Scoping study for the design and use of biodiversity offsets in an English Context

Final Report

to

Defra

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Compiled by

Jo Treweek (Treweek Environmental Consultants)

With contributions from:
Kerry ten Kate, freelance consultant
Bill Butcher, WGB Environment
Orlando Venn, Treweek Environmental Consultants
Lincoln Garland and Mike Wells, Biodiversity by Design
Dominic Moran, Scottish Agricultural College
Stewart Thompson, Oxford Brookes University

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Executive Summary

Defra commissioned a scoping study for the design and use of biodiversity offsets in an English context. The results of the study are summarised in this report and are intended to inform debate on the possible contribution of biodiversity offsets to conservation and sustainable development goals in England.

Biodiversity offsets have attracted increasing interest as a mechanism for enhancing biodiversity in the wider countryside in many countries. Duties under the Countryside and Rights of Way Act (2000), the Natural Environment and Rural Communities Act (2006) and associated planning policy are driving some planning authorities to seek ecological compensation for impacts on a broader spectrum of biodiversity than before, and more specifically, to explore options for offsetting. In setting out the UK's approach to biodiversity conservation, Defra (2007) identified a likely need to explore new policy options, possibly including market creation in biodiversity or the development of incentives for biodiversity "*such as biodiversity offsets*". Such options were seen to be particularly necessary to reduce rates of loss of non-designated sites and features.

This report presents a review of important factors to consider in designing possible options for biodiversity offsets in England, and includes:

1. a review of experience in the implementation of biodiversity offsets worldwide;
2. a consideration of whether offsets would be likely to benefit biodiversity in England;
3. an assessment of how offsets might complement existing policy
4. a review of some of the economic considerations that might influence the private and social costs of alternative offset arrangements; and
5. some possible changes that might have to be made to increase use of offsets as a mechanism to compensate for biodiversity loss.

Policies and laws requiring biodiversity offsets are in place in many countries and some biodiversity offset schemes have been operating for many years. They include conservation or mitigation banks in the United States, market trading systems for biodiversity credits produced by landowners in Australia and guidance concerning integration of offsets with environmental assessment in South Africa. Experience worldwide reinforces the fact that successful implementation of biodiversity offsets depends crucially on arrangements that provide stakeholders with clearly defined rules and objectives, and are legally, institutionally and financially secure. While the business case for voluntary biodiversity offsets and the emergence of markets in biodiversity credits suggest that markets can support moves towards no net loss of biodiversity, regulation is essential to create a sufficient business case and to ensure that conditions are in place for markets to flourish. Monitoring and enforcement are also essential to ensure that commitments are met and that appropriate management remains in place.

Review of relevant law and policy in England suggests that biodiversity offsets are unlikely to be implemented to any great extent under current EU law and associated regulations, particularly for biodiversity which is not designated or protected at European level. Further, the 'Biodiversity Duty' is open to interpretation with respect to requirements for enhancement and, in particular, with respect to requirements to compensate for residual adverse effects of any given development proposal. Under the current system in England, some offsets have been implemented, but there is no

consistency in requirement or approach. So far, offsets have only occasionally been used for 'wider biodiversity' – i.e. for the full range of biodiversity components (beyond listed species and habitats) that comprise the richness of English wildlife and which are increasingly lost to cumulative impacts and fragmentation of habitat. It would be useful to instigate further systematic research on current and likely future interpretations of the Biodiversity Duty by UK local authorities and the extent to which they are likely to require biodiversity offsets from developers as part of the mitigation hierarchy. Such research could also identify examples of good practice.

There are several reasons why biodiversity offsets should be given further consideration in an English context, including:

1. The urgent need to develop new mechanisms to arrest biodiversity decline.
2. The fact that there are many hidden environmental costs to development and it is appropriate that some of these should be offset.
3. The need to streamline the planning system for large infrastructure projects without detriment to the country's biodiversity.
4. The fact that it might be possible to catalyse a market for enhanced biodiversity.
5. The need for clarity in terms of developers' obligations with respect to biodiversity.

The current situation in England is considered to lend itself quite well to further development of offsets for the following reasons:

1. The UK Biodiversity Action Plan approach lends itself to targeted management which is tailored to individual habitat types and species and these are a potential basis for defining biodiversity credits which could be traded.
2. There are comprehensive systems of data management and mapping in place which could be developed and adapted to meet the requirements of an offset scheme without major modification.
3. The planning system already allows for developer contributions and combines national, regional and local perspectives and priorities (as required for implementation of the UK Biodiversity Action Plan).
4. Existing agri-environment schemes have created a precedent for individual landowners to manage their land for conservation benefit and there are tried and tested administrative procedures in place.
5. Many local authorities are drastically under-resourced at present with respect to the Biodiversity Duty under NERC and would benefit from increased investment to address hidden costs of development.

The development of a biodiversity offset scheme for England would require further investigation of certain key issues. The principal question is whether additional law and policy would be required in order to ensure a regular, consistent integration of a 'no net loss of biodiversity' requirement into development proposals, or whether this could be accomplished with the current regulatory framework if supplemented by new, clearer guidance. The authors of this report have inadequate data on planning authorities' practice and intent, England-wide, to offer an unambiguous answer to this question. However, most biodiversity offset policies (for instance, in the United States, Australia and South Africa) are less equivocal concerning the regulatory requirement for no net loss of 'wider biodiversity' than relevant English policy. Working within the current policy framework of the EU Directives, implementing regulations and associated UK legislation, however, a step towards achieving 'no net loss' of biodiversity could be taken simply by offering clearer guidance on when biodiversity

offsets are appropriate and expected, how to determine their nature, scope, scale and location and the delivery mechanisms involved.

There is currently no system in place to trade biodiversity credits or to operate mitigation or conservation banks in the UK. Either or both of these mechanisms offer potential in the English context and merit further, more detailed consideration. Their overall costs and benefits are not straightforward to assess, however, and different ecological equivalence requirements would have a significant bearing on the scale and liquidity of any resulting market in biodiversity credits. Whereas a ton of carbon is the same wherever it is captured or emitted in the world, biodiversity is heterogeneous and varies considerably depending on its spatial context. This makes the rules governing definition of biodiversity 'credits' and ecological equivalence, and setting spatial constraints on trading, of great importance. More stringent ecological equivalence requirements might limit the supply and demand for particular categories of biodiversity credit designated as necessary to satisfy offset requirements, limiting the number of possible trades. In contrast, a more flexible regime might allow more potential for trades and offer potential efficiencies in offsetting costs, but at the price of allowing certain impacts on biodiversity to be 'offset' by gains of different biodiversity components.

While it is possible to simulate offsetting behaviour in theory, reliable empirical information concerning the relative costs and benefits of alternative schemes overall is difficult to obtain. Further work is likely to be required through pilot cases to assess likely costs/benefits for England. More detailed economic options (cost-benefit) appraisal is likely to be required (both from a private and public perspective) to inform a possible future (regulatory) impact assessment exercise from the perspective of effectiveness, efficiency and equity of options.

One or a number of pilot projects to test the application of biodiversity offsets in practice would be an effective way to generate the information needed to carry out more detailed assessment of costs and benefits. Pilot projects would also provide an opportunity to test different possible metrics for biodiversity credits and to establish clearer operating principles and rules.

The Community Infrastructure Levy could be one means of funding biodiversity enhancement, given the role of biodiversity in green infrastructure, but there are a number of potential draw-backs which lead the authors of this report to be wary of suggesting the CIL as a vehicle for funding biodiversity offsets. First, the use of CIL funds is determined case-by-case and biodiversity is likely to be the focus only in a minority of cases. Second, some biodiversity requirements are not readily incorporated in green infrastructure as interpreted by some authorities (investment in 'green/open space' or recreational areas, for example, does not necessarily achieve conservation of biodiversity per se). Finally, Local Authorities may remain unwilling to impose levies which might deter developers if they are not similarly required by neighbouring authorities. The mechanism is therefore not likely to make a substantial further contribution towards no net loss of biodiversity. To make the CIL of value to biodiversity, more specific requirements leading to consistent application across authorities would be needed.

Conclusions:

1. Biodiversity offsets can help move towards no net loss or a net gain of biodiversity and ensure that those having a significant residual impact on biodiversity in England bear the costs of making good this impact. They can also help streamline the planning process by reducing uncertainties of outcome and creating economic incentives for landowners to invest in conservation activities.
2. Biodiversity offsets are already required in some strict circumstances under EU law and are encouraged, but not unambiguously required, under UK law and planning policy. The situation in England lends itself to the greater use of biodiversity offsets for a number of reasons, but current practice is patchy and there is inadequate guidance to enable developers to determine whether and when a biodiversity offset is appropriate and required and what is the necessary nature, scale and location for any such offset.
3. It would be possible to design a system of biodiversity offsets for England based on habitats and species included in the UK BAP. Such a system could include relatively stringent offset requirements for priority habitats and species and a simpler, more straightforward approach for habitats and species of 'local value'.
4. Further work is needed to:
    a. Establish whether clearer 'when and how' guidance under the current policy framework would be sufficient to result in a significant move towards no net loss of biodiversity in the context of development projects, or whether a more specific, additional policy requirement for 'no net loss' would be required to achieve this end;
    b. Undertake a series of pilot projects that explore, in the context of real development projects, how biodiversity offsets can best be implemented in England, including through the use of credits and banking. It would be important for these pilots to consider key aspects of offset design and implementation from different stakeholder perspectives (landowners, developers, planners and regulators and conservation organisations);
    c. Draft the specific 'when and how' guidance on biodiversity offsets for England, building on experiences such as BushBroker and to some extent BioBanking in Australia and elsewhere; and
    d. Explore in more detail the costs of administering a system of biodiversity offsets in England, based on more specific data from b. and c. above. It is also necessary to explore further the costs of biodiversity offsets from a developer perspective as compared with current levels of developer contribution.

CONTENTS

1 INTRODUCTION

This report presents the results of a scoping study for the design and use of biodiversity offsets in an English context. The results of the study are intended to inform debate on the possible contribution of biodiversity offsets to conservation and sustainable development goals in England.

An important driver for the project is the need for a robust mechanism to ensure that any streamlining of the planning system for major strategic projects can occur without significant risk of compromising the national biodiversity resource and with every chance of enhancing its resilience in the face of both natural and human-induced changes. Another important driver is the ongoing decline in biodiversity which is taking place in most countries despite existing provisions in policy and legislation. The UK is committed to a significant reduction in the rate of loss of biodiversity by 2010 under the Convention on Biological Diversity (CBD), and has a more challenging target as an EU Member State to halt the decline of biodiversity by 2010. All available evidence suggests that these targets are unlikely to be reached. Despite recent improvements and gains in some habitats, others continue to decline (Natural England, 2008). These targets are therefore unlikely to be reached overall and biodiversity is continuing to decline to the point where essential ecosystem services may be compromised (www.twentyten.net).

In England, the Government's Housing Green Paper (July 2007) set out aspirations for a possible 3 million new homes by 2020. Although rates of housing delivery may be lower than envisaged at that time, it remains a priority to consider how biodiversity commitments can be met in conjunction with housing growth and delivery of associated infrastructure throughout the country. There is also an increasing need to consider how the ecological functionality of the landscape can be retained in the face of cumulative losses of biodiversity which are not redressed through existing provisions. This may be because they are the result of development for which planning permission is not required, because they are apparently insignificant when considered in isolation, or because mitigation measures recommended in environmental impact assessments are not always implemented or their effectiveness monitored.

The Millennium Ecosystem Assessment (www.millenniumassessment.org) confirmed the need for radical institutional and policy changes for declines in biodiversity to be reversed. This is reflected in Natural England's Manifesto for the Natural Environment (2008), which emphasised the need for urgent action to address increasing levels of threat to the natural environment outside protected areas and suggests that this might require coordinated action, not just by government, but by a wider coalition with business and communities.

Biodiversity offsets have attracted increasing interest as a mechanism for enhancing biodiversity in the wider countryside in many countries. In setting out the UK's approach to biodiversity conservation, Defra (2007) identified a likely need to explore new policy options, possibly including market creation in biodiversity or the development of incentives for biodiversity "*such as biodiversity offsets*". Such options were seen to be particularly necessary to reduce rates of loss of non-designated sites and features. New duties under the Countryside and Rights of Way Act (2000) and Natural Environment and Rural Communities Act (2006), and associated planning policy (see Sections 4.1 and 4.3), are driving some planning authorities to seek

ecological compensation and enhancement for impacts on a broader spectrum of biodiversity than before, and more specifically to explore options for offsetting.

Biodiversity offsets are controversial, however. Proponents of offsets argue that a well-designed and implemented offset system could elevate the profile of biodiversity conservation, and enhance conservation of non-designated sites and features. Offsets are also thought to be a potential avenue for market creation for biodiversity, thereby offering potential efficiency gains that are commonly ascribed to the use of market based instruments for conservation in other areas such as air and water pollution. This potential includes the potential provision of new funding streams and investment in biodiversity, opening opportunities for market forces to benefit environmental protection and for private land holders to receive payments for conservation management or outcomes.

On the other hand there is some scepticism about the ability of offsets to achieve adequate compensation, let alone significant biodiversity enhancement, and some concern about their effectiveness as implemented in other countries, particularly where achievement of 'no net loss' has been conditional on successful habitat restoration or creation. Biodiversity offsets can be seen as a 'license' to destroy biodiversity in cases where a proposed development might otherwise have been considered unacceptable due to the magnitude or severity of its impacts. Some developers are concerned that requirements to offset the effects of their developments with an aspiration of 'net gain' (see definition in Box 1) might mean that, in effect, they are required to finance reparations for past biodiversity losses as well as those directly associated with their particular proposals. Whilst this might be a reasonable societal expectation of industry, much might need to be done to persuade the business community of the acceptability of such an approach.

The extent to which offsets might offer scope to maintain and potentially enhance biological diversity and to contribute to sustainable development at least social cost to society is explored in the following section.

1.1 Offsets as a tool for sustainability

Biodiversity is increasingly seen as a form of capital that contributes to a country's welfare via the production of ecosystem goods and services. Using a capital analogy, the depletion of natural assets, or in this case species and their habitats, can be likened to a form of depreciation to a capital stock. As in the case of man-made capital, this depreciation should ideally be measured year on year to determine whether a country is investing in sufficient replacement capital to be on a sustainable pathway. Here sustainability is equated with the ability to pass on capital stocks to future generations thereby ensuring future welfare-generating potential.

If a country registers a depreciation flow year on year without a corresponding growth in the stock of the natural asset then the asset stock is bound to decline. On the other hand, if the depreciation debit is offset by some form of growth, then the net effect can be that the stock remains constant or possibly even grows. This can be the case for some renewable biological assets which can, in theory, be managed sustainably, such as forests or fisheries. It is not possible to compensate for depreciation of all biodiversity by offsetting flows, however, and even stocks of renewable biodiversity are often depleted faster than they can recover, putting them on an extinction pathway. From the perspective of inter- and intra-generational social welfare, the question is whether the loss of one form of biodiversity in one spatial and temporal location can be

compensated or offset by the growth of another form of resource; specifically other biodiversity or some other man made capital asset.

The loss of some biodiversity has damaged the integrity of habitats and ecosystems and this loss has also demonstrably compromised the provision of some goods and services. It can be argued that we are all psychologically diminished by the passive damage cost of extinction. Some ecologists and biologists therefore maintain that the inherently irreplaceable nature of much biodiversity qualifies it as a form of *critical* natural capital. On this basis, no loss of biodiversity should be tolerated and no replacement is possible. Moreover, in planning, the concept of safe minimum standards should be adopted to avoid any actions that lead to any critical threshold. This is akin to the use of a strong sustainability criterion. In contrast, the sustainability criterion for renewable or less endangered resources might suggest that some replacement is possible under a weak sustainability rule (see Pearce and Atkinson 1995).

A strong sustainability rule places considerable constraints on development, implying that there is little or no scope for capital substitutability. There are ethical arguments for adopting this as a normative stance, but development has traditionally been a series of pragmatic compromises between the reduction of one form of biological resource and its replacement with another. Use of a weak sustainability criterion for development requires us to be discriminating about the nature of capital substitutability. Some species and habitats do need to be off-limits by virtue of their non-substitutability, but society may decide that is acceptable to substitute others.

Biodiversity offsets are a case where this weak/strong distinction is fundamental. The definition of offset rules and principles necessarily reflect the extent to which we apply strong and weak sustainability criteria. Thus the decision on what qualifies to be considered in an offset scheme and the offset conditions can be made more or less restrictive to reflect safe minimum standards and a more or less ecologically specific definition of the general policy goal of 'no net loss'. This is considered further in terms of thresholds for deciding when use of offsets is appropriate in Chapters 3 and 4.

As an important aside, the incommensurable nature of natural and man-made capital stocks means that the measurement of sustainability is complicated. It is often suggested that a common monetary unit of account should be used as a sustainability indicator to calculate welfare across a time period, for example use of adjusted gross domestic product. However, calculation of adjusted green domestic product means that some form of environmental valuation of depreciation is required and this is beyond the scope of this report. Also very relevant to the provision of offsets is the pressing need to formulate policy which makes provision for ecological resilience against a background of climate change and the greater pressures on ecosystems posed by changing population and consumption patterns. Again, detailed consideration of the interaction between these topics and offsetting policy is beyond the scope of this report.

1.2 The purpose and content of this document

Experience worldwide reinforces the fact that successful implementation of biodiversity offsets depends crucially on arrangements for land management which deliver clearly defined outcomes and are legally, institutionally and financially secure. As experience in implementation of biodiversity offsets worldwide has been mixed, it is important to review the ecological, economic, political, social, legal, financial and institutional factors which might influence the suitability and success of their implementation in England.

This report presents an overview of important factors to consider in designing possible options for implementing a system of biodiversity offsets in England and considers:

1. whether offsets would be likely to benefit biodiversity in England;
2. how offsets might complement existing policy; and
3. what changes might have to be made to increase use of offsets as a mechanism to compensate for biodiversity loss.

It includes:

- A definition of biodiversity offsets, an explanation of their purpose and a summary of principles for good practice (Chapter 2).
- A review of lessons learned from experience in the design and implementation of biodiversity offsets in different countries (Chapter 3).
- A consideration of the potential role of biodiversity offsets in an English context, based on review of existing policies and legal requirements relating to the Biodiversity Duty and the effectiveness of existing mechanisms intended to achieve 'no net loss' of biodiversity or a net positive outcome for biodiversity (Chapter 4).
- Possible scenarios or options to consider and take forward or explore further and an indication of further work required to design an effective system of offsets for an English context (Chapter 5).

The report reflects the results of two stakeholder workshops held at Oxford Brookes University in November 2008 and March 2009, in which participants reviewed the potential risks and opportunities associated with biodiversity offsetting. A summary of these workshops can be found as Appendix D to this report.

2 THE DEFINITION AND PURPOSE OF BIODIVERSITY OFFSETS

This chapter provides a definition for biodiversity offsets and considers their purpose. It outlines some key assumptions and considers the part biodiversity offsets can play in achieving no net loss and preferably a net gain of biodiversity following development.

Biodiversity offsets are essentially counterbalancing activities for losses of biodiversity due to development, undertaken to achieve a net neutral or beneficial outcome (Escorcio Bezerra 2007) after the development is implemented. They are intended to be used only after other appropriate actions have been taken to avoid adverse impacts on biodiversity or to reduce them to acceptable levels, whether these are mitigation measures recommended following environmental impact assessment (EIA) or conditions on planning consents. Biodiversity offsets therefore offer a potential mechanism to balance the impacts of development activities with the conservation of biodiversity while complementing existing controls and mechanisms designed to avoid significant adverse effects.

The definition of biodiversity offsets in **Box 1** draws on that developed by the Business and Biodiversity Offsets Program following consultation with a wide range of stakeholders in many countries.

Box 1 Definition of Biodiversity Offsets[1]

Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from development plans or projects after appropriate prevention and mitigation measures have been taken.

In UK legislation and planning policy, several terms are used which have a similar meanings to the term 'offsets' but are not identical and can cause confusion. The terms 'offsets', 'compensation' and 'enhancement' may all be used interchangeably without complete clarity concerning their meaning. **Box 3** shows how these terms appear to be interpreted in UK planning policy guidance (ODPM *et al*., 2006). Offsets are distinguished from other forms of ecological compensation by their formal requirement for measurable outcomes and their explicit requirement for achievement of 'no net loss' to be demonstrated with respect to a particular impact.

What this means and how to measure it lies at the heart of biodiversity offsetting, but it is not always easy to determine what should be measured or accounted for in an offset. As it is impossible to count every individual in every population of every species, and as no two sites are ever identical in terms of their biodiversity, the choice of metrics often involves selecting 'surrogates' or 'proxies' which can be quantified and which can be considered representative of 'overall' biodiversity. The extent to which the selected measures are genuinely representative of biodiversity overall may be difficult to demonstrate.

[1] after the definition of BBOP, the Business and Biodiversity Offsets Program, see http://www.forest-trends.org/biodiversityoffsetprogram/

Box 2 The goal of biodiversity offsets – (drawing on the BBOP definition)

The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to composition, structure, function and people's use and cultural values associated with biodiversity.

Most policies or requirements for offsets suggest that they should be used with an aspirational goal of achieving a net benefit for biodiversity (**Box 2**), but with an implicit minimum requirement for achievement of 'no net loss'. A requirement to achieve 'no net loss' enshrined in policy and regulation places the onus on the proponent of a development to demonstrate clearly and transparently how parity will be achieved in biodiversity terms (Latimer and Hill, 2007) after their development is in place. The term 'no net loss' therefore refers to the goal of restoring a pre-impact biodiversity state, whether in terms of composition, structure, amount or condition.

Box 3 The mitigation hierarchy as reflected in UK planning guidance (after the Royal Town Planning Institute's Five-Point Approach to Planning Decisions for Biodiversity, recommended in Planning for Biodiversity and Geological conservation: A Guide to Good Practice (ODPM, Defra, English Nature, 2006).

Step in the hierarchy	How it might be implemented
1. Information	
Obtain sufficient information about biodiversity or the development and its potential effects.	Information to identify and describe the biodiversity that might be affected and the likely impacts on that biodiversity associated with development may be procured through environmental assessment or provided at an earlier stage with an application for a screening or scoping opinion.
2. Avoidance	
Avoid adverse effects through planning or design.	Good design and spatial planning delivers a development proposal that avoids impacts on biodiversity at source and is compatible with objectives and targets for biodiversity.
3. Mitigation	
Where adverse effects are unavoidable, seek to reduce them to acceptable levels.	Generally recommended through environmental assessment (at strategic or project levels) and potentially built into planning conditions or legally binding agreements.
4. Compensation	
Where, despite mitigation, there are residual adverse effects that cannot be reduced further, identify measures that can be undertaken to compensate for them.	Can take the form of biodiversity offsets if explicitly designed to achieve no net loss as a minimum and if measures can be guaranteed on the ground in compliance with the principles set out in the following section.
5. Enhancement/ new benefits	
Aside from the impacts referred to above, seek opportunities to provide benefits for biodiversity.	Actions undertaken to benefit biodiversity, not necessarily linked to impacts and often undertaken independently of offsets.

To demonstrate that 'no net loss' has been achieved offsets must be clearly defined, transparent and measurable. This means that assessment of biodiversity lost due to development or gained through an offset must use the same currency and this should reflect consideration of both pattern (structure and composition) and process (functionality).

Identifying a suitable currency is not straightforward. In its simplest interpretation, an offset might involve protection, restoration or enhancement of an area of land for the purpose of providing compensation for unavoidable impacts on another area. No net loss could be determined simply in numbers of hectares impacted or offset, but this would be to ignore the biodiversity supported by the land and its 'quality'. Aspects of biodiversity which are taken into account to demonstrate achievement of 'no net loss' have included *inter alia* amounts or areas of habitat of a particular type and condition, populations of a single species, levels of persistence of species' populations or levels of ecological function or service (Cuperus *et al*., 2001; Cuperus *et al*., 1999).

The need for a workable biodiversity currency which can be traded in a straightforward and cost-efficient process can result in over-simplification of biodiversity and failure to provide offsets for key components or values: ecological accuracy calls for a metric that is complex enough to capture all details of composition, structure and process, but socio-economic realities may force or encourage compromises towards more practical and streamlined metrics. Narrow definition of biodiversity as adopted in offsets is a concern raised by Burgin (2008) in a review of the Threatened Species Conservation Amendment Bill 2006, which provided for the establishment of the biodiversity banking system in New South Wales, Australia. There is increasing interest in how ecosystem services might be used as a currency as opposed to measures of biodiversity itself, but there is as yet little experience to learn from in this regard. There are risks inherent in using ecosystem services broadly as a basis for determining 'no net loss', however: a net gain of one ecosystem service (for instance, carbon sequestration) can be at the expense (net loss) of another (for instance, biodiversity).

This is a complex and sometimes controversial area of debate. How losses and gains in biodiversity are defined and measured lies at the heart of biodiversity offsetting and has major implications for outcomes on the ground as explored further in Chapter 4. The concept of biodiversity offsets is based on the fundamental assumption that biodiversity is substitutable, such that impacts on biodiversity in one location can be traded for gains in another, but biodiversity change in some dimension invariably results following an impact and associated offset. Perfect substitution or replication is impossible, so it is necessary to define what is acceptable in terms of the nature of biodiversity delivered in the offset and its location. This has resulted in discussion about where offsets can be located and to what extent they should be required to be 'like for like'. In practical terms, most approaches to biodiversity offsets adopted worldwide involve metrics that entail a combination of area and condition of biodiversity, and one or more of the following broad types of action (BBOP 2008):

- **undertaking positive management interventions to restore an area or stop degradation**: improving the conservation status of an area of land whether by introducing suitable conservation management, restoring habitats or (where proven methods exist or there are no other options) reconstructing or creating habitat;
- **averting risk**: protecting areas where there is imminent or projected loss of biodiversity; entering into agreements such as contracts or covenants with individuals in which they give up the right to convert habitat in the future in return for payment or other benefits now;
- **providing compensation packages** for local stakeholders affected by a development project and an associated offset, so they benefit from and support the presence of the project and the offset.

An offset must show measurable, additional in situ conservation outcomes (i.e. not simply investment in research, training and awareness-raising). Most offset policies explicitly or implicitly require *in situ* conservation results that match the project's impacts, based on activities which continue at least for the duration of the impact. Activities such as, education and research to support this can be extremely valuable but are generally not regarded as a core part of the offset, unless they also give rise to measurable on the ground conservation outcomes.

In terms of delivery this might entail:

- purchase of land by a developer (whether private or public) on which these actions can be implemented, whether by themselves or on their behalf;
- agreements with existing landowners who are paid to undertake offset activities on behalf of the developer;
- paying a contribution to initiatives which achieve a beneficial outcome for biodiversity similar to that impacted but which may not be designed to offset a specific impact.

There are several aspects of biodiversity offset design which have proved to be controversial. Most of these are reflected in principles produced to accompany many policies and laws requiring offsets (see Section 3.4.1).

3 LESSONS LEARNED FROM INTERNATIONAL EXPERIENCE

This chapter considers what lessons can be learned from international experience concerning the establishment of legal and policy requirements for biodiversity offsets, their design and implementation.

3.1 Introduction

The practice of biodiversity offsets is growing, with over 30 countries now requiring some form of compensation for damage to biodiversity or having systems in place that require offsets[2]. The United States has required compensatory mitigation for wetlands since the 1970's. Australia has been actively developing biodiversity offset schemes at both federal and state level and has a variety of approaches to policy, law and market mechanisms in place.

The EU has built specific requirements for ecological compensation into the Birds[3] and Habitats[4] Directives in cases where the integrity of the Natura 2000 network might be compromised and is currently exploring use of biodiversity offsets more widely in Europe as a tool for biodiversity, both within and outside the Natura 2000 network. Member States vary in the extent to which they have developed specific laws and regulations requiring offsets. A system of ecological compensation has been operating in Germany since 1976 (the German Eingriffsregelung as defined in the German Federal Nature Conservation Act) independent of requirements under the Habitats Directive (Darbi *et al*., 2009) and there is growing interest in mitigation banking in France. There is increasing interest in market-mechanisms for trading biodiversity credits with discussion about more intensive use of market-based instruments to reach environmental goals (EEA, 2006).

Despite the growing adoption of offsets globally there is currently relatively little documented evidence of their effectiveness or economic efficiency compared to other policy instruments as many countries have only recently introduced explicit requirements for offsets. However comprehensive reviews have been undertaken in the United States and the effectiveness of ecomarkets has been tested in pilot projects in Australia. This chapter reviews the ways in which different countries have developed laws, policies relating to biodiversity offsets and the various approaches they have taken to implementation.

Summaries of biodiversity offset schemes operating in selected countries are included as Appendix A.

3.2 Policy on no net loss or net gain of biodiversity

Clear policy statements are important to clarify intentions for biodiversity outcomes and help to avoid controversy or confusion concerning the role and acceptability of offsets. It is essential for all parties (whether they are developers, regulators, environmental

[2] Among these are the USA, Canada, 27 Member States of the EU, Switzerland, Australia, New Zealand, Brazil, South Africa, Mexico and China.
[3] Council Directive 79/409/EEC on the Conservation of Wild Birds
[4] Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora.

consultants, specialist scientists or community groups) who are involved in developing or reviewing options for environmental offsets to understand what they are aiming for and clear policy can clarify goals and objectives as well as reducing risk of inappropriate application of offsets.

Box 4 The need for clarity in policy (EPA Western Australia 2006)

"The [Western Australian] Environmental Protection Authority (EPA) recognises that various offset policies and approaches are being developed and used without common overarching principles and acknowledges that there is the potential for inconsistent messages to be given. In addition there is some concern from the community about what offsets should and shouldn't be".

Policy that articulates a goal of no net loss or net gain can have a powerful influence on practice. The first explicit 'no net loss' policy was introduced for certain types of wetland in the United States in the early 1970's and it was this policy which triggered the various compensation banking initiatives which have evolved since, though legal provisions requiring compensatory mitigation have obviously also played a key role. Review of the effectiveness of the wetland mitigation banking system in achieving the national policy of 'no-net loss' of wetlands after 15 years of operation (National Research Council, 2001) showed that wetland mitigation projects had not always satisfied the basic goal of restoring and maintaining the quality and quantity of the country's wetlands. Following this review the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers developed new standards to promote no net loss of wetlands and strengthened wetland restoration and protection policies (US EPA, 2008[5]).

EU policy has also had a strong influence, as demonstrated by the emergence of 'Habitats Regulations Assessment' under the Habitats Directive and its application to plans and projects likely to have significant effects on any Natura 2000 site (sites designated under the Birds' or Habitats Directives). The Habitats Directive is, in effect, a 'no-net-loss' policy, in so far as it requires all Natura 2000 areas to be protected from deterioration and damage. A plan or project likely to have a significant effect on any Natura 2000 site must undergo assessment to determine whether it would damage the *ecological integrity* of the site. If the plan or project is assessed as having the realistic potential to adversely affect site integrity, it can only proceed where there is no alternative location, and where its implementation is of overriding public interest.

Stricter criteria are applied where a site contains a priority interest. As with all European Directives, the Habitats Directive is a framework-policy, so that detailed implementation is the responsibility of national governments (Ledoux *et al*., 2000). The implications of EU policies and requirements for development of a system of biodiversity offsets in England are considered further in the following chapter. In particular, Chapter 4 considers the potential benefits of extending the precautionary 'no net loss' policy which is currently applied largely to the Natura 2000 network to all ecosystems and biodiversity, allowing offsets to increase the 'stock' of habitat in the landscape and therefore contribute to more climate-resilient habitat networks.

[5] http://www.epa.gov/wetlandsmitigation

Box 5 Examples of policy on 'no net loss' or 'net gain' of biodiversity

The principle of 'no net loss' for all biodiversity is enshrined in international commitments and targets under the Convention on Biological Diversity.

The United States has a national policy of 'no net loss' for certain types of wetland.

In Australia National Objectives and Targets for Biodiversity Conservation (Environment Australia, 2001) have been established with the aim of reducing the national rate of land clearing to zero.

In 1997 the Australian State of Victoria's Biodiversity Strategy established net gain in the extent and quality of native vegetation as a primary objective.

In Western Australia offsets are intended to "ensure that significant and unavoidable adverse environmental impacts are counterbalanced by a positive environmental gain, with an aspirational goal of achieving a 'net environmental benefit'".

In the EU, 'no net loss' and precautionary policy apply to sites designated under the Birds' and Habitats Directives.

Initial learning from offset experience suggests that a consistent value metric is fundamental to the definition of no net loss and therefore effective implementation of policy. In existing and proposed schemes (e.g. Queensland Government) this is normally construed to mean habitat units that can be scored on a 'like for like' basis with some flexibility over strict equivalence (see Section 3.5.3 for an example).

3.3 Laws requiring offsets

Several countries have laws requiring offsets. This section summarises selected examples to illustrate differences in requirement.

In the United States, public agencies and private developers are legally required to avoid, minimise or mitigate adverse impacts on certain types of habitat as a pre-condition for obtaining permits which authorise land development. Offsets may be required for unavoidable impacts on wetland and aquatic ecosystems under the Clean Water Act 1972 Chapter 404(b)(1) and the US Army Corps of Engineers regulations (33 CFR 320.4(r)). The 1973 Endangered Species Act carries a similar obligation to provide offsets for unavoidable impacts on habitat for listed species. A key provision of these laws is the possibility of off-site mitigation by third parties where public authorities determine that it is feasible and appropriate (Bishop, 2004). In addition to federal laws, 23 states had statutes or regulations in place authorising the use of mitigation banks by 2001 (Environmental Law Institute 2002).

In Australia, offsets are triggered as a requirement at the federal level under the Environmental Protection and Biodiversity Conservation Act 1999 and by planning and conservation laws in a number of States and Territories. Several States have introduced regulations and planning guidance notes to give effect to this legislation. These vary in terms of the biodiversity components addressed, some requiring offsets only for permits to clear native vegetation, others requiring them for potential impacts on particular threatened species and some for both. In the State of Victoria, 'native vegetation offsets' are required under planning law. Following avoidance and minimisation, the Victorian system requires developers to offset impacts on native vegetation as a condition for planning approval, according to the Native Vegetation Regulations under the Planning and Environment Act. However, there is no explicit conservation banking legislation (unlike for BioBanking in NSW, see Appendix A). When they present an application for permission to clear native vegetation, developers are obliged to have considered the requirements set out in a key 2002 policy document 'Victoria's Native Vegetation Management: A Framework For Action', which is incorporated into the Native Vegetation Regulations. Other interpretative guidance is available but not legally binding. While this makes the Department's mandate for offset requirements fairly contestable (e.g. appealable to the Victoria Civil and Administrative Tribunal), it has been broadly accepted by developers and farmers and allows flexibility as the offset requirements can be amended and updated without the need for amended legislation.

In Germany, compensation is required for unavoidable impacts under the Eingriffsregelung (impact mitigation regulation, 1976), which is based on the Federal Nature Conservation Act (Bundesnaturschutzgesetz). The Eingriffsregelung has been in place since 1976 and requires developers to avoid impacts on nature and landscape (Darbi *et al*., 2009). In the case of unavoidable impacts, the project developer has to implement appropriate measures of nature conservation or landscape management to compensate. This law differs from some others requiring offsets in that it has a broad field of application to the entire ecosystem and its capacity and natural scenery. The Eingriffsregelung therefore includes an obligation to conserve the status quo via avoidance (preventive approach) and also to compensate for unavoidable impacts (corrective approach). As laid down in Article 18 of the Federal Nature Conservation Act, the application of the Eingriffsregelung begins with the identification and evaluation (in terms of significance) of the impacts of a project, plan or action on nature and the landscape. Due to the very broad meaning and scope of "ecosystem and landscape scenery" and a comprehensive spatial approach, however, most actions that are subject to authorisation are obliged to carry out such an assessment, regardless of the size of the action and whether a particularly valuable area is affected or not (Peters *et al*. 2002 in Darbi *et al*., 2009). This broadens the remit of EIA as generally applied under the EU Directive and also extends requirements for ecological compensation to biodiversity in the wider countryside, rather than having a focus purely on designated sites and protected species. It also places a great deal of importance on interpretation of what constitutes a significant impact which requires an offset, which is notoriously difficult.

3.4 Overview of delivery mechanisms

Various approaches have been taken to implement policies and laws requiring offsets, as summarised in Section 3.2, some countries using more than one. Early policies on biodiversity offsets such as the Clean Water and Endangered Species Acts in the United States and the Birds and Habitats Directives in Europe tend to rely on regulations which require ecological compensation or biodiversity offsets under certain prescribed circumstances. So far there has been limited or no use of mitigation banking as a mechanism to deliver ecological compensation for unavoidable impacts on European designated sites of the Natura 2000 network, but there is growing interest in it, particularly for coastal ecosystems affected by both coastal squeeze and infrastructure development (Crooks and Ledoux, 2002).

More recent policy models in Australia and South Africa have incorporated sets of principles for biodiversity offsets or developed market-based mechanisms. The State of Victoria in Australia[6] is using three principal government-intermediated mechanisms to achieve no net loss of native vegetation in the context of development:

- **Native vegetation offsets**: these are required under planning law. Offsets for relatively minor projects are regulated by local authorities using a very basic area/ratio calculation. Offsets for more significant projects are referred to the Department of Sustainability and the Environment (DSE), which calculates loss/gain using a 'Habitat Hectares' method, although there are alternative, simpler metrics for offsets for scattered and large old trees.
- **BushBroker**: a market-based and computerised system for matching credits to specific offsetting requirements, following which the buying and selling of native vegetation credits is undertaken by the owners and buyers of credits or their agents. BushBroker also registers expressions of interest by landowners in supplying credits. Presently, it oversees the registration, listing, extinguishing, and quality control of native vegetation credits agents, but this function will, in future, be transferred to the Native Vegetation Credit Register (below):
- **The Native Vegetation Credit Register**; a computer-based function for the registration, listing, extinguishing, and quality control of native vegetation credits, registering the contact details of buyers and sellers, credits registered, and sales made.

[6] http://www.dse.vic.gov.au/DSE/nrence.nsf/

Box 6 Different approaches to implementing biodiversity offset law and policy

Approach[7]	Examples
Principles-based approaches with or without accompanying legal requirements and/or guidance.	- Several states in Australia including Queensland, West Australia and New South Wales. - Provincial Government of the Western Cape of South Africa (2008). - BBOP (2009), based on consultation with stakeholders from several countries (see Appendix B).
Market mechanisms including systems of tradeable credits or auction-based approaches.	The State of Victoria, Australia has developed various forms of eco market: BushBroker is a system of tradeable credits.
Mitigation and conservation banks.	Mitigation banks have been operating in the United States since the 1970's. Wetland mitigation banks are used to offset development impacts on wetland habitats in accordance with the Clean Water Act and no net loss policy. Conservation banks are used to offset impacts on threatened species and their habitat. Other countries also have some examples but at a lower level of implementation.
Guidance on good practice	- United States for wetland mitigation banks[8]. - Provincial Government of the Western Cape of South Africa. - BBOP[9] for businesses undertaking voluntary offsets and for other parties wishing to design or implement offsets.

3.4.1 Guiding principles for biodiversity offsets

Sets of principles have been produced by several governments to implement policy and regulatory requirements, including the Western Cape's Department of Environmental Affairs and Development Planning in South Africa, the Queensland Government in Australia (Queensland Government, 2008), and the Environmental Protection Agency in Western Australia. Principles have also been produced by some industry or business coalitions on a voluntary basis to guide good practice. Draft voluntary principles produced by the Business and Biodiversity Offsets Program (BBOP) in February 2008 are presented in Appendix B.

Principles adopted worldwide overlap to a considerable extent, the majority addressing the following issues:

- The need for design and implementation of biodiversity offsets to comply with all relevant national and international law(s).
- The fact that offsets should be used only for residual adverse impacts and impacts should first be avoided by using all reasonable and cost-effective prevention and mitigation measures (application of the mitigation hierarchy).
- The need for offsets to achieve no net loss of biodiversity or preferably a net gain 'on the ground'.
- The need for offsets to achieve 'like for like' replacement, or if this is not possible, the conservation of biodiversity of at least as high significance as that

[7] Note that these approaches are not mutually exclusive: conservation banks may be one way to apply a principles-based approach, for example and there are some overlaps between banks and other market-based mechanisms, as both involve sales of biodiversity credits
[8] EPA, www.epa.gov/owow/wetlands/guidance/mitbankn.html
[9] www.forest-trends.org

affected by a proposed development or 'better' ('trading up').This is sometimes stated as 'like for like or better'[10].

- The fact that offsets should not be pursued if there would be residual adverse impacts on biodiversity, where the biodiversity values lost cannot be replaced.
- The need for offsets to be designed and implemented in an equitable manner, such that any rights and responsibilities, risks or rewards associated with a project are shared in a fair and balanced way among stakeholders.
- The need for offsets, and any mitigation undertaken before offsets are agreed, to be enduring and enforceable (e.g. through conditions, covenants or contracts).
- The need for offsets to constitute 'new' or additional conservation activities. Existing actions or previous offsets can not be used to offset a new activity (the principle of 'additionality').

In addition the following are included in one or more sets of principles in current use:

- Offsets should be based on sound science and sufficient, reliable and relevant information.
- A precautionary approach should be taken in cases where there is a possibility of a residual adverse impact on important or 'critical' biodiversity and levels of uncertainty are high, whether this relates to the likely significance of a residual adverse impact or the likely success of an offset.
- Offsets must be located appropriately[11], according to biodiversity priorities in the area and in support of any strategic biodiversity plans which are in place.
- Offsets in the most appropriate form must be secured before development commences, to give assurance of effectiveness.
- Offsets must consider all significant impacts on biodiversity: direct, indirect and cumulative impacts.
- Offsets must consider the risks that they may not achieve ecological outcomes (i.e. include a contingency factor). This may be reflected in the use of multipliers.
- Offsets must consider primarily the use but, where at all possible, also the non-use, values of biodiversity and ecosystem services to affected communities in particular, and society as a whole, and should involve affected parties in their design.
- Offsets should not create more impacts that would in turn need compensation (unless the latter can be accommodated within the offset).

Principles that might be appropriate in an English context are suggested in Chapter 5.

[10] It is generally accepted that, as far as possible, offsets should be '**like for like**' (for example, impacts on a particular habitat type should be offset through conservation, restoration, or creation of the same woodland type). Recognising that such a rule could constrain offsets and limit opportunities to invest offset funds and efforts in biodiversity which has greater priority, has tended to result in a rule of 'like for like ***or better***'. There are important consequences that follow from this rule. In an English context, for example, achieving like-for-like replacement requires precise definition of habitats and sufficient knowledge of their relative priority for acceptable trade-offs between habitats to be determined. Is it acceptable to exchange saltmarsh habitat for freshwater grazing marsh, for example?

[11] Most offsets are '**off-site**' as they are most likely to come into play when options for on-site mitigation are limited or have already been used. This may make it necessary to define a geographical area within which delivery of an offset can be considered acceptable. 'Offset receiving' or 'offset service' areas may therefore be defined for this purpose, whether on the basis of ecosystem limits (e.g. within a water catchment) or on the basis of continued access to ecosystem services by the same communities that have been affected by the impact.

3.4.2 Market mechanisms

Basic offsetting (where a developer undertakes conservation actions to offset the impacts of its own project) is one end of a spectrum at the other end of which is the potential for offset credits to be banked and or traded. In such banking and trading models, credits can be established prior to the impacts they are designed to offset (overcoming the issue of temporal loss of biodiversity) and enabling credits to be drawn down when needed (supporting speedier project planning and approval times). Such a system means that developers do not have to deliver offsets themselves and can buy a credit from a bank instead. These forms of offset arrangement are a basis for creating market-tradeable conservation and/or (property) development rights. In essence these mechanisms offer potential to deliver (weakly) sustainable development at least social cost to society.

The use of Market-Based Instruments (MBIs) is well-established in environmental management, in particular in the efficient regulation of air and water pollution and solid waste management. There are three broad categories of MBI (See Table 1). *Price-based* instruments such as an environmental (or development) tax provide certainty to industry as to the compliance costs of achieving an outcome, but the environmental outcome generated to the broader community is uncertain. *Rights (or quantity)* based instruments can be designed to control the quantity of the environmental good or service (or a suitable proxy) to the socially desired level. These instruments provide certainty as to the environmental outcome but not the cost to industry of achieving that outcome. *Instruments designed to reduce market friction* are less common. They aim to stimulate a market to produce a desired environmental outcome by improving the workings of existing markets by reducing transaction costs or improving information flows. Responses to market friction (e.g. product labels) tend to be less certain and longer term.

MBIs have potential efficiency properties that make them preferable to command and control regulation, which simply mandates actions that all agents must comply with, even if compliance is more costly for some than others. MBI's use this compliance cost difference in an inventive way. For example, the efficiency gains of (pollution) emissions trading systems lie in allowing overall pollution abatement goals to be undertaken by those who can do it most cheaply. Thus a pollution limit or bubble is first set by the regulator. This in turn defines a limit to an initial allocation of permit to all polluters by auction or by so-called grandfathering based on historic emissions. Both high and low cost emitters are typically in receipt of allowances. When trading is allowed, the result is low cost mitigation being undertaken by efficient producers who then sell permits to (high cost) less efficient polluters who find it more cost effective to pollute while holding allowances. The pollution threshold is therefore achieved at least cost to society. The same efficiency gains could apply to trading of biodiversity credits and their delivery in the most suitable locations, with attendant economies of scale.

Further fundamental advantages of MBIs are that they seek to address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services. Market failure, in the case of biodiversity, arises from the characteristics of biodiversity benefits.

The main regulatory difficulties are:

1. biodiversity related goods and services are often public goods;
2. the use or conservation of biodiversity is associated with external effects; and
3. asymmetry of information between those paying for conservation measures and those carrying them out. In the context of biodiversity this simply exacerbates inherent scientific uncertainties about the status of biodiversity at any given location.

How do all these theoretical properties of MBIs apply to offsets? Biodiversity offsets nominally provide for the maintenance of some form of related public good, though the definition of the public good is crucial, as is its spatial and temporal provision. It also turns out to be easier to offset or replace some public good values than others. Recreational and some forms of aesthetic value are relatively easy to address, for example, whereas the complexity of biodiversity presents particular problems.

Biodiversity is spatially heterogeneous and spatial proximity of impact and offset sites matters (Hartig and Dreschler, 2009). If it takes time to establish an offset, the interim temporal losses also need to be accounted for. Achievement of 'no net loss' is very much dependent on what is offset, where and when. Efficiency gains are not guaranteed if 'like for like' replacement of biodiversity is demanded as there will be limited flexibility with regards to where (or when) the habitat / ecosystem to be 'replaced' is required. This means that the market could not exploit a range of options as it could - for example – for reductions in greenhouse gas emissions as there are limited alternatives for spatially specific biodiversity benefits and hence limited scope for MBIs to reduce costs. Further advice on the comparative cost-benefit of biodiversity offset mechanisms would thus depend on more specific information on the degree of ecological equivalence required.

Table 1 Market-based instruments

Price-based	Rights-based	Market friction
• Emission charges • User charges • Product charges • Performance bonds • Non-compliance fees • Subsidies (materials and financial) • Removal of perverse subsidies/taxes • Deposit-refund systems	• Tradeable permits, rights or quotas • Offset schemes	• Reducing market barriers • Extension / education programs • Research programs designed to facilitate market exchanges • Labelling • Information disclosure

In terms of environmental externalities, the structure of an offset does allow for some form of internalization of development impact costs. Whether the offset rules are providing a sufficient incentive to avoid loss in the first place is a matter that reverts back to the choice of a weak/strong sustainability criterion. More practically, this is a question of how categories are defined for which offsets can and cannot be used. Alternatively, it is possible to mix forms of instrument, for example the use of performance bonds in conjunction with offsetting. Performance bonds are often paid

by the developer as insurance against the offset failing to deliver the required biodiversity benefit. The use of such an instrument would raise the likelihood that offsets would work but also provide a further financial disincentive to offset, i.e. maintaining focus on prevention and mitigation of biodiversity impacts. It is possible to tailor the design of offsets to maximize some of the theoretical efficiency properties associated with MBI's, but the specific characteristics of biodiversity and the currently inexact nature of the offset relative to the residual cost is something of a compromise.

Information asymmetry is perhaps a particular advantage of market-based offsets. In essence, land owners and developers know more about their land than government. They can therefore choose to develop less biodiversity-rich sites and offset accordingly. However, asymmetry of information and limited monitoring also provides incentives for strategic behaviour to under-offset. Depending on the specific offset scheme, monitoring and transaction costs can be high. Under a banking and/or auction scheme, some part of these costs can be reduced through the use of brokering functions that can reduce transaction costs for participants. Stavins (1996) defined transaction costs as inputs of resources, or the difference between the buying and selling price of a commodity. In other words, when there are transfers of any property right, parties in the exchanges have to find and communicate with each other and this incurs costs.

As is the case with atmospheric pollution, the most attractive property is in the potential to exploit the issue of cost heterogeneity inherent in matching 'like for like' in conservation terms. The stringency of the offsetting requirements (particularly ecological equivalence) will be a significant determinant of the demand and supply of offsets. Any restriction on market conditions by increasing the stringency of ecological equivalence requirements will reduce the potential for efficiency gains to be realized. Suppose, for example that the favored option is offsetting combined with banking and trade in biodiversity credits. In this case, the flexibility comes in terms of:

- Type: How flexible is the like for like criterion in ecological terms?
- Space: how flexible can a system be in terms of spatial requirements for the offset i.e. location, connectivity, contiguity of sites e.t.c..
- Time: the extent to which there is exact temporal congruence between offset and development.

Wissel and Watzold (2008) discuss how each of these requirement categories can be varied in scheme design, but point out that any design ends up trading off a number of factors that ultimately determine the efficiency of design, specifically:

- Market activity: in essence stricter requirements lead to fewer restorations or offsets and therefore – in the case of a trading regime - less market activity. Fewer trade options can exacerbate potential issues of market power exercised by both suppliers and those demanding offsets. Market power can reduce market efficiency; trades take place at a higher cost to society than they would under a more competitive market with many participants. On the other hands, stricter requirements and thus more costly offsets may also create economic incentives to avoid damage in the first place.
- Transaction costs: are affected by decisions on initial permit allocations and the amount of time participants (those looking to buy or sell offsets and those regulating and monitoring the market) have to spend finding out about each

other. These costs are therefore related to market activity with better information generally deriving from more fluid markets with more participants.
- Cost effectiveness: minimizing costs can be traded against the strictness of the ecological equivalence objective (or numerator).

These issues affect demand and supply side incentives and so do existing returns to alternative land uses.

The way in which market-based schemes to trade biodiversity credits have been established in Victoria, Australia, is a response to this need for effective communication and exchange of information in order to reduce overall transaction costs and enhance the efficiency of the offsetting process.

Loss of endangered native vegetation has stimulated a requirement, under the Native Vegetation Act in Victoria, Australia, for developers to seek to avoid and minimise impacts on native vegetation, and to offset residual impacts. A number of biodiversity offsets tools have been developed to help achieve this. One is the 'habitat hectares' metric for quantifying projects' impacts on native vegetation and balancing these with gains resulting from offsets (see section 3.5.4). Another is the use of market-based mechanisms for delivering the desired policy goal of a 'net gain' of native vegetation, including an offset scheme called BushBroker (see Box 7). It is important and interesting to note that the system entails a fairly strict ecological equivalence requirement, involving several hundred difference types of biodiversity credit. A developer must obtain credits of the kinds that match the impacts caused by its project. Selling credits to developers needing offsets is just one way in which landowners in Victoria can generate income from conservation gains on their land. The state offers several other incentive schemes, such as 5-year agreements under BushTender (an investment by government of Aus$9m since 2001) and PlainsTender (Aus$2.6 since 2004/5), in which it pays landowners to generate conservation gains on their land. While the potential income per habitat hectare from these schemes is an order of magnitude less than can be earned by providing a credit for an offset through BushBroker, there have been more transactions and they have involved much larger areas of land than have offsets. BushTender has involved 17,000 ha. to date and PlainsTender 5,000 ha, compared with under 500 ha. of offsets through BushBroker (Kerry ten Kate pers. comm.).

Mitigation (or conservation) banking (see following section) and market-based systems for trading offsets are neither truly distinct nor mutually exclusive, for instance conservation banking operates through sales of credits, just as market mechanisms do. There is no reason why both approaches should not be used in combination.

Box 7 Bushbroker

Summary description:
Bushbroker is a system to establish, register and trade native vegetation credits (where a native vegetation credit is a gain in the quality or extent of native vegetation) because clearing of native vegetation that requires planning approval must be offset by a gain elsewhere.

Landowners register their interest in delivering credits with Bushbroker. A field officer for the Department of Sustainability and the Environment works with the landowner to prepare a draft management agreement as the basis for the establishment of native vegetation credits and also calculates the number of credits potentially available, based on the habitat gains achievable through the management plan. Potential buyers of credits can search the BushBroker database for native vegetation credits that could match their specific requirements. BushBroker provides relevant information to the buyer, who can then progress a trade. Trading of credits (i.e. negotiations over price) is between the buyer and seller. BushBroker is not involved other than to record trading information such as new ownership details of the credits. A web-based system is proposed.

Policy/ legal trigger
The clearing of native vegetation in Victoria is regulated by the Planning and Environment Act 1987. In most cases permitted clearing of native vegetation must be accompanied by the identification of an appropriate offset vegetation offset.

Regulator:
Department of Sustainability and Environment (DSE). Responsible for agreeing the number and type of credits that can be registered and determining the number of credits required for the offset.

Offset rules
- 'Like for like' requirement in terms of habitat type. There are some 700 combinations of bioregion and ecological vegetation classes, each generating a different class of credit (although a much smaller number of credit types has been traded in practice so far). This precision in the definition of credits supports a fairly stringent 'like for like' approach.
- A credit can only be used for an offset once.

Benefit for biodiversity:
Helps to avoid the problems of managing several scattered, small areas of native vegetation which are unlikely to be sustainable in the longer term.

Benefit for developers:
Provides a simple and secure process for locating third party offsets (subject to approval from the responsible authority).

Benefit for landowners:
Represents an opportunity to improve biodiversity on their property, as well as generate a potentially new income stream from their native vegetation.

Costs/benefits
- Benefits local government through reduced administrative costs.
- Reduces overall transaction costs by facilitating the process of finding suitable offsets.

The price of native vegetation credits is determined by supply and demand. Because some vegetation types are scarcer than others, prices for credits vary.

How permanence is assured
Offset agreements under Bushbroker are subject to secure and permanent agreements registered on land title. http://www.dse.vic.gov.au

3.4.3 Mitigation or conservation banking

Conservation banking (or mitigation banking[12]) is a specific mechanism in which initiation of offset implementation takes place prior to approval for development impacts. This section refers to 'mitigation' and 'conservation banking' as developed in the United States, but it is important to note that these are forms of 'compensation' banking as understood in the EU. An area of land is generally protected, restored or enhanced for the purpose of providing compensation for unavoidable impacts on another area and is usually established by a government agency, business, nonprofit organization, private landowner or other entity under a formal agreement with a regulatory agency. The biodiversity benefits generated through offset actions that have been initiated (but may not have fully matured) are 'banked' and later sold as mitigation credits to developers to offset residual impacts from approved development projects (Cox and Kotze, 2008). Purchase of an appropriate number and type of credits is generally a condition of planning approval. Credits might be based on quantification of habitat characteristics, ecosystem processes, values or functions and can be either withdrawn by single users, or sold piecemeal to a number of developers.

Conservation (or compensation) banking is just one way in which offset requirements can be met. In the United States and in New South Wales, Australia, there is explicit mitigation or conservation banking legislation. In the State of Victoria, Australia, developers can purchase native vegetation credits from registered landowners as one option for meeting offset requirements, as outlined in the previous section. They are not required to do so by law, but may choose to take this route to fulfill their offsetting obligations for reasons of expediency or cost.

Most experience in the operation of compensation banks comes from the United States, where they have been used to compensate for losses of wetland ecosystems (wetland mitigation banks) or habitat for threatened species ('conservation banks'). Mitigation banks generally have four distinct components:

- a bank site - the area of land restored, established, enhanced, or preserved;
- a bank instrument[13] - the formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval;
- provision for regulatory review, approval, and oversight; and
- a service area - the geographic area in which permitted impacts can be compensated for at a given bank, i.e. the area within which credits are allowed to be purchased.

Various advantages are claimed for mitigation banking, both from an ecological perspective and with respect to economic efficiency. Guidelines accompanying US federal guidelines on wetland mitigation banking refer to the environmental benefits of consolidating mitigation into larger areas of wetland. The National Research Council (2001) argued that opportunities for wetland mitigation or compensation on a development site are typically constrained by hydrological conditions that are likely to be modified by the developments requiring mitigation, hence '*opportunities for in-kind compensation need to be sought within a larger landscape context'*. They also assert that bankers can often provide higher quality mitigation at lower cost, due to economies

[12] In the USA, 'mitigation banking' is associated with wetland mitigation (offsets) under the Clean Water Act, whereas 'conservation banking' is associated with offsets for impacts on particular species under the Endangered Species Act.

[13] A bank's instrument identifies the number of credits available for sale and requires the use of ecological assessment techniques to certify that those credits provide the required ecological functions.

of scale and the specialist skills required to deliver credits. Developers are able to transfer responsibility to experts and don't have to engage in the process of identifying or procuring suitable land or the specialists needed to undertake management. Likewise, regulatory agencies find it easier and cheaper to oversee a few large mitigation banks than several small, separate mitigation projects (Bishop, 2004).

There have also been many recorded failures, but many of these could apply to most kinds of biodiversity offset and are not unique to mitigation banking. In a review of the literature regarding the merits of the banking system, Cox and Kotze (2008) reported that a high proportion of these were related to lack of regulation by the state of banks operated by 'third party bankers'. Another contributory factor was the acceptance by regulators of proposed offsets which relied for their success on untried, untested or ineffective techniques for restoration or creation of new habitat. Problems can also arise where offsets are required for habitats with very exacting requirements for which limited suitable offset sites can be identified. There is considerable inherent uncertainty in attempting to restore habitat functions after the original habitat has been lost (Roberts, 1993; Zedler, 1996). As pointed out by Kustler and Kentula (1990), total duplication of natural wetlands is impossible due to their complexity and subtle relationships between hydrology, soil, vegetation, animal life and nutrients which may have developed over thousands of years. These problems are particularly apparent in terrestrial habitats, such as mature forests and peat systems (Crooks and Ledoux, 2002). In addition to the concerns surrounding effective implementation, the need to derive tradeable credits can result in over-simplification of biodiversity such that less tangible aspects of biodiversity, such as long-term ecosystem functioning or aesthetic value are not taken into account, with a consequent undervaluing and overall loss.

Experience in the U.S. and in Australia emphasises the need for a balance to be struck between the level of regulation required to ensure ecosystem quality is maintained, and over-regulation which drives mitigation costs up and can drive mitigation supply down as a consequence (Ledoux *et al*., 2000).

Box 8 United States Wetlands Mitigation Banking (after ten Kate *et al*., 2004)

A specific category of mitigation banking. While the process of mitigation banking commenced with the no net loss requirement for wetland ecosystems as summarised here, conservation banking is now be used for a wider range of habitats and for individual threatened species.

Summary description:
A wetland mitigation bank is privately or publicly owned land managed for its wetland values. In exchange for permanently protecting the wetland, the bank operator is allowed to sell habitat credits to developers who need to satisfy legal requirements for compensating wetland impacts of development projects.

Policy/ legal trigger
The US Clean Water Act 1972 Chapter 404(b)(1) and the US Army Corps of Engineers regulations (33 CFR 320.4(r))

Offset rules
Application of the mitigation hierarchy/ a sequential approach:
Developers whose plans will damage wetlands need to obtain permits from the US Army Corps of Engineers. To obtain a permit, developers must first prove that the wetland damage is "unavoidable". They must then seek to minimise any adverse impacts on those wetlands that cannot reasonably be avoided and finally, they must provide "compensatory mitigation" for unavoidable adverse impacts that remain after all minimisation measures have been exercised. The developer must demonstrate that other wetlands, of "similar functions and values", and in a specified "service area" (determined by the Army Corps of Engineers), have been "protected, enhanced, or restored" to compensate for those that will be damaged.

In theory, for every hectare of wetland destroyed, a hectare (and usually more) of comparable wetland must be restored or recreated within the defined "service area".

Use of mitigation bank credits must occur in advance of development, when the compensation cannot be achieved at the development site or would not be as environmentally beneficial.

Regulator
US Army Corps of Engineers

Benefit for biodiversity:
Helps to consolidate small, fragmented wetland mitigation projects into large contiguous sites which will have much higher wildlife values.

Benefit for developers:
Saves developers time and money by providing them with the certainty of pre-approved compensation lands and provides for long-term protection and management of habitat.

Benefit for landowners:
Offers landowners economic incentives to protect natural resources.

Benefit for government
Benefits local government through reduced administrative costs.

How permanence is assured
e.g. through the bank 'instrument' which constitutes a formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval.

3.5 Key aspects of biodiversity offset design

Practical approaches to the design of biodiversity offsets vary considerably, but most require the issues identified in Table 2 to be addressed in some form and in some order. The following sections draw on existing approaches to biodiversity offsets worldwide to explore key aspects of offset design and implementation which might have to be addressed to design an effective system of biodiversity offsets for England.

3.5.1 Biodiversity-based criteria/ thresholds for deciding when an offset is appropriate

Most biodiversity offset schemes in operation worldwide set out the circumstances under which offsets are likely to be considered appropriate. In some cases upper and lower thresholds have been established where offsets are considered to be inappropriate above the 'upper threshold' or unnecessary below the 'lower threshold'. In Western Australia, for example, an offset is considered to be inappropriate in any case where "residual environmental impacts are expected to have an adverse effect on 'critical' or 'high value' assets" or where the biodiversity values to be lost cannot be replaced. Offsets are used where residual environmental impacts are significant and are considered capable of being offset, but are not so significant that the development should not proceed on environmental grounds.

Box 9 Thresholds for biodiversity offsets

- Biodiversity offsets are not appropriate for 'critical' or 'non-substitutable' biodiversity assets which cannot be replaced using known techniques or within reasonable timeframes.
- Biodiversity offsets are appropriate for residual impacts on important biodiversity which can be replaced with known techniques and within reasonable timeframes, and for which suitable land is available.
- Biodiversity offsets may not be necessary for biodiversity which is not threatened, has a wide distribution and is exposed to relatively trivial impacts.

Offsets are only possible if the biodiversity affected is substitutable, e.g. if a similar habitat can be re-created and this is possible with acceptable cost and within an acceptable time frame. For offsets requiring restoration, an important consideration is therefore the extent to which important or 'high value' biodiversity can be replaced. Morris *et al*. (2007) reviewed literature on the restoration of UK habitats and found considerable differences in the timescales needed to create conservation habitat of a comparable quality to undisturbed, 'high quality' examples of the same type. Whereas some wetlands may take just a few years to restore, some woodland might take hundreds of years. There may also be habitats or species with such exacting requirements that suitable conditions for their restoration are inherently rare, limiting practical opportunities for offsets. Offsets involving restoration would also be inappropriate in case where knowledge of ecological requirements is poor or if there are no tried and tested techniques for restoration.

Table 2 Issues to be addressed in biodiversity offset design

Defining circumstances in which use of biodiversity offsets is appropriate	Most policies and schemes worldwide set out the conditions under which biodiversity offsets are required or likely to be accepted by regulators, based on the significance of biodiversity affected and the nature of the anticipated impacts. ***This has implications for the acceptability of a project as well as the appropriateness of offsets as a mechanism. It also has implications for 'equity' with respect to the extent of developer responsibility to compensate for past losses of biodiversity***
Having a clear mechanism to confirm there is a significant residual adverse impact on biodiversity for which an offset might be required	Biodiversity offsets are a form of compensation and are generally intended to deal with significant residual effects on biodiversity that remain after other appropriate actions have been taken to avoid them or reduce them to acceptable levels, whether these are mitigation measures recommended through an environmental assessment process or other conditions on development consent. There are two important considerations here: whether the biodiversity affected is of concern and whether the impact has exceeded defined thresholds of significance. ***This has implications for other available policy, legal and practical mechanisms for avoidance and minimization of impacts and their effectiveness. Determining impact significance can be controversial and may require guidance.***
Establishing the target or subject of the biodiversity offset, defining ecological 'equivalence'	Most successful biodiversity offset schemes are based on clearly defined targets or aims for the outcome of the offset (i.e. the desired end result in conservation terms) and define what constitutes a 'like for like' exchange. ***This has implications for how conservation status or significance is defined and therefore how targets and objectives are articulated in national and local biodiversity action plans and in spatial plans. It also has implications for local opportunity mapping.***
Having an agreed method to quantify biodiversity losses associated with the project and required gains through an offset.	Appropriate methods and metrics are needed to demonstrate that 'no net loss' will be achieved, by quantifying residual losses due to an impact and required gains through an offset. The information needed to do this may go beyond that normally available e.g. through Environmental Impact Assessment for a proposed project. ***This has implications for how SEA and EIA are conducted as most fail to quantify impacts or assess condition in a consistent way. How losses and gains are measured can be controversial.***
Achieving additionality.	Most offset principles and schemes stress the need for 'gains' achieved through offsets/credits to be 'additional' to what would have happened without the offsetting efforts. ***This has considerable implications for existing duties of care where offsets are delivered on existing designated or high biodiversity areas and how this is codified.***
Selecting offset locations and activities.	Optimal location of biodiversity offsets depends considerably on spatial context within the landscape and on 'real world' opportunities and constraints (biological, economic, social and political). Alternative locations and activities may need to be compared to select those which optimize potential gains (also taking into account local community access). This will depend on restoration potential, background rates of loss, and likely success of alternative offset interventions. ***This has implications for data management and in particular creates a requirement for consistent and reliable biodiversity mapping at all scales of planning which is not currently available in England.***

3.5.2 Confirming there is a significant residual adverse effect

There are two important considerations here. The first is to confirm that all reasonable measures have been taken to avoid and minimise impacts, so that those remaining can be considered 'residual'. The second is to establish whether those residual impacts are really 'significant', and thus merit an offset. How these issues are addressed depends to a great extent on how the likely impacts of proposed developments on biodiversity are identified, assessed and managed in different countries. In the majority of countries which have implemented systems of offsets, however, formal environmental assessment is carried out (whether at strategic or project level, or both), with an associated requirement to supply evidence to planning authorities that the mitigation hierarchy has been applied.

'Residual': the need for biodiversity offsets to be considered as a 'last resort' to compensate for residual adverse effects on biodiversity remaining after all reasonable measures have been taken first to avoid and minimize impacts – including indirect and cumulative impacts - is enshrined in most existing principles for biodiversity offsets. This is largely because protection of biodiversity is best achieved *in situ,* by avoidance of any development impact 'at source' and because there is always some uncertainty about the effectiveness of ecological restoration or rehabilitation. It is therefore considered appropriate to consider offsets only when the mitigation hierarchy has been appropriately applied. This is clearly reflected in the EU Habitats Directive Article 6(4) and is a strict requirement in the UK for impacts on Natura 2000 sites (Dodd, 2008). There is relatively little guidance available concerning what constitutes a reasonable level of effort in terms of applying the mitigation hierarchy, however, and this can have a considerable bearing on how residual adverse impacts are defined and quantified.

Guidance produced for the Western Cape of South Africa (Department of Environmental Affairs and Development Planning, 2008) requires proponents of development to demonstrate that a positive, 'planning with nature' approach has been adopted before biodiversity offsets have been selected as a solution by providing clear evidence that:

- all reasonable and feasible alternatives to avoid or minimize negative impacts on biodiversity and valued ecosystem services have been duly considered;
- the mitigation hierarchy has been followed, namely impact avoidance, impact minimization, and repair/restoration of impacted biodiversity;
- risks associated with either non-implementation, or ineffective implementation, of proposed mitigation measures have been assessed by the biodiversity specialist (e.g. risk of fire management not being implemented, and associated implications).

Biodiversity offsets are **not** considered by the authorities if inappropriate use is made of offsets as a negotiation tool to leverage environmental authorization, or unless evidence can be provided that full consideration has been given to reasonable and feasible alternatives that would avoid significant adverse impacts on biodiversity. EIA is the main vehicle for delivery of the necessary evidence, but it is not clear what criteria are used to determine whether full consideration has been given to alternatives or what constitutes a reasonable alternative.

In the State of Victoria, Australia, applicants for native vegetation clearance permits must spell out which steps they propose to take to avoid or minimise a project's impacts prior to considering offsets for residual impacts. Experience to date on behalf of the regulator suggests that rigorous offset requirements have resulted in proponents

revising their plans and putting more effort into the avoidance and minimisation parts of the hierarchy (Kerry ten Kate, pers. comm.).

'Significant': whether there is a significant residual adverse effect on biodiversity which might require an offset depends both on the importance and resilience of biodiversity affected (considered in the previous section), on the magnitude and significance of impacts and on the likely effectiveness of planned mitigation. In the context of the Western Cape, offsets are considered when residual negative impacts on biodiversity (confirmed through EIA) are found to be of 'medium' to 'high' significance (criteria for determining significance are provided in the guidance). It should be noted in this context that a new approach to assessing significance in Ecological Impact Assessment has recently been published under the auspices of the IEEM in the UK[14].

3.5.3 Establishing the target or subject of biodiversity offsets

Decisions concerning what should be priorities for offset activities and the biodiversity components to be benefited by offsets are influenced by:

a) Minimum and maximum thresholds for biodiversity offsets.
b) A replacement policy: e.g. 'like for like', or 'like for like or better ('trading up')'.
c) Whether policy supports 'trading up' in terms of conservation priorities, targets and objectives and if so what constitutes 'trading up' and when it is permissible and encouraged.

Offsets in Australia are generally based on the principle of 'like for like' or better and are required for specific, native vegetation communities (the equivalent of semi-natural vegetation types in England). Similarly, in the United States, under arrangements for wetland mitigation and conservation banking, developers must purchase credits for habitat similar to that which they intend to convert. Normally this means that they can only purchase mitigation or conservation credits within a defined 'service area' which includes comparable habitat. Under the EU Habitats Directive, appropriate habitat compensation is required on a 'like for like' basis where statutorily protected habitats or species listed in the Directive are adversely affected by development.

Comprehensive mapping of habitat in the Western Cape of South Africa has played a fundamental role in establishing offset requirements (Department of Environmental Affairs and Development Planning, 2008). Appropriate 'receiving areas' for offsets have been defined which reflect conservation priority, based on a comprehensive process of spatial biodiversity mapping and threat assessment. There are clearly established conservation priorities (based on current distribution and level of threat) which allow rules to be established concerning 'trading up'. Offsets are required for impacts on threatened and endemic habitats and species, and multipliers are used to determine the size of offset required.

In the State of Victoria, Australia, native vegetation is classified into bioregions within which ecological vegetation classes (EVCs) are identified and these are both mapped for the whole State. This helps to ensure that offsets fit within broader conservation plans, optimising the conservation benefits derived through offset investment and establishing the circumstances in which 'trading up' is possible or considered appropriate. Developers are required to assess conservation significance for ecological vegetation classes affected by their proposal (they may do this themselves

[14] http://www.ieem.net/ecia/

or hire consultants to do it on their behalf). 'Conservation significance' (what the UK IEEM Ecological Impact Assessment Guidelines call 'ecological value') reflects inherent conservation status (pre-assigned) and the importance of sites affected. The Victoria Department of Sustainability and the Environment (DSE) has established 'like for like' rules which also allow trading up and these are set out in a Framework for Action (Victoria, Department of Sustainability and the Environment 2002). Offset requirements reflect the conservation significance of vegetation on sites affected. The dividing points between these categories have been established on a slightly arbitrary basis, but boundaries of this kind help establish comparatively simple rules and straightforward paths that enable developers to know what is expected of them and what process to follow. While 'like for like' (same vegetation type, same bioregion, same conservation significance) is the presumption in Victoria (see Box 10), developers can choose to undertake offsets on higher conservation significance land ('trading up'). National, regional and local biodiversity plans and spatial strategies are instrumental in reducing the risk of impacts on important biodiversity and the costs of offsetting these impacts when necessary. They can reduce the potential for later conflict by allowing developers to use existing information on conservation priorities when planning their projects and offsets. They may also reduce the level of effort required in selecting and comparing alternative locations and assist in identifying and assessing cumulative effects.

Box 10 Rules for trading up, offsets in the State of Victoria

An offset on a site of 'Very High' conservation significance must result in a net outcome of 'a substantial net gain i.e. at least twice the calculated loss in habitat hectares' of the same vegetation type (EVC).

An offset on a site of 'High' conservation significance must result in a net gain of at least 1.5 the habitat hectares lost within the same EVC or a 'Very High' EVC in the same bioregion.

An offset for impacts on 'Medium' or 'Low' categories must result in an 'equivalent gain' (i.e. 1 x the calculated loss in habitat hectares) of any EVC in the bioregion or a Very High or High significance site in an adjacent bioregion.

If developers opt to trade up, they may be eligible for a 'discount' in the offset calculation through the application of a fraction multiplier that reduces the number of habitat hectares they're obliged to supply (Appendix H p16 of the Framework (DSE 2002):

High	➔	Very High	=	0.7 x offset (habitat hectares)
Medium	➔	Very High	=	0.5 x offset (habitat hectares)
Medium	➔	High	=	0.66 x offset (habitat hectares)

Figure 1 Appendix G from the From Victoria's Native Vegetation Management: A Framework For Action, Establishing the basis for 'Very High', 'High', 'Medium' and 'Low' Conservation Significance

APPENDIX 3| DETERMINING CONSERVATION SIGNIFICANCE

TABLE 5. DETERMINING CONSERVATION SIGNIFICANCE

	BIODIVERSITY ATTRIBUTES			
CONSERVATION SIGNIFICANCE	VEGETATION TYPES		*OR* SPECIES	*OR* OTHER ATTRIBUTES
	Conservation Status[1]	Habitat Score[2]		
VERY HIGH	Endangered Vulnerable Rare	0.4 - 1 0.5 - 1 0.6 - 1	• best 50% of habitat for each threatened species[2] in a Victorian bioregion	• sites with unique National Estate values • sites identified as being of national significance as a relict, endemic, edge of range or other non-species values • Ramsar Sites • East Asian-Australasian Shorebird Site Network sites • Other wetlands of international significance for migratory waterbirds • areas identified as providing refuges (e.g. during drought) for threatened species
HIGH	Endangered Vulnerable Rare Depleted	< 0.4 0.3 - 0.5 0.3 - 0.6 0.6 - 1	• the remaining 50% of habitat for threatened species[2] in a Victorian bioregion • best 50% of habitat for rare species[2] in a Victorian bioregion	• sites with rare National Estate values • sites identified as being of state significance for relictual, endemic, edge of range or other non-species values • Wetlands listed in 'A Directory of Important Wetlands in Australia' • Wetlands of national significance for migratory waterbirds • areas identified as providing refuges (e.g. during drought) for rare species • priority areas for the re-establishment of habitat for a threatened species (eg. as determined in a Biodiversity Action Plan)
MEDIUM	Vulnerable Rare Depleted Least Concern	< 0.3 < 0.3 0.3 - 0.6 0.6 - 1	• the remaining 50% of habitat for rare species[2] in a Victorian bioregion • best 50% of habitat for regionally significant species[2]	• sites with uncommon National Estate values • sites identified as being of regional significance for edge of range or other non-species values • Wetlands of bioregional significance (based on application of National Land and Water Resources Audit criteria).
LOW	Depleted Least Concern	< 0.3 < 0.6		

1. see Appendix 2
2. conservation status of species determined with reference to NRE Victorian Rare or Threatened Flora and Fauna lists, as supplemented by the relevant Native Vegetation Plan. The relative quality and suitability of habitat for threatened species depends on particular requirements and therefore must be estimated on a species-by-species and location-by-location basis by the relevant planning authority using the best available information.

3.5.4 Quantifying impact losses and offset gains

Offsets must be clearly defined, transparent and measurable. This requires assessment of biodiversity lost due to development or gained through an offset to use the same currency or metric. A key preoccupation for the architects of offsets and trading systems is the selection of a suitable metric and the establishment of a defensible system to determine biodiversity equivalency (see Box 11). Assessment of equivalency provides the basis for deciding when an offset has established the same biodiversity as an original damage (i.e. 'no net loss' has been achieved) and can be based on both economic and ecological factors.

Box 11 How losses and gains are calculated in an offset (BBOP Offset Design Handbook 2009)

Losses and gains are calculated as follows:
• loss = predicted situation for affected area's biodiversity with no development impact minus predicted situation for affected area after impact and restoration.
• gain = predicted situation for offset area's biodiversity with offset intervention minus predicted situation for offset area with no intervention, adjusted for risk factors associated with these predictions.

The majority of offsets in current use are based on measures of land area adjusted by some measure of 'quality' (condition) or ability to support particular biodiversity features or resources, though there is increasing interest in measures of occupancy or persistence in the landscape for species' populations. The proposed BBOP method (BBOP Offset Design Handbook, 2009) calculates equivalence of impacts and offsets on the basis of 'habitat hectares' (building on the approach developed in Victoria, Australia), taking into account area, type and quality of biodiversity as measured on the basis of key attributes. For certain species of conservation significance, detailed assessments of loss and gain may be required, particularly where these species might experience impacts other than, or in addition to, habitat degradation or conversion, such as intensified hunting pressure, increased disturbance or interruption to migration or disturbance. In such cases, metrics based on habitat proxies may not be particularly informative and it may be necessary also to carry out population assessments. This quantifies losses with respect to key species using estimates of population persistence and predicts how this will change following project implementation.

How a similar system could be developed for England is explored in the following Chapter, based on definitions and categories of habitat addressed through the UK Biodiversity Action Plan (BAP). A possible metrics framework is included as Appendix C. This is based on numbers of hectares of BAP habitat of certain conservation significance and quality and assumes a close relationship between management and habitat condition.

Practitioners of economic valuation point out that measurement of loss and gain can also be based on a more utilitarian metric that suggests that offsetting should not lead to any decline in human well being as measured by society's preference for conservation goods. Quantifying these preferences is not straightforward, however. While a range of methods do exist to measure the value of non market impacts, their consistent use in offset cases is likely to be limited by the cost of conducting valuation studies for each offset case. Of course this assumption conceals the fact that many people favour, often aesthetically, some types of biodiversity over others, irrespective of the wider goods and services that they offer.

One option suggested by Roach and Wade (2006) is to combine a habitat equivalent unit metric with willingness to pay approaches in cases where ecological and human losses are part of residual damages (this might have some relevance to the implementation of the Environmental Liability Directive in Europe). This suggestion was made in the context of compensation requirements that are enshrined in legal requirements for natural resource damage assessment (NRDA) in the United States. As for offsets, the question is how to define the equivalence between the natural resource injury and the compensation provided, which is required to equate to the damages incurred by society during the interim restoration of the original damage. In essence, compensatory restoration projects must provide a present value of service gain equal to the present value of the service losses from the natural resource injury. The details of this calculation are defined in guidance provided by NOAA (2000), with refinements by Thur (2007). Building on previous work by Dunford *et al* (2004), Roach and Wade and subsequently Zafonte and Hampton (2007) explored how Habitat Equivalency Assessment could be reconciled with economic theory and the assumptions that are necessary for ecological 'service to service' compensation. In essence the assumption in HEA is that, as an approximation, the values humans place on natural resources are proportional to the ecological services these resources provide. That is, there is equal utility or welfare generated by the ecological offset. In summary, this literature largely rationalizes the avoidance of WTP approaches in favour of ecological metrics that can be appropriately calibrated with ratios. One assumes that these ratios should somehow account for 'non-use' value, though the literature is less clear on this.

It is important to consider how similar the biodiversity structure, composition and function at an offset site must be to that affected by the development project for all stakeholders to accept that no net loss can be said to have been achieved. Exchange rules may be used to determine what levels of difference might be acceptable and assessments of equivalency may also be used.

At some point, a comprehensive assessment is likely to be required of the biodiversity components that must be offset in order to satisfy the goal of no net loss, or a net gain, of biodiversity. The process used to identify and prioritize these components varies, sometimes being undertaken through environmental assessment (as in the Western Cape of South Africa, for example) or as a parallel or independent voluntary exercise (specific assessments carried out to assess credits for U.S. wetland mitigation banks). Regardless of this it is important to consider implications for biodiversity at the species, communities and/or ecosystem levels as well as those ecosystem services delivered by the landscape that support lives and livelihoods (e.g. use and cultural values of biodiversity) which must be offset.

3.5.5 Achieving additionality

Conservation gains achieved through offsets must be additional to what would have happened without offsetting effort and must therefore go beyond any basic duty of care to protect biodiversity. In the State of Victoria, Australia, methods for calculating gain start explicitly from a baseline duty of care to protect native vegetation (such as prevention of invasion by certain noxious weeds)[15] on behalf of private and public landowners alike as well as any other existing conservation commitments. This duty is not spelled out in any single document but is codified in a range of legislation, including that on native vegetation.

Accepting the requirement for additionality, four types of conservation gain which can be delivered through offsets are recognised in the State of Victoria (See Box 12):

1. Prior management gain
2. Security gain
3. Maintenance gain
4. Improvement gain

Interestingly, these categories of gain have some overlap with the UK BAP (see section 4.4) sets targets to 'maintain extent' or 'achieve condition' for BAP habitat and to add to the stock of BAP habitat through 'restoration' or 'expansion' BAP habitats.

There is current debate concerning the acceptability of delivering biodiversity credits on land in England which is already included in agri-environment agreements or designated, for example as a Site of Special Scientific Interest (SSSI). Similar issues arise with respect to the possible use of Natura 2000 sites in Europe as conservation banks. Experience suggests that clear management plans with specific targets and commitments are essential to ensure that 'additionality' of action can be demonstrated over existing obligations or duties of care. As well as considering additionality, however, it is essential to ensure that any use of offsets would not compromise in any way the ability to deliver site conservation objectives for a SSSI or Natura 2000 site.

If the baseline expected of government according to the protected area status and conservation priorities of biodiversity is established, it may then be possible to allow offsets on public land in cases where the protected area status would be increased and/or conservation outcomes beyond **and in addition to** the government's duty of care in that particular setting would be achieved through the offset. In Victoria, Australia, this has happened as a 'last resort' in cases where it has proved difficult to source an offset for rarer vegetation types on private land. To satisfy the need for additionality, such offsets were only permitted in a 'low level' reserve where other uses were allowed previously and were foregone through the offset, resulting in vegetation enhancement (ten Kate, pers. comm.). Similarly on private land holdings, offsets could potentially complement existing commitments through agri-environment schemes provided that additional management inputs and requirements are clearly articulated and costed. However an important issue to consider here is the consistency of objectives and incentives provided by overlaying offset options on existing agri-environmental incentive structures. Specifically, it is important to consider how fluctuating offset values represent an opportunity cost to scheme participation.

[15] Duties of care also extend to other obligations, for example not to kill wild animals, which belong to the Crown, not to cause gross soil disturbance, not to cause run-off causing soil erosion e.t.c.

Box 12 Types of gain recognised for offsets/credits in the State of Victoria, Australia

1. Prior management gain acknowledges actions taken to manage a freehold site and maintain native vegetation since State-wide planning permit controls for native vegetation removal were introduced in 1989. In the offset calculations, the habitat hectare gains from maintenance and improvement are inflated by 10% of the current (pre-offset) condition score (in habitat hectares) as a means of acknowledging this retrospective contribution. This has potential in England as a means of potentially benefiting land owners with sites already supporting high biodiversity.

2. Security gains are achieved through entering into an on-title agreement (i.e. a covenant on the land) to enhance the security of appropriate management in the long term, or by locating the offset on land that has greater security than the clearing (impact) site, or by transferring private land to a secure public conservation reserve. In the offset calculations, the gains from placing land under protected status are calculated as 10% of the current condition score in habitat hectares.

3. Maintenance gain is achieved through commitments that contribute to the maintenance of the current vegetation quality over time (i.e. avoiding any decline), possibly by forgoing potentially damaging operations (over-grazing, for example).

4. Improvement gains are achieved through management commitments beyond existing obligations under legislation to improve the current vegetation quality. Achieving improvement gain is predicated on maintenance commitments (such as controlling grazing/weeds) being already in place. Typical actions include enhancement planting or re-vegetation over a 10-year management period. For an offset, a commitment to maintain the improvement gain (i.e. no subsequent decline in quality) will be required in perpetuity.

3.5.6 Selecting suitable locations and activities for biodiversity offsets

Actions in one or more locations must deliver the required biodiversity gains to compensate for the impacts of development in order to qualify as a successful offset. The significance of impacts on biodiversity depends considerably on spatial context. Similarly, the ability of offset locations to perform similar functional roles within the landscape or to provide viable habitat, is highly context-specific. Some metrics, such as habitat hectares in Victoria and the 'Calculator' for BioBanking in New South Wales, explicitly factor in landscape features into the loss/gain calculation.

Selection of suitable locations for offsets should therefore take account of:

- landscape context (connectivity, linkages and connectivity, opportunities in the landscape for corridors to allow ecological and evolutionary processes to continue over time (e.g. along river systems, across altitude or soil type interfaces and climate gradients));
- conservation status at a relevant scale of consideration;
- where it is possible and/or appropriate to achieve restoration or enhancement (biodiversity opportunity and potential respectively);
- implications for local community use and access.

Suitable locations may be found in close proximity to the area affected by the project, but it is possible that locations meeting key biodiversity criteria may only be found some distance away. To deliver all components of a required offset may require different activities to be undertaken in different locations (a 'composite offset') because there is no one location which has all the attributes needed to support them. The need

to find suitable offset sites to deliver conservation gains of key biodiversity components influences the scale at which suitable 'receiving areas' are defined. Most schemes worldwide state a preference for offsets to be located in suitable areas as close as possible to the development causing the impact and within the relevant jurisdictional boundary for applicable policy or legal requirements.

3.6 Offset implementation

Robust implementation mechanisms require clear responsibilities to be assigned, whether for implementing the offset, regulating, monitoring or enforcing it. It is also necessary to decide when an offset should be implemented (in advance of an impact or not), how long it should last (its timing and duration) and what methods will be used to secure long-lasting benefits. A further important question is who should pay for the offset? According to the 'polluter pays' principle, the developer generally covers the cost of the offset. However there are some costs associated with regulation or monitoring which may be picked up by government. Several biodiversity offset and biobanking schemes start with an investment from government to establish the scheme, then plan to move increasingly towards cost recovery, in which the transaction and running costs of the offset scheme are priced into the cost of the offset borne by the developer. This is considered further in Section 3.6.2.

3.6.1 Offset delivery

Offsets can be provided by a range of actors, including:

- Developers on their own land holdings.
- Individual landowners (such as farmers).
- Conservation organizations.
- Government bodies.

Developers required to provide offsets for impacts associated with their proposals generally have the following options (for example see Bayon, 2004):

- implementing the offset themselves or with the assistance of specialists;
- paying another party (this might be a government agency, an NGO, a private landowner) to establish and implement the offset (sometimes referred to as 'in lieu fee arrangements); or
- paying into a mitigation bank (which could be run by any of the parties identified in the previous bullet or by an entrepreneur).

An important issue is the availability of suitable land on which offsets/ required credits can be provided and this can influence decisions about which route to take. One of the reasons for establishment of BushBroker in Victoria, Australia was the need for knowledge and market awareness about availability of credits and their likely price. Another was avoidance of the need to procure land for purposes of providing offsets, which can be very time-consuming and result in considerable distortion of land prices.

Developers most likely to implement offsets themselves are larger developers with long term investment plans (mining or extractive companies or public companies responsible for capital investment in infrastructure such as Highways departments or the Environment Agency for example) who are able to procure land and have the in-house expertise to manage it. For smaller scale plans and projects, having to undertake offset projects can be both challenging and expensive. If biodiversity management is outside the core business of a company, it can be much more

straightforward for it to pay another party to implement the offset or to buy credits in a mitigation or conservation bank.

3.6.2 Regulation, monitoring and enforcement

Effective and well resourced regulation is key to the success of offset systems. The regulatory requirement varies between schemes and workload clearly reflects the number of offsets required/ delivered and the complexity or heterogeneity of biodiversity affected. Some of the administrative requirements associated with operation of BushBroker in Victoria, Australia and associated registration of credits have been reviewed by ten Kate (pers. comm.). The Department for Sustainability and the Environment (DSE) has several full time staff devoted to these activities and others contribute to training, provision of information and publications. There are additional requirements in terms of general inputs to review of planning decisions, including advice to developers and local authorities on the 'avoid and minimise' part of the mitigation hierarchy.

For BioBanking as operated in New South Wales, Australia, there will be auditing and enforcement on a 3 year-basis for selected proposals (based on risk assessment) and every 6 years for every transaction. The costs for this are covered within fees payable by the offset provider of Aus$1100 per site per annum. Payments are generally phased and tied to 'delivery' or the achievement of defined targets. Money is paid to the register by the developer and held by the Secretary for the benefit of the landowner, subject to an agreement. Offset providers may be required to report annually on their performance in delivering against agreed targets or objectives.

A typical schedule under BushBroker for payment by the DSE Secretary to the provider of credits might be as follows[16]:

- Initial Payment on Commencement of the Agreement (Initial Payment) 25% of the Total
- At the end of the first year 5% of the Total
- No later than the end of the second year – ('Establishment') 10% of the Total
- No later than the end of the third year – ('Survival 1') 10% of the Total
- At the end of the fourth year 5% of the Total
- No later than the end of the fifth year – ('Survival 2') 15% of the Total
- At the end of the sixth year 5% of the Total
- At the end of the seventh year 5% of the Total
- At the end of the eighth year 5% of the Total
- At the end of the ninth year 5% of the Total
- At the end of the tenth year – ('Completion') 10% of the Total

Note: a landowner's obligations are to maintain the offset (credits) in perpetuity (which obligation is registered on the land title), but the management agreement stipulates particular actions the landowner will take in the first 10 years, and then maintenance activities to be undertaken in perpetuity thereafter. The payment for the credits is staggered over the initial 10 years as above. The provision of the credits is monitored by DSE in years 1, 2, 5 and 10 for every site.

[16] NB: the total equals the amount of money paid to the Register (by the developer) and held by the Secretary for the benefit of the Landowner, subject to this Agreement.

Similarly U.S. mitigation bank instruments make provision for long term monitoring and regulation, though an element of the regulatory cost is borne by government. More information is required on cost implications of different systems, as little is published.

3.6.3 Timing and duration of offsets

Important questions to consider are:

- Whether the offset should be in place before an impact takes place, or whether it can be established after the impact? If the offsets are delivered after the impact, how is temporal loss factored in?
- Whether the offset lasts in perpetuity, or for the duration of the impact, or for another length of time?

Most offset schemes require offsets to be in place prior to development impacts occurring. Otherwise a high degree of assurance is required that the offset will be implemented without excessive delays. In Queensland developers must deposit a bond in cases where there will be a delay in offset implementation.

European Commission guidance makes it clear that a Natura 2000 site must not be irreversibly affected before compensation is in place (EC, 2007), but there are no such requirements for wider biodiversity. The result of compensation should be effective at the time the damage occurs on the site concerned. However, derogation is possible if it can be ascertained that time lags "*would not compromise the objective of no net loss to the overall coherence of the N2K network"*.

Hitherto the delivery of offsets before impacts take place has not been achieved in the UK: projects have not generally been delayed to allow time for a compensatory site to become established. This issue is particularly important where mitigation or conservation banks are used and is considered further in section 5.4.1.

The availability of offsets in advance of impacts is linked to the strictness of like-for-like rules and the ability to predict the kind of biodiversity that will be lost to development in coming years. In Victoria and NSW, there are many hundred of kinds of biodiversity credit. Development is known to be taking place in particular bioregions and for certain vegetation classes. As it is possible to anticipate the kind of credits most likely to be needed, government can communicate with landowners about the opportunity for them to receive income from developers to pay for such credits, and hence encourage them to make credits available. The high price of such credits in the market place acts as an incentive for landowners to generate them. In Victoria, for certain impacts on biodiversity of 'Very High' significance, offsets need to be underway prior to permission for the project impact. For less severe impacts, the developer may have up to a year to source an appropriate offset.

3.6.4 Securing long term benefits

European Commission guidance (EC, 2007) makes it clear that compensatory measures require a sound legal and financial basis for long-term implementation, protection, monitoring and maintenance. 'Long term' is not defined, but the need for 'in perpetuity' provision is implied. In England, a number of compensation agreements have referred to management and protection for 50 – 70 years, but this is generally for provision of compensation in dynamic coastal environments where it is difficult to make predictions past this timeline (RSPB (2008) Andrew Dodd, pers. Comm.)

It is essential to ensure sustainability of an offset, e.g. though endowment funds for on-going management, mandatory renewal of credits subject to inspection, easements or other legal restrictions on land use. Land may be transferred to government or, where an offset provider retains ownership, a covenant is generally required that runs with the land and binds any successors in title. In 'BushBroker', this is entered into the deeds and recorded in the Land Registry. This is one of the main advantages of an explicit system of offsets as opposed to general requirements for compensation, which often don't require any long-term commitment or the provision of funds for management in perpetuity.

3.7 The effectiveness of offset schemes

Reliable information concerning the overall performance of offset schemes overseas (whether in terms of biodiversity outcome or economics) is difficult to obtain except for wetland mitigation banking in the United States, which has been comprehensively reviewed. Given the criticisms and acknowledged shortcomings of instruments such as wetland mitigation banking, it is nevertheless difficult to ascertain whether the situation would have been better or worse without them. It is important to recognise that biodiversity could continue to decline regionally despite operation of an effective offset instrument (when reviewed on a case by case basis).

In the State of Victoria, progress in achieving the government's 'net gain' policy (introduced in 2002) is reviewed regularly. Review has showed net loss of native vegetation state-wide since the introduction of the policy, but this was not attributable to performance of offsets (which is closely monitored and regulated). It occurred largely as a result of slow decline areas across the landscape as a whole (Victoria, Department of Sustainability and Environment 2008). It is generally accepted that the introduction of a strong policy requirement for 'net gain' combined with a workable system of offsets has been effective a) in reducing applications to clear native vegetation and b) ensuring effective management or restoration on some areas which might otherwise have continued to degrade.

The effectiveness of offset schemes may vary from different perspectives. Experience from offset systems currently in operation suggests that they are relatively popular with developers provided that there is a level playing field in terms of required practical and financial commitment and that the costs of purchasing credits are proportionate to the scale and profitability of their proposals and the magnitude and significance of the impacts attributable to them. Developers prefer a flexible system, however, which allows them to weigh up the costs and benefits associated with different mechanisms. This can be illustrated by reference to the BushBroker system (Box 13).

Box 13 Flexible approach used in BushBroker

Local government can determine appropriate offsets for less significant impacts using simple guidance from the Department of Sustainability and the Environment based on a measurement of area with a multiplier depending on the vegetation class affected.

For more significant impacts, applications are referred to the regulator (DSE) at which point there are two options for calculating the number of credits (habitat hectares) required: a) a 'Default Score' (which is an area adjusted by multipliers established by the DSE, based on a little above average scores for project losses against a benchmark) or b) a full habitat hectares calculation based on a site visit and application of the approved assessment methodology.

The Default Score option has lower transaction cost than undertaking habitat hectares assessments or hiring consultants to undertaken them on their behalf, developers often opt for the latter because it the default score tends to result in a larger offset commitment. Developers can choose which option to pursue and balance transaction costs with those of offset implementation.

For biodiversity specialists such an approach also has some benefits. It allows compensation to be provided across the spectrum of conservation priority and potentially generates funds to support a higher level of conservation effort outside of protected areas. There are some important conditions that have to be met, however, as discussed throughout this report. These include provision for exclusion of offsets for 'critical natural capital' and for offsets to be used for 'constant natural assets' or other biodiversity only when proven and tested techniques and suitable locations are available. There is a real risk that offset schemes could undermine other existing funding streams, so it is important for duties of care and responsibilities for biodiversity to be clearly identified.

In practice, weak government capacity is often a significant barrier to the implementation of market-based instruments. In the USA, the main bottlenecks and complaints about mitigation banking can often be traced to gaps in the regulatory regime, including inconsistent rules and treatment, and weak capacity on the part of regulators (Bishop, 2004). A clear lesson from the U.S. is that firm regulatory procedures should be in place to ensure that: the compensation is provided and is of suitable quality; that only biodiversity considered to be a constant natural asset (i.e. substitutable) is displaced and that critical environmental capital (non-substitutable) is provided a greater level of protection (Crooks and Ledoux, 2002). Government therefore has a key role in the success of biodiversity offsets, whether to define clear environmental targets and performance indicators, establish an enabling framework of incentives and/or property rights to stimulate demand for and supply of environmental services, or to ensure fair and transparent monitoring and enforcement of the rules. From the perspective of the regulator, therefore, an effective system may require relatively intensive involvement, but it is possible for offset schemes to finance an element of this.

3.7.1 Economic appraisal of offset options

The offset or banking concept implies that equivalent social welfare can be created or maintained through a system that allows developers to offset damages or to acquire valuable habitats that may subsequently become tradable. As noted in section 3.4.2 the notional efficiency gains purchased by this form of instrument are in terms of

potential facilitation of development that may otherwise be non-negotiable because of regulatory restrictions. Furthermore the effectiveness of offsetting and trading arrangements has to be underpinned by equivalent trades or offsets in welfare terms.

Section 3.4.2 outlined a range of elements that characterise alternative offset schemes. In developing an *ex ante* economic framework, a number of other factors should be considered as part of any economic appraisal of scheme options. Each alternative to the *status quo* can be subjected to an economic options appraisal that can adopt a private and public perspective. The latter is most relevant to this study, which we assume could inform a future (regulatory) impact assessment exercise with the principal consideration being effectiveness, efficiency and equity of options.

- *Effectiveness* of the option: Relative to the baseline or *status quo*, how does the option change developer incentives and in turn how well does it work in delivery of the conservation goal? Here effectiveness can be equated with the ecological objective of 'no net loss' of biodiversity.

Different options imply different behaviours and thus costs to private developers and government. In terms of contracting under asymmetric information[17] the literature on optimal contracting in agri-environmental policy offers useful parallels[18] and suggests that adverse selection and moral hazard are important factors to consider in scheme design and will require further consideration in progressing offsets further in England. The former suggests that a subset of developers will be more likely offer to mitigate and offset. This may lead to offsetting patterns that are less than representative in terms of costs and therefore inefficient outcomes. The latter (moral hazard) suggests that certain scheme designs may offer incentives to cheat in some circumstances. Formal analysis of moral hazard in environmental public good contracting[19] has suggested that incentives can be modified by:

1. the probability of detection, i.e. the intensity of compliance monitoring;
2. the level of fine for detected contract violations;
3. the stringency of the management prescriptions; and
4. the payment rate (which in turn relates to the opportunity cost of any land use).

Since detected violations involve the full grant being repaid, a high payment rate acts as a deterrent to cheating. The latter can easily be transposed to offset conditions. A further relevant issue identified in the agri-environmental context is the issue of dynamic efficiency. Typical agri-environmental contracts do not provide producers with adequate incentives to seek out new methods of reducing costs, to introduce new ideas, or to be willing to take risks for the provision of biodiversity. There is also hardly any incentive for local landholders to co-ordinate their actions across several holdings.

A final point to note is that efficiency is also a determinant of the efficient applicable scale threshold for offsetting requirements. In other words, the chosen threshold needs to balance social benefits against aggregate compliance and transactions costs.

[17] Asymmetric information here simply means that developers and regulatory agencies have different information and different incentives to share or hide it from each other.
[18] See also Bardsley, P and I Burfurd (2008). Contract Design for Biodiversity Procument, http://www.economics.unimelb.edu.au/downloads/wpapers-08/1031.pdf
[19] http://www.scotland.gov.uk/Publications/2006/02/21152441/3

- *Efficiency*: and what is the balance of benefits or effectiveness relative to the totality of costs?

Elements impacting on effectiveness necessarily alter the efficiency of options. In other words, the outcome is less conservation per pound spent by both private and public bodies. Private costs include regulatory compliance expenditure (acquiring land, form filling, time and any new labour and capital expenditures), whereas public costs comprise scheme administration and monitoring. These transaction costs can be inflated or reduced by information asymmetries between landholders and public agencies and the heterogeneity of producers. Falconer and Whitby (1999) distinguish three categories of transaction costs in the operation of agri-environmental schemes. These are:

- information costs for surveying and designating areas of environmental sensitivity and designing appropriate management prescriptions;
- contracting costs including promotion of the scheme to (in their case) farmers, negotiation between farmers and agency, and the administration of contracts;
- policing costs including costs of compliance monitoring and enforcement, environmental monitoring and scheme evaluation. Note that any requirement for ex ante and ex post scrutiny (i.e. cost-benefit analysis) of offsets will contribute to these costs.

These costs tend to be disregarded in policy discussions and, where considered, it is generally assumed that they should simply be minimised. These transaction costs represent a significant element of public expenditure and may be sufficiently important to constrain the resources available for implementing some options, especially in times of public expenditure scrutiny and cut-back. The danger is that the development of administrative structures may not keep pace with the rapid increase in the scope, scale and complexity of offsets schemes. Insufficient scheme administration will inevitably result in reduced environmental effectiveness.

- *Equity:* (i.e. distributional) impacts who is effected by the policy choice and how? This consideration can be within and across time periods.

Any government impact assessment normally includes an element of distributional impact. This is often focused on the supply side - i.e. the compliance cost incidence and whether it falls predominantly on small or medium sized enterprises, on a particular industry that is more exposed to international competition, or in a particular location of the country. In the context of offsets, this raises a number of further distributional implications that need to be explored from supply and demand sides. On the former, the development of trading or banking can raise issue of market power and access to credits. On the demand side, some consideration needs to be given to whether offsets are likely to be more beneficial or damaging to certain socio economic groups.

Another important consideration is the intergenerational (as opposed to intra generational) equity of offsetting. Specifically, if some offsetting takes time, then there is a question of how to reflect the interim damage costs experienced relative to the baseline. As previously noted, compensatory restoration projects should ideally provide a present value of service gain equal to the present value of the service losses from the natural resource injury. This suggests the need for some form of present value consideration to collapse the relevant net value schemes to their present value

equivalents for consideration. The treatment of discounting in the context of offsets can draw on the NRDA assessment experience in the U.S.

3.7.2 Critical Success Factors

Implementing biodiversity offsets requires *inter alia*: methods to quantify a residual biodiversity impact and determine the nature, scale and location of the offset needed (in credit trading schemes, this may be defined as the number and type of biodiversity credits required to offset a given impact), policy to govern institutional arrangements and define associated responsibility, adequate capacity (within the private sector and government) and sufficient financial capacity to implement, maintain and regulate a formal offset system. Some factors contributing to the likely success of offsets are summarized in Box 14. These are picked up in the following chapter with respect to the potential role of biodiversity offsets in England.

Box 14 Factors contributing to the success of offsets in delivering no net loss or a net gain of biodiversity

- Political direction and support.
- A clear policy intent to achieve no net loss or a net gain of biodiversity.
- Strict adherence to the mitigation hierarchy and requirements to demonstrate that this has been done.
- Legal requirement or strong regulatory control including provisions to secure biodiversity offsets 'in perpetuity'.
- Sufficient regulatory capacity and resources.
- Requirement and capacity for monitoring.
- Accessible and reliable information on affected biodiversity.
- Clearly defined biodiversity priorities combined with accessible and reliable information on biodiversity potential and opportunity.
- A sufficient supply of land suitable for delivery of offsets.
- Opportunity and mechanisms for community involvement.
- Clearly defined responsibilities.
- Offset arrangements which are secure, robust, and likely to produce a long-lasting benefit in reasonable time.
- Offset requirements which are clearly defined, readily implementable, measurable and enforceable.

In addition there might be particular pre-requisites for introduction of a system of mitigation banking (Bishop, 2004):

1. Land developers (public and private) are obliged to (or volunteer to) mitigate the impacts of their activities on natural habitat.
2. Environmental regulators accept the principle of transferring full liability for off-site mitigation, where avoidance of impacts is not possible and on-site mitigation is deemed inferior.
3. Future land use change in a given area is sufficient to generate demand for mitigation services from land developers.
4. Mitigation service providers (banks) are able to provide eligible offsets (habitat restored or improved in perpetuity, to the satisfaction of regulators) at reasonable cost.

4 POTENTIAL ROLE OF BIODIVERSITY OFFSETS IN ENGLAND

This chapter considers the part that biodiversity offsets could play in England in terms of the conservation and sustainable use of biodiversity and how they might complement existing conservation and planning policy. It sets out the current 'baseline' situation in terms of planning policy and biodiversity.

Review of experience worldwide suggests that offsets could benefit biodiversity in England, provided that certain conditions are met. Possible advantages from introducing a system of biodiversity offsets in England include:

1. A more streamlined planning process with respect to biodiversity requirements.
2. Clarity and incentives for developers concerning biodiversity conditions and requirements.
3. Cost-effective mitigation and compensation with economies of scale and more strategic delivery.
4. Providing a mechanism for achieving 'no net loss' and not just partial mitigation (or poorly defined 'enhancement').
5. Enhancing the value of biodiversity and providing a mechanism for landowners and nature conservation managers to be recompensed for delivery of biodiversity credits.
6. Giving effect to the 'polluter pays' principle.
7. Accounting for externalities and hidden benefits/ costs associated with biodiversity/ its loss (currently developers seldom account for the costs of residual impacts which are consequently borne by society in general).
8. Assisting governments to meet national targets for biodiversity conservation and to comply with their obligations in terms of the millennium goals and international law such as the Convention on Biological Diversity (CBD).

Possible advantages in terms of biodiversity conservation include:

1. Reinforcing requirements relating to maintenance of the integrity of sites in the Natura 2000 network.
2. Strengthening existing requirements to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.
3. Raising the profile of non-designated biodiversity and strengthening requirements for 'no net loss' or enhancement of wider biodiversity following development.
4. Strengthening the application of the mitigation hierarchy by requiring developers to demonstrate the achievement of no net loss of biodiversity on the ground.
5. Providing a mechanism to strengthen planning conditions (e.g. section 106 agreements) as they apply to biodiversity.
6. Providing an additional funding mechanism for biodiversity, including funds for regulation and monitoring.
7. Helping to build ecological networks which are more resilient to climate change etc., for example by reducing fragmentation.
8. Going beyond Natura 2000 and habitats/ species of Community interest to tackle other English priorities (e.g. 'biodiversity interests' as covered in PPS9).
9. Strengthening the UK biodiversity process and contributing to UK Biodiversity Action Plan targets.
10. Increasing the area of land under management for conservation.

Offsets could also have a part to play in compensating for damage from diffuse sources and in managing cumulative effects. Participants in the stakeholder workshop held at Oxford Brookes University on 13 November 2008 were broadly in favour of an approach to biodiversity offsets that might strengthen strategic approaches to development of more resilient habitat networks, based on national/ regional mapping and priority-setting.

It is particularly important to consider how offsets might complement existing mechanisms relating to the conservation and sustainable use of biodiversity and planning objectives for biodiversity.

Some of the areas where biodiversity offsets could possibly make a positive contribution are considered further in the following sections. The chapter also considers the possible implications of offsets for existing statutory provisions for biodiversity through statutory protection, government policy and agri-environment schemes.

4.1 Strengthening the legal basis for offsets

This section considers the legal and planning policy basis for offsets in the current situation, and the extent to which relevant legislation might provide an opportunity to deliver more biodiversity offsets, should they be considered important in terms of implementing EU and English biodiversity policy.

The UK Government has ratified a number of international treaties with implications for nature conservation and biodiversity, notably the Convention on Biological Diversity (CBD). Such treaties are not considered binding on or actionable by private citizens in the UK courts, but they represent international law that is binding on Government. (Reid, 2002; Defra, undated). Although there are no direct triggers or requirements for the use or consideration of biodiversity offsets in the CBD, its objectives, individual articles (especially 6, 8, 10 and 11) and the Decisions of the Conference of the Parties (particularly their commitment to substantially reduce the rate of loss of biodiversity by 2010) provide a mandate for the UK to aim for 'no net loss' of biodiversity. The Biodiversity Strategies for the component countries of the UK and the UK BAP are key commitments under the CBD and Section 4.3 considers the part offsets might play in delivering the UK's biodiversity strategies.

Many of the UK's environmental protection law have been shaped by European policies and directives. Examples of direct references to offsetting or compensation as a mechanism to tackle significant residual effects of development are included in Box 15.

Box 15 Use of the term 'offsetting' within European Legislation

Habitats Directive:
If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take ***all compensatory measures necessary*** *to ensure that the overall coherence of Natura 2000 is protected.*

EIA Directive,[20] [21]:
Article 5(3) *requires that the developer submit 'a description of the measures envisaged […] to prevent, reduce and* ***where possible offset*** *any significant adverse effects to the environment'.*

SEA Directive[22]:
Annex I - the report should *provide information regarding 'the measures envisaged to prevent, reduce and* ***as fully as possible offset*** *significant effects on the environment of implementing the plan*.'

ELD Directive:
Annex II …re*storation of these natural resources to their baseline condition is to be achieved by way of so-called primary****, complementary and compensatory*** *remediation measures.*

The requirement under the Habitats Directive is probably best understood and case law now exists to frame the design and implementation of compensatory measures in cases where a European designated site is affected. The purpose of compensation under the Habitats Directive is to provide a similar level of natural resources and services at an alternative site in cases where there are unavoidable adverse impacts on the Natura 2000 network. The Directive supports the application of the mitigation hierarchy (avoid, mitigate and only then compensate) and enshrines the principles of 'no net loss' and the 'precautionary principle'. The recent guidance on Article 6(4) provided by the European Commission (EC, 2007) sets out the criteria that compensatory measures must meet to be acceptable: they must be targeted, effective, technically feasible and secured in perpetuity. They therefore share many characteristics of biodiversity offsets, including a requirement for 'like for like' compensation. In addition, rules are provided on the extent of compensation, location of compensatory measures and timing of compensation. The ability to deliver effective compensation is theoretically a key test in the decision on whether or not a plan or project can go ahead.

Current requirements or opportunities to offset under the SEA and EIA Directives are more ambiguous and this gap needs to be addressed by clear guidance if offsets are to be incorporated explicitly in the impact assessment and project approval process (see Chapter 5). The emphasis under these Directives is on prevention through the development of alternatives in the pre-development phase and then the application of mitigation to limit or reduce the degree, extent, magnitude or duration of adverse

[20] Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment
[21] Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the Council environment
[22] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the ssessment of the effects of certain plans and programmes on the environment

effects. The EIA Directive requires developers to '*describe measures envisaged*' to offset significant residual adverse impacts '*where possible*', but does not require the developer to demonstrate how a 'no net loss' outcome will be achieved through such measures. There is no requirement to demonstrate how the measures described/envisaged would be implemented or to give any undertaking that they will be. Similarly the SEA Directive includes a requirement to provide information about measures '*envisaged*' to prevent, reduce or even offset significant effects on the environment, but no specific mention is made of biodiversity in this context and there is no requirement to provide any evidence that proposed measures have actually been undertaken (or even that it would be realistic and practical to undertake them). We could find no examples of securing biodiversity offsets through the SEA process and the documented list of failures in EIA to quantify and mitigate ecological impacts (e.g. Treweek *et al.*, 2000) and the ineffectiveness or non-existence of post-permission implementation and monitoring in many instances emphasises the challenges inherent in integrating biodiversity offsets with environmental assessment.

This means that biodiversity offsets are unlikely to be implemented in many circumstances under current EU law except in cases where Natura 2000 sites are affected. The same applies to associated regulations used to implement EU Directives in England (and Wales). On the other hand, clearer interpretation of the EU Directives, implementing regulations and associated UK legislation could clarify and crystallise the circumstances in which biodiversity offsets are required in the UK, the nature, scope and scale of those offsets and the delivery mechanisms involved.

4.1.1 The Biodiversity Duty

In England, the various duties under S.74 of the Countryside and Rights of Way Act 2000 have been updated by S.40 of the Natural Environment and Rural Communities (NERC) Act 2006. These include a duty known as the 'Biodiversity Duty' (Defra, 2007) which requires that:

> '*every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity'*.

According to legal advice originally prepared for the Welsh Assembly Government, this means that the conservation of biodiversity:

> '*is a factor that they* [planning authorities] *must consider [*along with other factors which are not necessarily of an ecological nature*] when deciding whether to, and how to, exercise their functions'*.

The public authorities to which this duty applies are listed in S.40 (4) of the Act and notably include local planning authorities. Local planning authorities must therefore exercise the Biodiversity Duty when assessing planning applications. By implication (but this implication is far from clear), developers **should** also show how their proposals respect the Biodiversity Duty for them to be viewed favourably by planning authorities. However the extent to which developers are required to demonstrate appropriate application of the mitigation hierarchy very much depends on the expectations and requirements of the local authority.
The extent to which local planning authorities and developers must '*have regard*' to, or consider the conservation of biodiversity is not clearly defined in NERC, and it is not regular practice for developers to propose 'no net loss' biodiversity offsets in order for

their proposals to be satisfactory to local authorities, helping the latter to meet their obligations under the Biodiversity Duty. Although the requirement to have '*regard*' to biodiversity allows for significant residual adverse effects on biodiversity to be offset, this is not obligatory. Further, the inclusion of the clause '*so far as is consistent with the proper exercise of those functions'* potentially softens the Biodiversity Duty as the primary duty of the local planning authority is to carry out its main functions, which may not always be compatible with the conservation of biodiversity (Roberts & Reid, 2005). This is despite the fact that the intent of this qualifier was primarily to recognise that different public authorities are not reasonably be expected to have regard for biodiversity everywhere, but only as regards the functions under their administrative remit.

Biodiversity offsetting, as often defined, requires 'no net loss' and '*preferably a net gain of biodiversity*'. In this regard and as with CROW, 'conserving biodiversity' is defined in the NERC Act as including:

> '*restoring and enhancing a population or habitat'* (S.40 (3)).

The Guidance for Local Authorities on Implementing the Biodiversity Duty (Defra, 2007) also states:

> '*It is important for local authorities to actively seek opportunities for biodiversity enhancement*'.
>
> '*Planning conditions and obligations are useful mechanisms for imposing mitigation and enhancement measures where it is not possible to achieve the appropriate level of mitigation or enhancement as part of the design of a development proposal*.'

While the Biodiversity Duty is not translated into a standard requirement of developers, its general intent and spirit is therefore consistent with most approaches to biodiversity offsets worldwide which seek 'no net loss' as a minimum requirement on a case by case basis, but are seen as an important mechanism for achieving wider biodiversity enhancement (see Section 4.3.1).

The NERC Act dissolved English Nature and the Countryside Agency and transferred their functions to a newly created single organisation known as Natural England. Natural England's general purpose is, as stated in S.2 (1):

> '*to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development*.'

A complete list of legislation and planning policy which has relevance with regard to offsetting is shown in Box 16.

Box 16 UK legislation and planning policy relevant in an English context

- Planning and Compulsory Purchase Act (2005)
- Environment Act (1995)
- Countryside and Rights of Way (CRoW) Act (2000)
- Natural Environment and Rural Communities (NERC) Act (2006)
- PPS9 – Biodiversity and Geological Conservation (1994)
- PPS11 - Regional Spatial Strategies (2004)
- PPS12 - Local Spatial Planning (2008)
- The Community Infrastructure Levy (2008)

4.2 Reinforcing Natura 2000

Given the clear requirements for ecological compensation in cases where European sites could still experience loss of integrity after implementation of suitable mitigation, it is worth considering whether compensation banking or other biodiversity offset mechanisms might strengthen current approaches to the provision of ecological compensation in cases where there are unavoidable impacts on European sites. It is also worth considering whether the practical experience gained in undertaking such compensation might have wider implications for offsets in cases where other biodiversity is affected.

According to Article 6(4) of the Habitats Directive, a plan or project that will adversely affect the integrity of a Special Area for Conservation (SAC) may only be carried out if there is no alternative, if it is necessary for imperative reasons of overriding public interest and if compensatory measures are taken. These compensatory measures must ensure that the overall coherence of Natura 2000 is protected (not just the integrity of the site affected) and should (a) address, in comparable proportions, the habitats and species negatively affected and (b) provide functions comparable to those which had justified the selection criteria of the original site. In theory, requirements for compensation are such that improved management, habitat restoration or creation in new locations must be undertaken to the point where equivalent conservation status to the affected site is achieved. As shown in Box 17, compensation provided under the Habitats Directive has been based on a 'like for like' basis, whereas compensation provided for the Cardiff Bay Barrage (which pre -dated the Habitats Directive) was 'out of kind'. Comprehensive monitoring data are not yet available to establish the extent to which strict 'like for like' compensation has been achieved 'on the ground', but the requirement is strongly enforced, at least in broad terms.

Although opportunities to provide compensation for unavoidable impacts on Natura 2000 sites are most likely to be sought on alternative sites, one question is whether it might be acceptable to use an existing European site to deliver credits by virtue of enhanced management to achieve additional conservation objectives (raising the question of 'additionality') in cases where this is not possible. On any site where there is an existing duty of care or commitment, the only way in which additional biodiversity credits could be generated, is through enhanced management resulting in the

achievement of new, higher conservation objectives. This emphasises the need to define offsets/credits very clearly and to specify which aspects of management are already required.

Box 17 Examples of compensation projects for impacts on Natura 2000 sites

Development name & date	Habitat removed	Designation	Compensation offered and location
Cardiff Bay Barrage – 1989.	167 ha of intertidal mudflat.	SSSI, pSPA	439 ha of wetland created on Gwent Levels. 'Out of kind' (contrary to legislative requirements).
Lappel Bank & Fagbury Flats – 1989 (pSPA identified 1993).	22 ha of intertidal mudflat & 32 ha of intertidal mudflat/ saltmarsh respectively.	None directly but was the centre of an ECJ ruling – should have been in the SPA	Creation of 108 ha of new mudflat and saltmarsh areas by re-alignment of flood defences in Gt. Thames Estuary Natural Area. 7% increase to existing intertidal area. 'Like for like'.
Harwich channel deepening – 1998.	Existing sediment levels reduced by 2m.	SPA	17 ha of intertidal habitat at Trimley. 'Like for like'.
Immingham outer harbour – 2005.	31 ha of intertidal mudflat.	SPA	71.5 ha of mudflat at Chowder Ness & Welnick. 'Like for like'.

Targets in the UKBAP to create 100ha of saltmarsh a year have catalysed several schemes which are currently under development to restore or create salt marsh in association with managed realignment of coastal flood defences. In addition, there will also be a requirement to compensate for losses to Natura 2000 sites in relation to sea level rise. The Environment Agency has taken an active role in seeking opportunities to identify and secure suitable land and has also engaged in some discussions with developers concerning potential to combine mitigation or offsets with realigned flood defences. In the United States some large companies and government agencies have created mitigation banks for their own use, so that they can draw down credits for their own planned activities in the knowledge that suitable and sufficient credits will be available when required.

4.3 Strengthening biodiversity policy

This section considers strengths and weaknesses of current biodiversity policy in order to identify possible benefits associated with offsets (explored in more detail in Chapter 5). The objectives of planning policy relating to biodiversity are set out in Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS9; ODPM, 2005). They include the following objectives relevant to an overall policy of biodiversity enhancement and which are therefore relevant in establishing a potential requirement for offsets:

- promote sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development;
- conserve, enhance and restore the diversity of England's wildlife;
- contribute to rural renewal and urban renaissance by enhancing biodiversity in green spaces and among developments.

It is suggested that regional planning bodies and local planning authorities should aim to 'maintain, and enhance, restore or add to biodiversity' and also that they should:

> '*ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; and to biodiversity and geological interests within the wider environment*'.

Biodiversity offsets are one way in which these objectives and planning principles could be implemented, for example they could help to extend the compensation requirements required under the Habitats Directive to biodiversity interests within the wider environment, for which negligible compensation takes place at present. This includes species and habitats protected under the Birds and Habitats Directive but occurring outside of Natura 2000 sites (Dodd, 2007). Another potential benefit associated with introduction of specific policy requirements for biodiversity offsets could be the implementation of requirements for local development frameworks to develop appropriate policies to contribute to regional biodiversity targets and the restoration or creation of priority habitats (see also following section).

With regard to the seemingly ambiguous requirements of the Biodiversity Duty, PPS9; appears to bring at least some clarity. In particular with respect to the need to conserve and enhance biodiversity, the key principles of PPS9 promote a sequential approach of: avoiding impacts, mitigating impacts and compensating for any remaining impacts (i.e. the mitigation hierarchy). Specifically PPS9 states that where:

> *'significant harm* [to biodiversity interests – defined below] *cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused.'* (para. 1(vi))

This statement appears to establish a requirement to adhere to the mitigation hierarchy in English planning policy, as well as allowing for the possibility of biodiversity offsetting. Notably, where significant harm cannot be prevented through implementation of the mitigation hierarchy planning consent *should* not be granted. The accompanying Guide to Good Practice (ODPM, Defra, and English Nature, 2006) provides further guidance with respect to compensation and enhancement as set out in Box 18.

The term 'biodiversity interests' is not clearly defined in PPS9 although it can reasonably be interpreted to include:

- statutory designated sites (i.e. Natura 2000 sites, SSSIs, National Nature Reserves and Local Nature Reserves);
- species protected under Schedule 2 of the Habitats Regulations 1994 and Schedule 1 and 5 of the Wildlife and Countryside Act 1981;
- local Sites, e.g. County Wildlife Sites, Sites of Importance for Nature Conservation e.t.c.;
- priority habitats and species;
- ancient woodland and veteran trees;
- important habitat networks.

Box 18 Guidance relating to biodiversity offsetting in planning for biodiversity and geological conservation: a guide to good practice (ODPM, Defra and English Nature, 2006)

'The development control process is a critical stage in delivering the protection and enhancement of biodiversity and geological conservation required by PPS9. The following key examples of good practice can help better achieve these objectives:

- Adopting the five point approach to decision-making – information, avoidance, mitigation, compensation and new benefits.
- Ensuring that planning applications are submitted with adequate information using early negotiation, published checklists, requiring ecological surveys and appropriate consultation.
- Securing necessary measures to protect, enhance, mitigate and compensate through planning conditions and obligations.
- Carrying out effective planning enforcement.
- Identifying ways to build biodiversity and geological conservation into the design of new development.' (Chapter 5 Good practice summary)

'Compensation relates to all measures designed to help to **offset** the adverse effects that cannot be further reduced by mitigation. Compensation measures, a final option wherever all mitigation possibilities have been exhausted, will normally involve **off-site measures to offset losses** within the development site or to **offset residual effects** on affected wildlife sites. Developments may provide a combination of both mitigation and compensation because the aim is to maximise the effects of mitigation in order to reduce the need for and scale of compensation measures.' (para. 5.29)

Despite the above planning policy and guidance, the requirement under PPS9 to adhere to the mitigation hierarchy and undertake adequate compensation for significant impacts to biodiversity interests has been questioned. Assuming 'significant harm' can be defined, the principal reason for this uncertainty in interpretation is because of the inclusion of the word '*should*' instead of more compulsive language such as '*shall'* or '*must*'. Words such as '*should*' allow local authorities to weigh up biodiversity concerns with economic and social considerations. This flexibility is in accordance with the wording attached to the Biodiversity Duty, which by default or design facilitates consideration of the conservation biodiversity alongside the wider duties of planning authorities. Unfortunately, as far as biodiversity is concerned, it is these wider considerations which, anecdotally at least, seem to be given greatest prominence.

Nevertheless, such consideration of biodiversity is a material consideration in planning policy. In accordance with the Planning and Compulsory Purchase Act 2004, new development should be in keeping with local, regional and national planning policy unless there are material considerations to indicate otherwise. Hence PPS9 does not merely provide planning guidance, it has some statutory basis. In addition, the word 'should' does infer greater compulsion than alternative verbs that were perhaps also considered when drafting the policy, such as '*could*' or '*may*'. While economic and social considerations often do override ecological considerations when it is being decided whether an ecologically sensitive site should be developed or not, the planning authority can and *should* (in keeping with the above policy statement) be at least insisting on adequate mitigation and compensation or else, again in keeping with policy, refuse planning permission.

Although there has been no systematic review of policy decisions following the implementation of PPS9, anecdotal evidence seems to suggest the ambiguity and uncertainty discussed above is such that current policy and guidance is insufficient to provide a reliable means of achieving biodiversity offsetting. How greater clarity might be achieved is considered in Chapter 5.

4.3.1 Policies on enhancement

Biodiversity offsetting, as generally defined, requires '*preferably a net gain of biodiversity*'.

The word 'enhance', and synonyms for it, are included at least 13 times in PPS9 and numerous times in the accompanying Guide to Good Practice, emphasising the importance attached to the need to go beyond mere damage limitation for biodiversity in the planning process. For example, in terms of development control, PPS9 states:

> '*To promote sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development'*; and
>
> '*To contribute to rural renewal and urban renaissance by enhancing biodiversity in green spaces and amongst developments*.'

Specifically in relation to '*networks of natural habitats*', which provide stepping stones for the migration or dispersal of species, PPS9 requires that they should be:

> '*protected from development, and, where possible, strengthened by or integrated within it*.'

The requirement for ecological enhancement is qualified in PPS9 in several places by '*wherever possible*' or '*where possible'*. If planning authorities do not have adequate ecological expertise to advise them on such matters (see below), some developments may well be approved that interpret these caveats in ways that offer few tangible enhancements (Garland & Wells, 2006) and do not improve the overall ecological quality, extent, capacity, structure and functioning of a site and the surrounding network of sites and features in line with Oxford and McArthur's (2000) definition of enhancement.

Guidance is required on what constitutes an appropriate or sufficient level of enhancement and to create a clearer definition of and requirement for enhancement. The Guide to Good Practice does provide some clarity in this respect stating:

> '*It is good practice to work on the principle of 'no net loss' of biological and geological diversity, and to aim for a 'net gain' in biological and geological resources as a result of the development proposal*.'

For enhancement to truly mean 'net gain' there must be more biodiversity following development than there was before it took place. At present PPS9 does not make it a clear requirement of government policy for '*enhancement*' to be interpreted as net enhancement having first achieved and 'no net loss', though this clearly constitutes good practice. The concern voiced by some developers that they may be asked to do more than merely redress losses associated with their particular proposals also needs

more specific reference in government guidance. Although this might well be considered to be a reasonable societal goal, unambiguous policy is required to clarify the extent of shared responsibility for past losses of biodiversity. The relationship between 'no net loss' policy and policy on enhancement is considered in more detail in the following section.

4.3.2 Relationship between a minimum requirement for no net loss and policies on enhancement

What distinguishes 'offset mechanisms' from other approaches to ecological compensation, is the fact that they involve clear and transparent accounting for any losses, gains or trade-offs. 'No Net Loss' is a key concept because it establishes the minimum requirement for an offset. This does not imply that offsets necessarily fall short of wider policies seeking biodiversity enhancement, as offsets are one of many possible implementation mechanisms and would complement (rather than replace) the Biodiversity Duty set out in PPS9. Through application of offsets, it would be possible to realise net biodiversity gains 'on the ground' and one of the main motivations for considering a system of biodiversity offsets in England is precisely to establish a mechanism for delivering demonstrable, quantifiable biodiversity gain.

4.4 Strengthening the UK Biodiversity Process

Conservation in the UK has focused historically on protected areas such as National Parks and Sites of Special Scientific Interest (Natural England, 2008b). However a large proportion of the UK's semi-natural habitat is located outside the protected area system, where the natural environment is increasingly under threat and has less diversity and less local distinctiveness than in the past. Much of this habitat (with its associated species) is included in the UK Biodiversity Action Plan (BAP) but has limited protection from development. If biodiversity offsets are to be used to strengthen conservation of habitat outside protected areas, it is important to consider how they could be integrated with existing provisions.

The England Biodiversity Strategy, for example, (Defra, 2002; N.B. the strategy is regularly reviewed and updated) focuses on delivery of targets for priority habitats and species, identified at national level and listed under Section 41 of the NERC Act, 2006. Prioritised action for each habitat and species, or for groups of them, has been identified in habitat or species action plans or 'signposts' at the UK level (Biodiversity Reporting and Information Group, 2007). Local Biodiversity Action Plans (LBAPs) produced by local partnerships establish local priorities for habitats and species, usually within a county or unitary authority area. Regional targets are developed by regional biodiversity partnerships, with reference to both national and local targets, and are adopted in Regional Spatial Strategies or Integrated Regional Strategies.

The England Biodiversity Framework (Natural England, 2008) recognises the need to go beyond protected sites and separate species and habitat action plans and to adopt integrated landscape-scale approaches that restore whole ecosystems. One of its purposes is to achieve priority habitat targets through greater collective emphasis on habitat restoration and expansion. Another important change is to approach conservation of BAP priority species primarily through habitat based action.

Biodiversity offsets could help to achieve BAP targets by:

1. Delivering additional conservation gains to BAP habitat through an offset in cases where the biodiversity impact of development is on a non-BAP habitat.
2. Applying offsets to the delivery of landscape scale approaches that restore whole ecosystems (including BAP targets), through aggregation of offsets for several developments in a strategic approach.

One issue that needs to be resolved through further work is the relationship between BAP habitat targets and how equivalence would be determined in a system of offsets. Under a 'like-for-like or better' rule, would it be acceptable or appropriate to swap one BAP habitat for another in an offset agreement? Clearly this would not be suitable where the BAP impacted is a 'no loss' habitat (see Box 19).

Box 19 Summary description of BAP habitat targets

Habitat targets are of four types (see Figure 2):

"Maintain extent" and "achieve condition" apply to the current resource of BAP habitats – achieving the target involves no change in habitat category. "Maintain extent" entails the avoidance of destruction or loss of quality to the extent that the habitat would no longer be described as BAP habitat. "Achieve condition" entails the improvement of condition in an existing BAP habitat (normally through management), to deliver the desired quality.

"Restoration" and "expansion" entail a change of habitat category from a non-BAP type to a BAP habitat. "Restoration" applies to land that supports degraded former BAP habitat, whereas "expansion" takes place in landscapes where there are few remaining examples of the BAP habitat (an intensively farmed arable landscape, for example).

For application of the "Maintain Extent" targets, BAP habitats are allocated by the England Biodiversity Group to two categories: "No loss" and "No net loss". In the case of "No net loss" habitats there is acceptance that some of the current resource may be lost provided that the loss is compensated by restoration/ expansion elsewhere. In the case of "No loss" habitats no destruction or serious loss of condition is considered acceptable (such habitats can essentially be regarded as non-substitutable.

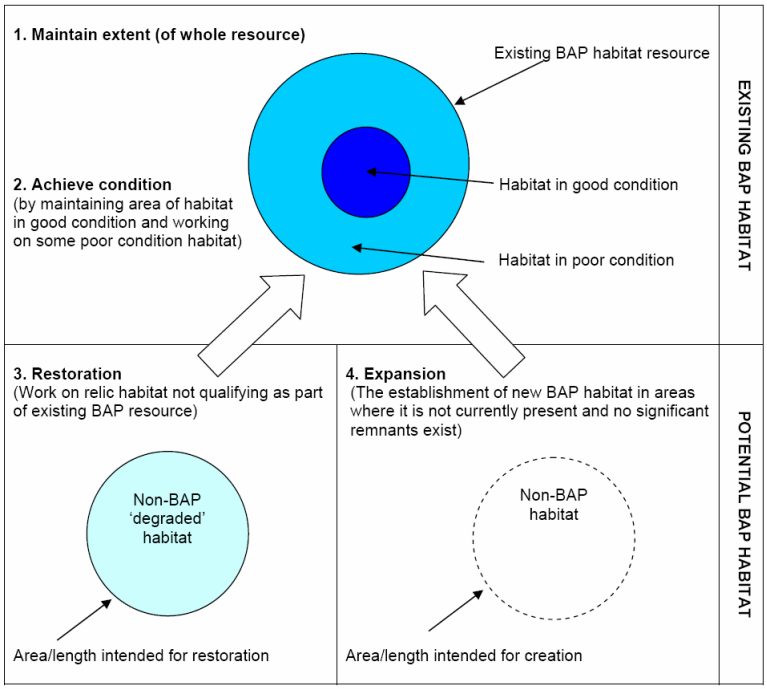


Figure 2: Definition of UK BAP Targets (UK Biodiversity Group, 2006)

4.5 Helping to build ecological networks

There is widespread agreement among policy stakeholders concerning the importance of developing ecological networks (and enhancing connectivity) as one of a suite of measures to help biodiversity adapt to climate change (e.g. Hopkins *et al*., 2007; Parliamentary Office of Science and Technology, 2008; Woodland Trust, 2006). ODPM's (Office of the Deputy Prime Minister [now Department for Communities and Local Government]) Planning Policy Statement 9 (PPS9) affirms the value of habitat networks and their use in linking areas of biodiversity importance through the provision of routes or stepping stones for the migration, dispersal and genetic exchange of species in the wider environment (ODPM, 2005).

Ecological networks are seen as important because habitat fragmentation is thought to be a major factor constraining the ability of species to adapt to changes in their climate space. How well a species can adapt to climate change will depend largely on how easily it can disperse and whether suitable habitat is available to move through and into (Branch Partnership, 2007). Habitat loss and degradation, the increasing isolation of habitat patches and the intensification of land use in the intervening landscape matrix threaten the ability of species to disperse and colonise new areas (Defra, 2008).

Improving connectivity has been suggested as an adaptation to climate change to facilitate species dispersal. This might include physical linkage of habitat patches or measures to enhance the permeability of the landscape, given different species' dispersal abilities, and the nature of land cover and land use in the areas between habitat patches. Development of ecological networks is relatively well advanced in the Netherlands. In England, a review of literature and studies carried on behalf of Defra

(Defra, 2008) found evidence of positive responses to the presence of an intervening matrix with features of a similar structure to the 'home' habitat across taxonomic groupings, habitat types and scales, particularly for less mobile species. The results of the systematic review carried out as part of this study also suggested some evidence, (albeit partial and limited), that landscape features between habitat patches, such as corridors and matrix structure can have a role in enhancing connectivity. Relatively mobile groups like butterflies, birds and large herbivores benefit from increased connectivity. For these species, spatial targeting of measures to create corridors and a matrix with structural affinity to the "home" habitat should enhance population persistence and may promote longer distance movement. However, there was a large number of species for which no information was available; reptiles and species of freshwater habitats were particularly poorly covered as were species of low mobility. Plants were not included in the review as no plant studies fitted the strict inclusion criteria. For these species, the benefits of landscape modification to promote landscape connectivity remain unproven. Nevertheless, no evidence was found that contradicted current policy and practice. Given the magnitude of the threat posed by climate change, a precautionary approach would indicate that measures to enhance functional connectivity should be a priority.

Combating the impact of climate change on biodiversity cannot be addressed solely by improving connectivity. Intervention to increase species' resilience to climate change may be as important as measures to enhance movement. Actions that can promote resilient populations include: conserving protected areas and all other high quality habitats, reducing sources of harm not linked to climate, conserving the range and ecological variability of habitat and species, creating buffer zones around high quality habitats, and taking action to control spread of invasive species. In turn, larger populations can produce more individuals capable of dispersal and habitats will be more welcoming to colonisation and establishment, thereby increasing the likelihood and success of chance long-distance dispersal events, which for many species appear to be vital in keeping pace with climate change.

Connectivity analyses have been applied by Natural England to four broad habitat types – deciduous woodland, heathland, grassland and mires –as part of an initiative to develop a Pan-UK ecological network in order to improve the "ecological coherence of protected areas and provide a focus for climate change adaptation" (Catchpole, 2006). The main aim of this work was to identify areas of extensively managed land in between existing statutory and non-statutory sites that should be maintained through the targeting of land management subsidies and the development of appropriate spatial planning policies. It was not intended to provide any indication of habitat potential as it only estimates the current patterns of connectivity that may be present in a landscape. In spite of this, it can be used in combination with other information sources to identify priorities for enhancing the potential of sites to adapt to climate change through the systematic consideration of small gaps between key networks as well as any pinch points or barriers that may be present within those networks. Natural England recommend a sequence of action to improve the resilience of existing habitat where the creation of new networks or stepping stones between networks only occurs after other suitable actions have been taken to strengthen the conservation of existing sites and to buffer them against threats (Catchpole & Buchanan, 2008).

Biodiversity offsets have the potential to make a significant contribution to the achievement of robust functional networks provided that the location and design of offset actions can be set in a strategic framework, still under development.

4.5.1 Species considerations

The new approach to conservation of BAP priority species in the England Biodiversity Framework, primarily through habitat-based action, would support an emphasis on habitat-based metrics for offsets as widely adopted worldwide. However further work is required to consider how impacts on BAP species that are not closely associated with particular habitats would be accommodated.

Functional networks are defined in part by analysis of species dispersal ability across landscapes of variable permeability. The approach is constrained by limited availability of good research evidence for most species and by patchy recorded data for species distribution in habitat patches in the landscape. Consequentially characteristic species for habitats are used, which may or may not be the most suitable for determining functional networks, and may not be actually present in the networks in question. Ideally a much larger range of species would be used, with focus on recorded species in each potential network.

A small sub-set of species has also been used to attempt to define sustainable functional networks and assess the effectiveness of development of a robust corridor in the southern Dutch province of Limburg as part of the Dutch National Ecological Network (BRANCH, 2007). Important habitats in the network are forests, heathland, pasture, hedges, arable fields and marshy valleys. Modelling was used to analyse how freely wildlife could move between habitats and to assess how climate change could improve or reduce the sustainability of the habitat networks of selected species, with and without the robust corridor. Species which were modelled included: sand lizard; purple emperor butterfly; great crested newt; Dartford warbler; Cetti's warbler; woodlark and Bechstein's bat. These species have different dispersal capacities and are likely to respond differently to climate change. The approach again illustrates that robust assessment of network effectiveness needs to include consideration of species, and that the suite of species covered should be as wide as possible and locally relevant to the networks concerned.

The rebuilding biodiversity approach used in the development of Nature Map in SW England (South West Wildlife Trusts, 2005) applies the concept of Minimum Dynamic Area (Pickett & Thompson, 1978), and seeks to select the most area-demanding species for each habitat as the basis for determining required habitat patch size in landscape scale restoration. Examples include stone curlew for chalk grassland, marsh fritillary for purple moor grass and rush pastures. The argument here is that if the most area-demanding species is catered for then the full suite of characteristic species associated with the habitat will by definition be covered. This has the merit of reducing the number of species that need to be considered in analysis, but issues remain around identifying the most area-demanding species, the application of meta-populations to the model and the lack of definitive research for the patch sizes required by most species. Such issues would require further investigation if a species-specific approach to biodiversity offsets were to be taken.

4.6 Improving application of the mitigation hierarchy

There is well documented evidence of the frequent failure of existing approaches to mitigation of ecological impacts in the UK (e.g. Treweek and Thompson, 1997; Thompson *et al*., 1997), though no more recent reviews appear to have been carried out. Effectiveness of EIA is key, as although application of the mitigation hierarchy is

embedded in planning policy and is required under the UK's EIA Regulations, they do not include an absolute requirement to implement mitigation (see also section 4.1).

There are several reasons why current approaches to EIA fail to deliver no net loss of biodiversity:

1. Mitigation measures are likely to be recommended only for significant adverse impacts and impacts on non-designated sites and species are often considered insignificant.
2. There is no requirement to carry out cumulative effects assessments and therefore cumulative impacts on biodiversity are not generally mitigated for.
3. There is no requirement to provide evidence that mitigation can or will be implemented, or to demonstrate that it has achieved the intended results, or make corrections if it has not.
4. There are no guiding principles established for what constitutes acceptable mitigation: often the mitigation provided is not 'in-kind' although clearly it should be, by definition.
5. Even if implemented, much mitigation is provided in inappropriate locations with inadequate provision for the longer-term funding required to ensure success.

In addition, the Environmental Statement, which would normally specify appropriate mitigation, is generally forgotten once planning consent is given (Hill, 2009): it is a tool for gaining consent and not a legally binding commitment. The requirement to deliver offsets is usually linked to plan development and developments for which planning permission is required. There are currently a number of problems with both the assessment system and implementation system. These include (Treweek, 2000):

- a frequent failure to properly characterise ecological impacts;
- a frequent failure to properly mitigate for important ecological impacts (proposed mitigation measures are inappropriate and implementation is not mandatory, unless made a condition of planning or bound by legal agreement); and
- a very frequent lack of monitoring or follow-up (actual outcomes are not known and no corrective action is generally taken in the event of mitigation failure).

In terms of implementation there is a lack of capacity in local authorities. Only about 35% of local planning authorities employ an ecologist or biodiversity officer (Mike Oxford 2008 pers. comm.), the result being that resources are not in place to advise planners regarding interpretation and implementation of new biodiversity policy, successful implementation of many of the important policy advances, or any system of biodiversity offsetting. Discussions with the Association of Local Government Ecologists (ALGE) suggest that planning authority ecologists are not always sufficiently consulted on all development control matters that are potentially very significant for biodiversity.

A clear requirement to demonstrate no net loss would establish a clear endpoint or ecological goal for ecological mitigation and could result in more rational and rigorous approaches to mitigation design, as demonstrated by current practice for avoidance, mitigation and compensation relating to Natura 2000 sites. At the very least, clear guidance for planning authorities on interpreting current biodiversity policy specifically regarding the mitigation hierarchy and enhancement (which should include an effective mechanism for offsetting) is required. It is interesting to note that the offsets system in

Victoria, Australia, has introduced a distinction between those comparatively modest impacts for which local authorities can determine the appropriate biodiversity offset (based on simple area- and significance-based metrics determined for them by central government) and more significant impacts for which specialist central government staff assess developers' use of more sophisticated loss/gain metrics.

For the majority of activities and practices in sectors such as agriculture and forestry the requirement to offset their impacts poses a more complex set of issues. Without a clear permitting process the necessary intervention mechanism is not in place to evaluate the need for an offset. However, coordination with these sectors may provide the greatest opportunity to deliver the large-scale effective offsets which are needed to produce a net gain in biodiversity from general urbanisation and other development. There are considerable potential benefits to be gained from increasing the levels of biodiversity on agricultural land.

One of the main potential benefits of offsets is that they could improve the availability of funds for monitoring and enforcement. Offsets are also transparent and enforceable and could shift the emphasis of mitigation planning towards a more outcome-oriented approach than tends to be practised at present.

There are noticeable gaps in securing an effective implementation mechanism. Procedures do exist for assessing the need for an offset, and for securing monetary contribution to the development of offsets. A reliable system of implementation, enforcement, monitoring and review is needed.

4.7 Streamlining the planning process

The Planning Bill introduces a new system for approving major infrastructure of national importance, such as harbours, waste facilities and nuclear power stations. A key objective of the Bill is to streamline planning decisions and avoid long public inquiries.

The Planning Act 2008 was granted Royal Assent on 26 November 2008. The Act builds on the proposals set out in the Planning White Paper and introduces a new system for nationally significant infrastructure planning, alongside further reforms to the town and country planning system and the introduction of a Community Infrastructure Levy. The Act establishes an Infrastructure Planning Commission (IPC) as the new authority granting development consent for nationally significant infrastructure projects and also provides for the Government to produce national policy statements (NPSs) to be used as the policy framework for the Commission's decisions. It imposes a requirement on project promoters to consult affected parties and local communities prior to submitting an application, and sets out a new process for examining applications.

The Act also makes further reforms to the town and country planning system, including changes to the Local Development Plan system by removing some minor procedures; adding a duty on councils to take action on climate change in their development plans; and to have regard to the desirability of achieving good design; streamlining development control procedures; making changes to the appeals process; and adding transitional powers allowing regional assemblies to delegate some planning functions to regional planning bodies.

As pointed out by Morris and Huggett (2007), there are certain industries or activities that are likely to be considered by government and society as social and/or economic imperatives and which might constitute 'nationally significant infrastructure' under the Act. These include renewable energy, fossil energy, transport networks, power generation and flood risk management. In these sectors, locations are determined strategically and often well in advance of development taking place. It should therefore be possible to take a similar strategic approach to identification of land required to offset their impacts. There are some issues to resolve with regional spatial planning, however, as Regional Spatial Strategies do not currently take a consistent approach to the prioritisation of biodiversity of land that might be required to develop ecological networks.

The Planning Act also contains enabling powers to empower local councils to apply a Community Infrastructure Levy (CIL) on new developments in their areas to support infrastructure delivery. The CIL has been identified as a possible funding mechanism for green infrastructure and also possibly for biodiversity offsets. An important potential benefit of CIL is that it could more easily fund sub-regional infrastructure – that is, larger pieces of infrastructure typically benefiting more than one local authority area. The Regional Spatial Strategy (RSS) would be expected to identify these infrastructure requirements, which would then be cascaded down into local development plans. The Government proposes that local authorities should have the freedom to work together to pool contributions from CIL within the context of delivering the RSS and local development plans (DCLG 2008).

One of the reasons for introducing the CIL was that local authorities tend only to negotiate planning obligations alongside consents for larger developments, because the time and costs involved do not always make it worthwhile negotiating on smaller developments. Only around 14 per cent of all housing planning permissions made any contribution in 2005-06, for example. Many medium-sized and smaller developments do not contribute anything at all. However, there are certain difficulties in using the CIL as a mechanism to fund biodiversity offsets. First, the use of CIL funds is determined case-by-case and biodiversity is likely to be the focus only in a minority of cases. Second, some biodiversity requirements are not readily incorporated in green infrastructure as interpreted by some authorities (investment in 'green/open space' or recreational areas, for example, does not necessarily achieve conservation of biodiversity per se). Finally, Local Authorities may remain unwilling to impose levies which might deter developers if they are not similarly required by neighbouring authorities. The mechanism is therefore not likely to make a substantial further contribution towards no net loss of biodiversity. To make the CIL of value to biodiversity, more specific requirements leading to consistent application across authorities would be needed.

4.8 Providing an additional funding mechanism

Biodiversity offset schemes in other countries have been successful in activating markets in biodiversity credits. In the State of Victoria, Australia, there is a relatively modest market for biodiversity credits. This is because:

- A 'net gain' policy objective (introduced in 2002) for native vegetation has been effective in reducing rates of clearing.
- Since 2002 applications to clear vegetation have been received for only a couple of hundred hectares of private land, so a relatively small number of offsets have been required.

In the United States, in 2005 there were over 500 mitigation banks established and between 70 and 100 species banks. Endangered species banking (conservation banks) are estimated to generate $370 million gross revenues per year and wetland credit banking approximately US$1bn per year (Environmental Law Institute, 2007). The size of these 'markets' has been growing considerably since requirements for offsets were tightened in the US in the last eighteen months. Prior to this, developers selected alternative mechanisms for delivering their offset obligations, such as undertaking the offsetting actions themselves or paying a fee in lieu, since the obligations involved in these delivery mechanisms were less onerous than establishing a conservation bank or the cost of buying credits from one. Now, the performance standards and hence costs across the different delivery mechanisms are more comparable, so the choice of conservation banking has been growing.

In England there are potential opportunities for land owners and land managers to provide and potentially sell biodiversity credits based on the conservation actions they have undertaken. It is possible that a requirement for biodiversity offsets could provide a new funding stream for private landowners. WWF-UK, in a House of Commons Select Committee investigation, suggested that the cost of proposed upgrades of flood defences along a stretch of river in Sussex (£10 million) could have provided enough funding for 50 years' salt marsh restoration payments for every farmer in the floodplain (reported in Crooks and Ledoux (2002). The overall potential magnitude of the offsets market is difficult to estimate, however. Demand for offsets would obviously depend to a large extent on the economy and rates of development. Although rates of development have slowed, it is thought likely that there could still be quite strong demand for offsets and that a relatively high proportion of landowners would be in a position to provide biodiversity credits if these were based on BAP habitat definitions and targets. It is instructive to consider the situation in Victoria, Australia, where landowners in the Victoria volcanic plains have, over the last two years, received average payments of Aus$125,000 per 'habitat hectare' from developers for their biodiversity credits.

From the point of view of funds for monitoring and enforcement, there is a policy choice available to government. Government could pay to run the scheme and to monitor and enforce it, or it could operate a scheme on a cost recovery basis, where the cost of running the scheme is estimated and priced into individual offsets (as in New South Wales, Australia). Another option is to adopt a phased approach (as in Victoria, Australia) by paying to run the scheme initially (e.g. by covering staff salaries of the people doing the assessments and running a register of required offsets/ providers) and then move towards cost recovery.

4.9 Risks and possible weaknesses

Perceived risks are likely to vary considerably between participants in the process.

From a public perspective:

- There may be perceptions that negotiated offset and compensation packages are used to make otherwise 'unacceptable' adverse environmental impacts 'acceptable'.
- Developer contributions may be misconstrued as a green light for developers to buy themselves out of planning policies and restrictions.

From a regulatory perspective:

- Offsets proposed in the guise of sustainability tools, may over-ride the protection and conservation of valuable environmental assets. It is necessary to consider how 'critical assets' can be fully protected and conserved so the country fulfils its statutory and policy requirements.
- The need to ensure additionality might place potential offset providers at a disadvantage in cases where their land already supports high biodiversity.
- Existing duty of care obligations could be compromised by introduction of a system that supports sale of biodiversity credits from private land.
- The relationship with other developer contribution frameworks is unclear: e.g. how to ensure s106/ CIL delivers 'biodiversity' when appropriate?
- There is a risk that authorities could divert resources from other successful conservation initiatives into offsetting.
- The shift in policy and agenda towards eco-urbanism, i.e. integrating new biodiversity resources within new development, thereby providing valuable ecosystem services to local communities, could be compromised.
- The buying and selling of offset credits could lead to paper-based corruptions of the system whereby offsets became virtual rather than real, if not adequately regulated (especially if credits were resold several times).

From the perspective of the developer, biodiversity offsets could be seen as one more hoop to jump through, further complicating existing obligations to safeguard biodiversity and constituting an additional tax, particularly for smaller scale developments. For this reason, a 'twin-track' approach with a simple offset calculator for smaller and less significant impacts is advisable. The circumstances under which offsets would be required could be controversial and there could be resistance to any requirement to purchase biodiversity credits as a pre-condition for obtaining development consent.

5 POSSIBLE MODIFICATIONS REQUIRED TO SUPPORT A SYSTEM OF BIODIVERSITY OFFSETS IN ENGLAND

This chapter presents recommendations arising out of the scoping study for changes which could be made to implement a system of biodiversity offsets in England. In particular it suggests possible modifications to existing policy, legal and institutional frameworks within which a system of biodiversity offsets might be designed and implemented.

As illustrated in Chapter 3 of this report, there are many possible approaches to biodiversity offsets which could be considered for application in an English context. These range from voluntary options, where developers undertake offsets because there is a business case to do so, to more regulated options in which offsets are required for certain levels of impact on certain kinds of biodiversity or in which biodiversity credits can be traded through a market-based system.

5.1 Options appraisal

Against a background of existing policy and practice, as outlined in Chapter 4, policy-makers have the following broad strategies available to them:

1. Continue with 'business as usual';
2. Make better use of existing policy and legal frameworks (e.g. by developing clearer guidance, establishing principles, introducing minor amendments to policy to strengthen requirements for developers to demonstrate no net loss of biodiversity, with the option of using offsets as part of the mitigation hierarchy)
3. Introduce new law/policy to:
    a. Trigger offsets where current law doesn't;
    b. Create property rights in biodiversity credits to stimulate private landowners and biodiversity banking;
    c. Establish rules on banking, to enable it to happen.

The following sections summarise main advantages and disadvantages associated with each option. This includes a qualitative assessment of effectiveness and relevant costs.

5.1.1 Option (1) 'Status quo' or 'Baseline situation'

This entails compliance with current EU and UK law and policy, using presently available guidance. Table 3 summarises some of the key issues to consider and the likely outcome of continuing under this scenario. A fundamental consideration is whether the current baseline situation is likely to improve without increased use of offsets and whether there are alternatives to offsets which would lead to a better strategic outcome.

Advantages: No further policy intervention required. Offsets are already possible for many significant residual impacts on biodiversity.

Disadvantages: Although the policy intent of PPS9 is clear, there is some confusion about the extent to which strict adherence to the mitigation hierarchy is required. In particular there is uneven practice in terms of provision of compensation on the ground. It is also possible for biodiversity considerations to be overridden by economic and

social considerations. The result is that some significant impacts on biodiversity might not be mitigated or compensated for. There is no mechanism in place to enable habitat banking. In addition, although offsets for 'wider biodiversity' (ie not EU listed species and habitats) might be encouraged, they are not enquired under the UK 'Biodiversity Duty'. As the 'Biodiversity Duty' applies strictly to local authorities and not to developers, quantified biodiversity offsets are unlikely to take place for wider biodiversity.

Likely outcome:
Under a 'business as usual' scenario it is likely that there would continue to be relatively limited application of offsets and continuing net biodiversity loss and fragmentation of habitats. Offsets would be used largely for impacts on European designated sites and associated habitats and species and also European Protected Species outside such sites where Natural England licences are required. Use of offsets to achieve 'no net loss' more generally would probably remain very limited. It is unlikely that biodiversity offsets would be required by planning authorities in many cases to compensate for residual adverse impacts remaining after application of the mitigation hierarchy, principally because of the ambiguity of the 'encouragement' (rather than requirement) to do so, partly because of limited understanding of when and how to undertake biodiversity offsets and partly because of limited capacity to regulate or monitor the process. Although there are incentives for compliance under command and control regulations, the development of a market for biodiversity offsets could make them more attractive. There are examples of good practice which could be built on to provide guidance on application of the mitigation hierarchy, with advice to planning authorities or developers on what constitutes a reasonable level of mitigation effort. Levels of development of conservation banks as a mechanism for delivering offsets would probably remain relatively low.

Table 3 Issues to consider and likely outcome under Option 1

Issue	Situation and Likely outcome
Trigger	- EU law: compensation compulsory for designated European sites and protected species. - UK law (other biodiversity values): compensation recommended, but implementation in practice is inconsistent (there is little documented evidence). The Duty under NERC to seek biodiversity enhancement where possible can be over-ridden by other social and economic priorities. **Result**: biodiversity offsets currently rare and many impacts on biodiversity are not compensated for.
What about 'non offsetable' impacts?	- EU law: project shouldn't proceed, or 'compensatory conservation' must be provided to maintain the integrity of the Natura 2000 network in cases where development proceeds because of overriding public interest. - UK law: compensation should be provided and planning permission should not be given in cases where significant residual impacts on biodiversity will remain, but there is some ambiguity. Application in practice is not consistent and there is little follow-up.
Scope	Species and habitats listed under the Birds and Habitats Directives; remediation under the Environmental Liability Directive. Broader biodiversity is identified as a consideration under PPS9, but practice is inconsistent. Offsets are not required in all cases where priority BAP habitat is affected, for example.
Guidance on rules (eg thresholds, trading up, implementation)	EU Guidance on Article 6(4) available but outside of Natura 2000, developers left to interpret law and precedent. No guidance on how to do offsets under PPS9.
Land availability	There has been no systematic or strategic assessment of land suitability of availability. Current approach is reactive and established on a case by case basis. Unclear where offset sites are to be found, on whose land, and whether land purchase is essential for the offset.
Implementation (ie management on the ground)	No guidance. Developer is responsible under EU law, but can outsource. The Environment Agency has provided some compensatory habitat for coastal ecosystems.
Governance of the offset arrangements	No guidance. Developer is responsible under EU law, but could outsource.
Monitoring	Unclear and inconsistent. Little monitoring is carried out. It is not a requirement of Environmental Assessment Regulations and planning authorities are under-resourced in this regard.
Enforcement	It would be a statutory offence and breach of contract between regulatory agency and proponent/developer if the developer did not comply with Section 106 Agreements but there is little evidence of enforcement.
Transaction costs	Offsets are few and do not necessarily reach standards of international best practice, but existing ones involve moderate transaction costs. Uncertainty and lack of clarity in current policy probably inflates transaction costs unnecessarily.
Streamlining process	Incentives unclear. Project proponents report lack of clarity, uncertainty, some duplication of effort.

5.1.2 Option (2) Amendments to existing policy frameworks

Under this scenario, existing legal and policy frameworks would be amended where possible. Defra could also offer supplementary guidance to developers and local authorities on:

- Using EU and UK law and policy as a trigger for biodiversity offsets (i.e. when to require biodiversity offsets – lower and upper thresholds; what is required by EU and UK law).
- Then offering supplementary 'how to' guidance. For instance:
    - Upper and lower thresholds on biodiversity offsets
    - How to apply the mitigation hierarchy.
    - How to quantify the loss of biodiversity caused by projects and the gain caused by offset activities.
    - Presentation of a demonstrable ex post and ex ante case for offsetting rather than mitigation.
    - Site selection, including aggregated offsets.
    - Like for like and trading up.
    - Multipliers.

It could also introduce incentives for best practice compliance offsets and for voluntary offsets, such as:

- Tax breaks.
- Streamlined permitting procedures.

Advantages: Clarity for developers on what's expected of them, leading to better conservation outcomes and more consistency of practice. Greater biodiversity gains from aggregated offsets, and possibly benefits from clearer land-use planning. Incentives encourage best practice compliance and voluntary offsets but don't require complex regulation.

Disadvantages: This model is likely to be inadequate to stimulate conservation banking markets and– depending on the nature of the new guidance – may not result in many more biodiversity offsets, given the optional nature of the requirement for them under the existing 'Biodiversity Duty' in UK law, except possibly in relation to Natura 2000 sites and with respect to flood risk management where there may be sufficient demand to generate such a market (Dodd, 2007).

Likely outcome: It is not clear whether this model would result in stimulation of significantly more biodiversity offsets or a market for credits (with incentives for landowners to conserve biodiversity). Depending on the nature of the supplementary policy guidance that could be issued by Defra, biodiversity offsets would occur largely as a result of local authority discretion. Without a stronger regulatory requirement, local authorities may not prioritise biodiversity in their planning conditions, and net loss may continue. In addition, without a clear and unambiguous general requirement for biodiversity offsets, there would likely be insufficient demand for offsets to stimulate landowners to generate offsets (or 'credits') on their land or for companies to be established as conservation bankers. The viability of this option thus turns on the level of political will to issue guidance that requires biodiversity offsets and creates incentives for them.

Table 4 Issues to consider and likely outcome under Option 2

Issue	Likely outcome
Trigger	- Guidance under PPS9 made clearer. - Developers encouraged/ sometimes required to do offsets themselves, or may find others to do them on their behalf. **Result:** some more offsets, at individual authorities' discretion. Developers to establish their own offsets or outsource them. Markets for biodiversity credits unlikely to emerge without a more stable and less discretionary market.
What about 'non offsetable' impacts?	Clearer guidance could spell out which impacts should be the subject of biodiversity offsets (ie upper and lower thresholds). Guidance could clarify what, if any, compensatory conservation would be required where impacts could not be offset.
Scope	Species and habitats listed under Birds and Habitats Directives; remediation under ELD. Wider biodiversity should be addressed under PPS9, but compensation is not automatic or regular.
Guidance on rules (eg thresholds, trading up, implementation)	Existing guidance consolidated and clarified on thresholds and trading up. Since no trading/credits envisaged in this model (given lack of adequate demand and market stimulation) and developers are to source offsets themselves. Suggestive procedural guidance could be offered on site selection, how to find potential partners for offset delivery, etc.
Land availability	With no credit system in place, the developer must find suitable land for the offset case-by-case. However, this need not necessarily be by land purchase, and could be by long-term contract with a landowner and/or a covenant entered onto land title. Standard model contracts and covenants could be offered as guidance.
Implementation (ie management on the ground)	Could be by: • Government (e.g. Natural England, Environment Agency, local authorities) • Private landowners including farmers, NGOs, Wildlife Trusts, • Conservation banking companies (if they're prepared to take on bespoke, in perpetuity, project-specific conservation without the volume of banks. But this is unlikely to be economically attractive.
Governance of the offset arrangements	Range of options, depending on who implements.
Monitoring	Should be defined in offset design and planned (and costed) into offset implementation.
Enforcement	Government could enforce its contracts with developer and offset implementer. Could be statutory offence for developer/implementer to fail to perform offset.

	Guidelines could require developers to deposit performance bonds and offset implementers to insure against offset failure and/or conservation bank bankruptcy.
Transaction costs	There would be more offsets and these would meet best practice and thus possibly be more demanding than existing offsets, raising transaction costs. Transaction costs may be higher for case-by-case offsets (as in this Scenario) compared with a credit trading or banking model. Further work needed.
Streamlining process/ incentives	Possibility of: • Handing over offset design and implementation responsibilities to third parties. This could be by bilateral agreements, case-by-case, by developers. Or it could be through a system of trading in biodiversity credits generated on landowners' land. But there may be inadequate incentive for landowners to participate without a more defined and less discretionary market. Further research needed. • Lower transaction costs through aggregated offsets and banking. • Policy guidance could create a twin-track approach in which projects with individual significant residual impacts offset them using detailed loss/gain quantification methods (see Appendix C for an example), and smaller projects follow a fast track approach process with more approximate, quicker methods. • Fast-track planning consents for projects with demonstrable no net loss offsets (or offset proposals) in place prior to planning applications. • Density bonuses where net gain is demonstrated. • Clarity on land-use planning (Go and No Go Zones, and offset site selection) • Clarity on which impacts can and cannot be offset and the implications, clarity on offset requirements and processes.

5.1.3 Option (3) Introduction of new policy

In this option, new policy would be introduced to stimulate both a regulated and a voluntary market in conservation banking, somewhat analogous to conservation banking in the US or to the BushBroker Scheme operating in the State of Victoria, Australia. Private landowners would be eligible to generate biodiversity credits on their land. In addition, policy would be clarified and amended such that biodiversity offsets were unambiguously required for any significant residual impacts.

Advantages: Significant impacts on biodiversity which are not currently adequately compensated could be addressed under this option. Biodiversity offsets would take place regularly, and would make a major contribution towards achieving no net loss of biodiversity in England. It would be possible to develop Payments for Ecosystem Services (PES) models (i.e. payment for biodiversity outcomes on private land) as a workable basis for delivering biodiversity offsets in England. Biodiversity could potentially become an asset for landowners rather than a liability.

Disadvantages: Political will needed and relatively high transaction costs might be involved, particularly in initial stages.

Likely outcome: The market would be stimulated to generate conservation gains and landowners would have an opportunity to become more actively engaged, receiving income for conserving biodiversity on their land. It would be necessary to establish triggers for invoking offsets in policy/law. Enhanced legal certainty might encourage more private companies (and possibly NGOs) to invest in conservation banking.

Table 5 Issues to consider and likely outcome under Option 3

Issue	Likely outcome
Trigger	Requirement under PPS9 re Natura 2000 and European Protected Species made firmer and clearer, such that developers are required to demonstrate achievement of 'no net loss' as a minimum. For residual adverse impacts remaining after mitigation developers required to: (1) Do own offsets, or (2) Buy credits May be an option to pay a fee/ developer contribution to local authorities in cases where the biodiversity affected is of low conservation priority and/or the development proposes is small scale. **Result**: many more offsets and more options for delivery, including a new market in credits, with income available for private landowners that undertake conservation on their land.
What about 'non offsetable' impacts?	Thresholds established to confirm circumstances under which impacts are not-offsetable. Impacts beyond thresholds raise questions concerning appropriateness of project. Non-offsetable impacts allowed for public interest reasons would result in 'compensatory conservation', which could be punitive but wouldn't be an offset.
Scope	All significant residual impacts on biodiversity are offset [including broader biodiversity, not only EU listed species and habitats].
Guidance on rules (eg thresholds, trading up, implementation)	Explicit guidance on thresholds, trading up, site selection, designation of credits, implementation/guarantee of offsets. Possible 'two –track' approach in which projects with individual significant residual impacts offset them using detailed loss/gain quantification methods (see Appendix C for an example), and projects with less significant impacts follow a fast track approach process with more approximate, quicker methods.

Land availability	Offset sites can be found on any or all of the following:
	• Protected areas, provided additionality can be demonstrated.
	• Other public land.
	• Private land, including:
	  ○ land purchased explicitly as an offset/conservation bank by a private conservation banking company
	  ○ conservation easements/ covenants on farms and other private land where conservation 'credits' can be generated.
	Note: further discussion required concerning legitimacy of offsets on designated sites such as SSSIs (Additionality).

Implementation (ie management	Could be by:

on the ground)	• Government (e.g. Natural England, Environment Agency, local authorities) • Private landowners including farmers, NGOs, Wildlife Trusts, • Conservation banking companies • Community Land Trusts. Could be economically attractive.
Governance of the offset arrangements	Clarified for each of 3 options: (1) Own offsets: a range of options, including multi-stakeholder group (2) Fee in lieu: local authorities (3) Credits: rules established for conservation banks and private landowners
Monitoring	Agreed in implementation agreements. For instance, credit payments dependent on monitored performance against agreed standards.
Enforcement	Government could enforce its contracts with developer and offset implementer. Could be statutory offence for developer/implementer to fail to perform offset. Guidelines could require developers to deposit performance bonds and offset implementers to insure against offset failure and/or conservation bank bankruptcy.
Transaction costs	There would be more offsets and these would meet best practice and thus possibly be more demanding than existing offsets, raising transaction costs. However, a clear system and the two-track approach above would reduce transaction costs involved in uncertainty and reinventing the wheel. Conservation banking may reduce transaction costs. Further study is needed.
Streamlining process/ incentives	Possibility of: • Handing over offset design and implementation responsibilities to third parties, using the banking/credit purchase option. • Lower transaction costs through aggregated offsets and banking. • Lower transaction costs and simple procedures not involving detailed fieldwork for local authorities for less significant impacts under a 'twin track' system. • Fast-track planning consents for projects with demonstrable no net loss offsets (or offset proposals) in place prior to planning applications. • Density bonuses where net gain is demonstrated. • Clarity on land-use planning (Go and No Go Zones, and offset site selection) • Clarity on which impacts can and cannot be offset and the implications, clarity on offset requirements and processes

5.2 Recommendations for possible amendments to existing frameworks and requirements

Given the limitations of the current situation (as explored in Chapter 4), the following sections outline some of the changes that could be made to assist in implementation of option 2 or 3. It is considered likely that biodiversity decline in the wider countryside would continue under current provisions and that introduction of a stronger requirement to demonstrate 'no net loss' for individual development proposals and to purchase biodiversity credits to offset significant residual adverse effects would have a beneficial benefit: cost ratio. Although there are risks associated with offset schemes, experience overseas suggests that many of these can be overcome and that the risks of biodiversity loss associated with a 'do nothing' scenario are likely to be greater. There is now a great deal of experience to draw on and it should be possible to design an effective system with suitable safeguards in place.

5.2.1 Principles for designing and implementing biodiversity offsets

Practical approaches to the design and implementation of biodiversity offsets vary considerably. Since it is hard to design detailed offset policies and procedures that will be appropriate for every planning context and set of circumstances, it may be helpful to establish guiding principles. These may be aspirational, or fundamental obligations or rules that all parties are required to observe.

Box 20 suggests a set of principles for application to the design and implementation of biodiversity offsets in England. This list is not intended to be comprehensive, but can be used as a basis for consultation. There is an overarching principle that biodiversity offsets should comply with all relevant national and international law, and be planned and implemented in accordance with the Convention on Biological Diversity and its ecosystem approach.

Box 20 Suggested principles for biodiversity offsets in England

Principle	Rationale/ explanation
No net loss	A biodiversity offset should achieve measurable conservation outcomes that can reasonably be expected to result in no net loss of biodiversity as a minimum.
Like for Like	Biodiversity offsets should achieve 'like for like' outcomes or, if this is not possible, enhance biodiversity which has the same or higher conservation priority. Offsets should be delivered through 'better and positive' environmental offset ratios
Adherence to the mitigation hierarchy	Biodiversity offsets are a commitment to compensate for significant residual adverse impacts on biodiversity remaining after appropriate measures have been undertaken to avoid them or reduce them to acceptable levels according to the mitigation hierarchy. Offsets cannot provide a justification for proceeding with projects for which the residual impacts on biodiversity are unacceptable.
Conservation priority	Biodiversity offsets should be designed and implemented in order to optimise conservation outcomes, taking into account available information on the full range of biological, social and cultural values of biodiversity.
Long-term success	The design and implementation of a biodiversity offset should be based on the objective of securing outcomes that last at least as long as the project's impacts (and preferably in perpetuity) and are sustainable in terms of: a) the viability of key biodiversity components, b) the reliability and accountability of governance and financing, and c) social equity, for example in terms of community-access to areas of local biodiversity value.
Stakeholder participation	Offsets must consider the values of biodiversity and ecosystem services to

	affected communities in particular, and society as a whole, and involve affected parties in their design. The full and effective participation of stakeholders should be ensured in all phases of decision-making about biodiversity offsets, including their positioning, evaluation, selection, design and implementation. Special consideration should be given to the rights and interests of local communities.
Transparency	The design and implementation of biodiversity offsets, and communication of their results to the public, should be undertaken in a transparent manner
Enforceability	Offsets must be enforceable – through conditions, covenants or contracts
Timing of offset delivery	Offsets in the most appropriate form should be secured before development commences, to give assurance of effectiveness.
Thresholds	There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected. Offsets should not be pursued if there would be residual impacts of 'very high' or 'critical' significance on biodiversity, nor where the biodiversity values lost cannot be quantified or replaced.
Additional conservation outcomes	A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.

5.2.2 Amendments to policy and legislation

This section considers possible amendments that might be required or that could be made to existing conservation policy if offsets are going to help to implement conservation policy and meet biodiversity objectives and targets.

Under existing policy and legal arrangements, it is ***possible*** for impacts on biodiversity to be offset, but:

- Impacts on non-EU listed species and habitats are not currently subject to the mitigation hierarchy (and biodiversity offsetting as we define it) as a matter of course, as relevant policy drivers are ambiguous and can be overridden by other material considerations which may be of a social and/or economic nature.
- The only unambiguous requirement to undertake offsets relates to the Natura 2000 network and also European Protected Species outside of designated sites subject to Natural England licensing (both cases with respect to the Habitats Regulations). There is a clear requirement to demonstrate 'no net loss', whether in terms of the integrity of a Natura 2000 site or the conservation status of associated species and there is a legal requirement to provide compensation in cases where unavoidable residual adverse impacts remain following mitigation. However, there is no guidance on how to quantify and plan offsets for impacts on EU-listed species and habitats.
- New or revised policy may thus be needed to enable markets or to deliver offsets through credits and banks.

As alluded to above with respect to non-EU protected habitats and species, policy stating that mitigation and compensation should be considered and implemented is ambiguous and subject to interpretation.

To reiterate Section 4.3, PPS9 states that where:

> '*significant harm* **[to biodiversity interests]** *cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused'*.

While it can probably be inferred that 'biodiversity interests' cover a much broader spectrum of habitats and species than merely those protected under EU legislation (see Section 4.3) clarification would be welcomed in any amendments to planning policy. For example it is not clear to what extent it might capture local community use or the services provided by biodiversity as part of green infrastructure in general.

While PPS9 makes it very clear that developers should consider the need for compensation (or offsetting) should efforts to avoid or mitigate significant impacts be insufficient, what is missing is a clear 'no net loss' requirement. This also makes it difficult to determine what constitutes enhancement (mentioned thirteen times in PPS9) and what quantum of enhancement might be considered sufficient to achieve policy goals. Another important area of uncertainty relates to how 'significant harm' to this interest would be determined.

While the developer must start with the assumption that it must comply with planning policy, it is up to the planning authority to then decide whether such matters can, on request from the developer, be overridden by other material considerations of an economic or social nature. In practice biodiversity interests do appear to be over-ridden by these other considerations, a problem compounded by the fact that planning authorities have insufficient capacity to sufficiently review applications from a biodiversity perspective and consider detailed requirements for compensation. The fact that it is not always straightforward to determine whether residual adverse effects are in fact significant or whether effective compensation can be defined and implemented makes it very challenging for planning authorities to insist on adequate compensation.

The current situation is not entirely clear and needs further investigation. Clearer requirements for offsets could make it easier for all parties to implement policy. If a compulsory regulated approach is identified as the most suitable way forward, amendments may be required to key pieces of legislation relating to environmental assessment and planning to require offsets for certain impacts on certain biodiversity. Additionally amendments may be required to remove some of the ambiguity in current wording as suggested in Box 21.

Box 21 Possible changes in wording (in *bold/ italics*) to strengthen PPS9

- Where granting planning permission would result in significant harm to those interests, LPAs will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm.
- In the absence of any such alternatives LPAs ***shall*** ~~should~~ ensure that before planning permission is granted adequate mitigation measures are put in place.
- Where a planning decision would result in significant harm to biodiversity which cannot be prevented or adequately mitigated against appropriate compensation measures ~~should be sought~~ ***shall be provided***.
- If significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused. [***In cases where significant harm cannot be prevented adequately mitigated against or offset, planning permission will be refused unless there are over-riding reasons of public interest***].

Note that there is currently no guidance to LPAs to assist them in deciding when they can be 'satisfied' that there are no other reasonable alternative locations. However improvements to spatial biodiversity mapping and planning should assist in this regard (see Section 5.3.4). PPS9 or accompanying guidance should also clarify the circumstances under which compensation/offsets would be required for different types of site/habitat/species.

5.2.3 Environmental Assessment (SEA and EIA)

The procedures set out in the EU EIA Directive 85/337/EEC (and the associated UK regulations) require the environmental consequences of projects to be identified and assessed before authorisation is given. The EIA Directive outlines which project categories should be subject to EIA, which procedure shall be followed and broadly sets out the required content of the assessment. As explained in the previous chapter, the UK Regulations require proponents of development to recommend suitable mitigation measures, but do not currently require their actual implementation or any monitoring of their effectiveness. Although it is straightforward in theory to add a requirement for offsets to the standard EIA mitigation hierarchy (for example in guidance accompanying the regulations), there is little guarantee under the current system that offsets would be delivered in practice. It is thought likely that a requirement to offset IF significant adverse impacts would remain after other avoidance or mitigation measures have been taken, would result in closer attention to mitigation recommendations. It may be cheaper for developers to implement effective mitigation than to purchase biodiversity credits for offset purposes. This is certainly the experience of regulators in Victoria, Australia.

In cases where Environmental Statements or SEA Reports accompany applications for development consent or approval, there should be opportunities for the insertion of conditions based on the results of environmental assessment (through section 106 agreements for example). If offsets were agreed as a binding planning condition, a court order could potentially be brought on any party not delivering the agreed measures and a breach of conditions notice would be served. However, this is not a fail-safe mechanism as planning conditions are not routinely checked and action is often only taken in response to a complaint (Cullingworth and Nadin 2002). Also

Environmental Statements do not often include sufficiently detailed requirements which could be carried forward into an Environmental Management Plan, meaning that monitoring of implementation would therefore be essential. Furthermore, there are many cases EIA is not required for proposals which might affect, for example, BAP habitat outside of a protected area. Some provision for offsets might therefore be required which did not depend fundamentally on the EIA or SEA process for application of the mitigation hierarchy.

5.3 Provision of Guidance:

At present there is no clear guidance on ***how*** to do offsets (e.g. what's not offsetable, how additionality can be assured, metrics for measuring loss/gain, locating offsets, trading up, use of multipliers e.t.c.) or under what circumstances they would be appropriate or inappropriate. The complex issues and options surrounding the design and implementation of offsets need to be clarified and standardised if planning authorities are to be able to develop and communicate offset requirements. If a voluntary approach to offsets is considered appropriate, such guidance would have a key role in implementing principles of good practice.

Some of the important issues for which guidance would be required are considered in the following sections. These include:

- defining which habitats and species should be subject to offsetting (see following section);
- determining what constitutes a significant residual adverse effect;
- measuring loss and gain;
- use of multipliers (for example to account for temporal losses during offset delivery);
- equivalence and scope for 'trading up';
- selecting suitable locations/ identifying suitable land for offsets;
- monitoring and enforcement.

5.3.1 Defining thresholds

Biodiversity offsets are neither possible nor appropriate for all biodiversity. It is essential for any system of biodiversity offsets to incorporate safeguards to ensure that offsets are only used when proven techniques for delivery are available and the time required to achieve the desired outcome are realistic. Given this requirement, a possible framework for defining thresholds for application in an English context is set out overleaf in Table 7. This defines the circumstances in which:

- the biodiversity affected is so rare, vulnerable, threatened, or difficult to restore that offsets should not be permitted (Category A on Table 7);
- residual impacts on biodiversity cannot be compensated for using known or proven techniques and are of such magnitude/ significance that offsets should not be permitted (Category A on Table 7);
- there are significant residual impacts on biodiversity but well designed offset projects could be considered appropriate (Category B on Table 7). It is assumed that this category would include all 'biodiversity interests' as inferred in PPS9 – see Section 4.3);
- biodiversity impacts are relatively trivial and either offsets would not be required or a different mechanism should apply (Category C on Table 7; N.B. offsetting may still be appropriate should significant cumulative impacts resulting from a range of recent or proposed developments be reasonably anticipated).

Table 6	Sites	Habitats	Species
Category A: Offsets not possible or appropriate	Offset not allowable in any case where the development would: • Destroy a Natura 2000 or other international site • Destroy any part of a Natura 2000 site. • have a significant adverse effect on the integrity of a Natura 2000 site. • Destroy a SSSI or have a significant adverse effect on its integrity/ ability to achieve favourable condition. AND compensation for residual impacts is not possible using proven techniques.	Offset not allowable in any case where the development would: • Destroy any UK BAP habitat for which national BAP 'maintain extent' target is assessed as "No Loss". • Destroy any ancient habitats (Ancient woodland, blanket bog or other habitats which are not restorable in 'human' timeframes). • Destroy any vital habitat networks or stepping stones as covered under the Habitats Regulations and PPS9. • Destroy any habitat for which no suitable land is available for restoration. AND compensation for residual impacts is not possible using proven techniques.	Offset not allowable in any case where the development would: • Destroy any habitat parcel supporting a key population of a European protected species (i.e. affecting their Favourable Conservation Status). • Destroy critical feeding, breeding or commuting habitat for a European Protected Species. • Cause irreversible population decline for any European protected species. AND compensation for residual impacts is not possible using proven techniques.
Category B: "Goldilocks Zone" – Offset required/ allowable	An offset would be allowable/ required for: • Destruction of any part of a Natura 2000 site. • Developments likely to have significant adverse effects on achievement of integrity of any Natura 2000 site. • SSSI – destruction of any part. • Local Wildlife Sites, other than those in Category A – destruction of any part, or significant adverse effect on integrity. PROVIDED THAT an offset is feasible using proven techniques OR is provided in advance.	An offset would be allowable/ required for: • Destruction of UK BAP habitat wherever it occurs (not just in international sites), excluding those in Category A. • Destruction of any semi-natural habitat [e.g. defined by IHS] > 0.25ha patch size, other than that in Category A. • Removal of potential for restoration or expansion of BAP habitat identified by a Regional Spatial Strategy or Regional Biodiversity Partnership as part of a BAP restoration or expansion zone (other than that in Category A). PROVIDED THAT an offset is feasible using proven techniques OR is provided in advance.	An offset would be allowable/ required for: • Destruction of any part of a habitat parcel with recent records of a European protected, UK protected, BAP or LBAP species. • Destruction of any part of a habitat parcel predicted by Habitat Suitability Mapping to support European protected species (other than that in Category A). PROVIDED THAT an offset is feasible using proven techniques OR is provided in advance.
Category C: No offset or 'streamlined offset' to achieve No Net Loss	Offset may not be required in cases where development would affect other land/ habitat not falling into Categories A or B, Non-BAP habitat, or cases where development does not have an adverse effect on a Local Wildlife Site OR for development proposals not requiring planning consent. Offset may be required in cases where development is likely to give rise to in-combination or cumulative impacts (even if not requiring planning consent), where local wildlife sites are affected or where local communities value the biodiversity affected.		

5.3.2 Confirming significant residual adverse effects

In defining the circumstances under which impacts are likely to be considered significant in an English context, there are two main approaches that could be considered:

1. producing a list of developments (similar to screening criteria as set out in the EIA Regulations) of such a scale/ type that offsets would or would not be considered necessary; and/or
2. providing guidance on how the significance of an adverse impact on biodiversity might be determined on a case by case basis (building on the guidance on ecological impact assessment issued by the IEEM for example).

Alternatively an offset might be required for any development affecting any of the biodiversity within Category B in the table in the previous section, if the impact (with suitable avoidance and mitigation measures in place) will result in effects on the integrity or condition of an area/ habitat or the status of a species.

Additionally it may be necessary to provide guidance concerning how indirect and cumulative impacts might be addressed (this might relate to the lower threshold used to trigger offsets) and whether an insignificant individual impact might still trigger an offset if the cumulative effect of this impact could be significant. How strategic environmental assessment is implemented will also be important in this regard. Interpretation of impacts in terms of no net loss of biodiversity (see following section) is helpful in confirming significant residual adverse effects, but guidance is likely to be required to show how significance is interpreted. In particular review of offset requirements against current guidance is recommended (in particular IEEM's guidance on Ecological Impact Assessment).

5.3.3 Quantifying impact losses and offset gains

It is suggested that suitable metrics for quantifying impact losses and offset gains in England could be developed for compatibility with how biodiversity targets are articulated in the UK BAP. A possible metrics framework is included as Appendix C.

The metrics used to measure losses of biodiversity due to a development and gains of biodiversity through an offset need to apply to both:

a. Land exposed to a development impact.
b. Land on which offset actions would be undertaken.

This is essential to the transparent comparison of biodiversity losses and gains. In the case of land impacted by development, the metrics conceptually need to cover both:

i. land that is directly lost to development; and
ii. land that will remain post development but may be the subject of decline in conservation status , habitat quality/ integrity or status of key species populations.

In common with methods currently being used in the State of Victoria, Australia, and under development by BBOP, it is suggested that habitat could be used as the primary metric. Use of habitat has the benefit of reflecting use of land by species and can therefore be used to link consideration of sites and species: sites can be described and measured in terms of their component habitats and species populations can be assessed by reference to the habitats required to support them. The main reason for suggesting use of habitat, however, is that this is the main way in which the UK

Biodiversity Biodiversity Action Plan articulates targets for biodiversity action in England.

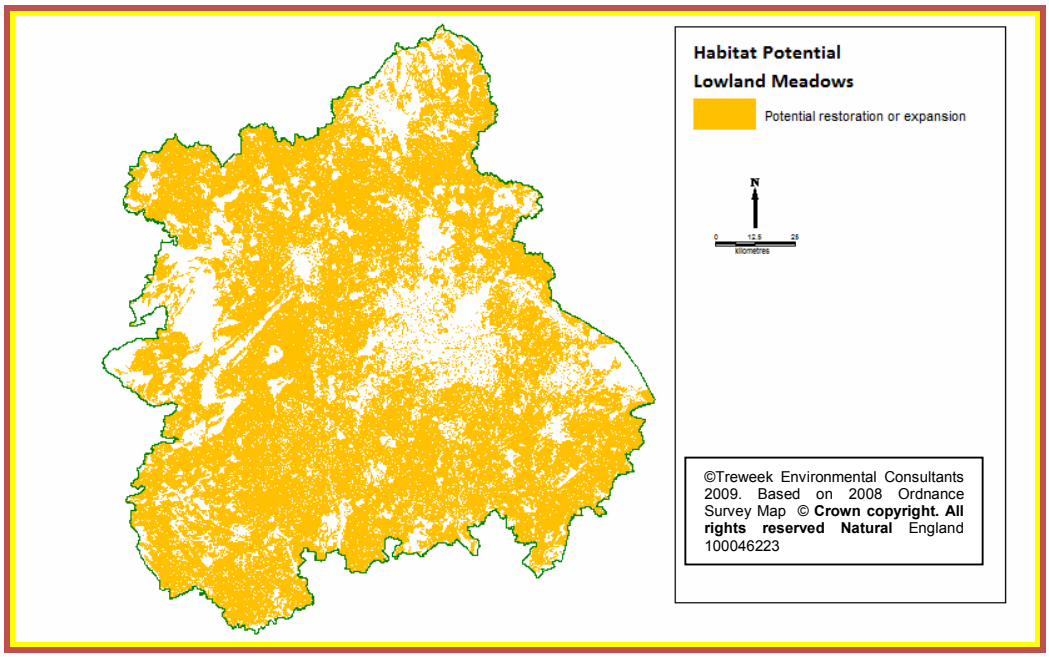
The proposed unit is 'Habitat Hectares' (number of hectares of a particular habitat in a particular condition), similar to the metric used largely for native vegetation in Victoria, Australia and also adapted and broadened by BBOP to include fauna as well as flora and to take functional as well as structural and compositional aspects of biodiversity into consideration (BBOP Offset Design Handbook 2009)[23]. Land impacted by development or land subject to an offset can be mapped and recorded on the basis of 'habitat parcels', in which each parcel is allocated to a single habitat category and is assigned a single condition or quality measure. Habitat parcels can be evaluated/ defined in terms of their inherent properties (rarity, species composition, species richness) and in terms of their condition or conservation status (which in the UK is generally heavily influenced by management). 'Like for like' rules require parity to be demonstrate in terms of type and area, but some adjustments may be possible to allow 'trading up' with respect to conservation significance. Appendix C provides a hypothetical worked example of how the number of habitat hectares required in an offset could be calculated. The main advantage of such an approach is that it could be applied to develop offsets as a mechanism for delivery of national and local BAPs. It also lends itself very well to the concept of aggregating offsets at sub-regional level. Pilot testing of the method would be required to test its application in practice.

5.3.4 Selecting suitable areas and activities for biodiversity offsets

Biodiversity offsets have most to offer in situations where biodiversity targets are clearly articulated within the context of conservation priority. In England there is currently a lack of systematic biodiversity mapping and planning which has been conducted uniformly across the country and which could be used to define suitable 'offset receiving areas' but there are established systems which could be adapted for this purpose relatively easily. At a regional level, biodiversity potential maps have been produced in order to derive regional biodiversity targets. An example from the West Midlands is shown in Figure 3. Clearly, 'lowland meadow credits' could only be generated on land with ecological potential to support them and this map shows there is considerable potential to restore lowland meadows throughout most of the West Midlands. Further work is generally required to determine where it would be most desirable or cost effective to maintain, restore or enhance a habitat. This might depend on a policy goal to create habitat networks, or reflect local aspiration. Such issues are generally picked up through local opportunity mapping.

[23] The metric should be further adapted for appropriate use in England

Figure 3 Potential for restoration of lowland meadows in the West Midlands

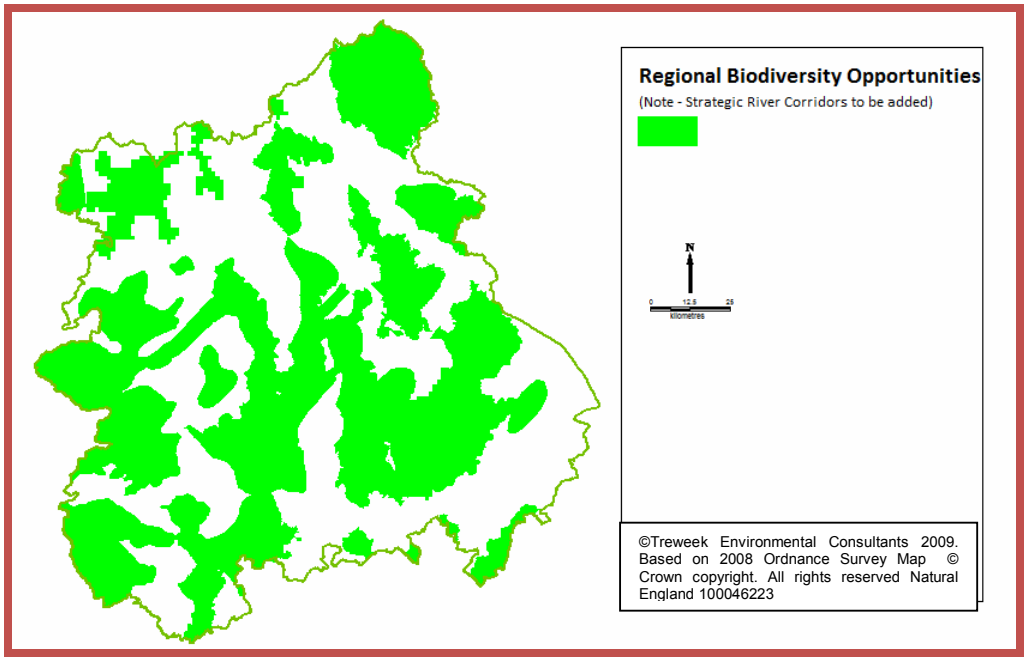


Local opportunity maps consider how national and regional targets can be implemented at local level, given practical opportunity and local objectives (see Figure 4, adapted from a regional opportunity map produced by the West Midlands Biodiversity Partnership). With a consistent approach to national, regional and local biodiversity mapping in place, it would be possible to design biodiversity offsets to contribute to the achievement of a certain level of representation of biodiversity features/resources at a particular geographic scale (regional or national level, for example). In some countries (notably South Africa) positive offset multipliers have been developed to ensure that, despite cumulative impacts through successive developments, a specific area of a particular ecosystem is conserved in line with targets or objectives. The area needed (and thus the multiplier to be applied) can be calculated from assessments of areas of habitat that need to be conserved to ensure long-term persistence of the ecosystem (including viable populations of particular species within it).

In England the target level of representation might reflect targets for BAP habitats, species and other priority conservation targets (e.g. veteran trees), or the achievement of climate-resilient habitat networks. Comprehensive spatial mapping is essential in order to review the implications of ongoing development for residual habitat distribution and potential. For the 943 species and 56 habitats which have been listed as priorities for conservation action under the UK Biodiversity Action Plan (UK BAP) for England (Section 41 list), 'action categories' have been defined which could possibly provide a basis for determining what might constitute an appropriate offset activity (see also Appendix C). It is possible to envisage a system in which each area of land has a menu of habitat potential (wide or restricted), reflected in habitat potential maps, and in which delivery could be targeted (much as it is now through Higher Level Stewardship or HLS) to maximise conservation benefit, reflected in habitat opportunity maps. It is

important that a consistent definition of habitat should therefore be used, and use of the Integrated Habitat System (HIS) is recommended.

Figure 4 Regional Biodiversity Opportunities in the West Midlands: an example of an opportunity map



Two pieces of European legislation and accompanying guidance provide direction on the criteria that should be considered for the selection of an offset site, the Habitats Directive and the Environmental Liability Directive (ELD). Although the text of the Habitats Directive does not make direct reference to site selection, the European Commission guidance is clear on the requirements (EC, 2007). It states:

- *'Compensatory measures should be located to accomplish the highest effectiveness in maintaining the overall coherence of the Natura 2000 network'*.
- '*The area selected for compensation must be within the same bio-geographic region'.*
- *'there is general agreement that the local conditions necessary to reinstate the ecological assets at stake are found as close as possible to the area affected by the plan or project. Therefore, locating compensation within or nearby the Natura 2000 site concerned in a location showing suitable conditions for the measures to be successful seems the most preferred option.'*

Under the ELD, when a damaged site itself cannot be restored, another site nearby which is of equivalent environmental value can be enhanced to compensate. Similarly, a site located even further away from the damaged site, but which fulfils the same environmental role, could be improved. When deciding between these options, the authorities have to consider various factors, such as the effect of each option on public health and safety, benefits for the overall environment, costs and implementation time, the likelihood of success, the possibility of future and collateral damage, distance to the

damaged site, and social, economic and cultural concerns and other relevant factors specific to the locality.

These pieces of legislation are in consensus with offset policies elsewhere globally. For example in Victoria, Australia, the offset program requires like for like offsets (denominated in terms of some 700 different bioregions and ecological vegetation classes) and calls for "an adequate geographic link between losses and offsets," and requires offsets to be "as close as possible" when "higher significance" vegetation is affected. National law and planning policy does not provide any statutory provisions that must be adhered to regarding identifying suitable locations for offsetting in relation to wider biodiversity interests. The Guide to Good Practice provides the only guidance on this, suggesting that compensation measures will normally involve off-site measures to offset losses.

In England, the appropriate geographic unit for offset 'receiving' areas depends to a large extent on the scale of planning. Under the current system, it is likely that offset receiving areas would be established on a regional or sub-regional scale. Priorities for offsets could then be established strategically and used to inform local delivery, analogous to the current approach to regional and local establishment of biodiversity targets. It would be important for offset receiving areas to be defined and recognised in relevant spatial plans (and taken into consideration in strategic level assessments).

5.4 Implementation and funding mechanisms

At present there is no market trading mechanism for biodiversity offsets and it would be necessary to carry out further investigation to consider how such a mechanism could be introduced or a market catalysed, though there is experience from other countries to build on.

The following sections explore some possible implementation and funding mechanisms in more detail, including:

- conservation banks;
- a system of payments to landowners;
- use of section 106 agreements and/or CIL.

5.4.1 How could compensation banking and credits work in England?

Compensation banking could operate in England through a system of biodiversity credits that are traded. Developer contributions would be used to deliver credits of the appropriate type according to a management agreement, with financial provision for regulation, monitoring and management for an agreed period. Developers' offset obligations could be defined in terms of specific types and amounts of credits needed to offset their impacts, and private and public landowners or conservation banking companies set up for the purpose could generate these credits on their land and sell them to developers which needed them as a condition for project approval.

Compensation or conservation banking could thus provide:

- A source or revenue for landowners, creating an incentive for them to generate conservation outcomes on their land
- A means to secure additional conservation outcomes on private as well as public land.
- An option for developers (e.g. companies who may not be experts in conservation management) to purchase credits rather than undertaking the offset activities themselves.
- A source of offsets that could be generated prior to impacts, thus speeding up project approval times, since the offsets would be available 'off the shelf' in advance.
- A means for buyers and sellers of conservation credits to find each other, through a Broker system that could be run by government or privately.
- Banks make it possible for mitigation requirements from development projects across a region to be bundled and applied at a single, high-priority site. They can be used in a strategic way to achieve regional environmental objectives, such as region-wide implementation of the BAP, for example.

The principles of compensation or conservation banking in most systems require offsets (biodiversity credits) to be identified and implementation underway in advance of development. This raises the question of whether a system of conservation banking in England would require a priori steps to ensure that credits would be available to meet demand for them. In Victoria, Australia, government undertook an outreach, education and awareness raising campaign with landowners to encourage them to get involved in the BushBroker scheme and ensure there were suppliers of credits available to meet the demand for credits that was generated by policy intervention.

One of the major risks of compensation or conservation banking is that credits could be defined too broadly, so that an impact on particular biodiversity components could be 'offset' by conservation of different types of biodiversity component. Such an approach would depart from strict 'like for like' requirements for offsets, and could result in net loss of certain biodiversity components over time. To avoid this, conservation banking in Australia (Victoria and New South Wales) has designated several hundred types of biodiversity credit. A developer is obliged to undertake its own like for like offset, or to purchase credits of the specific kinds and amounts needed to meet the 'like for like' rules and truly offset its impact. Consequently, it is envisaged that different credits would be required for different habitats affected in England (probably using a consistent classification system such as IHS). To determine the appropriate number of credits would require certain information to be provided (or obtained) by the developer.

Developers applying for planning permission might therefore have to provide:

1. A description of the proposed development;
2. An assessment of biodiversity likely to be affected,
3. A statement indicating how 'no net loss' of biodiversity will be achieved, including details of any measures proposed to avoid or minimise impacts and of any proposed measures to offset significant residual adverse impacts, including a description of the types and amounts of biodiversity credits needed to offset the specific impacts concerned, within England's 'like for like' rules.

This information might be procured through SEA/EIA or specific biodiversity assessments could be commissioned. Consideration needs to be given to whether a standard assessment methodology would be required. In most countries, developers

are required to provide or commission the information needed to determine the number of credits they should purchase, but the required number is calculated by the regulator or by accredited assessors using a formal assessment method (New South Wales BioBanking, for example).

Required credits could be calculated (by the regulator or a registered assessor) using a habitat hectares method similar to the provisional method set out in Appendix C. These would have to satisfy the rule of 'like for like or better'.

Developers would then agree the number and class of biodiversity credits proposed to offset their impact and submit a statement explaining their proposed method of delivery with their planning application. Developers would be required to purchase credits prior to planning permission being granted.

A compensation or conservation banking system that allowed individual landowners to generate and sell credits would require a system of performance-based payment for conservation actions on private land. England already has experience with similar schemes. For instance, administrative structures are well established for agri-environment provisions in England through the Stewardship Scheme. Private landowners have experience of engaging in agreements with government to undertake prescribed management. Experience from Australia suggests that it would be possible to set up an effective trading mechanism for biodiversity credits produced by individual landowners without the need for developers to purchase land themselves to provide offsets. Provided that undertakings to provide biodiversity credits were additional to existing commitments and duties of care, there is no reason why landowners in England could not generate biodiversity credits for offset purposes. One important aspect to consider is the extent to which the conservation outcomes of offset activities would have to be defined, as opposed to simply prescribing suitable management activities. In England there is a very strong relationship between management and habitat condition, but it is likely that an offset scheme would require closer definition of target outcomes associated with prescribed management.

Using this approach, the 'receiving area' for offsets would be anywhere with suitable habitat (ie that could generate credits of the correct type), whether this was existing or potential BAP habitat (see Appendix C), provided of course that the requirement for additionality was satisfied[24]. Further consideration is required to determine 'service area' limits, but regional or sub-regional boundaries are most likely to fit with the current planning system. This approach would be flexible in biodiversity terms in that each landowner might have a 'menu' of possibility depending on the various habitats that could be supported on their land. Relative priorities for delivery would depend on specific offset requirements and also on conservation priority (probably to be determined at regional or sub-regional level). Further consideration needs to be given to the likely availability of suitable land (given development impacts envisaged) and whether a balanced outcome could be achieved with respect to the full spectrum of BAP habitat.

The pricing of credits also needs further consideration and testing in a pilot case. The price need not necessarily be predetermined by government, but could be established case-by-case through negotiation between the landowner providing the credit and the

[24] Additionality is ensured in conservation banking agreements through the specification in the management agreement between the landowner and government of measures which go beyond the existing commitments to manage land and generate new and additional conservation outcomes.

developer, based on supply and demand in the market-place. In order to consider whether generation of biodiversity credits would be an attractive proposition, a landowner needs to work out how much it will cost to undertake the management activities and capital works that might be required to generate the credits and maintain them in perpetuity. The government of Victoria advises biodiversity credit providers that they are likely to need to consider the following costs when deciding how to price their credits:

- capital works such as fencing;
- annual works required under the management agreement;
- income foregone;
- rates (including any changes associated with on-title agreement);
- consultancy or agent-fees;
- contingencies, e.g. for failure of vegetation establishment;
- allowance for inflation, taxes and insurance;
- financial advice including development of cost estimates for offset delivery.

Banks make it possible for mitigation requirements from development projects across a region to be bundled and applied at a single, high-priority site. They can be used in a strategic way to achieve regional environmental objectives, such as region-wide implementation of the BAP, for example. Alternatively, it is conceivable that a public body could make profits from selling credits to developers who need to compensate for their activities elsewhere. In this case, the revenues above the costs of mitigation could be used to recreate habitat, including in cases where natural losses occur. This is not unlike the current situation in which the Environment Agency has sought ways to meet targets for saltmarsh restoration through managed realignment schemes and has also considered agreements with developers to provide compensatory habitat for port expansion.

5.4.2 Community Infrastructure Levy and Section 106 Agreements

There is some scope for considering a flexible approach in which payments of developer contributions through something akin to the Community Infrastructure Levy complement a more rigorous offset requirement for more significant impacts on more important biodiversity. For several reasons, the CIL does NOT appear to be suitable as the main delivery mechanism for a 'lower tier' approach for biodiversity offsets, for the following reasons:

1. The charges will be fixed according to the scale of development, and therefore take no account of the specific biodiversity context for impacts. This could mean that the charge would be too high in some cases and too low in others.
2. CIL is exclusively for contributing to infrastructure required for future development of the area. Infrastructure is defined by government as including parks and green infrastructure, but the definition does not extend to biodiversity resources that have no direct relationship with development. If efforts were made to include biodiversity per se as a legitimate form of infrastructure, it is possible that only biodiversity providing proven ecosystem services could benefit and other biodiversity could not be supported through this mechanism.

The CIL mechanism does have some potentially useful pointers with respect to a biodiversity offset scheme design that might meet the requirements of government, however in that:

- CIL will only contribute to infrastructure development, and the bulk of funds should continue to come from core government funding;
- CIL funds from a number of developments can be pooled in order to achieve more strategic schemes that may cross local authority boundaries. It is envisaged that the RDAs will administer these, according to the infrastructure priorities set out in the Regional Spatial Strategy.
- CIL emphasises the need for clarity and certainty for developers. This could underline the need for a straightforward biodiversity offset design.

In many ways Section 106 agreements (which continue alongside CIL) appear to be a more suitable mechanism for biodiversity offsets in that they can be negotiated according to the circumstances of individual developments – i.e. varied by location and biodiversity impact. As presently applied, however, they generally imply a continued involvement of the developer. For offset projects this may not be desirable and could limit the scope for payments into a pot that would support a more strategic and streamlined approach.

It is possible that a similar mechanism could be developed to ensure that 'no net loss' policy could be implemented at local as well as regional scales, and for all biodiversity (not just priority habitats and species). One approach might be to develop a portfolio of approved biodiversity offset projects in agreement with local biodiversity partnerships and/or community committees which could be funded through biodiversity offset contributions set at a default level on the basis of area affected with a multiplier (as used in Victoria, Australia by local government). It is important that any such mechanism should allow for 'no net loss' biodiversity outcomes to be identified for all development proposals and not just on a selective basis, but that it should be straightforward to implement.

5.4.3 Potential roles

An overview of the roles different organisations might play in the implementation of offsets in England is provided in Table 7.

5.5 Conclusions and recommended next steps

There are several possible delivery mechanisms for implementing offsets in England. These are not mutually exclusive and it may be that the most effective system would combine them. Broadly they include:

1. Strengthening current requirements under the Biodiversity Duty (under the current provisions, loss of biodiversity is allowable where local authorities feel other issues are of higher priority).
2. Requiring 'no net loss' of biodiversity to be demonstrated for all planning applications likely to have (significant) adverse impacts on biodiversity or any impact on certain biodiversity.
3. Requiring developers to demonstrate application of the mitigation hierarchy through EIA/SEA and other legislation requiring assessment of effects on the environment and adding an explicit requirement to offset for unavoidable residual adverse impacts.

4. Using or building on agri-environment agreements or other landowner conservation agreements to generate offsets (or biodiversity credits) on private land.
5. Through other regulated or voluntary approaches including establishment of a market/ mitigation banks.

Possible amendments to policy and regulations were considered in earlier sections within this chapter. There is interest in a flexible system which might allow for a more streamlined or straightforward delivery mechanism in cases where land of lower conservation priority would be affected or where proposed development is of such a scale/type that its residual impacts would be unlikely to be individually significant, but where some compensation for overall cumulative impact is required to achieve 'no net loss' or 'net gain'. One approach might be to develop a portfolio of approved biodiversity offset projects in agreement with local biodiversity partnerships and/or community committees which could be funded through biodiversity offset contributions set at a default level on the basis of area affected with a multiplier as necessary to reflect context or location (as used in Victoria, Australia by local government). For more significant impacts on more important biodiversity, however, a more rigorous approach would be required.

Such a system would be based on the following key considerations:

1. it is not appropriate to use offsets for residual adverse impacts on some biodiversity (category A in Table 6);
2. for biodiversity in category B in Table 6, a rigorous approach to offsets would be required under the Biodiversity Duty and because of government commitments and targets, including the UK BAP. This would require calculation of biodiversity credits required using a rigourous and standardised approach (for example like that proposed in Appendix C). For this category of biodiversity, offsets are considered to offer potential for enhancement which does not happen to any significant extent under current provisions;
3. for other biodiversity and for smaller scale developments, a more straightforward delivery mechanism might be appropriate, akin to the CIL, though it is considered essential for any such mechanism to be 'ring-fenced' for biodiversity, otherwise experience suggests it will have low priority. Under such an approach, the offset for smaller scale developments could be calculated by local authorities based on simple area multipliers established by a regulatory body, based on average results from the use of habitat hectares metrics in larger projects. This would mean that local authorities would not need to undertake detailed fieldwork or use complex metrics, but could simply apply a pre-determined multiplier figure.

Table 7 Pros and Cons of Possible Policy Options With Respect to Offset Implementation in England

Key consideration	Policy option	Possible advantage	Possible disadvantage	Comment on existing frameworks/ mechanisms
Who would implement the offset?	Developer	Assumes own responsibility.	Not a conservation delivery expert and may prefer to outsource and transfer liability.	Precedent under the 'polluter pays principle'.
	Local authority	- Offset delivery could contribute to conservation duties and supplement income for this purpose. - Creation of an explicit role could strengthen biodiversity as a key planning consideration.	- Lack of long term stability of budgets. - Insufficient capacity at present to take on extra long-term commitments, but with developer contributions this might be increasingly possible. - Reduced ability to achieve regional prioritisation through a strategic approach.	Some precedent through implementation of Section 106 Agreements. CIL will introduce new mechanism. Currently no established financial mechanism to generate income from offsets.
	Environment Agency or other Statutory Body	- National consistency in approach. - Capacity to regulate and monitor. - Could potentially streamline implementation of many relevant European Directives including the Water Framework Directive, the ELD, the Birds and Habitats Directives. Strategic overview and ability to link national	-With the exception of Natural England, relatively little direct involvement in land management. -Reluctance to engage in long term commitment to land management/ associated budgets.	Current and established experience in implementation of national scale regulation.

		and regional priorities.	-Rules concerning additionality would have to be tightened.	
	Independent wildlife group or body (eg Wildlife Trust, RSPB)	Existing land holdings which could be developed and expanded. - Appropriate experience. - Independent perspective.	Could compromise independent status unless adequate controls in place. -Rules concerning additionality would have to be tightened.	Theoretically possible under existing law/policy, but rights/ responsibilities/ liabilities are not sufficiently clear to encourage uptake
	Private individuals / landowners	- Could turn biodiversity from a liability to an asset for landowners. - Could achieve conservation outcomes on significant areas currently outside protected areas.	- Lack of expertise in conservation management beyond current agri-environment experience. - Risk of bias and possibly a stronger need for regulation and monitoring -Rules concerning additionality would have to be tightened.	We currently lack a system of biodiversity credits that would allow landowners to generate and sell biodiversity credits. However, our legal system provides for covenants and easements.
	Conservation banking company	- Efficiencies of scale. - Operator that would explicitly take on the role and liabilities associated with delivering biodiversity offsets.	Needs policy intervention to make this model work.	Not possible at present due to lack of a system of biodiversity credits that would define banking companies' rights and responsibilities, thus creating sufficient certainty for a market to flourish.
Who would	Government,	- Could ensure compliance with policy.	Extra duty.	Possible but current

govern/ oversee and/or enforce the offset?	Statutory Bodies	- Could tie this in with other public duties, e.g. implementing NBSAP	Capacity and budget available?	capacity insufficient
	Developer	- Could help manage its own business risk associated with potential failure of the offset.	- May not exist or be responsible for the offset land as long as the offset should endure. - Could be conflict of interest as extra costs not in company's financial interests.	Has not worked well in other countries and requires long term commitment and also carries long term liability and risk which would be a disincentive.
	Multi-stakeholder body (eg like trust fund)	Ensures multi-stakeholder perspectives are represented.	Could increase transaction cost associated with setting up and managing the offset	Precedent through implementation of Section 106 Agreements
Who would monitor the offset?	Government, Statutory Bodies, Developer, Banker or independent review body	Independent review mechanism is preferable.	Clear reporting obligations would have to be set out to ensure stringent requirements are met.	Experience overseas suggests that it is important for this function to be managed independently.

5.6 Next steps

There are several issues that would require further research and consideration for an effective system of biodiversity offsets to be progressed.

Firstly, the Biodiversity Duty under NERC does not appear to have acted as a disincentive to developers to submit proposals which would result in removal of BAP habitat, but documented evidence of experience 'on the ground' is very limited. It is important to obtain better information about current outcomes in terms of the success of PPS9 in particular. In addition the following steps are recommended:

- Research or review to confirm biodiversity for which offsets are not appropriate so that this can be listed/ scheduled.
- Testing of possible metric frameworks in a pilot loss/gain assessment (one or more).
- More detailed analysis (i.e. theoretical and empirical simulation) of the contracting options for offsetting instruments, associated incentive structures, and the resulting private and social costs and benefits of alternative offset options.
- Review of any necessary regulatory requirements and costs.
- Review of national and regional approaches to biodiversity mapping and definition of habitat potential and opportunity.
- Study to review current levels of impact on BAP habitat and species under the Biodiversity Duty and in relation to planning applications.
- Review of available guidance and in particular current guidance on Ecological Impact Assessment to determine how a requirement for offsets might be integrated, reflecting current approaches to assessment of impact significance.

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For those less familiar with the concept of biodiversity offsets and to provide useful background information in general, the following web sites are recommended:

www.forest-trends.org

www.environmentbank.com

APPENDIX A: SUMMARY OF APPROACHES TO BIODIVERSITY OFFSETS IN SELECTED COUNTRIES

Australia

Several states in Australia have introduced some form of biodiversity offsets. Examples from New South Wales and Victoria are outlined here.

New South Wales

The Threatened Species Conservation Amendment (Biodiversity Banking) Bill 2006 was passed by the New South Wales Parliament on 22 November 2006 and inserts a new Part 7A into the Threatened Species Conservation Act 1997. This provides the basis for a 'biobanking' scheme, to be regulated by the Department of Environment and Conservation ("DEC"), which would allow developers to buy credits to offset the adverse ecological impacts of their development as an alternative to the current threatened species approval process.

The 'biobanking' scheme is voluntary and is intended to "[create] a market that values biodiversity conservation. The scheme will send a strong price signal that maintaining and rehabilitating bushland can produce a valuable asset, rather than producing a potential future liability." (2nd Reading Speech, NSW Legislative Council, 24 October 2006).

In summary, the biobanking scheme has the following key features:

- Establishment of 'biobank' sites by a voluntary "biobanking agreement" entered into between a landowner and the Minister for the Environment. Landowners apply for their land to be officially registered and then carry out conservation management as instructed.
- Trading of credits: biodiversity credits are created once a biobanking agreement is registered. Once registered, the credits may then be "traded", or used to offset a biodiversity impact on another site.
- Issue of "biobanking statements" to developers for their proposed development which essentially allows them to purchase biodiversity credits to offset any impact of their development on biodiversity values.

The scheme is based on a "biodiversity assessment methodology", based on the same biometric and threatened species tools developed for use under the Native Vegetation Act 2003.

Developers applying for a biobanking statement need to provide:

- A description of the proposed development;
- Details of any on-site measures proposed to minimise biodiversity impact;
- An assessment of likely biodiversity impact, prepared in accordance with the biobanking assessment methodology; and
- Details of the number and class of biodiversity credits proposed to be retired to off-set the impact.

They must therefore use the formal assessment methodology to calculate required gains/credits and must demonstrate that the mitigation hierarchy has been appropriately applied for their proposal.

Victoria

Loss of endangered native vegetation has stimulated a requirement, under the Native Vegetation Act in Victoria, Australia, for developers to seek to avoid and minimise impacts on native vegetation, and to offset residual impacts. A number of biodiversity offsets tools have been developed to help achieve this. One is the 'habitat hectares' metric for quantifying projects' impacts on native vegetation and balancing these with offsets' gains. Another is the use of market-based mechanisms for delivering the desired policy goal of a 'net gain' of native vegetation, including an offset scheme called BushBroker. Selling credits to developers needing offsets is just one way in which landowners in Victoria can generate income from conservation gains on their land. The state offers several other incentive schemes, such as 5-year agreements under BushTender (an investment by government of Aus$9m since 2001) and PlainsTender (Aus$2.6 since 2004/5), in which it pays landowners to generate conservation gains on their land. While the potential income per habitat hectare from these schemes is an order of magnitude less than can be earned by providing a credit for an offset through BushBroker, there have been more transactions and they have involved much larger areas of land than have offsets. (BushTender has involved 17,000 ha to date and PlainsTender 5,000 ha, compared with under 500 ha of offsets through BushBroker.)

BushTender

About one million hectares of Victoria's remaining native vegetation remains on private land, of which approximately 60% is of threatened vegetation type. While only 12% of all the native vegetation in Victoria exists on private land, it is estimated to support 30% of Victoria's threatened species' populations.

Under BushTender, landholders nominate their own bid price in a competitive tender and choose a range of actions to protect and enhance native vegetation. This could include fencing of native vegetation to exclude stock, control of environmental pests and weeds, and supplementary planting of native understorey.

Successful bids are those that offer the 'best value for money' in terms of native vegetation outcomes. Successful landholders receive periodic payments under contractual agreements with DSE.

http://www.dse.vic.gov.au

The delivery of 'net gain': involves a reduction in losses in the extent of existing native vegetation; a reduction in losses in the quality of existing native vegetation due to threatening processes, and the achievement of gains in extent and quality of native vegetation through its rehabilitation and re-vegetation with indigenous species for biodiversity conservation and land and water resource outcomes. There is a graded required outcome from 'substantial net gain' where the conservation significance is very high to 'net gain' and 'equivalent gain' for high and medium conservation significance offsets.

Victoria Habitat Hectares Scoring Method

The method involves assessment of a number of site-based habitat and landscape components against a pre-determined 'benchmark' relevant to the vegetation type being assessed.

Assessors must first determine the bioregion(s) in which a habitat hectares assessment is to be conducted. Bioregions are landscape units based on a range of environmental attributes such as climate, geomorphology, lithology or vegetation. A statewide bioregion map (and bioregion layer within the DSE Geospatial Data Library) identifies 28 bioregions within Victoria and shows their distribution.

The habitat hectares approach requires the condition of native vegetation at a site to be assessed in comparison to a 'benchmark' that represents the average characteristics of a mature and apparently long-undisturbed state for the same vegetation type (Parkes *et al.* 2003). Habitat hectare assessments are conducted with reference to a bioregional benchmark for the vegetation type in question. Bioregional benchmarks for Victoria are available from the DSE website. They might specify the number of species that should be present, typical dominant or 'character' species, average canopy height and percentage cover for different life forms. Benchmarks apply to particular 'Ecological Vegetation Classes' (EVCs) within a particular bioregion.

EVCs are aggregations of botanical communities that are defined by a combination of species composition, life form, position in the landscape and an inferred fidelity to particular environments. The habitat hectares approach is constrained to a single EVC of similar 'quality'. There is guidance to explain how quality should be assessed. Each unique EVC/ quality combination is referred to as a 'habitat zone'. A patch of native vegetation may contain one or more 'habitat zones' due to localised variation in 'quality'. The number and size of habitat zones depends on a number of factors including the size of the area being assessed, the variability of the vegetation and the context of the assessment.

The habitat hectares assessment approach involves assigning a habitat score to a habitat zone, to indicate the quality of the vegetation relative to the EVC benchmark. A total score of 1.0 is built up from constituent scores for a series of separate attributes, for example 'absence of weeds', '%cover of high native herb diversity'. The final habitat hectare value is a measure of both the quality (habitat score) and quantity (hectares) of the vegetation, and therefore requires consideration of the total number of hectares present. It is determined by multiplying the habitat score (as a decimal) of the habitat zone by the number of hectares in the habitat zone.

When applied to offset calculations, the habitat hectares method can be used to determine the type and number of habitat hectares likely to be lost due to a development proposal and therefore the type and number required to be provided.

West and South Australia

West and South Australia also have biodiversity offset (or environmental offset) policies. In West Australia the aim is to achieve no environmental difference (i.e. no net loss) and aspirationally, a net benefit. That is, the successful integration and application of offset activities should aim to produce a 'net environmental benefit' outcome. Both 'direct' (off site ecosystem restoration, off site ecosystem rehabilitation, land acquisition for conservation) and 'contributing' (materially add to environmental

knowledge, research, ongoing management and protection, covenanting) offsets can be included in an offsets package. Priority would be given to formulating a package that will deliver the maximum long-term environmental benefit with a high level of certainty that it can be successfully implemented in the context of 'like for like or better' (referring to similar or better environmental values and attributes – species compositions, vegetation complex, landscape functions).

South Africa

The rationale for biodiversity offsets in the Western Cape of South Africa (Department of Environmental Affairs & Development Planning, 2007) is two-fold: firstly, the province contains exceptional biodiversity that is unique globally; secondly, its ecosystems underpin socio-economic development and delivery of important services such as the reliable supply of clean water, ecotourism and coastal protection.

Introduction of biodiversity offsets was a logical adjunct to several laws, policies, plans and guidelines at both national and provincial levels which focus on achieving long term development benefits without compromising the natural environment and biodiversity. Many of these laws, policies or plans provide direction for, or inform, the use of biodiversity offsets as an instrument for environmental management. Importantly:

- The conservation of the natural environment is required in terms of the Constitution, the National Environmental Management Act (NEMA), and its Biodiversity Act.
- The national environmental management principles in NEMA include the need to 'avoid, or minimize and remedy' the disturbance of ecosystems and loss of biological diversity, and the need for development not to jeopardize ecological integrity.
- The Western Cape Provincial Spatial Development Framework (WCPSDF, approved by Provincial Cabinet in 2005) created the policy framework for biodiversity offsets to curb the continual erosion of biodiversity
- The National Biodiversity Strategy Action Plan (NBSAP) explicitly recognises the need for biodiversity offsets.
- Biodiversity plans at different scales identify priority and/or irreplaceable areas for biodiversity conservation; typical 'receiving areas' for biodiversity offsets.

The Guidance produced to support introduction of biodiversity offsets in the Western Cape (Department of Environmental Affairs & Development Planning, 2007) sets out some principles for offsetting (See Appendix A). It focuses on the consideration of offsets within the standard EIA process leading to an environmental authorization. The planning authority may request offsets to be considered, in which case an Offset Report sets out information gathered during the offset design process, and proposes both a type of offset and the preferred option of securing that offset. There are prescribed 'offset receiving areas' which reflect conservation priority. An 'Offset Management Plan' is required for on-site offsets or off-site offsets comprising habitat where agreement has been reached to secure these offsets, and this is submitted as part of the Environmental Impact Statement or an Environmental Management Plan submitted with the Final EIA Report. A key feature of the guidance is its comprehensive consideration of offset ratios which reflect the degree of vulnerability or threat associated with affected biodiversity.

Brazil

Brazil's National Forest Code (originally, 1934, with subsequent laws in 1965, 1989 and 2001) establishes, among other things, Legal Forest Reserves (LFR), which are protected areas with the goal of sustainable use of natural resources and the conservation and rehabilitation of ecological services and biodiversity. The Forest Code requires landowners to maintain a fixed minimum percentage of natural vegetation on their property (ranging from 20% to 80% depending on the region): effectively, a set-aside provision. Landowners which do not meet the LFR minimum percentage are required to comply by replanting vegetation, allowing natural regeneration or through compensation. Landowners that cannot accomplish the requirement on their own land can purchase appropriate forested areas from others. This form of compensation (and trade), is one of the two biodiversity offsets arrangements under Brazilian legislation.

The second is Law 9.985/2000, which set up the National System of Protected Areas of the Nature, known as 'SNUC Law' requires industrial development projects in Brazil to contribute financially to a national system of conservation units. The law initially established that the amount of compensation could not be less than 0.5% of the total predicted investment costs of the project. However, in April of 2008, the Federal Supreme Court adjudicated on a case brought by the National Confederation of Industry (CNI), and abolished the floor of 0.5%, stating that the compensation must be proportionate to the impact of each project, rather than to the capital costs of the undertaking (Borscheit 2008). Formulae have been used in the past at the State level as the basis for this form of compensation and are now being discussed by policy-makers at the national level with a view to establishing guidance in line with the Supreme Court's guiding principle of proportionality to impact (Leonardo Geluda, pers. Comm. 2008).

United States

The United States has operated biodiversity offsetting in various forms for more than 30 years, with a variety of possible mechanisms. One of the best known systems was developed under the United States Clean Water Act and uses mitigation banks for the purpose of providing compensation for unavoidable impacts on aquatic resources permitted under Section 404 or a similar state or local wetland regulation[25]. There are also possible offset mechanisms for impacts on listed species under the Endangered Species Act.

This section focuses on mitigation banks as a particular category of biodiversity offset. A mitigation bank is an area of land that has been protected, restored or enhanced for the purpose of providing compensation for unavoidable impacts on another area and is usually established by a government agency, business, nonprofit organization, or other entity under a formal agreement with a regulatory agency. Mitigation banks have four distinct components:

- a bank site: the area of land restored, established, enhanced, or preserved;

[25] EPA, Compensatory Mitigation Fact Sheet, www.epa.gov/owow/wetlands/pdf/CMitigation.pdf

- a bank instrument: the formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval;
- an Interagency Review Team (IRT) which provides regulatory review, approval, and oversight of the bank; and
- a service area: the geographic area in which permitted impacts can be compensated for at a given bank.

The value of a bank is defined in "compensatory mitigation credits." A bank's instrument identifies the number of credits available for sale and requires the use of ecological assessment techniques to certify that those credits provide the required ecological functions.

Mitigation banks are a particular kind of offset mechanism in which the responsibility for compensatory mitigation implementation and success is assumed by a party other than the development proponent. Transfer of liability to a third party can be a very attractive feature for developers who would otherwise be responsible for the design, construction, monitoring, ecological success, and long-term protection of mitigation/ offset sites[26]. Mitigation banking has a number of other potential advantages over other forms of compensatory mitigation carried out by development proponents because of the ability of mitigation banking to:

- reduce uncertainty over whether the compensatory mitigation will be successful in offsetting project impacts;
- assemble and apply extensive financial resources, planning, and scientific expertise not always available to many compensatory mitigation proposals carried out by individual proponents;
- reduce permit processing times and provide more cost-effective compensatory mitigation opportunities; and
- enable the efficient use of limited agency resources in the review and compliance monitoring of compensatory mitigation projects because of consolidation.

Guidance from U.S. Fish and Wildlife Service (FWS) in 1983 supported the establishment of the first banks, most of which were sites of compensatory mitigation for impacts due to projects planned by state Departments of Transportation or other state agencies (U.S. Fish and Wildlife Service, 1983). The subsequent expansion of mitigation banking was catalysed by the release of several important reports that challenged the effectiveness of compensatory mitigation practices (Eliot, 1985; Race, 1985; Erwin, 1990). By 2001, 23 states had either statutes or regulations in place that authorized the use of mitigation banks and an additional eight states had issued guidelines to govern the use of mitigation banks (Environmental Law Institute 2002).

[26] http://www.epa.gov/owow/wetlands/facts/fact16.html

Wetlands Mitigation Banking

The primary law conserving wetlands in the United States is the Clean Water Act (CWA), passed in 1972. Section 404 authorizes the Secretary of the Army to "issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into navigable waters at specified disposal sites". These permits, administered principally through the Army Corps of Engineers (the Corps) and known as "404 permits", "wetland permits", or "Corps permits", are the cornerstone of federal efforts to encourage protection of wetland resources through market-based means.

Wetland mitigation banking is the most mature of the offset frameworks, having been initiated in the 1970s. The policy objective is to offset adverse impacts to wetlands through compensatory mitigation that replaces wetland functions and values. Federal guidance on wetland mitigation banking was issued in 1995, and policy development continues under the auspices of the Federal Interagency Mitigation Workgroup. On March 31, 2008, the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (the Corps) announced innovative new standards to promote no net loss of wetlands by improving wetland restoration and protection policies, increasing the effective use of wetland mitigation banks and strengthening the requirements for the use of in-lieu fee mitigation.

In November 1995, EPA, the Corps, FWS, National Oceanic and Atmospheric Administration's National Marine Fisheries Service, and U.S. Department of Agriculture's Natural Resources Conservation Service released the final Federal Guidance on the Establishment, Use, and Operation of Mitigation Banks (www.epa.gov/owow/wetlands/guidance/mitbankn.html. In 2008, revised regulations were issued by the EPA and the Army Engineering Corps governing compensatory mitigation (www.epa.gov/wetlandsmitigation/). These regulations established equivalent and effective standards for all three compensatory mitigation mechanisms commonly used in the United States: mitigation banks, in-lieu fee mitigation, and 'permittee-responsible mitigation'. Interestingly, mitigation banking is considered to be the most reliable form of compensatory mitigation, so these regulations establish a preference for the use of banks when appropriate credits are available.

APPENDIX B BBOP PRINCIPLES

The Business and Biodiversity Offset Program (BBOP) developed principles on biodiversity offsets to help developers, conservation groups, communities, governments and financial institutions that wish to consider and develop best practice biodiversity offsets. They were developed by members of the BBOP Secretariat and Advisory Committee during the first phase of the programme's work (from November 2004-December 2008). They reflect discussion by members of the BBOP Advisory Committee, some practical experience through trials at the BBOP pilot project sites, and have also benefited from contributions and suggestions from many of the 200 people who registered on the BBOP consultation site and numerous others who have participated in workshops and meetings. For further information see www.forest_trends.org

PRINCIPLES ON BIODIVERSITY OFFSETS
SUPPORTED BY THE BBOP ADVISORY COMMITTEE

Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development[27] after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity.

These principles establish a framework for designing and implementing biodiversity offsets and verifying their success. Biodiversity offsets should be designed to comply with all relevant national and international law, and planned and implemented in accordance with the Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans.

1. ***No net loss:*** A biodiversity offset should be designed and implemented to achieve *in situ*, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.

2. ***Additional conservation outcomes:*** A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.

3. ***Adherence to the mitigation hierarchy:*** A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy.

4. ***Limits to what can be offset:*** There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.

5. ***Landscape Context:*** A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach.

[27] While biodiversity offsets are defined here in terms of specific development projects (such as a road or a mine), they could also be used to compensate for the broader effects of programmes and plans.

6. ***Stakeholder participation:*** In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, implementation and monitoring.

7. ***Equity:*** A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognised rights of indigenous peoples and local communities.

8. ***Long-term outcomes:*** The design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in perpetuity.

9. ***Transparency:*** The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner.

10. ***Science and traditional knowledge:*** The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.

APPENDIX C: A POSSIBLE METRICS FRAMEWORK

Introduction

This appendix sets out a possible habitat-based metrics for evaluation of losses due to development and potential gains on offset land. It relates the proposed metrics framework to UK BAP target type definitions and to non BAP related biodiversity enhancements.

The metrics used to measure losses of biodiversity due to a development and gains of biodiversity through an offset need to apply to both:

1. Land[28] that is impacted by development
2. Land on which offset actions would be undertaken.

This is essential to the transparent comparison of biodiversity losses and gains. In the case of land impacted by development, the metrics conceptually need to cover both:

1. land that is directly lost to development, and
2. land that will remain post development but may be the subject of decline in conservation status[29], habitat quality/ integrity[30] or status of key species populations.[31]

Habitat as the primary metric

It is proposed that habitat should be used as the primary metric. Conceptually habitat is the most suitable basis for the metric as it reflects use of land by species and therefore links consideration of sites and species. Sites can be measured in terms of their component habitats; species populations can be measured with reference to the habitats required to support them.

The proposed unit is **Habitat Hectares** reflecting approaches used in other countries and currently being developed by BBOP**.** Land impacted by development or land subject to an offset can be mapped and recorded on the basis of 'habitat parcels', in which each parcel is allocated to a single habitat category and is assigned a single condition or quality measure.

Habitat Evaluation/ Definition

Habitat parcels can be evaluated/ defined in terms of inherent properties (rarity, species composition, species richness…) and in terms of their condition/ conservation status (heavily influenced by management) (see Figure 5).

[28] Sensuo lato - Land, water, sea
[29] Statutory sites
[30] Non-statutory sites, BAP habitat, semi-natural habitat
[31] European protected, UK protected or BAP species

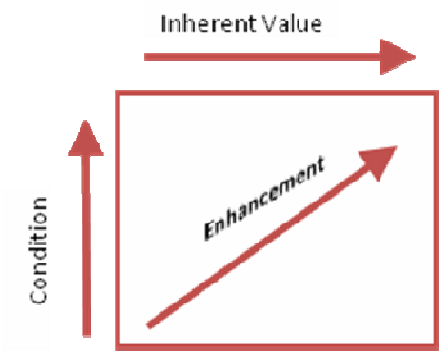


Figure 5 Evaluation against inherent value and condition

It can be argued that inherent value should be given greater weight than condition, as it is a more fundamental characteristic of an area of land, whereas condition can be altered through management. 'Inherent Value' would therefore be weighted as suggested in Figure 6. It is proposed that a 3x3 matrix is used to evaluate habitat parcels according to their inherent 'value' and their condition. A larger matrix might give a closer fit to reality but would be less straightforward to apply in practice. Habitats would be assigned to an 'inherent value' category of 'low', 'medium' or 'high'. The simple 3x3 matrix suggested in Figure 6 gives a numeric scale for any given habitat parcel from 2 to 18: (Inherent value assigned 2-6, condition 1-3, cells are products of rows and columns).

		Inherent value		
		Low (2)	Medium (4)	High (6)
Condition	High (3)	6	12	18
	Medium (2)	4	8	12
	Low (1)	2	4	6

Figure 6 Habitat Parcel Evaluation Matrix

These scores could be calibrated as required e.g. against a scale of 0 to 1 (Figure 7). The precise numbers are irrelevant provided it is understandable.

		Inherent value		
		Low	Medium	High
Condition	High	0.33	0.67	1.00
	Medium	0.22	0.44	0.67
	Low	0.11	0.22	0.33

Figure 7 Matrix calibration

Measurement of Inherent Value and Condition

The inherent value of habitat parcels could be measured with reference to categories in a standard habitat classification such as IHS (Integrated Habitat System) which encompasses all UK terrestrial, freshwater and marine habitats, including European and BAP habitats (www.ihs.somerc.co.uk). It is also now widely used at local and regional scales for mapping and collating habitat data recorded in other classifications (e.g. Butcher, 2007; SERC 2008). IHS habitat categories can be assigned an inherent value score of 2, 4 or 6 using the following criteria:

Inherent Value Score	Criteria	Example
6	Categories on Annex 1 of the EU Habitats Directive or Section 41 of the NERC Act (BAP Habitats)	Lowland calcareous grassland
4	Other semi-natural habitats, including degraded BAP habitats capable of restoration	Mixed woodland – plantation on ancient woodland site
2	Artificial habitats	Improved grassland

Figure 8 Inherent Value Criteria

It is proposed that condition should be measured with reference to the suitability of management relevant to the habitat type under consideration. Habitat parcels can be assigned a condition score of 1, 2 or 3 using the following criteria:

Condition Score	Criteria	Example
3	Management is optimal/ close to ideal for the purpose of maximising the biodiversity value of the habitat	Sheep grazing of moderate intensity on lowland calcareous grassland
2	Management is sub-optimal but is not seriously damaging the biodiversity value of the habitat	Intermittent light cattle grazing on lowland calcareous grassland
1	Management is seriously damaging the biodiversity value of the habitat	Intensive pig rearing on lowland calcareous grassland

Figure 9 Condition Criteria

Condition scores can be assigned to a list of known impacts and management interventions, using a matrix against IHS habitat categories (some impacts are positive in one habitat but negative in another). The Centre for Evidence Based Conservation[32] could be used to inform these decisions, or, in the absence of evidence, statutory agency management advice.

Application of metrics – a hypothetical example

An area of land that will be impacted by a proposed development uses existing data, or has a standard survey if required, mapped using IHS, and a condition assessment of

[32] Centre for Evidence Based Conservation www.cebc.bangor.ac.uk/

each habitat parcel. There are three habitat parcels identified, each with a unique combination of habitat category (and hence inherent value score) and condition. The habitat evaluation score is assigned with reference to the matrix (see Figure 10). The area of the parcel is multiplied by the score to give the habitat-hectares metric. These are totalled for all of the land impacted by development.

	Hectares	Value	Condition	Score	Hab-Ha
Parcel 1	14	High	High	1	14
Parcel 2	30	High	Medium	0.67	20.1
Parcel 3	24	Medium	Low	0.22	5.28
TOTAL	**68**				**39.38**

Figure 10 Development evaluation example

If it is proposed that all of this land is to be lost to development, assuming that none falls into the 'non-offsetable' Category (Category A in Table 7 of the Report), the total number of habitat-hectares is a measure of the biodiversity to be offset. If a proportion of the habitat parcels will survive or remain post-development, then the size, value and condition of the remnants will require predictive evaluation in the scheme design. In this case the biodiversity to be offset would be the difference between current and outcome states.

Measurement of the offset

The land proposed for offsetting would be evaluated using the same metrics. Offsetting would always be required to give a higher habitat-hectare net outcome than that being lost. Arguably, it should be substantially higher, to allow for uncertainty in prediction and temporary loss of value in transition (in other words use of multipliers might be appropriate). The offset land could be 'low' category habitat restored to medium or high value, or high value habitat with the ideal management put in place in perpetuity – the direction must be positive on one or both axes, and never negative on either axis.

In the example given above, the offset must provide a **minimum** of 39.38 habitat-hectares. There could be a choice of locations/ methods to achieve this.

A hypothetical Site 1 currently has 60 hectares of high value habitat that is in poor condition through damaging management. It therefore has a habitat-hectares score of 20 (60 * 0.33 see Figure 7). Securing favourable conservation status in perpetuity through putting in place ideal management would raise the site score to 60 (60 * 1.00), an improvement of 40 habitat hectares, thus achieving the minimum offset target.

Alternative Site 2 currently has 80 hectares of degraded BAP habitat, inherent value score 4, in moderate condition currently, condition score 2. Its current score is therefore 35.2 habitat hectares (80 * 0.44). Putting in place ideal management is assessed as capable of restoring the parcel to BAP habitat over a period of time, and it will therefore be raised to score 80 (80 * 1.00), an improvement of 44.8 habitat-hectares, again achieving the offset target. Note that this example has made an improvement on

both axes – achieving condition and changing the habitat type to one of higher inherent value.

		Hectares	Value	Condition	Score	Hab-Ha
Site 1(1Parcel)	Before	60	High	Low	0.33	20.0
	After	60	High	High	1.00	60.0
	Net Change					**40.0**
Site 2(1Parcel)	Before	80	Medium	Medium	0.44	35.2
	After	80	High	High	1.00	80.0
	Net Change					**44.8**

Figure 11 Offset land options evaluation example

Relationship with UK BAP

This section explores how possible biodiversity enhancements achieved on offset land using these metrics could be related to biodiversity targets in the UK BAP (2006).

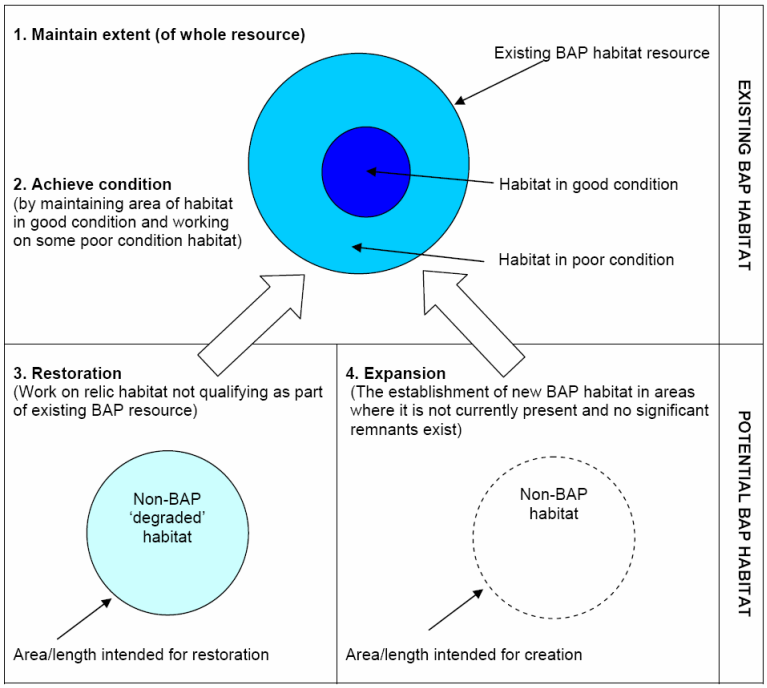
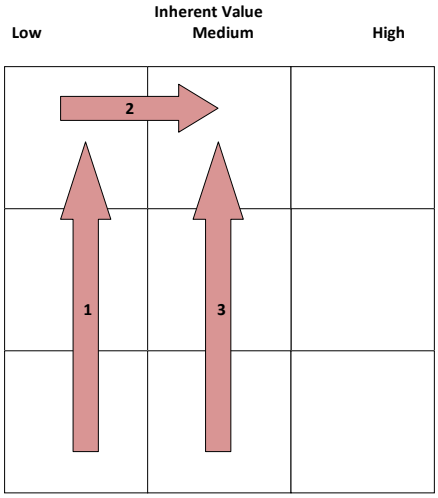
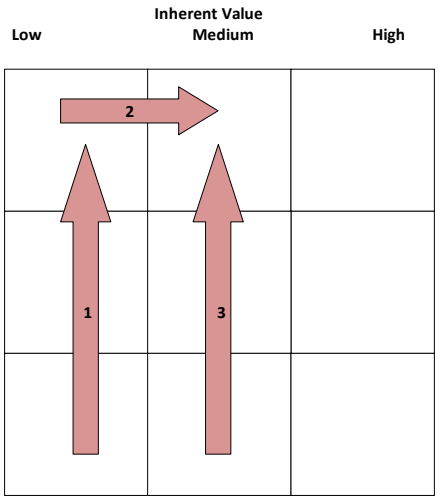


Figure 12 Definition of UK BAP Targets (UK Biodiversity Group, 2006)



1. Improving condition of an artificial habitat
2. Re-creating a "semi-natural" habitat
3. Improving condition of a "semi-natural" or degraded BAP habitat

Figure 13 Enhancement directions on the offset matrix



1. Improving condition of an artificial habitat
2. Re-creating a "semi-natural" habitat
3. Improving condition of a "semi-natural" or degraded BAP habitat

Figure 14 Non BAP-related enhancements on the offset matrix

Definitions of target types in the UK BAP are shown in Figure 2. The three types of target that involve change are shown against the offset matrix in Figure 13. ***Achieving condition*** entails a management change within land that already meets the definition of BAP habitat, and is therefore represented by upwards movement in the third column. ***Restoration*** entails a change of habitat type from degraded BAP habitat (i.e. former BAP habitat that no longer meets the definition) to the point where it meets the definition of BAP habitat. This is therefore represented by a horizontal movement from column 2 to column 3. Near ideal management will normally be essential to achieve this, so the movement will usually be across the top row; often the management will need to be improved first, represented by an upwards movement in the central column. ***Expansion*** involves moving from a non BAP habitat to a BAP habitat and is therefore represented by a left to right movement; again management improvement will be a frequent precursor.

The offset matrix can also accommodate biodiversity enhancements unrelated to BAP habitat, as shown in Figure 14. Movement 1 could be, for example, introducing small scale habitat features into a previously intensively managed urban park. Movement 2 could be, for example, developing a garden pond, that, while valuable, does not meet the BAP criteria for ponds. Movement 3 could be, for example, stopping damaging management of a parcel of rough grassland, and starting a timely annual mowing regime.

APPENDIX D: WORKSHOP PROCEEDINGS

As part of the study, two workshops were held on 13.11.08 and 02.03.09. Participants were identified by both the research team and the steering group, with helpful suggestions from the participants themselves (see attached lists of participants and organisations represented). The purpose of the first workshop was to introduce the research remit, to indicate our current knowledge base on the subject of biodiversity offsets and to explain key concepts and principles to those participants relatively new to the concept. A key component of the day was a strengths, weaknesses, opportunities and threats (SWOT) analysis of several key themes. The analysis was performed by breakout groups with a member of the research team operating as a facilitator and rapporteur. The questions which prompted the SWOT analysis are summarised below.

'Design and Implementation'
Thresholds: what should be the thresholds for severe impacts that cannot be offset?

- Metrics: Should England prescribe which metrics are to be used, or allow choice? Should Defra communicate 'welcome' metrics? Which metrics does the group find satisfactory?
- Site Selection: Should there be guidance suggesting offsets should be as local as possible to the impacts, or should they be able to be located in the highest conservation priority sites commensurate with 'like for like or better'? Are BAP sites relevant to site selection? (If so, how to avoid cost shifting.)
- Out of kind/trading up: What could be used as the basis for this in the UK?
- Multipliers /managing risk/ensuring certain areas conserved: Should we go for the Western Cape approach that ensures persistence/representation even with cumulative impacts? If not, how should multipliers and time discounting be dealt with?
- How could conservation gains for offsets be delivered on private land? Covenants, easements, Payments for Ecosystem Services?

'Maintaining the status quo'?

- What are the strengths and weaknesses of the current policy framework for biodiversity offsets (ie Birds and Habs Directive, ELD, WCPA, NERC, CROW, PS9 etc)?
- Are offsets triggered in all circumstances when they are needed? If not, what are the gaps when offsets are needed but policy doesn't yet require them?
- Do existing measures provide enough guidance on thresholds, metrics, site selection, multipliers, implementation mechanisms?
- What are the risks and opportunities of working largely within the existing policy framework for biodiversity offsets? (Opportunities: no need to overcome political barrier for more policy; Risks: current policy framework still leading to biodiv loss and not enough offsets?)

Mitigation/Habitat Banking

- What would be the risks and threats of introducing a banking/biodiversity credit trading system in England?
- What could be the advantages and opportunities of doing so?
- What policy measures would need to be taken to manage the risks of banking/credits if such an approach were to be taken?

- What legal and policy measures (eg definition of credits, obligations with respect to liabilities and assurance) would be needed for banking to work in England? What other support (scientific, technical, capacity building/training) would be needed?

The findings of the SWOT analysis were incorporated into the interim report. Additionally they were used to inform the direction of future research for the team, in particular the identification of areas of ambiguity or gaps in current knowledge.

The purpose of the second workshop was to report back following issue of the interim report and to discuss potential implementation options in more detail. There was lengthy discussion about which types of activities offsets should apply to, with a suggestion that this should include all commercial, profit making activities – but hard to define. Questions relating to what parameters we need to consider were much in evidence – activities, implications for existing designations and also inherent value all being central to the debate. One suggested starting point might be to use any site allocations in the LDF to provide a strategic approach and make clear to developers what is expected. An initial site survey before inclusion within the LDF would clarify whether a "full bells and whistles" approach or whether an approximate quicker method was appropriate. In tandem with this there was also discussion around non-offsetable impacts, with many noting that despite many much lauded initiatives, biodiversity is still in decline.

A key component of the second workshop surrounded scope and guidance with complete agreement that all biodiversity should be catered for to address cumulative (loss) issues (not just designated or protected). Many delegates observed that Section 106 agreements were not currently doing the job for biodiversity with a plea that the final report makes it clear where there are market failures. In addition the mood of the workshop was that the EIA regs are also not performing for biodiversity with a suggestion that Schedule 2 needs to be revised to include more projects, smaller projects and that the thresholds which trigger the process might be in need of an overhaul.

Many delegates indicated that the task of managing mitigation banks on the ground should not fall to Natural England with governance needing to be undertaken by a separate accredited body. The question of where a bank might be located and whether the land required to deliver a banking system was available was raised. Consensus was that when considering land availability there is also a need to incorporate a range of pressing issues including climate (change), soil suitability, future species adaptability and social needs. It was agreed that extensive mapping and modelling are needed to examine this and that its provision is a priority if habitat banking is to move forward.

The workshop concluded with a view from many that a stringent set of principles are needed to ensure that offsets are delivered on the ground and that these need to be backed up by a stronger requirement for 'no net loss' to be demonstrated by developers. Many felt that we need to get the triggers sorted first and to deliver the banking mechanism later with an acknowledgement that the market should develop this to an extent.

DELEGATES WORKSHOP 1		
Name		**Organisation**
Armsworth	Paul	University of Sheffield
Briggs	Brian	Environment Bank
Brown	Andy	Anglian Water
Butcher	Bill	WGB Environment
Butterworth	Tom	Natural England
Croucher	Toby	Sustainability & Climate Change
Dawes	Samantha	RSPB
Dodd	Andy	RSPB
Donovan	Deanna	JNCC
Garland	Lincoln	Biodiversity by Design
Gillespie	Rob	Environment Bank
Harwood	Neil	Arup
Horsley	Nick	WBB Minerals
Hoskyns Abrahall	Harry	Kimberley Burge
Hunter	Rachel	FRB
King	Miles	Grasslands Trust
Latimer	William	Faber Maunsell
Lewis	Paul	Defra
MacDonald	Ewan	University of Oxford
McHugh	Nicola	Oxford Brookes University
Moon	Sarah	UNEP – WCMC
Moran	Dominic	Scottish Agricultural College
Morris	Roger	Natural England
O'Neill	Dominic	Natural England
Owen	Jeremy	Land Use Consultants
Owen	Nicola	Quarry Products Association
Packer	Mike	Arbocarb
ten Kate	Kerry	Business & Biodiversity Offsets Programme
Tew	Tom	Natural England
Therivel	Riki	Levett-Therivel Consultants
Thomas	Matthew	Brighton & Hove
Thompson	Stewart	Oxford Brookes University
Treweek	Jo	Treweek Environmental Consultants
Venn	Orlando	Treweek Environmental Consultants
Watts	Kevin	Forest Research
Watts	William	Environment Agency
Wells	Mike	Biodiversity by Design
Williams	Will	Natural England
Wilson	Rebecca	Forestry Commission
Wynde	Robin	RSPB

DELEGATES WORKSHOP 2	
Name	**Organisation**
Peter Brotherton	Natural England
Andy Dodd	RSPB
Bill Watts	Environment Agency
David Hill	Environment Bank
Deanna Donovan	JNCC
Derrick Wilkinson	Country Land & Business Association
Graham Tucker	IEEP
Harry Hoskyns Abrahall	Kimberley Burge
Helen Dunn	Defra
Ian Hepburn	Wildlife Trusts
James Vause	Defra
Jo Treweek	Treweek Environmental Consultants
Jonathan Ekstrom	The Biodiversity Consultancy
Julian Harlow	Natural England
Kerry ten Kate	BBOP
Matthew Cranford	Eftec
Mike Oxford	ALGE
Nick Horsley	WBB Minerals
Nicola McHugh	Oxford Brookes University
Nicola Owen	Quarry Products Association
Orlando Venn	Treweek Environmental Consultants
Paul Raven	Environment Agency
Riki Therivel	Levett-Therivel
Rob Gillespie	Environment Bank
Roger Morris	Natural England
Rowan Secrett	Scott Wilson
Sarah Lucking	Defra
Sarah Moon	UNEP / WCMC
Sarah Webster	Defra
Stewart Thompson	Oxford Brookes University

APPENDIX E: HOW KEY ISSUES ARE ADDRESSED IN 3 SCENARIOS

Issue	Scenario 1 (Business As Usual)	Scenario 2	Scenario 3
Trigger	EU law: compulsory for designated European sites and protected species. UK law (other biodiversity values): recommended but doesn't happen in practice. **Result**: biodiversity offsets rare.	Guidance under PPS9 made clearer. Developers encouraged/sometimes required to do offsets themselves, or may find others to do them on their behalf. **Result:** some more offsets, at individual authorities' discretion. Developers to do deals.	Requirement under PPS9 made firmer and clearer, such that developers are required to demonstrate achievement of 'no net loss' as a minimum. For residual adverse impacts remaining after mitigation developers required to: (1) Do own offsets, or (2) Fee in lieu to local authorities, or (3) Buy credits **Result**: many more offsets, options for delivery including a new market in credits.
What about 'non offsetable' impacts?	EU law: project shouldn't proceed, or 'compensatory conservation' where project proceeds because of overriding public interest. UK law: unclear	As for Scenario 2.	Thresholds established to confirm circumstances under which impacts are not-offsetable. Impacts beyond thresholds raise questions concerning appropriateness of project. Non-offsetable impacts allowed for public interest reasons would result in 'compensatory conservation', which could be punitive but wouldn't be an offset.
Scope	Species and habitats listed under Birds and Habs Directive; remediation under ELD. [Broader biodiversity is identified as a concern under PPS9…but in practice rarely addressed].	Species and habitats listed under Birds and Habs Directive; remediation under ELD. [Broader biodiversity under PPS9…more common, but not automatic or regular.]	All significant residual impacts on biodiversity are offset [including broader biodiversity, not only EU listed species and habitats].
Guidance on rules (eg thresholds, trading up, implementati	Not available. Developers left to interpret EU law and precedent. No guidance on how to do offsets under PPS9.	Existing guidance consolidated and clarified on thresholds and trading up. Since no trading/credits envisaged in this model and developers are to source offsets themselves, suggestive procedural guidance on site selection, potential partners for offset delivery, etc.	Explicit guidance on thresholds, trading up, site selection, designation of credits, implementation/guarantee of offsets. 'Two –track' approach in which projects with individual significant residual impacts

on)			offset them using detailed loss/gain quantification methods, and smaller projects follow a fast track approach process with more approximate, quicker methods.
Land availability	Unclear where offset sites are to be found, on whose land, and whether land purchase essential for the offset.	Since no credit system, the developer must find suitable land for the offset case-by-case. However, this need not necessarily be by land purchase, and could be by long-term contract with a landowner and/or a covenant entered onto land title.	Offset sites can be found on any or all of the following: • Protected areas, provided additionality can be demonstrated • Other public land • Private land, including: o land purchased explicitly as an offset/conservation bank by a private conservation banking company o conservation easements/ covenants on farms and other private land where conservation 'credits' can be generated. Note: further discussion required concerning legitimacy of offsets on designated sites such as SSSIs (Additionality).
Implementation (ie management on the ground)	No guidance. Developer is responsible under EU law, but could outsource.	Could be by: • Government (eg Natural England, Environment Agency, local authorities) • Private landowners including farmers, NGOs, Wildlife Trusts, • Conservation banking companies (if they're prepared to take on bespoke, in perpetuity, project-specific conservation without the volume of banks.	Could be by: • Government (eg Natural England, Environment Agency, local authorities) • Private landowners including farmers, NGOs, Wildlife Trusts, • Conservation banking companies • Community Land Trusts. Could be economically attractive.

		Unlikely to be economically attractive.	
Governance of the offset arrangements	No guidance. Developer is responsible under EU law, but could outsource.	Range of options, depending on who implements.	Clarified for each of 3 options: (1) Own offsets: a range of options, including multistakeholder group (2) Fee in lieu: local authorities (3) Credits: rules established for conservation banks and private landowners
Monitoring	Unclear.	Should be defined in offset design and planned (and costed) into offset implementation.	Agreed in implementation agreements. For instance, credit payments dependent on monitored performance against agreed standards.
Enforcement	It would be a statutory offence and breach of contract between regulatory agency and proponent/developer if the developer did not comply	Government could enforce its contracts with developer and offset implementer. Could be statutory offence for developer/implementer to fail to perform offset. Guidelines could require developers to deposit performance bonds and offset implementers to insure against offset failure and/or conservation bank bankruptcy.	Government could enforce its contracts with developer and offset implementer. Could be statutory offence for developer/implementer to fail to perform offset. Guidelines could require developers to deposite performance bonds and offset implementers to insure against offset failure and/or conservation bank bankruptcy.
Transaction costs	Offsets are few and do not necessarily reach standards of international best practice, but existing ones involve moderate transaction costs. Uncertainty and lack of clarity in current policy probably inflates transaction costs unnecessarily.	There would be more offsets and these would meet best practice and thus possibly be more demanding than existing offsets, raising transaction costs. Transaction costs may be higher for case-by-case offsets (as in this Scenario) compared with twin track and banking model. Further work needed.	There would be more offsets and these would meet best practice and thus possibly be more demanding than existing offsets, raising transaction costs. However, a clear system and the two-track approach above would reduce transaction costs involved in uncertainty and reinventing the wheel. Conservation banking may reduce transaction costs. Further study is needed.
Streamlining process/ incentives	Unclear. Project proponents report lack of clarity, uncertainty, some duplication of effort.	Possibility of: • Handing over offset design and implementation responsibilities to third parties, using the	Possibility of: • Handing over offset design and implementation responsibilities to third

		banking/credit purchase option. • Lower transaction costs through aggregated offsets and banking. • Fast-track planning consents for projects with demonstrable no net loss offsets (or offset proposals) in place prior to planning applications. • Density bonuses where net gain is demonstrated. • Clarity on land-use planning (Go and No Go Zones, and offset site selection) Clarity on which impacts can and cannot be offset and the implications, clarity on offset requirements and processes.	parties, using the banking/credit purchase option. • Lower transaction costs through aggregated offsets and banking. • Fast-track planning consents for projects with demonstrable no net loss offsets (or offset proposals) in place prior to planning applications. • Density bonuses where net gain is demonstrated. • Clarity on land-use planning (Go and No Go Zones, and offset site selection) • Clarity on which impacts can and cannot be offset and the implications, clarity on offset requirements and processes