Independent assessment of the potential for Biodiversity Offsetting to compensate for nightingale habitat loss at Lodge Hill, Kent

Environment Bank Ltd.
July 2012

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1 Context

The Lodge Hill planning application is a broad and complex matter requiring a wide range of considerations to be made by the planning authority. Environmental matters are one of these, and will be key in determining whether the development can meet the tests of 'sustainability' set out in the National Planning Policy Framework. Within the environmental matters there are many different species and habitats to consider, and this has been set out in a variety of documents relating to the Outline Planning Application. There has been a particular focus on the birds of Lodge Hill, with a masterplan for breeding birds submitted in April 2012. And within the birds, one species in particular, the nightingale *Luscinia megarhyncos*, is the subject of much discussion.

It has been known for many years that the Lodge Hill site was used by nightingales, a species that has declined considerably in Britain over the past 60 years. The developer has accepted that habitats used by nightingales would be lost as a result of the development, and has proposed strategies to avoid and mitigate habitat loss on-site, and then to compensate for any residual effect by creating an off-site compensatory habitat close to the development site. These proposals have been under consideration by interested parties.

Recently however, a new national survey of nightingales has been published, which shows that the site now holds many more birds than in previous years - this raises questions as to the adequacy of the offset previously proposed (and also means the site may now be eligible for notification by Natural England as a Site of Special Scientific Interest, but this issue is not considered further here). At the same time, 'biodiversity offsetting' was announced as a Government Policy in the Natural Environment White Paper, with an accompanying framework of national metrics to guide planning authorities in quantifying how necessary habitat offsetting is in delivering 'no net loss' of biodiversity.

Given these recent changes, Medway District Council requested a rapid independent analysis of the existing proposals and, given the new circumstances and using the new Government metrics, of whether creating compensatory habitat to offset the impact of the development on nightingales was appropriate and, if so, a preliminary view on how much offsetting habitat would be necessary to deliver 'no net loss' and whether it would seem possible to deliver it in the area.

2 Analysis

2.1 Current proposal

In summary, the existing proposal estimated that habitat lost to the development would cause the loss of 26 pairs of nightingale, estimated that each pair needs 2ha of habitat, and therefore that 52ha of nightingale habitat would be lost. It proposed that 14.4ha of habitat would be created on-site and 52ha of habitat would be created off-site, and therefore that there would be a net gain of 14.4ha of nightingale habitat.

The proposal concluded that the conservation status of the nightingale would be at least maintained, and probably enhanced at the site, and, in reaching this conclusion, noted that the calculations for habitat gain were likely to be conservative because:

- the estimates of habitat required by each pair (2ha) were generous, because habitat not used was not excluded from the estimation – it might be that each pair needs as little as 1ha of good habitat
- the overall calculation did not factor in the areas of habitat retained at the site, nor the contribution to nightingale habitats of the general green infrastructure of the new development;
- the areas of created habitat would be managed specifically for nightingales and are likely to be at least as good as the areas lost on the site, which were not so managed.

The proposal is a good example of compensatory schemes that were undertaken prior to the new Government policy on biodiversity offsetting – we consider the analysis to be thorough and highly competent. But in the absence of proper metrics it needed to make assumptions as to habitat creation, did not assess the effect of habitat condition, and did not incorporate multipliers relating to spatial, temporal and delivery risks.

Lastly, the proposal used (as the best available evidence at the time) the nightingale surveys from 2009/10 and these data have now been superseded.

For these reasons, we conclude that (through no fault of the consultants involved) the current proposals for off-site habitat creation of 52ha do not adequately meet current Government policy and would not now allow a conclusion of no net loss of biodiversity.

2.1.1 RSPB concerns on mitigation and habitat compensation

It is helpful here to note and consider the concerns already raised by the RSPB as part of the existing process. In summary, these were that:

- there would be significant indirect effects of the development on the adjacent SSSI and that a 200m buffer would be inadequate
- new survey data would demonstrate that the nightingale population on the site was more than previously estimated (this has since proved to be correct), and hence the estimate of '26 pairs needing 52ha' was too low
- the whole site may be nationally important for nightingales and should be notified as an SSSI (this is a decision for Natural England)
- off-site habitat compensation was inappropriate for nightingales. On this issue, the RSPB concluded that it "is not aware of any evidence that guarantees the effectiveness of intentional establishment of fully functioning habitat capable of supporting breeding nightingales. Even if such establishment was possible, it is likely to be at least 10 years, if not longer, before any habitat would be capable of supporting breeding nightingales. Overall, the RSPB is not persuaded it is possible to guarantee the success of habitat compensation for breeding nightingales at this point in time. Nightingale habitat should, at this stage, be considered irreplaceable in the context of paragraph 118 of the NPPF".

This preliminary analysis of habitat compensation through offsetting does not address indirect impacts on the SSSI, nor SSSI notification – these are separate issues. As set out above, this report agrees that the analysis needs to be updated with new population data – we do this below.

Importantly, we consider that whilst the RSPB's concerns over habitat compensation for nightingales are entirely legitimate, their conclusion that nightingale habitat is

“irreplaceable” is invalid. Firstly, few outcomes in nature conservation land management are guaranteed, so requiring a scheme for habitat management that ‘guarantees’ breeding nightingales is unhelpful. This is particularly so for migratory species like the nightingale where factors throughout its migration route (that are entirely outwith the control of the managers of its summer breeding sites), will significantly affect population sizes. On the other hand, a brief internet search easily provides evidence that habitat creation and restoration in England does indeed work for nightingales:

- Cotswold Water Park - survey shows numbers maintained since last checked in 1999, probably due to the availability of widespread suitable nesting habitat and a high abundance of invertebrate food availability. CWP provides a network of dense hedgerows and scrub of the appropriate age and structure, thereby ensuring that suitable sites are always available.
- Alton Water - owned by Anglian Water who manage succession to woodland and maintain scrub to maintain nightingale numbers.
- Strensham water treatment works - Scrub habitat with the favoured structure was created as part of a landscaping scheme and it was promptly occupied by nightingales. Opportunities exist to create correctly structured scrub by modifying hedge management or creating scrub patches in field corners or adjacent to woods.
- Paxton Pits Nature Reserve - Arable farmland 70 years ago, but when sand and gravel extraction was completed, scrub spread over the former workings - and in time the habitat attracted nightingales. Considerable habitat management work done by staff and volunteers during the winter. There have been annual increases in numbers over most of the last 15 years, against the national trend.

Conversely, (in the limited time available) we could find no examples of where habitat creation for nightingales *hadn’t* worked. In other words, the evidence runs counter to the view that nightingale habitat is ‘irreplaceable’.

Finally, we support RSPB’s concerns over the risks in creating habitats, whether these relate to temporal lags in habitat function, spatial risks through offsetting in a different place, or the delivery risks of creating or restoring habitat. All of these factors are accounted for in calculating the amount of offsetting required using the Defra offsetting metrics.

2.1.2 Applying Defra metrics to estimate compensatory habitat requirements

Full metric analysis for offsetting requires site visits to assess habitat loss and condition, and takes several weeks. In the limited time available we have, for each of the three main habitat types important for nightingales at the site (semi-natural broadleaved woodland, planted broad leaved woodland, and scrub), applied the national Defra metrics to three different scenarios at Lodge Hill to illustrate the range of offsetting requirements that would be appropriate, depending on which scenario stakeholders agreed to be most appropriate:

1. Using the data from existing reports on the actual habitat loss due to the development, with no assumptions about nightingale use of that habitat.
2. Using the complete data set on the location and numbers of breeding nightingales to assess where habitat used by nightingales would be lost – in this case we have used data from 2009, 2010 and 2012 to give complete coverage of all habitat used by the birds over the three year period (these

data are set out in Figure 1 and Table 2 and were kindly provided to us by Thomson Ecology).

3. As 2 above, but considered further that the development would indirectly impact the site to such an extent that even the habitat retained on the site would be lost to the nightingales – in effect, the total abandonment of the development site by the nightingales.

Application of the Defra metrics is complicated, and is highly sensitive to the type and condition of the habitat being lost, and the type and condition of the habitat being created on-site in mitigation and also off-site in compensation. Differences in habitat type and condition can make a big difference to the amount of offsetting required. In the absence of a site visit, or a management plan for habitat creation off-site it is not possible to limit all of these variables, and yet presentation of the Conservation Credit calculations would then be bewildering.

In the interest of comprehension therefore, we have made the following assumptions in the application of the metrics;

- the target condition of any habitat being created on-site would be 'poor' – because it is within the development area - although normally habitat created and managed for the species would be 'good'
- the target condition of any habitat being created off-site would only be 'moderate' – although normally habitat created and managed for the species would be 'good'
- the condition of the habitat being lost to the development would not be 'poor', it would be either 'good' or 'moderate' – although the habitat on the site, which is not being managed in any way, could quite possibly be 'poor'.

All of these assumptions make this particular application of the Defra metric *very* conservative, and the estimations of habitat compensation required for each of the three scenarios will be at the very top of the range. With more time and some site visits we would be able to test and refine these assumptions and the process of doing so is likely to reduce the estimates of offsetting habitat needed to achieve no net loss. However, using upper estimates in this report allows us then to explore the question – 'Is there enough habitat creation available in the area?'.

Although we have assumed the condition of the habitat lost on site is not 'poor', it could still be either 'moderate' or 'good'. We have presented both options because whilst we think, in reality, the habitat will probably be 'moderate', if it is 'good' then more compensation is needed and so will be part of the most extreme offsetting scenario.

Finally, the offsetting metrics allow for compensation either by creating habitat or by restoring existing habitat. Usually, the area of habitat required under habitat restoration schemes is smaller than under habitat creation schemes because the risks of delivery (and therefore the mulitipliers used to calculate areas needed) are much smaller.

So for each of the three scenarios we will calculate the area of offset needed for both habitat restoration and habitat creation options, and for each of these there will be an upper and lower limit of area needed depending on whether the habitat lost on site is assessed to be in 'moderate' or 'good' condition.

The full offsetting report for the first scenario, demonstrating the calculation of the metrics, is attached at Appendix 1. Offsetting reports for the other scenarios are not

included here, the methodologies used are identical. The results for all three scenarios are set out in the table below.

2.1.3 Results of applying Defra metrics

The results of applying the Defra metrics are set out in the summary table below. It can be seen that for scenarios 1 and 2, where the direct impact of the development on nightingale habitat is broadly similar in the two scenarios, then no net loss will be achieved, either by restoring c.30-80 hectares of habitat, or by creating c.65-160 hectares of habitat.

In the third scenario, however, the nightingales completely abandon the site, and the consequent habitat loss suffered by the birds is much greater; in this case, one would need to restore c.120-200 hectares of habitat, or create c.260-420 hectares.

Table 1 – showing the areas of habitat creation, or restoration, that would be required under three different scenarios

Assumptions:

- all on-site mitigation (both retention and creation) of current proposal is delivered, but that target condition of on-site measures is only 'poor'
- all off-site mitigation (habitat creation) of current proposal is delivered, but that target condition is only 'moderate'
- target condition of any future off-site habitat creation will only be 'moderate'
- range of areas given reflect areas needed if habitat to be lost on-site is 'moderate' (lower end) or 'good' (upper end).

Habitat	Area lost (ha)	Area of habitat creation needed (ha)	Area of habitat restoration needed (ha)
Scenario 1 Considering only habitat lost			
Semi-natural broad leaved woodland	21	67-99	29-44
Plantation broad leaved woodland	14	5-20	3-9
Scrub	25	17-43	12-29
Total	**60**	**99-162**	**44-82**
Scenario 2 Calculating habitat lost according to development footprint of habitats known to be occupied over three years (2009 – 2012)			
Semi-natural broad leaved woodland	19	58-87	26-39
Plantation broad leaved woodland	13	3-17	1-8
Scrub	19	6-26	4-17
Total	**51**	**67-130**	**31-64**
Scenario 3 Calculating habitat lost according to complete abandonment of site by nightingales			
Semi-natural broad leaved woodland	71	224-336	99-149
Plantation broad leaved woodland	16	9-26	4-11
Scrub	29	26-56	17-37
Total	**116**	**259-418**	**120-197**

2.1.4 Potential for habitat management to deliver offsetting

Normally The Environment Bank Ltd. would source ‘receptor’ sites to receive funding to deliver biodiversity gain from our National Registry, the Environmental Markets Exchange. In this case however, this work to identify potential habitat creation sites within the area has already been done by the ‘Greening the Gateway’ project. A total of 11 possible nightingale habitat creation sites have been identified (see map in Figure 2), with a total of 280ha of habitat creation possible. The work, which we again consider to be both thorough and competent, also analysed site suitability based on criteria of size, proximity to existing nightingale habitat, potential for scrub conversion or restoration, ownership details and likely willingness of owners to participate. Using these criteria, the five best sites comprise 175ha of potential habitat creation.

3 Conclusions

We conclude that:

- the existing compensatory proposal, based on 2009/10 data and without the Defra metrics, is inadequate;
- habitat offsetting for nightingales is an appropriate compensatory mechanism to ensure no net loss of biodiversity;
- in the time available, it is not possible to be precise on the area of offset land that would be needed, but this will be
    - between 70 and 400 ha for habitat creation, most likely around 100ha

    or
    - between 30 and 200 ha for habitat restoration, most likely around 50ha;
- the exact potential for habitat restoration is unknown at this stage, but other studies suggest there is 175ha of land that could be used to create nightingale habitat.

Thus, we conclude that offsetting is both appropriate and feasible to use to ensure no net loss of nightingale habitat at Lodge Hill.

Table 2. Breakdown of Total Nightingale Habitat Availability (calculated by including all suitable habitat blocks which contains any part of the territory oval as mapped by the BTO (BTO, 2012), Thomson Ecology data points from 2009 and 2010 and also retained habitats)

Habitat Used in all Years (Total Available Habitat)		**Development Phase**			
Development	**Habitat Type**	**1**	**2**	**3**	**Total Area (ha)**
Habitat Creation Areas (Temporary Loss)	Bare Ground	0.38	0.01	0	0.39
	Semi-natural Broadleaved Woodland	2.22	0.32	3.10	5.64
	Coarse Grassland	1.45	1.60	0.87	3.91
	Dense/Continuous Scrub	0.82	0.77	0.43	2.01
	Plantation Broadleaved Woodland	0.89	0.24	0	1.13
	Tall Ruderal Vegetation	0.30	0.03	1.21	1.54
Total Temporary Loss (ha)		**6.06**	**2.96**	**5.61**	**14.63**
Habitat in Development Area (Permanent Loss)	Bare Ground	0.34	0.93	0	1.27
	Semi-natural Broadleaved Woodland	8.18	2.13	2.56	12.86
	Coarse Grassland	7.63	9.52	9.35	26.50
	Dense/Continuous Scrub	4.12	10.07	3.21	17.39
	Plantation Broadleaved Woodland	6.75	4.40	0.71	11.86
	Scattered Broadleaved Woodland	0	0.24	0	0.24
	Scattered Mixed Woodland	0.08	0	0	0.08
	Tall Ruderal	0.85	0.70	0.45	1.99
Total Permanent Loss		**27.94**	**27.98**	**16.26**	**72.18**
Retained Habitat	Semi-natural Broadleaved Woodland	27.31	8.43	16.74	52.48
	Coarse Grassland	0.25	0.85	0.24	1.33
	Dense/Continuous Scrub	6.71	2.81	0.04	9.56
	Plantation Broadleaved Woodland		2.70		2.70
	Tall Ruderal		0.48		0.48
Total Retained Habitat (ha)		**34.27**	**15.26**	**17.02**	**66.54**
Total Available Habitat (ha)		**68.27**	**46.20**	**38.88**	**153.35**

Figure 1 Nightingale territories at Lodge Hill for three years 2009-2012.

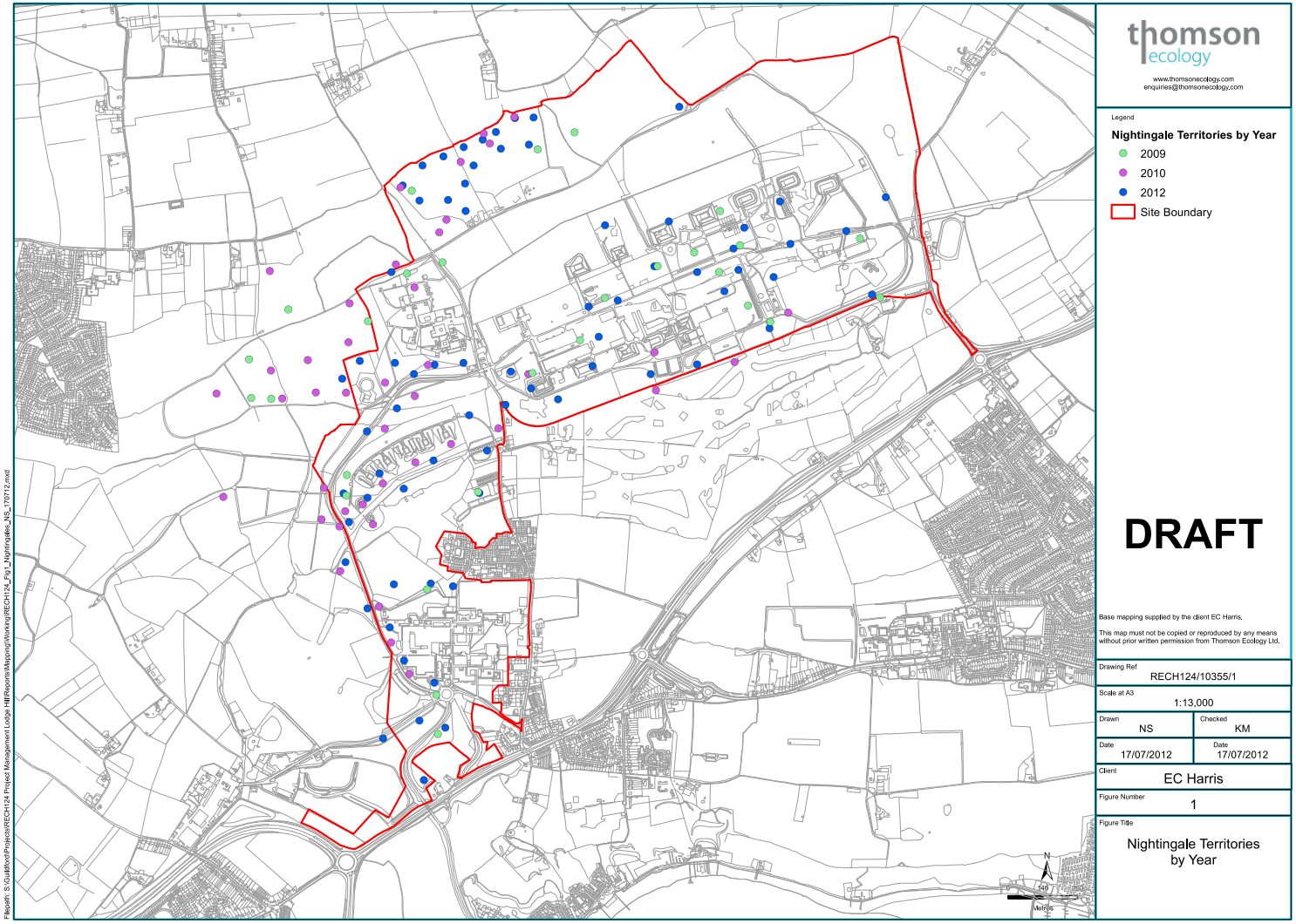
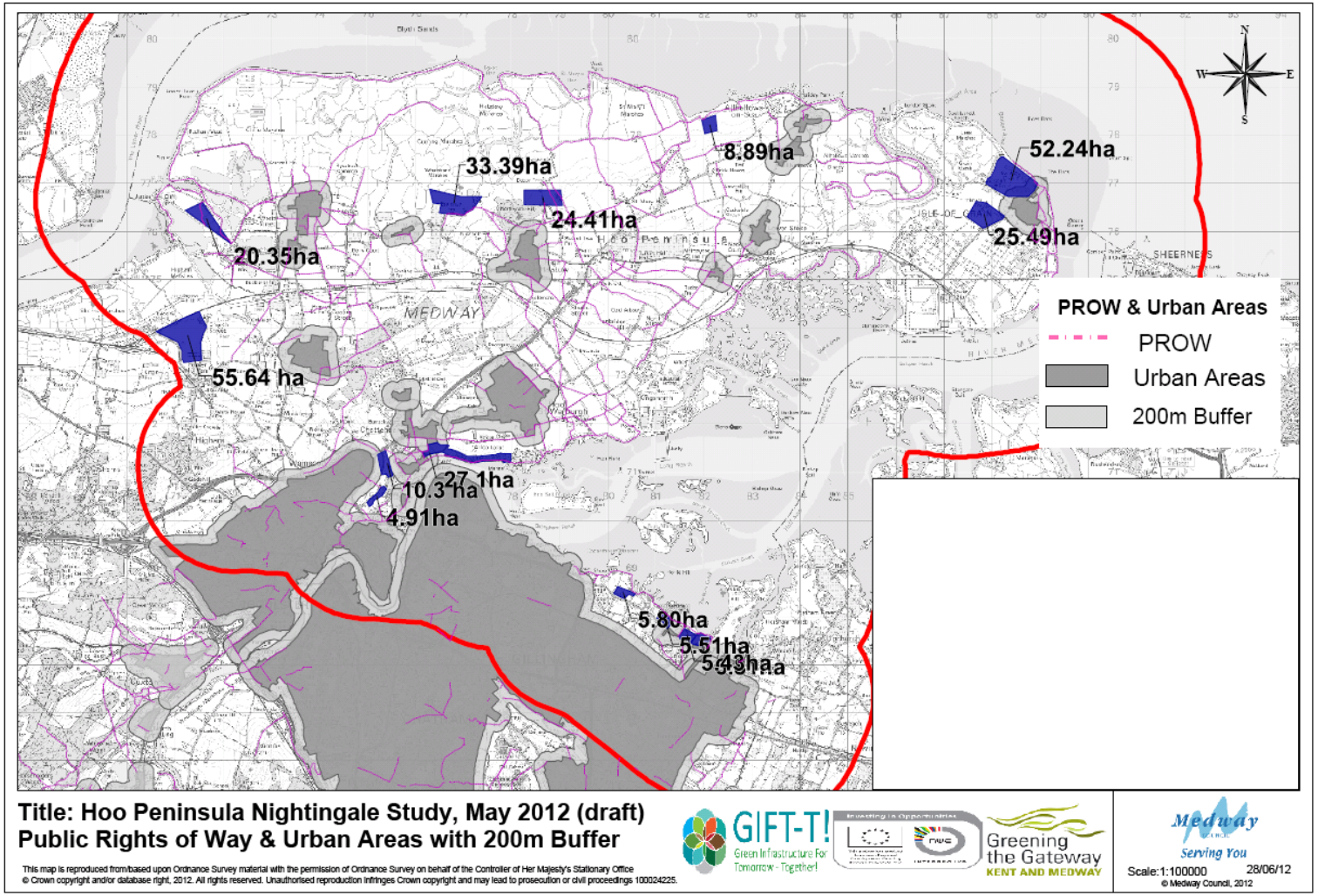


Figure 2. Location of possible opportunity sites: The map below shows the locations and size (ha) of the 11 Nightingale habitat creation opportunity sites.



Appendix

Preliminary Biodiversity Offsetting Scoping Analysis of Woodland and Scrub Habitat at Lodge Hill, Kent

Preliminary Biodiversity Offsetting Scoping Analysis of Woodland and Scrub Habitat at Lodge Hill, Kent

4 Introduction

4.1 General Introduction

This report has been prepared for Medway District Council by The Environment Bank Ltd. (EBL). Biodiversity offsetting has been introduced as a policy in the government's Natural Environment White Paper. This report consists of a scoping analysis of the biodiversity offsetting requirement, through the purchase of Conservation Credits, for impacts on broadleaved woodland and scrub habitats in relation to nightingale breeding habitat by the proposed development at Lodge Hill, Kent. This analysis is based on existing ecological knowledge.

4.2 Location and Description of Site.

The site, an area of 320ha (grid reference TQ761736), comprises the former Chattenden Barracks (now demolished) located north of the village of Chattenden, part of the Chattenden Training Area, Lodge Hill Camp and Lodge Hill Training Area.

The site supports broadleaved woodland, plantation broadleaved woodland, scattered trees, dense scrub, scattered scrub, poor semi-improved grassland, improved grassland, coarse grassland, standing water, amenity grassland, ephemeral short perennial vegetation, introduced shrub, species-poor hedgerows, buildings, bare ground and hard standing. Several UK BAP Priority habitats occur on the site including Wet Woodland, Lowland Mixed Deciduous Woodland, Hedgerows, Ponds, Lowland Meadow, and Purple Moor-grass and Rush Pasture. Mixed Deciduous Woodlands, Lowland Meadows, Standing Open Water and Wet Woodlands are also Kent BAP Priority habitats.

Approximately 35ha of Chattenden Woods SSSI, of national importance, occur within the site, together with areas of ancient woodland, including Round Top Wood, Deansgate Wood, Wybornes Wood and Lodge Hill Wood considered of County value.

Species of conservation importance including scarce plants, scarce/notable invertebrates, great crested newts, slow worms, grass snakes, adders, common lizards, nightingale, bullfinch, house sparrow, skylark, song thrush, dunnock, swallow and water voles were recorded.

4.3 Background

Redevelopment of the site is expected to deliver 5000 homes, employment and retail facilities, schools, health centres, sports areas and open space. Areas of Chattenden Woods SSSI that occur within the site and all areas of ancient woodland, including Round Top Wood, Deansgate Wood, Wybornes Wood and Lodge Hill Wood will be retained in any future development proposals. The proposals described above are hereafter referred to as "the proposed development".

An EIA Scoping Report produced by Hyder Consulting in September 2008 for the Chattenden and Lodge Hill proposed development included considerations with regards to the potential and significance of effects of the proposed development on ecological resources and designated sites. A Desk Study and Extended Phase 1 Habitat Survey Report was produced by Thomson Ecology in October 2011. This report provided a

preliminary ecological assessment of the site and was submitted as a technical appendix for the ecology chapter of the Environmental Statement for the development proposals.

A point of concern raised by Natural England and the RSPB in relation to the proposed development has been the nightingale *Luscinia megarhyncos* population of the current Chattenden Woods SSSI and adjacent Lodge Hill site. This is based on the fact that the area supports more than 1% of the British population of nightingales, a rapidly declining species (60% decline between 1995-2009). Nightingales breed in a wide range of lowland habitats but require a deciduous woodland and a dense understory of scrub. Nightingales are found throughout the proposed development site and the Chattenden Woods SSSI. Nightingales currently form part of the woodland breeding bird assemblage feature of the SSSI, but are now breeding across the SSSI and the surrounding area (utilising the dense scrub in the latter). A comprehensive nightingale survey in, and around, the proposed strategic allocation site was conducted by the British Trust for Ornithology (BTO) as part of the National Nightingale Survey 2012. The survey identified the following number of nightingale territories:

Table 1.1. BTO National Nightingale Survey 2012 results for the site and environs.

Survey Area	BTO National Nightingale Survey 2012
Lodge Hill area, including the proposed Lodge Hill strategic allocation site, Chattenden Woods SSSI and areas bordering the SSSI	84
Chattenden Woods SSSI	27*
Areas bordering with the Chattenden Woods SSSI and the proposed Lodge Hill Strategic Allocation Site	6
Proposed Lodge Hill Strategic Allocation Site	**69***
Area of Chattenden Woods SSSI which falls within the proposed Lodge Hill Strategic Allocation Site	16
Within the Lodge Hill Strategic Allocation Site and outside of the area of the Chattenden Woods SSSI which falls within the Strategic Allocation Site	53*

*This number includes 2 territories which straddle the border of the Chattenden Woods SSI and the Lodge Hill Strategic Allocation Site.

To compensate for impacts to the woodland and scrub habitats, and achieve no net loss of suitable habitat for breeding nightingales, biodiversity offsetting is being considered. EBL was commissioned by Medway District Council to undertake an analysis of the impacts to scrub habitats in the proposed development area, with a view to consider a biodiversity offsetting approach. Prior ecological assessments undertaken, mitigation proposals, impact assessments (in biodiversity units) and offset options are presented below.

4.4 Objectives of Report

This report is a preliminary biodiversity offsetting analysis for the predicted loss of suitable nightingale habitats (broadleaved woodland and scrub habitats) of the Lodge Hill site as a result of the proposed development. This requires;

- ecological information of habitat(s) to be lost and an examination of on- and off-site habitat creation or restoration proposals
- assessment of the quality and condition of the habitats to be lost or degraded, based on existing ecological knowledge
- estimation of the Conservation Credit requirement for the loss of habitats and Conservation Credit scores of on- and off-site habitat proposals
- determination of suitable biodiversity offsetting options for mitigating ecological impacts on habitats present at the site via the creation or restoration of habitats at ecological receptor sites.

4.5 Limitations of Report

The conclusions of this report are based on information provided by the client at the time of the assessment. Some of this information has not been verified and, therefore, EBL cannot accept responsibility for any conclusions based on this information. EBL accepts no responsibility for the accuracy of any third party data used in the production of this report.

Natural ecological communities are susceptible to change, and, at times, as a result of internal and external environmental factors, this change can be rapid. Conservation Credit requirements are based on ecological assessments of habitats carried out at a prior date, and, as such, changes which may affect the conclusions of this report may occur if the recommendations for purchasing Conservation Credits are not taken up for a period of time.

A biodiversity offset is a commitment to compensate for significant adverse impacts on biodiversity identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been taken according to the 'mitigation hierarchy'. The credit requirement estimated in this report takes into consideration the development proposals for building-in beneficial biodiversity features as part of a good design. Any changes to planning proposals or decisions may affect the credit requirement of the site and a review of the changes to determine credit requirement would be recommended.

5 Habitats

5.1 Surveys

The assessment makes use of an impact assessment of habitat losses, extended Phase 1 habitat survey of the site and desk study conducted by Thomson Ecology (2008), plus surveys of protected species (all of which were undertaken between 2009 to 2011).

5.1.1 Environmental Impact Assessment Scoping Report

An EIA scoping report was undertaken by Hyder Consulting in September 2008 for the Chattenden and Lodge Hill proposed development. This report included an assessment of potential effects on ecological resources and designated sites.

5.1.2 Desk Study

A desk-based study was conducted by Thomson Ecology in November 2008 for records of protected species and designated sites within 2 km of the site. This included a review of existing statutory sites of nature conservation interest, such as Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and National Nature Reserves (NNRs), and non-statutory sites, such as County Wildlife Sites (CWSs).

5.1.3 Extended Phase 1 Habitat Survey

An extended Phase 1 habitat survey was undertaken by Thomson Ecology in November 2008 in accordance with the Joint Nature Conservation Committee (JNCC)[1] and Institute of Ecological Assessment (IEA)[2] guidelines. In summary, this comprised walking over the survey area and recording the habitat types and boundary features present. Dominant plant species observed within each habitat type were recorded on a DAFOR scale. This scale classifies species as Dominant, Abundant, Frequent, Occasional or Rare. Full details of methods and results can be found in the Thomson Ecology report [3].

5.2 Habitat Descriptions

A wide range of habitats are present at this site however this assessment is confined to the main habitats which support nightingales.

Drawings 5-2a to c in Lodge Hill Environmental Statement (Thomson Ecology) show the broadleaved woodland and scrub habitat types present on site. A summary of the broadleaved woodland and scrub habitats areas present on the site is shown in table 2.1

Table 2.1. Summary of potential nightingale habitat existing on site.

Habitat	Area (ha) existing on site
Broadleaved semi-natural woodland	33
Broadleaved plantation woodland	18
Dense scrub	28

6 Biodiversity Offsetting

6.1 Non-statutory Guidance

Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development 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[3].

Biodiversity offsets, as set out by 'Principles of Biodiversity Offsetting' (Business and Biodiversity Offset Programme, BBOP), 'should be designed to comply with all relevant national and international law, and planned in accordance with the Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans'.

The UK Government, as signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Countryside and Rights of Way Act 2000 (Section 74) and most recently in the Natural Environment White Paper (June 2011), much of which is delivered by Natural England through its Corporate Plan.

EBL is developing a model approach to biodiversity offsetting through the use of Conservation Credits. Specialist advice, as provided by EBL, is needed for implementing the Conservation Credits biodiversity offsetting scheme, assessing development credit requirements in association with, or on behalf of, developers or planning authorities, and sourcing appropriate receptor sites. EBL has used Defra's proposed metrics approach to provide as robust a methodology as possible, along with a support system for clients so they can fulfil guidelines and observe best practice for biodiversity offsetting through Conservation Credits.

Biodiversity offsetting through the Conservation Credits scheme provides the means of recreating or restoring habitats to offset land affected through development. Best practice in biodiversity offsetting aims to deliver biodiversity gains by encouraging a novel and improved approach to sustainable development to meet the needs of society.

6.2 Biodiversity Offsetting Assessment

6.2.1 Methodology

The methodology for the assessment (Defra, 2012) of habitats uses a number of metrics to assess the quality of the habitats on site in relation to each habitat's ecological value and current condition, therefore providing a suitable assessment of the biodiversity value of the site. This allows the impact of the development on the scrub habitats to be quantified, so that what is needed in terms of compensation, as an offset requirement, can be evaluated.

Habitat type

Firstly, habitats are pre-assigned to one of three habitat type bands (Table 3.1 below). Habitats are assigned to these bands on the basis of their distinctiveness. Distinctiveness includes parameters such as species richness, diversity, rarity (at local, regional, national and international scales) and the degree to which a habitat supports species rarely found in other habitats and/or their Biodiversity Action Plan (BAP) designation.

Biodiversity bands have been assigned to a range of habitats for Defra technical guidelines and these documents are referred to in the assignment process. A biodiversity distinctiveness category is assigned to each habitat parcel present at the site, excluding the operational areas. Any designated habitats or habitats of significant biodiversity value are defined as 'high'. Semi-natural non BAP habitats are deemed to be of 'moderate' biodiversity value, and intensively managed agricultural land and artificial habitats are deemed to be of 'low' biodiversity value. Operational areas and hard surfaces are assigned to the 'very low' categories of both biodiversity distinctiveness and condition and obtain no credit score.

Table 3.1: Habitat type bands

Habitat type Bands	Biodiversity distinctiveness	Type of habitat
High	High	BAP priority habitats as defined in Section 41 of the NERC act (2006)
Medium	Medium	Semi-natural
Low	Low	For example: Intensive agricultural

Habitat condition

To assess the condition of the habitats, the Higher Level Stewardship Farm Environment Plan (FEP) handbook (Natural England, 2010) provides a clear and transparent methodology which assigns habitat condition into one of 3 categories; poor, moderate or good.

The condition assessment category is derived from the number of criteria that the habitat meets within the FEP handbook (Natural England, 2010). There are three condition assessment categories: A (Good - 0 failed criteria), B (Moderate - 1 failed criteria) and C (Poor - 2 or more failed criteria). Section 2 of the FEP handbook lists the features for habitat identification, feature details and condition assessments for a range of habitats.

The FEP handbook is not comprehensive and does not include condition assessment criteria for all habitats. In these cases, criteria for similar habitats would be used if appropriate or additional information, such as species of conservation importance which are recorded and deemed to be supported by the condition of the habitat.

As with the habitat distinctiveness, each habitat is assigned a condition category as shown in table 3.2 below.

Table 3.2: Condition categories

Habitat condition category	Description
Good	Excellent representation of 'typical' habitat type concerned. All 'typical' habitat condition criteria met.
Moderate	Average to reasonable representation of 'typical' habitat type concerned. One or two 'typical' habitat condition criteria not met.
Poor	Below average representation of 'typical' habitat type concerned. Several 'typical' habitat condition criteria not met.

6.2.2 Habitat Distinctiveness and Condition

The woodland and scrub habitats and mosaic habitats on site were assigned one of three categories of distinctiveness. UK BAP priority habitats are considered to be of high distinctiveness. Other semi-natural habitats not included as BAP priority habitats were considered to be of medium distinctiveness (e.g. scrub and scrub mosaic habitats).

Insufficient ecological information of these habitats was available in the extended Phase 1 habitat survey for comparison against FEP woodland and scrub criteria to determine a condition category. Due to the paucity of ecological information on condition the analysis will be conducted for two scenarios, under the assumption that the habitats present are all in either moderate or good condition (i.e. none are in poor condition). To determine condition categories for these habitats an additional habitat survey would be recommended in which woodland and scrub habitats, including mosaic habitats comprising these habitats, would be assessed against FEP criteria. With this additional information, our analysis would be able to provide a more accurate estimate of the biodiversity offset requirement to achieve 'no net loss' of suitable nightingale habitat.

Scrub

The areas of scrub and scrub mosaic are not included in any BAP priority habitat but are semi-natural and are therefore considered to be of 'medium' habitat distinctiveness.

Condition of the scrub habitats could not be inferred from existing ecological information. It is recommended that an additional survey of the scrub habitats be conducted to assess the ecological quality. Table 3.3 gives the criteria outlined FEP handbook (Natural England, 2010) for condition assessment. For the analysis, two condition scenarios are conducted; moderate and good.

Table 3.3. Criteria for scrub habitat

Habitat criteria
There are at least three woody species, with no one species comprising more than 75% of the cover.
There is a good age range – a mixture of seedlings, saplings, young shrubs and mature shrubs.
Pernicious weeds and invasive species make up less than 5% of the ground cover.
The scrub has a well-developed edge with ungrazed tall herbs.
There are many clearings and glades within the scrub.

Broadleaved semi-natural woodland

Areas of broadleaved semi-natural woodland are considered to fit the criteria for the UK/local BAP priority habitats and the distinctiveness for the woodland is defined as 'high'.

Condition of the broadleaved woodland habitats could not be inferred from existing ecological information. It is recommended that an additional survey of the broadleaved semi-natural areas be conducted to establish the ecological quality of these habitats. Table 3.4 gives the criteria used in the FEP handbook (Natural England 2010) for condition assessment of 'native semi-natural woodland'. For the analysis, two condition scenarios are conducted; moderate and good.

Table 3.4. Criteria for assessment of native semi-natural woodland condition

Habitat criteria
Native species are dominant. Non-native and invasive species account for less than 10% of the vegetation cover.
A diverse age and height structure.
Free from damage (in the last 5 years) from stock or wild mammals – there should be evidence of tree regeneration such as seedlings, saplings and young trees.
Standing and fallen dead trees of over 20 cm diameter are present.
The area is protected from damage by agricultural and other adjacent operations.

6.3 Biodiversity Offset Methodology

The Conservation Credit analysis uses Defra's metrics[4] to determine the credits required to offset the impacts of the proposed development on the scrub habitats present. This methodology has been the subject of extensive consultation as part of Defra's development of biodiversity offsets.

Development of an appropriate biodiversity offsetting strategy requires; taking into consideration measures to avoid, minimise and compensate for biodiversity loss; the identification of potential offset sites; and measures required to implement, monitor and manage the biodiversity offset in the long term. The net credit requirement estimated in this report takes into account the predicted direct habitat losses due to the proposed development, together with the on-site habitat creation proposals.

6.3.1 Conservation Credit Requirement Calculation

Following habitat distinctiveness and condition assessments (as outlined in section 3.2.1), the site credit requirement is established to allow biodiversity offset design.

The key components of the metric, which determine the number of credits that are required to be purchased, are;

a) area of habitat to be lost to, or degraded by the proposed development
b) the distinctiveness and condition of the habitat lost or degraded at the site of development, inclusive of any designation.

For each habitat parcel, the assigned band of habitat distinctiveness and condition category is scored, as shown in the offset scoring matrix (Table 3.5), which provides the "units" of biodiversity per hectare as a measure of habitat value.

Table 3.5. Offset scoring matrix for habitat condition and biodiversity distinctiveness

		Biodiversity distinctiveness		
		Low	Medium	High
Condition	Poor	2	4	6
	Moderate	4	8	12
	Good	6	12	18

Distinctiveness and condition categories assigned consider species richness, habitat type and quality, capability of supporting biodiversity, with particular reference to protected species, site context and contribution to wider landscape.

Any site designations (e.g. BAP priority habitat) confer a biodiversity distinctiveness of 'high'; this is because species or habitats present have been deemed to be of value on either a local, regional or national level. The area of the habitat to be lost or degraded, multiplied by the matrix score (Table 3.5) gives the credits, or 'biodiversity units' required for the offset. With several habitat types present, the assessment is repeated for each one and the results summed to give the overall offset requirement according to habitat types or offset strategy.

Where a proposal for an onsite offsetting area exists, the value or 'biodiversity units' that the offset area will deliver on achieving the future target level of ecological value, once the baseline condition has been taken into account, is determined. This requires the application of multipliers designed to compensate for risks associated with habitat enhancement works. Details of multipliers are outlined in section 3.3.2. The final offset score obtained is then deducted from the site credit requirement to provide the net requirement of the site.

6.3.2 Biodiversity Offset Calculations

With the credit requirement of a site established, the offset strategy is designed accordingly. To achieve 'no net loss' of biodiversity for a habitat type or habitats at a site the offset must deliver an overall ratio of 1:1 (or better) when offset gains are compared with predicted losses due to development. The necessary compensation for the type of offset can include either 'trading up' to a higher distinctiveness band (such as converting non UK BAP habitat into a UK BAP habitat) or creating / maintaining a habitat in the same band. Recommended offset strategies for habitat types are shown in table 3.6.

Table 3.6. Habitat type bands and recommended offset strategies

Habitat band	Habitat type	Offset strategy
High	BAP priority habitats as defined in Section 41 of the NERC act (2006)	Within band type and ideally 'like for like'
Medium	Semi-natural	Within band type or trade up
Low	For example: Intensive agricultural	Trade up

Multipliers

A range of multipliers have been developed by Defra to buffer offset delivery, by factoring in a range of risks associated with habitat restoration or creation. These multipliers are applied to the offset area Conservation Credit calculations.

In delivering offsets there may be a mismatch in the timing of impact and offset; for example, there may be a considerable time difference between the occurrence of a negative impact on biodiversity and the time when the offset compensation reaches the required quality or level (target condition). A temporal multiplier is used to compensate for this time lag.

Table 3.7. Multipliers for different time periods

Years to target condition	Multiplier
5	1.2
10	1.4
15	1.7
20	2.0
25	2.4
30	2.8
32	3

Offsets will involve either restoration or expansion of habitats, and both are likely to have risks associated with them. Some habitats are more difficult than others to restore or expand, and there will therefore be different levels of risk for different habitats. However, for any particular habitat, restoration is likely to be lower risk than creation/expansion.

To compensate for the level of risk involved a multiplier is used depending on the level of technical difficulty of restoration or expansion. This is shown in table 3.8.

Table 3.8. Multipliers for different categories of delivery risk

Difficulty of creation/restoration	Multiplier
Very High	10
High	3
Medium	1.5
Low	1

6.4 Biodiversity Offset Analysis

The site comprises 320ha, of which 79 ha of existing broadleaved woodland and scrub or scrub mosaic habitat is considered to be potentially suitable nightingale habitat:

- Semi-natural broadleaved woodland (33ha)
- Plantation broadleaved woodland (18ha)
- Dense scrub (28ha).

Of the suitable nightingale habitat 60 ha are predicted to be lost:

- Semi-natural broadleaved woodland (21ha)
- Plantation broadleaved woodland (14ha)
- Dense scrub (25ha).

The proposal includes both on- and off-site habitat creation of suitable nightingale habitat.

Proposed on-site habitat creation comprises:

- Plantation broadleaved woodland (4ha)
- Dense scrub (10ha)
- Scattered scrub (0.4ha).

Proposed off-site habitat creation comprises:

- Plantation broadleaved woodland (22ha)
- Dense scrub (30ha).

A summary of habitat losses and gains is summarised in table 3.9. The biodiversity units for the proposed on-site habitat creation were estimated based on information available at the time of writing this report. The biodiversity units or credit score of the proposed habitat created on-site is then deducted, together with the off-site habitat creation credit score, from the credit requirement of the proposed development area, leaving the net credit requirement. This net requirement determines an appropriate offsetting strategy for ensuring that there is no net loss of biodiversity.

Although the biodiversity units for the proposed off-site habitat creation also need to be estimated, at the time of writing this report only target habitat type information was

available. In order to be able to calculate the credit score the baseline ecological conditions and target condition of the habitats in the proposed off-site offsetting area are required. However, to provide a guideline of the credit score that the off-site habitat creation would likely generate, it has been assumed that habitat creation would occur on semi-natural areas in poor condition. Using this, the estimates provided in this report are provisional and would require revision with additional ecological information about the offset site or sites once it is available.

Table 3.9. Summary of nightingale habitat gains and losses for all three phases of development.

Habitat	Area (ha) existing on site	Loss (ha)	Retained (ha)	Creation on site (ha)	Creation off site (ha)
Broadleaved semi-natural woodland	33	21	12	-	-
Broadleaved plantation woodland	18	14	3	4	**22**
Dense scrub	28	25	3	10	**30**
Scattered scrub	-	-	-	0.4	**3**
Total	**79**	**60**	**18**	**14.4**	**52**

6.4.1 Credit Requirement

Here, we report the metric calculations to determine the credit requirement for the loss of semi-natural broadleaved woodland and scrub habitats which are considered suitable nightingale habitat as a result of the proposed development. The proposed development will result in a predicted loss of approximately 60ha of suitable nightingale habitat, which comprises 21ha of semi-natural broadleaved woodland, 14ha of plantation broadleaved woodland and 25ha of dense scrub. Existing ecological information was insufficient to be able to assign condition categories to the habitats, therefore two scenarios for condition categories of moderate (Table 3.10) and good (Table 3.11) for all habitats have been developed to provide provisional estimates. The credit requirement has been estimated independently for areas of habitats affected by direct impacts of the proposed development.

<u>Semi-natural broadleaved woodland</u>

The areas of semi-natural broadleaved woodland are considered to be of ‘high’ biodiversity distinctiveness. Condition is assumed to be either moderate or good. The credit requirement of semi-natural broadleaved woodland habitats to be lost is estimated at 252 and 378 credits for assumptions of moderate and good condition, respectively.

<u>Plantation broadleaved woodland</u>

The areas of plantation broadleaved woodland are considered to be of ‘medium’ biodiversity distinctiveness. Condition is assumed to be either moderate or good. The credit requirement of broadleaved plantation woodland habitats to be lost is estimated at 112 and 168 credits for moderate and good condition, respectively.

Dense scrub

The areas of scrub are considered to be of 'medium' habitat distinctiveness. Condition is assumed to be either moderate or good. The credit requirement of dense scrub habitats is estimated at 200 and 300 credits for assumptions of moderate and good condition, respectively.

Table 3.10. Areas, matrix and credit scores of habitats assumed to be in moderate condition in proposed development area

Habitat	Habitat distinctiveness	Habitat condition	Matrix score	Area (ha)	Credits
Semi-natural broadleaved woodland	6	2	12	21	**252**
Plantation broadleaved woodland	4	2	8	14	**112**
Dense scrub	4	2	8	25	**200**
Total	**-**	**-**	**-**	**60**	564

Table 3.11. Areas, matrix and credit scores of habitats assumed to be in good condition in proposed development area

Habitat	Habitat distinctiveness	Habitat condition	Matrix score	Area (ha)	Credits
Semi-natural broadleaved woodland	6	3	18	21	**378**
Plantation broadleaved woodland	4	3	12	14	**168**
Dense scrub	4	3	12	25	**300**
Total	-	-	-	**60**	846

The credit requirement for the development area assuming moderate or good condition for all habitats is 564 and 846 credits respectively.

6.4.2 Credit score for habitat creation proposals

6.4.2.1 On-site habitat creation

On-site habitat creation plans comprise 4ha of plantation broadleaved woodland, 10ha of dense scrub and 0.4ha of scattered scrub. Offsite habitat creation plans comprise 22ha of broadleaved woodland and 30ha of dense scrub. Calculations undertaken are on a per habitat type basis and follow Defra's metric guidelines. On-site and off-site habitat creation proposals were assessed separately.

At the time of writing this report long-term management plans for these habitats were not available and management time periods undefined. The biodiversity units of the target distinctiveness and condition of the habitats in the proposed onsite habitat creation reported here take into consideration the potential increased human disturbance and pressure due to proximity of developed areas, the time required for the habitats to reach maturation (ecological function), risks associated with enhancement works, as well as the spatial

contribution of the offsetting site to the ecological network i.e. the proposed offset area is adjacent to the SSSI, a site of national importance, and being placed into good management would increase the value of the area as a buffer zone for the SSSI. It is assumed that a poor target condition will be achieved. The value of these areas would be increased by being placed into appropriate management and target condition would then be subject to revision.

With any habitat creation or restoration projects there are associated risks. For each habitat type there are specific technical risks associated with restoration vs. creation projects. There are also temporal risks which factor in the time lag of habitats reaching functional ecological maturity. Both these sets of risks are addressed through the use of multipliers in the calculation of the credit score for each habitat.

Target condition: Poor

The credit scores for the proposed on-site habitat creation assuming poor target condition are shown in table 3.12.

Broadleaved woodland

The credit score, assuming poor condition, for the proposed on-site habitat creation of 4ha of broadleaved woodland is 7.62.

Dense and scattered scrub

Under the same assumption, the credit score for habitat creation of 10ha of dense scrub is 19.05 and 0.76 for the creation of 0.4ha of scattered scrub.

Table 3.12. Credit scores of proposed on-site habitat creation using target distinctiveness and assumed poor condition.

Habitat	Biodiv. Distinct.	Habitat condition	Area (ha)	Tech. Risk	Temp. Risk	Credits
Planted broadleaved woodland	4	1	4	1.5	1.4	**7.62**
Dense scrub	4	1	10	1.5	1.4	**19.05**
Scattered scrub	4	1	0.4	1.5	1.4	**0.76**
Total	-	-	**14.4**	-	-	27.43

6.4.2.2 Off-site habitat creation

The proposed off-site habitat creation of suitable nightingale habitat comprises 22ha of broadleaved woodland and 30ha of dense scrub.

To calculate the condition uplift to be created in the off-site receptor area the credit scores for both current and target condition need to be calculated. The current credit score is then deducted from the target credit score to obtain the units (or credits) of the condition uplift provided by the offset area. An assumption that the baseline ecological condition of a semi-natural area in poor condition was made, as the baseline ecological condition of off-site receptor areas was not available at the time of writing the report. The estimated credits are provisional and would be revised if further ecological information about the off-site area is submitted.

A summary of credit scores of off-site habitat creation, assigned technical and temporal multipliers and target distinctiveness and condition is shown in table 3.13.

Broadleaved woodland

The credit score, assuming moderate target condition, for the proposed on-site habitat creation of 22ha of broadleaved woodland is 83.81.

Dense and scattered scrub

The credit score for habitat creation of 30ha of dense scrub is 114.29.

Table 3.13. Proposed off-site habitat creation areas and estimated credit scores based on 10 year management plan and assumption of baseline ecological conditions of semi-natural area in poor condition.

Habitat	Target biodiversity distinctiveness	Target condition	Condition uplift	Area (ha)	Technical multiplier	Temporal multiplier	Credits
Broadleaved woodland	6	2	8	22	1.5	1.4	**83.81**
Dense scrub	4	3	8	30	1.5	1.4	**114.29**
Total	**-**	**-**	**-**	**52**	**-**	**-**	**198.10**

6.4.3 Net credit requirement

The net credit requirement for the site is the credit requirement for the proposed development area once the credits of the condition uplift (offset credits) for on-site and off-site habitat creation have been deducted.

As habitat conditions were not able to be inferred from existing ecological information the net credit requirement has been calculated for two scenarios; where all habitats are considered to be in either moderate or good condition. An additional assumption was made with regards to on-site habitat creation proposals as target condition of habitats was not specified, therefore habitat condition has been assumed as poor.

The net credit requirement for the site, which will require offsetting, once habitat creation proposals have been taken into consideration ranges from 338.48 (for assumption that all habitats to be lost are in moderate) to 620.48 (for assumption that all habitats are in good condition). The credit requirements are detailed in table 3.14.

Table 3.14. Net credit requirements per habitat type assuming poor target condition of onsite habitat creation.

Habitat	Area lost (ha)	Credit requirement	On-site area created (ha)	On-site credits	Off-site area created (ha)	Off-site credits	Net credit requirement
Assuming moderate condition for all habitats lost							
Semi-natural broadleaved woodland	21	252	0	0	0	0	**252**
Plantation broadleaved woodland	14	112	4	7.62	22	83.81	**20.57**
Dense scrub	25	200	10	19.05	30	114.29	**66.67**
Scattered scrub	0	0	0.4	0.76		0	**- 0.76**
Total	**52**	**524**	**14.4**	**27.43**	**52**	**198.10**	**338.48**
Assuming good condition for all habitats lost							
Semi-natural broadleaved woodland	21	378	0	0	0	0	**378**
Plantation broadleaved woodland	14	168	4	7.62	22	83.81	**76.57**
Dense scrub	25	300	10	19.05	30	114.29	**166.67**
Scattered scrub	0	0	0.4	0.76	0	0	**-0.76**
Total	**52**	**786**	**14.4**	**27.43**	**52**	**198.10**	**620.48**

Negative credits are added to credit requirements of habitats of same distinctiveness where possible to obtain net credit requirement by habitat type (net credit requirement B), these are shown in table 3.15 below.

Table 3.15. Summary of net credit requirement per habitat type with offset area taken into account for assumptions of poor, moderate and good condition of all habitats lost and poor and moderate target conditions of onsite habitat creation.

Habitat	Area lost (ha)	Onsite area created (ha)	Offsite area created (ha)	Net credit requirement assuming poor target condition of onsite habitat creation A	Net credit requirement assuming poor target condition of onsite habitat creation B
Assuming moderate condition for all habitats lost					
Semi-natural broadleaved woodland	21	0	0	252	**228.76.**
Plantation broadleaved woodland	14	4	22	20.57	**20.57**
Dense scrub	25	10	30	66.67	**65.90**
Scattered scrub	0	0.4		-0.76	**0**
Total	**60**	**14.4**	**52**	**338.48**	**338.48**
Assuming good condition for all habitats lost					
Semi-natural broadleaved woodland	21	0	0	378	**378**
Plantation broadleaved woodland	14	4	22	76.57	**76.57**
Dense scrub	25	10	30	166.67	**165.90**
Scattered scrub	0	0.4		-0.76	**0**
Total	**60**	**14.4**	**52**	**620.48**	**620.48**

6.5 Offsets Measures

The main ways to generate measurable biodiversity gains are by improving condition of a particular habitat (e.g. by bringing a degraded lowland meadow habitat into appropriate management) or by elevating the distinctiveness category (e.g. by converting a habitat of 'low' distinctiveness such as 'improved grassland' to a habitat of 'high' distinctiveness such as 'unimproved neutral grassland'). Offsets for the potential loss of particularly high value habitats on site, the hedges, and other habitats are discussed. Recommended offset measures reported here have factored in recreation or restoration and temporal risks associated with the delivery of the biodiversity offset and are based on receptor area(s) that aim to deliver two category uplifts through appropriate management works. All offset measures provided in this report are estimates and provisional in their nature. Final offset measures are dependent on the identification and evaluation of the biodiversity offsetting

potential of the appropriate receptor site(s). Summaries of credit requirements and offset options are shown in table 3.16.

Since a range of assumptions have been applied to the condition of the habitats to be lost as a result of development, as well as assumptions applied to the target condition of on-site habitat target conditions, the offset requirements are presented as a series of ranges. The offset requirements are likely to be closer to the moderate condition assumptions. To increase the accuracy of the credit and offset requirements additional ecological information would need to be established. Proceeding with a biodiversity offsetting strategy based on current existing information would not be recommended.

6.5.1 Offsets for loss of broadleaved woodland and scrub

Within type

All offsets estimated in this report are for within type options as the aim to create an equivalent suitable area of habitats for nightingales. Credit requirements of valued habitats such as UK BAP habitats would be employed in like-for-like offsets, that is, the creation or restoration of BAP priority habitats.

Broadleaved woodland

Semi-natural broadleaved woodland

The loss of broadleaved woodland on the site due to the proposed development is estimated at 21ha. The credit requirement for the loss of semi-natural broadleaved woodland ranges between 252 and 378, depending on the assumption that the habitat condition is moderate and good, respectively, and once the offset area has been taken into account. To offset the loss of the semi-natural broadleaved woodland one the following off-site measures are recommended;

- the creation of between 66.5 and 99.2ha of broadleaved woodland at a suitable receptor area or areas
- the restoration of between 29.4 and 44.1ha broadleaved woodland at a suitable receptor area or areas.

Plantation broadleaved woodland

The loss of plantation broadleaved woodland on the site due to the proposed development is estimated at 14ha. The credit requirement for the loss of plantation woodland ranges between 20.57 and 76.57, depending on assumptions and once the offset area has been taken into account. To offset for the loss of the plantation broadleaved woodland at the site one the following off-site measures are recommended;

- the creation of between 5.4 and 20.1 ha of broadleaved woodland at a suitable receptor area or areas
- the restoration of between 2.4 and 8.9ha broadleaved woodland at a suitable receptor area or areas.

While the creation or restoration of large woodland areas for conservation purposes should be a priority, the extension of smaller woods to a size of 10ha is considered to be highly beneficial to both species richness and population stability of regional woodland bird assemblages[7].

Dense scrub

The loss of dense scrub habitats on the site due to the proposed development is estimated at 25ha. The credit requirement for the loss of dense scrub account ranges between 65.9 and 165.9, depending on assumptions and once the offset area has been taken into account. To offset the loss of the dense scrub at the site one the following off-site measures are recommended;

- the creation of between 17.3 and 43.6ha of dense scrub at a suitable receptor area or areas
- the restoration of between 11.5 and 29.0ha of dense scrub at a suitable receptor area or areas.

Nightingale habitat preferences would dictate the type of woodland and scrub habitats and long-term management to maximise the potential of the sites as suitable nightingale habitat. Nightingales are known to breed in a wide range of habitats but require dense understory or ground vegetation and show a preference for dense scrub and deciduous woodland especially oak *Quercus* spp., or a mixture of oak and birch *Betula* spp., or hazel *Corylus avellana,* the latter forming a dense understory. Nightingales show a preference for thickets of dense scrub such as blackthorn *Prunus spinosa* and bramble with margins of rough grass.

It also must be noted that nightingales have not colonised many coppices where suitable habitat has been recreated, suggesting that it is not a strong colonist[8] and although a biodiversity offsetting strategy will aim to achieve 'no net loss' of suitable nightingale habitats, the successful creation or restoration of these habitats will not guarantee that nightingales will colonise these areas.

Table 3.16. Credit requirements and offset options for direct impacts according to habitat type with assumptions for moderate and good condition for habitat to be lost and assumptions of poor target conditions for proposed onsite habitat creation.

Habitat	Area lost (ha)	Onsite area created (ha)	Offsite area created (ha)	Net credit requirement assuming poor target condition of onsite habitat creation	Offset options		
					Creation	**Restoration of BAP habitat**	**Restoration of semi-natural area**
Assuming moderate condition for all habitats lost							
Semi-natural broadleaved woodland	21	0	0	252.0	66.15	29.4	**-**
Plantation broadleaved woodland	14	4	22	20.57	5.4	2.4	**-**
Dense scrub	25	10	30	65.90	17.3	-	**11.53**
Scattered scrub	0	0.4		0	0	0	**0**
Total	**60**	**14.4**	**52**	**338.48**	**88.85**	**31.80**	**11.53**
Assuming moderate condition for all habitats lost							
Semi-natural broadleaved woodland	21	0	0	378	99.23	44.10	**-**
Plantation broadleaved woodland	14	4	22	76.57	20.1	8.93	**-**
Dense scrub	25	10	30	165.90	43.55	-	**29.03**
Scattered scrub	0	0.4		0	0	0	**0**
Total	**60**	**14.4**	**52**	**620.48**	**162.88**	**53.03**	**29.03**

7 Conclusions

An offset requirement, in Conservation Credits, based on existing ecological knowledge, has been estimated for the loss of semi-natural broadleaved woodland, plantation broadleaved woodland and dense scrub habitats at the proposed development. Assumptions were made for condition, as existing ecological information was not sufficient to infer categories, and two scenarios were generated based on assumption of either moderate or good habitat condition. The existence of both on- and off-site proposed habitat creation plans have been taken into consideration in the estimates of credit requirements and offset measures provided below.

The overall credit requirement for the loss of semi-natural broadleaved woodland (21ha), plantation broadleaved woodland (14ha) and dense scrub habitats (25ha) at the Lodge Hill site is estimated to be between 338.48 and 620.48 Conservation Credits, assuming poor target condition of onsite habitat creation (due to increased pressure and disturbance from nearby developed area) and under condition scenarios of moderate and good of habitats to be lost, respectively.

The credit requirement for the loss of 21ha of semi-natural broadleaved woodland is estimated between 66.2 and 99.2. The credit requirement for the loss of 14 ha of plantation broadleaved woodland is estimated between 20.6 and 76.6. The credit requirement of 25ha of dense scrub to be lost is estimated between 65.9 and 165.9.

To ensure ecological equivalence through biodiversity offsetting for loss of woodland and scrub habitats suitable for nightingales the following offset measures (creation of restoration offset options) are proposed options to expend the credit requirement of the development and discharge the mitigation:

To offset the loss of the semi-natural broadleaved woodland either the creation of between 66.2 – 99.3ha or the restoration of between 29.4 – 44.1ha of broadleaved woodland would be needed.

To offset the loss of the plantation broadleaved woodland either the creation of between 5.4 – 20.1ha or the restoration of between 2.4 – 8.9ha of broadleaved woodland would be needed.

To offset the loss of the dense scrub either the creation of between 17.3 – 43.6ha or the restoration of between 11.5 – 29.0ha of dense scrub would be needed.

EBL would be able to source receptor sites and/or assess the condition uplift that would be delivered by an offset at suggested receptor sites, organise the appropriate habitat creation and conservation management, and enter into a delivery contract with the Key Delivery Body (eg landowner/farmer, land management company or organisation etc) responsible for creating and management the receptor site. The developer's mitigation liabilities would hence be discharged on the purchase of all Conservation Credits and a letter of sale and credit certificates would be issued to the developer by EBL. The latter would then be submitted to the local planning authority as proof of discharge of the mitigation.

8 References

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