



THE SIZEWELL C PROJECT: EN010012

WRITTEN REPRESENTATION

**NEGATIVE IMPACTS OF SIZEWELL C ON THE  
INVERTEBRATES OF SIZEWELL MARSHES SSSI  
AND NEARBY DESIGNATED HABITATS**

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*Grayling butterfly, Goose Hill woodland ride. This valuable habitat would be entirely lost under the Sizewell C construction site.  
(Photo: A. Abbott, 2020.)*

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## Abstract

This fully referenced study examines in detail the specific habitat requirements of some of the 143 invertebrate species of conservation concern, that rely on the mosaic of habitats in and around Sizewell Marshes Site of Special Scientific Interest. It challenges EDF Energy's assumption that their new habitat creation scheme at Aldhurst Farm would compensate for all the habitats and taxa lost or damaged due to the Sizewell C construction works on the main development site. While some of the more common species may well move to the new habitat, this study clearly demonstrates that species that are specialists would not thrive here. These tend to be the rarer ones, many already at threat of extinction, particularly those that are found only in the coastal region of East Anglia. Moreover, Aldhurst Farm does not offer compensation for the destruction of wet woodland, nor the loss of sunny rides of mature forest, nor grazing marsh, nor ancient reed-beds and dykes that have taken centuries to evolve.

Bearing in mind the very long time scale of 12 years for the construction works, compared to the short lives of most invertebrates, many taxa would be wiped out before having the chance to re-establish themselves elsewhere. Also considered is the fragmentation of the landscape that would result from the building works, together with the impacts of lighting, dust and diesel fumes on fragile insects. The study also refers to the changes in hydrology that would jeopardise the health of the marshes. The conclusion is that, at best, some of the commoner invertebrates would relocate to Aldhurst Farm. At worst, bearing in mind that the invertebrates are at the bottom of the food chain, loss of populations could cause a cascading effect threatening the entire ecology of Sizewell Marshes SSSI.

## 1. INTRODUCTION

Friends of the Earth are profoundly opposed to the intentional destruction of protected habitats and species. 'Protect' means, according to the Oxford Dictionary, 'keep safe, defend, guard against danger, injury, disadvantage etc', yet EDF Energy's plans for Sizewell C nuclear power station would not only destroy directly part of Sizewell Marshes Site of Special Scientific Interest, but would also have a negative impact on the rest of this unique mosaic of habitats due to construction activities and permanent alteration of the landscape. Moreover, as it is never appropriate to consider a single site in isolation, it is necessary to consider how the effects reach into neighbouring habitats.

Sizewell Marshes SSSI is protected under the Wildlife & Countryside Act 1981 (as amended), under which it is an offence to intentionally or recklessly damage, disturb or destroy land known to be an SSSI or intentionally or recklessly disturb the wildlife. Types of operation likely to damage the special interest, as set out by Natural England, include the following:

- The killing or removal of any wild animal (includes invertebrates)*
- The destruction, displacement, removal or cutting of any herb, leaf-mould or turf*
- Changes in tree or woodland management, including afforestation, planting, clear and selective felling*
- Drainage; the changing of water levels and tables*
- Infilling of ditches, ponds and pits*
- Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, and spoil*

*Construction ... of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground*  
*Storage of materials*  
*Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling*  
*Use of vehicles or craft likely to damage or disturb trees, ground vegetation or earthworks*

EDF Energy, through its building of Sizewell C, would be guilty of all of these offences. It is inconceivable, therefore, that planning permission should be granted for this vast project, which also lies largely within Suffolk Coast & Heaths Area of Outstanding Natural Beauty (AONB). No amount of mitigation could ever make up for such chronic damage to this special site and surrounding environment, which has taken many hundreds of years to evolve.

Moreover, the invertebrates of Sizewell Marshes SSSI constitute a special feature of interest, as stated in the official citation:

*Sizewell Marshes are important for their large area of lowland, unimproved wet meadows which support outstanding assemblages of invertebrates ...*

and also:

*Sizewell Marshes are of exceptional interest for their invertebrate fauna, supporting a wide range of taxa and many nationally rare or scarce species.*

The Executive Summary of EDFE's main document on invertebrates (ES Vol 2, App 14A.4) confirms that 2,068 species have been identified within the study area, with one protected species and at least 22 Red Data Book species, together with 120 considered to be Nationally Scarce. This site does not exist in isolation as it is surrounded by four County Wildlife Sites (CWSs), all of conservation importance, namely Sizewell Levels & Associated Areas, Leiston Common, Suffolk Shingle Beaches and Southern Minsmere Levels. Moreover, immediately to the north lie the Minsmere-Walberswick Heaths & Marshes Special Area of Conservation (SAC), and Minsmere-Walberswick SSSI, Special Protection Area (SPA) and Ramsar, of national, European and international importance. The inter-connectedness of these sites allows many of the protected species to flourish, as they have the opportunity to use the entire area, according to their degree of mobility. Damage to Sizewell Marshes SSSI will therefore have far-reaching effects, should the application for Sizewell C be granted, causing fragmentation and loss of connectivity. 'Suffolk Ecology Principles for Sizewell C' states that

*Sizewell Marshes SSSI ... is designated for outstanding invertebrates ... and these species assemblages should remain intact.*

They will not, if the application for Sizewell C is granted. As this study shows, direct loss of habitat and damage to eco-systems due to construction activities mean that the invertebrate assemblages would be seriously impaired. Moreover, it can well be argued that the Sizewell C works would damage the special interest features of the Minsmere-Walberswick Heaths & Marshes SSSI and Ramsar. For example, the protected Norfolk Hawker dragonfly inhabits the Ramsar site and is able to use the Sizewell Marshes SSSI for

dispersal and vice-versa (see below). Equally, the BAP Priority species White-mantled Wainscot uses the reed-beds from Minsmere through to Sizewell and beyond. EDFE's invertebrate document (APP-231) confirms that the triangle of land beneath the Sizewell C footprint 'provides a connection between wetland habitats within the greater Sizewell Marshes SSSI and those within Minsmere-Walberswick Heaths & Marshes Ramsar site and SSSI' (1.2.4). Yet this triangle would be totally obliterated by the access road crossing and part of the station platform, thus severing ecological linkages. These are further discussed in our study of the proposed new access road, *q.v.* (Fulcher, 2021).

### **1.1 Background to this study**

Whilst primarily a desk-top study, this work has been underscored by collaboration with Suffolk Butterfly Conservation and Suffolk Wildlife Trust. It has also greatly benefited from advice offered by local ecologist Tom Langton and experienced entomologist Richard Wilson. Conversations have been ongoing with the many members of Suffolk Coastal Friends of the Earth who live close to Sizewell and have in-depth local knowledge of the area and its wildlife. Some are regular visitors to the Sizewell Estate, enjoying rambling, bird watching or dog walking around the permissive paths. Others have a special interest in the rare butterflies which can be seen here.

It is extremely disappointing that EDF Energy refused to allow ecologist Tom Langton access to the SSSI in order to do survey work on our behalf. It is our view that where a protected site and its wildlife are concerned, then their needs should be put before any commercial interests. Moreover, it indicates a lack of transparency and willingness to work with local people.

### **1.2 The decline of insects**

Loss of invertebrates on the Sizewell Estate needs to be put into the national and international context. A grim picture of losses of essential insects across the planet was presented in a peer-reviewed paper published recently: 'Worldwide decline of the entomofauna' (Sanchez-Bayo & Wyckhuys, 2019). Having reviewed 73 reports of insect decline, the authors concluded, judging by the rapid rate of recent extinctions, that 40% of the world's insect species would be gone within the next few decades. Professor Dave Goulson estimates 41%, saying that insects are dying out eight times faster than larger animals (Goulson, 2019). Buglife adds that the drivers are habitat loss and fragmentation combined with agricultural intensification and climate change (Shardlow, 2019). All of these factors put the invertebrates of Sizewell at risk, with EDFE's proposals adding to the burden, especially in respect of habitat loss, fragmentation and fundamental changes to hydrology.

### **1.3 The problem with EDFE's surveys**

Having read through all of EDFE's reports relating to invertebrates, it is very obvious that the emphasis is mainly on the numbers of species within the various habitat types, rather than on the individual species themselves. This results from the use of the ISIS system (now 'Pantheon'). (AS-033: 14.8.6 and Table 14.14.) The only exception is White Admiral

butterfly, thanks to the surveys commissioned by British Energy. This means that the essential requirements of many of these species, particularly those that occupy a highly specialised niche, or those that consistently use more than one habitat, are not properly taken into account. For example, the habitat of Norfolk Hawker is described as W314 – reed-fen and pools, but this fails to mention its need for nearby woodland where it can rest from foraging. White-mantled wainscot is also described as using this same habitat, but an essential detail is left out: the reed bed must be old for the larvae, and preferably dry, with dead stems, not new. It also should not be regularly managed. (APP-231, Table 1.4.)

This has implications for the mitigation proposals. These cannot be correctly carried out if the individual needs of rare species are not properly and fully considered.

Moreover, there are important gaps within the documents. White Admiral butterfly thrives in woodland, where there are sunny rides and honeysuckle for the caterpillars to feed on. Yet part of its Sizewell habitat, namely Goose Hill, would be almost completely felled with all of the land going under concrete for the main construction site. The fact that it is impossible to compensate for the loss of mature woodland with warm rides is conveniently ignored.

Many of the rarer aquatic invertebrates will only thrive in water that is very low in nutrients. The compensation habitat that has been provided at Aldhurst Farm, however, has water that lies within a Nitrate Vulnerable Zone (NVZ) due to agricultural run-off and is therefore too high in nutrients. (APP-297: 19.4.14.) Such enrichment produces algae, which in turn uses up oxygen and causes eutrophication. This process can be clearly seen in EDFE's photograph of one of the lagoons, taken in 2018. (Plate 14.1 in APP-224.) Indeed, Leiston Beck that runs through the new site is also enriched with phosphates due to the adjacent sewage works. (APP-297: 19.4.63.) While insects that are generalists may well find a new habitat here, the rarer specialists will not.

A factor that is not taken into account by EDFE is the very short lives of most of the resident insects, amounting to three years at the most. Bearing in mind that the works would carry on for 12 years and even longer for any habitat restorations, populations of certain rarities could easily be wiped out well before any mitigation is fully functioning.

Effects of the construction works, such as dust, fumes and lighting, while modelled separately, are not then applied to individual species. Nor are the collective impacts taken together. A proper in-depth assessment of the overall impacts on invertebrates is missing.

Yet nothing could be more important as regards the ecology of Sizewell Marshes SSSI and surrounding area: the invertebrates lie at the bottom of the food chain. Any decline in their abundance will directly affect those species that feed on them, such as the bats, including the rare Barbastelle, insectivorous birds, many of which fly over from RSPB Minsmere, the reptiles that inhabit the Sizewell Estate, amphibians especially the very rare Natterjack toad, and fish. We could therefore be seeing a cascading effect. As the invertebrates decline due to the Sizewell C works, so also will all the other species that rely on them. Ultimately this could lead to ecological collapse.



#### **1.4 Effects of the changed hydrology**

Suffolk Coastal Friends of the Earth have commissioned an expert report from Dr Rob Low and associates on the impacts of the Sizewell C building works on the hydrology of Sizewell Marshes SSSI (Low, R. *et al*, 2021), to which the examiners are referred. Their report demonstrates how the construction of the cut-off wall around the station platform will result in drawdown of ground water. The Applicant's plan is to keep the water levels the same by introducing water from the drains. However, this water is not of the same quality as the ground water. APP-297, 19.4.67 describes it as 'moderate to poor'. The Sizewell Drain, for example, is contaminated with hydrocarbons. (APP-297: 19.4.63.) The Applicant blames vehicles belonging to Sizewell villagers, but pollution from the Sizewell B traffic is much more likely. Water from the west via the Leiston Drain runs from a Nitrate Vulnerable Zone, as already mentioned, due to fertiliser run-off, exceeding drinking water standards. (APP-297: 19.4.41.) The phosphates from the sewage works and Leiston Water Recycling Centre also cause enrichment. (APP-297: 19.4.63.) Those very rare invertebrates that need clean water low in nutrients to survive (see for example under 2.1b below) will not re-colonise here, despite EDF's assertions.

The Applicant maintains that mitigation for the loss of invertebrates due to stopping up and diversion of drains and dykes will be provided at the Aldhurst Farm habitat creation site. We do not agree with this. It is very obvious that the water quality is not suitable for most of the Red Data Book listed species to thrive.

#### **1.5 Fen meadow compensation land**

In addition to the Aldhurst Farm scheme, the Applicant is now planning to create three new areas of fen meadow, in an effort to compensate for the loss of this rare habitat from Sizewell Marshes SSSI. The emphasis here is on the plants, rather than the invertebrates, with a plan to transplant squares of the turf that would otherwise be lost, in the hope that some of the flora will re-establish. The assumption is that the invertebrates will re-colonise naturally. However, two of the sites, at Halesworth and Benhall, are some miles away, while the third, at Pakenham, is 42 miles distant, in a different local authority area and far too far away to mitigate for loss of the Sizewell invertebrates. Initial investigative work has begun, but that is all.

Added to this is the uncertainty as to whether these new sites will work. It is well known that fen meadow is notoriously difficult to re-create. For this reason, Natural England have asked for nine times the area lost. Due to the delay in initiating these sites and the doubt about their successful establishment, we cannot accept that they will offer any suitable mitigation for invertebrates lost at Sizewell.

## 2. Some of the RDB and Nationally Scarce species most likely to suffer from the Sizewell C works

### 2.1 NORFOLK HAWKER DRAGONFLY (*Anaciaeschna/Aeshna isoceles*)

This rare and endangered dragonfly is fully protected under the Wildlife & Countryside Act, 1981, which means that it cannot be intentionally killed or injured, nor can the place it uses for shelter be damaged in any way. Norfolk Hawker is also a Priority Species under the UK post-2010 Biodiversity Framework and listed as category 1 in British Red Data Books on insects.

One of two brown hawkers, it is recognisable by the yellow triangle near the top of its abdomen, the green eyes and clear wings. It was once found across the whole of East Anglia, but by the 1970s was believed to be extinct. Thanks to well-managed nature reserves it made a comeback in the 1980s, but remains endangered.

Its range is very limited, being confined mainly to the Norfolk Broads and parts of Suffolk, including Sizewell, where there is unspoilt grazing marsh with dyke systems and very clean, non-saline water that is low in nutrients. (APP-231: 1.2.7.) This is particularly important, as it spends two years as an aquatic nymph, before climbing on to vegetation at night and moulting into an adult by the early morning. It then flies off to feed and takes up to three weeks to reach maturity. The adult can be seen flying between May and August. Ideally, the dykes need to have rushy margins with an abundance of aquatic plants. These typically include Water Soldier (*Stratiotes aloides*), Water Milfoil (*Myriophyllum* sp.), the floating Frogbit (*Hydrocharis morsus-ranae*), also Broad-leaved Pondweed (*Potamogeton natans*), and the red-listed Greater Bladderwort (*Utricularia vulgaris*). The water must be relatively still. (Mason & Parr, 2016.)

Norfolk Hawker needs a lot of space in which it can hunt successfully, with trees and bushes close to its breeding site for resting. Routes between these will become established. EDFE's main document on invertebrates confirms that the dragonfly has been seen 'in good numbers' within Sizewell Marshes SSSI between 2011-2018 (APP-231: 1.1.15). In 2010 an adult was caught in a malaise trap in the north-east corner of the 'triangle', which would be entirely lost to the SSSI Crossing and part of the station platform (APP-231: 1.2.7).

The British Dragonfly Society lists the main threats that it is subject to: loss of grazing marsh to arable land; poor ditch management; nutrient enrichment; pollution; fluctuations in water levels; and climate change (BDS, retr. 2020).

#### 2.1a Would it survive Sizewell C?

According to the British Dragonfly Society one-third of British species are facing extinction, and three species have already become extinct since the 1960s. With such low numbers in a very confined area, it would take very little to push Norfolk Hawker over the edge. Climate

change is already affecting it very badly, as sea levels rise and salt water increasingly infiltrates into fresh water habitat.

Staff of EDF Energy have told us on more than one occasion during the pre-application consultations that Sizewell Marshes SSSI is not worth saving, as it will all be under sea water in less than 30 years. This, of course, gives them carte blanche to build over it with impunity and to disregard the needs of the resident animals and their habitats. We find this attitude reprehensible. Rare fauna and flora should be saved and protected at all costs until new habitat can be found or created for them.

Our members regularly see Norfolk Hawker hunting over Sizewell Marshes and sightings are noted in the application documents. The EDF Energy/Amec invertebrate survey report of 2009 confirmed its presence, when a nymph was recovered from a ditch immediately adjacent to the SSSI triangle planned to go under concrete (Godfrey 2009/2014). The following year in June an adult was caught in a malaise trap (Godfrey 2010/2014) on the Sizewell Belts. (APP-231, Annex 14A4.3.) It was also observed that same month on grazing marsh west of Sizewell B power station, and also immediately north-west of the SZC site. Moreover the Suffolk Wildlife Trust Annual Land Management reviews regularly confirm its presence, ranging widely over Goose Hill, which would be entirely lost under the SZC footprint, and Kenton Hills, which is likely to be irreparably damaged by dust and pollution from the adjacent construction works.

Despite the promised 'best practice', it is inevitable that EDF Energy's proposed construction works would pollute the dykes where the dragonfly breeds, with dust, road run-off and increased nutrient levels changing the chemistry of the water, leaving it unsuitable for Norfolk Hawker. The company itself admits that there would be 'a high risk of dust impact on sensitive receptors' (APP-212, 12A: 1.1.2).

Pollution from the 24-hour artificial lighting would be a significant problem for the species, as the larvae emerge into adulthood during the night, no doubt for protection. The constant bright light would upset its bio-rhythms, causing confusion, and leaving it exposed to predation during this delicate process. (BDS, retr. 2020.)

The vast size of the building site and the fact that it would divide the Area of Outstanding Natural Beauty into two from east to west means that a significant proportion of the dragonfly's existing very small range would disappear. Currently, the open landscape from Sizewell, through to Minsmere and on to the Norfolk Broads gives the species just enough space to thrive. The planned division of this landscape would cut off the Sizewell dragonflies completely from those at Minsmere and beyond. This fragmentation would leave isolated populations unable to disperse for breeding. This, combined with polluted dykes and changes in water levels, sometimes sudden, from the deep pile-driving to create foundations for the reactor platform, would almost certainly mean the death knell for Norfolk Hawker at Sizewell.

### 2.1b No suitable compensation offered

Despite the new ponds and ditches at Aldhurst Farm, there is no suitable habitat for the species here. This site was created out of intensively farmed arable land, leaving nutrient levels in the water much too high for many years. Norfolk Hawker is one of those rare invertebrates with larvae that must have clean water without enrichment. (APP-297: 19.4.41.)

Moreover, this would be a poor hunting ground for Norfolk Hawker, as there is no grazing marsh over which to find food and, apart from a small copse, there are few trees here for resting. Its continuing presence in and around Goose Hill and Kenton Hills indicates its liking for woodland as a protection area and also as a further hunting ground along the rides.

The Amec 2009 report confirms that the adults are 'relatively widespread and frequent throughout the Sizewell Belts and Kenton and Goose Hills' (Godfrey 2009/2014). (APP-231: Annex 14A4.3.) Why then is an important resting place of this RDB1 species, i.e. Goose Hill, being entirely obliterated by the SZC proposals in contravention of the Wildlife & Countryside Act, under which the species is protected? Why also is a known breeding ditch, directly adjacent to the building footprint, being at the least extensively damaged if not also lost to the construction works? Either the works here should not be allowed to go ahead, or else proper mitigation should be put in place for the protection of the species. More recently the company has confirmed that ditches under threat would be carefully searched and fish and aquatic macro-invertebrates recovered – but what happens then? There are no details of proposals for their safe relocation. (APP-224: 14.8.99.)

### 3. HAIRY DRAGONFLY (*Brachytron pratense*)

Classified as 'Nationally Scarce' and listed in the Odonata Red Data book for Great Britain, this small hawk dragonfly has gained its common name from the hairs on its thorax. The males have green and blue markings, while those of the females are yellow.

The dykes within grazing marshes at Sizewell provide an ideal habitat for the species, where there is either standing or slow-moving water along with floating plant material. There also needs to be rich marginal vegetation, typically including Common Club-rush (*Schoenoplectus lacustris*), Great Fen-sedge (*Cladium mariscus*) and True Bulrush (*Scirpus lacustris*). Expanses of open water are also important over which to hunt, and nearby stands of trees that provide shelter and places to feed. After catching flying insects, the prey will be taken to a perch.

The Amec survey of 2010/2014 confirms its presence at Sizewell, saying that it was 'frequent in the ditches on the grazing marshes' and that it 'shared the habitat with the Norfolk Hawker' (Godfrey 2010/2014/APP-231, Annex 14A4.3). In Suffolk the species used to be confined to the marshes of the coastal strip, but more recently there has been a movement inland along the main river valleys. Overall, eutrofication has reduced its range.

Eggs are laid into floating dead and decaying plant material, and the larvae are found in similar situations. As it can take up to three years to emerge, the species is clearly

extremely vulnerable to over-enthusiastic management of the dykes, as it can easily be cleared out. It is also intolerant of pollution. It flies when sunny from the end of April to early July.

The construction of Sizewell C will remove some of this species' habitat both directly and indirectly. Dust pollution from land clearing and the constant use of unmade tracks by a variety of vehicles, will be very harmful to Hairy Dragonfly, smothering its breeding grounds with dust particles and contaminating the air in which it flies. APP-213, Appendix 12A confirms that activities including excavation, loading, haulage, stockpiling and mud on roads will all raise particles of dust. Those that are coarse, PM<sub>10</sub> to PM<sub>30</sub>, will settle on the ground, smothering vegetation and creating films over water. (1.3.10.) Further pollution from diesel leaks and run-off into the ditches will be inevitable. The loss of the species would be significant at Sizewell.

### **3.1 Lack of proper mitigation**

The Aldhurst Farm scheme does not provide suitable habitat where the Hairy Dragonfly could thrive. Its needs are similar to those of the Norfolk Hawker: very clean water low in nutrients, preferably with open expanses, grazing marsh, the right plant material, and nearby woodland for resting. This important mosaic of habitats is not present at the Farm.

At the time of writing (2020) the new ponds are seriously overgrown with the reeds and the entire wetland has been invaded by bindweed. Due to lack of management, no areas of open water are now visible. (Photo: Appendix 1.)

### **4. SUFFOLK ANTLION (*Euroleon nostras*)**

The Suffolk Antlion is extremely rare, with few records. It was selected as a Suffolk Local Biodiversity Action Plan species and is provisionally listed as RDB2, Nationally Vulnerable. It was first noted in 1931 at Gorleston, with no further mention of the species until 1988, when one flew into a house near Lowestoft. In 1994 two Antlions were found by the Minsmere toilet block, then two years later 12 newly emerged adults were noted nearby. The following year it was spotted at Dunwich Forest on the verge. (Plant, 1997.) More recently, in 2003, Suffolk Wildlife Trust discovered the insect at Walk Barn on the Sizewell Estate and here again during the Amec 2007/2010 surveys. (APP-231, Annex 14A4.3.) This is directly adjacent to the main construction site. The Suffolk Wildlife Trust warden confirms that it continues to flourish in this habitat.

Clearly, its stronghold is within the Minsmere-Sizewell area, indicating, perhaps, a relic of colonies more widely distributed throughout the Suffolk Sandlings. There was, however, a surprise report from the BBC in 2011 that the larvae appeared to be thriving at Holkham National Nature Reserve in Norfolk.

The larva digs a conical pit in soft, fine sand, in a south-facing position, where it is warm and dry, preferably under an overhang. It then buries itself at the bottom, waiting for prey to arrive. It flicks sand at the prey, often an ant, until it slips down the side of the pit. It then catches it with its fearsome pincers.

It takes two years for Antlion to develop. When it finally emerges as an adult, it looks like a cross between a lacewing and dragonfly, with long, slender body.

#### 4.1 Affected by light pollution

Artificial lighting is a serious problem for Antlion, because the adult emerges and flies during the night. It is clearly attracted to light as it occasionally turns up in a moth trap. As with other night-flying insects, it is likely to be harmed by hot bulbs or by crashing into the lights. Night-time exposure leaves it very vulnerable to predation. Bats will fly around lights, waiting for the insects to arrive.

Night-flying insects have evolved to use the soft light of the moon and stars for courtship, foraging and navigation. Permanent artificial illumination inhibits the carrying out of these crucial biological functions and is a main contributor to the decline of insect species. (Owens et al, 2019). This means that Antlion will no longer be able to thrive at Sizewell – nor even at Minsmere - wherever there is light spill into the protected sites and nearby habitats. Although EDF has committed to minimising light pollution, this will not sufficiently reduce negative effects on highly sensitive insects.

#### 5. WHITE ADMIRAL (*Limenitis camilla*)

This large black-and-white butterfly used to have a wide range throughout southern and central Britain, having increased after the 1920s when coppicing was no longer practised. The species has, however, suffered a dramatic decline in the last few decades. According to UK Butterflies there has been a loss in abundance of -59% between 1976 and 2014. This is thought to be due largely to destruction of their woodland habitat. Overall, their range has shrunk by 25% since the 1970s.

White Admiral is a Biodiversity Action Plan species and is listed as a Species of Principal Importance under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006 in England. This places a duty on the Local Authorities and government agencies to protect, enhance and restore the species. On the Suffolk Butterfly Conservation website, White Admiral is shown as a 'scarce resident, Suffolk BAP species'.

These butterflies are very well recorded and monitored in and around the Sizewell area. Members of the local group of Butterfly Conservation walk two transects regularly from 1 April to 30 September each year, one of which is Sizewell Belts. Colonies are also recorded immediately north on the Minsmere Levels and also at Minsmere North, while to the south they breed in the Aldringham area. To the west they are found in the parish of Theberton.

The favoured habitat is mature woodland, either deciduous or mixed with conifer, that has sunny rides and dappled shade. The main food plant of the caterpillars is honeysuckle, preferably hanging down in loose strands just a few meters from the ride edge. They feed on this when they emerge in spring from their silky leaf shelters. For nectar, the adults favour the flowers of bramble. (BC, retr. 2020.)

Colonies are discrete and at low numbers within the woodland. One rarely sees more than two or three adults at the same time.

### 5.1 Loss of valuable woodland rides

In 2007 British Energy commissioned a White Admiral desk study and survey report, which was undertaken by Andrew Godfrey for Amec Environment & Infrastructure UK Ltd. (APP-231: 1.1.20.) The area covered was the part of the Sizewell Estate likely to accommodate new nuclear build, i.e. Kenton and Goose Hills. The current owners of the estate, EDF Energy, added their name to the report in 2014. It is unclear how much the report was altered or updated, if at all.

The whole of the Sizewell Estate lies within Suffolk Coast & Heaths Area of Outstanding Natural Beauty and as such is protected by the Countryside & Rights of Way Act (2000). Kenton and Goose Hills lie directly adjacent to Sizewell Marshes Site of Special Scientific Interest, which is afforded protection under the Wildlife & Countryside Act (1981, as amended). These woodlands are part of Sizewell Levels & Associated Areas County Wildlife Site (CWS) and are managed by Suffolk Wildlife Trust. The whole area, consisting of a mosaic of interconnected habitats, is ecologically extremely rich.

The woodlands of Kenton and Goose Hills, with their warm, sunny rides and presence of honeysuckle, offer the ideal habitat for White Admiral butterfly. The trees are mainly Scots pine (*Pinus sylvestris*) and Corsican pine (*Pinus nigra ssp. laricio*), together with blocks of mixed deciduous woodland that includes pedunculate oak (*Quercus robur*) and silver birch, with some elder and hazel. There is also a small strip of mature maritime pine (*Pinus radiata*) on the eastern side of Goose Hill. This habitat is classified as Dry Woodland 31 community.

Under 1.1 Background it is stated that the population of White Admirals on the Estate 'is not actively monitored', but this is not correct. As stated above, the local group of Butterfly Conservation keeps regular records, which are lodged with the Suffolk Biodiversity Information Service. Moreover, the permissive paths give access to the public, who regularly report sightings, especially along the popular Sandlings Walk at Goose Hill.

The Field Surveys of 2007 were carried out on six days, three in early July and three in early August. Observations of the butterfly were made on each of the three July days, but not in August. This is not surprising as August is very much the end of the season for White Admiral. However, further incidental observations were noted during other protected species surveys, two on 8 July and one on 4 August. Most of the sightings were in Kenton Hills, while two were on the Sandlings Walk along the southern side of Goose Hill. The year 2007 was considered to be a bad one for White Admiral due to the very wet June. Observations have been more frequent during sunnier years. However, the 2007 surveys established the presence of this protected species within Kenton and Goose Hills.

The conclusion of the 2007 survey points to the difficulty in determining population size of White Admiral, due to the tendency of the butterflies to move to and from the woodland canopy. This really can only be assessed by the suitability of the available habitat. It is a very real concern, therefore, that all of Goose Hill will go under concrete for construction areas, an access road and haul road and that this part of the habitat will be entirely lost.

Records by Suffolk Butterfly Conservation between 2013 and 2017 continue to confirm the presence of White Admiral on both Goose Hill and Kenton Hills.

## **5.2 Lack of mitigation and importance of honeysuckle**

Andrew Godfrey was also the lead surveyor of the larval survey report of 2009, commissioned by Amec for British Energy. The report was re-visited by EDF Energy in March 2014. (APP-231: 1.1.22.) Its purpose was to enlarge on the earlier 2007 report, reviewed above. The purpose was also to inform mitigation and habitat management strategies. It is extremely disappointing that none has been put in place by EDF Energy.

It is notable that of the 23 tetrads in Suffolk where White Admiral was recorded, 10 were clustered to the north of the British Energy Estate, i.e. at Kenton and Goose Hills. This means that almost half of the existing population is dependent upon this habitat, which, with its sunny woodland rides and availability of honeysuckle, is ideal for the species.

Twenty likely search areas were chosen, according to the availability of the preferred food plant, honeysuckle. As indicated on the map provided, only five (not six as stated) were investigated on Goose Hill, whereas 15 (not 14 as stated) were located at Kenton Hills. It is noticeable from the map that the Sandlings Walk has been excluded as a search area. This is very surprising, as the adults are often seen along this sunny ride. The survey is therefore seriously biased towards Kenton Hills, even though the food plant was available at Goose Hill, although apparently less plentiful or not so accessible. This is acknowledged. Thus, only one incidence of larval damage was found at Goose Hill, whereas 10 such were noted at Kenton Hills.

The conclusion that the metapopulation is in the southern part of Kenton Hills is therefore questionable, as is the assumption that the colony would continue to survive without the Goose Hill habitat. We do not agree with this conclusion for the reasons given below.

## **5.3 Negative impacts of the construction site on remaining White Admiral butterflies**

The construction area, access road and haul road as proposed for Sizewell C would take nearly the whole of Goose Hill and would therefore lie directly adjacent to Kenton Hills. As it would range across the whole of the Area of Outstanding Natural Beauty from east to west, it would form a massive barrier between the White Admiral colony remaining at Kenton Hills and those further north at Minsmere. Although this butterfly species is a strong flyer, the construction site would nevertheless form a major disincentive for northern dispersal. Genetic diversity would therefore be reduced and the remaining colony would become weakened through in-breeding.

Butterflies will avoid roads, not just for the risk of direct traffic kill, but also because moving vehicles create air turbulence. This means that, even when attempting to cross a road, the adult butterfly may be thrown back to the same side. Such efforts can cause exhaustion and reduce ability to find nectar (Spalding, 2003). Needless to say, there would be no remaining nectar sources on the construction site, the sunny rides and bramble flowers having been entirely removed.



Along the entire north-western edge of Kenton Hills there would be the 'green' rail route and further construction and laydown areas. Any remaining butterflies and other wildlife would therefore be hemmed in on two sides, further reducing the ability to disperse or find food.

#### **5.4 Impacts of diesel exhaust fumes and smoke**

Pollution from diesel exhaust fumes of the heavy construction traffic, the train and the many other vehicles would have a direct effect on the remaining plants at Kenton Hills. This in turn would affect the butterfly and moth caterpillars feeding on those plants.

Dr Stuart Campbell of the University of Sheffield discovered that plants exposed to nitrogen dioxide from traffic fumes could better defend themselves against herbivorous insects by producing more defensive chemicals in their leaves. This proved to be harmful to the larvae feeding on the leaves and they grew poorly in comparison to those feeding on leaves unaffected by traffic fumes (Campbell, 2018). We can anticipate, therefore, that the butterfly caterpillars, including White Admiral, would not thrive well in such an air-polluted area.

As for the adult butterflies, they have a strong sense of smell and use this to identify the location of good sources of nectar. Any pollutants in the atmosphere, such as the fumes from the nearby traffic, mask the scent emanating from the flowers, making it more difficult for the butterflies to feed efficiently (Dunham, 2014).

Further research into the impact of vehicle exhaust pollutants shows that xylene and toluene combine with volatiles given off naturally from plants, forming a background mix of odours. These confuse the nectar-seeking butterflies, which then waste energy trying to work out where the good sources of nectar are (Riffell et al., 2014).

Since EDF Energy would be cutting down hundreds of trees, one may well ask how they are to be disposed of. We are reassured that no burning would be carried out on site, as this would have an extremely deleterious effect on any nearby butterfly population, as research by Tan et al (2018) clearly demonstrates. The toxic gases given off by the smoke significantly increased the mortality of caterpillars. Those that survived took longer to develop and were lower in weight.

#### **5.5 Problems caused by dust**

When land is cleared, as would be the case at Goose Hill, across Sizewell Marshes SSSI and over to the location of the reactor platform, 'high levels of dust' are created (Guzder, 2019). Despite best practice, as promised by EDF Energy, the fact is that large quantities of dust are unavoidable, especially when earth is moved, pits dug or large stock piles created, as would be the case for Sizewell C.

In addition to particle matter from diesel engines (DPM), construction activities also generate dust from cement, concrete, silica and wood, generally referred to as PM<sub>10</sub>, that is particle matter less than or equal to 10 micrometres in diameter and invisible to the naked

eye. Much of this is toxic and can cause lung cancer in both people and animals. Wind can spread such dust into the surrounding areas, where it will settle.

According to EDF Energy's plans, the main construction site in and around Goose Hill will be criss-crossed with unpaved roads. The many vehicles using these roads and tracks, some of which would be heavy, will inevitably raise large volumes of dust. Here again, it will be blown by wind into both Sizewell Marshes Site of Special Scientific Interest and into Kenton Hills, and beyond to the Minsmere-Walberswick SSSI and SAC, contaminating the whole area. One researcher found that dust from a haul road was regularly being deposited more than 1 km away (Everett, 1980). As it settles on the plants, it causes shading, affecting the plant's ability to photosynthesise. The dust will also choke the stomata, blocking the natural processes of transpiration. (APP-224: 14.7.72.) Eventually they are likely to wither. Any creatures dependent on such plants will also suffer. It is highly probable that the butterfly food plants at Kenton Hills will be affected by dust from the construction sites lying on two sides of the remaining woodlands, not just in the short term, but for the entire duration of the 12 years needed to build the nuclear reactors and associated buildings.

There is no question that the White Admirals which manage to survive initially at Kenton Hills would become gradually weakened over time and would almost certainly die out during the very long construction time of 12 years or more. Even thereafter, a permanent access road leading to the nuclear power station would remain, with its associated barrier effect and ongoing problems caused by traffic fumes.

#### **5.6 Compensatory habitat must be provided for these protected butterflies**

It is a serious concern that no mitigation measures for White Admiral have been included in the Applicant's proposals. Rather, an assumption has been made that the species would continue to survive at Kenton Hills. We profoundly disagree, and our position is supported by peer-reviewed research, some of which is quoted above, along with Suffolk Butterfly Conservation.

White Admiral is a protected species listed under section 41 of the NERC Act 2006. If Sizewell C goes ahead, then EDF Energy needs to provide suitable habitat to which the species is able to disperse, to compensate for that lost at Goose Hill and the inevitable damage caused at Kenton Hills. This must consist of woodland with sunny rides and availability of the main food source, i.e. native honeysuckle (*Lonicera periclymenum*). So far, none has been promised.

#### **6. GRAYLING (*Hipparchia semele*)**

Like the White Admiral, Grayling is protected under section 41 of the Natural Environment & Rural Communities Act 2006 and is listed as a Species of Principal Importance. It is classified as a UK Biodiversity Action Plan Priority Species and Butterfly Conservation gives it 'High' conservation priority. Using the post-2001 IUCN criteria, it is classed as 'Vulnerable', a Red Data Book 2 species. As a habitat specialist, it is particularly sensitive to changes in the

environment, especially habitat loss, degradation and fragmentation – such as would be caused by the construction of Sizewell C nuclear power station, should it go ahead. Since the 1970s it has declined by -72% and by -58% within the last 10 years alone (UKBMS, 2020).

Suffolk Butterfly Conservation group has monitored this butterfly regularly and records show that between 2013 and 2017 it was present at Sizewell Village, Leiston Common, Kenton Hills and Minsmere Levels (Parker, 2019). This is confirmed by the Hyder invertebrate survey report of 2014, which also corroborates the presence of the species within the Minsmere-Walberswick Special Area of Conservation (SAC). Our members have reported frequent sightings along the Goose Hill rides and within the dunes on the coastal strip. Clearly, construction across its range would have a very deleterious effect on this declining species. It is no longer true to say that the species is ‘abundant’ in the area, as claimed in the Hyder report (Mellings & Davies, 2014). Here are two recent statements from Suffolk Butterfly Conservation (2020): ‘The Grayling is a BAP declining species and is not abundant. In fact it is becoming very local in its distribution, colonies suffering from habitat degradation and fragmentation which the Sizewell C works corridor will further exacerbate.’ ‘Over the past 15 years Grayling has been lost from most of West Suffolk, and now the high-quality coastal sanctuary is at risk.’

Grayling is very much a sun-loving butterfly, so requires a warm microclimate in which to thrive. It regulates its temperature by leaning sideways towards the sun on cool days, or head-on when warm, always with closed wings. Indeed, much of its time as an adult is spent basking. It therefore seeks warm, bare ground or rocks. Surrounding vegetation needs to be sparse, with small tussocks of fine-leaved grasses here and there, on which eggs are laid singly. Main caterpillar food plants are Sheep’s-fescue (*Festuca ovina*), Red Fescue (*F. rubra*), Bristle Bent (*Agrostis curtisii*) and Early Hair-grass (*Aira praecox*). Dunes, salt marsh and cliff tops are all good habitats, as is heath land that has warm, open paths and tracks. Sandy rides in open woodland may also be used, such as those found at Kenton Hills and Goose Hill.

### **6.1 Impact of new coastal defences and other construction works**

It is a major concern that the beach at Sizewell would be entirely dug up for new defences, thus destroying the Grayling colonies that have their habitat in the dunes. These butterflies tend to remain within their colonies, rarely going further afield, apart from individuals dispersing to nearby colonies to breed. It is likely, therefore, that the coastal strip colonies here would be completely obliterated. To say that disruption would only be ‘temporary’ is of course stretching the truth, as it would take many years fully to restore the beach. Meanwhile the presence of Grayling within the region would be greatly reduced.

As noted above, the construction works would stretch inland, through Goose Hill and towards Kenton Hills. This entire area would form an inhospitable belt, making dispersal from south to north, or vice-versa, very difficult, and from east to west virtually impossible. As with White Admiral, pollution from diesel fumes and dust would further weaken any colonies remaining at Kenton Hills.

## 6.2 Light pollution

Grayling caterpillars are curious in that they feed at night. The 24-hour artificial lighting, required for the safety of construction workers, is likely to upset their natural feeding patterns, as they have evolved to respond to the gentle light of the moon and stars. During winter they hibernate within the grassy tussocks, but then feed again in the spring. Permanent artificial lighting would upset their natural biorhythms and cause extra stress to the species (Owens et al, 2019).

It is thought that this night-feeding is a strategy that has evolved to reduce predation on the Grayling larvae. The persistent illumination, however, will have the opposite effect, increasing predation of the caterpillars, thereby greatly reducing the numbers able to develop into adult butterflies. In turn, reproduction of the species will be reduced, resulting in population decline (Bruce-White & Shardlow, 2011).

## 6.3 Habitat creation requirements

EDF Energy seems to believe that the new habitat at Aldhurst Farm would satisfy the Graylings' requirements and that they would start a new colony here. Unfortunately the heathland that the company had originally promised to create on part of the site has so far not been undertaken. No doubt this is due to the expense involved. In theory, Grayling might find a habitat here, supposing that there were also sunny, open tracks with plenty of bare ground, where the butterflies could bask and thermo-regulate. However, such a habitat takes a long time to establish, and if it were to receive healthy adults, then it should already be up and running by now. Sadly, this is not the case. As for the promised acid grassland, this has been overtaken by thistles and docks. (Photo Appendix 2.)

The NERC Act, under which the Grayling is protected, aims to 'further the conservation of the living organisms and types of habitat' that are listed under the act. We want to see both EDF Energy, the local authorities and government agencies comply with these aims.

## 7. WHITE-MANTLED WAINSCOT (*Archana neurica*)

This moth is rare and local, being found only in a very small number of reed beds in coastal Suffolk. The Sizewell C project would therefore destroy the whole of the central part of its remaining range. It was once found in East Sussex, but became extinct there due to human activities. Will the Applicant be finally responsible for wiping out this rare and endangered species?

Like butterflies, moths have suffered serious declines in recent decades. Sixty-two species became extinct in the 20<sup>th</sup> century and possibly four more. The report *The State of Britain's Larger Moths 2013*, based on research carried out jointly between Butterfly Conservation and Rothamsted Research, asserts that 61 species declined by 75% or more between 1968 and 2007. In particular, moths that specialise are at greatest risk, such as this Wainscot. Overall, there was a loss in abundance of all moths of 40% in the southern half of Britain.

This catastrophic decline is blamed mainly on habitat loss, degradation and fragmentation – just such as would be caused by Sizewell C.

White-mantled Wainscot is listed under s41 of the NERC Act (2006) as a Species of Principal Importance and is a new BAP Priority Species. It is listed as a Red Data Book 3 species, i.e. 'rare' and 'at risk'.

There is only one generation, with eggs being laid under the leaf sheaths of Common Reed. The larvae hatch between mid-April and early May, after which there are four moultings. It pupates at the end of May/early June, the adults finally emerging at the end of that month or early July.

### **7.1 Effects of light pollution**

This moth is attracted to light, so the 24-hour arc lighting would be a very serious problem. It would be killed all too easily by flying into glass or by coming into contact with hot bulbs. Vehicle lights and windows could be similarly lethal.

Artificial lighting can substantially alter moths' behaviour, their life cycles and the rate at which they are preyed upon. A moth such as White-mantled Wainscot will not thrive where there is light pollution (Bruce-White & Shardlow, 2011). Over time, the species will become reduced. Bearing in mind the very low numbers of this species that remain, it could quickly become extinct as the result of the Sizewell C construction works.

### **7.2 A specialist**

This moth needs, most particularly, dry old reed bed for its larvae, where there are dead stems. It has suffered from over-management of reed beds, where there has been mechanical cutting or burning, destroying the old plants. The larvae feed inside the hollow stems of Common Reed (*Phragmites australis*). In 2007 it was recorded from a malaise trap situated within the SSSI triangle, part of the Sizewell C footprint (Mellings & Davies, 2014/APP-231, Annex 14A4.3.) This important part of its habitat would be totally erased.

### **7.3 Any mitigation?**

As with all other invertebrates likely to be affected by the Sizewell C project, EDF Energy assumes, wrongly, that the Aldhurst Farm scheme will provide sufficient compensation. White-mantled Wainscot requires, above all, ancient, historic reed beds that have been left mostly unmanaged. A particular problem for the species in question is that this habitat has been newly created. It will be many years before the reed beds are old enough to provide just the right conditions for White-mantled Wainscot larvae, if at all. Meanwhile this local species could easily die out.

Another problem is that the reeds at Aldhurst Farm were brought in from commercial stock and are therefore not the same as those on the Sizewell Estate. It could be that unsympathetic species have been carried in on these plants – at any rate they could be different from those at Sizewell. It would have been far preferable if reeds from Sizewell could have been transplanted.

## 8. OTHER WAINSCOTS

Immediately to the north of the proposed Sizewell C power station lies the Minsmere to Walberswick Heaths and Marshes Special Area of Conservation (SAC), which more or less corresponds to the Minsmere-Walberswick SSSI. This is cited as having a 'rich insect fauna, particularly moths, which include a number of rare species, notably *Archanara neurica* (White-mantled Wainscot), *Photodes (Protarchanara) brevilinea* (Fenn's Wainscot) and *Senta (Mythimna) flammea* (Flame Wainscot)'. These are all associated with Common Reed swamp habitat and all are dependent upon *Phragmites australis* as a larval food plant, which typically develop in the hollow stems. They are also found in Sizewell Marshes SSSI. These habitats, currently contiguous, would be divided in two by the Sizewell C construction works, causing fragmentation and habitat loss.

### 8.1 The Flame Wainscot

This is classified as Nationally Scarce and is restricted to a number of East Anglian fens, including those at Sizewell. It is considered to favour stands of scattered reed rather than those planted densely. The reeds at Aldhurst Farm are in fact tightly packed, to the point that it is difficult to see any water at all. Unless these are managed specifically for this moth, then it is unlikely to colonise here.

Like the White-mantled Wainscot the adult is attracted to light and, as a night-flying moth, will therefore suffer badly from the constant artificial illumination. The larvae, as night feeders on the outside of the reed stems, will be seriously exposed to predators, causing a decline in numbers able to survive into adulthood and able to breed.

### 8.2 Fenn's Wainscot

This is also restricted to East Anglian fens and is classified as a UK BAP Priority Species. Its habitat should therefore be enhanced, not destroyed nor damaged, as with the Sizewell C construction activities. It, too, is attracted to light and numbers will therefore deteriorate due to direct mortality, increased predation or disorientation.

Of the three, this Wainscot has the best chance of finding a new habitat at Aldhurst Farm, but only if it is sympathetically managed – and, according to the agreement with Suffolk Coastal District Council in 2015, EDF Energy only commits to ten years of management, after which the future of the scheme seems to be in doubt.

As can be seen, these three Wainscots have different habitat requirements, from old reed beds to newly cut reeds. Why, then, did EDF Energy not follow the advice given in its own Sizewell C invertebrate surveys of 2014? This suggests that a series of pools should be cut out 'over a succession of years' to provide areas 'of different successional stages' (Mellings & Davies, 2014/APP-231, Annex 14A4.3). Yet the pools were all made at the same time, limiting the number of species likely to be attracted to the new habitat.

#### 9. CINNABAR MOTH (*Tyria jacobaeae*)

This striking red and black moth was once common and widespread, but, according to the Norfolk Wildlife Trust, in the last 35 years its numbers have crashed by -83%. This is attributed to the overly zealous control of its main food plant, Ragwort (*Senecio jacobaea*), by land owners, due to its toxicity to horses. It is now a Section 41 Species of Principal Importance under the NERC Act and, under the UK post-2010 Biodiversity Framework, it is a UK BAP Priority Species (research).

Its preferred habitat is open, well-drained grassland, especially if rabbit grazed. The grassy dunes of the coastal strip County Wildlife Site (CWS), immediately to the east of the power stations and Sizewell C site, and on into the Minsmere-Walberswick Heaths & Marshes SAC, are therefore ideal for it. The digging up of the CWS for new defences would destroy this favoured habitat completely, reducing its numbers still further. It can also be found in sunny woodland rides, but here again those at Goose Hill would all disappear, while those at Kenton Hills are likely to be damaged by dust and fumes. It may also use open heathland, if mature, and if the food plant is present. However, the promised heath has not yet been created at Aldhurst Farm. In any case local residents are opposed to this, due to fire risk.

The Cinnabar flies mostly at night, although it can sometimes be seen during the day, as it is easily disturbed. Like many moths it is attracted to artificial light and will therefore suffer the same fate as the other night-flying rarities discussed here, due to the 24-hour security and Sizewell C works lighting. This applies not only to the actual footprint of the new plant, but also to extensive spillage, which would also seriously affect the adjacent Minsmere-Walberswick SAC immediately to the north.

#### 10. THE ALDER SIGNAL MOTH (*Stathmopoda pedella*)

Surveys of the Sizewell Marshes SSSI triangle, which would be taken for part of the new reactor platform together with the crossing of the access road, have demonstrated that this Nationally Scarce micro-moth is well established in this wet woodland habitat. Indeed, it is an Alder carr specialist, its larvae feeding on the green fruits of Alders. Both species are used, *Alnus glutinosa* and the introduced Grey Alder, *A. Incana*.

It seems astonishing that in the pre-application consultations EDF Energy dismisses this area of Alder carr as being of little importance compared with the more mature wet woodland immediately adjacent. While it is true that there are no ancient trees directly under the Sizewell C footprint, nevertheless this is clearly a very significant habitat containing rare species, and it should not be destroyed. In the DCO documents, the Applicant does in fact acknowledge its importance and the harm caused: 'A significant moderate adverse effect is predicted to occur on the wet woodland invertebrate assemblages of high conservation value .... there is no practical way to avoid the impacts described.' (APP-224: 14.8.98.) After persistent pressure from ourselves and others, EDFE has now agreed to create a small piece of wet woodland to the west of The Grove. This,

however, would be only 0.7ha in extent, just a fraction of the amount lost, now increased to 3.12ha (REPI-004: Exec. Sum). In addition, it is too far from the original site to provide any connectivity.

The fate of the Alder Signal moth in the area is now very uncertain, as this is a local moth. Any future establishment of wet woodland would be far too late, as it takes many years for the trees to establish. By this time the species would already have been exterminated.

#### 11. SPIDER-HUNTING WASP (*Evagetes pectinipes*)

This is a rare and nationally endangered species, categorised as Red Data Book 1. Black with yellow markings, it is a cleptoparasite; rather than hunting the spiders and paralysing them with a sting, it seeks out the burrows of other spider wasps where there is already captured prey. It is therefore generally seen running around on the ground, with just short bursts of flight. Having found a burrow it then uses its tarsal combs to excavate it. It consumes the single egg that has been laid within the spider, and then lays its own egg in the same place. It will then close up the burrow.

When it hatches, the larva will feed on the spider and subsequently pupate, before emerging as an adult the following spring.

In order to survive, this species clearly needs a well established colony of other spider wasps on which to prey. This leaves it dependent and extremely vulnerable. Moreover, the habitat has to be just right to sustain the colony. The coastal strip at Sizewell, where there are sand dunes, some bare, others vegetated with short sward and many plant species, is ideal. Here there are good sources of nectar for the adults. Moreover it is easy for the spider wasps to excavate their burrows within the sandy ground.

Unfortunately this fragile area lies totally within the Sizewell C red line boundary. The entire beach would be dug up for new defences. Despite the recommendations for habitat creation, as set out in the Hyder report of 2014 (APP-231, Annex 14A4.4, p. 68), there appears to be no commitment from EDF Energy to compensate for this loss. The presence of *Evagetes pectinipes* is particularly significant, as it is the first Suffolk record of this rare species, normally found only in sandy areas of Kent. The very least that EDFE could do would be to retain some of the habitat undisturbed, so that this could act as a resource from which the restored land could be re-colonised.

#### 12. SOLDIER FLIES

These flies, belonging to the Stratiomyidae family, have earned their common name due to their bright, often metallic colouring with regular patterns. They can be recognised by their distinctive hairy eyes and bodies. There are almost 50 species in the UK with a variety of habitats, but those at Sizewell with aquatic larvae are associated with the high quality wetland with drainage ditches. The adults like to sun themselves with wings folded flat.



### 12.1 *Odontomyia angulata*

This is the rarest of the soldier flies at Sizewell, listed as Red Data Book 1 and at risk of extinction. Black with striking green edging, it is confined to East Anglia only, mainly Norfolk, and requires very ancient ponds or still ditches that have exceptional fauna. It is extremely worrying that the larvae were found in a ditch directly adjacent to the SSSI triangle, that would be lost to the Sizewell C construction works. (Amec 2009/2014 in APP-231, Annex 14A4.3.) The newly created wetlands at Aldhurst Farm do not replicate the specific very old ditch habitat which the species inhabits. The applicant does admit that the Farm would take a long time to evolve satisfactorily.

### 12.2 Ornate Brigadier (*O. Ornata*)

*O. Ornata* is mostly found in grazing marsh ditches with fresh water and rich submerged and floating vegetation. The favoured ditches are at least 1 m wide and sympathetic management is crucial. Listed as Red Data Book 2, it is considered to be vulnerable and at risk of extinction should the causal factors continue, such as habitat loss, as here. It is particularly sensitive to the loss and degradation of fens. Amec surveyors recorded it in the same area as *O. angulata* (Amec 2009/2014 in APP231, Annex 14A4.3). It was also recorded directly under the Sizewell C footprint at the *Phragmites* fen near the footbridge. (APP-231: Table 1.4.)

### 12.3 Silver Colonel (*O. argentata*)

This species is instantly recognisable by the silvery hairs on its body. Males have occasionally been seen hovering and shimmering in groups. Females are largely dark brown. The favoured habitat of this Vulnerable species (RDB2) is fen and marsh, especially where there are shallow pools and ditches that dry up in summer. They can also be found in wet woodlands that have clearings, where the larvae have been reported in rotting alder wood. The adults are rather slow moving and will sit on the vegetation or seek nectar from hawthorn flowers or willow catkins. Their flight period is fairly brief, from April to early June. This species was once quite widely distributed, but its range has contracted significantly to just a small number of sites in East Anglia. (Amec 2009/2014 in APP-231, 14A4.3.)

These rare soldierflies are all seriously threatened by the proposed Sizewell C works.

## 13. GREAT SILVER WATER BEETLE (*Hydrophilus piceus*)

This Nationally Scarce species is classified under the IUCN Red List as Near Threatened. Despite its common name, it is not in fact silver, but black with a greenish hue. The silver appearance is caused by a bubble of air captured on the underside of the beetle by fine hairs. At 50mm in length, this is the largest aquatic beetle to be found in Britain.

Although a strong flyer, it is not a particularly good swimmer, and is seen generally crawling around on the water plants. The adults are mainly vegetarian, but will also feed on decaying organic matter, scavenge on carrions of fish and may eat small living invertebrates.

The larvae are mostly carnivorous with serrated mandibles. They eat water snails and may drag aquatic animals out of the water to disable them.

The favoured habitat of Great Silver Water Beetle is marshy peatland with ditches that have thick vegetation, precisely that found within the coastal grazing marshes of Suffolk. Loss of this fenland through drainage has been extremely detrimental to the survival of the beetle – hence its position on the Red List. It now faces further loss of habitat through the Sizewell C development. The area where it has recently been surveyed will be subject to extensive damage due to the re-alignment of the Sizewell Drain.

Moreover, functional linkage can well be established between the existing Great Silver Water Beetles in the reed-fen and pools of the adjacent Minsmere to Walberswick SSSI and SAC and those at Sizewell. The fragmentation that would be permanently caused by the new access road will significantly reduce the opportunities for dispersal and successful breeding of both this species and many others.

## **14. Conclusion**

While it has only been possible to look at a few of the 143 species of conservation concern known to inhabit Sizewell Marshes SSSI and surrounding designated sites, nevertheless the particular needs of these invertebrates reflect those of many others. It is therefore possible to draw some important conclusions from those presented here.

EDF Energy have made the assumption that the Aldhurst Farm habitat creation will offer sanctuary to all invertebrates affected by their construction proposals. This study shows that this is not at all the case. Some species need sunny woodland rides, others wet woodland, and yet others established grazing marsh and ancient reed-fen. None of these habitats is on offer at Aldhurst Farm.

It is not just direct habitat loss that will substantially reduce populations of rare species, but also other effects of the construction works, such as light pollution, dust and traffic fumes that will weaken remaining taxa.

A major concern is the length of time involved to build such a massive development compared with the very short lives of most species of invertebrates. The term 'temporary' cannot be accepted in this context, when this means in fact at least 12 years. There would be no time for many species to recover from such long-term destruction and disturbance of their habitat.

While some of the more common species that are able to adjust quickly to a new habitat may well colonise Aldhurst Farm, supposing that they have the means of getting there, others will not, due to their very special requirements.

The conclusion can only be drawn that some very rare specialists will not survive the Sizewell C development and those that are only found very locally are likely to become extinct.

## 15. Appendices

### APPENDIX 1.



*The Aldhurst Farm habitat creation has not been cared for and is completely overgrown with bindweed, with the lagoons no longer visible.  
(Photo: R. Fulcher, 2020.)*

### APPENDIX 2.



*Thistles and docks have overrun the 'acid grassland' at Aldhurst Farm.  
(Photo: R Fulcher, 2020.)*

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