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Sizewell C

Review of Bat Impact Assessment

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1 Executive Summary

1.1 This report provides an independent review of the effects of the proposed Sizewell C Nuclear Power Station (the Main Development Site, link road and rail link) on bats. The ecological impact assessments (EcIAs) for these three main elements of the scheme and all documents appended to them have been reviewed to inform this report.

1.2 The report concludes that there is a lack of clarity in how the importance of the EDF Estate, and the range of habitats within it, to bats (particularly barbastelle and Natterer's bat) has been evaluated. As a result, it is not possible to take an independent view on how the various impact mechanisms identified in the Main Development ES will potentially affect bat populations, and whether the mitigation proposed (which also lacks detail) is likely to be practical, and effective enough to support the conclusions. It is also unclear, given the predicted significant residual effect on barbastelle from construction phase impacts, the extent to which population size will be affected. The report also identifies that further information needs to be supplied with regard to the potential impacts of the Sizewell Link Road on barbastelle, and their potential to act in combination with those of the Main Development Site. It recommends that to secure appropriate monitoring of effects on key bat populations using the site, a comprehensive Bat Monitoring Strategy is produced prior to any construction taking place, and proposes the principles of such a strategy.

1.3 Table 1, below, sets out areas in which it is considered further information would be useful in understanding how conclusions presented in the respective EcIAs have been reached. Sections 3 and 4 of this document provide further context to the requests for further information identified in the third column of Table 1, and Section 6 sets out the principles of a Bat Monitoring Strategy for the construction and operational phases of development (also referred to in the table).

Table 1. Further Information Requirements

Main Development ES Chapter		
Topic	**Issue Identified**	**Reason for Further Information Request**
Evaluation of importance of Main Development Site to bat species.	Very limited analysis of desk study, published population data and field survey data is presented to inform the evaluation in the Main Development ES Chapter. Information leading to the conclusion that the populations of barbastelle and Natterer's bat using the EDF Estate are of national and county importance respectively would be very useful to the reader (as opposed to having to read through appendices).	For ease of understanding of assessment process
Evaluation of importance of habitats within EDF Estate to bats	Site specific data concerning bat (in particular barbastelle) use of the Estate at differing stages in the breeding cycle and at different ages are not presented	For ease of understanding of assessment process. For understanding the proportionality and likely success of mitigation
	The importance of Goose Hill to the barbastelle population is not clearly assessed. Appended radio tracking data and the technical appendices indicate this area is important to breeding females and newly-volant bats.	To inform independent review of assessment of effects, the proportionality and likely success of mitigation, and the outcome of the scheme with regard to barbastelle
	Radio tracking data on Natterer's bat is not used to inform site-specific habitat preferences This represents some of the best available data for the species, and should be drawn upon irrespective of the limitations of the data set.	To inform independent review of assessment of effects, the proportionality and likely success of mitigation, and the outcome of the scheme with regard to Natterer's bat
	The extent to which it is concluded that important commuting routes are present within the EDF Estate lacks consistency between the Main Development ES and the appended Bat Method Statement	For understanding the proportionality and likely success of mitigation. For understanding the likely effectiveness of monitoring construction-related impacts / continued comparable use of the retained features.
Mitigation	Two key areas of the EDF Estate for roosting and foraging barbastelle are Ash Wood and Nursery Covert. The ES does not identify why perimeter (construction free) buffers around these habitats cannot be maintained or why it is not possible to maintain direct (partial) connectivity between the two	To understand the design evolution process. Perimeter buffers and retention of commuting features would increase confidence in the assessment that all residual effects other than those resulting from habitat fragmentation

	areas via Stonewall Belts (partial: accepting this would need to be breached by haul roads).	(for barbastelle) will be non-significant.
	A bat house is proposed for the site. This is identified as being part of the mitigation solution in the Main Development ES. This suggests that bat roosts in buildings will be impacted (as replacement bat boxes are proposed in relation to loss of tree roost resource).	To understand whether there is limited confidence in conclusions with regard to potential displacement of bat roosts in buildings / why the bat house is proposed, and to ensure the design is appropriate for all of the species that could potentially be affected given the variety of roosting in different structures NB. This is repeatedly referred to as mitigation in the ES and appended documents.
	Very limited information is provided on how crossing points within retained features will be designed to encourage bat use.	To understand mitigation proposals and allow an assessment of their likely effectiveness.
	There is a lack of clarity over internal lighting of the culvert across Sizewell Marshes and the approaches to it. The water vole strategy suggests it may be internally lit, which would be in conflict with use by bats	To allow an assessment of the likely effectiveness of mitigation proposals
	No detailed information is provided on how the need for adaptive control measures (for lighting and noise) will be identified and implemented during construction works.	To understand likely impacts on bats. To allow an assessment of the likely effectiveness of mitigation proposals. To provide a basis for a Working Method Statement and brief to the Ecological Clerk of Works (team)
Assessment of Lighting Impacts on Retained Bat Roosting and Foraging Habitats and Commuting Routes	An understanding of what the commitment to keep these areas as dark as is 'reasonably practicable' will mean in practice. This suggests the approach will be engineering as opposed to ecologically led.	To understand the likely effects on light-sensitive bat species, effectiveness of proposed avoidance measures (such as habitat retention) and mitigation measures (such as crossing points). To inform a Bat Working Method Statement
	Information on how task specific lighting controls will be achieved (there is an apparent diversion between the Lighting Strategy and ES over degree of automation)	To understand the likely effects on light-sensitive bat species and the effectiveness of proposals in monitoring light pollution. To inform a Bat Working Method Statement
Assessment of Likely Collision Mortality with Construction Traffic	Limited information is provided on traffic speed / frequency of movement/ timing of movement/ maximum height of vehicles where haul roads cut through areas with retained trees on either side. These are factors that all inform level of risk with regard to collision mortality.	To increase confidence in conclusions of assessment
Assessment of Significance of Interactive (inter-relationship) Effects during Construction	Some bat species are likely to be affected through all of the impact mechanisms identified (including barbastelle, Natterer's bat and brown long-eared bat). However there is no detailed assessment of the likely interactive effects of development presented on the species of particular concern. Rather, it is assumed that all of the mitigation to address individual impacts will be effective. There is not enough detail provided with regard to the mitigation proposed (e.g. lighting will be as low as is 'reasonably practicable') to have confidence in this conclusion. In order to be able to conclude confidently that significant inter-relationship effects are unlikely the assessment needs to be underpinned by clear commitments.	To understand predicted significance of effects / residual effects on bat populations from the construction process.
Assessment of Significance of Residual Effects	The main Development ES concludes a significant residual effect on habitat connectivity for barbastelle, but does not provide a conclusion as to how the population will be affected.	To understand the worst realistic case outcome for the species as a result of effective habitat loss.
	The Main Development ES concludes a minor adverse (non-significant) effect on Natterer's bat. It states that Natterer's bat is of medium sensitivity to habitat fragmentation, this may result in colony displacement and increased competition for resources. It further states there is unlikely to be a population decline, but the rationale for this is unclear.	To understand the worst realistic case outcome for the species as a result of effective habitat loss.
	No evidence-based assessment of significance of operational phase habitat restoration on bat species is provided.	To understand the predicted future baseline / long term effects following completion of development. To inform long term monitoring objectives.
	No evidence of monitoring of bat use of newly-developed habitat at Aldhurst Farm is presented (if this has been collected)	To understand whether newly-created habitat is being used by bats (particularly barbastelle), and evidence the conclusions of the ES.

Monitoring of Effects on Bat Populations	Areas of uncertainty are identified with regard to effects of construction on bat populations, and commitments are made to monitoring in relation to these / the response of bat populations to construction and operation. No detailed Bat Monitoring Strategy is provided for the construction or operational phases.	To address areas of residual uncertainty, modify mitigation proposals (where feasible), to demonstrate commitment to understanding effects on bat populations and provide an evidence base to inform other projects.
Figures	Appended figures to Main Development ES Chapter do not show all roosts, show some as being of a different type to those referred to in the text, and are very cluttered. Revision needed.	For ease of understanding of baseline conditions and how these have informed the assessment process
	Species-specific figures for barbastelle and Natterer's bat roosts, foraging areas and commuting routes not provided for Main Development ES.	For ease of understanding of baseline conditions and how these have informed the assessment process
	Figures showing worst realistic case lighting of retained bat roosting, foraging and commuting areas during construction are not presented. These to include a figure showing the degree of light spill onto Sizewell Marshes and around the entrance and exit points of the proposed culvert	To inform understanding of likely effects of construction and effectiveness of mitigation for light sensitive bat species

Link Road ES Chapter

Topic	Issue Identified	Reason for Further Information Request
Evaluation of importance of hedgerows along Link Road route to barbastelle.	The ES concludes that barbastelle activity on hedgerows that will be severed by the Link Road is very low. Review of the data appended to the report indicates that some of the highest rates of barbastelle activity associated with the scheme (including on the EDF Estate where the population is considered to be of national importance) have been recorded along the Link Road route. Clarification required.	To inform an independent review of the assessment of effects, the proportionality and likely success of mitigation, the likely outcome of the scheme with regard to barbastelle, and the need for monitoring.
Assessment of impacts of construction and operational phase road fatality on barbastelle population	Depending on whether the conclusion with regard to the previously identified topic is re-evaluated based on both the data previously presented and the data currently omitted (see below), a revised assessment may need to be undertaken. This would consider the likely level of collision risk at crossing points based on traffic data and the evidence base for the mitigation proposed being successful.	To inform an independent review of the assessment of effects, the proportionality and likely success of mitigation, the likely outcome of the scheme with regard to barbastelle, and the need for monitoring.
Supporting Data	Appended data tables to the ES chapter are incomplete. No autumn data are presented.	To allow interpretation of data presented and understanding of baseline and assessment process
Figures	Appended figures to Sizewell Link Road lack information on detector numbers (so data presented cannot be related to detector location) and the data presented are cluttered (with some detector locations being obscured).	To allow interpretation of data presented and understanding of baseline and assessment process

2 Introduction

Purpose of this Report

2.1 EDF Energy submitted a Development Consent Order (DCO) to the Planning Inspectorate for a new nuclear power station at Sizewell (Sizewell C) in May 2020. There were three elements to the submission that included detailed consideration of likely effects on bats:

- The ecology chapter of the Environmental Statement (ES) for the Main Development Site.
- The ecology chapter of the ES for the Sizewell Green Rail Route.
- The ecology chapter of the ES for the Sizewell Link Road.

2.2 The rail route and link road are collectively referred to in the Main Development submission as 'Associated Development.'

2.3 Suffolk County Council, working in partnership with East Suffolk Council and the Suffolk Wildlife Trust, has engaged BSG Ecology to critically review the elements of the DCO submission that relate to bats in order to obtain an independent technical view of whether the conclusions drawn are robust and defensible.

2.4 As part of this review, particular emphasis has been placed, at the request of the client, on determining whether mitigation and compensation proposals are proportionate, and whether there can be a high degree of confidence that they will be successful.

2.5 At the further request of the client, an outline for a Bat Monitoring Strategy has been included. The purpose of this is to provide a degree of guidance to the development team on what the LPAs see as being a reasonable and proportionate approach to long-term bat monitoring of the important bat populations on the EDF Estate.

3 Main Development Environmental Statement (ES) Chapter

Overview

3.1 Chapter 14 of the Main Development ES considers the effects of the construction and operation of the Sizewell C Nuclear Power Station (NPS) on ornithology and terrestrial ecology (including bats). It presents an assessment of impacts, evaluates the significance of their effects, identifies mitigation, and assesses likely residual effects of development on bat populations using the site.

3.2 This section of the review focusses on the Main Development ES chapter, associated appendices and figures.

Baseline Evaluation

3.3 This assessment of importance of bat populations using the Main Development Site was reached based on survey work completed between 2007 and 2018. This work involved substantial programmes of radio tracking, tree and building inspection, the deployment of static data loggers and walked transect work.

3.4 It is understood that the commissioning parties of this report consider the importance of bat populations as concluded in the ES to be common ground.

3.5 The importance of bat populations within the Zone of Influence (ZoI) of the Main Development Site is categorised as follows in the ES Chapter.

Species	Importance of Bat Population using Site
Barbastelle	High (national)
Natterer's bat	Medium (county)
Leisler's bat	Low (district / local)
Nathusius' pipistrelle	Low (district / local)
Noctule	Low (Zone of Influence)
Serotine	Low (Zone of Influence)
Daubenton's bat	Low (Zone of Influence)
Brown long-eared bat	Low (Zone of Influence)
Common pipistrelle	Low (Zone of Influence)
Soprano pipistrelle	Low (Zone of Influence)

3.6 It follows that this review, while considering effects on all bat species, concentrates on potential effects and associated mitigation for those bat populations of greatest importance, i.e. barbastelle and Natterer's bat.

Summary of Potential Impacts

3.7 The ES indicates that the following impacts have the potential to result in effects on bat populations during the construction phase:

- Loss of (known) roosts / a reduction in the roosting resource available to bats as a result of land take.
- Loss of foraging and commuting habitat as a result of land take.
- Habitat fragmentation due to habitat loss.
- Noise disturbance leading to displacement of roosting, foraging and commuting bats.

- Lighting disturbance leading to displacement of roosting, foraging and commuting bats and a reduction in some prey species in retained dark corridors / areas.
- Inter-relationship effects resulting from the above impacts.

Summary of Mitigation

3.8 The ES identifies the following principal mitigation:

- Embedding the avoidance of key roosting, commuting and foraging areas into the design process, thereby avoiding impacts arising.
- Replacement roosts
    - The provision of bat boxes in retained areas of woodland to ensure the overall roosting resource is maintained.
    - Further boxes to be erected proportionate to the number of trees that need to be lost to facilitate construction
    - The provision of a purpose-built bat house.
- Habitat creation. The creation of wetland, grassland and scrub habitats within the EDF Estate and at Aldhurst Farm to the west of it. Much of this habitat creation is in progress.
- Retention of key commuting routes including Upper Abbey bridleway (with dark corridors where it is breached by haul roads) and the incorporation of a bat culvert into the Main Platform approach road where it crosses the Sizewell Marshes.
- Minimisation or avoidance of lighting on key retained commuting routes during construction, along with a range of more task-specific control measures aimed to limit light levels / spill overseen through the implementation of a method statement.
- Implementation of a lighting plan aimed to minimise impacts on bats during operation.

Residual Effects

3.9 The ES Chapter concludes with regard to **construction phase** effects[1] on bats

- All residual effects on bats are concluded to be minor adverse or negligible (neither of which is significant in EIA terms), with the exception of construction phase habitat fragmentation for barbastelle. This is concluded as being moderate adverse (significant in EIA terms).

3.10 The ES Chapter concludes with regard to **operational** phase effects[2] on bats:

- Lighting disturbance for all species will be mitigated through the implementation of a Lighting Management Plan for Construction and Operational Sites. Residual effects will be minor adverse or negligible for all species.

Comments on Main Development ES Chapter

3.11 This section provides analysis and comment on the clarity / coherency of the impact assessment presented in the Main Development ES Chapter. Commentary on mitigation, enhancement and monitoring is provided in the section that follows.

3.12 The amount of information on how the populations of species using the site have been valued, how the range of survey work completed has evolved to address specific questions as part of a robust baseline characterisation, and how individual species use the site that is presented in the Main Development ES Chapter is limited. There is also no clear synthesis presented in the appendices.

[1] This is a summary of information presented in Table 14.66. While the table is split into mitigation for individual species / small groups of species the measures listed are the same for all. Barbastelle, Natterer's bat, Leisler's bat, Nathusius' pipistrelle, noctule, serotine, Daubenton's bat, brown long-eared bat, soprano pipistrelle and common pipistrelle are the species considered.

[2] This is a summary of information presented in Table 14.67. While the table is split into mitigation for individual species / small groups of species the measures listed are consistent for all. The species considered are as per Footnote 1.

Information on the lighting strategy and how effects of light will be mitigated is also largely appended / contained in other documents (see further comments on this later in this section). The result is that through reading the chapter alone it is not possible to come to an independent view with regard to:

- How the baseline evaluation of importance of bat populations has been reached
- How consideration of the general and site specific ecological characteristics of the bat species (such as the loss or fragmentation of core areas for foraging animals using the site or differences in ranging behaviour and habitat use at different life stages[3]) has informed the assessment and mitigation design process.
- Whether mitigation is appropriately targeted, proportionate and likely to be successful.

The inclusion of more information in the Main Development ES would have enabled anyone reading the document to understand the impact assessment process without having to revert to various other documents.

It is also noted that the text of the assessment, particularly with regard to construction phase noise and construction and operational phase lighting impacts is repetitive, with slight variations of the same literature review presented numerous times for the former. For species other than barbastelle and Natterer's bat it would have been useful for the reader to see this text consolidated and variations in how individual species are predicted to respond to the impacts summarised.

3.13 The most useful Figure to refer to when reading the ES is Figure 14C1A.1[4]. There are, however, various issues with this figure including:

- Some roosts that are shown on the figure overly each other to the point that you cannot determine their type through cross referencing with the key.
- Various roosts referred to in the ES text are not marked on the figure, or if present appear to be marked as a different type to that referred to. These include, for example:
    - Natterer's bat roosts of various types at Upper Abbey Farm and roosts in Ash Wood (referred to in the noise assessment section for Natterer's bat).
    - A Daubenton's bat hibernation roost at Upper Abbey Farm noted in the ES text but not marked on the figure.
    - A probable brown long-eared bat hibernation roost at Upper Abbey Farm that is not marked, and a maternity roost at Lower Abbey Farm that appears to be marked as a roost of unknown type.
    - Noctule roosts. The species is not included on the figure, but there are references to noctules roosting in bat boxes within the Sizewell Estate, and further potential roosts in The Grove, the eastern end of Goose Hill and at Leiston Old Abbey.
- Further to the final sub-bullet above it is unclear how bats that are very likely to have roosted in certain areas (such as noctule in part of Goose Hill for example), but for which no specific roost has been located have been treated in relation to this figure.
- It is also unclear whether the figure presents data for the whole period for which survey was completed (i.e. 2007-2018).

The result is that it is very difficult to have confidence that the information presented on this figure is accurate for any species. This is of particular concern with regard to barbastelle, as while a good number of roost sites are shown, the regular roost switching of the species is likely to generate a lot of registrations, and for Natterer's bat, for which the important roosts at Upper Abbey Farm are not marked.

[3] In particular breeding adult females pre and post birth, recently flying (volant) young of the year
[4] The data contained on this figure are reproduced on various other figures.

Another result is that the figure gives a slightly misleading impression of the range of species roosting and number of roosts of different type present or likely to be present within the EDF Estate.

It would be preferable to present specific figures for barbastelle and Natterer's bat, given the importance of the populations and the need for the reader to be able to understand the locations of roosts, commuting routes and foraging areas of these species. It is unclear from the figure whether, when defining important foraging areas and commuting routes this has been done based on the overall bat assemblage / weight of total observations or taking account of key foraging areas and commuting routes for each individual species (where these are apparent). Separate figures would clarify this.

3.14 A review of baseline survey reports appended to the Main Development ES indicates that Goose Hill is of importance to barbastelle. This conclusion is based on the following:

- Data indicate it is used as a foraging resource by adult and juvenile barbastelles.
- It is suggested in one of the reports that Goose Hill could support barbastelle roosts based on recording of early evening calls.
- It would appear from radio tracking work undertaken on behalf of Wood Group in 2010 and 2011 that Goose Hill is part of a core area used by breeding females pre and post birth, and by juvenile bats in the period immediately after they are able to fly independently (become volant) from their mothers. During this time juveniles are more restricted than adult females in how far they range and make use of foraging habitat closer to natal roost sites.
- Radio tracking work completed on behalf of Arcadis in 2014 concluded Goose Hill to be less important later in the season, once juvenile bats had matured and were able to follow their mothers to foraging areas further afield. Bats were tracked moving north of the EDF Estate. It is noted in the report that weather was windy during the tracking period, however, and that this may have affected bat habitat use. In the absence of other complementary data (such as from static detectors), and given the issues with weather, it is unclear how much weight to place on the conclusion that the importance of Goose Hill to barbastelle declines later in the season.
- As well as a foraging resource, Goose Hill provides woodland habitat connections between Ash Wood and Black Walks to the north and Kenton Hills, Nursery Covert and Sizewell Marshes to the south. This direct connectivity will be lost during the construction phase. The habitats to the south of Goose Hill were shown in 2010 and 2011 to be important foraging areas for barbastelle forming part of the core area used by breeding females and juveniles.

The ES appears to place weight on the 2014 results that indicate that barbastelle bats utilise a wider foraging resource to the north of the Sizewell Estate when considering potential effects on the population. The loss of the majority of the woodland at Goose Hill, its potential impact on young barbastelle and breeding adult females in the pre and early post birth period, and the implications for the population have not been demonstrably considered.

3.15 It is also noted that the ES concludes a likely significant residual effect due to habitat fragmentation on barbastelle. This logically implies there will be a population-level effect on the species, but it does not go on to describe this effect, which could assumedly range between population reduction and local extinction. There is also no assessment of the degree of certainty that should be placed on any such assessment.

3.16 The ES states that too few individual Natterer's bats were radio tracked to enable the home ranges of bats to be identified. This seems a notable omission given the time period over which work was completed. It is also noted that the description of habitat usage by Natterer's bat is based on generic information, suggesting limited confidence in characterising how the species uses the Estate.

In the absence of a detailed data set, the information relating to those Natterer's bats that were tracked nevertheless represents an extremely relevant source of information for determining the Core Sustenance Zone (CSZ) of the bat population within the EDF Estate. It should have therefore been referred to (in a qualified manner) as part of the evaluation process. As with barbastelle, in

drawing conclusions on the effects of loss of foraging habitat, habitat fragmentation and the effectiveness of mitigation it would be useful to comment on whether there is any age class specific information on ranging distances apparent from this data. This would allow conclusions to be appropriately precautionary.

In particular it would be useful if there was some further rationale provided with regard to the conclusion that the Natterer's bat population is unlikely to decline as a result of construction-related impacts. There is clearly limited information available with regard to use of the EDF Estate by the species, and the ES text further states that Natterer's bat is of medium sensitivity to habitat fragmentation and that the colony may be displaced. Without a more evidence-based evaluation it is difficult to determine whether the conclusion that the residual effect will be minor adverse (as concluded in the ES) is reasonable.

3.17 There is a lack of clarity with regard to whether clear bat commuting routes are present or not within the EDF Estate. For example, Section 14.13.6 of the ES states that clear evidence of commuting activity along defined routes is limited, while the appended Bat Method Statement lists a series of key commuting (and foraging) areas that can be cross referenced with the ES figures. The lack of a consistent narrative on this point will make monitoring change / continued use of retained features, which is committed to elsewhere in the document / appendices, problematic.

3.18 The ES indicates that there are very few relevant studies of how bats respond to construction noise, and presents a review of broadly applicable (including some anecdotal) information that has been collated for context when assessing likely impacts of noise on the species present. It indicates that as low amplitude calls are made by barbastelle (to avoid detection by moths) the species could be affected by construction phase noise, but goes on to suggest (based in large part on a study of greater mouse-eared bat) that while reduced foraging efficiency may result, displacement of foraging barbastelles due to noise is unlikely. In both the evaluation of impacts of noise on the barbastelle population, and the equivalent sections on other species, the ES emphasises its conclusions are precautionary in nature[5]. It might have been more reasonable to assert, given the lack of directly applicable studies, that effects are, to an extent, unpredictable, and need to be explored through monitoring (the ES does indicate monitoring will be undertaken).

3.19 Section 14.13.248 of the ES (within the section on Leisler's bat and Nathusius' pipistrelle) makes reference to Natterer's bat, and has clearly been copied over from the previous section relating to that species. If bespoke consideration of impacts on species is not required, this emphasises the need to consolidate text for the sake of brevity and readability.

3.20 In considering residual effects in Table 14.66, it would be useful to also identify whether the effects of habitat restoration / creation on barbastelle, Natterer's bat and the wider bat assemblage of the EDF Estate are likely to be significant. It would seem proportionate to link this to a commitment to monitor roost occupancy and habitat use of those species most likely to be affected by the development proposals, as part of clear objectives concerning bat populations on the EDF Estate.

Comments on Environmental Measures proposed for Bats

3.21 This section considers whether mitigation and compensation proposals are proportionate, and whether there can be a high degree of confidence that they will be successful. It also reviews monitoring commitments and comments on their likely effectiveness.

Roosting Bats

3.22 The ES indicates that there are two elements to proposed mitigation for roosting bats[6]:

- The avoidance of key roosting and foraging areas as part of the design process (primary mitigation), thereby avoiding the potential for impacts to arise.
- The provision of alternative roosts including:

[5] The word is repeated on numerous occasions in both the section concerning barbastelle and that concerning Natterer's bat.

[6] Impacts have been identified as arising from direct habitat loss as well as displacement from retained roosting areas as a result of light levels and noise.

- Forty-five bat boxes that have been erected in retained areas of woodland ahead of any tree felling taking place. These are in St James Covert (10), Reckham Pits Wood (5), and on the south side of Kenton Hills (5) to the south of the construction area, and in Sandypytle Plantation (10) and The Grove (15) to the north of it. Section 14.13.16 notes these are of a design known to be used by barbastelle.
- Further boxes to be erected proportionate to the number of trees that are lost during site clearance for construction, and the quality of features on each (not fixed at present). The appended Bat Method Statement indicates that for every tree with one or more medium or high Potential Roost Features (PRFs) that will be lost a bat box will be erected. Table 1.2 of the Bat Mitigation Strategy notes that in the event known roosts are lost, this provision would be increased in consultation with Natural England.
- A purpose built bat house or upgrade of an existing structure to provide additional roosting capacity. This is repeatedly stated to be mitigation[7] (as opposed to enhancement), but there is no clear statement as to what this mitigation relates to, given the previous provision for bat boxing. It is inferred that in the event that roosting bats at Upper Abbey Farm were displaced, they could move to this structure, which would be located in a dark, well-vegetated area outside the site boundary (at Lower Abbey Farm). The two are linked by Upper Abbey Farm bridleway, which meets the lane to Lower Abbey Farm to the north of the site.

  The bat house is an 'off the shelf' design; the proposed design is set out in the Mitigation Strategy. Dimensions will be a minimum of 5 m (length) x 4 m (breadth) x 2 m (height).

3.23 With regard to primary mitigation, perhaps the most effective means of mitigating impacts on barbastelle roosts in Ash Wood (which appear to be the most important areas for barbastelle within the EDF Estate) would have been to put a perimeter exclusion zone around it during construction and retain the link (via Stonewall Belts) to Nursery Covert (another key area of the EDF Estate for the species). While there will be no physical removal of trees, Ash Wood will be affected by light spill and construction noise, as the construction area abuts its southern, western and northern edges. The effects on roosting bats are uncertain. There is no statement in the ecology ES Chapter with regard to why this was not possible.

3.24 No evidence is presented in the ES on the likely usage of the proposed boxes by bats. However, it seems reasonable to assume, given the range of species that have been recorded using bat boxes in the Kenton Hills / Nursery Covert woodland complex, that occupancy is likely, and the boxes proposed are of industry standard design. It would have been useful to broadly identify those areas of retained woodland that have the capacity to take more bat boxes / those that currently have limited opportunities for roosting bats. This would assist the ecological team engaged post consent in ensuring this element of mitigation is effective.

3.25 It would also be useful to clarify why the bat house is required as mitigation, as there is no clear indication in the ES that there is likely to be significant displacement of roosting bats from Upper Abbey Farm. If there is a lack of confidence in this conclusion, this should be stated clearly, as the barn at Upper Abbey Farm is a very large structure of considerable age with numerous roosting opportunities. The proposed bat house is unlikely to provide suitable mitigation for a multiple species roost, and the design may need to be adapted depending on the scale of loss that is recorded in any of the current buildings used as roosts. If there is loss of a small number of roosts of common species or roosts of low conservation significance then the bat house as proposed is likely to provide a suitable compensation building, but beyond this uncertainty about the effectiveness of the proposed Bat House increases.

Foraging Bats

3.26 Primary (design phase) mitigation has resulted in the retention of key areas of value to foraging bats (Ash Wood, part of the Upper Abbey Bridleway, and the majority of the complex of woodland at Kenton Hills, Nursery Covert and Fiscal Policy). Retained areas are shown in Figure 14C1.12

[7] It is stated fifteen times in the ES and appended Bat Mitigation Strategy that this is mitigation as opposed to enhancement.

3.27 The ES identifies habitat creation within the published Core Sustenance Zones of the bat species affected by development as the main means of ensuring no significant residual effect of bat loss of foraging habitat. It goes on to state that "*The operational phase provides more extensive foraging areas than at present and overall the operational development would secure a demonstrable improvement in biodiversity value*."

3.28 New areas of semi-natural habitat that will be available to foraging bats include:

- Habitat creation for marsh harrier at Great Mount Walk / Low 40 Acres directly east north-east of Ash Wood. Approximately 40 hectares of rough grassland and scrub will be created in this area, with a further 1.2 ha of reed bed and 0.7 ha of wet woodland to the north of it. The marsh harrier habitat creation will be completed prior to construction (no direct reference to the timing of the wet woodland and reed bed creation has been found - but there is no suggestion it will not be completed prior to construction).
- Habitat creation at Aldhurst Farm directly west of the EDF Estate. This has resulted in the creation of five hectares of wetland (reed bed / riparian habitats and ditches) and 2 km of ditches, together with approximately 60 hectares of acid grassland. The wetland element of this was established between 2014 and 2016 and was provided to compensate for loss of reed bed within the Sizewell Marshes.
- Enhanced reptile habitat within the EDF Estate. Great Mount Walk / Low 40 Acres will include the creation of reptile habitat alongside habitat for foraging marsh harrier. A further fifty hectares of arable and intensively grazed grassland will be converted to Suffolk Sandlings habitats (comprising dry grassland with woodland and scrub). The area of this habitat within Aldhurst Farm and the EDF Estate will reach approximately 300 hectares (as these areas will add to existing Sandlings habitats on Leiston Common and at Broom Covert).

While the extent of habitat of different types that will be lost has been calculated (for both the ES and the accompanying Biodiversity Net Gain calculation), there is no qualitative assessment of habitat loss / gain in terms of the ecology of the key bat species present, barbastelle and Natterer's bat, or of the wider bat assemblage. The ES simply relies on the fact that habitat creation will result in biodiversity gain, and assumes that bat species will benefit. This is too simplistic, given the association of many species with woodland / woodland edge habitats. The assessment needs to consider habitat quality, function and connectivity when drawing conclusions on the likely impact of the proposed changes on bat species. In drawing conclusions, the ES should also consider the time it is likely to take for new habitat to develop to a point that it is providing a good quality foraging resource, and whether the habitat is in a good location spatially. This may not be as simple as the establishment of particular plant associations and habitat condition assessment. Foraging quality will be influenced by the level of prey productivity, the range of prey available over the active season, and the physical characteristics of the new habitats / their ability to provide a range of foraging opportunities – such as sheltered habitats as well as open grassland habitat.

3.29 Of particular concern is that there is no recognition that the extensive area of plantation woodland at Goose Hill, which is referred to as an important / high quality foraging area for barbastelle, for the range of species it supports, and the frequency at which bats use it (in baseline reports informed by radio tracking data) will be largely lost. The key ecological questions that need to be asked at this point are:

- Will recently-created acid grassland with scrub (and other habitats) provide an equivalent foraging resource (in terms of prey species abundance) to the habitats being lost either directly such as at Goose Hill or potentially indirectly through loss of habitat connectivity?
- Baseline radio-tracking data collected to inform the ES indicated that juvenile barbastelle bats stay close to roost sites when young (and only recently flying) and as such have a more limited foraging area available to them. As the habitats that will be created are very different in structure from those that will be lost (mature plantation woodland with grassy sheltered rides), can similar levels of use be confidently predicted?

3.30 As a result it is considered that at present it is not possible to assess the likely impact of loss or change in foraging habitat on population viability in barbastelle with a high degree of confidence.

3.31 It is also notable, given the reliance of the ES on these habitats to effectively neutralise the loss of foraging habitat resulting from construction, that no evidence is presented that bat activity around the developing wetland complex at Aldhurst Farm has been monitored. This would have provided an indication of the effectiveness of mitigation in terms of bat foraging.

Habitat Fragmentation for Bats

3.32 The continued movement of bats around the landscape between roost sites and foraging areas is critical for the maintenance of viable bat populations during construction. Mitigation to address habitat fragmentation for bats involves:

- The retention of Upper Abbey bridleway (with dark corridors where it is breached by haul roads)[8]. Suitable crossing points at other locations where key commuting (and foraging) routes[9] are breached[10]. The Bat Mitigation Strategy states, "*In these locations, a suitable crossing will be installed. See Appendix 2 for the generic recommendations on crossing-points which will be followed.*"
- The incorporation of a bat culvert into the approach road where it crosses the Sizewell Marshes (linking the Main Development to the construction area) to maintain commuting routes / minimise habitat fragmentation during construction. The Bat Mitigation Strategy states: "*Where the SSSI is crossed, the proposed culvert dimensions provide a substantial cross-sectional area of approx. 20m^2 and would not be grilled. A culvert of this size should allow access for all species likely to use culverts (i.e. all species other than the open-adapted 'big bats')*."
- Alternative roost provision and habitat creation to accommodate bats displaced from roosts, commuting corridors and foraging areas by construction noise.

3.33 Despite the statement in the Bat Mitigation Strategy (with reference to the first bullet above), Appendix 2 does not elaborate on the design of the suitable crossing points proposed where key commuting routes are severed. It appears mitigation is simply reliant upon the maintenance of dark, quiet corridors. Independently assessing the likely effectiveness of the mitigation is further complicated as details of the width of each severance point and what it will look like during construction are not provided in the ES or Bat Mitigation Strategy. The crossing points and general light levels on the Upper Abbey Farm bridleway are considered in the Lighting Strategy however (see following section).

3.34 Based on the information available, the dimensions of the culvert (6 m in height x 3.6 m width x 68 m length), the review of evidence that is appended, and the proposed retention and planting of vegetation linking it to retained roosting areas, it is reasonable to conclude the culvert is likely to be used by bats. It should also be noted that the ES concludes a likely significant effect on barbastelle will result from habitat fragmentation irrespective of whether the species uses the culvert or not (as a result of increased commuting distance to foraging areas).

3.35 Clearer information on lighting of the culvert would be useful however (see section below), both with regard to the approaches to it (which will need to be dark to encourage use) and whether it will be internally lit. It is noted that there is a potential conflict between internal lighting of the tunnel to make it more attractive / less of a barrier to movement to water vole (referred to in the water vole mitigation strategy), and its use by light sensitive bats. If it is to act as bat mitigation it needs to avoid internal lighting at night.

[8] Referred to in the Main ES text.

[9] Referred to in the Bat Mitigation Strategy. This identifies a number of important commuting and foraging routes that will be severed during the construction of the site, namely: Upper Abbey Barn bridleway (which links Leiston Old Abbey Wood and Fiscal Policy to Ash Wood and Plantation Cottages), Stonewall Belts to Nursery Covert (linking Ash Wood and Kenton Hills), The Grove to Goose Hill to Sizewell Belts (Grimseys); and, Kenton Hills to Leiston Old Abbey Wood.

[10] Upper Abbey Farm bridleway will be retained but severed by two haul roads, the main access road and a railway line. Stonewall Belts will be removed during construction, albeit Figure 14C1A.6 suggests a retained green corridor to the east of the commuting route alignment (figure 14C1A.5), comprising a series of water management zones (however this route will also be severed at a number of points). The Grove to Goose Hill to Sizewell Belts will be severed by the SSSI crossing point. Kenton Hills to Leiston Old Abbey Wood will be severed by a haul road and railway line. All of these commuting routes will be reinstated during the operational phase with continued severance of route 1 where it is crossed by the main access route and route 3 by the SSSI crossing.

3.36 Finally, irrespective of the design of crossing points, some bats are likely to cross the access road / haul roads, particularly in areas where there are retained trees either side of the roads. Mortality risk is acknowledged in the Bat Mitigation Strategy and considered low, but no information on vehicle movements, speed, height of vehicles etc. is provided in support of this. It is therefore not possible to take a view on whether this is a reasonable conclusion.

Mitigation for Lighting

3.37 In addition to measures previously identified that aim to provide roosting and foraging areas for displaced bats, the ES proposes to address lighting impacts through:

- Construction phase lighting measures aimed at minimising impacts on key retained roost sites, foraging areas and commuting routes, along with a range of control measures aimed to limit light levels / spill overseen through the implementation of a method statement.
- An operational phase lighting plan to mitigate any lasting impacts.

3.38 Further information is presented in Appendix 2B, the Lighting Management Plan.

3.39 Figure 1.15 of the Lighting Management Plan shows important areas for bats, with Section 1.3.16 indicating that all retained areas adjacent to the site boundary will be kept as dark as is reasonably practicable.

3.40 Similarly, Section 1.3.17 states that where foraging routes and flight paths interconnect over the temporary construction area "*where reasonably practicable*" these connecting areas shall be left dark. It also indicates that where lighting in these areas has been deemed necessary the lighting shall be switched off when not required.

It is unclear the circumstances in which leaving these areas dark will be reasonably practicable and, therefore, what the resulting lighting impact on bats will be.

Paragraphs 1.3.42 *et seq* indicate that lights will be controlled by a switch / timer operating dusk to dawn, with the exception of task lighting which may be manual and short-term duration.

3.41 In both the above situations it is unclear how, in practice, light control to benefit bats will be achieved. Clarity and detail in terms of the strategy is needed at this point to allow effective measures to be incorporated in (for example) the subsequent brief to an ecological clerk of works. There is also a slight divergence between the text of the ES, which suggests a more refined (less automated) strategy in terms of light control than the Lighting Strategy which leans towards automation. In particular a clear means to practically control light levels associated with task lighting needs to be set out, as some of the task specific light has the greatest potential to impact on key retained features (such as Ash Wood) - as it will typically be associated with the highest light levels.

3.42 There are several other amendments / clarifications to the Lighting Strategy / ES that would make it easier to understand likely lighting impacts and resulting effects on bats:

- An assessment could be presented for the worst realistic case scenario in terms of lighting of adjacent habitats. This would lead to more confidence that the assessment of lighting impacts on bats is as accurate as possible.
- A figure could be presented indicating how bats will be able to move through the landscape during construction (or potentially stages in construction) and operation. At present it is challenging for the reader to understand where the retained dark corridors will be both within and around the EDF Estate and, it follows, to understand whether mitigation is likely to be effective.
- It would be useful to include information on lighting levels at the culvert entry and exit points and any linking areas that could be used by commuting bats. These should then be used to inform the assessment of whether species that are considered to respond negatively to light in the main ES (particularly barbastelle and Natterer's bat) are likely to use the feature.

- Linked to the previous point, Table 1.9 shows that maximum light levels on the Sizewell Marshes SSSI are 18.4 lux, but there is no indication about where the higher lux levels would be expected. Whilst this is considerably lower than the lux levels elsewhere, it is not clear whether or not this could result in an impact on bats; further justification of the conclusion that an intrinsically dark area can be preserved would be helpful.

3.43 The Lighting Management Plan does provide confidence that the following can be maintained as intrinsically dark areas:

- Upper Abbey Farm bridleway (evidence is presented on Plate 1.18 and Table 1.7)
- The northern edge of Kenton Hills (evidence is presented on Plate 1.19 and Table 1.8)

3.44 Consideration of lighting impacts during the operational phase is set out in Paragraph 1.4.16 of the Lighting Management Plan *et seq* but lacks the detail set out for the construction phase. If lighting impacts on bats are predicted to be the same as or less than construction phase impacts this needs to be clearly stated in the plan and cross-referenced in the ES Chapter.

Inter-relationship (Interactive) Effects

3.45 Populations of barbastelle and Natterer's bat have the potential to be affected through all of the construction phase impact mechanisms identified, being sensitive to lighting and (certain levels of) noise in addition to the loss of foraging habitat and severance of commuting routes. The section on inter-relationship effects therefore considers how these impact mechanisms might interact, and whether the magnitude of the combined impact is likely to be greater than the sum of its respective parts.

3.46 In reaching a conclusion, the ES assumes that all mitigation proposed for lighting and noise is likely to be fully effective, and no additional significant inter-relationship effect is likely.

3.47 While this conclusion may be reasonable, it is not possible to confidently reach an independent view on this, as the level of information presented with regard to mitigation (in the ES and appended documents) is insufficient / lacks clarity.

3.48 One step in demonstrating the conclusion is evidence-based might be to overlay GIS data on retained habitats, predicted light and noise levels (and thresholds where bat displacement is likely) during the construction process to derive figures that indicate the extent to which key bat species are likely to be displaced during sub-phases of work. However, this needs to be done in combination with the provision of further information on mitigation and how it will be effectively implemented and monitored.

Monitoring Proposals

3.49 Predicted effects on bat populations associated with the construction related noise, lighting and habitat fragmentation and loss are all subject to a level of uncertainty. It follows that the ES recognises a need for monitoring. In the event mitigation for these impacts is ineffective, further measures to reduce the residual effects to acceptable levels will need to be considered.

3.50 The following sections of the ES refer to monitoring in relation to barbastelle:

- Section 14.13.109 of the ES, concerning the displacement of barbastelle from suitable roosting and foraging habitat as a result of noise states: "*Furthermore detailed monitoring of known roost locations and key foraging / commuting routes during Phase 1 and 2 would be undertaken to establish the extent of disturbance and quantify any potential negative impacts e.g. roost abandonment*."
- Section 14.13.113 indicates noise monitoring would also be completed to inform the need for licencing, and to 'allow impacts on barbastelle to be appropriately addressed' (the section in inverted commas is our interpretation of the meaning of the part of the paragraph not directly related to licencing).

- Section 14.13.21, which concerns effects of lighting on barbastelle and states: "*It is not possible to accurately predict the impact from lighting once the mitigation measures (as outlined in the Bat Mitigation Strategy …..) are applied*." The paragraph concludes that monitoring is needed on this basis.

3.51 There is repetition of these statements, or slight variations on them, in each of the species accounts that follow the impact assessment text for barbastelle. However, despite the predicted residual significant impact on barbastelle as a result of habitat fragmentation, there is no explicit commitment to monitor either the use of the culvert by bats or the effectiveness of retained dark corridors across Upper Abbey Farm bridleway. There is also no commitment to attempt to monitor levels of use of newly created foraging habitat by bats, during either the construction or operational phases of development. Finally the indication in Section 14.13.21 that monitoring of residual lighting impacts on bats will be required is not elaborated upon.

3.52 The Bat Mitigation Strategy makes the following further comment with regard to monitoring (summarised from Table 1.2 Mitigation Proposals):

- Impacts to tree roosts will be monitored at a frequency of at least once a year to determine if noise levels are affecting their usage (in comparison with baseline levels).
- Impacts to (non-tree) roosts resulting from construction phase noise will also be monitored. The frequency of this monitoring is not commented upon.
- Impacts to commuting routes resulting from construction phase noise will also be monitored at a frequency of at least once a year to determine if their usage has been affected (in comparison with baseline levels).
- There are references to monitoring the effects of noise on commuting and foraging bats in relation to both the tree and non-tree roost rows of Table 1.2 (referred to above), but it is unclear whether this relates to commuting and foraging areas associated with particular bat roosts or is an error in the table.

3.53 No further detail is provided with regard to these monitoring proposals.

3.54 No commitment is made in the Bat Mitigation Strategy to monitoring the effectiveness of the culvert in allowing movement of bats between retained areas of foraging habitat, or of the residual effects of lighting on bats. The document concludes that a holistic assessment of the impact on bats has been provided for the entire construction period.

3.55 A further document, the Bat Method Statement, makes commitments to monitor bat boxes (installed to compensate for roosting habitat for various bat species) annually from one year after construction commences to five years after construction is complete, reiterates the areas of the site that are most sensitive to noise disturbance (and should therefore be monitored with regard to bats) and notes the need to monitor the use of the new roost building proposed.

Comments on Monitoring Proposals

3.56 Designing an effective monitoring programme to determine the effects of disturbance on bat species that regularly switch roost sites and rarely use the same roost on more than one occasion is clearly inherently complicated. The concept of roost abandonment (ref Section 14.13.109), referred to in the text of the ES is not necessarily a useful trigger for additional mitigation without further definition, and identifying thresholds at which noise or light might be influencing roost choice decisions made by bats will be extremely difficult. It may be possible to infer limits of tolerance based on where bat roosts are, in comparison with the baseline situation, but not (necessarily) from areas in which roosts are absent. With regard to foraging and commuting bats, determining the extent to which bat behaviour is influenced by environmental variables such as weather, insect hatches and land management as opposed to development-related impacts will be extremely challenging.

3.57 The monitoring strategy offers the opportunity to address many of the information gaps that have complicated the assessment process, and to demonstrate the effectiveness of key mitigation and

enhancement such as the new areas of habitat and the culvert that will allow bats to pass across the Sizewell Marshes.

3.58 At present, the monitoring proposed in the Main Development ES and accompanying documents appears to be at an early stage in its design, and is very limited in terms of detail. If the development is consented based on the current information, the onus will be transferred to the post consent ecological support team to develop an effective monitoring protocol for determining changes in bat behaviour that trigger corrective action. As there will be considerable pressure from the construction team to push ahead with work, this is unlikely to result in the best outcome for bats.

3.59 It is recommended that in order to secure appropriate monitoring of effects on key bat populations using the site, a Bat Monitoring Strategy is produced prior to any construction taking place. This should be set in the context of an overall vision and clear linked objectives for the bat community during construction and operation. In the absence of an outline strategy, guidance as to what might represent a proportionate and appropriately focussed approach to bat monitoring is set out in Section 6 of this report.

4 Sizewell Link Road ES Chapter

Overview: Sizewell Link Road

4.1 The Sizewell Link road scheme will provide a new connection between the B1112 south of Theberton and the A12 between Yoxford and Saxmundham; a distance of approximately 7 km.

4.2 The operational road would be used by the general public as well as construction workers arriving by car, park and ride buses from both the park and ride sites, and goods vehicles delivering freight to the Sizewell C main development site.

4.3 The Link Road will be a single carriageway (in both directions) with a speed limit of 60 mph. The area it will pass through is dominated by arable farmland. Field boundaries are predominantly species rich hedgerows with trees.

4.4 The assessment of impacts of the new road on bats is presented in the Sizewell Link Road ES Chapter. The assessment has been informed by desk study and field survey involving static detector deployment, walked transects and tree assessment work.

4.5 The desk study returned records of eleven species of bat, with the Natterer's bat maternity roost at Upper Abbey Farm (on the Main Development Site) noted as being within approximately 1.5 km of the proposed road.

4.6 Transects and static deployments were completed on a monthly basis throughout the active season (April to October 2019). At least ten static detectors were deployed throughout and four transects completed each month. The number of static detectors was increased to fourteen and the number of transects to five following further access permissions being achieved in summer 2019.

4.7 The field survey was completed in 2019. The results, impact assessment and mitigation are summarised as follows:

- Bat activity on field boundary hedgerows was reported to be limited. Common and soprano pipistrelles used the hedges most frequently, with other species, including barbastelle, Natterer's bat, brown long-eared bat and 'big bats' occurring at '*very low levels*'.
- Eighty-four trees along the route were surveyed. Of these three were found to have high, 41 medium, 26 low and four negligible bat roost potential. Forty-six of these trees will need to be removed.
- Bats were evaluated as a feature of county / medium importance.
- Mitigation identified includes:
    - Checks of all trees to be removed for roosting bats. These to be completed far enough in advance of potential tree removal to allow licenses to be achieved.
    - Tree removal in the autumn, before hibernation roosts have formed and after maternity roosts have broken up.
    - The provision of bat boxes to address the reduction in the roosting resource available to bats.
    - The planting of standard trees where the road breaks through hedge lines (to allow bats to pass over gaps at canopy height).
    - The planting of 13.1 hectares of woodland

4.8 Residual effects were considered likely to be minimal due to the low level of bat interest associated with the habitats along the route.

Comments on Sizewell Link Road ES Chapter

4.9 As with the Main Development ES, there is a disconnect between the ecology of the bats and the likely effects of the development on them; i.e. there is no real attempt at interpretation of the data in an attempt to determine why bats might use particular features and why the time of night at which activity was recorded or any seasonal variation in use occurred might be important.

4.10 There are also various points of clarification and amendment that would be useful in enabling the reader to follow the logic of the ES text. These include:

- A figure illustrating the positions of known roosts in relation to the proposed Link Road.
- The rationale for the selection of the hedgerows to sample using static detectors. This is not included in either the chapter or the appendix to it. It is unclear to what extent the desk study, Phase 1 and any other considerations (such as the features the hedgerows link to) were taken into account when planning the survey effort.
- The dates of the tree surveys. It is unclear whether these were completed at a time when leaves were on the trees, and to what extent these were limited in terms of confidence in conclusions. This information is not in the ES Chapter or the appendix to it.
- An overview figure and a series of route section figures showing the bat transects and static locations (but not the bat registrations). The symbols on the figures provided overly each other and the positions of some static detectors are almost entirely obscured. More importantly, the static detectors are not numbered, making it impossible to cross reference the appended data with the detector locations and put the level of activity at each into the context of the local landscape and Core Sustenance Zones of known roosts.
- A clearer statement in the main text about the number of static detectors that were used across the season (to match the statement in the appended report).
- Information on the experience of the ecologists undertaking all aspects of the bat work. The inclusion of this information would be useful in understanding the experience level of the team engaged, and follows the recommendations of the British Standard 42020.

4.11 A fundamental point involves clarification of the rationale for concluding that barbastelle activity was recorded at 'very low' levels. No data are presented to support this assertion in the text of the ES chapter. A review of the data presented in the Appendix indicates that barbastelle was recorded on each of the walked transect routes (at levels of between 0.9 and 3.1 bats/hour over the surveys) and peak monthly activity levels from static detectors included 21.4 bats per night[11] (b/n) at Detector 12 in April, 18.4 b/n at Detector 7 in May, 93.6 b/n at Detector 7 in June, 7.4 b/n at Detector 5 in July and 51.4 b/n at Detector 5.1 in August. The record of 93.6 bats per night at Detector 7 is the second highest encounter rate for barbastelle recorded (with regard to the Main Development Site, the Link Road and the Rail Link) at any detector deployed to sample bat activity in relation to the Sizewell C scheme. The record of 51.4 bats per night at Detector 5.1 in August is also notable in terms of the Main Development Site data set. It is further noted that baseline survey (radio-tracking) work completed in relation to the Main Development Site recorded barbastelle ranging over the eastern part of the Link Road route.

4.12 No follow up survey (such as thermal imaging coupled with static recording) was completed to gain insight into how many barbastelles might have generated the peak activity recorded (i.e. could this have been attributed to one or two bats foraging up and down the hedge line, or was this regular directional movement). The data also do not allow an assessment of the time of night when calls were recorded, which might indicate the local presence of a roost. It is also possible that during the deployments some nights had far higher levels of barbastelle activity, as the data presented are averages. This makes it impossible to take an independent view on whether the conclusions of the ES are reasonable.

4.13 In addition it is noted that of the 64 static deployments for which data are presented, 50 of these returned barbastelle records, suggesting the species is widespread across the survey area and

[11] An average from across the deployment period.

makes use of most or all linear features. There is therefore potential for a cumulative fatality effect on barbastelle from each of the crossing points.

4.14 It is also noted that September and October static data is omitted from Table 1.19 in the appendix to the report. As maternity roosts would have broken up by that time, and bats are foraging and dispersing over a wider area of the landscape, it would be reasonable to expect some differences in terms of results, and this could influence interpretation. At present this is not available to enable the reader to come to a view.

4.15 Given that the conclusion of very low barbastelle activity is critical in terms of the assessment of impacts and deriving proportionate mitigation, both the levels of activity and the extent to which the species ranges across the area are of concern.

4.16 It is unclear why barbastelle has not been considered as a feature in its own right (given the nationally important population reported in the Main Development ES and the proximity of part of the road route to a known maternity colony and within its Core Sustenance Zone). The assessment presented is for the bat assemblage, which is dominated by more common and widespread species, and a few 'big bats' that have less potential to be impacted by development.

4.17 The effectiveness of the mitigation seems uncertain (i.e. the planting of trees adjacent to crossing points to enable bats to 'hop over' them[12]. In practical terms (e.g. for topple distances and sight lines) trees will need to be set back from the road and may not act as the hop over points they are intended to provide; detail would be useful on this point. There is also a lack of information on the height / maturity of the trees that will be planted i.e. whether they will be of a height to allow the mitigation to be theoretically successful from the time at which they are planted.

4.18 The ES does not attempt to assess the effects of increased bat fatality through road traffic collisions on the bat populations, despite the fact that information on road width, speeds and predicted traffic volumes will have been available. Instead it relies on the conclusion that for all species other than (common and widespread) pipistrelles, activity levels were low and mitigation (see previous paragraphs) is proportionate. In the context of the barbastelle results, the basis for this assertion has not been presented, and the likely effectiveness of the mitigation solution identified is not expanded upon. It follows that there is also no consideration of to what extent traffic fatality along with any residual effects from the Main Development Site might act in combination to result in an effect on the wider barbastelle population, or how the effects of the Link Road on bat populations can be effectively monitored[13]. Depending on how this point is addressed there may be a need to revise the in-combination assessment for scheme.

[12] To have confidence in this conclusion it would be useful to understand whether there is any empirical data that suggests barbastelle retain height when crossing gaps in cover as opposed to dropping close to ground level (where they are at greater risk of collision with vehicles). It would also be helpful if the ES was to present information suggesting this sort of measure has been effective elsewhere in the UK.

[13] Currently the commitment to monitoring is limited to checks of any bat boxes erected as mitigation and checks of whether light spill is excessive during construction and operational phase activities. Excessive lighting is not defined.

5 Sizewell Rail Link ES Chapter

Overview: Sizewell Rail Link

5.1 The Sizewell Rail Link will allow construction materials to be delivered by rail. It will require a new section of track between the Saxmundham to Leiston branch line and the Main Development Site, and improvements to the existing branch line.

5.2 The new section of track will be approximately 1.8 km in length, with improvements required over a further 2.7 km of track. There will be up to six train movements per day, five of which will be between 23:00 hours and 06:00 hours, with the remaining movement outside this period.

5.3 The track extension will be in place for the duration of the construction period of the Sizewell C plant, after which it will be disassembled and the area restored to agriculture.

5.4 The effects on ecology (including bats) and ornithology resulting from the proposed rail link are assessed in Chapter 7 of the Rail Route ES Chapter.

5.5 The impact assessment is supported by a desk study and survey work. The latter was most recently completed in 2014 (static detector deployments and walked transects) and 2016 (tree roost assessments). There is also more historical data available for the area (from 2011), but this was for a previous iteration of the scheme and is only directly relevant in part.

5.6 Survey work involved the deployment of four static detectors for one week in each month between April and October 2014 inclusive. Monthly walked transects (two transects were used) were also completed in each of these months. Ground level tree assessments

5.7 It is concluded that the bat community is of county / medium importance. Common and soprano pipistrelles were the only species recorded using the hedge lines with regularity. Barbastelle activity was noted to peak at 8.25, 8.3 and 8.71 average passes per night at static detectors. The latter result is for September and the former two for August.

5.8 Potential impacts on bats could result from:

- The loss of four sections of species-rich hedgerow and one section of species poor hedgerow (780 m in extent) used for commuting and foraging
- The loss of 16 trees, including ten of high, three of moderate, and 2 of low-moderate roosting potential.
- Noise, vibration and lighting impacts

5.9 Mitigation includes:

- The avoidance of woodland areas (such as Buckle's Wood) through the design process.
- Bat boxes to provide alternative roost locations to address the loss of the trees. It is noted that these will be monitored, and in the absence of evidence of roosting, they will be moved to alternate locations.
- The incorporation of a bund along the northern side of the track, and partial bunding along its southern side to alleviate light spill and noise into adjacent habitats.

5.10 The ES notes that a worst case assessment would be local abandonment of roosts in Buckle Wood (adjacent to the eastern edge of the site).

Comments on Rail Link Road ES Chapter

5.11 While the data collected to inform the application are relatively old, and two years is often taken by the statutory agencies to be the cut off in terms of life span of ecological survey information,

the arable habitats within the site appear very unlikely to have changed since 2014. It is therefore considered that age of data should not represent a particular concern in consideration of the rail application.

5.12 Based on the intensively farmed nature of the land, the limited predicted impact of the works, and the number and speed of train movements at night it is reasonable to conclude that effects on bat populations are likely to be minor.

6 Principles of Bat Monitoring Strategy

Overview

6.1 In the absence of a detailed Bat Monitoring Strategy (BMS) in relation to Sizewell C, the commissioning bodies of this report have requested the principles of such a strategy are set out.

6.2 This section of the report therefore provides some guidance as to what the BMS might reasonably involve.

Construction Phase Monitoring

Guiding Principles

6.3 Ahead of the construction phase an appropriately detailed BMS should be drafted, discussed and agreed with nature conservation stakeholders. There should be an overall aim / vision to the monitoring, and a number of linked objectives identified. Parameters for assessing the success of mitigation will also need to be clearly set out.

6.4 The plan needs to be very clearly focussed on barbastelle; the Main Development ES states that the population using the EDF Estate is of national importance, and concludes barbastelle will be significantly affected as a result of the proposals. Potential effects on the Natterer's bat population should also be considered, as the population using the Estate is considered of county importance; this is a secondary concern however.

6.5 There are two elements to monitoring that will need to be detailed in the BMS:

a. Monitoring of whether individual construction processes are likely to result in effects on bats, leading to adaptive mitigation being implemented.

b. Long term study of how the bat population reacts to construction, and of the effectiveness of primary and secondary mitigation in sustaining important bat populations.

Monitoring to Inform Adaptive Mitigation during the Construction Phase

6.6 Monitoring of construction phase operations will be needed to ensure they do not result in noise or light levels that, in the absence of further mitigation, are likely to impact on bats and their roosts.

6.7 The principles of monitoring individual elements of the construction process, and deriving appropriate adaptive mitigation should be laid out in a Working Method Statement (WMS).

6.8 It is envisaged the following are likely to be essential elements of the WMS, which will form the basis of the brief (regarding bats) for the Ecological Clerk of Works (ECoW):

1. An introduction in which measurable, acceptable limits of noise and light intensity around[14] individual retained features during diurnal and nocturnal works are defined. These should be based on the best available information on likely effects, and set at a level appropriate for the most sensitive species present (likely to be barbastelle).
2. A system of briefing ahead of each new construction phase activity (if these can be defined / are discrete enough), when contractor teams change, and / or at a given frequency for the duration of the construction period. It is envisaged these briefings will not be restricted to bats (i.e. they may cover other ecology or wider environmental considerations), but bats should be a standing item at each briefing. The aim should be to create a working culture in which consideration of impacts on ecological features, including bats, becomes engrained.

[14] Potentially at points on the edge of these features.

3. A requirement for the ECoW to document and report on noise and light levels during all operations on a daily basis to demonstrate there is no exceedance of acceptable levels as set out in the WMS. A standard proforma for documentation to be appended to the WMS.
4. The WMS to provide a clear (written) mandate to the ECoW / ECoW team from EDF to instruct any operations exceeding acceptable noise or light levels cease without any undue delay / as soon as it is safe to do so.
5. In the event of an exceedance, a requirement for the ECoW to lead a prompt investigation into the circumstances that led to the exceedance (including its scale and the potential for repetition), and to report on the implications of this within a defined time period (such as 24 hours). A standard protocol for investigating and reporting exceedances to be appended to the WMS.
6. Identification of typical practical measures to further limit noise and light emissions associated with elements of the construction programme if exceedances have resulted. At their simplest these might involve e.g. micro-siting temporary lighting further from retained features during night time work or scheduling short term works close to retained features for daylight hours.
7. Information setting out how any lessons learned will be integrated into ongoing / planned works - leading to behavioural change in the construction team (potentially including the ECoW team).
8. Appropriate trigger points, in the event that exceedances occur with regularity (this should be defined in the WMS) or cannot be practically completed within the thresholds identified in the WMS, for entering into discussions with Natural England with regard to secure a license to derogate the law regarding the disturbance of bats.

6.9 It will be important to document who the ECoW will report to with regard to implementation of the WMS on both a daily basis and in respect of an exceedance, so that a clear chain of responsibility and internal communication is established.

6.10 An agreed periodic system of reporting on the implementation of the WMS to the planning authority and other stakeholders will also need to be put in place. This will assist the local planning authority in addressing any questions from conservation organisations and third parties with regard to the works. If this is made publically available, it will also provide clear, readily accessible evidence that effects on bats resulting from the construction process are being controlled as far as is practicable.

Long Term Monitoring of Impacts of Construction on Bat Populations

6.11 It is likely that the overarching aim of monitoring will be to determine whether construction results in change in the size of the barbastelle (and potentially Natterer's bat) population and the nature of its use of the EDF Estate. Objectives will then revolve around monitoring to tease out the extent to which individual and interactive impacts (positive and negative) have driven any changes, thus informing any further feasible mitigation and determining whether the impact assessment made in the ES was accurate.

6.12 Monitoring should seek to build a robust evidence base that can be used to infer development-related change with regard to some impacts e.g. tolerance limits to noise based on previous sustained roost occupancy within woodland that subsequently becomes unoccupied (at the same time of year). For other impacts, the initial questions may be simpler (e.g. are barbastelle using newly-created habitat?), albeit assessing levels of use and whether these habitats are more important to populations than those they are compensating for will be more challenging.

6.13 It is also clear that there remain information gaps, such as with regard to the size of the barbastelle population on the EDF Estate, and whether it is a separate sub-population or part of the same population that is present at Minsmere. Pre-construction survey[15] and construction phase monitoring should continue to explore these data gaps, as they will aid in interpreting the effects of development on the population. The resolution of the current data set means that only

[15] The baseline year / baseline situation against which change will be monitored will initially need to be defined. This process should help identify any data gaps (such as whether baseline bat activity data have been collected for areas or farmland in which habitat creation is due to take place) which, if not available, will prevent change being assessed

relatively dramatic changes in bat numbers and behaviour will be detectable (i.e. abandonment of areas of woodland formerly used for roosting or marked changes in habitat use).

6.14 Long term construction phase monitoring might reasonably include:

- Monitoring of bat use of retained linear (commuting) features and the newly-created culvert using static detectors. Consideration should be given to whether it would be appropriate to have static detectors, noise and light monitoring equipment permanently deployed (during the active season for bats) in the same locations to determine whether there are links between noise and/or light levels and bat activity. Control locations may be necessary to identify any non-development related fluctuations in activity / usage levels of otherwise unaffected features.
- Complementary thermal imaging (infrared cameras might also be appropriate) to determine how bats behave at crossing points (on both the Link Road and on retained features within the Main Development Site). Questions to be answered might include:
    - Do most or all bats (particularly the focal species) cross the gaps in the retained features?
    - Do bats drop closer to ground level at points of severance (putting themselves at greater risk of vehicle collision) or remain at canopy level?
    - Do bats approaching the culvert fly over it as opposed to through it?
- Demonstration of whether any newly-created bat roosts / boxes are used. This should form part of a ringing programme (for barbastelle and Natterer's bat) initially to build up further information on population size (i.e. through mark and recapture and statistical modelling) and to allow inferences to be made with regard to population trends. This should commence prior to construction[16], and can include checks of both established and new bat boxes.
- Demonstration of whether newly-created habitat is used by bats. This might be addressed through a range of techniques:
    - Radio-tracking to determine whether barbastelle (and potentially Natterer's bat) of both sexes, at different stages in the breeding process, and in different age classes are using these areas. Analysis of data should allow comparison with the results of previous radio tracking, which may allow changes in behaviour to be identified.
    - Static detector monitoring within these habitats to determine frequency of encounter of barbastelle (and Natterer's bat), potentially complemented by thermal imaging or infrared monitoring to collect more information about behaviour and number of animals exploiting areas.
    - Consideration of collection of bat faeces which can be analysed to determine prey composition. Barbastelle are predominantly a moth feeder, and moth food plants and habitat associations are well known. It may therefore be possible to determine the habitat types in which barbastelles are foraging most productively as opposed to simply where individuals are travelling to.

6.15 Annual population monitoring will need to be detailed in a report in which the information collected is referenced back to the aim and objectives of the study. An overview of the main findings of the study should be provided to stakeholders on an annual basis.

Operational Phase Monitoring

6.16 The focus of operational phase monitoring will logically be led by the outcome of construction phase monitoring, and can reasonably be left relatively open at this stage.

6.17 At one extreme, if the barbastelle (and / or Natterer's bat) population was to cease to breed on the EDF Estate during construction, be dramatically reduced in number, or remain present but

[16] Consideration should be given to extending this study to the Minsmere area to look at whether ringed bats are recaptured in boxes or in traps in that area. This study might ultimately inform (over time) a DNA methylation study aimed at looking at whether the population includes a representative range of age classes.

commute out of the Estate to forage, the focus would logically be on monitoring whether there was a return to the area following habitat reinstatement.

6.18 If it is assumed that the barbastelle (and / or Natterer's bat) population remains present, and appears either not to be impacted or to be only marginally impacted by the works, by the end of the 9-12 year construction period the population will have been very well studied. It might then be reasonable for a long term monitoring strategy to be derived in consultation with the Suffolk Wildlife Trust and the local bat group, with the results informing Estate Management Reports.

6.19 It might also, at the end of the construction period, be an appropriate time to implement an academically-led project looking at population structure through a DNA methylation study. This would inform whether the population present at the conclusion of construction included animals of a range of ages, suggesting a healthy population, or contained few young bats (inferring a lack of recruitment to the adult population). The potential for this sort of study would be reliant on sustained ringing of animals before and during construction however (as it requires samples to be taken from animals of known (minimum) age).

7 Conclusions

7.1 The most problematic aspect of the bat assessment with regard to the Sizewell C Main Development Site is that it is not possible to understand the bat impact assessment process from the ES Chapter alone. Reference needs to be made to numerous baseline reports, a Protected Species Mitigation Plan and Method Statement, a non-licensed method statement, a lighting strategy, and other chapters of the ES for a full picture to be gained. Accompanying figures that should help interpretation are not clear. The time needed to complete the task will make it very difficult for nature conservation consultees and third parties to effectively comment on the proposals. The same is true, to a lesser extent, for the Sizewell Link Road.

7.2 The importance and function of Goose Hill to breeding female and juvenile barbastelle is emphasised by appended radio tracking data / reports completed on behalf of Wood Group[17], but this information is not really explored in the ES. Rather, it is assumed that the loss will be effectively mitigated by the creation of wetland, grassland and scrub. Factors such as the prey species these are likely to support, and the time they will take to develop are not considered, on the basis that their extent and inherent biodiversity value will be higher. The result is that the impact on barbastelle (as well as Natterer's bat for which the ES acknowledges gaps in the baseline data concerning site-specific habitat usage) is not possible to predict with a high degree of confidence

7.3 The Main Development ES acknowledges a residual effect on barbastelle resulting from habitat fragmentation. This logically implies there will be a population-level effect on the species, but it does not go on to describe this effect, which could range between population reduction and local extinction. It is unlikely that further mitigation (beyond adaptive measures detailed in Section 6) will be possible to address this residual effect.

7.4 It would also be useful if there was some further rationale provided with regard to the conclusion that the Natterer's bat population is unlikely to decline as a result of construction-related impacts. The ES text states that Natterer's bat is of medium sensitivity to habitat fragmentation and the colony may be displaced, but concludes that the residual effect will be minor adverse.

7.5 The section on inter-relationship effects considers how impact mechanisms such as noise and lighting will interact with habitat loss and fragmentation. The ES concludes that all mitigation proposed for lighting and noise is likely to be successful, and that it follows inter-relationship effects will not be significant. It is not possible to confidently reach an independent view on the accuracy of this conclusion, as the level of information presented with regard to mitigation (in the ES and appended documents) is insufficient / lacks clarity. One way to achieve an evidence-based conclusion might be to overlay GIS data on retained habitats, predicted light and noise levels (and thresholds where bat displacement is likely) during the construction process to derive figures that indicate the extent to which key bat species are likely to be displaced during sub-phases of work.

7.6 Given the key importance of Ash Wood to the nationally important barbastelle population using the EDF Estate, it would seem proportionate that a perimeter area around it would be kept free of construction traffic, noise and light impacts. It would also be useful to understand why Stonewall Belts (which provides a direct link to Nursery Covert) could not have been retained (albeit with severance points for haul roads). The Main Development ES notes the emphasis that has been placed on primary mitigation in development design, but the effectiveness of this is reduced given the lack of buffering to the wood and the severance of the link between the two areas of the EDF Estate that appear of greatest importance to the barbastelle maternity population.

7.7 The reasoning behind the need to provide a bat house as mitigation needs to be clarified. Without this clarification the inference is a lack of confidence in the assessment that roosting bats in buildings will not be displaced. If there is a lack of confidence in this conclusion, the impact

[17] Wood Group is referred to in the ES. For clarity, the data were actually collected on behalf of Entec UK Ltd., Amec and Amec Foster-Wheeler, all of which have been subsumed into Wood Group following a series of acquisitions.

mechanism(s) leading to the effect should be clearer in the ES, and the conclusions of the assessment and need for mitigation should be expressed more transparently.

7.8 Very little detail on the design of crossing points on retained commuting routes for bats is presented in the Main Development ES and appended Bat Mitigation Strategy. Further information, including clearer drawings, are needed to have confidence that these commuting routes will remain in use.

7.9 The Main Development ES and appended information does not provide a good basis for the design and implementation of practical construction phase controls to minimise construction phase impacts on bats. Measures are too high level, and for lighting there appears to be divergence between the Lighting Strategy and the ES over the extent to which lighting will be automated. In particular a clear means to practically control light levels associated with task lighting needs to be set out, as some of the task specific work has the greatest potential to impact on key retained features (such as Ash Wood) as it will typically be associated with the highest light levels.

7.10 The Main Development ES Chapter, Bat Mitigation Strategy and Method Statement all refer to monitoring being required. No clear monitoring strategy is presented, however, and there is no indication that a clear vision is developing in this regard. Section 6 of this report provides some direction as to what a Bat Monitoring Strategy for the site might include, including both adaptive mitigation for individual tasks and longer term monitoring to understand how bat populations on the Estate respond to the construction programme.

7.11 With regard to the Sizewell Link Road ES Chapter, further information is needed as to the rationale for concluding barbastelle use of the site is very low. This does not appear to be supported by the (incomplete) baseline data appended to the chapter. This indicates average barbastelle activity levels at some detectors are higher in some months than at almost all monitoring locations used to inform the Main Development ES. This conclusion of very low activity is fundamental to the impact assessment for the Link Road, as mitigation is designed on this basis (and is very limited) and no monitoring is proposed of fatality. In the event the conclusion is revised, this may lead to the in-combination assessment for both the Link Road and Main Development needing to be reappraised.