

10.0 ECOLOGY

Introduction

- 10.1 This Chapter provides a summary of the Ecological Impact Assessment (EclA) conducted as part of the wider EIA process in respect of the proposed development of an Energy from Waste (EfW) facility at Ardley Quarry, Ardley, Oxfordshire.
- 10.2 The EclA can be considered as having three main purposes:
- to provide an objective and transparent assessment of the ecological effects of a proposed development or activity;
 - to permit objective and transparent determination of the consequences of the proposals in terms of national, regional and local policies relevant to nature conservation; and
 - to demonstrate that a proposed development or activity will meet the legal requirements relating to habitats and species.
- 10.3 This EclA follows a standard approach based upon the description of the existing baseline conditions within the application site; an evaluation of the habitats and species present within the application site; the identification of potential ecological effects of the proposed EfW development; and an assessment of the likely significance of identified impacts on the valued ecological receptors (VERs). Where a significant negative impact has been identified, suitable mitigation measures to prevent, reduce or offset the level of impact are provided with any residual effects, following the implementation of mitigation and enhancement measures, identified and assessed.

Legislative and Policy Context

- 10.4 This section summarises the key legislation and policies relevant to ecology and nature conservation.

Legislation

- 10.5 The key wildlife legislation underpinning the conservation of habitats and species are summarised below:
- **The Wildlife and Countryside Act 1981 (as amended).** The Wildlife and Countryside Act 1981 is the primary legislation in Great Britain for the protection of flora, fauna and the countryside. This legislation is the means by which the 'Bern Convention' and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/EEC) are implemented in Great Britain. The Act also empowers Natural England to protect habitats of national importance through the statutory designation of Sites of Special Scientific Interest (SSSIs) for features of interest.
 - **The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).** The Conservation (Natural Habitats, &c.) Regulations 1994 transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national

law and provides for the designation and protection of 'European sites' including Special Areas of Conservation (SAC) and Special Protection Area (SPA), the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. The regulations introduce a review procedure for plans and projects likely to significantly affect a European site, and licensing requirements for developments that may affect a European protected species for example, bats, otter and great crested newt. In 2007, an amendment to the regulations increased the legal protection given to protected species in England and Wales and removed the exemption from an offence if 'actions were an incidental result of a lawful operation and could not reasonably have been avoided'.

- **Protection of Badgers Act 1992.** Badgers are protected under the Protection of Badgers Act 1992 making it an offence to knowingly kill, capture, disturb or injure and individual animal or intentionally damage, destroy or obstruct an area used for breeding, resting or shelter. A licence is required for heavy machinery work within 30m, light machinery work within 20m and had digging within 10m of a badger sett.

Planning Policies

10.6 Nationally, the Government's commitment to sustainable development and conserving the diversity of wildlife is set out in a number of Planning Policy Guidance (PPG)/Planning Policy Statement (PPS) Notes that include PPS9: Biodiversity and Geological Conservation. In addition, the UK Biodiversity Action Plan (UK BAP) identifies habitats and species on a UK wide basis that require special consideration for protection, enhancement and expansion. These are summarised below:

- **Planning Policy Statement 9 (PPS9): Biodiversity and Geological Conservation.** PPS9: Biodiversity and Geological Conservation was published in August 2005 and is accompanied by Government Circular 06/05: Biodiversity and Geological Conservation which covers relevant legislative provisions at the international and national level that can impact on planning decisions affecting biodiversity and geological conservation issues, and Good Practice Guidance. PPS9 sets out the Government's broad policy objectives in relation to the protection of biodiversity and geological conservation in England through the planning system, and its proposed planning policies that will help deliver these objectives. These policies reflect statutory obligations for nature conservation.
- **UK and Local Biodiversity Action Plans.** The UK, along with 150 other countries, signed up to the Convention on Biological Diversity in 1992, during the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The aims of the plan are: "To conserve and enhance biological diversity within the UK, and to contribute to the conservation of global biodiversity through all appropriate mechanisms ". The UK BAP identifies a number of Priority Habitats and Species and outlines UK Habitat Action Plans (HAPs) and Species Action Plans (SAPs) to conserve them. To implement the UK BAP, a number of Local Biodiversity Action Plans (LBAPs) have been

produced including the Oxfordshire BAP. This plan implements individual HAPs and SAPs at the local level.

- 10.7 A number of regional and local policies relating to the protection and enhancement of the natural environment, are contained in the South East Regional Spatial Strategy (March 2006), Oxfordshire Structure Plan 2016 (adopted October 2005) and Cherwell District Local Plan (adopted November 1996). The policies relevant to ecology and nature conservation are summarised in Table 10-1.

Table 10- 1: Summary of Local Planning Policies Relating to Nature Conservation

Policy Area	South East Regional Spatial Strategy	Oxfordshire Structure Plan	Cherwell District Local Plan
Protection and enhancement of the countryside	NRM4	G5	C3, C4
Protection of nature conservation sites	NRM 4	EN2	C1
Protection of semi-natural habitats	NRM4	EN2	Env9
Protection of trees, hedgerows and woodlands	NRM5	-	C14
Protection of species	NRM4	EN2	C2

Methodology

- 10.8 Baseline ecological data was collated through a combination of desk-based study and field survey undertaken by ecologists from SLR, Biocensus and Graeme Smart Limited.

Scope of Works

- 10.9 The scope of works was defined through a combination of consultation, best practice and from preliminary desk-based studies and site visits undertaken during the pre-assessment stage.

Desk-based Study

- 10.10 A preliminary desk-based study was undertaken and involved collating data from a number of organisations and examining published data relating to Ardley Quarry and in a defined study area centred on this site. Data included information on statutory and non-statutory nature conservation sites within a 10km radius of the site a distance considered appropriate with respect to the controls required by the Waste Incineration Directive for aerial deposition) as well as records for protected and notable species within a 2km radius of the site (National Grid Reference SP543253).
- 10.11 Data sources used in the collection of ecological data included:
- Multi-agency Geographic Information for the Countryside (MAGIC) (www.magic.gov.uk);
 - National Biodiversity Network (NBN) (www.nbn.org.uk);
 - Natural England (www.naturalengland.org.uk);

- Oxfordshire Biodiversity Action Plan;
- Thames Valley Environmental Records Centre (TVERC);
- UK Biodiversity Action Plan (www.ukbap.org.uk).

Field Surveys

10.12 The scope of ecological surveys was defined on the basis of known and the potential ecological interest within the application site and best practice. These surveys included:

- an extended Phase 1 Habitat Survey;
- breeding bird survey;
- great crested newt survey; and
- reptile survey and reptile mitigation strategy.

Over and above the surveys detailed above it was deemed that no other specialist surveys were necessary in respect of the habitats present on site and their potential to support protected species.

Extended Phase 1 Habitat Survey

10.13 An extended Phase 1 Habitat Survey was carried out at the site of the proposed EfW and the immediate surrounding area on 9 June 2008 by a senior ecologist from SLR. The survey was conducted following a standard methodology¹ and involved the production of a map of the habitats present using colour codes and target notes (TN) to describe any feature of particular ecological interest. This survey method was extended to include the recording of additional information on habitats and species, including any evidence for the presence of, or potential presence of, statutory protected species, other species of conservation concern, or any other features of note and that may require mitigation or ecologically sensitive design of the proposed development.

10.14 The remainder of the site is either active or restored landfill. The areas of restored landfill would not be affected by the proposed development and the existing areas of active landfill on the site will continue as active landfill. These active areas have not been surveyed as they are not considered to be of any ecological value. The focus of the ecological assessment has therefore been on the part of the site which has not yet been landfilled and where the EfW has been located.

10.15 Whilst not a full botanical or protected species survey, the extended Phase 1 Habitat Survey enables experienced ecologists to obtain an understanding of the ecology of a site such that it is possible to:

- confirm the nature conservation significance of a site, and assess whether the potential for impacts on habitats/species is likely to represent a material consideration in planning terms; or

¹ Nature Conservancy Council (1990). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit, 2003 reprint*. JNCC, Peterborough.

- establish the scope and extent of any additional specialist ecological surveys that will be required before such a confirmation can be made.

Breeding Bird Survey (SEE APPENDIX 10/1 VOLUME 4).

- 10.16 A breeding bird survey was undertaken at the proposed EfW site between April to July 2008 by Biocensus. The methodology used was closely based on that adopted by the British Trust for Ornithology (BTO) Common Bird Census and Breeding Bird Survey.
- 10.17 A series of easily repeatable circuits of the site were walked in order to provide full coverage of the survey area. A total of six visits were made to the survey area to ensure that any difference in the breeding season between species was accounted for. All survey work was conducted at dawn to encompass the period of highest bird activity in order to increase the probability of detecting breeding bird species present on the site.

Great Crested Newt Survey (SEE APPENDIX 10/2 VOLUME 4).

- 10.18 The application site currently lies within an area that is subject to an approved and licensed on-going mitigation strategy for great crested newt as part of the planned expansion of landfill operations. As part of this strategy, great crested newt are regularly monitored and areas within the site are subject to a programme of exclusion, capture and release into newly created habitat on areas of restored landfill. Once these areas have been cleared of great crested newt they are released for landfill operations.
- 10.19 As part of the on-going mitigation the great crested newt population is being continuously monitored by the licence holder Graeme Smart. However, in respect of this proposed development further survey work was undertaken on a total of 26 ponds. A total of six visits were made to each of the ponds during the period March to June 2008 and appropriate survey techniques including bottle-trapping, sweep netting and/or nocturnal torch survey were used to provide population size class assessment for each waterbody and for the survey area.

Reptile Survey and Mitigation Strategy (SEE APPENDIX 10/3 VOLUME 4).

- 10.20 A reptile survey was carried during 2008 by Graeme Smart Ltd. The survey involved the placing of approximately 180 artificial refugia throughout the parts of the survey area, not previously cleared as part of the great crested newt mitigation, in late May 2008.
- 10.21 The refuges were left in situ before being checked for their use by reptiles starting in July 2008. A total of six visits were carried out and the survey was completed in October 2008. A Reptile Mitigation Strategy was published in February 2009 and is attached in Appendix 10/4 of Volume 4.

Uncertainty of Data and Limitations

- 10.22 The extended Phase 1 Habitat Survey was conducted in June, which is considered to be an optimum time to undertake such surveys and it is

considered that the survey results are representative of the habitats within the site, and include the dominant and characteristic species of flora.

- 10.23 The lack of evidence of any one particular protected species does not necessarily preclude its presence at the site either at this current time or in the future. It is considered however, that the timing of the extended Phase 1 Habitat Survey was suitable for protected species and their habitat-based assessment, as most species would have been active during this time and provided evidence of their presence.
- 10.24 The above limitations are considered to be minor, and it is unlikely that additional survey of the site would materially alter the conclusions of this EclA, based on the layout of the development as currently proposed.

Assessment Methodology

Evaluation

- 10.25 The ecological features, identified through the desk-based study and field survey, were given a value based on a geographic context. Ecological features are defined as:
- statutory protected (i.e. Natura 2000 sites, SSSI, National Nature Reserve) or non-statutory locally designated (i.e. County Wildlife Sites) sites and features;
 - sites, habitats and features of recognised biodiversity value but not designated as detailed above (i.e. areas listed on published inventories of priority habitats such as the ancient woodland inventory and lowland grassland inventory) or areas of habitats subject to an UK HAP or Local HAP; and
 - species protected or controlled by law or of biodiversity value or significance including Species of Conservation Concern; and UK SAP and Local SAP species.

Assessment of Impacts

- 10.26 The assessment of potential ecological impacts has been carried out using the guidelines published by the Institute of Ecology and Environmental Management (IEEM)² and can be summarised as:
- the identification of the range of potential impacts that may arise from the proposed development;
 - the consideration of the systems and processes in place to avoid, reduce and mitigate the possible effects of these impacts;
 - the identification of opportunities for ecological enhancement within the proposed development;
 - an assessment of the residual impacts, following consideration for the implementation of avoidance, mitigation and enhancement measures; and
 - where necessary the identification of compensation required to offset any residual effects.

² Institute of Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*.

- 10.27 Where a potential impact has been identified, mitigation measures have been formulated using best practice techniques and guidance to prevent, reduce or offset a significant effect.
- 10.28 Impacts are defined as being negative, neutral or positive. The term significant is independent of the value of the receptor. A significant impact is defined as an impact on the integrity of a defined ecosystem and/or the conservation status of habitat or species within a given geographical area.

Ecological Baseline Conditions

- 10.29 The site is an active waste management facility approximately 1km south of the village of Ardley, Oxfordshire and lies within a semi-rural setting, to the west of the M40 Motorway. The site is bounded to the north by the Banbury to High Wycombe main railway line, to the east by the Gagle Brook, to the south by arable land and to the west by the B430 road.
- 10.30 The site consists of areas of restored landfill, active landfill and areas awaiting landfill with the associated offices, recycling centre and leachate and landfill gas management facilities located in the top north western corner of the site proposed EfW facility will be situated in the southeast corner of the quarry site (survey area) in an area that consists of quarry spoil heaps with typically steep slopes that give this area an undulating topography.
- 10.31 In the south of the survey area is a large ponded area that receives large quantities of surface water run-off from the landfill site and which has its drainage impeded by the near vertical walls of the former quarry running along the southern boundary and by a large spoil heap to the east. A line of small ponds extend northwards from the large ponded area cutting through the central parts of the survey area.
- 10.32 Immediately west of the survey area is the active landfill site. This area includes a large area recently cleared in preparation for the construction of new landfill cells as well as active cells and is considered to have no ecological value.
- 10.33 Since the cessation of quarrying operations the survey area has been largely left undisturbed with the exception of some remedial restoration works. Today, the site is dominated by habitats typical of post-mineral abstraction that form a mosaic of bare substrates, ephemeral and tall ruderal vegetation, rank grassland, scrub development and areas of open standing water. It is important to note that most of the survey area has been earmarked for landfill with some areas already in the process of being readied for this purpose.

Nature Conservation Sites

Statutory Designated Nature Conservation Sites

- 10.34 The application site does not currently have any statutory nature conservation designation and Natural England have confirmed that they do not intend to designate the existing landfill site as a SSSI.

- 10.35 There are no international statutory designated nature conservation sites (i.e. SPA, SAC and Ramsar Site) within a 15km radius of the site. The closest international site is Oxford Meadows SAC lying approximately 18km to the southwest and outside in respect to the controls required by the Waste Incineration Directive for aerial deposition
- 10.36 Within a 10km radius of the site there are ten SSSIs (five biological SSSIs and five geological SSSIs) and three Local Nature Reserves (LNRs). Details of these sites are presented in Table 10-2 and their locations shown on Drawing 10/1.

Table 10- 2: Statutory Designated Nature Conservation Sites

Site	Conservation Interest	Approximate distance and direction from Ardley Quarry
Nationally Designated Nature Conservation Sites:		
Ardley Cutting and Quarry SSSI	Geological interest for its Jurassic rocks and has biological interest associated with limestone grassland.	0.8km North at closest point
Stratton Audley Quarries SSSI	Geological interest for studying facies changes which occur in the upper part of the White Limestone and in the Forest Marble formations.	5.8km East
Bestmoor SSSI	Semi-improved floodplain meadow adjacent to the River Cherwell that supports one of the largest known British populations of the increasingly rare narrow-leaved water-dropwort (<i>Oenanthe silaifolia</i>).	6.1km Northwest
Weston Fen SSSI	A small, species-rich calcareous fen bordering a fast-flowing stream with willow carr, hazel woodland, limestone grassland and marshy grassland habitats. The site is of interest for its flowering plant communities associated with wetland habitats and for its invertebrate fauna.	6.4km South
Kirtlington Quarry SSSI	Geological interest in that is one of only five sites in the work to yield Middle-Jurassic mammal fossils.	7.8km Southwest
Horsehay Quarries SSSI	Geological importance for its rock section of the Middle Jurassic that includes the best exposure of the 'White-Sands' facies of north Oxfordshire	8.4km West
Wendlebury Meads and Mansmoor Closes SSSI	A series of traditionally managed unimproved neutral meadows supporting a complex variety of plant communities and are amongst the few surviving examples of calcareous clay pasture communities which were once widespread throughout southern England.	8.5km South
Middle Barton Fen SSSI	Represents the most extensive example of calcareous fen-meadow currently known in Oxfordshire and forms the largest remaining area of species-rich fen habitat outside East Anglia and North Wales.	9.7km West
Arcott Bridge Meadows SSSI	Old, unimproved neutral grassland managed for hay meadow and pasture lying on the floodplain of the River Ray.	9.9km Southeast
Shipton-on Cherwell and Whitehill Farm Quarries SSSI	Geological interest for its exposed sections of White Limestone and is one of the most important sections in Oxfordshire for displaying the typical local Mid to Upper Bathonian lithostratigraphic succession.	9.9km Southwest
Locally Designated Nature Conservation Sites:		
Bure Park LNR	An urban park in the centre of Bicester.	3.9km Southeast
Crecy Hill LNR	A steep bank of limestone grassland with associated	7.7km Southwest

Kirtlington Quarry LNR	limestone flora and invertebrate fauna. Part of the Kirtlington Quarry SSSI as detailed previously.	7.8km Southwest
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10.37 The geological SSSIs detailed previously are not considered further in this Chapter due to the fact that these geological sites and have not been notified for their biological interest. The exception is of Ardley Cutting and Quarry SSSI that has some biological interest.

Non-Statutory Designated Nature Conservation Sites

10.38 Ardley Quarry and the site of the proposed development do not have any non-statutory nature conservation designations. There are however a number of non-statutory site within a 2km radius of the application site including three County Wildlife Sites (CWS); two nature reserves; and three woodlands listed on the Ancient Woodland Inventory. Details of these sites are presented in Table 10-3.

Table 10- 3: Non-Statutory Designated Nature Conservation Sites

Site	Conservation Interest	Approximate distance and direction from Ardley Quarry
County Wildlife Sites:		
Trow Pool	Two shallow ponds surrounding by woodland, scrub and tall herb and grassland. The ponds support a species-rich aquatic and marginal plant community.	0.5km Southeast
Stoke Wood	Woodland managed by the Woodland Trust	1.7km Northeast
RAF Upper Heyford Airfield	Large area of limestone grassland some of which is species-rich with several notable species. The site also supports a diverse assemblage of bird and butterfly species.	2.0km Northwest
Other Nature Reserves:		
Road Verge Nature Reserve	A road verge and lay-by with recognised botanical interest on the western side of the B430.	0.5km South
Ardley Quarry	A Wildlife Trust managed reserve with recognised butterfly interest.	1.2km North
Ancient Woodland:		
Stoke Wood	Plantation Ancient Woodland Site	1.7km Northeast
Un-named Woodland	Ancient Semi-Natural Woodland	1.8km Southeast
Un-named Woodland	Ancient Semi-Natural Woodland	2.0km Northwest

Habitats

10.39 The survey site is a mosaic of different habitat types that are comprised of six broad habitat types including: bare substrates; ephemeral/short perennial vegetation; tall ruderal vegetation; tall rank grassland; scrub; and areas of open standing water. Drawing 11/2 shows the locations and extent of the habitats recorded along with the location of associated TN. Each TN is described in detail in Table 10-4.

10.40 The following habitats, in order of area of coverage from high to low, are present within the application site:

- ephemeral/short perennial vegetation;
 - bare substrate;
 - tall rank grassland;
 - tall ruderal vegetation;
 - open standing water;
 - scrub;
 - marginal and inundation vegetation; and
 - woodland plantation.
- 10.41 The majority of the land within the area consists of former quarry spoil heaps of bare substrate consisting of poor soils and rock that have become colonised typically by relatively sparse and scattered ephemeral/short perennial plants (TN1, TN3, TN5, TN10, TN17, TN28 and TN30).
- 10.42 Along the eastern edge of the site and on older spoil heaps species-poor tall rank grassland (TN11, TN12 and TN13) and tall ruderal vegetation (TN15 and TN16) communities have developed along with varying amounts of some scrub development (TN14).
- 10.43 In the southeast corner of the site, where surface water-run off collects, a large expanse of open standing water has formed (TN2 and TN9) providing habitat for a number of wetland birds. Along its northern edge is a small fringe of wetland habitat lying between large spoil heaps consisting of dense willow carr (TN6) along with some marginal and inundation communities (TN4, TN7 and TN8).
- 10.44 Extending northwards from the large pond are a series of smaller well vegetated ponds that run through the central part of the application site (TN21 to TN27 inclusive and TN29) that have formed in depressions left over from former quarrying operations and between large spoil heaps.
- 10.45 In the north of the survey area are a further three ponds including a large pond (TN20) that provides surface water attenuation for run-off from the landfill and two smaller ponds (TN18 and TN19) along the northern boundary.
- 10.46 The area west of the EfW is active landfill and consists of an active landfill cell and a newly constructed cell surrounding by bare substrates, which is not considered to be of any ecological value and has therefore not been surveyed.
- 10.47 Adjacent to the B430, where the access to the EfW facility is proposed, there is a narrow grassland dominated verge (TN33), a strip of woodland plantation (TN32) that shields the landfill from the road and a small strip of grassland (TN31) that has developed on an access route around the top of the landfill.

Table 10- 4: Target Notes

TN	Description
1	A relatively flat area of cleared ground lying between the large body of open standing water to the east, the near-vertical wall of the former quarry to the south and galvanised steel herpetofauna-proof fencing erected as part of on-going great crested newt mitigation running to the west and north respectively beyond which is the active landfill. This area is becoming colonised by ephemeral/short perennial plants that are spread

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TN	Description
	<p>sparingly over the bare substrates. Species present include the grasses: creeping bent (<i>Agrostis stolonifera</i>), red fescue (<i>Festuca rubra</i> agg.), Yorkshire fog (<i>Holcus lanatus</i>), perennial rye-grass (<i>Lolium perenne</i>) annual meadow-grass (<i>Poa annua</i>), and rat's-tail fescue (<i>Vulpia myuros</i>), along with the herbs of thyme-leaved sandwort (<i>Arenaria serpyllifolia</i>), great willowherb (<i>Epilobium hirsutum</i>), rosebay willowherb (<i>Chamerion angustifolium</i>), creeping thistle (<i>Cirsium arvense</i>), spear thistle (<i>Cirsium vulgare</i>), teasel (<i>Dipsacus fullonum</i>), cut-leaved crane's-bill (<i>Geranium dissectum</i>), black medick (<i>Medicago lupulina</i>), bristly oxtongue (<i>Picris echioides</i>), ribwort plantain (<i>Plantago lanceolata</i>), greater plantain (<i>Plantago major</i>), wild mignorette (<i>Reseda lutea</i>), bramble (<i>Rubus fruticosus</i> agg.), broad-leaved dock (<i>Rumex obtusifolius</i>), ragwort (<i>Senecio jacobaea</i>), groundsel (<i>Senecio vulgaris</i>), colts-foot (<i>Tussilago farfara</i>), scentless mayweed (<i>Tripleurospermum inodorum</i>) and field pansy (<i>Viola arvensis</i>).</p> <p>Goat willow (<i>Salix caprea</i>) self seeded scrub (up to 50cm high) is beginning to develop across the site.</p>
2	<p>A relatively large area of eutrophic open standing water that receives large quantities of surface water drainage from the landfill site and experiences wide ranges of fluctuating water levels. The pond has very high near-vertical banks of bare stone along its eastern and southern edges with a wide drawdown zone on the gently sloping areas to the west and north. As far as could be determined the pond supports no aquatic flora with the exception of green algae but does provide habitat for a large number of gulls and various waterfowl along with a large population of stickleback.</p>
3	<p>A small earth bank, running behind a section of galvanised steel herpetofauna-proof fencing and a small ditch that discharges into the large waterbody (TN2). The bank supports an ephemeral/short perennial community similar to TN1 but is more developed with a greater abundance of grasses and herbs.</p> <p>The graminoid species include creeping bent, cock's-foot (<i>Dactylis glomerata</i>), common couch (<i>Elymus repens</i>), red fescue, Yorkshire fog, perennial rye-grass and hard rush (<i>Juncus inflexus</i>).</p> <p>Other plants growing on the bank were common centaury (<i>Centaureum erythraea</i>), common mouse-ear (<i>Cerastium fontanum</i>), creeping thistle, teasel, great willowherb, cats-ear (<i>Hypochaeris radicata</i>), common bird's-foot trefoil (<i>Lotus corniculatus</i>), black medick, field forget-me-not (<i>Myosotis arvensis</i>), ribwort plantain, greater plantain, creeping buttercup (<i>Ranunculus repens</i>), curled dock (<i>Rumex crispus</i>) ragwort, red clover (<i>Trifolium pratense</i>), white clover (<i>Trifolium repens</i>) and colt's-foot.</p>
4	<p>A small shallow drain that conveys surface water run-off from the landfill site to the large waterbody (TN2). Included in the target note is the vegetation growing on the left bank and a small strip of grassland habitat that extends from the top of this bank to a section of galvanised steel herpetofauna-proof fencing beyond which are former quarry spoils heaps.</p> <p>The channel is densely vegetated with creeping bent, great willowherb, soft rush (<i>Juncus effusus</i>), hard rush, common reed (<i>Phragmites australis</i>), creeping buttercup, celery-leaved buttercup (<i>Ranunculus sceleratus</i>), Watercress (<i>Rorippa nasturtium-aquaticum</i> agg.), curled dock and reedmace (<i>Typha latifolia</i>) and the species composition reflects that this watercourse is periodically dry.</p> <p>The left bank and adjacent grassland strip is dominated by creeping bent with false oat-grass (<i>Arrhenatherum elatius</i>), common centaury, creeping thistle, cock's-foot, tufted hair-grass (<i>Deschampsia cespitosa</i>), teasel, great willowherb, field horsetail (<i>Equisetum arvense</i>), Yorkshire fog, cut-leaved crane's-bill, cat's-ear, soft rush, blunt-flowered rush (<i>Juncus subnodulosus</i>), black medick, ribbed melioid (<i>Melilotus officinalis</i>), greater plantain, rough meadow-grass (<i>Poa trivialis</i>) and white clover.</p> <p>Some willow development of white willow (<i>Salix alba</i>) and goat willow is present in the channel and on the bank.</p>
5	<p>A relatively large area of high piled quarry spoil, fenced off with herpetofauna-proof fencing, that has approximately 60% bare substrate and some colonisation of scattered ephemeral/short perennial plants that include the grasses species meadow foxtail (<i>Alopecurus pratensis</i>), wild oat (<i>Avena fatua</i>) and cock's-foot along with other typical species that include cow parsley (<i>Anthriscus sylvestris</i>), common centaury, creeping thistle,</p>

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TN	Description
	<p>spear thistle, teasel, field horse-tail, herb Robert (<i>Geranium robertianum</i>), common bird's-foot trefoil, black medick, ribbed melilot, field forget-me not, common poppy (<i>Papaver rhoeas</i>), bristly oxtongue, wild mignorette, greater plantain, creeping buttercup, broad-leaved dock, water figwort (<i>Scrophularia auriculata</i>), ragwort, red campion (<i>Silene dioica</i>), white campion (<i>Silene latifolia</i>), prickly sow-thistle (<i>Sonchus asper</i>), Dandelion (<i>Taraxacum officinale</i> agg.), white clover, scentless mayweed and field pansy.</p> <p>This are of spoil is due to be removed and used for landfill operations during summer 2008.</p>
6	<p>A patch of dense goat willow dominated scrub (2 to 2.5m high) with some white willow also present growing in an area periodically inundated from TN2. Ground vegetation is restricted to the extreme edges of the scrub where light can penetrate the dense canopy and includes the many of the species recorded in TN4.</p>
7	<p>A small shallow depression periodically inundated and dominated by common spike-rush with creeping bent, false fox-sedge, hard rush, gypsywort (<i>Lycopus europaeus</i>), water mint (<i>Mentha aquatica</i>) and silverweed some willow encroachment around the edges from TN6.</p>
8	<p>An area of marginal vegetation dominated by reedmace on the northern shore of TN2 and forming a patch of dense vegetation between the open standing water and willow carr.</p>
9	<p>A small arm of TN2 that during periods of drawdown becomes a separate pond and will eventually dry out with on small patches of creeping bent and water mint growing in the drawdown zone. During the survey large numbers of stickleback were observed.</p>
10	<p>A relatively large area of high piled quarry spoil that has a very steep slope on its western side leading down to TN2. The spoil has approximately 70% bare substrate and some colonisation of scattered ephemeral/short perennial plants including the grasses false oat-grass, false brome, cock's-foot and Yorkshire fog and the herbs hedge bindweed (<i>Calystegia sepium</i>), creeping thistle, spear thistle, teasel, great willowherb, cut-leaved crane's-bill, hogweed (<i>Heracleum sphondylium</i>), cat's-ear, nipplewort (<i>Lapsana communis</i>), autumn hawkbit (<i>Leontodon autumnalis</i>), oxeye daisy (<i>Leucanthemum vulgare</i>), common bird's-foot trefoil, black medick, wild mignorette, field forget-me-not, bramble (<i>Rubus fruticosus</i> agg.), bittersweet (<i>Solanum dulcamara</i>), ragwort white clover, red clover and colt's-foot</p>
11	<p>Tall rank species-poor neutral grassland on a relatively large area of high piled quarry spoil co-dominated by false oat-grass and cock's-foot with tufted hair-grass, red fescue and Yorkshire fog also conspicuous. Other species within the sward include lesser Burdock (<i>Arctium minus</i>), spear thistle, teasel, great willowherb, cleavers (<i>Galium aparine</i>), black medick, ragwort, colt's-foot, germander speedwell (<i>Veronica chamaedrys</i>) and common nettle (<i>Urtica dioica</i>) that becomes locally dominant on the east facing slope in the northeast of the spoil pile.</p>
12	<p>Tall rank neutral grassland with a sward dominated by cock's-foot with frequent false oat-grass, Yorkshire fog along with soft brome (<i>Bromus hordeaceus</i>), red fescue and rough meadow-grass. Creeping thistle is frequent throughout with cow parsley, lesser burdock, spear thistle, great willowherb, cleavers, cut-leaved geranium, wood avens (<i>Guem urbanum</i>), hogweed, oxeye daisy, black medick, wild parsnip (<i>Pastinaca sativa</i>), greater plantain, broad-leaved dock, ragwort, white campion, bittersweet, dandelion, colt's-foot, common nettle and common vetch (<i>Vicia sativa</i>) also present.</p> <p>In the central and north-eastern parts of this grassland area some scrub consisting of common hawthorn (<i>Crataegus monogyna</i>), dog rose (<i>Rosa canina</i> agg.) and bramble is beginning to develop.</p>
13	<p>Area of quarry spoil that supports a mosaic of scattered scrub, species-poor tall rank grassland and tall ruderal vegetation.</p> <p>The scrub consists of field maple (<i>Acer campestre</i>), sycamore (<i>Acer pseudoplatanus</i>), common hawthorn, dog rose, elder (<i>Sambucus nigra</i>) and dense patches of bramble and is found scattered throughout growing through a typically rank grassland co-dominated by false oat-grass and cock's-foot, although false brome is locally dominant in some places, with frequent creeping thistle. Other species present include cow parsley, spear thistle, cleavers, hogweed, oxeye daisy, field forget-me-not, wild parsnip, common poppy, ragwort, red campion, white campion, bittersweet, colt's-foot and common nettle. In places, the tall ruderal species form dense stands of vegetation that outcompete other grasses and herbs.</p>

ECOLOGY 10

TN	Description
14	Sycamore dominated scrub with some field maple, hawthorn, white willow and goat willow with typically abundant common nettle typically forming the ground cover. In parts are a few depressions that periodically fill with water but which support no aquatic or marginal species.
15	Tall ruderal vegetation co-dominated by cow parsley, hogweed and common nettle with many of the species recorded in TN13 infrequent.
16	An area of quarry spoil dominated by dense bramble patches and tall ruderal vegetation dominated by common nettle.
17	An area consisting of large numbers of small low spoil heaps that form a very undulating surface dominated by an ephemeral/short perennial vegetation with some willow scrub development. Graminoid species include locally abundant false oat-grass with Yorkshire fog and hard rush locally frequent. Other species present include abundant colt's-foot and common bird's-foot trefoil along with common spotted-orchid (<i>Dactylorhiza fuchsia</i>), teasel, herb Robert, oxeye daisy, black medick, field forget-me-not, ribwort plantain, bramble, ragwort and common vetch with common hawthorn, white willow and goat willow being to develop.
18	A narrow and shallow linear eutrophic pond with frequent reedmace and soft rush along with water plantain, floating sweet-grass (<i>Glyceria fluitans</i>), jointed rush (<i>Juncus articulatus</i>) and lesser spearwort (<i>Ranunculus flammula</i>).
19	A very small shallow eutrophic ephemeral pond dominated by reedmace with water plantain, floating sweet-grass and soft rush also present.
20	A relatively large almost circular highly eutrophic pond supporting little aquatic and marginal flora except for fennel pondweed (<i>Potamogeton pectinatus</i>) small stands of emergent reedmace with some creeping bent, marsh foxtail (<i>Alopecurus geniculatus</i>), jointed rush and soft rush growing around the margins. The banks of the pond are highly disturbed and damaged by water-birds.
21	A relatively large shallow pond with dense vegetation consisting of the submerged species of rigid hornwort and curled pondweed (<i>Potamogeton crispus</i>); the emergent species of water plantain, frequent common spike-rush, lesser spearwort and dominant reedmace; and marginal species including marsh foxtail, marsh bedstraw (<i>Galium palustre</i>), soft rush, hard rush and pink water-speedwell (<i>Veronica catenata</i>).
22	A small narrow and shallow linear pond with goat willow heavily shading 50% of the water surface restricting the aquatic species to small stands of reedmace and some water plantain. The margins are dominated by soft and hard rush.
23	A small linear ephemeral pond similar to TN22 but with only 25% of the water surface shaded by goat willow.
24	A relatively large circular deep pond dominated by reedmace with common spike-rush, curled pondweed, broad-leaved pondweed (<i>Potamogeton natans</i>) and fennel pondweed.
25	A narrow shallow linear pond dominated by reedmace with goat willow shading 40% of the water surface. Hard rush is abundant along its margins.
26	A narrow shallow linear pond dominated by reedmace with frequent common spike-rush, water mint and broad-leaved pondweed also present along with abundant hard rush along its margins. Willow scrub shades 50% of the waters surface.
27	A small shallow pond dominated by broad-leaved pondweed and reedmace with frequent water plantain, common spike-rush and water mint. Willow scrub shades 60% of the waters surface.
28	A relatively large area of high piled quarry spoil, fenced off with herpetofauna-proof fencing, that has approximately 70% bare substrate and some colonisation of scattered ephemeral/short perennial plants dominated by colt's-foot but with daisy (<i>Bellis perennis</i>), common cats-ear, creeping thistle, spear thistle, teasel, field horsetail, black medick, wild mignorette, ragwort, white campion, prickly sow-thistle, common field speedwell (<i>Veronica persica</i>), field pansy and the grasses of false brome (<i>Brachypodium sylvaticum</i>), cock's-foot and Yorkshire fog forming a conspicuous component to the sparse vegetation. Small patches of goat willow are found growing along the bottom of northern and eastern

TN	Description
	edges of the spoil pile. This area of spoil, at the time of survey was in the process of being removed and used in landfill operations.
29	A small shallow eutrophic pond in the northeast corner of TN19 dominated by rigid hornwort (<i>Ceratophyllum demersum</i>) but with water plantain (<i>Alisma Plantago-aquatica</i>), lesser spearwort and reedmace growing in areas of shallow water and frequent soft rush around the its margins. This pond is due to be destroyed during summer 2008 as part of the removal of the spoil as detailed for TN28.
30	An area of largely bare substrate and exposed fissured rock with some colonisation by ephemeral/short perennial type vegetation including pyramidal orchid (<i>Anacamptis pyramidalis</i>), thyme-leaved sandwort, daisy, rosebay willowherb, creeping thistle, spear thistle, great willowherb, field horse-tail, cat's-ear, oxeye daisy, common bird's-foot trefoil, black medick, field forget-me-not, bramble, ragwort and common vetch with a largely sparse distribution of graminoids including creeping bent, false oat-grass, Yorkshire fog and hard rush.
31	A small red fescue dominated grassland strip running on the top of the quarry along its western boundary with false oat-grass, cock's-foot, tall fescue (<i>Festuca arundinacea</i>), Yorkshire fog and rough meadow-grass also present in the sward. Herb species include creeping thistle, perforate St John's-wort, frequent black medick, self-heal (<i>Prunella vulgaris</i>), bramble, white campion and frequent white clover. Self-seeded ash (<i>Fraxinus excelsior</i>) are developing throughout the sward.
32	A narrow strip of woodland/hedgerow forming a boundary between the B430 and the landfill site consisting of field maple, Norway maple (<i>Acer platanoides</i>), sycamore, alder (<i>Alnus glutinosa</i>), hazel (<i>Corylus avellana</i>), beech (<i>Fagus sylvatica</i>), ash, blackthorn (<i>Prunus spinosa</i>), sessile oak (<i>Quercus petraea</i>) and dog rose with a ground flora dominated by ivy (<i>Hedera helix</i>) with frequent herb Robert, wood avens (<i>Geum ubanum</i>) and ground-ivy (<i>Glechoma hederacea</i>).
33	Road-side verge co-dominated by false oat-grass and red fescue with false brome, cock's-foot and tall fescue forming the sward along with yarrow (<i>Achillea millefolium</i>), cow parsley, common knapweed (<i>Centaurea nigra</i>), creeping thistle, ground-ivy, hogweed, perforate St John's-wort, wild parsnip, ribwort plantain, creeping buttercup, bramble, broad-leaved dock, white campion, hedge woundwort (<i>Stachys sylvatica</i>) and common nettle.

Flora

Protected and Notable Species

- 10.48 No statutory protected or notable plant species were recorded in or directly adjacent to the survey area.
- 10.49 Protected and notable species recorded within 2km of the proposed EfW facility include rough marsh-mallow (*Althea hirsuta*), corn chamomile (*Anthemis arvensis*), stinking chamomile (*Anthemis cotula*), basil thyme (*Clinopodium acinos*), dwarf spurge (*Euphorbia exigua*), wood barley (*Hordelymus europaeus*), catmint (*Nepeta cataria*), round-leaved mint (*Mentha suaveolens*), sainfoin (*Onobrychis viciifolia*), allseed (*Radiola linoides*), meadow clary (*Salvia pratensis*), night-flowering catchfly (*Silene noctiflora*) and dragon's teeth (*Tetragonolobus maritimus*). None of these species were identified within the application site and the site is not considered likely to be key for any of these species.

Non-native Invasive Species

- 10.50 No non-native invasive species of plants were found in or immediately adjacent to the survey area.

Fauna

- 10.51 Records of protected and notable fauna within a 2km radius around the site were obtained from TVERC and from the NBN gateway and are annotated accordingly.

Badgers

- 10.52 Data obtained from TVERC identify two locations where badgers have been recorded both of which lie outside and north of the survey area.
- 10.53 The habitats present in the survey area have the potential to support badgers although no evidence of badger activity (i.e. setts, latrines, snuffle holes and tracks) was observed within the survey area. However, badgers are known to be active on the restored parts of the landfill directly to the north of the survey area and it could be reasonably expected that badgers cross the southern corner of the quarry site.

Bats

- 10.54 There are no historical records for any bat species at or in close proximity to Ardley Quarry. The closest records are for brown long-eared bat (*Plecotus auritus*) at Bucknell Churchyard approximately 1.7km east of Ardley Quarry.
- 10.55 The site offers very low bat roosting opportunities. There are no suitable buildings on site and the trees growing on the site are relatively young or scrubby and do not support obvious features that could provide opportunities for roosting bats. The exposed rock faces, whilst slightly fissured in places, are not considered optimum habitat for bats.
- 10.56 Whilst, there is potential for bat species to utilise the area for foraging purposes, with the quarry linked to surrounding countryside by well defined features (i.e. Gagle Brook) offering suitable commuting routes, it is unlikely that this site is important or critical for bats.

Other Protected and Notable Mammal Species

- 10.57 No other evidence of protected mammal species was found during the site visits.
- 10.58 Evidence of mink (*Mustela vison*) including footprints and spraints were found around the large pond in the southeast corner of survey area.

Birds

- 10.59 The habitat types within and around the survey area provide suitable habitat for a range of breeding bird species typical of woodland, farmland and wetland habitats.
- 10.60 A formal breeding bird survey, carried out by Biocensus in 2008, recorded a total of 56 species. Of the species recorded only little ringed plover is listed

on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) with 23 species included on the Red and Amber List of Birds of Conservation Concern³ respectively.

- 10.61 A copy of the full bird survey report produced by Biocensus is presented at Appendix 10-1.

Reptiles

- 10.62 Early results from the reptile survey have found the survey area to support both common lizard (*Lacerta vivipara*) and grass snake (*Natrix natrix*). The total counts, for each of these species recorded during the surveys to date, are provided in Table 10-5.

Table 10- 5: Summary of Reptile Survey Results to Date.

Date	Common Lizard	Grass Snake
02/07/08	50	44
22/07/08	28	25
15/08/08	28 (+45 juveniles)	34

based on “the maximum numbers of animals seen by observation and/or placed under tins at a density of up to 10/ha, by one person in one day”.

- 10.63 According to the guidelines on reptile surveys produced by Froglife⁴, the population size class of reptiles can be based upon the maximum number of adults observed by one person in one survey visit with artificial refugia set at up to ten per hectare. The categories used to define the population size classes of the commoner species of reptile are provided in Table 10-6.

Table 10- 6: Summary of Reptile Survey Results to Date.

Species	Low Score 1	Good Score 2	Exceptional Score 3
Adder	<5	5-10	>10
Grass Snake	<5	5-10	>10
Common Lizard	<5	5-20	>20
Slow Worm	<5	5-20	>20

- 10.64 Maximum counts, to date during one survey over the total survey area of 6.4 hectares, are 50 common lizard and 44 grass snake and this indicates a ‘exceptional’ population size class of both these species.

- 10.65 For a site to qualify as a key reptile site it must meet at least on of the following criteria:
- Supports three or more reptile species;
 - Supports two reptile species;
 - Support and exceptional assemblage of one species;

³ RSPB (2004). *The Population Status of Birds in the UK – Birds of Conservation Concern 2202-2007*. Royal Society for the Protection of Birds.

⁴ Froglife (1999). *Reptile Survey: an Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation*. Froglife Advice Sheet 10. Froglife, Peterborough.

- Supports an assemblage of species with a total population score of at least 4; or
- Does not satisfy the above criteria but is of particular regional importance due to local rarity.

10.66 Under this criteria the site is considered to qualify as a 'key reptile site'.

10.67 A full reptile survey report and mitigation strategy has therefore been prepared and is contained in Appendices 10/3 and 10/4 of Volume 4.

Amphibians

10.68 Ardley Quarry supports a 'large' population size class based upon the criteria detailed in the Great Crested Newt Mitigation Guidelines where populations can be classed as:

- small – maximum counts of up to 10 adults;
- medium – maximum counts between 11 and 100 adults; and
- large – maximum counts of over 100 adults.

10.69 A mitigation strategy for this species, including trapping, relocation and exclusion of great crested newts has been underway on this site since 2004 and as such there is a great deal of data relating to the population on this site as part of the continuing extension of the landfill operations.

10.70 The peak counts for the 2008 survey at each of the ponds within the survey area produced a summarised in Table 10-7 and the full great crested newt survey report is presented in Appendix 10-2. In addition to great crested newt, the site supports a 'large' population size class of smooth newts (*Triturus vulgaris*) as well as common toad (*Bufo bufo*) and common frog (*Rana temporaria*) with these two latter species listed as priority species in the UK BAP.

Table 10- 7: Summary of 2008 Great Crested Newt Survey

Pond	Method	Peak Count
18	Torch/Bottle Trapping	1
19	Torch/Bottle Trapping	1
20	Torch	0
21	Torch/Bottle Trapping	32
22	Torch/Bottle Trapping	5
23	Torch/Bottle Trapping	5
24	Torch/Bottle Trapping	31
25	Torch/Bottle Trapping	11
26	Torch/Bottle Trapping	9
27	Torch/Bottle Trapping	8
28	Torch/Bottle Trapping	7
29	Torch/Bottle Trapping	7
Large Water Body	Torch	0

Invertebrates

10.71 A number of butterfly and moth species as listed in the UK BAP as Priority Species have been recorded (TVERC) in close proximity to the application site including: small heath (*Coenonympha pamphilus*), small blue butterfly

(*Cupido minimus*); dingy skipper (*Erynnis tages*); Duke of Burgundy (*Hamearis lucina*); wall brown (*Lasiommata megera*), wood white (*Leptidea sinapis*) and grizzled skipper (*Pyrgus malvae*); and the moth species: grey dagger (*Acronicta psi*), small square-spot (*Diarsia rubi*), rosy rustic (*Hydraecia micacea*), lackey (*Malacosoma Neustria*), shaded broad-bar (*Scotopeteryx chenopodiata*), white ermine (*Spilosoma lubricipeda*), cinnabar (*Tyria jacobaeae*) and four spotted moth (*Tyta luctuosa*).

- 10.72 The survey area provides potentially suitable habitat for a diverse range of invertebrate species but none of the aforementioned species or other notable species were observed during any fieldwork carried out on the site.

Other Species

- 10.73 No other evidence was found during the site visits of any other protected or notable species.

Predicted Trends

- 10.74 In the absence of the proposed development, the site would continue to be cleared, under an existing and agreed great crested newt mitigation strategy, as part of the permitted landfill operations which is anticipated to run until 2015. These areas would then be developed for landfill operations until such time they would come to the end of their life and restored to agricultural land. Areas outside these clearance cells, without intervention, would continue to develop from ephemeral type vegetation to typically tall rank grassland with some scrub development.

Evaluation of Habitats, Species and the Site

Evaluation Criteria

- 10.75 Ecological features that have the potential to be affected by the proposed development were evaluated and valued in accordance with the following geographical context:
- international;
 - UK;
 - National (England);
 - Regional (South East);
 - County (Oxfordshire);
 - District (Cherwell);
 - Local or parish (Ardley); and/ or
 - Within the immediate zone of influence (less than local value).
- 10.76 These categories are then applied to the features identified in the baseline surveys and desk-top studies. Some features can already be recognised as having ecological value and as such they may be designated as a statutory or non statutory wildlife site, other features may require an evaluation based upon their previously un-assessed biodiversity value. The rationale for grading such features is provided below.

Designated Sites

- 10.77 Natural England notifies sites that are of international or national importance for nature conservation as Sites of Special Scientific Interest (SSSIs), although some sites that are of national importance for certain species have not been so designated. Internationally important sites may also be designated as Special Areas of Conservation, Special protection Areas or Ramsar sites. In some instances a site that is considered to be of national importance can also be purchased by Natural England and designated as a National Nature Reserve.
- 10.78 Oxfordshire County Council recognises sites/features that are of county and local importance for nature conservation with a range of non-statutory designations. Whilst these areas are not protected by law, it is a requirement of the planning process that any potential impact upon such sites is considered when making a planning decision. These designations include County Wildlife Sites and Ancient Woodland.

Non-designated Features of Biodiversity Importance

- 10.79 Criteria are applied to assess the nature conservation value of the habitats and species/populations that a site supports. As there is rarely comprehensive quantitative data on the habitat or species population resource, particularly at the regional and local levels, the nature conservation evaluation process inevitably involves a qualitative component. This requires a suitably experienced ecologist to make a professional judgement based upon a combination of published sources, consultation responses and knowledge of both the site and the wider area

Habitat Value

- 10.80 For features that have not been formally recognised by a designation, an evaluation based upon those IEEM guidelines has been undertaken. The features being evaluated are considered in the context of the site and locality. In this way it is possible to provide a more accurate assessment of the impacts in the locality.

Value for Species

- 10.81 The criteria used to determine the biodiversity value of a species or features that may support a species include the following general considerations:
- rarity at a geographical level (international, national or local);
 - endemism and locally distinct varieties or sub-species;
 - species on the edge of their geographic range;
 - size of populations in the local geographic context;
 - species-rich assemblages of a larger taxonomic grouping, e.g. herpetofauna or over-wintering birds;
 - plant communities, ecosystems or habitat mosaics/associations that provide habitat for any of the above species or assemblages; and
 - populations of species considered as significant under locally published guidelines or red data books.
- 10.82 All species and populations of species, including those with statutory protection, are evaluated on the same basis. It should be noted that even

when a species is protected under European and UK statute, the presence of a small population on a site within a region where this species is widespread is unlikely to be assessed at a value of greater than district level importance. Equally, a particular feature on a site may attract large numbers of an unprotected species that has limited distribution and this may represent a feature of regional importance.

Social, Community or Economic Value

- 10.83 Some habitat/species may not be particularly rare or of high ecological value in their own right. However they may be of social or community value for a neighbourhood/community that has the use of such an area for recreational or educational use.
- 10.84 In addition some wild populations of animals may also be of economic value, such as red grouse on heather moors that can be shot, trout in rivers that are fished, or even significant populations of birds that may attract bird watchers to a region.
- 10.85 Such an assessment is, however, centred on those populations and areas that are considered to be natural or semi-natural.

Whole Site Value

- 10.86 A second stage of evaluation entails a collective review of the differing levels of importance of the various habitats and species present, in order to reach an evaluation of the site as a whole. Ultimately, this evaluation is also a matter of professional judgement, guided by published sources, consultation responses and local knowledge.

Evaluation of the Designated Sites

- 10.87 Table 10-8 summarises the evaluation of the designated sites within the zone of influence of the proposed development.

Table 10- 8: Evaluation of Designated Nature Conservation Sites

VER	Distance	Conservation Value
Statutory Designated Nature Conservation Sites		
Ardley Cutting and Quarry SSSI	0.8km North at closest point	National
Bestmoor SSSI	6.1km Northwest	National
Weston Fen SSSI	6.4km South	National
Wendlebury Meads and Mansmoor Closes SSSI	8.5km South	National
Middle Barton Fen SSSI	9.7km West	National
Arncott Bridge Meadows SSSI	9.9km Southeast	National
Bure Park LNR	3.9km Southeast	District
Crecy Hill LNR	7.7km Southwest	District
Kirtlington Quarry LNR	7.8km Southwest	District
Non-Statutory Designated Nature Conservation Sites		
Trow Pool CWS	0.5km Southeast	County

Road Verge Nature Reserve	0.5km South	District
RAF Upper Heyford Airfield CWS	2.0km Northwest	County
Ardley Quarry Nature Reserve	1.2km North	District
Stoke Wood CWS and two other ancient semi-natural woodlands.	1.7km Northeast, 1.8km Southeast and 2.0km Northwest respectively	County

Evaluation of the Habitats and Species within the Application Site

10.88 Table 10-9 summarises the Valued Ecological Receptors, including designated sites, habitats and species, recorded in the application area.

Table 10- 9: Evaluation of Valued Ecological Receptors within the Application Site

VER	Conservation Value	Status and Reason for Importance
Habitats		
Ephemeral Vegetation	Less than local	Colonising species of plants that are common and widespread in their distribution. Potential to provide suitable habitat for a number of ground nesting birds.
Tall Ruderal Vegetation	Less than local	Small single species stands of vegetation consisting of common and widespread species.
Rank Grassland	Less than local	Colonising species-poor grassland common and widespread throughout lowland England.
Scrub	Less than local	Early successional scrub development that is common and widespread.
Standing Open Water and associated marginal and swamp vegetation	Local	Some of the ponds currently supporting a large population size class of breeding great crested newts. New ponds being created to compensate for the ponds to be lost through on-going great crested newt mitigation.
Bare Substrate	Less than local	Potential to support a diverse range of invertebrate species.
Species		
Bats	Less than local	European Protected Species Potential foraging habitat for a number of species of bat.
Breeding Birds	Local	Little ringed plover included on Schedule 1 of the Wildlife & Countryside Act 1981. Breeding habitat for gadwell. A good diversity of bird species using the site including 23 of conservation concern.
Reptiles	County	Partially protected under the Wildlife & Countryside Act 1981. Site supporting an 'exceptional' populations of common lizard and grass snake. Grass Snake is a UK BAP priority species
Great Crested Newt	County	European protected species. Large population size class sized of great crested newt. Widespread throughout England but estimated to be one of the largest population of this species in Oxfordshire.
Other Amphibian Species	Local	Large population size class of smooth newt. Common frog and common toad are UK BAP priority species but are common and widespread.

Whole Site	District	Open mosaic land on former developed sites fall under UK BAP priority habitat. A mosaic of habitats, including bare substrates, ephemeral vegetation, tall ruderal, rank grassland, scrub and standing open water supporting 'large' populations of great crested newt and reptiles
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Evaluation of the Social, Community or Economic Value

- 10.89 The habitats and species present within the site do not have any social or community due to the restricted access to the site or economic value.

Potential Impacts

- 10.90 This section describes and assesses the potential impacts that may arise through the proposed development at Ardley Quarry and their likely effects on the VERs, identified through the desk-based study and field survey, that lie inside the application site and within the zone of influence outside the application boundary.
- 10.91 Both qualitative and quantitative information has been used to identify potential significant ecological impacts, including the positive, negative, direct, indirect and the cumulative environmental effects. Direct effects are certain to occur and are largely restricted to the footprint of the EfW facility and the immediate surroundings. Indirect effects are those where the impact is not certain to occur or the spatial and/or temporal magnitude of the effect is uncertain.
- 10.92 The potential impacts arising from the proposed development, fall into three main categories:
- impacts arising during the construction phase;
 - impacts arising post-construction and during the operation of the EfW facility, landfill and HWRC; and
 - impacts arising post operation.

Predicted Impacts – Construction Phase

- 10.93 Landfill operations will continue and there would be no increase in the footprint of the consented operation, so no impacts above the permitted baseline for the site are predicted. The improvements to the HWRC would take place on areas of the site which are already developed and no ecological impacts are predicted.
- 10.94 The predicted impacts are therefore most likely to arise from the construction the EfW facility and include:
- direct loss of habitats for plants or animals, and consequent local loss of species as a result of the physical requirements of the development.
 - temporary disturbance due to human activity, dust, noise and light; and
 - surface water management and water quality.

Habitat Loss and Fragmentation

- 10.95 Habitat loss involves the direct destruction or physical take-up of vegetation, or the removal of other structures with conservation interest. Habitat loss may also occur as a result of a change in land or water management, for instance the drying-up of ponds or leading to successional changes in habitat type. Habitat loss can result in the direct loss of individuals or populations of plant or animal species or indirectly by increasing levels of stress placed upon populations of some species.
- 10.96 No statutory or non-statutory designated nature conservation site will be directly or indirectly affected during the construction phase of the EfW facility.
- 10.97 The construction works will lead to a direct habitat loss in the footprint of the development, through site clearance works, earth moving and construction activities. The habitats to be lost are generally of low intrinsic ecological value and include habitats typical of early colonisation and successional stages of development on abandoned mineral workings including ephemeral/short perennial vegetation, tall ruderal vegetation, colonising rank grassland, early scrub development and open standing water.
- 10.98 However, the site is already consented for clearance as part of landfill operations and even without the proposed EfW facility these habitats would eventually be lost over time. No additional habitats over and above those within the site will be lost as a result of the construction works.
- 10.99 The development site has connectivity to the wider open countryside along its northern and eastern boundaries but is restricted elsewhere by the active landfill and old quarry walls. The loss of the habitats on the site is unlikely to cause significant habitat fragmentation to and from the surrounding countryside.

Effects on Species

- 10.100 It is unavoidable that site clearance activities will involve a loss of, or damage to a number of plant communities and species most of which are common and widespread in the county. However, a number of statutory protected species have the potential to be affected by the construction of the EfW facility including breeding birds, great crested newt and reptiles.

Great Crested Newt

- 10.101 Great crested newts are fully protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Habitats &c.) Regulations 1994 (as amended) and it is an offence to kill or injure great crested newts. Furthermore, the amended legislation now states (in regulation 39(1)) that a person commits an offence if he:
- “deliberately disturbs wild animals of any such species [i.e. great crested newts] in such a way as to be likely significantly to affect –
 - (i) the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young; or

- (ii) the local distribution or abundance of that species.”

Deliberate disturbance of great crested newts can be licensed by Natural England for a number of purposes, set out in Regulation 44. These include ‘imperative reasons of over-riding public interest’, which could cover the deliberate disturbance of these species during development operations. Licences can only be issued where there is no satisfactory alternative and where the action authorised will not adversely affect the conservation status of the species involved.

- 10.102 The construction of the EfW will not result in any additional loss of great crested newt breeding or terrestrial habitat but will rather necessitate that the clearance of these areas is brought forward, where practically possible, from that which is consented the current European Protected Species licence.

Badgers

- 10.103 The Protection of Badgers Act (1992) prohibits the intentional or reckless damage, destruction or obstruction of a badger sett, the intentional or reckless killing or injury of a badger, and the disturbance of a badger whilst it is occupying a sett.
- 10.104 Whilst badgers are not currently active in the footprint of the development, these creatures are residing nearby and the construction of the EfW has the potential to reduce the foraging area for this species. However, the open countryside to the east of the site is considered more favourable and offers more suitable habitat and the development is unlikely to significantly affect the ability of badgers to forage.

Bats

- 10.105 All 17 species of bat resident in the UK are afforded full protection under the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats &c.) Regulations 1994 (as amended). Seven of these species have Species Action Plans within the UK BAP because of their rarity or because their population has undergone a significant decline.
- 10.106 Whilst bats may utilise the application site for foraging purposes, the site is not considered to be critical or important for bats and any localised disturbance is unlikely to significantly impact upon the availability of suitable foraging habitat during the construction phase.

Birds

- 10.107 All wild bird species occurring in the UK, with the exception of eleven very common and/or ‘pest’ species, are afforded protection under the Wildlife & Countryside Act 1981 (as amended) prohibiting: their killing, injuring or taking; the damage, destruction or taking of nests in use or being built; and the taking or destruction of eggs. A refined list of bird species receives a greater degree of protection under Schedule 1 of the Act.
- 10.108 The breeding bird survey identified a number of key species using the site for breeding purposes with the large pond providing the main feature for breeding birds. The loss of habitat will have a permanent impact on the bird

species that currently use this site. However, under current planning consent this habitat will be lost to landfill whether the EfW facility is built or not.

- 10.109 The bare substrates, waters edge and ephemeral vegetation is attractive for ground nesting bird species, such as little ringed plover. Whilst it is unlikely that this bird breeds at this site, without development the ephemeral areas are likely to be lost due to natural succession and it is unlikely that little ringed plover would use this site in the long-term.

Reptiles

- 10.110 Common lizard and grass snake are afforded limited protection under the Wildlife & Countryside Act 1981 (as amended) making it an offence to intentionally kill or injure individual animals.
- 10.111 The construction of the EfW will not result in any additional loss of reptile habitat to that which is already consented under landfill operations.

Other Species

- 10.112 The site clearance and construction works will involve the loss of, or damage to, other wildlife that is present in the habitats that are being lost. For the purpose of this assessment in the absence of mitigation, the potential loss of small mammals, invertebrates and plants as not previously highlighted, is not considered important or critical to the integrity of local populations and is unlikely to have a significant impact on such populations.

Disturbance due to Human Activity, Dust, Noise and Light

- 10.113 Increases in disturbance, as a result of human activity can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.
- 10.114 The application site is already subjected to a certain level of human disturbance through the landfill operations particularly from noise and dust and to a certain extent the wildlife present will be habituated to these levels of disturbance.
- 10.115 Site clearance and construction activities, including piling, will increase noise levels across the site during daylight hours. With the exception of some of the birds species, none of the ecological receptors are sensitive to elevated levels of noise. Site clearance and construction activities will be restricted by planning conditions, and any noise generated from these activities will be confined to certain period during the day, which is not likely to coincide with main periods of dawn and dusk singing activity. As such, the generation of additional noise is assessed as negligible.
- 10.116 Of the known ecological receptors, only some species of bats are sensitive to light pollution and any artificial lighting used during the construction phase could impact upon any species foraging and commuting where lighting is installed. Lighting is anticipated to be minimal during construction and will retain large areas of the site in darkness for the use of bats. Any impact will be localised and is unlikely to affect obvious foraging and commuting routes.

- 10.117 Dust levels are anticipated to increase slightly during the construction phase but are deemed unlikely to have a significant impact on the flora and fauna within or immediately adjacent to the development site.

Surface Water Management and Water Quality

- 10.118 The potential impacts on surface waters and water quality have been assessed and considered in Chapter 9.
- 10.119 The potential impacts on watercourses during the construction of the proposed EfW facility could arise from direct pollution of surface water from silt mobilisation, spillages of oil and fuels, chemicals and/or cement which could have a significant adverse impact on the aquatic ecosystems.

Potential Impacts – Post-Construction and Operational Phase

- 10.120 The predicted impacts likely to arise during the proposed development include:
- emissions to air;
 - disturbance due to human activity, dust, noise and light;
 - surface water management and water quality
- 10.121 Again no additional impacts above the permitted baseline are predicted for the continuation of the landfill and HWRC operations, so the assessment focuses on the proposed EfW development.

Emissions to Air

- 10.122 The combustion of waste-derived fuel to generate power produces a range of pollutants that could potentially adversely affect the ecological resources within the zone of influence. A full description of these pollutants and their predicted dispersion across a 10km radius from the emission stack is provided in Chapter 5. This modelling takes into account the existing impact that the landfill gas engines have on local air quality.
- 10.123 The most pollutants with the most significant potential impact from the facility will be nitrogen oxides (NO_x) and oxides of sulphur, mainly sulphur dioxide (SO₂), along with the acidification and eutrophication associated with acid and nitrogen deposition of ecosystems, which can occur when these substances are deposited to land at high rates.
- 10.124 The UK Air Pollution Information System (APIS) database⁵ was used to estimate current and critical loadings, levels and exceedances at all the biological SSSIs for the following air pollutants.
- 10.125 As part of the EIA, air pollution modelling has been carried out to assess the effects of emissions from the proposed EfW on the biological SSSIs that lie within a 10km radius of the site. The results of this are presented in more detail in Chapter 5 of this ES.

⁵ www.apis.ac.uk

- 10.126 The levels of acidic and nitrogen containing compounds at these SSSIs were forecast using computer dispersion modelling techniques and assessed against standards, guidelines and critical load values.
- 10.127 The results of the modelling would indicate that the emission to air of these substances from the proposed EfW facility would be very low and are unlikely to significantly affect the integrity of any SSSI within the zone of influence.

Disturbance due to Human Activity, Noise and Light

- 10.128 The increase in traffic movements to and from the facility will increase disturbance levels across the site. Essentially the levels of disturbance are not anticipated to be high with many species over time expected to become habituated to increased disturbance levels.
- 10.129 The EfW facility will be located in an area that is not currently well lit during night-time periods and because the building will include external and internal lighting it has the potential to increase light levels significantly in this area and in the surrounding area. Some bat species are sensitive to light pollution and any artificial lighting used in and around the EfW facility could impact upon any species foraging and commuting in the general vicinity of this facility. However, large parts of the restored landfill will remain in darkness and any impact is unlikely to be significant.

Surface Water Management and Water Quality

- 10.130 The surface water management system, through the creation of a number of attenuation ponds, provides opportunities to incorporate some wildlife enhancement features into the design that can benefit a number of species (i.e. amphibians and aquatic invertebrates) and has the potential to have a positive impact for biodiversity. Although great crested newt may use these ponds, it is not considered that these will form part of the habitat compensation and creation that is likely to be required under any mitigation strategy for this species.

Potential Impacts – Post Operational Phase

- 10.131 The proposed EfW development is permanent, however upon completion of the landfilling operations the majority of the site would be restored to agriculture and woodland which would have a positive impact on biodiversity. The restoration scheme incorporates wildlife enhancement features in to the design in order to maximise these benefits.

Mitigation

- 10.132 The section outlines the mitigation measures that will be incorporated into the proposed development to prevent, reduce or offset any adverse effects on ecology and nature conservation. In general, mitigation measures include minimising land take and disturbance by reducing the footprint of the works so that adjacent habitats are not impacted, avoiding key habitat and areas used by protected species and minimising pollution of watercourses. Habitat creation is also an important aspect to ensure that key habitats are reinstated and wherever possible enhanced through use of seed sources on

the site and through selective planning using locally sourced native species that are appropriate to the locality.

Incorporated Mitigation

- 10.133 The layout of the EfW facility has been designed to minimise the land take in the existing quarry that is already consented for clearance for landfill operations.
- 10.134 All works will be undertaken in a sensitive manner and where appropriate under protected species licences and/or agreed mitigation strategies. Where any licences and mitigation plan is currently in place (i.e. great crested newt) an amendment to these existing agreements will be agreed with Natural England where the works are likely to affect protected species.
- 10.135 A surface water management system will incorporate a number of balancing lagoons and will be located along the eastern, southern and western boundaries of the site. The lagoons will incorporate wildlife design features, and appropriate planting, to provide suitable wetland habitat for a range of amphibians and invertebrates.
- 10.136 A series of air pollution controls are included in the design of the EfW facility as standard including gas scrubbing to remove heavy metals and other contaminants, bag filters to remove dust and particulates and non-catalytic reduction measures to reduce NOx and other gasses.
- 10.137 Landscaping around the facility using native trees and shrub species will provide some habitat for birds and invertebrates.

Mitigation During the Construction Phase

- 10.138 Prior to the construction phase of the development an Environmental Action Plan should be produced outlining the methodology of working, responsibilities, threats and mitigation measures for all actions to be taken to ensure compliance with statutory legislation and other ecological issues during the construction and post construction phases.
- 10.139 All great crested newt mitigation is anticipated to be undertaken subject to modifications made to the existing licence issued as part of the landfill operations. However, this will have to be approved by Natural England in respect to bringing forward the timeframe to clear areas in order to allow the EfW construction works to begin in 2010. Under the current mitigation scheme, ten new ponds are scheduled for construction in Autumn 2008 for completion by January 2009, but other ponds may have to be created as part of any amended licence.
- 10.140 A reptile mitigation strategy has been submitted to ensure that no individual animals are harmed during the construction phase. Any mitigation will be similar to and carried out in conjunction with great crested newt mitigation.
- 10.141 All work to remove scrub and other vegetation shall be avoided during the bird breeding season between the middle of March and the end of August, wherever practicable. If any clearance works need to be carried out during this period they will only proceed after the vegetation to be removed has been checked and deemed free of active nests by a suitably qualified

ecologist. If active nests are found then no clearance works will begin at the nest site and buffer zone around the nest site until the young birds have left the nest.

10.142 Although not currently active on the site, due to the highly capricious and mobile nature of this species, areas to be cleared will be inspected for any setts inside, or within 30m of, these areas. If badgers are found an appropriate mitigation plan will be produced and all works will be carried out under licence from Natural England.

10.143 Suitable site management will be implemented to avoid and/or minimise the generation of excessive human disturbance, dust, noise and light during the construction works.

Mitigation Post Construction and Operation

10.144 The air pollution modelling detailed in Chapter 5, suggests that the effect of emissions from the EfW facility on designated sites is negligible and therefore it is not intended to provide any further mitigation other than that already incorporated into the design of the facility.

10.145 Lighting used on the site shall be designed to be bat friendly to ensure that overspill is controlled to avoid adverse light pollution affected surrounding areas and potential important bat foraging and commuting routes.

10.146 Wildlife corridors will be created to provide links to and from the surface water attenuation lagoons to areas of open countryside and to the restored landfill that will provide suitable commuting and foraging habitat for amphibians and reptiles including the provision of suitable hibernacula. Further consideration to habitat creation and enhancement will be made through landscaping proposals within the application site.

Residual Impacts

10.147 This section discusses how, after the application of the mitigation measures, the likely significant ecological effects would impact upon the habitats and species within the zone of influence from the proposed development, this being defined by the sensitivity of the ecological receptor and the nature of the potential effect.

10.148 Table 10-10 provides a summary of the criteria required to evaluate impacts and assess the significance of any such impact.

Table 10-10: Key Consideration when Characterising Impacts

Descriptor	Definition⁶
Direction of impact	Positive or negative impact
Probability of occurring	Broadly defined on 3 levels: Certain, Probable or Unlikely
Complexity	Direct, Indirect or Cumulative
Extent and Context	Area/number effected and % of total
Magnitude	Describe severity of effect in words

⁶ Definitions for these terms and further information relating the methods of assessment are given in Guidelines for Ecological Impact Assessment (IEEM, 2006)

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Duration	Permanent or Temporary in ecological terms (e.g. within the lifetime of the species affected)
Reversibility	Whether or not the effect can be reversed in an ecological timescale
Area	Expressed as area or percentage of the study area.

10.149 A summary of the likely significant effects, the valued ecological receptors affected and the magnitude and significance of the effect are detailed in Table 10-11. This evaluation takes into account the mitigation measures already discussed and the residual impacts after their application.

Table 10-11: Summary of Residual Impacts

Important Ecological Feature	Description of Potential Impact	Characterisation of Impact	Ecological Significance of Impact if unmitigated	Mitigation and Compensation Proposals	Residual Impact following Mitigation and its Significance
Statutory and non-statutory nature conservation sites	Increase in acidification and nitrogen eutrophication	Negative, unlikely, indirect, permanent.	Negligible	Non-catalytic reduction measures to reduce NOx and other gasses.	Not significant
Colonising ephemeral, grassland and scrub habitats	Habitat loss Loss of breeding sites for birds	Negative, certain, direct, permanent. Areas across the application site.	Significant at less than local level	Landscape planting and habitat creation.	Not significant
Ponds	Loss of habitat. Pollution of surface water and run-off, increased sediment loading and changes to water quality	Negative, certain, direct, permanent. Restricted to the water bodies within the application site	Negligible at local level, significant at site level	Creation of new surface water management system. Creation of new ponds as part of on-going and future great crested newt mitigation.	Potential positive impact.
Badgers	Loss of potential foraging habitats	Negative, probable, direct, permanent.	Negligible at less than local level		Not significant
Bats	Loss of potential foraging habitats. Disturbance from changes in levels of	Negative, probable, direct, permanent. Restricted to very small part of the	Negligible at less than local level.	Careful design of lighting to avoid overspill onto adjacent areas.	Not significant

Important Ecological Feature	Description of Potential Impact	Characterisation of Impact	Ecological Significance of Impact if unmitigated	Mitigation and Compensation Proposals	Residual Impact following Mitigation and its Significance
	illumination	site, if at all.			
Birds	Destruction of bird breeding habitat and nests whilst in use. Destruction and disturbance of over-wintering habitat	Negative, probably, direct, temporary reversible.	Significant at up to local level Also an Offence under the W&CA 1981.	Clearance of the site outside the nesting season or pre-site stripping search by a qualified ecologist	Not significant
Great Crested Newt	Destruction and disturbance to breeding and terrestrial habitat	Negative, certain, direct, permanent, reversible.	Significant at county level An Offence under the W&CA 1981 and Conservation (Natural Habitats, &c.) Regulations 1994	Modifications to existing licence to be sought from Natural England On-going mitigation and habitat creation and enhancement	Not significant
Other amphibians	Destruction and disturbance to breeding and terrestrial habitat	Negative, certain, direct, temporary, reversible.	Significant at local level.	On-going mitigation and habitat creation and enhancement.	Not significant
Reptiles	Destruction and disturbance	Negative, certain, direct, temporary, reversible.	Significant at county level.	On-going mitigation Habitat creation and enhancement	Not significant

Legal and Policy Implications of Residual Impacts

10.150 This section summarises the significance of impacts in the context of statutory legislation and planning policy.

Legal Implications

10.151 With regards to statutory protected species the only issues relevant to the proposed development at this current time are breeding birds, great crested newt and reptiles. Provided that appropriate mitigation plans are properly implemented and all appropriate licences gained, it will be possible to undertake all planned works without the risk of breaching wildlife legislation. It is considered unlikely that other species, afforded full or partial legal protection, are currently present in the application site.

Policy Implications

10.152 Provided that all appropriate mitigation measures to prevent, reduce or offset an impact are implemented it is considered that the construction and operation of the proposed development will comply with the requirements of current national, regional and local planning policies.

Conclusion

10.153 The proposed development will not impact upon any statutory and non-statutory designated nature conservation sites within the zone of influence

10.154 The proposed development will result in the loss of some ephemeral/short perennial, tall ruderal, colonising grassland and scrub habitats of less than local value as well as a number of ponds of local value. Whilst the loss of these habitats will impact on a number of protected species (i.e. birds, great crested newt and reptiles), the construction of the EfW facility will not result in any additional loss of habitat that is not already consented under landfill operations even if the EfW facility does not go ahead.

10.155 Through careful consideration of the potential impacts of the proposed development and adhering to the mitigation measure recommended the potential negative ecological effects of the development will be reduced to negligible.