | 740m |
| Hook Meadow and the Trap Grounds SSSI | No | 575m |
| Oxford Canal Marsh CWS | | Adjacent |

4.0 Geology

The development site lies predominantly on impermeable Oxford Clay, which is not an aquifer². However, the south-west corner of the site and a thin band along the south-western boundary (corresponding to Goose Green and the green lane along the south-western boundary) lie on alluvium overlying flood plain river terrace gravels, which PBA 2009² state may be in hydrological continuity with those underlying the designated sites. These deposits are approximately 2m thick, with groundwater levels between 0.6m and 1.2m below ground level.

5.0 Ecology

The description of habitats given in the citations for the individual SSSIs that make up the Oxford Meadows SAC indicate that the habitat type is broadly similar throughout, being floodplain grassland on alluvium overlaying calcareous river gravels, with a long history of being managed either as meadow or pasture. This habitat type can be classified as National Vegetation Community (NVC) 'MG4 *Aloplecturus pratensis-Sanguisorba officinalis* grassland.' This is a lowland grassland community characteristic of areas where traditional hay meadow treatment has been applied to seasonally flooded land with alluvial soils. The Oxford Canal Marsh CWS is described as wet meadow, so it is presumed, given its location on the floodplain, to be a broadly similar plant community to the nearby SAC and SSSIs.

This community is almost exclusively found on floodplains in river valleys, on deep permeable soils which can hold a large amount of water. High river water levels in winter leave the land water-logged, and the soil profile then allows the ground to gradually dry out as the water table subsides. It is not clear whether flood events are an essential part of the hydrological budget for the community as flood events tend to occur in winter when the soil is close to saturation in any case. During summer months, water availability is probably not limiting to plant growth, except in the driest months. Indeed it has been noted that this community is generally intolerant of water logging during the growing season, to the extent that too much water can be more damaging than too little at this time of year.

6.0 Discussion of Potential Impacts

Concerns have been raised by Natural England regarding the impact of the proposed development on the balanced water regime of the Oxford Meadows SAC. Any potential issues are also relevant to the nearby SSSIs outside the SAC and the CWS, which are a similar habitat to the SAC.

The part of the proposed development site which is underlain by alluvial deposits and river terrace gravels is to be retained as green space and will not be built upon. Therefore there will not be any hydrological impacts resulting from disturbance or other modification of the deposits themselves.

Therefore the potential hydrological impacts that might occur relate to modification in quality or quantity of run off from the remainder of the development site that might occur as a result of development.

6.1. Modification of run off: Quantity

The British Geological Survey map of the area (see Figure 3 of PBA 2009) shows alluvial deposits extending in an approximately 2km band along the River Thames corridor at Oxford, from Kidlington in the north to south Oxford – a distance of more than 8km (Figure 3 of PBA 2009). The extent of the deposits on the proposed developments site is approximately 1ha, a very small proportion of the overall extent. It is therefore considered that any run off onto this area over and above that already experienced from the undeveloped site will have a negligible effect on the aquifer under the designated sites.

The SSSI units that make up the Oxford Meadows SAC are all currently assessed as being in either 'favourable' or 'unfavourable recovering' condition. Outside the SAC, Unit 1 of Hook Meadows and the Trap Grounds SSSI is in 'unfavourable no change' condition. This is apparently due to the site being undergrazed. There is therefore nothing to indicate in the Natural England condition assessments that the SAC or SSSIs in the vicinity of the proposed development site are currently experiencing any adverse impacts resulting from problems with groundwater or surface water hydrology.

The MG4 habitats are dependent on recharge of the aquifer in winter both from rainfall and flood events. Any slight changes to run-off levels from the proposed development site are unlikely to have any impact, given that the soils are likely to be saturated. During the summer months the water level in the soil gradually drops and water supply to the plant community will be provided from deep alluvial soils. Recharge of aquifer may also occur from the river⁵ although further investigations and regular monitoring would be required to confirm this. Again, any slight change in the quantity of run off is likely to have a minimal effect on water availability across the flood plain.

Consideration should also be given to the fact that the geology underlying the development site is impervious clay, and the creation of impermeable surfaces over this are unlikely to add significantly to the degree of site run off. The adjacent CWS is therefore unlikely to experience any changes in its hydrological regime, still less the more distant SAC and SSSIs.

6.2. Modification of run off: Quality

The quality of run off from the developed site is not considered further here. It is considered that it can be fully addressed through appropriate implementation of recognised sustainable drainage design techniques as has been recognised by the Environment Agency (reference made by Natural England in the Core Strategy Examination Paper).

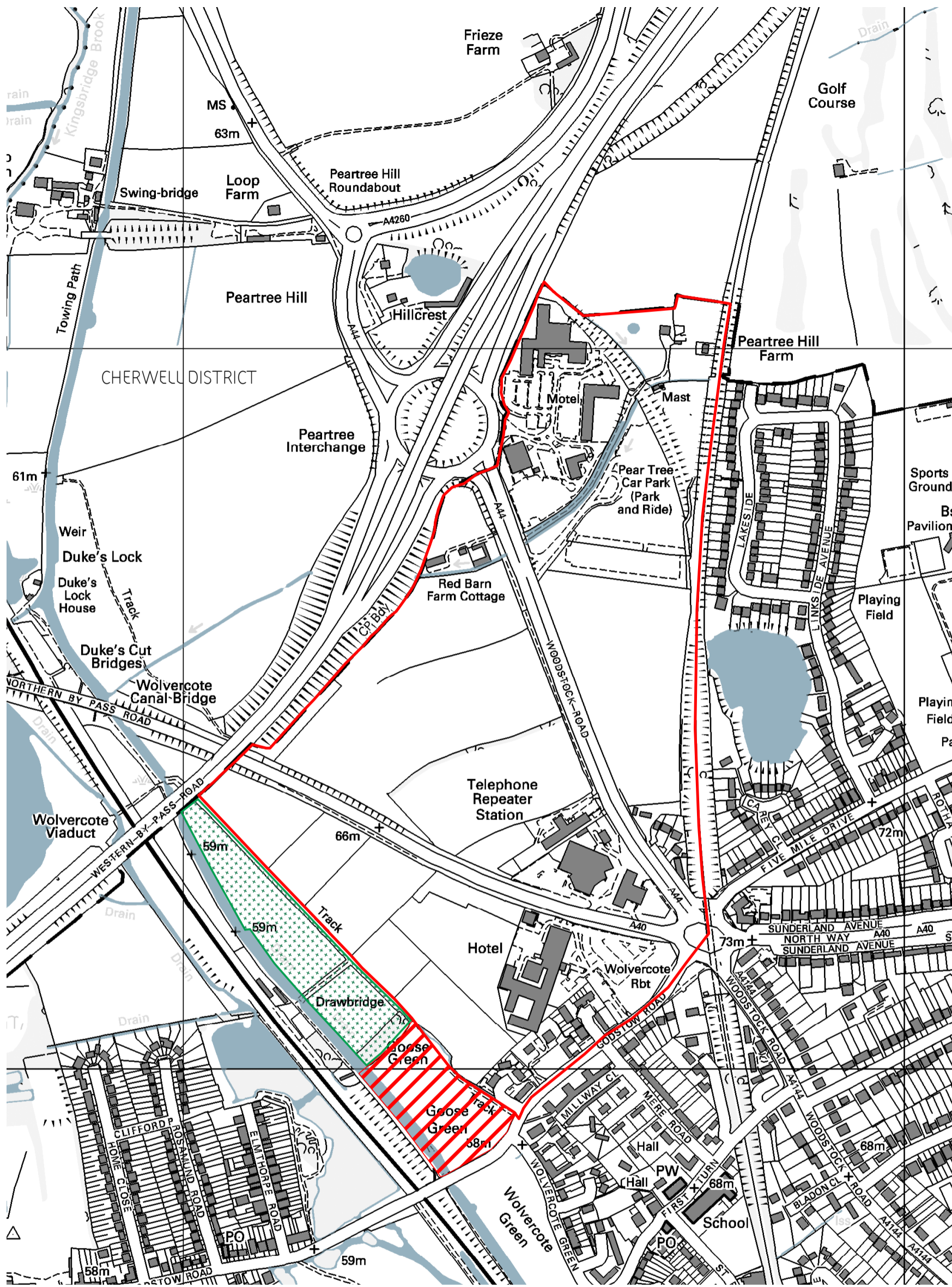
In conclusion, it is considered that the change in levels of run-off from the site onto the alluvial floodplain is likely to be such a small proportion of the whole water regime of the SAC and other designated sites as to be negligible, if indeed there is a change at all. Quantity of run off can be controlled by an appropriately designed SUDS, as has been recognised by the Environment Agency. A SUDS should be drawn up in consultation with, and the agreement of, Natural England and the Environment Agency.




7.0 Summary

The river terrace deposits that lie under the south-west corner of the proposed development site may be in hydrological continuity with the Oxford Meadows SAC and other nearby designated sites. They will not be physically impacted upon by the proposed development so potential hydrological impacts are limited to a modification of quality and quantity of run off from the site. The change in quantity of run off is likely to have such a small effect on the water levels of the underlying gravels as to negligible. This can in any case be controlled by an appropriately designed SUDS (as can the water quality). It is concluded that provided a SUDS is drawn up to take account of these issues, there will be no likelihood of significant impact on the interest features of the SAC, or the reasons for designation of the nearby SSSIs or CWS.

8.0 Figures

- 8.1. Figure1: Proposed development site boundary and location of CWS.**
- 8.2. Figure2: Location of Oxford Meadows SAC (taken from Nature on the Map)**
- 8.3. Figure3: Location of SSSIs within 2km of the proposed development site (taken from Nature on the Map)**



-  Site Boundary
-  Area proposed for removal from site boundary
-  Oxford Canal Marsh CWS

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OXFORD PEARTREE ROUNDABOUT

Oxford
T 01865 887050

LDA DESIGN

| | | | |
|--------|--------------|----------|-----|
| DATE | 07 July 2009 | DRAWN | SJN |
| SCALE | NTS | CHECKED | AG |
| STATUS | FINAL | APPROVED | AG |

Site boundary and CWS location

No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
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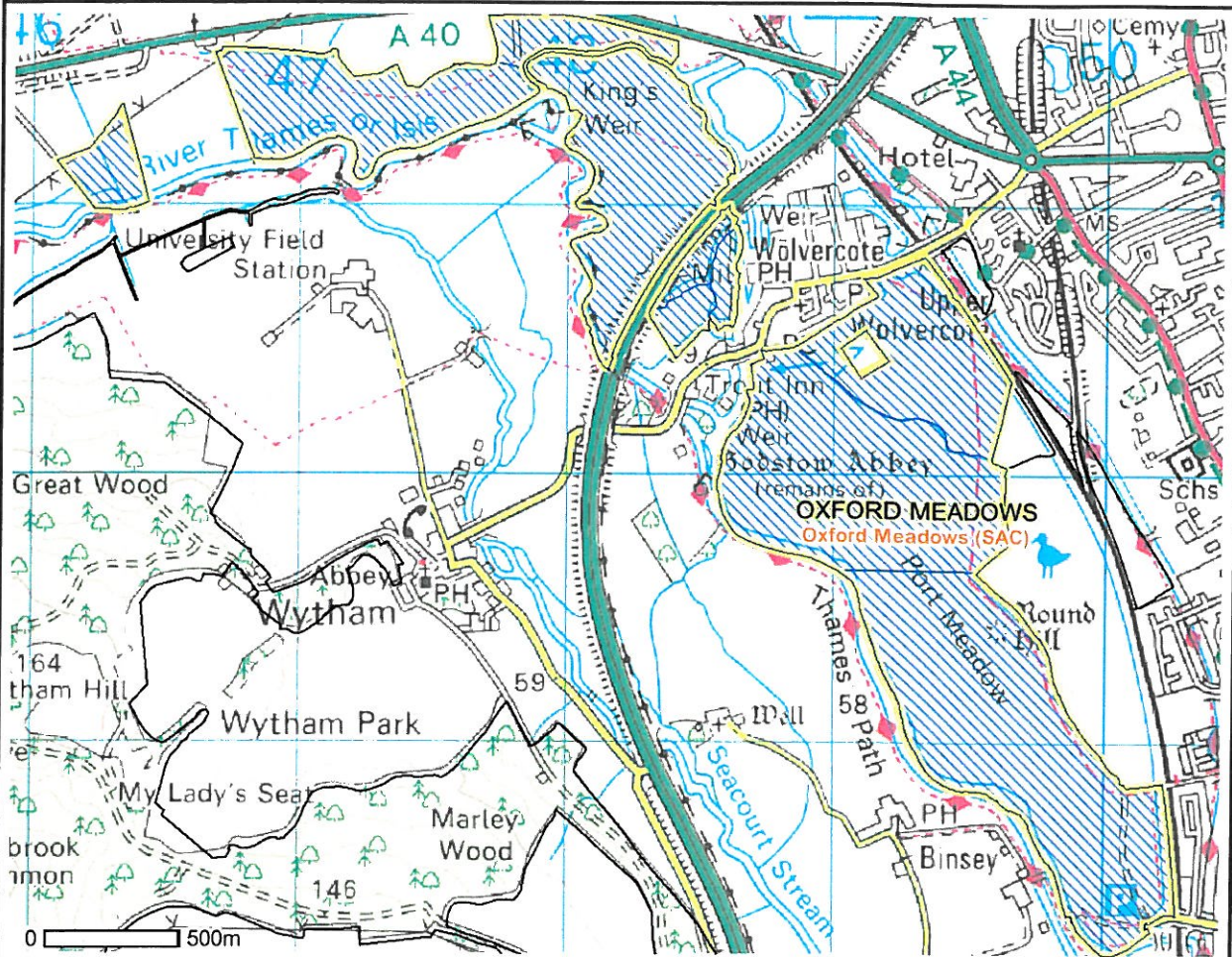
DWG. NO 1

LANDSCAPE
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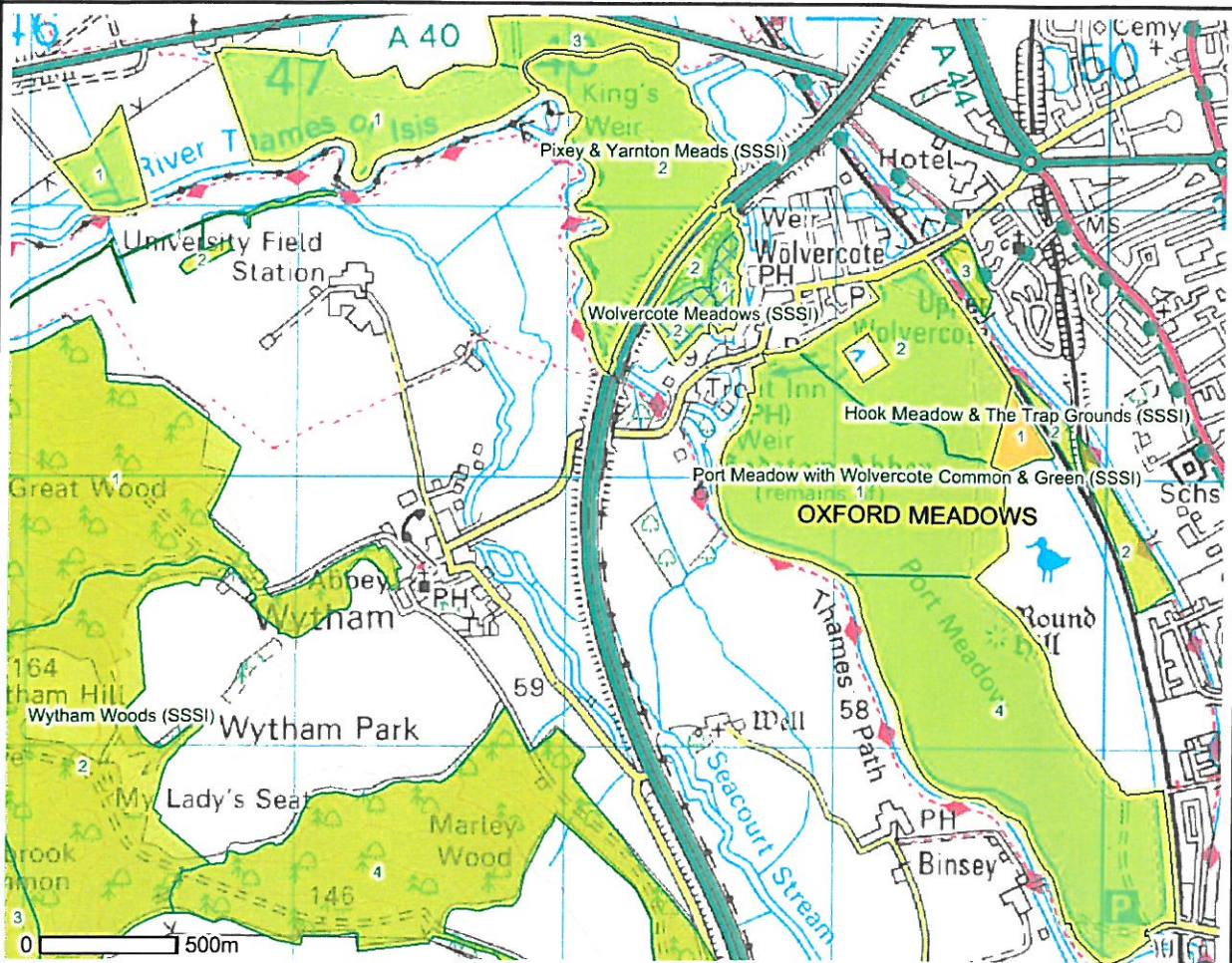


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| □ Selected Special Areas of Conservation | □ Favourable Condition | |
| □ Special Areas of Conservation | □ Unfavourable Condition | |
| □ SAC Water Framework Unit Condition | □ Ramsar Sites | |
| □ Favourable Condition | □ Sites of Special Scientific Interest | |
| □ Unfavourable Condition | □ Natural England Regions | |
| □ Special Protection Areas | □ Natural England Area Teams | |
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| ■ SSSI Live Management Agreements | ■ Natural England Area Teams |
| SSSI Unit condition - last updated 19 Jun 2009 | ■ Scotland, Wales and Ireland |
| ■ Favourable Condition | ■ Ordnance Survey background mapping |
| ■ Unfavourable Recovering | □ England |
| ■ Unfavourable no change | |
| ■ Unfavourable Declining | |
| ■ Part Destroyed | |
| ■ Destroyed | |
| ■ Not Assessed | |