Oxfordshire Minerals and Waste Plan
Minerals and Waste Core Strategy

Habitats Regulations Assessment Screening Report

for mineral and waste preferred strategies
August 2011

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1. Introduction

1.1 This is a Habitats Regulation Assessment screening report for the Oxfordshire Minerals and Waste Development Framework (MWDF). The European Habitats Directive[1] designates sites that are of international importance for their habitats, flora, or fauna; these are known as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites. Together they make up a network of protected sites known as the Natura 2000 network or 'European sites'. The Directive requires that land use plans are subject to Habitats Regulations Assessment (HRA) where they might have a significant effect on a Natura 2000 site. There are no Special Protection Areas or Ramsar sites in Oxfordshire or within 15km of the county border.

1.2 This document will assess the potential impacts of the development proposed in the MWDF on Special Areas of Conservation (SAC) in Oxfordshire and in neighbouring counties. The document has been prepared by the council for approval by Natural England, the statutory consultee for Habitats Regulations Assessment.

1.3 A list of definitions of the terms used in this report is at Appendix 1.

2. The Habitats Directive

2.1 The European Habitats Directive[2] designates sites that are of international importance for their habitats, flora, or fauna (Special Areas of Conservation), or for the species of birds they support (Special Protection Areas). These sites are collectively known as 'European Sites'. SACs are sites which host 'natural habitat types of Community interest (ie those which are in danger of disappearance, have a small natural range or present outstanding examples of certain habitat types), or species of Community interest (those species which are endangered, vulnerable to becoming endangered or which are rare)'.[3] Article 6(3) of the Habitats Directive requires that a HRA of any plans that could affect European Sites is undertaken:

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 and projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the

[1] Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna
[2] Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna
[3] Owen, R (2007) European Nature Conservation Sites and the Appropriate Assessment of Plans and Projects in *Journal of Environment and Planning Law, Occasional Papers No 35, 2007.*

assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

2.2 A ruling in 2005 by the European Court of Justice found that Britain had failed to apply Articles 6(3) and 6(4) of the Habitats Directive to land use plans. To address this issue, the Department for Environment and Rural Affairs (DEFRA) published amended regulations on 21 August 2007, stating that land use plans need to be assessed in line with articles 6(3) and 6(4) of the Habitats Directive. DCLG issued guidance to local authorities on writing the assessment; 'Planning for the Protection of European Sites: Appropriate Assessment' in August 2006. The guidance notes that 'land use plans' refer to Regional Spatial Strategies, the Mayor of London's Spatial Development Strategy, Development Plan Documents, and Supplementary Planning Documents.

2.3 The purpose of this HRA is to assess the potential impacts of the draft planning strategies for minerals extraction and waste management in the Core Strategy of the Oxfordshire Minerals and Waste Development Framework (MWDF), on the conservation objectives of the seven SACs in Oxfordshire.

2.4 The Habitats Directive applies the precautionary principle to European sites; plans and projects are only permitted if it can be shown that they will not have a significant adverse effect on the integrity of the sites. Adopting the precautionary principle, the screening stage of HRA should not include mitigation measures; these should only be taken into account at Appropriate Assessment stage (if this becomes necessary). If there is no viable alternative, compensation and mitigation measures must be used to ensure the continued integrity of the site.

2.5 The HRA process consists of four stages, as shown in Figure 1. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

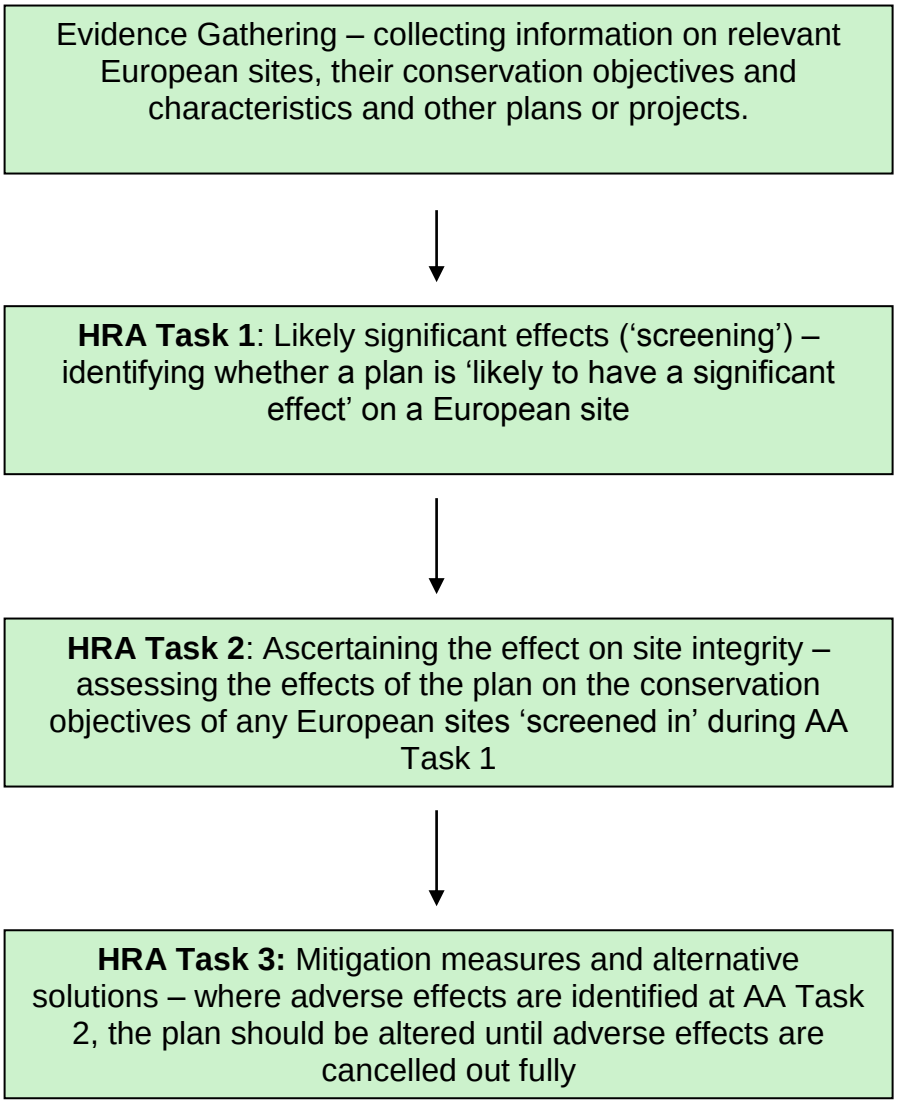


Figure 1: Four-Stage Approach to Habitat Regulations Assessment (HRA)
Source: CLG, 2006

2.6 This report represents the evidence gathering stage and Tasks 1 and 2 of the HRA process. The screening process 'is intended to capture plan policies or proposals that are likely to give rise to a significant effect on the European site'[4]. English Nature guidance[5] provides a useful definition of a significant effect;

[4] *The Appropriate Assessment of Spatial Plans in England; A guide why, when and how to do it*. RSPB, 2007
[5] *Habitats Regulations Guidance Note 3: The Determination of Likely Significant Effect under the Conservation (Natural Habitats &c) Regulations 1994*, (1999), English Nature

'…*any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects'*

2.7 The objective is to 'screen out' those strategy options that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects on European sites, usually because there is no mechanism for an adverse interaction with European sites.

3. Screening Methodology for the Report

3.1 The Habitats Directive and Regulations do not prescribe a methodology for a Habitats Regulations screening assessment. The methodology used in this report has been developed following a review of other HRAs, meetings with Natural England and a review of national guidance, including:

- Appropriate Assessment of the South East Plan (Workshop for Oxfordshire and Buckinghamshire sites 27 June 2006.)
- Meeting with Environment Agency 13th November 2007
- Meeting with Natural England 30th April 2007
- Meeting with Natural England 24th April 2008
- Meeting with Natural England, May 2010
- 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 (EU 2001a);
- The Appropriate Assessment of Spatial Plans in England (RSPB, Dodd et al, 2007)
- DCLG Guidance 'Planning for the Protection of European Sites: Appropriate Assessment (August 2006)

3.2 The screening methodology therefore:

- Outlines details of the European sites which may be affected by the identified impact pathways and the environmental conditions that are required to maintain the favourable conservation status of those sites in Table 1 and Appendix 4;
- In section 3, proposes that the methodology is based upon identified impact pathways for hydrological impacts and screening distances for air emissions.
- In section 4, describes the purpose of the Minerals and Waste Development Framework
- In section 5, proposes that the geographical scope of the report covers the SACs in Oxfordshire and provides a justification for not including SACs outside the county.

- In section 6, provides an assessment of the potential pollutants from mineral extraction areas and waste facilities. Appendix 5 also provides screening tables for the minerals options but not for waste as there is a more limited number of specific waste proposals.
- In section 7, identifies plans and policies which 'in combination' with the Oxfordshire MWDF, could have a negative impact on the European Sites
- Describes the preferred strategy for mineral working and identifies potential impacts of mineral extraction in section 8;
- In section 9, describes the preferred strategy for waste management facilities and identifies potential impacts of waste management processes;
- Provides the conclusions of the screening opinion in section 10.

Box 1 describes the source-pathway-receptor methodology[6] which will be used as part of this assessment.

Box 1: Source-pathway-receptors

The 'source' for waste management facility development is defined by the hazardous properties of the waste types managed and the operations to which they will be subjected. The 'source' for mineral extraction is defined as the hazardous properties caused by the process of extraction.
'Pathways' are the means by which the identified hazards are transferred from the source into the environment and from there to any defined 'receptors'. These include, but are not necessarily restricted to:
• releases to atmosphere such as landfill gas and particulate matter (atmospheric pathway)
• releases to the sub-surface environment such as leachate and landfill gas (sub-surface pathway)
• releases to surface water such as a leachate breakout (surface water pathway)

Receptors are those entities that are liable to be adversely affected by the identified hazards. These include, but are not necessarily restricted to:
• ecosystems, especially sites (but not exclusively) designated in accordance with the Habitats and Birds Directives
• surface water in the vicinity of the site
• groundwater in the vicinity of the site
• atmosphere, which is a receptor in regard to the risk of climate change.

If it can be shown that there is no plausible connection or pathway between potential releases from a specified hazardous source and environmental receptors, which are known or expected to exist in the vicinity of the site, then the situation cannot be considered to present a risk. In this case, there is no plausible source-pathway-receptor relationship.

[6] Adapted from Environment Agency (2004) Guidance on assessment of risks from landfill sites External consultation V1.0

4. The Oxfordshire Minerals and Waste Development Framework

4.1 The Oxfordshire Minerals and Waste Development Framework sets out policies and proposals for minerals and waste development in Oxfordshire until 2030. The following documents combine to make up the Minerals and Waste Development Framework:

- Minerals and Waste Core Strategy
- Minerals Sites Development Plan Document
- Waste Sites Development Plan Document
- Statement of Community Involvement

4.2 The Core Strategy Preferred Options document comprises separate planning strategies for minerals extraction and waste development. The Core Strategy therefore includes strategic planning policy for minerals extraction and waste management facilities until 2030. It also includes a vision and objectives for minerals and waste development and a preferred spatial strategy for the location of minerals extraction and waste management facilities.

4.3 Each Mineral Planning Authority is required by the Government to make provision for extraction of an amount of aggregates each year; this amount is known as the sub-regional apportionment. The draft planning strategy for mineral extraction identifies 11 areas of the county where the Council thinks that further mineral extraction should take place.

4.4 As Waste Planning Authority the Council is expected to identify the amounts of waste that will need to be managed throughout the plan period and the waste management capacity to manage that waste effectively. The draft waste planning strategy identifies a need for additional waste management capacity to manage certain types of waste and broad areas to which most facilities should be steered.

5. Geographical scope of the assessment

5.1 There is no pre-defined guidance that dictates the geographical scope of an HRA of a land use plan. Therefore, in considering the scope of the assessment, impact pathways have been used as well as screening distances. Current government guidance suggests that the following European sites be included in the scope of assessment:

- All sites within Oxfordshire's boundary; and
- Other sites which could be affected by the proposed development within the authority's boundary through a known 'pathway'

5.2 Impact pathways are routes by which a change in activity within Oxfordshire can lead to an effect upon a European site. In terms of the second category of European site listed above, CLG guidance states that the AA should be '*proportionate to the geographical scope of the* [plan policy]'.

5.3 The following European sites lie within Oxfordshire:

- Oxford Meadows SAC
- Cothill Fen SAC
- Hackpen Hill SAC
- Aston Rowant SAC
- Little Wittenham SAC
- Hartslock Wood SAC
- Chiltern Beechwoods SAC

5.4 These European sites are therefore all automatically included in the scope of this HRA screening report. A summary of the SAC characteristics is at table 1. A full description and map of each SAC is at appendix 4.

5.5 A further three SACs lie within 15km of the Oxfordshire border which could be affected by proposed development in Oxfordshire

- North Meadow & Clattinger Farm SAC (Wiltshire)
- Kennet & Lambourn floodplain SAC (Berkshire & Wiltshire)
- River Lambourn SAC (West Berkshire)

5.6 It is proposed that the closest waste facilities to North Meadow and Clattinger Farm SAC will be a new municipal solid waste and commercial and industrial waste recycling facility and a new construction and demolition recycling facility within 2 km of Faringdon. It is thought unlikely that there would be impact pathways from these facilities to the SAC; they are down wind from the SAC, nor are they linked hydrologically to it.

5.7 The presence of the North Wessex Downs AONB has precluded aggregates extraction near the border to Berkshire. Three new waste facilities are proposed in the Science Vale area, near Wantage, Grove, Abingdon or Didcot, one to recycle municipal solid waste and commercial and industrial waste, one to recycle construction and demolition waste and one to treat residual commercial and industrial waste. The recycling facilities are not likely to impact the River Lambourn SAC due to the distance from the SAC (at least 20km) and lack of impact pathways between them. Even if the treatment plant uses thermal technology, the distance of a plant from the SAC will greatly exceed the 10km screening distance recommended by the Environment Agency as the likely distance within which emissions to air could impact on European sites.

5.8 The presence of the North Wessex Downs AONB has precluded aggregates extraction near the border to Berkshire. Three new waste facilities are proposed in the Science Vale area, near either Wantage, Grove, Abingdon or Didcot, one to recycle municipal solid waste and commercial and industrial waste, one to recycle construction and demolition waste and one to treat residual commercial and industrial waste. The recycling facilities are not likely to impact the Kennet and Lambourn SAC due to the distance from the SAC (at least 20km) and lack of impact pathways between them. Even if the treatment plant uses thermal technology, the distance of a plant from the SAC will greatly exceed the 10km screening distance recommended by the Environment Agency as the likely distance within which emissions to air could impact on European sites.

5.9 For these reasons, this report proposes that the three SACs which lie within 15km of the county boundary are not connected to waste and minerals development in the county by a relevant impact pathway and that they can therefore be screened out of further assessment.

Table 1: Summary of Special Areas of Conservation; site character and conservation objectives

Name of Sites	Grid Ref	SAC EU Code	Area (ha)	General Site Character	Conservation Objectives
Aston Rowant	SU727972	UK0030082	127.75	Heath. Scrub. Maquis and garrigue. Phygrana (14%); Dry grassland. Steppes (62.5%); Broad-leaved deciduous woodland (23%); Other land (including towns, villages, roads, waste places, mines, industrial sites) (0.5%).	To maintain broadleaved mixed and yew woodland (calcareous oak, ash and beech woodland and neutral to acid oak, ash and beech woodland) and calcareous grassland (mixed chalk scrub with juniper) in favourable condition
Hartslock Wood	SU619789	UK0030164	34.24	Dry grassland. Steppes (13%) Mixed woodland (87%)	To maintain broadleaved mixed and yew woodland, lowland calcareous grassland and *Orchis simia* in favourable condition. The yew should remain at least frequent in the canopy, for it to maintain favourable status.
Little Wittenham	SU572929	UK0030814	68.76	Inland water bodies (standing water, running water) (1%); Bogs. Marshes. Water fringed vegetation. Fens (25%); Dry grassland. Steppes (2%); Improved grassland (10%); Broad-leaved.	To maintain lowland broadleaved woodland with ponds supporting a breeding population of great crested newts and a grassland habitat supporting a population of great crested newt in favourable condition.
Cothill Fen	SU463999	UK0012889	43.55	Inland water bodies (standing water, running water) (1%); Bogs. Marshes. Water fringed vegetation. Fens (25%); Dry grassland. Steppes (2%); Improved grassland (10%); Broad-leaved deciduous woodland (62%).	To maintain fen meadow, mire and swamp and broadleaved, mixed and yew woodland in a favourable condition.
Hackpen Hill	SU352847	UK0030162	35.83	Dry grassland. Steppes (100%)	To maintain lowland calcareous grassland supporting *Gentiana anglica* in a favourable condition.

Oxford Meadow	SP492090	UK0012845	265.89	Humid grassland: Mesophile grassland (87%); Improved grassland (13%).	To maintain alluvial, species rich flood meadows in a favourable condition. Port Meadow with Wolvercote Common & Green: to maintain, in favourable condition, the habitats for creeping marshwort *Apium Repens.*
Chiltern Beechwoods	SP975134	UK0012724	1276.48	Heath. Scrub. Maquis and garrigue. Phygrana (4%) Dry grassland. Steppes (8%) Broad-leaved deciduous woodland (88%)	To maintain, in favourable condition, the beech forest habitat (*Asperulo-Fagetum* beech forest), broadleaved and mixed yew woodland.

6. Pollutants

This section identifies a range of pollutants which could be produced by minerals and waste developments and justifies the use of screening distances and the source-pathway-receptor methodology. Screening distances are used as the basis on which the impacts of air emissions are assessed and the source-pathway-receptor methodology is used to assess potential hydrological impacts.

6.1 Waste Sites

This section identifies the potential impacts of waste facilities on air and water pollution.

Waste sites, particularly incinerators and landfill sites, can contribute to atmospheric pollution through emission of the following pollutants. A description of each pollutant and an explanation to justify whether each pollutant is assessed further or discounted are provided:

- Methane – Waste treatment, including landfill, released nearly 46% of the UK's methane emissions in 1996, about 2% of all greenhouse gas emissions (in terms of carbon equivalents)[7] It is not possible to relate quantities of methane to particular effects on specific European sites and it is therefore not possible to consider this gas within the scope of this HRA other than to note that increases in methane will contribute at a global scale to accelerating rates of climate change.

- Carbon dioxide – The rise in CO2 concentration is believed to be the main cause of climate change; it is one of the main combustion products from burning fossil fuels. Carbon dioxide is a long-lived pollutant and can remain in the atmosphere for between 50 and 200 years. It is not possible to relate quantities of carbon dioxide to particular effects on specific European sites and it is therefore not possible to consider this gas within the scope of this HRA other than to note that increases in carbon dioxide will contribute at a global scale to accelerating rates of climate change.

- Oxides of Nitrogen (NOx) – Oxides of nitrogen are formed during high temperature combustion processes from the oxidation of nitrogen in the air. The principal source of oxides of nitrogen is road traffic, which is responsible for approximately half the emissions in Europe[8]. NOx concentrations are therefore greatest in urban areas where traffic is heaviest. An increase in the deposition of nitrogen from the atmosphere to soils is generally regarded to lead to an increase in soil fertility, which can have a serious deleterious effect on the quality of semi-natural, nitrogen-

[7] Environment Agency Website

[8] Dore CJ et al (2005) UK Emissions of Air Pollutants 1970 – 2003. UK National Atmospheric Emissions Inventory. http://www.airquality.co.uk/archive/index.php

limited terrestrial habitats. High NOx levels can also have directly toxic effects on plants; it is this aspect which is the subject of this assessment.

- Hydrogen chloride and hydrogen fluoride (HCl and HF) – Both of these chemicals are produced in small amounts as a result of certain energy from waste facilities, principally incineration. HF is the most phytotoxic of all air pollutants. It accumulates in very high concentrations in the margins of leaves. In sensitive species this may lead to distortion of the leaf shape, chlorosis (yellowing), red colouration and, in extreme cases, death of tissues. HCl can also have local, direct, effects on plants, but there is little information available about dose-response relations. Quantities of hydrogen chloride and hydrogen fluoride emitted by incinerators typically result in ground-level concentrations lower than the concentration that will harm vegetation and therefore these chemicals are not considered further in this assessment[9].

- Ammonia (NH3) – Most ammonia is agriculturally produced although it is also produced by composting organic matter on waste sites. It is probably the main source of nitrogen deposition on many wildlife sites. Impacts of NH3 include soil and freshwater acidification and enrichments of ecosystems by nitrogen, or eutrophication[10].

- Low-level ozone (O3) – this is unlike the other pollutants mentioned, in that it is not emitted directly into the atmosphere, but is a secondary pollutant produced by a complex reaction between nitrogen dioxide (NO2), hydrocarbons and sunlight[11]. Although peak levels of ozone are generally reducing, annual average levels are generally increasing. The long range nature of this pollutant means that the distance from source to deposition can often be across national boundaries. Low-level ozone can therefore only be addressed at the national and international level.

- Dioxins – These are long-lived organic compounds, which form when chlorinated substances in waste such as PVC plastic are burnt and accumulate in the human food chain. Dioxins emissions have declined 80% over the period 1990 to 2008. The largest sources of PCDD/F emission has been, and still is, waste incineration. However emissions from waste incineration have fallen by 86% between 1993 and 2008. This significant trend has been driven by the introduction of control measures[12]. As with ozone, the distance from emission to deposition of dioxins can be many hundreds of miles, potentially crossing trans-national boundaries,

[9] ERM, 2007 Appropriate Assessment of the Surrey Waste Development Framework
[10] UK Air Pollution Information System http://www.apis.ac.uk
[11] UK Air Pollution Information System http://www.apis.ac.uk
[12] National Atmospheric Emissions Inventory
www.aeat.co.uk/netcen/airqual/naei/annreport/annrep96/sect6_3.htm

and is dependent upon meteorological conditions. Most importantly, amounts of dioxins formed in incinerators do not depend on chlorine levels, but primarily on the design and operating temperatures of the facility[13]. It is therefore not possible to consider dioxin emissions in detail within this assessment. However, it is important to note that dioxins are only emitted by incineration and that incinerators are required by law to control their dioxin emissions below set thresholds.

- Emissions of cadmium (Cd) have declined by 92% since 1970. Historically, the main sources of cadmium have been energy production, non-ferrous metal production and iron and steel manufacture (as well as other forms of industrial combustion). However, recently Cd emissions from road transport have become more significant (14% in 2008) as reductions have been successful from other sources. The emissions from energy production include a significant proportion from waste combustion and fuel oil combustion for electricity generation. The large reduction in waste emissions is partly due to improved controls on Municipal Solid Waste (MSW) incinerators from 1993 onwards and their conversion to power generating plants[14].

- Migration of landfill gas outside the perimeter of landfill sites taking biodegradable waste can occur, but only where sites have been inadequately engineered. In such circumstances the gas will exclude oxygen from the soil and lead to the exposure and possible death of plants and soil fauna. Such effects are unlikely beyond a 0.5km radius[15] in any case, but since they are a result of poor engineering design, and any current landfill sites will be required to conform to all modern authorisations, they are not considered further in this assessment.

- Biopathogen emissions

  Some composting sites can result in the production of bio-pathogens, which if released into the environment can result in adverse effects on vegetation within European sites located close to the facility. Work which was carried out in Sussex in 2008 resulted in Natural England agreeing that a screening distance of 1km should be applied to such facilities.

[13] Chlorine Online Information Resource website
http://www.eurochlor.org/upload/documents/document57.pdf
[14] National Atmospheric Emissions Inventory
www.aeat.co.uk/netcen/airqual/naei/annreport/annrep96/sect6_3.htm
[15] Scottish Environment Protection Agency. 2003. Technical Guidance Note - Habitats Regulations & The Landfill Regulations Guidance
http://www.sepa.org.uk/pdf/guidance/landfill_directive/habitats_landfill_regulations_guidance.pdf

- Dust

  Many waste facilities can create dust. Landfill sites, thermal treatment plants, in vessel composting facilities, materials recycling facilities and transport emissions associated with waste facilities all lead to dust arisings.

  Effects of dust will depend on the prevailing wind direction and the transport distance is related to particle size; large particles (>30um) will mostly deposit within 100m of the source, intermediate particles (10-30um) are likely to travel up to 200 - 500m. Smaller particles (<10um) can travel up to 1km from the source. With regard to the interest features of European sites, it is likely to be the large and intermediate size particles that are of most interest since if present in sufficient quantities they can smother vegetation, preventing light penetration to the chloroplasts and blocking stomata thus interrupting photosynthesis and transpiration. In prolonged cases, death of plants can result.

  Dust impacts cannot be quantified beyond the broad potential distances identified above for different particle sizes. For the purposes of screening, proposals for waste development that concern areas more than 500m from a European site have been 'screened out' as being unlikely to contribute significant dust impacts even without special mitigation such as 'wetting'.

- Nitrogen Oxide Emissions

  Energy from Waste or thermal treatment plants have the potential to emit the greatest amounts of exhaust gases which can result in substantial increases in the local NOx concentration.

  The Environment Agency guidance on screening point-source pollution emitters[16] lists the presence of a Natura 2000 site within 10km as one of the indicators that detailed assessment (i.e. dispersion-modelling) may be required for a planning application/IPCC consent. The implication of this is that the emissions of a point-source can normally be considered effectively inconsequential on sites located more than 10km distant. This would apply particularly to emitters such as thermal waste treatment facilities.

  A landfill gas flare (or utilisation engine) will produce an emission of exhaust gases such as sulphur dioxide, NOx, unburnt hydrocarbons, carbon monoxide and hydrogen chloride. However, the volume of exhaust gases is likely to be small in comparison to other combustion facilities and at a distance of >1km from the European site may well be

[16] Environment Agency (2003) Integrated Pollution Prevention & Control – Environmental Assessment & Appraisal of BAT. Horizontal Guidance Note IPPC H1.

inconsequential[17]. A distance of 1km has therefore been used throughout this screening report as a basis on which to screen landfill issues in or out of assessment with regard to air quality issues.

The scale of vehicle movements associated with waste facilities depends upon the type and scale of facility, which are only identified in the Minerals and Waste Development Framework at the most strategic scale. It is therefore impossible to give meaningful 'typical' values for traffic movements. A review by ERM in 2007[18] identified that:

- A Household Waste Recycling Centre may have small numbers of HGV movements per day but large numbers of car movements when the public brings its waste to the site.
- Energy from Waste facilities will generally have large numbers of HGV movements (100-200 per day) but there will be a much smaller number of cars traveling to the site.
- Most other forms of waste treatment fall between these two extremes, depending on their type and size.
- If there are multiple waste facilities on one site, the picture may be further complicated with different flows of vehicles to each facility.

➢ Water Quality

The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
- Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.
- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system,

[17] Scottish Environment Protection Agency. 2003. Technical Guidance Note - Habitats Regulations & The Landfill Regulations Guidance. http://www.sepa.org.uk/pdf/guidance/landfill_directive/habitats_landfill_regulations_guidance.pdf

[18] ERM (2007) Appropriate Assessment of Surrey Waste Development Framework, Surrey County Council

possibly having negative effects on the reproduction and development of aquatic life.

Water quality may be adversely affected by waste sites through:

- Pollution through water runoff from hard surfaces carrying oils, heavy metals and/or de-icing compounds. While these effects can be dispersed throughout the downstream water catchment, they will be most visibly manifested within tens of metres to a few hundred metres of the site; and
- Discharges of leachate from landfill sites can add ammonia, other nutrients and chemical pollutants to surface water bodies. Leachate can also penetrate groundwater. Leachate can escape from landfill sites by leakage through a barrier / containment system, break out through a cap, or overtopping containment.

General conclusions which can be drawn from the above study are that all new waste facilities are likely to result in a local increase in vehicle movements and that the distance vehicles travel as well as the type of vehicles and numbers of them are important to contributing to deteriorating atmospheric deposition of European sites.

Atmospheric emissions of NOx from other types of facility are negligible. For example, anaerobic digestion does result in the generation of biogas but not NOx. The emissions to the air are well controlled; some emissions may arise from biogas under positive pressure in the tank, but under normal operating conditions biogas is not released direct to air.

Equally, waste transfer stations and mechanical biological treatment plant can incorporate a number of different processes in a variety of combinations and can be built for various purposes, but air emissions and health impacts are most likely to be linked to traffic movements.

In general therefore, the view has been taken in this screening report that waste sites other than landfill and treatment facilities are unlikely to have a significant air quality effect on European sites (other than through associated vehicle exhaust emissions). No new landfill sites are proposed in the preferred strategy.

6.2 Quarries and mineral sites

Atmospheric pollutants generated by minerals sites are more limited and can generally be confined to dust and traffic exhaust emissions. Vehicle exhaust emissions have already been discussed. Effects of dust will depend on the prevailing wind direction and the transport distance is related to particle size; large particles (>30um) will mostly deposit within 100m of the source, intermediate particles (10-30um) are likely to travel up to 200 - 500m. Smaller particles (<10um) can travel up to 1km from the source. With regard to the

interest features of European sites, it is likely to be the large and intermediate size particles that are of most interest since if present in sufficient quantities they can smother vegetation, preventing light penetration to the chloroplasts and blocking stomata thus interrupting photosynthesis and transpiration. In prolonged cases, death of plants can result.

Dust impacts cannot be quantified beyond the broad potential distances identified above for different particle sizes. For the purposes of screening, proposals for minerals development that concern areas more than 500m from a European site have been 'screened out' as being unlikely to contribute significant dust impacts even without special mitigation such as 'wetting'.

There are several ways in which quarrying / mining can affect water quality/resources:

- Quarries and mines that are below the water table will require dewatering on a regular basis. Dewatering can lead to a reduction in the water table and "draw down" from hydraulically linked groundwater dependent habitats (including streams and rivers);
- The physical presence of a new quarry in the unsaturated zone (i.e. above the water table)can increase the possibility of aquifer contamination and result in a direct reduction in temporary groundwater storage capacity;
- If the water that is pumped from a quarry as a result of dewatering has a high proportion of clays and suspended particles, or is contaminated with metals, it can reduce water quality within those watercourses that receive the water; and part of the quarry, to keep pace with the inflow of groundwater.
- Backfilling a dormant quarry with overburden or imported fill may cause changes to groundwater levels, quality and flow paths in adjoining areas.

6.3 Direct land take

Issues of direct landtake from European sites generally relate to existing permissions (often associated with mineral extraction) that were granted prior to the designation of the site and which have not yet reached completion. At this stage we have not identified any European sites that may be subject to direct landtake as a result of minerals operations in Oxfordshire.

6.4 Screening Distances

Table 2 summarises the screening distances that will be used for each source of impact discussed in this section of the report. The 'screening distance' is the distance within which (using the guidance on pathways available from the Environment Agency and the other sources identified in this section) different sources of impact or types of waste/minerals site

should be taken forward for more detailed consideration of impacts. The screening distance does not imply that all sites within that zone will lead to an adverse effect on a European site, merely that impacts/effects cannot be dismissed out of hand. Conversely, any pathway that exceeds the screening distances shown can be assumed to result in no significant impact on a SAC.

Table 2: screening distances for impacts based on 'source-pathway-receptor' methodology

Pathway	**Screening Distance**
Air quality – thermal treatment	10km from European site
Air quality – landfill gas flares	1km from European site
Air quality - biopathogens	1km from European site
Air quality - dust	500m from European site
Air quality – traffic emissions	200m from European site
Water quality and flows	No standard distance – use Source/Pathway/Receptor Approach for each case

7. Existing Trends, Other Plans, Policies, Strategies and Initiatives

7.1 Article 6(3) of the Habitats Directive states 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 implication of the site in view of the site's conservation objectives.'

7.2 Table 3 shows relevant policies, plans and initiatives which have the potential to have a cumulative or synergistic effect on SAC habitats, flora or fauna, with the emerging MWDF. It also provides a 'Red, Amber, Green' assessment of their potential impacts on European sites. The County Council considers that the most relevant documents with quantifiable impacts and spatial implications for European sites in and adjacent to Oxfordshire are:

- The Regional Spatial Strategy (South East Plan) for the South East 2006-2026
- Swindon Borough Core Strategy
- The emerging Oxfordshire District LDFs
- Oxford City Core Strategy 2026
- Oxfordshire Local Transport Plan 2011-2030
- Wycombe Core Strategy
- West Berkshire Core Strategy (Proposed submission document 2010)

7.3 This list has been informed by consultation with neighbouring authorities, district councils in Oxfordshire and a number of other stakeholders, which has taken place to ensure that all relevant plans, policies and projects have been taken into account.

Table 3: Relevant plans and policies to Oxfordshire MWDF Habitats Regulations Assessment

Policy, plan, strategy or initiative	Impact	Potential cumulative impact? RAG Status
South East Plan 2006-2026	Focus new development on the Central Oxfordshire Sub Region	Potential impact on air quality and water quality, land take.
	18,000 new jobs 2006-2026 Concentrate economic development in Science Vale UK	Nearest site is Little Wittenham; unlikely direct impact on great crested newts.
Wycombe LDF 2006-2026	6,600 new homes in Wycombe District, of which the majority in High Wycombe, Marlow and Princes Risborough.	Potential impact of recreational pressures on Aston Rowant. Potential reduction in air quality due to increased traffic generation associated with new development.
Oxfordshire LDFs	55,200 new homes in the county: Cherwell 13,400 South Oxfordshire 10,940 Vale of White Horse 11,560 West Oxfordshire 7,300	Pressure on recreational facilities and open space in the County. Potential impact on air and water quality.
Swindon Borough Core Strategy	Swindon is one of the strategically significant cities and towns identified in the RSS as a primary focus for development. Swindon: 52.5 ha employment land, 19,000 new homes by 2026.	Potential increase in recreational pressure on Hackpen Hill, an area of access land.
Oxford City Core Strategy 2026	8,000 new homes and between11,280-13,900 new jobs between 2006 and 2026. Strategic employment area at Northern Gateway.	Pressure on recreational facilities which is accessible to Oxford such as Oxford Meadows SAC. Proximity of new employment land to Oxford Meadows SAC; associated traffic generation and air pollution.
Thames River Basin Management Plan	Review of abstraction licences from River Thames and its tributaries.	Should improve river flows to Oxford Meadows by reducing permitted abstraction.
Thames Water's Water Resources Management Plan 2009	Proposed Upper Thames Reservoir in Vale of White Horse to cover 21 miles² and hold 100 million litres of water.	Unlikely to have an effect. Nearest SAC is Cothill Fen. Appropriate assessment has shown that proposed pipeline from reservoir to Farmoor reservoir will not impact on the SAC.
Oxfordshire Local Transport Plan 3 2011-2030	Upgrade A415 from A34 to A40	Landtake, construction process and water contamination could impact on Cothill Fen.
	Improve junctions on Oxford ring road	May improve air quality by improving traffic flows
	Improved access to sites from improvements in public transport	Recreational pressure on sites
West Berkshire Core Strategy (Proposed submission 2010)	10,500 new homes to 2026	Possible recreational pressure on Hackpen Hill

8. Minerals spatial strategy options

8.1 The County Council's preferred spatial strategy approach for mineral working for consultation is:

i. sand and gravel – concentration of working at Lower Windrush Valley, Eynsham/ Cassington/Yarnton, Sutton Courtenay, Cholsey and Caversham;

ii. soft sand – working in three existing areas: south east of Faringdon; Tubney/Marcham/Hinton Waldrist; and Duns Tew;

iii. crushed rock – working in three existing areas: north of Bicester to the east of the River Cherwell; south of the A40 near Burford; and south east of Faringdon.

8.2 The map at appendix 2 shows the location of these areas in relation to the Special Areas of Conservation. Section 6 of this report has highlighted that mineral working can have particular air pollution and hydrological impacts on the environment. The screening tables at Appendix 5 provide an assessment of all the option areas on each SAC and identifies that hydrological and air quality impacts could be particularly relevant to Oxford Meadows SAC and Cothill Fen SAC. These impacts are discussed below.

8.3 Air Pollution

The Department of Transport's Transport Analysis Guidance[19] notes that 'beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant.' This distance has been used in this screening report in order to determine whether European sites are likely to be significantly affected by development proposed in the MWDF.

8.4 The following European sites in Oxfordshire lie within 200m of a major road which could be used as a strategic lorry route for minerals and waste traffic:

- Oxford Meadows SAC is located within 200m of the A40
- Aston Rowant SAC is located within 200m of the M40

The Highways Agency's publication the Design Manual for Roads and Bridges (March 2011) notes that an assessment of air quality is only required if the traffic increase associated with a development proposal is likely to result in an increase of more than 10% Annual Average Daily

[19] www.webtag.org.uk/archive/feb04/pdf/feb04-333.pdf

Traffic (AADT)[20]. The AADT at Stokenchurch, adjacent to Aston Rowant SAC is 105,105 vehicles, and at Wolvercote, adjacent to Oxford Meadows, is 68,918. The proposed options for mineral extraction will enable the continued supply of aggregates to markets within Oxfordshire and to wider markets, but it is not anticipated that there will be any significant increase in vehicle movements associated with mineral extraction. There is therefore unlikely to be a deterioration of air quality associated with mineral extraction proposed in this plan. It is proposed that no further assessment of air quality associated with the impact of working on these two SACs is therefore required.

8.5 Hydrology

In Oxfordshire there are two European sites that have a particular hydrological sensitivity; Oxford Meadows and Cothill Fen.

Oxford Meadows

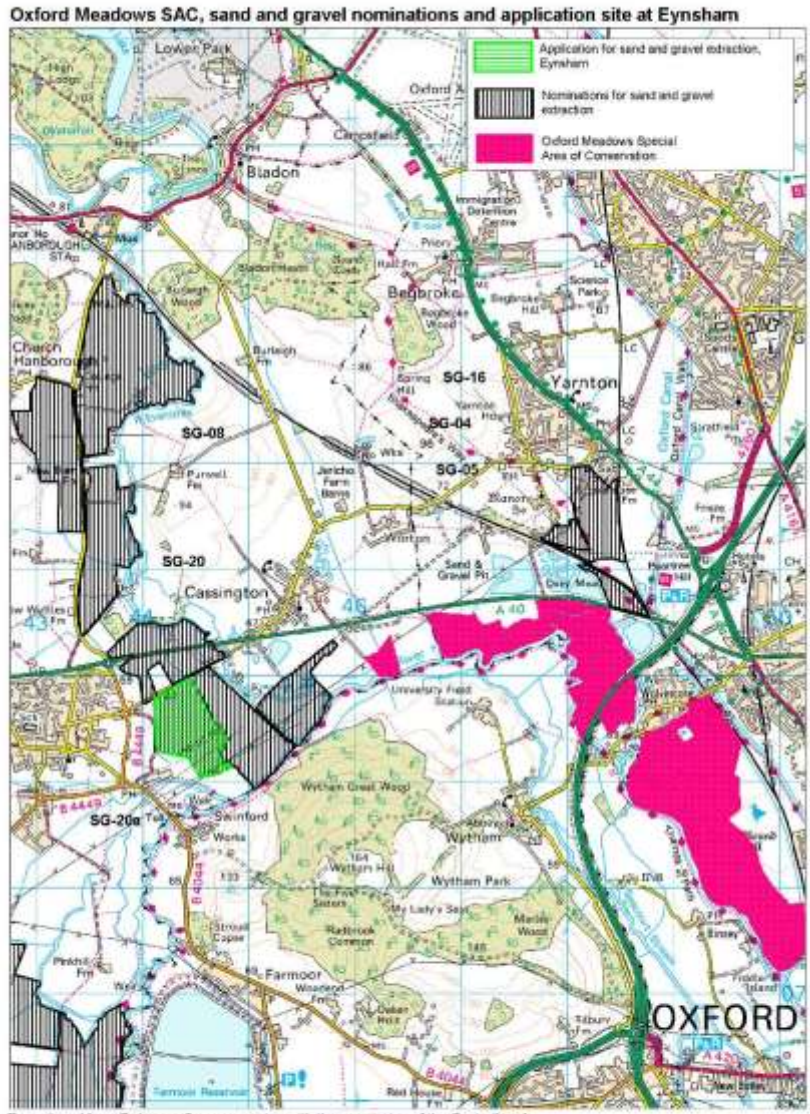
A hydrological study was undertaken in support of a planning application for extraction of sand and gravel east of Eynsham, where many of the nominations for future extraction are located. The proposed site is in close proximity to both the River Thames and the River Evenlode. In a letter dated 2007, Natural England said that[21] *'based on the information provided, Natural England does not object to the proposal. Natural England is of the opinion that the proposal would not be likely to have a significant effect on the Oxford Meadows SAC, and therefore does not require appropriate assessment in accordance with Regulation 48 of the Conservation (Natural Habitats &c.) Regulations 1994.'*

In the summary hydrological assessment which supports the planning application[22] (Appendix 6), the hydrologist also noted that 'dewatering of the proposed Eynsham Quarry does not present a risk to Cassington Meadows SSSI as this site is beyond the radius of influence of typical sand and gravel dewatering.'

Clearly this does not preclude the need for further assessment of individual planning applications, but these reports do indicate that in principle, it might be feasible to extract sand and gravel from sites which are as far or further from the SAC as the planning application site, without having a significant effect on Oxford Meadows SAC. Figure 2 shows the location of the planning application site and the other site nominations.

[20] Highways Agency (2011) Design Guide for Roads and Bridges, Vol 11, Section 3 Environmental Assessment Techniques, Part 1 Air Quality
[21] J Gifford, Western Area Government Team, SE Region Natural England, 6 November 2007.
[22] Bennett, S (2007) Summary Hydrological Assessment, Proposed Eynsham Sand and Gravel quarry.

Fig 2: Oxford Meadows SAC and site nominations for sand and gravel extraction



8.6 It is not possible to assume that sand and gravel extraction in sites which are closer to the SAC than the application site (SG-04, SG-05, SG-16 and SG-20a) will not have a significant impact on Oxford Meadows SAC. The strategy assumes delivery of 180,000 tonnes of sand and gravel per year from this option area. Assuming that all other planning criteria do not prevent working, the application site, SG-08 and SG-20 could potentially deliver 5.8 million tonnes over a period of 21 years, an average of 0.275mtpa. The strategy is therefore potentially deliverable, without using

sites which could have a potential impact hydrologically on the integrity of Oxford Meadows SAC.

8.7 Cothill Fen

A planning application was recently submitted for soft sand extraction on a site adjacent to Cothill Fen. Due to the potential for the proposal to have hydrological impacts on the SAC, Natural England requested that a full Appropriate Assessment of the proposals be carried out. The Appropriate Assessment[23] found that the proposal would not impact on the integrity of Cothill Fen as measures could be taken to ensure that hydrological impacts would be prevented by implementation of planning conditions which would require buffer zones to be in place, no extraction to take place within 1 metre of the water table and the preparation of a Water Management Plan which must be approved by Natural England and the Environment Agency. This site is the closest of any of the nominated sites and it demonstrates that, in principle, subject to further assessment of individual proposals for extraction, soft sand extraction in this area can take place without impacting on the integrity of the SAC.

9. Waste strategy options

9.1 Policy W5 describes the proposed strategy for further waste management facilities to supplement existing provision by allowing for the development of strategic facilities in specified broad areas as follows:

For municipal waste, provision will be made for:

- A household waste recycling centre to serve Banbury;
- Two residual waste transfer stations in the Abingdon / Didcot / Wantage & Grove and the Witney / Carterton areas of the county.

For the other main waste types, provision will be made for:

- Additional permanent recycling plants for commercial and industrial waste at or close to towns in the northern (Bicester) and southern (Abingdon; Didcot; Faringdon; Henley; Thame) areas of the county;
- A plant for treatment of and recovery of resources from residual commercial and industrial waste (which is not recycled) in the Abingdon / Didcot / Wantage & Grove area;
- Additional permanent recycling plants for construction, demolition and excavation waste (to produce recycled aggregates and soils) at or close to Oxford and the large and smaller towns in the rest of the county; and temporary recycling plants located at landfill and quarry sites across Oxfordshire.

[23] Baker Shepherd Gillespie (2009) Upwood Park, Besselsleigh Appropriate Assessment

The broad areas are expected to be defined by a 5 km radius drawn around the larger towns and a 2 km radius around the smaller towns. The strategy also gives a general presumption in favour of smaller waste management facilities to serve local needs beyond these broad areas (i.e. in more rural locations) and confirms that sites for new waste management facilities will be identified in a sites allocations document (the Waste Sites Development Plan Document).

9.3 The specific proposals are for waste management facilities which are unlikely to have impacts on the European sites (see paragraph 6.7) with the possible exception of the treatment plant proposed in the Abingdon/ Didcot/ Wantage-Grove area. Figure 3 shows the location of this area in relation to Cothill Fen, Oxford Meadows and Little Wittenham SACs, all of which lie within 10km of this area. Any proposal for a plant treating waste by means of incineration is likely to give rise to emissions to air and would require a further screening opinion if the site lies within 10km of one or more of these SACs.

9.4 That said, a proposal for an Energy from Waste facility at the Sutton Courtenay landfill site (between Didcot and Abingdon) was considered by the County Council (as Waste Planning Authority) in 2009. Although the application for planning permission was refused by the Council, Natural England confirmed that the proposal was unlikely to have a significant effect, alone or in combination with other plans or projects, on the SACs. It is not yet confirmed that the treatment plant proposed in the waste strategy will employ Energy from Waste technology (a proposal for a Mechanical Biological Treatment plant on the same site is currently the subject of an undetermined planning application). But the detailed assessment work undertaken in the consideration of the previous planning application gives further confidence to the conclusion that the plan's proposals should have no significant impact on the SACs.

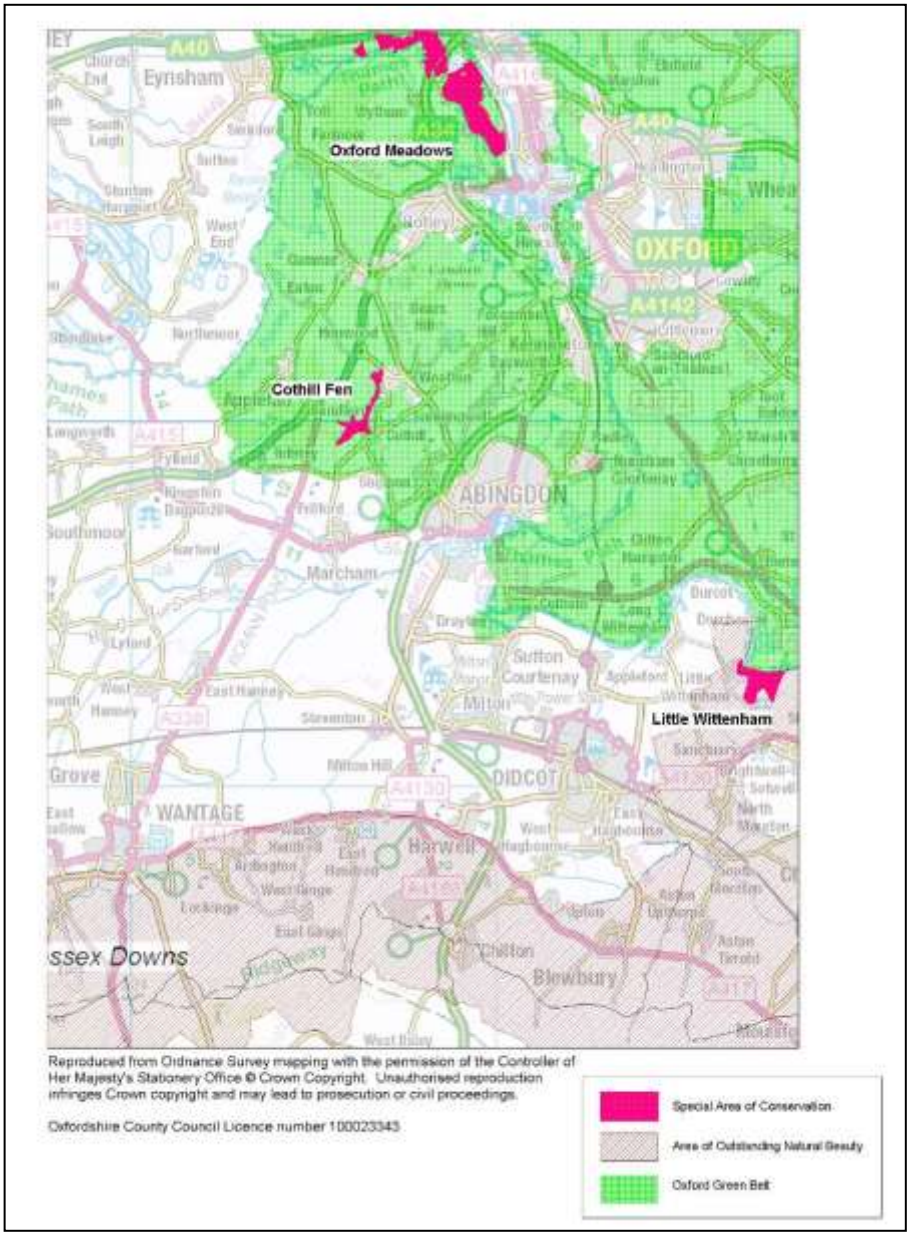


Figure 3: waste strategy option area and local SACs

9.5 A household waste recycling centre near Banbury may generate a significant number of vehicle movements, with associated emissions, but there are no European sites in this area, so an impact on any SAC is unlikely.

9.6 A residual waste transfer station in the Witney/Carterton area is unlikely to have an impact on any European site. A residual waste transfer station in the Abingdon/Didcot/Wantage/Grove area could have an impact from associated traffic emissions if located within 200m of a SAC. If identified

for development in the subsequent site allocations document, this will be subject to a similar HRA screening process prior to adoption.

9.7 Provision for additional temporary or permanent recycling plants for commercial and industrial waste and for construction, demolition and excavation waste may generate traffic with associated emissions, which could have an impact on European sites. Under policy W5, small scale waste management facilities may also be located in the rural areas; there are no likely impacts from these facilities other than emissions from traffic if the sites are located within 200m of a SAC. However, the possible Impact of any of these circumstances can't be foreseen at this stage and, if such proposals come forward through the subsequent site allocations document, this will be subject to further HRA screening prior to adoption.

9.8 Policy W7 of the strategy provides for additional landfill capacity for inert (construction, demolition and excavation) waste. This will mainly be at exhausted quarries where such material is beneficial in site restoration, but in some cases deposit of this material may be allowed in other circumstances (e.g. structural site landscaping) if there is an overall environmental benefit. The Minerals Sites Development Plan Document will identify quarries where such waste might be used in their eventual restoration and any impact of such fill on a SAC will be assessed in the adoption of this document.

9.9 Policy W10 makes provision for the storage of intermediate level radioactive waste at the Harwell Science and Innovation campus (pending its eventual removal to a permanent off-site disposal facility – location as yet specified but most unlikely to be within Oxfordshire). Storage will take place within a specially constructed building built to rigorous standards and regulated by, amongst others, the Environment Agency. Harwell will not therefore have an impact on any SAC because its location is distant from them.

9.10 Policy W10 also makes provision for the storage of a specified amount of low level radioactive waste at Harwell pending its disposal at a facility outside Oxfordshire. If transported by road, such movement will take place over a considerable period of time i.e. years and will not give rise to significant impact to any SAC within 200 m of any road used to transport the waste. The policy allows for the possibility of the waste being disposed at an existing landfill in Oxfordshire; any such landfill would be strictly regulated by the Environment Agency. The screening distance recommended by the Environment Agency, beyond which it is unlikely there will be impacts on European sites, is 1km from landfills. The closest landfill to a SAC is at Sutton Courtenay, some 5km west of the SAC.

10. Conclusions of screening opinion

10.1 The likely impacts of the preferred strategies for sand and gravel extraction, soft sand extraction, crushed rock extraction and waste management facilities on the Special Areas of Conservation in Oxfordshire have been assessed.

10.2 The seven Special Areas of Conservation could be potentially affected by the impacts of waste management and mineral extraction. There is no justification for assessing any potential impact on the Special Areas of Conservation in neighbouring counties because no source-pathway-receptor links have been found to exist between the proposed development and the sites.

10.3 Using the source-pathway-receptor screening assessment, and taking into account the other plans and policies which are relevant to this assessment, this report has identified that mineral extraction from some of the site options within the Eynsham/Cassington/Yarnton area could impact on the conservation objectives of Oxford Meadows SAC through a hydrological pathway. The conservation objectives of this SAC are dependent on the hydrological regime and further mineral extraction upstream of the SAC, with its potential impacts on groundwater and surface water flows could impact on these objectives. However, section 8.6 has demonstrated that the minerals strategy for sand and gravel is potentially deliverable without needing to work the sites which could have an impact on the integrity of Oxford Meadows SAC.

10.4 The proposed minerals development is unlikely to make a significant contribution to air pollution on Oxford Meadows SAC or on Aston Rowant SAC as the proposed development represents a continuation, rather than an increase, in aggregate extraction. The existing levels of traffic which pass these sites are such that the HGV movements associated with the proposed development will have a negligible impact on existing levels.

10.5 No other areas included in the preferred strategy for minerals extraction are likely to have impacts on the SACs in Oxfordshire.

10.6 The report identifies that a proposal for a residual treatment plant in the Abingdon/Didcot /Wantage/Grove area, if located within 10km of Cothill Fen, Oxford Meadows or Little Wittenham, may require a further screening opinion and a full appropriate assessment may be required. However, the strategy identifies a wide area for possible location of this plant and the technology which would be used is not currently known. No other impacts of proposed waste management facilities are likely to have a significant negative impact on the integrity of the SACs in Oxfordshire.

Appendix 1 Definitions of terms used in the report

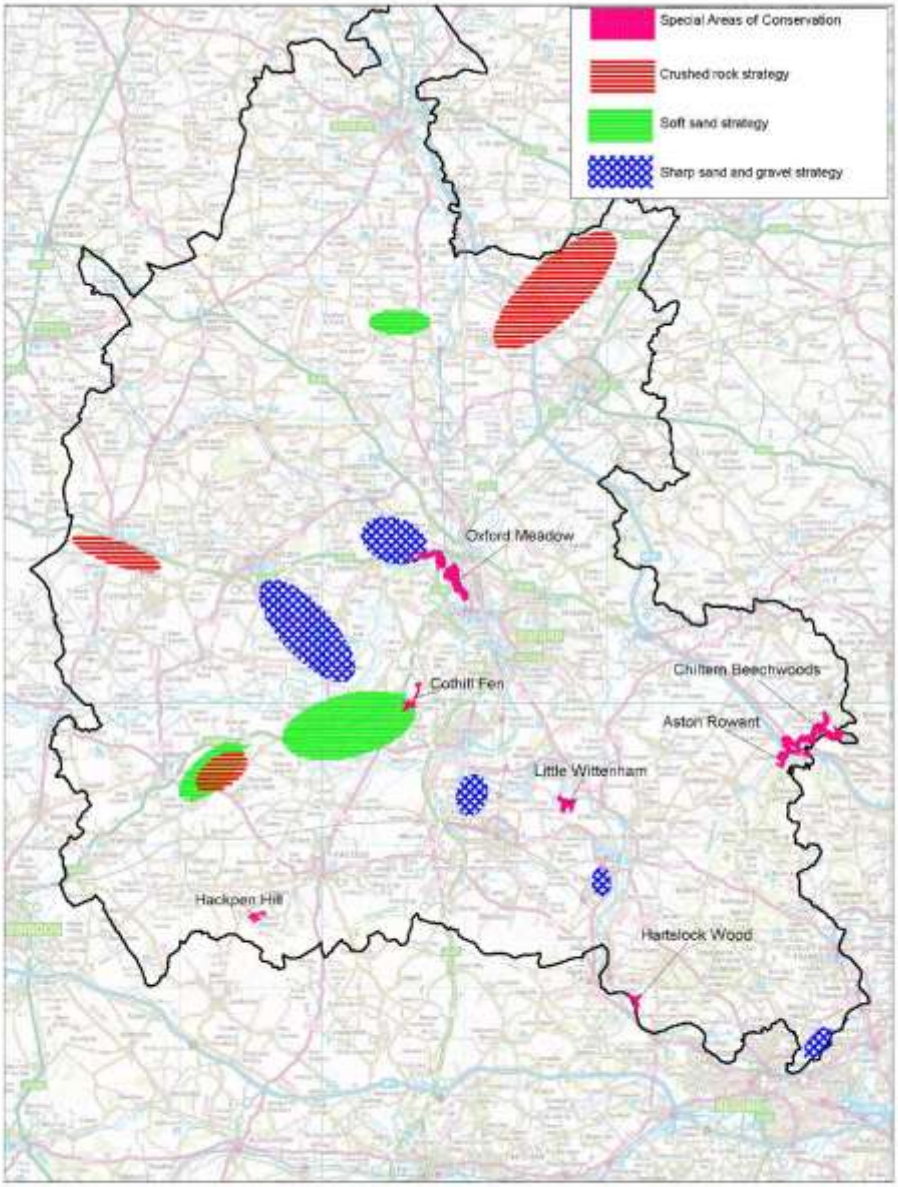
The Habitats Directive refers to a number of phrases which have specific connotations to the implementation of the Directive and to the Appropriate Assessment process.

- Site Integrity: the coherence of a site's ecological structure and function across its whole area which enables it to sustain the habitat, complex of habitats and /or the levels of populations of the species for which it was classified. A detailed assessment of whether the MWDF will have an impact on the integrity of the sites will be carried out in Stage 2, the Appropriate Assessment stage, if necessary.
- Conservation objectives: objectives to maintain the primary and secondary reasons for designation in a favourable condition. Conservation objectives relate to the component SSSIs which make up a Special Area of Conservation.
- Conservation Status: the sum of the influences acting on a natural habitat and its typical species that may affect its long term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory. The conservation status is described as 'favourable' when its natural range and areas within that range are stable or increasing, and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.
- Natura 2000 site: A coherent European ecological network of Special Areas of Conservation and Special Protection Areas, provided for by Article 3(1) of the Habitats Directive. This network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, enables the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.
- Competent authority: The "competent authority" is defined as including any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office[24].
- Precautionary principle: projects can only be permitted where it has been ascertained that they will have no adverse effect on the integrity of the site. If there is any doubt about potential impacts of a development on a European site, development will not take place unless it can be demonstrated that adequate mitigation measures have been implemented to ensure that damage does not occur.
- Likely significant effect is an effect that may be predicted as the result of as plan or a project that may affect the conservation objectives of the features for which the site was designated. The concept of 'significant

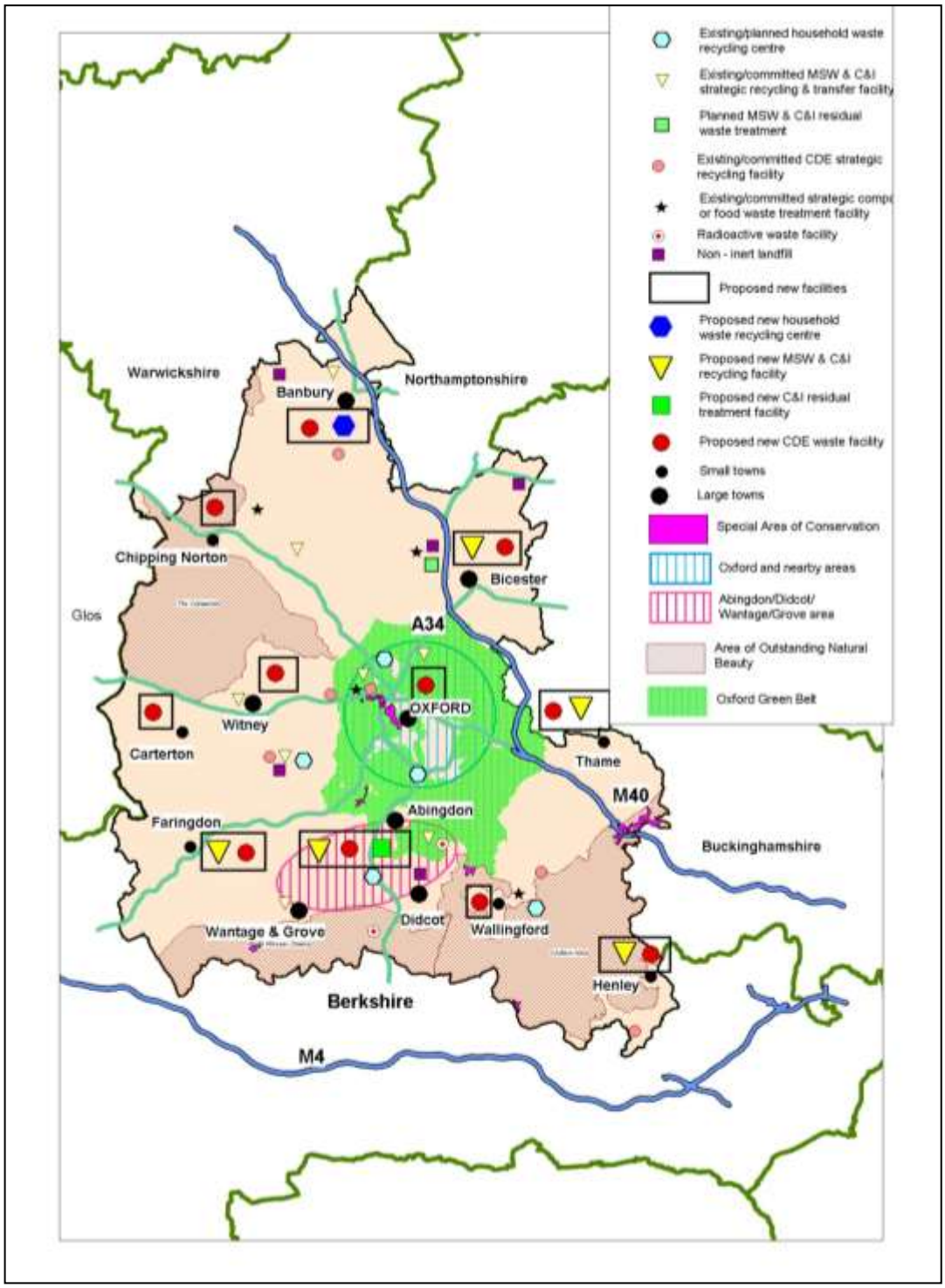
[24] The Conservation (Natural Habitats, &c.) Regulations 1994

effect’ should be interpreted as objectively as possible in relation to the specific features and environmental conditions of the site concerned.

Appendix 2 Preferred strategy for crushed rock, soft sand and sharp sand and gravel and Special Areas of Conservation

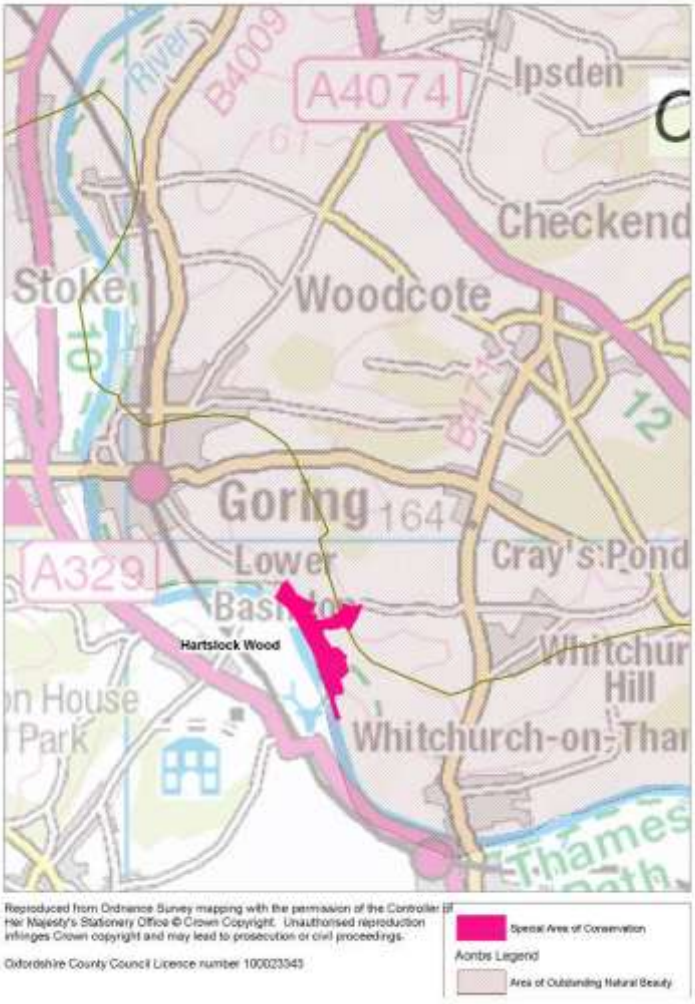


Appendix 3 Key diagram showing preferred waste strategy



Appendix 4 Detailed Description of each Special Area of Conservation

Hartslock Wood



Source: OCC

Semi-natural dry grasslands and scrubland facies: on calcareous substrates. This is considered to be one of the best areas in the United Kingdom for monkey orchids (orchis simian) and a diverse range of ages of yew (*Taxus baccata.)*

Natural woodland dynamics are allowed to prevail over a significant proportion of Hartslock Wood. The conservation objectives state that the yew should remain at least frequent in the canopy, for it to stay favourable. Whilst some natural regeneration of yew is occurring, it is not clear how the wood will develop and whether yew will retain dominance in the canopy. The yew on site often exhibits strong indications of chlorosis (yellowing). It is not known whether this is a natural consequence of stress relating to the strongly calcareous soil conditions or a result of some other factor such as aerial pollution. However, the wood is not currently considered to be under any significant threat.

Woodland management is supported financially by a WGS scheme, which promotes retention of yew and removal of non-native tree species.
The grassland area of the site is generally well managed as a nature reserve by the Buckinghamshire, Berkshire & Oxfordshire Wildlife Trust. Without sustained grazing the site would quickly become covered with scrub.

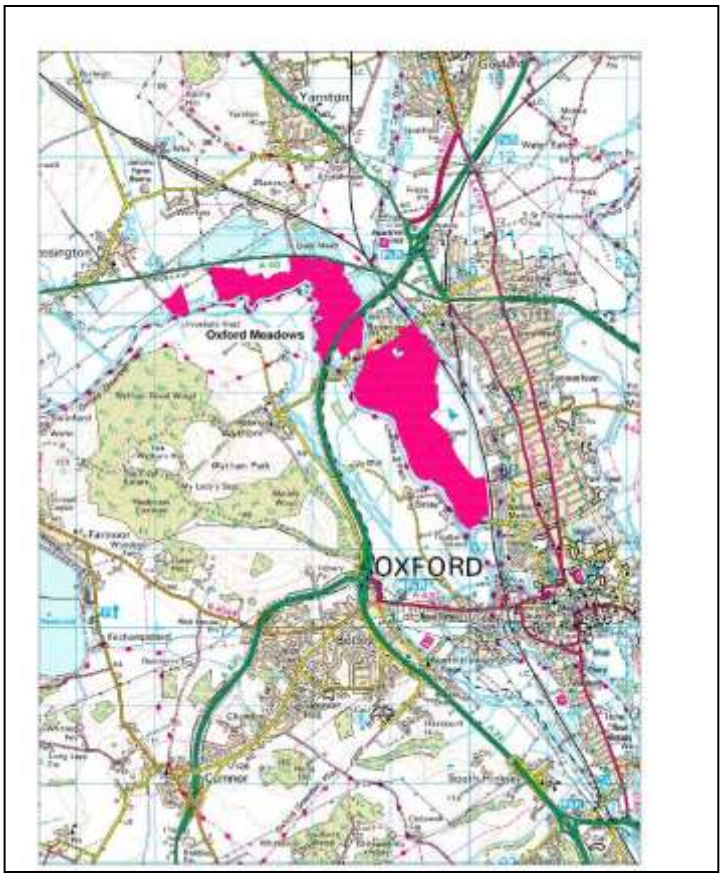
Little Wittenham

Triturus cristatus (Great crested newts) for which this is considered to be one of the best areas in the United Kingdom.

Little Wittenham is managed primarily for nature conservation and environmental education. The great crested newt population has been the subject of intensive research and ongoing management includes the provision of new ponds and the creation of hibernation sites. The great crested newt population appears to be relatively stable and is not considered to be under any known threat.

Source: OCC

Oxford Meadows



Source: http://data.nbn.org.uk/siteInfo/siteSpeciesGroups.jsp?useIntersects=1&allDs=1&engOrd=1&srcKey=UK0012845&srcDsKey=GA000327

Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) for which this is considered to be one of the best areas in the United Kingdom.
The area supports the protected species *Apium repens* (creeping marshwort*)* for which this is the only known locality in the United Kingdom. *Apium repens* is only a designated feature in Port Meadows, and Wolvercote Common and Green.

The special interest of the site is critically dependent upon groundwater levels and annual flooding, and the site is very sensitive to changes in groundwater levels. Several of the component parts are dependent upon traditional hay-cutting and aftermath grazing. HLS payments provide financial support for this management.

Port Meadow is registered Common Land with common grazing rights administered by the Freemen of Oxford and Wolvercote Commoners' Committee. Stocking levels are high and grazing takes place throughout the year. The impact of this high grazing pressure upon *Apium repens* is under investigation as part of a wider programme of research into the ecology of the species. At present, it is thought that *A. repens* is tolerant is not dependent upon this management regime. Groundwater levels and flooding events on Port Meadows are monitored, as is the distribution of *A. repens* on the site.

The HRA of the Draft South East Plan[25] concluded that there were a number of possible impacts 'for which it was not possible to conclude' that there would be 'no adverse effect' on the Oxford Meadows SAC due to developments under the South East Plan, either alone or in combination with other plans or projects. These are:

- Increased water abstraction;

- Increased effluent discharge;

- Reduced air quality;

The report noted that further assessment of implications of future extraction on the Oxford Meadows SAC is required. If this assessment concludes that further extraction could lead to significant 'in combination' effects on the SAC's integrity and there are no other viable options for alternative aggregate extraction within Oxfordshire, a review of Oxfordshire primary aggregate allocation may be required.

In their report on appropriate assessment of the impacts of the proposed Bicester to Oxford rail improvements project[26], ERM addressed the issue of air pollution on Oxford Meadows. They noted that:

- At present, vehicle emissions contribute 13% of nitrogen emissions
- The effect of nitrogen deposition needs to be balanced against the management regime
- The meadow is in favourable condition due to intensive grazing and flooding
- Livestock which graze the site are the greatest source of aerial nitrogen deposition (37%)through the deposition of ammonia
- The hay meadow and *apium repens* are not negatively affected by the high level of nitrogen, indeed *apium repens* is associated with areas trampled by cattle and horses and has a preference for habitats which are nitrogen rich. It is unlikely therefore that the contribution of vehicle emissions from mineral lorries will have an impact on Oxford Meadows. However, further work on the potential hydrological impacts should be undertaken.

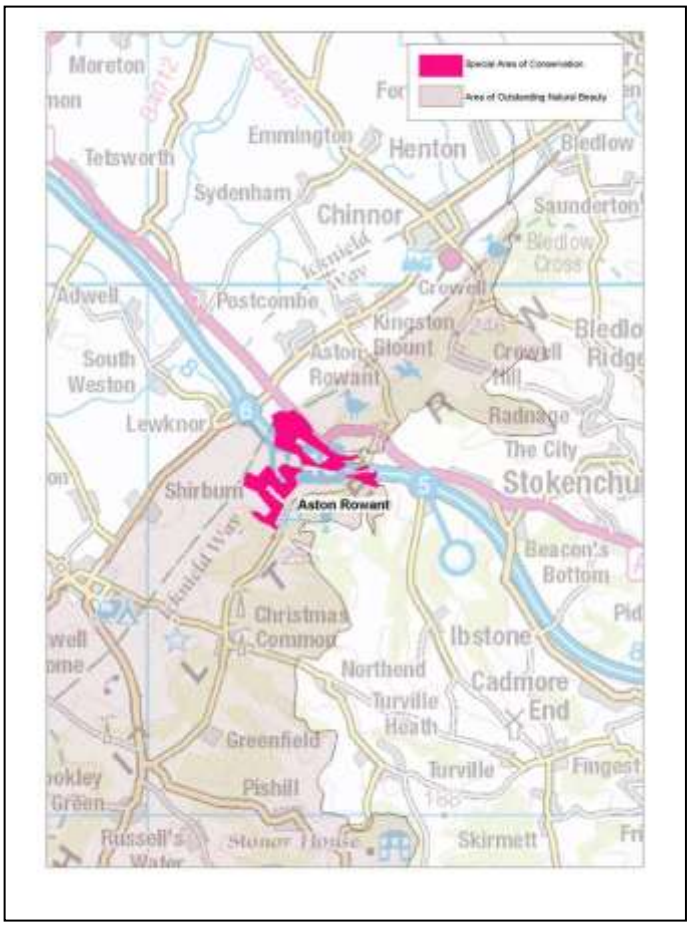
[25] Scott Wilson, Levett-Therivel (2009) Regional Spatial Strategy for the South East: Sustainability Appraisal and Habitats Regulations Assessment/ Appropriate Assessment of the Secretary of State's Final Revisions

[26] ERM (2010) The Chiltern Railways (Bicester to Oxford Improvement Order) Proof of Evidence of Andy Coates, Terrestrial Ecology

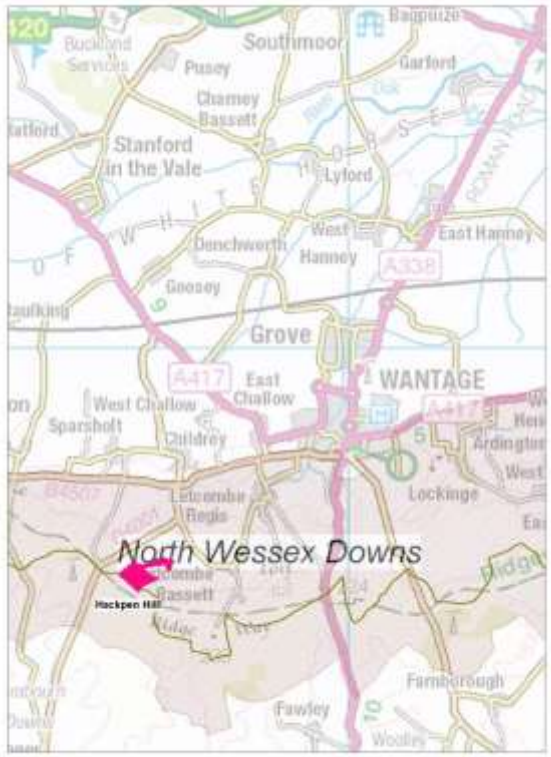
Aston Rowant

Aston Rowant is designated primarily for its *Juniperus communis* formations on heaths or calcareous grasslands, together with a qualifying feature *Asperulo-fagetum* beech forests for which the area is considered to support a significant presence. Aston Rowant is one of the best remaining examples in the UK of lowland and juniper scrub on chalk substrate. The conservation objectives for the site are to maintain the *juniperus communis* and *asperulo-fagetum* beech forests in favourable condition.

95% of the site is designated a National Nature reserve, which is under direct control of Natural England. However, despite controlled grazing and shrub management, the juniper population at Aston Rowant is declining because of a low rate of reproduction. A management strategy to protect existing plants, to promote reproduction and to protect young plants is being actively pursued.



Hackpen Hill



Source: OCC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia)* for which the area is considered to support a significant presence. The herb flora includes a significant population of early gentian *Gentianella anglica*, as well as autumn gentian *Gentianella amarella*, fragrant orchid *Gymnadenia conopsea*, frog orchid *Coeloglossum viride*, horseshoe vetch *Hippocrepis comosa*, common rock-rose *Helianthemum nummularium* and dwarf thistle *Cirsium acaule*

A grazing regime is supported financially by a Natural England management agreement. The site is subject to periodic damage by rapid fluctuations in rabbit numbers. Investigation is currently underway to find a means to reduce the threat.

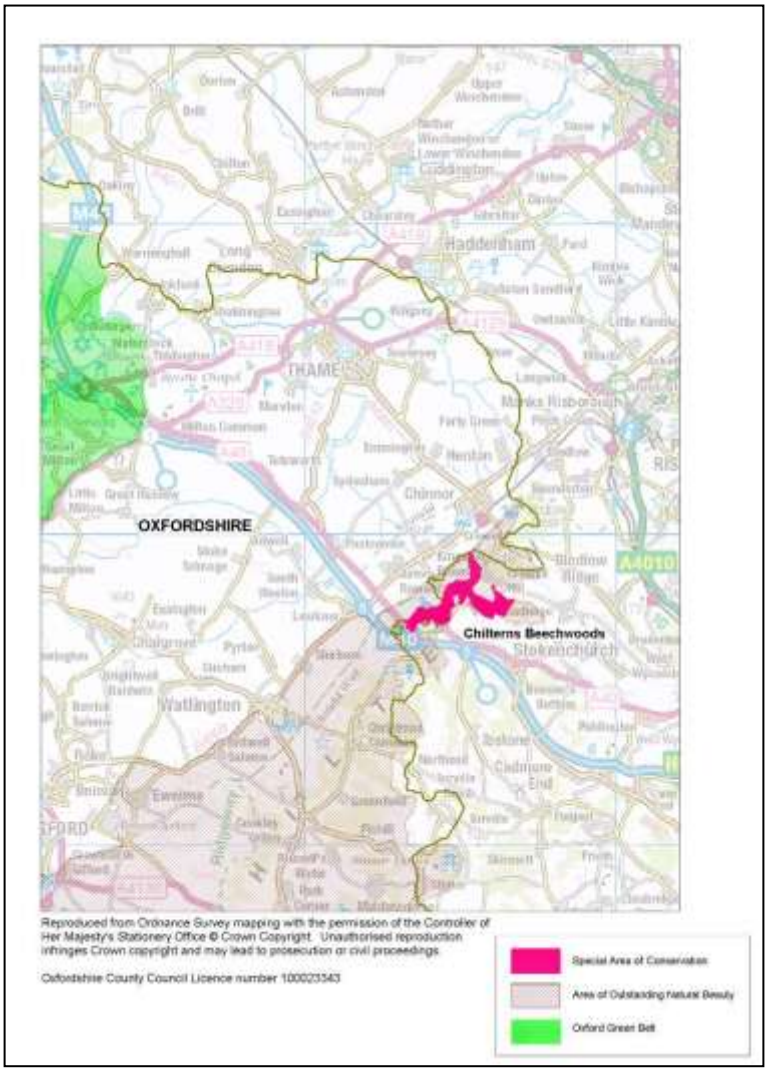
Cothill Fen

Source: OCC

Cothill Fen is designated for its alkaline Fens, for which this is considered to be one of the best areas in the UK, and for the alluvial forests, with *Alnus glutinosa and fraximus excelsior* for which the area is considered to support a significant presence.

The open fen habitats on the site have suffered from the effects of successional change as a result of cessation of traditional management (grazing and peat cutting). Parts of the site have become dominated by reed, scrub or *molinia* and only relatively small areas of species-rich short fen remain. Natural England and the Berks, Bucks and Oxon Wildlife Trust have now acquired the site to gain management control. Management initiatives include reed cutting and scrub removal to increase area and diversity of the short fen habitat and to improve habitat suitability for southern damselfly.

Chiltern Beechwoods



Source: http://data.nbn.org.uk/siteInfo/siteSpeciesGroups.jsp?useIntersects=1&allDs=1&engOrd=1&srcKey=UK0012724&srcDsKey=GA000327

The Chilterns Beechwoods SAC comprises several land parcels across Buckinghamshire and Hertfordshire, all of which are also designated as SSSIs. The SAC is designated primarily for its *Asperulo-Fagetum* beech forests for which this is considered to be one of the best areas in the United Kingdom. It also has one qualifying Annex I habitat (Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) for which the area is considered to support a significant presence and one qualifying Annex II species (stag beetle, *Lucanus cervus.)*

There are 5 component SSSIs, each of which has its own conservation objectives for the European interests.

The conservation objectives are to maintain in a favourable condition: in Ashridge Commons and Woods SSSI broadleaved mixed and yew woodland; in

Ellesborough and Kimble Warrens *asperulo-fagetum* beechwoods and semi-natural dry grassland and scrubland facies on calcareous substrates (*festuco-brometalia);*

The majority of beechwoods in the Chilterns are very uniform in terms of age-class and species composition, as a result of historical promotion of beech as a timber tree. Significant changes to the structural and species diversity of these woods are required in order to promote a more natural composition.

Beech woodland in the Chilterns is currently facing a decline due to very low market value for timber and damage to young trees by grey squirrels. The availability of financial support through the Woodland Grant Scheme goes some way in helping to address this issue but it is not clear whether this offers sufficient incentive to woodland managers to continue to manage in ways which will promote an increase in structural and species diversity of the characteristic beechwood communities. In particular, there may be a lack of sufficient financial support to provide for the retention of a larger proportion of mature trees in order to increase the provision of dead-wood habitat. This latter issue is the subject of a joint national review by Natural England and the Forestry Commission.