The Sizewell C Project

6.3 Volume 2 Main Development Site

Chapter 14 Terrestrial Ecology and Ornithology

Appendix 14A8 Bats

Part 4 of 5

Revision: 1.0

Applicable Regulation: Regulation 5(2)(a)

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May 2020

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

SIZEWELL C DEVELOPMENT – MAIN DEVELOPMENT SITE: VOLUME 2, CHAPTER 14, APPENDIX 14A8 – Bats:

Documents included within this Appendix group are as follows:

- **APPENDIX 14A8 BATS**
- **ANNEX 14A8.1** – FIGURES (provided separately)
- **ANNEX 14A8.2** - DESK STUDY
- **ANNEX 14A8.3** – METHODOLOGY
- **ANNEX 14A8.4** - RESULTS
- **ANNEX 14A8.5** - SECONDARY DATA
- Annex 14A8.5 Amec Phase 1 Aldhurst Farm 2011
- Annex 14A8.5 Amec Aldhurst Farm Bat Survey 2012
- Annex 14A8.5 Amec Coronation Wood Bat Survey 2012
- Annex 14A8.5 Amec Sizewell Bat Survey Report 2007
- Annex 14A8.5 Amec Sizewell Bat Survey Report 2008
- Annex 14A8.5 Amec Sizewell Bat Survey Report 2009 (included in Part 2)
- Annex 14A8.5 Amec Sizewell Bat Survey Report 2010
- Annex 14A8.5 Amec Sizewell Bat Survey Report 2011 (included in Part 3)
- Annex 14A8.5 Amec Sizewell Hibernation Survey 2011
- Annex 14A8.5 Amec Upper Abbey Ecological Appraisal 2013

- Annex 14A8.5 Royal Haskoning Sizewell Power Station ISFSI and Car Park Extension Ecological Scoping Report 2008
- Annex 14A8.5 Galloper Wind Farm Chapter 5 ES Terrestrial Ecology
- Annex 14A8.5 Sizewell Land Management Annual Review 2013
- Annex 14A8.5 Sizewell Land Management Annual Review 2011
- Annex 14A8.5 Sizewell Land Management Annual Review 2012 (included in Part 4)
- Annex 14A8.5 Site Manager's Report May-Sep 2018
- Annex 14A8.5 Sizewell Annual Report 2014
- Annex 14A8.5 Sizewell B Annual Report 2017

• ANNEX 14A8.6 - PRIMARY DATA

- Annex 14A8.6 11H5.1 Hyder Cresswell 2013 Monitoring strategy
- Annex 14A8.6 Sizewell B Relocated Facilities Bat and Badger Technical Note [CONFIDENTIAL, provided separately]
- Annex 14A8.6 Sizewell B Relocated Facilities Bat Re-entry Emergence Survey 2019 Technical Note
- Annex 14A8.6 Bat Radio Tracking Drawings February 2016
- Annex 14A8.6 Bat Radio Tracking Report May 2016
- Annex 14A8.6 Automated Bat Detector Monitoring Report 2013-2014 (included in Part 5)
- Annex 14A8.6 Automated Bat Detector Monitoring Report 2013-2014 Figures
- Annex 14A8.6 Sizewell C Sandpits Technical Note [CONFIDENTIAL, provided separately]

NOTE:

Please note that the red line boundary used in figures within this document may have since been amended, and therefore does not reflect the boundaries in respect of which development consent has been sought in this application. However, the amendment to the red line boundary does not have any impact on the findings set out in this document and all other information remains correct.

SIZEWELL LAND MANAGEMENT

ANNUAL REVIEW 2012

SIZEWELL LAND MANAGEMENT

ANNUAL REVIEW 2012

SUMMARY OF THE YEAR

- Wettest year on record with over 957mm of rain and corresponding difficulties with land management and direct impact on many willdlife species.

- Amenity and Accessibility Fund launched in support of Suffolk Coasts and Heaths AONB and awards over 90K to support 10 local projects.

- Suffolk Wildlife Trust volunteers remove large area of scrub to improve habitat of the reed bed and remove gorse from Retsoms and Whinny Marsh.

- Natural England s assessment of Lower Abbey Marshes as part of the Minsmere- Walberswich Heaths and Marshes SSSI concludes they are in favourable condition.

- Reptile translocation and habitat enhancement completed on the site for the Emergency Response Centre at Sizewell B Railhead. 5 adder, 27 slow worm and 4 common lizards translocated within the railhead site.

- New Hedgerow Management Plan prepared.

SIZEWELL LAND MANAGEMENT

ANNUAL REVIEW 2012

INTRODUCTION

2012 began with a drought, but will be remembered, in England, as the wettest year since records began. The annual rainfall at Sizewell was 957mm, compared with just over 500mm in 2011, and was over 300mm more than the long term average. Over 80mm of rain fell in just two hours in July, which caused extensive damage to various tracks across the Estate. The bridleway on Broom Covert had a 1m deep channel gouged straight across the track making it totally impassable and required some 30 tons of material to repair. The Sizewell Belt marshes were water logged for long periods and the Leiston Beck was often too full to allow any water to discharge from off the marshes.

The poor spring weather meant that the numbers of times that bird recordings were undertaken had to be reduced, as many areas were simply too wet to access and often flooded. Therefore for many species the numbers recorded this year should be regarded as a minimum, and for some species the apparent decline is more likely to be due to the problems with recording due to the exceptional weather conditions, than an actual decline in their population.

Many migrant species were over 50% down in numbers due to weather conditions on migration. Also some species such as sedge warbler arrived 2-3 weeks later than usual, which coincided with the persistently wet spring weather, lack of a good feed source, and difficulties with recording.

Despite these problems, the number of breeding bird species recorded was 64, still above the site s average over the past 13 years, which typically varies between 57 and 67 species and included 12 Biodiversity Action Plan Priority Species. Casual recording around the remainder of the estate brought the figure up to 66 species, which included black redstart and kittiwake, with common buzzards finally nesting in Ash Wood also a single grasshopper warbler holding territory for the first time since 2000.

Overall, the number of bird territories has increased across the Estate, which indicates that the long term management is meeting its biodiversity objectives, and that generally the various habitats across the Estate are improving.

Weather conditions were particularly bad for butterflies this year with no white admirals recorded in Kenton Hills. However insects did remain flying until late in the year when weather was suitable, as a red admiral butterfly was seen on 22nd November.

Work on the site preparation for the Emergency Response Centre at the Sizewell B Railhead begun, and all reptiles have been captured and translocated away from the development area and the site is now ready for construction work to begin.

SIZEWELL BELTS SSSI AND LOWER ABBEY MARSHES

Sizewell Belts
Despite the weather the cattle managed to graze the whole site but were taken off in early autumn to prevent excessive poaching. However the marshes were always far too wet to attempt a hay cut.

Most of the marshes were topped following grazing, but five marshes were only grazed and could not be topped, due to being either water logged, or because the gateways or dyke crossings points were impassable. The gateways and crossing points were subsequently repaired by the ditching contractor, over winter, who also cleaned the dykes below Reckham Pits Wood and on Lower Abbey marshes.

The high water levels washed out the soil bund between Leiston Beck and Goose Hill Marshes, which resulted in high water levels on the marsh for most of the summer. This was also been repaired by the ditching contractor later in the year. Many gateways were rebuilt with wing fences and several lengths of fencing were completely replaced, including the section behind St James Covert.

As part of the regular management of the marshes, weeds were cleared from the sluices to ensure the water levels could be controlled and so that excess water could be discharged off the marshes whenever possible.

A large amount of scrub was removed from the reedbeds with the help from the Suffolk Wildlife Trust volunteers and a total of 45 man days were spent on the task. The high water levels have prevented the reed being cut this year as planned, but the work will be carried out next year when conditions are more suitable and new machinery will be available.

Lower Abbey Marshes
Natural England carried out a condition assessment of Lower Abbey Marshes as part of the Minsmere Walberswick Heaths and Marshes SSSI. This assessment found the marshes have remained in a Favourable condition, following the Favourable assessment in August 2009. The marshes passed all of the targets for vegetation and structure and for breeding birds and the full assessment findings are attached as Appendix 2 to this report.

Reedbeds
A large area of scrub was removed from the reed bed with the help of the Suffolk Wildlife Trust Mid Week Team, who along with three other volunteers contributed over 45 volunteer person days cutting and removing scrub willow and alder.

The characteristic boom of a bittern was heard in the reedbed, but unfortunately it did not establish a nesting territory

HEATHLAND

Leiston Common
The Exmoor ponies were taken off the common in February and moved to Knettishall Heath. The Hebridean sheep flock were turned back onto the common in early summer but on one occasion some managed to escape. Efforts to find, count, and retrieve black sheep one evening in the dark proved impossible. The lost sheep were found the next morning and returned to the flock. The sheep were removed in late August to allow some bracken control to be carried out.

Retsoms
Old leggy gorse was cleared off Retsoms and Whinny Hill by SWT volunteers contributing another 32 person days of work. A gate and hanging post had to be replaced on Retsoms and general fencing repairs undertaken before sheep could be introduced.

The Hebridean sheep have continued to have a positive impact on grazing the grass areas on Retsoms. However it was decided that sheep grazing was preventing the heather from reaching a mature phase as most of the heather was being grazed too short and that reducing the grazing pressure would help some of the plants mature and create a more diverse age and size range of heather plants. Consequently the sheep were removed and the field was rested over the summer. Before the sheep were re-introduced in November, the heather areas were protected with temporary electric fencing to prevent grazing.

The natterjack toad pond was netted to reduce predation and by around mid June there were about 5000 tadpoles starting to metamorphose ready to leave the pond. A second spawning occurred in early July, when a further 4-6 strings of spawn were noticed. The pond water overfilled due to the heavy rain and so the spawn may not have survived.

The bracken on Whinny Hill was treated by cutting and bruising. A bracken bruiser was borrowed from Redgrave and Lopham Fen NNR and used to control bracken as an alternative to applying Asulox which may not be available for use in the future.

WOODLAND MANAGEMENT

Ash Dieback *(Chalera fraxinea)*
The woodlands at Sizewell include many young plantations but fortunately ash trees were not often included in the tree planting mixtures for these woods as the soils at Sizewell are mainly light textured and prone to drought. Light soils and low rainfall favour the selection of other tree species, and therefore the Estate includes few ash trees.

However, an EDF Energy Protocol for Ash Dieback has been developed and will be implemented at Sizewell. The first stage will involve an inspection of the ash trees which will take place next summer and the subsequent reporting of any findings. Inspectors from Defra plant health department visited the Estate to check for incidences of the fungus.

Maintenance of Existing Woodlands and Plantations
The young Scots pine plantations in Goose Hill were assessed for losses and replanted. The Corsican pine regeneration within the plantations was controlled as the Forestry Commission are particularly concerned about the susceptibility of Corsican pine to red band needle blight, although all pines can be affected by the fungal disease. The Forestry Commission will allow some Corsican pine regeneration as long as it does not compete with the Scots pines and then expect the Corsican pines to be controlled at first thinning.

Due to the exceptionally wet spring and summer, no herbicides were applied to the newly planted trees, and maintenance of the restocked areas was undertaken by strimming, brush cutting, and mowing.

One advantage of the wet weather was that establishment rates of the newly planted trees were exceptionally high with very few losses in their first season. In addition, growth rates of established trees have been much higher than in drier years.

Fiscal Policy
An area of dead and windblown elms in Fiscal Policy woodland was cleared and replanted as coppice with standard woodland, using Hazel for the under storey of woody shrubs, and English Oak for the wide spaced canopy trees. Largely thanks to the wet weather, all of the trees and shrubs established well.

Deer Management
Deer management at Sizewell aims to reduce the impact of deer damage to trees, crops, and biodiversity generally. In addition to controlling the population of deer, the care of the young trees involves providing greater protection using taller tree tubes to remove the emerging trees above the browsing height of deer. A large number of tree tubes on susceptible young oaks and sweet chestnut trees were replaced with taller tubes.

In previous years deer control has been carried out throughout the year, but due to the decrease in Muntjac deer on the Estate, for which there is no closed season as Muntjac breed all year round, the deer control contract was not issued during the closed season for Red Deer which runs from 1 April until the 31 October.

The total number of deer controlled on the Estate this year is 34, slightly higher than last year, and of these, 5 were Muntjac and 29 were red deer. The assessment of the impact of deer damage on the Estate by periodically monitoring deer browsing on young trees is no longer possible as the trees are now fully protected above deer browsing height.

Kenton and Goose Hills Woodland
Edge trees at various marked locations along the ride sides in Kenton and Goose Hills were felled to maintain the woodland rides as open grassy areas and to create a degree of diversity on the woodland edge.

Tree Risk Identification and Management
The Tree Risk Identification and Management Strategy was revised and reissued, and the annual inspection of trees carried out in the summer. Informal observations are an integral part of the revised strategy and all reports or concerns about tree safety are passed on, so that a formal inspection can be carried out at the first opportunity and any necessary work undertaken in a timely fashion.

Dead trees are retained wherever possible at Sizewell because of their benefit to wildlife, but the condition of many of the Estate s elms continues to decline and they have to be felled when they become a hazard.

A group of dead elms in Kenton Hills with known potential for bats had been recorded as hazardous and were marked for soft felling. Natural England were consulted and an arboricultural method statement for the soft felling was prepared. The work did not require a license, but would be undertaken under the supervision of a licensed bat worker. Another contractor working elsewhere on the Estate had been instructed to carry out some tree work, and they mistakenly felled the group of dead elms, as they were marked with orange tree marker, similarly to other trees that had been marked for felling. The incident was fully investigated and ADAS were reminded that pre-job briefs should be given to all contractors and all contractor operatives need to attend.

Several large trees were blown over or damaged by the strong winds in early January. A large old oak at Upper Abbey Farm came down, and a large Poplar by the footbridge over the dykes in Goose Hill snapped off at the base.

A large Monterey Cypress tree in the front garden of one of the cottages at Lower Abbey Farm was felled as it was considered hazardous. The tree was leaning towards the cottage and for safety reasons was felled using a mobile elevated working platform.

The last remaining Poplar by the foot bridge in the southern part of Goose Hills was identified as having honey fungus, a common root disease of trees which also causes decay in standing trees. Honey fungus *(Armillaria)* was confirmed on felling, where the tree showed the characteristic signs of a mycelium sheet under the bark, with black bootlace-like rhizomorphs, and tissue decay. The tree was very close to the watercourse and a footpath and required rebalancing prior to being safely felled.

ABBEY FARMS

Winter Bird Feed Crop
The bird cover plot was sprayed off in early spring to reduce the amount of thistle and several loads of farm yard manure were applied before ploughing in and seeding. Rabbit browsing of the feed crop has become worse, and new fencing will be required.

Hedgerows
The hedgerows on the Estate were cut before the deadline of 1st March, and work this winter included cutting the hedge along Eastbridge Road, following a comment from a local parishioner. The hedgerow cutting plan was amended to make sure that in future the roadside hedge is managed on a regular basis.

The Estate hedgerows were re-surveyed and a revised Hedgerow Management Plan has been prepared. The revised plan includes a thorough description of the hedges

and recommendations for appropriate management in line with the vision for the eventual operational landscape as part of the Nuclear New Build proposals.

The field margins were all cut and the material collected using the SWT Rytec flail mower.

SIZEWELL FORESHORE

The replacement interpretation board was erected and the steps through the dunes were repaired in the spring

There were quarterly meetings of the Sizewell Shoreline Management Group looking at the effects of coastal processes and monitoring the changes. The northern section on the site continues to erode.

The temporary beach fence was erected which helps prevent trampling of the shingle flora, and resulted in a good display of both sea pea and sea kale. The enclosed area also provides a suitable breeding site for ringed plover, although none nested.. The fence was in place throughout the spring and summer and removed in the autumn. The two sets of steps to the beach are showing signs of wear and will be replaced next year.

COMMUNITY

A Green Team from Suffolk County Council Archaeology unit helped with work on the reed bed. Over 77 hours of volunteer time have been contributed to the management of the Estate during the year.

The SWT wardens led a dawn chorus walk on 5 May attended by 8 people but a general wildlife walk on 14 April attracted only three people two of which were on holiday and staying locally. A general guided walk held in June was attended by 16 people.

Over 20 members of the station outage team spend a hot day in July cutting parts of the grazing marshes at the Suffolk Wildlife Trust s Darsham Marshes reserve. Parts of the reserve are too wet for machinery to access so have to be cut by hand or with a small mower. The cutting maintains the floristic diversity and stops the grass from becoming rank as well as the reeds from encroaching.

The Helping Hands project allows employees to help in the community by volunteering to support social, environmental and educational projects during company time. This was the first time a team from Sizewell had carried out work under the Helping Hands banner.

Sizewell B Amenity and Accessibility Fund

Planning permission was granted in July 2011 for the new Dry Fuel Store at Sizewell B. The Amenity and Accessibility Fund was developed to mitigate the impact of the new Dry Fuel Store on the Area of Outstanding Natural Beauty (AONB). The fund was designed to support projects that improve the amenity and accessibility of the AONB within the locality of Sizewell B and its environs. The main aims of the fund are to:

- Improve the environment and natural character of the area
- Conserve habitats and species
- Increase the enjoyment and experience of the AONB for residents and visitors
- Conserve and enhance the area s natural beauty
- Improve the visual appearance of the area
- Improve sustainable access to the area.

An initial 120,000 was paid into the Fund by EDF Energy in 2012 with further annual payments of 20k per annum to be paid.

A total of some 90k was awarded in 2012 to ten projects from both professional organisations and individuals:

- Warden s Charitable Trust, Sizewell - 25, 125 to enhance the site for visitors including the disabled
- RSBB - 9,700 to install a viewing platform and interpretation at North Warren/ Aldringham Walks
- Tunstall & Rendlesham Off-Road Group - 1000 for waymarking of 10 mile mountain bike trail in Tunstall Forest
- EU Balance Inspirational Information Group - 12,100 for interpretation along the Suffolk coast
- Suffolk Coast Ltd - 12,000 for a tourist app information guide
- Suffolk Prambling - 5,000 to produce 10 walking guides and a website for families with prams
- Dunwich Greyfriars Trust - 5,000 to provide interpretation to this heritage site

- Suffolk Wildlife Trust - 12,190 for habitat restoration, visitor improvements and learning activities at Dunwich Forest, Dingle Marshes, Hazelwood Marshes and Sizewell
- Eastfeast - 4,575 to provide fun environmental learning events for three local schools
- Sizewell Hall - 5,000 to develop a nature trail including disabled access.

The Fund is being managed by EDF Energy, Suffolk Coastal District Council and Suffolk County Council in consultation with Suffolk Coast and Heaths AONB

SIZEWELL B EMERGENCY RESPONSE CENTRE

As part of the planning of the Emergency Response Centre for Sizewell B, an ecological survey identified the presence of 4 species of reptile on the site which are protected by law: adder, slow worm, common lizard and grass snake. Prior to the start of construction, a reptile fence was erected and a programme of capture and translocation undertaken, supervised by an ecologist. A total of 5 adder, 27 slow worm and 4 common lizards were safely released onto a receptor site where the habitat had been enhanced for them with the construction of a hibernaculum, a log pile and a brash pile as well as scrub clearance to ensure the south side of the hibernaculum was not shaded from the sun. A habitat management plan has been drawn up to ensure the population of the reptiles on the site is conserved for the future. The ecological mitigation work has also helped to achieve an initial BREEAM assessment of Very Good for the project.

EDF ENERGY INTER SITE BIRD CHALLENGE 2012

Sizewell came third in the EDF Energy inter-site bird challenge with a total of 160 bird species recorded using the estate. Particular highlights included the sightings of Great White Egret and Glossy Ibis back in February, whilst winter favourites Waxwing and Snow Bunting were recorded in the latter part of the year.

SIZEWELL NEW BUILD REPTILE HABITAT CREATION

Kenton and Goose Hills Woodland
The open areas in Kenton Hills and in St James Covert are developing well and were sprayed to control bracken using Asulox in August. The areas were subsequently left undisturbed until late autumn to allow adequate translocation of the herbicide and then flailed to remove bramble and bracken and to encourage the heathland type acid grasses.

St James Covert
St James Covert now has a rich mosaic of native woodland, shrubs and grassy open areas. The open grassy rides and glades have been managed by spraying and by mowing, and have been fenced to exclude reptiles. The perimeter of the fence, on

the outside, was cut to prevent vegetation forming a bridge over the fence which could be used by reptiles to enter the excluded areas.

Estate Ex-arable Land, Part Rosery, White Gates and Red Rails Fields
Red Rails and White Gates fields were too wet to top in spring and early summer. When conditions were suitable and would have allowed the fields to be cut, it was decided that the volume of grass as cuttings would have a detrimental effect on the sward. The fields were therefore sheep grazed and then the grazing aftermath was topped.

The central area in Red Rails field was cut and baled as hay.

Field voles have been found under 18 of the 24 sections of corrugated steel sheeting used to assess their presence in Red Rails field. The outside edge of the perimeter fencing in both Red Rails and White Gates Fields was also cut to prevent a vegetation bridge for reptiles forming.

BIODIVERSITY MONITORING

Breeding birds
All the usual areas were fully surveyed using BTO Common Bird Census methodology. See table in appendix for full results.
A total of 12 Biodiversity Action Plan species were recorded breeding. 2012 saw increases in skylark, song thrush (>50%), but declines in yellowhammer and reed bunting. The declines may be due to the poor weather in May reducing recorder effort and the amount the birds were singing. Skylark and song thrush sing much earlier and are therefore more likely to have been recorded.

Wintering birds
The winter Wetland Bird Survey (WeBS) was carried out from September to December alongside the Farmland bird survey.
See tables in appendix for full results

Water voles
The annual survey was carried out and results submitted to the National Key Sites project. The results show a stable population.
Details of the survey can be found in the species section of this report.

Otters
Spraints and tracks have been found throughout the year indicating a continued presence.

Bats
Natterers bats were found in the Kenton Hills bat boxes for the second time.

Brown hare
Sightings were recorded throughout the year. Animals were recorded on the all monthly farmland bird counts

Amphibians
Monitoring of the natterjack reintroduction continues. Results are in the amphibian section of this report.

Dragonflies
Only blue tailed damselfly and common red darter recorded in Lower Abbey pond

Moths
The Suffolk Moth Group had a trapping session on 4th June.

Butterflies
No transect surveys were carried out due to the ill health of our surveyor

Adders
Monitoring projects are running both on the reptile plots at Upper Abbey and on Black Walks

Reedbeds
Vegetation surveys are undertaken every two years with the result details reported in the Fen vegetation monitoring programme report ELP July 2012. The current condition assessment is favourable.

Wet Woodland

No monitoring required, area stable

Coastal Grazing marsh
Monitoring undertaken for vegetation Site in favourable condition, see ELP report and summary in this report.
Breeding bird, WeBS and water vole monitoring undertaken.

Vegetated shingle
Area temporarily fenced for ringed plover and shingle vegetation. No breeding ringed plover.

Coastal dune monitoring
No monitoring undertaken

Lowland dry acid grassland
No monitoring undertaken

Cereal field margins
Winter farmland bird surveys undertaken

Fens
Monitoring undertaken for vegetation Site in favourable maintained condition, see ELP report and summary in this report.
Breeding and wintering bird survey undertake

Species Recording

Plants
Fen Meadow monitoring
The fen meadow-monitoring programme entered its sixteenth year. A number of quadrats have been set up and are visited every two years on a rolling programme of visits. Changes are recorded and the results related to either management or natural fluctuations. A full report has been produced by Jonny Stone of OHES Environmental.

The summary for the 2012 survey is as follows;
The eight permanent plots in compartments G19, G37, G39, G42, G59, M12, Y and Z were re-surveyed on 13th and 16th July following an extremely wet early summer rainfall. At the time of survey, all plots were saturated to the ground surface, but only Plots 39, 42 and M12 were inundated. It is likely that seedling recruitment has been affected in most plots.

Levels of species-richness, sward height and plant litter cover were all found to be favorable on the Belts plots, with some plots, especially G37, in excellent condition. A number of new bryophyte records were made (especially in Plot G39), reflecting, it is believed, the continued progress in reducing the height of rush cover and promoting higher light levels on the wet ground. Plots Y and Z remain noticeably less species and continue to lack the fen meadow specialist plants that are abundant on the Belts.

The second site condition assessment form for the SSSI units will be combined with the results of the 2011 survey, for submission to Natural England.

Invertebrates

Butterflies

SWT volunteer Trudy Seagon set up butterfly transects along the Upper Abbey Farm field margins in 2004 and has repeated the survey annually since that time. A total of 22 species were recorded in 2007 the same as 2006. This is probably the peak species count having started with 19 species in 2004. The 2008 survey reflected the weather with only 16 species recorded and a total of 336 individuals compared to 1591 in 2007. The 2009 season was a great improvement with a dry summer contributing to a species total of 20 and 1889 individuals, the highest individual total since the survey began. In 2010 the numbers recorded dropped back to the 2007 level with 1537 individuals recorded however the species count increased by two to 22 equalling the previous best counts.

The total number of individuals increased to an all time high in 2011 with 2094 butterflies seen over 24 visits however only 16 species were recorded
Unfortunately Trudy was taken seriously ill this summer and was unable to carry out the survey. Weather conditions were particularly bad for butterflies with no white admirals recorded in Kenton Hills. However insects did remain flying late in the year when weather was suitable as a red admiral was seen on 22nd November

Dragonflies

Norfolk hawker: Adults and tenerals (freshly emerged insects) seen in good numbers on the Belts
Banded Demoiselle: Seen in small numbers at two places on site. On Lower Abbey Farm marshes along the main Minsmere River and on Goose Hill marshes along the Leiston Beck.
Emerald Damselfly**:** Seen in small numbers on Goose Hill marshes.
Large Red Damselfly: Common around the site.
Azure Damselfly: Very common on site.
Blue-tailed Damselfly: Common on site.
Small Red-eyed Damselfly: Now common on site
Southern Hawker: Common on site
Migrant Hawker: Common on site
Common darter: Some seen flying as late as 22nd November

Moths

The Suffolk Moth Group held a trapping session on 11th May. We are awaiting results form this visit.

Ant lions

The number of pits varies from year to year with weather and vegetation growth however the work carried out in 2007 proved beneficial. The 2008 count was 123 pits in the cattle yard and 89 in the new area outside. This was low compared to the peak count of 900 in 2004 but weather conditions and rabbit activity were the likely limiting factors. The 2009 survey showed an overall increase with 377 pits in the cattle yard and 105 pits in the new area. The dry early summer in 2010 proved productive with a total of 1032 pits, the highest figure since the colony was discovered. The colony continued to expand with a slight increase of 1100 pits in 2011. The wet weather obviously had an impact on the 2012 season as only 550 pits were counted. Rabbit activity continues to make monitoring difficult with the ground being constantly disturbed.

Mammals

Otters
Spraints and foot prints were regularly found throughout the Belts indicating a year round presence; there was one sighting in 2012 on Salt Marsh on 14th February.

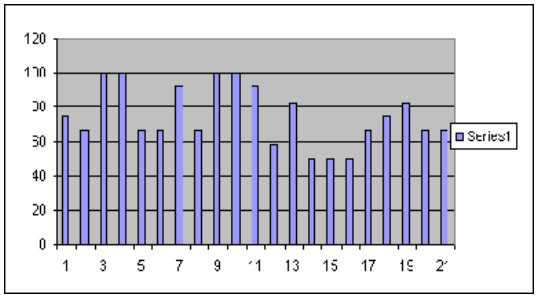
Badgers
The original set in Ash Wood continues to expand with several outlying holes dug throughout the wood and a second large sett is regularly occupied on the north side of the central ride. The animals have continued to expand their colonisation and additional sets have been appeared around the Estate including one in the pit beside Upper Abbey Farm.

Water voles
The National Key Site monitoring programme continued with just autumn surveys as per the Royal Holloway College recommendations.

Percentage of transects at Sizewell NKS for Water Voles with active signs of water vole presence

at each survey 2001 - 2012

Date	Pos	Neg
Spring 01	75	25
Autumn 01	67	33
Spring 02	100	0
Autumn 02	100	0
Spring 03	67	33
Autumn 03	67	33
Spring 04	92	8
Autumn 04	67	33
Spring 05	100	0
Autumn 05	100	0
Spring 06	92	8
Autumn 06	58	42
Spring 07	83	17
Autumn 07	50	50
Spring 08	50	50
Autumn 08	50	50
Spring 09	67	33
Autumn 09	75	25
Autumn 10	83	17
Autumn 11	67	33
Autumn 12	67	33



positive=presence of fresh feeding signs and/or droppings

negative=no fresh field signs present

Spring=May

Autumn=September

The 2012 survey was as predicted and the numbers increased showing cyclical population changes commonly found in all vole species when in a stable environment with no predation by mink. The requirement for UK analysis is now just one survey per year in the autumn, when the peak number of voles is present, due to juvenile recruitment.

Bats
The natterers bats were not evident in the barn until September suggesting they bred elsewhere and returned when the young were flying.
The annual bat box check in Kenton Hills was carried out in October. Seven boxes were occupied at the time with others showing signs of occupancy during the year. Three species of bats were found totalling 2 soprano pipistrelles, 3 noctules and 21 natterers bats.

Deer
Regular counts were made of red deer and muntjac throughout the year. No other species were recorded.

Reptiles and amphibians

Natterjack toads
Following the creation of two ponds on Retsoms in 2004 specifically for natterjack toads a three year introduction programme started in 2005. Tadpoles were brought from Holme NNR in Norfolk and released into both ponds and this was repeated in 2006. One pond has a butyl liner and the second was constructed using bentonite clay. The bentonite clay pond has proved to be problematic and now no longer holds water. The butyl lined pond continues to function well and is pumped dry each winter to remove potential predators (water beetles and dragonfly larvae) and allowed to refill naturally with rain water. A permanent low fence was installed around the pond in 2009 and has allowed for improved protection supporting lengths of garden netting to prevent avian predators gaining access to the pond perimeter. The toads spawned in 2010 with some 2500 tadpoles seen feeding however no toadlets were known to have emerged but at least the adults appear to have survived the cold winter. Following a second consecutive cold winter 2011 proved to be the best ever year for the toads. The first strings were laid in April from which toadlets emerged and a second spawning occurred in late July resulting in yet more successful metamorphosis.


Juvenile natterjack toad Photo: Dayne West

In 2012 the toads produced 8 strings of spawn on 28th April resulting in many hundreds of tadpoles. The pond was covered with netting to reduce predation and by mid June there were around 5000 tadpoles starting to metamorphose ready to leave

the pond. A second spawning occurred in early July, when a further 4-6 strings of spawn were seen. The pond water soon after was cloudy with the excessive rain and so this spawn did not survive.

Reptiles
Two monitoring projects were set up one on Black Walks and the other on the reptile mitigation areas on Red Rails and White Gates.

The project on Black Walks was designed to see if reptiles were present on site in case it was suitable for translocation of animals from elsewhere on the estate. However as could be expected reptiles are present and a mature adder was found almost immediately.

The second project was to check the efficiency of the fencing designed to keep the animals out as the site is being developed as a receptor site. However gaps in the fence had already allowed animals through and a grass snake and adder were found under the tins. On a positive note large numbers of short tailed field voles were found indicating a good food source for both reptiles and barn owls is developing.

Sizewell Bird Report 2011

The details of the breeding and wintering surveys are to be found at the end of this report.
The following is a list of birds recorded on the estate during the period of this report but only refers to significant species and is not a total species list.

Systematic list;

Bittern	A bird was flushed on the belts on 13th February and a bird was heard booming in the reedbed for three days in March
Little egret	This species is now regularly seen on the estate.
Grey heron	Birds are present throughout the year. A single pair again nested in Sizewell Went
Glossy ibis	A single bird was seen on site on 24thFebruary, this a first for the Estate.
Gadwall	Four territories were located the steady decline is mirrored nationally.
Common Buzzard	A pair nested in Ash Wood, the first time this species has nested on the estate
Goshawk	A single bird was reported by AMEC surveyors over Goose Hill on 8th February.
Hobby	One pair held territory on the estate and birds were still on site in October
Merlin	A single bird was seen on 15th February
Jack snipe	Single birds were seen on 8th February and 16th March

Turtle dove	Only one territory was recorded on site
Cuckoo	Only one territory was located on the estate
Barn owl	Birds have been present throughout the year though no nest was found
Woodlark	The decline of this bird continues with no birds recorded holding territory on the estate for the past four years.
Skylark	Only 6 territories were found but the survey was incomplete as not all of the arable land was surveyed however this does indicate a continued decline.
Pied wagtail	A pair nested under the bonnet of the tractor raising 4 young but their second clutch was washed out during heavy rain
Waxwing	A flock of 10 birds were roosting on the Belts on 19th December
Nightingale	Three birds held territory a slight increase on previous years
Black redstart	Two pairs are thought to have bred within the power station fences.
Cettis warbler	Only 9 territories were found a 77% decrease on 2011, it is likely the severe winter and heavy spring rain are the main factors
Willow warbler	Again a welcome increase with 6 territories recorded compared to just one territory in 2010
Nuthatch	A single bird was seen in Reckham Pits Wood on 2nd April, the first sight record for over 10 years
Reed bunting	Only 1 territories located but some survey areas were difficult to access.

Summary

The key areas of the estate are surveyed during the breeding season using the BTO s Common Bird Census method of mapping all territories with the exception of the field margins which are treated as transects as in the BTO s Breeding Bird Survey methodology.

The poor spring weather meant that the recording effort was reduced and some areas were very difficult to access due to flooding. Therefore for many species the totals should be regarded as a minimum, so for some species their apparent decline is solely due to recorder effort/weather conditions.

The number of breeding species recorded in the survey areas totalled 64, still above the sites average over the past 13 years. Casual recording around the remainder of the estate brought the figure up to 66 species, which included black redstart, and kittiwake.

Common buzzards finally bred on site with a pair nesting in Ash Wood also a single grasshopper warbler held territory for the first time since 2000.

Many migrant species were over 50% down in numbers most likely due to weather conditions on migration but also some species such as sedge warbler were 2-3 weeks later than normal arriving which then coincided with the poor spring weather and so recording was difficult.

The water levels rose quickly on the marsh and probably accounts for the reduction in moorhen numbers.
A total of 11 Biodiversity Action Plan species were recorded breeding. 2012 saw declines in yellowhammer and reed bunting but this may well be weather related.

The WeBS counts cover both winter periods where it was notably cold for the first with much of the site frozen for most counts.

The farmland winter bird counts continued. This survey began in 2001 and concentrates on the arable fields at Upper and Lower Abbey farms.

Sizewell Breeding Birds 1999 2012
Losses and Gains over 14 years at Sizewell

Breeding bird surveys have been undertaken on parts of the Sizewell Estate since 1993. In that time the estate has grown in size from initially comprising of just the A & B sites and Kenton & Goose Hills to the present 821 hectares of land consisting of the former Sizewell Hall estate including Sizewell Belts and also Upper and Lower Abbey Farms.

The total area has now remained unchanged since 1995 when the Upper and Lower Abbey Farms were purchased. Whilst the Belts have always been systematically recorded other areas have gradually come into the surveying programme and so to provide some meaningful long term data for the purpose of this report we have used 1999 as the start point. Since then all the recording has been standardised and consistent and so year on year comparisons can be made. There are still some species which occur but do not get regularly recorded such as house martins on some of the buildings and the black redstart nesting around the power stations.

The results are in the appendix and show how over time the fortunes of the various species fluctuate. Within the table is the current national status of each species, i.e. declining, declining by >25%, >50%, stable or increasing. Of the total number of species found breeding on the estate 39 are in national decline in varying degrees. Water rail and tawny owls are not surveyed annually and so yearly comparisons cannot be made, however it is considered that both species survive in stable populations.

The overall number of species breeding annually varies between 57 67 but overall the number of territories has increased which probably points to a general improvement in habitat across the estate.

Some 81 different species have bred over the 14 year period, in that time eight species have been lost as breeders and only three new species added.

Species lost; **Species gained**

Shoveler
Grey partridge
Ringed plover
Redshank
Lesser spotted woodpecker
Woodlark
Spotted flycatcher
Common buzzard
Collared dove
Cettis warbler

Declining species
Pheasant
Skylark
Garden warbler
Sedge warbler
Willow warbler
Coal tit
Linnet
Yellowhammer

Increasing species
Great spotted woodpecker
Song thrush
Long tailed tit
Chaffinch
Greenfinch
Goldfinch

Species breeding sporadically
Oystercatcher
Lapwing
Stonechat

Overall the trends on the estate mirror national trends which, leads to conclude that much of the declines are subject to external forces beyond the control of localised management.

Ringing Report Sizewell Estate 2012

Bird ringing took place in two locations on the Sizewell Estate during 2012. However, the poor weather, the wettest year on record, again restricted the amount of ringing carried out.

Upper Abbey Farm. Ringing was carried out here as part of the Foraging Farmland Bird Project (FFBP). The project involves catching birds utilising plots planted with a seed mix designed specifically to grow seed bearing plants. This is the second winter of the project. A minimum of five three hour ringing sessions between November and March each winter is required. In reality, many more sessions are carried out. All birds captured are ringed or re-processed but the target species of the project are Linnet, Tree Sparrow, Yellowhammer and Reed Bunting and, added this year, Dunnock.

The year began with five sessions from the 9th January to the 21st March. Only 34 birds were either captured or recaptured during these sessions, less than half of the total in the corresponding period in 2011. Of note was the early Chiffchaff ringed on the 21st March.

A further five sessions were possible between the 16th November and the 16th December when 70 birds were captured or recaptured including some target species Dunnock and Reed Bunting.

Retsom s Field. Ringing was carried out here during the autumn. The site is a small oasis of scrub and reed in the middle of open marsh and pasture and attracts both migrant and resident species. A total of 12 sessions between the 15th August and the 29th October saw 226 birds trapped and either ringed or reprocessed. By far

the most numerous species was Meadow Pipit with 95 captures including one ringed elsewhere, details of which are still awaited from the BTO. Of interest was one Common Whitethroat which was captured four times between the 5th and the 27th of September as it lingered in the same spot whilst it fattened up before undertaking it s migratory journey to the Iberian Peninsula or possibly even further to West Africa. Inward migration was noteworthy on the 21st of October when a fall of thrushes saw the capture of three Redwings, three Robins, Blackbird and Song Thrush.
Again during 2012 there was much evidence of local movement between Leiston, RSPB Minsmere and Sizewell Estate. This included a Green Woodpecker which had been ringed on Retsom s Field on the 20th September 2008 and recaptured at Minsmere on the 29th October 2012. Other notable movements were a Reed Warbler ringed at Hollesley, 22Km south, and re-trapped five days later at Retsom s Field and a Lesser Redpoll first ringed at the Retsom s Field site and re-trapped 16 days later at Kessingland coincidentally 22Km to the north! Three other birds, a Meadow Pipit, Sedge Warbler and Reed Bunting were re-trapped at Retsom s Field but original ringing data is still awaited from the BTO. Also of note was the Great Tit ringed at Upper Abbey Farm on the 11Th of November 2006 and recaptured on the 27th November 2012. It had been aged as a first year bird in 2006 so was a few months over six years old.

Carl Powell
Dec 2012

RINGING TOTALS SIZEWELL ESTATE 2012

Species	Adult	Pulli	Control	Total
Meadow Pipit	94		1	95
Wren	9			9
Dunnock	6			6
Robin	9			9
Blackbird	7			7
Song Thrush	1			1
Redwing	3			3
Cetti s Warbler	1			1
Sedge Warbler	3		1	4
Reed Warbler	17		1	18
Whitethroat	15			15
Chiffchaff	1			1
Willow Warbler	1			1
Goldcrest	3			3
Long tailed Tit	29		8	37
Coal Tit	1			1
Blue Tit	24		2	26
Great Tit	19			19
Jay	1			1
Chaffinch	14			14
Greenfinch	2			2
Goldfinch	2			2
Lesser Redpoll	8			8
Bullfinch	3			3
Reed Bunting	6		1	7
Totals	279		14	293

BIRD RETRAP HISTORY
EDF ENERGY SIZEWELL ESTATE

Birds ringed/recaptured/controlled by Carl Powell 2012

SPECIES	RING NUMBER	AGE/SEX	DATE	PLACE
Green Woodpecker	DR34182	4	20.09.08	Retsom s Field
		3?	28.10.12	Minsmere
Meadow Pipit	D117268	Details awaited from BTO		
		3	29.10.12	Retsom s
Wren	DAN965	3	23.09.11	Retsom s
		5	27.08.12	Retsom s
Wren	DAN998	3J	21.08.12	Retsom s
		3	17.09.12	Retsom s
		3	22.10.12	Retsom s
Dunnock	Y166094	3	14.11.11	UA Farm
		4	23.02.12	UA Farm
Dunnock	Y166172	3	02.12.11	UA Farm
		5	13.01.12	UA Farm
Dunnock	Y166210	3	30.12.11	UA Farm
		5	03.02.12	UA Farm
Robin	D119182	3	06.12.12	UA Farm
		3	16.12.12	UA Farm
Robin	Y166135	3	21.11.11	UA Farm
		3	02.12.11	UA Farm
		5	03.02.12	UA Farm
Robin	Y166228	5	09.01.12	UA Farm
		5	13.01.12	UA Farm
Cetti s Warbler	D119022	3M	21.09.12	Retsom s
		3M	04.10.12	Retsom s
		3M	22.10.12	Retsom s
Sedge Warbler	D047483		Details awaited from BTO	
		3	27.08.12	Retsom s
Reed Warbler	D079395	3	16.09.12	Hollesley, Suffolk
		3	21.09.12	Retsom s Field
Reed Warbler	Y166482	3	17.09.12	Retsom s
		3	21.09.12	Retsom s
Whitethroat	Y166421	4	15.08.12	Retsom s
		4	05.09.12	Retsom s

Whitethroat	Y166425	3J	21.08.12	Retsom s
		3J	27.08.12	Retsom s
Whitethroat	Y166428	4	21.08.12	Retsom s
		4	05.09.12	Retsom s
Whitethroat	Y166432	4	27.08.12	Retsom s
		4	17.09.12	Retsom s
Whitethroat	Y166459	3	05.09.12	Retsom s
		3	13.09.12	Retsom s
		3	17.09.12	Retsom s
		3	27.09.12	Retsom s
Whitethroat	Y166464	3	13.09.12	Retsom s
		3	17.09.12	Retsom s
Whitethroat	Y166480	3	17.09.12	Retsom s
		3	27.09.12	Retsom s
Long tailed Tit	DAN977	2	21.11.11	UA Farm
		4	21.03.12	UA Farm
Long tailed Tit	DVA549	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA550	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA552	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA557	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA559	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA565	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA571	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Long tailed Tit	DVA572	3J	25.05.12	Minsmere
		2	17.09.12	Retsom s
Blue Tit	D119023	3J	21.09.12	Retsom s
		3	29.10.12	Retsom s
Blue Tit	D119183	3	06.12.12	UA Farm
		3	16.12.12	UA Farm
Blue Tit	L276565	1	24.05.10	UA Farm
		4	25.08.11	Minsmere

		4	26.07.12	Minsmere
Blue Tit	L651520	5F	11.01.11	UA Farm
		5F	01.03.11	UA Farm
		4	14.11.11	UA Farm
		4	27.11.12	UA Farm
Blue Tit	L651523	5M	24.01.11	UA Farm
		6	16.02.12	UA Farm
		4	21.03.12	UA Farm
Blue Tit	L722972	3J	11.08.11	Minsmere
		5	16.02.12	UA Farm
Blue Tit	Y166099	3	14.11.11	UA Farm
		5	16.01.12	UA Farm
Blue Tit	Y166116	3F	16.11.11	UA Farm
		5	03.02.12	UA Farm
Blue Tit	Y166136	3	21.11.11	UA Farm
		5	09.01.12	UA Farm
Blue Tit	Y166280	5	16.02.12	UA Farm
		4	22.09.12	Minsmere
Blue Tit	Y278579	3J	30.08.12	Minsmere
		3	22.10.12	Retsom s
Great Tit	D119158	4M	18.11.12	UA Farm
		4M	16.12.12	UA Farm
Great Tit	D119159	3	18.11.12	UA Farm
		3	16.12.12	UA Farm
Great Tit	T698584	3M	11.11.06	UA Farm
		6M	22.01.08	UA Farm
		6M	10.04.10	UA Farm
		4M	10.12.11	UA Farm
		4M	27.11.12	UA Farm
Great Tit	Y166108	3M	16.11.11	UA Farm
		4M	03.02.12	UA Farm
Chaffinch	D119155	3F	16.11.12	UA Farm
		3F	16.12.12	UA Farm
Chaffinch	D119165	3F	27.11.12	UA Farm
		3F	06.12.12	UA Farm
Chaffinch	L967923	3	06.08.11	43 Abbey Road
		4M	15.10.12	Retsom s
Lesser Redpoll	D119062	3	27.09.12	Retsom s Field
		3	13.10.12	Kessingland

Reed Bunting	D047250		Details awaited from BTO	
		3M	21.09.12	Retsom s Field

Note 1: 43, Abbey Road, Leiston is the home address of Carl Powell. The distance to Upper Abbey Farm ringing site is approximately 1 mile. The distance to Retsom s Field ringing site is approximately 2.3 miles.

Note 2: Minsmere is the RSPB Reserve immediately to the north of Sizewell Estate. Minsmere and Upper Abbey Farm ringing sites are approximately 2 miles apart.

Note 3: Retsom s Field is on the Sizewell Estate. Upper Abbey Farm and Retsom s ringing sites are approximately 1.5 miles apart. Retsom s and Minsmere ringing sites are approximately 1.25 miles apart.

APPENDIX 1

Sizewell WeBS counts 2012							
	16.01.12	13.02.12	12.03.12	17.09.12	15.10.12	19.11.12	17.12.12
Little grebe	1						
Cormorant						1	
Bittern		1					
Little egret	1	2	2		2	1	
Grey Heron		3		6	3	5	4
Mute Swan	11		2	9	12	10	12
Greylag goose			2		1		
Canada goose						2	
Shelduck						1	
Wigeon	11						
Gadwall	4			4	13		7
Teal	13	48	10		12		4
Shoveler						4	
Mallard	19	26	13	3	28	34	13
Tufted duck						10	
Water rail			2			1	
Moorhen	4	4	1	7	8	8	3
Coot							
Lapwing		1			3	6	
Snipe	16				3	7	7
Oystercatcher					1		
Woodcock		2					
Black tailed godwit		2					
Curlew					1	1	
Marsh harrier	1						
Kingfisher						1	

Farmland winter bird counts Upper Abbey Farm Leiston 2012						
Species	23-Jan	16-Feb	12-Mar	15-Oct	19-Nov	18-Dec
Greylag goose	6					
Marsh harrier				1		
Kestrel			1		1	2
Red legged partridge	14	10	8	19	20	7
Pheasant	8	6	7	21	28	4
Lapwing					1	
Woodcock	5	3				3
Wood pigeon	53	30	19	141	108	25
Stock dove					4	
Barn owl	1				1	2
Great spotted woodpecker				2		2
Skylark	16	12	6		7	21
Meadow pipit	16	10	2			3
Pied wagtail	7	1	2		7	9
Dunnock	4		1	1		
Robin	2	1	2			1
Wren	2		2			1
Blackbird	3	1	2			5
Song thrush	1	2	1	1		
Redwing					1	
Long tailed tit	4		2			8
Blue tit	6		5		7	3
Great tit	8	2	3		5	5
Goldcrest					3	
Jay			1	6	6	1
Magpie	2	1	1	4	5	
Jackdaw	9	7	2		73	10
Rook	77	58	41	67	185	20
Carrion crow	12	14	18	9	48	33
Starling					1	
House sparrow				11	6	
Chaffinch	11	6	4	2	35	10
Greenfinch					2	
Goldfinch				10	11	
Linnet	76	50			50	
Bullfinch	1					
Yellowhammer	2		1		3	
Reed bunting	1					1

APPENDIX 2

Results of Condition Assessment of Lower Abbey Marshes
Unit 53 of Minsmere Walberswick Heaths and Marshes SSSI

This assessment found Unit 53 to be in Favourable condition. The Unit was assessed in August 2009 as also in Favourable condition. There is a risk to the unit from the Minsmere New Cut which carries eutrophic water out to sea via the Minsmere main sluice. Overtopping or leaking sluices would potentially threaten their conservation interest.

The Unit passed on all its targets including succession stages of the ditches (and extent of feature accordingly) and vegetation successional stage with in channel vegetation being at all succession stages. The cover of bank vegetation was over 90%, no negetative indicator species evident, generally a good frequency of positive indicators species (especially to the east). Tree cover along ditches to met the target set (< 10%). Ditches stopped at were all over 0.5 m deep (target is >0.5m smaller drains and >1m in main drains). No saline influence seen. Ditches were clear over >90% of channel (turbidity target). A range of ditch profiles present. The unit passes on algal dominance with little evident. Good range of aquatic and marginal plants present (almost certainly under recorded). Habitat suitability for inverts Target passes on average.

Breeding birds of LDG; Using SWT breeding bird survey data for 2010/2011 the eastern half of Unit 53 Lower Abbey Farm Marshes Marsh scored 31/20 respectively on the BTO Index, exceeding the target of 25 in 2010 but not 2011, which was a poor breeding year for birds due to weather. The Unit should not fail on the 2011 data accordingly and is found to be favourable re 2010 data.

Variety of breeding bird species (70), Variety of passage bird species (150) and Variety of wintering bird species (90) features were deemed to be in favourable condition for the Unit and whole site using BTO Bird Track data for Tetrad of TM4767 (Minsmere) with 0km/2km Buffer.

APPENDIX 3

Sizewell Breeding Birds 2012									
Species	Sizewell Belts	Retsoms/ S Marsh	Leiston Common	Reckham Pits Wood	Lower Abbey Marshes	Black Walks	Field margins	Other Areas	**Total**
Little Grebe	1								1
Grey heron	1								1
Mute Swan	2								2
Shelduck		2							2
Gadwall	1	2			1				4
Mallard	15	2							17
Tufted duck	1				2				3
Common buzzard							1		1
Sparrowhawk	1	1							2
Kestrel	1								1
Hobby		1							1
Red legged partridge							1		1
Pheasant		1					3		4
Water rail +									nc
Moorhen	10	2			1				13
Stock dove				1					1
Collared dove			1						1
Turtle dove*							1		1
Cuckoo*		1							1
Barn owl							1		1
Tawny owl+									nc
Little owl							1		1
Kingfisher	1								1
Green woodpecker	1	1	1	1	1		1		6

Gt spotted woodpecker	2	1	1	1	1				6
Skylark *		2					4		6
Swallow								1	1
Pied wagtail			1				1		2
Wren	61	8	14	12	7	4	2		108
Dunnock*	10	1	4	6		3	7		31
Robin	18	1	8	7	1	5	5		45
Nightingale	1		2						3
Blackbird	9	1	5		2	1	4		22
Song thrush*	8		2				3		13
Mistle thrush			1						1
Cettis warbler	3	3			3				9
Sedge warbler	6	1			2				9
Reed warbler	2	1			1				4
Grasshopper warbler	1								1
Lesser whitethroat						1	2		3
Whitethroat	5	3	1				2		11
Garden warbler	1								1
Blackcap	13	1	2	3	4		4		27
Chiffchaff	26	5	2	6	2	2	4		47
Willow warbler	1	4		1					6
Goldcrest	2	3	2	5	2	1	2		17
Long tailed tit	9	2	3	1	3	1	1		20
Marsh tit*	4		1		1				6
Coal tit	3	2		2					9
Blue tit	30	8	11	10	4	4	8		75
Great tit	22	5	6	5		4	6		48
Treecreeper	4	1			1				6
Jay							1		1

Magpie				1			1		2
Jackdaw	1						1		2
Carrion crow	1								1
House sparrow*			4			1			5
Chaffinch	39	29	16	6	10	13	8		121
Greenfinch	2		6	1	1	1	2		13
Goldfinch	3	2	2		1	2	1		11
Linnet*		1	3			3			7
Bullfinch*								1	1
Yellowhammer*			1				1		2
Reed bunting *	1								1
Species marked with an asterisk* = Birds with UK and Suffolk Biodiversity Action Plans									
Species marked with a plus sign + = Birds present but no count made									

APPENDIX 4

Sizewell Breeding Birds 1999 - 2012																	
															Annual trends		
Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean	Local	UK
Little Grebe	2	2	2	2	2	1	1	1	1	1	0	1	0	1	1.2	-	-
Grey heron	0	0	0	1	2	0	0	1	1	1	1	1	1	1	0.7	0	+
Mute Swan	4	4	4	4	5	3	7	5	5	4	6	4	2	2	4.2	-	+
Greylag goose	0	0	3	0	0	2	0	0	1	1	0	1	0	0	0.6	0	+
Canada goose	0	1	3	0	1	3	1	2	2	1	1	2	1	0	1.3	0	+
Shelduck	1	0	0	0	0	0	0	0	0	0	1	2	3	2	0.5	+	+
Gadwall	8	6	6	8	8	7	5	8	11	7	5	4	4	4	6.5	-	-
Teal	2	0	0	1	1	0	1	1	1	1	0	0	0	0	0.6	-	-
Mallard	32	19	17	40	37	23	28	20	24	26	15	20	17	17	23.9	-	+
Shoveler	1	0	1	0	0	3	1	1	1	0	0	0	0	0	0.6	-	-
Tufted duck	0	0	1	0	1	2	1	1	4	4	3	1	1	3	1.6	+	+
Common buzzard	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	+	+
Sparrowhawk	2	1	3	3	2	2	0	1	1	3	2	1	2	2	1.8	+	-
Kestrel	2	2	3	2	2	2	0	0	1	1	1	1	1	1	1.3	-	-
Hobby	1	0	1	0	0	0	1	0	1	2	1	1	1	1	0.7	+	+
Red legged partridge	4	3	4	4	8	11	6	3	4	3	1	4	2	1	4.1	-	-
Grey partridge	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	-	- >50%
Pheasant	6	6	11	11	4	17	7	3	8	8	1	5	4	4	6.8	-	+
Water rail +	2	1	1	1	1	8	1	3	6	8	nc	3	1	nc	2.6	0	0
Moorhen	28	26	32	29	36	51	53	31	36	45	32	34	22	13	33.4	-	+
Coot	3	3	3	1	1	2	0	0	0	1	2	2	1	0	1.4	-	+
Ringed plover	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	-	- >25%
Lapwing	2	2	1	1	1	0	0	1	1	0	0	3	1	0	0.3	-	-
Oystercatcher	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.0	0	0

Redshank	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	-	-
Stock dove	1	1	3	5	4	4	1	4	3	4	6	3	4	1	3.1	-	0
Collared dove	0	0	0	0	0	1	1	1	0	3	1	3	1	1	0.4	+	+
Turtle dove	2	0	6	0	6	2	1	3	2	1	2	1	1	1	2.0	-	- >50%
Cuckoo	2	1	2	2	1	2	1	1	2	2	2	1	1	1	1.5	-	- >25%
Tawny owl	3	0	0	1	1	1	0	2	0	0	2	2	0	nc	0.4	0	+
Barn owl	1	0	0	0	0	1	2	1	1	0	0	0	1	1	0.6	+	+
Little owl	2	0	1	0	1	0	1	0	1	1	0	1	0	1	0.5	-	- >25%
Kingfisher	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	0	-
Green woodpecker	4	3	2	3	3	4	6	3	5	6	6	7	8	6	4.7	+	+
Gt spotted woodpecker	3	3	1	6	5	5	4	9	4	3	7	5	6	6	4.8	+	+
Lesser spotted woodpecker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.0	-	-
Woodlark	6	3	5	2	5	4	3	3	2	1	0	0	0	0	2.4	-	- >50%
Skylark	12	6	16	29	19	23	15	16	14	15	9	7	4	6	13.6	-	-
Swallow	2	0	0	0	2	0	2	2	0	0	2	1	2	1	1.0	0	0
Meadow Pipit	0	0	0	6	4	2	3	1	0	1	1	1	0	0	1.3	-	-
Pied wagtail	3	2	2	1	1	1	2	1	2	2	3	1	3	2	1.8	+	0
Wren	117	127	125	136	132	143	181	134	159	147	137	112	92	108	132.1	-	+
Dunnock*	19	18	27	37	35	25	34	27	43	29	21	24	29	31	28.5	0	- >25%
Robin	24	47	59	84	84	66	64	88	101	97	78	89	55	45	70.1	-	+
Nightingale	3	1	0	0	1	1	1	1	1	2	2	3	2	3	1.5	+	-
Stonechat	0	0	0	4	3	4	0	0	0	0	0	2	0	0	0.9	-	+
Blackbird	30	33	33	37	37	31	31	25	46	41	29	36	37	22	33.4	-	-
Song thrush	2	1	3	3	3	3	1	2	4	12	5	6	6	13	4.6	+	- >25%
Mistle thrush	1	3	4	3	3	5	1	1	3	2	1	1	1	1	2.1	-	- >25%
Cettis warbler	0	1	1	4	4	7	19	11	14	20	13	21	23	9	10.5	-	+
Grasshopper warbler	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.2	-	- >50%

Sedge warbler	23	18	41	35	29	34	32	21	25	23	22	10	26	9	24.8	-	-
Reed warbler	26	24	33	25	29	34	21	30	32	32	21	29	7	4	24.8	-	+
Lesser whitethroat	1	0	1	1	3	2	2	3	7	1	3	3	1	3	2.2	-	0
Whitethroat	19	8	21	28	20	24	39	33	26	30	20	16	19	11	22.4	-	- >50%
Garden warbler	15	11	23	8	10	12	11	20	26	13	5	6	10	1	12.2	-	-
Blackcap	23	14	19	31	14	20	26	31	25	17	26	32	29	27	23.8	+	+
Chiffchaff	22	31	25	52	62	73	40	39	45	55	47	44	40	47	44.4	+	+
Willow warbler	11	7	14	8	5	5	4	2	3	3	5	1	5	6	5.6	-	-
Goldcrest	0	1	1	0	3	3	0	4	1	2	0	2	6	17	2.8	+	+
Spotted flycatcher	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0.3	-	- >50%
Bearded tit	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.0	-	-
Long tailed tit	9	6	6	10	7	14	12	21	12	21	13	18	14	20	13.1	+	+
Marsh tit	3	2	3	7	3	1	0	2	3	2	3	5	6	6	3.3	+	- >50%
Coal tit	32	29	13	32	44	41	56	30	13	15	10	6	16	9	24.7	-	+
Blue tit	32	29	13	32	44	41	56	49	50	61	41	44	92	75	47.1	+	+
Great tit	39	27	17	42	49	43	62	67	51	41	50	56	54	48	46.1	+	+
Treecreeper	3	1	3	4	5	4	1	4	2	2	0	6	7	6	3.4	+	-
Jay	2	2	3	2	2	3	2	3	3	2	3	2	2	1	2.3	0	+
Magpie	4	5	4	6	2	3	2	4	3	5	4	1	3	2	3.4	0	-
Jackdaw	6	27	2	7	11	12	3	9	5	7	6	8	1	2	7.6	-	+
Carrion crow	4	3	4	2	1	5	1	1	1	2	2	0	1	1	2.0	-	+
House sparrow	nc	nc	nc	nc	4	7	4	8	12	15	8	8	12	5	8.3	-	-
Chaffinch	50	88	111	140	136	128	155	161	138	141	134	147	116	121	126.1	0	+
Greenfinch	3	2	5	6	5	7	8	3	13	13	7	10	10	13	7.5	+	+
Goldfinch	1	0	1	1	4	4	5	8	7	4	6	7	14	11	5.2	+	+
Linnet	20	9	20	7	8	13	5	9	6	5	8	8	11	7	9.7	-	-
Lesser redpoll	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0	0	+
Bullfinch	0	1	0	1	1	2	0	0	1	1	0	2	1	1	0.8	-	- >25%
Yellowhammer	0	6	2	3	3	5	2	7	3	2	0	3	5	2	3.1	-	- >50%

Reed bunting	5	5	12	7	9	12	12	12	12	9	8	8	4	1	8.3	-	-
No. territories	696	687	785	972	982	1026	1049	1001	1044	1031	853	900	853	770	913.8		
No. species	66	57	40	60	67	60	58	63	65	63	58	65	62	64	60.3		

BIODIVERSITY ACTION PLAN INDICATORS

Positive Outcome ✓ ✗

Habitats

Coastal Grazing Marsh

1) The extent of coastal and flood plain grazing marshes.

- No loss of grazing marsh habitat has occurred; the area remains as 2000 baseline at 85ha. ✓

2) The diversity of aquatic vascular plants.

Number of species recorded 1998 = 43
2006 = 75 ✓

Survey not repeated since.

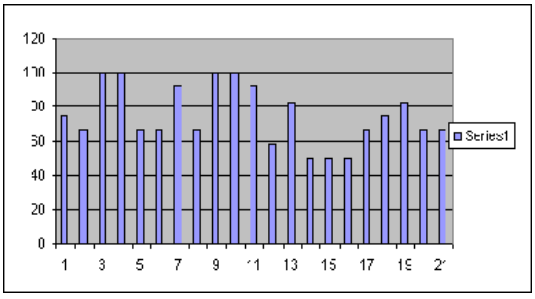
3) Maintain the water vole population.

Percentage of transects at Sizewell NKS for Water Voles with active signs of water vole presence at each survey 2001-2011

Percentage of transects at Sizewell NKS for Water Voles with active signs of water vole presence

at each survey 2001 - 2012

Date	Pos	Neg
Spring 01	75	25
Autumn 01	67	33
Spring 02	100	0
Autumn 02	100	0
Spring 03	67	33
Autumn 03	67	33
Spring 04	92	8
Autumn 04	67	33
Spring 05	100	0
Autumn 05	100	0
Spring 06	92	8
Autumn 06	58	42
Spring 07	83	17
Autumn 07	50	50
Spring 08	50	50
Autumn 08	50	50
Spring 09	67	33
Autumn 09	75	25
Autumn 10	83	17
Autumn 11	67	33
Autumn 12	67	33



positive=presence of fresh feeding signs and/or droppings

negative=no fresh field signs present

Spring=May

Autumn=September

✓

Positive Outcome
✓ ✗

4) Changes in the numbers of breeding and wintering waders and wildfowl.

Numbers of breeding wildfowl and waders

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Little Grebe	2	2	2	2	1	1	1	1	1	0	1	0	1
Grey Heron	0	0	1	2	0	0	1	1	1	1	1	1	1
Shelduck	0	0	0	0	0	0	0	0	0	1	2	3	2
Gadwall	6	6	8	8	7	5	8	11	7	5	4	4	4
Teal	0	0	1	1	0	1	1	1	1	0	0	0	0
Mallard	19	17	40	37	23	28	20	24	26	15	20	17	17
Shoveler	0	1	0	0	3	1	1	1	0	0	0	0	0
Water Rail	1	1	1	1	8	1	3	6	8	0	3	1	?
Moorhen	26	32	29	36	51	53	31	36	45	32	34	22	13
Coot	3	3	1	1	2	0	0	0	1	2	2	1	0
Lapwing	2	1	1	1	0	0	1	1	0	0	3	1	0
Redshank	1	1	1	1	0	0	0	0	0	0	0	0	0
Greylag Goose	0	3	0	0	0	0	0	1	1	0	1	0	0
Tufted Duck	0	1	0	1	2	1	1	4	4	3	1	1	3
TOTAL	60	68	85	91	97	91	68	87	95	59	72	51	41

✓

Positive Outcome
✓ ✗

Numbers of wintering wildfowl and waders

	Peak counts on any one visit										
	2001 -02	2002 -03	2003 -04	2004 -05	2005 -06	2006 -07	2007 -08	2008 -09	2009 -10	2010 - 11	2011 -12
Little Grebe	1	1	1	1	2	1	2	2	1	1	1
Grey Heron	7	7	5	5	7	6	4	3	4	4	3
Mute Swan	27	21	19	17	14	12	14	11	10	10	11
Greylag Goose	104	104	23	172	177	95	16	152	87	87	77
Wigeon	350	350	30	68	75	66	27	60	36	59	11
Gadwell	52	59	50	36	66	97	84	54	60	19	14
Teal	109	148	72	72	47	54	69	117	58	52	48
Mallard	96	113	106	158	80	83	49	66	62	62	26
Shoveler	7	7	2	8	2	0	2	4	4	4	0
Water Rail	3	2	2	3	2	1	2	3	1	4	2
Moorhen	24	24	37	37	16	12	18	14	17	12	9
Oystercatcher	1	1	2	2	2	1	0	2	0	0	0
Snipe	24	24	39	39	20	3	11	21	18	10	16
Curlew	11	11	17	25	17	0	0	1	0	0	1
European White Fronted Goose	66	1	43	0	0	0	0	0	0	0	0
Little Egret	0	0	0	0	0	1	1	2	1	2	2
Barnacle Goose	0	0	0	0	0	1	0	0	6	6	100

✓

Fen

1) The overall extent of fen habitat.

   - No loss of fen habitat has occurred; the area remains as 2000 baseline, ie 7.5ha.

✓

2) Breeding numbers of reed bunting, reed, sedge and grasshopper warbler.

Numbers of breeding reed bunting and warblers

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Reed Bunting	5	12	7	9	12	12	12	12	9	8	8	4	4
Reed Warbler	24	33	25	29	34	21	30	32	32	21	29	7	1
Sedge Warbler	18	41	35	29	34	32	21	25	23	22	10	26	9
Grasshopper Warbler	1	0	0	0	0	0	0	0	0	0	0	0	1

✗

Positive Outcome
✓ ✗

Lowland Heathland and Dry Acid Grassland

1) Numbers of breeding woodlark.

1999	6
2000	3
2001	5
2002	2
2003	5
2004	4
2005	3
2006	3
2007	2
2008	1
2009	0
2010	0
2011	0
2012	0

✗

2) The frequency/cover of key heathland floral species.

Vegetation surveys have been undertaken in 2000, 2004 and 2010 of the arable reversion field at Retsoms. Following sulphur treatment on part of the field as a means of reducing the pH, survey plots were established to compare the development of vegetation on the treated areas with the untreated part of the field.

The survey report concluded that the addition of sulphur and heather litter in the treated areas has produced heather-rich swards which, with the continuance of sustained management, are developing towards grass-heaths and, where building heather establishes high shade levels, into heather stands. The untreated areas, where management is coupled with summer droughting, can be expected to develop towards a grassland sward typical of dry, mildly acid conditions. SWR controlled broome in Summer 2011.

✓

Positive Outcome
✓ ✗

Reedbed

1) Extent of reed bed.

   - No loss of reed bed habitat has occurred; the area remains as 2000 baseline, ie 6.5ha. ✓

2) Numbers of breeding reed bunting and water rails.

	Reed Bunting	Water Rails
1999	5	2
2000	5	1
2001	12	1
2002	7	1
2003	9	1
2004	12	8
2005	12	1
2006	12	3
2007	12	6
2008	9	8
2009	8	0
2010	8	3
2011	4	1
2012	1	No change

✗

Vegetated Shingle

Detailed vegetation surveys of the foreshore in front of both B and C stations were carried out in 2009 by both Entec and Suffolk Wildlife Trust. These will provide a baseline for future surveys depending upon the new build proposals.

Species

BAP Species Monitoring:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Water Vole	R	R	R	R	R	R	R	R	R	R	R	R	R
Otter	R	R	R	R	R	R	R	R	R	R	R	R	R
Brown Hare	R	R	R	R	R	R	R	R	R	R	R	R	R
Skylark	6	16	29	19	23	15	16	14	15	9	7	4	6
Grey Partridge	0	0	1	1	0	0	0	0	0	0	0	0	0
Linnet	9	20	7	8	13	6	9	6	5	8	8	11	7
Reed Bunting	5	12	7	9	12	12	12	12	9	8	8	4	1
Song Thrush	1	3	3	3	3	1	2	4	12	5	6	6	13
Natterjack Toad	-	-	-	-	-	-	-	R	R	R	R	R	R

R = Recorded as present

✗

Sizewell Estate - Land Management/Biodiversity Survey Report: 11/05/2018 to 18/09/2018

All land management is carried out to ensure compliance with the current ELS / HLS Agreement with Natural England (01/12/2013 – 30/11/2023)

Land Management

- **Rotational Dyke Clearance/Maintenance**

Dyke Management Plan 2018-20 was produced by SWT (April 2018), it covers proposed work on c.2000m of dykes per annum. Barry Day & Sons Ltd. have been contracted for 10 days, commencing late-Oct/early-Nov. In addition, 1-2 of these days will be used to construct 2 piped culvert crossings (pending NE/IDB consents) between Stackyard and St. James' Marsh (RLR Field Nos. 6058 & 4642), facilitating better access/management of machinery/grazing cattle throughout the Belts holding.

- **Maintenance of Structures for Controlling Water Levels**

Any necessary clearance of sluices has been undertaken throughout the period, as and when required.

- **Monitoring / Management of Water Levels**

Monitoring of water levels across the Estate are carried out via the use of 7 water depth gauge boards and 2 piezometer tubes. Records are taken monthly (14th of the month or nearest working day). These measurements serve as a guide for managing individual marsh/dyke levels, as an indication of when sluices are blocked, and as an historical ongoing comparable record. Ultimately however, all water levels throughout the entire Estate are governed by the rate of flow available at the Minsmere Sluice to the north, where all flow-through waters culminate before being discharged to the sea. In times of high precipitation, the Estate's flow-through can be held-up for a matter of days.

Sluices are always kept clear of debris to allow continuous flows; any necessary adjustments are periodically made to change and satisfy the water level requirements of individual dykes/marshes. In accordance with the HLS requirements for raising the water levels in necessary areas (Maintenance of Wet Grassland for Waders & Wildfowl - HK10), the higher-level 'upstands' will be inserted in early-November.

- **Annual Removal of Dyke-side Scrub**

Clearance felling of Alder (mostly) and Willow will begin in early/mid-October, in preparation for the arrival of Barry Day & Sons to carry out dyke clearance works in late-October/early-November. Around 2000m of dykes will be prepared, an increase of about 80% on previous years, as recommended by the Sizewell Marshes SSSI: Grazing Marsh Dyke Monitoring Programme 2017 (Jonny Stone, 2017). Approx. 75% of those 2000m will need

scrub clearance to be carried out. Some volunteer help has been recruited to assist us take on this large task.

- **Maintenance/Restoration of Species-Rich Semi-Natural Grassland (HK6 / HK7)**
- **Maintenance of Wet Grassland for Waders & Wildfowl (HK10)**
- **Maintenance of Grassland for Target Features (HK15)**

Cattle/Sheep Grazing: Cattle (Grazier: Mr David Pratt) have been grazing at Lower Abbey Marshes since 02/05, they will likely be there until 30/11. Goose Hill Marshes were grazed from 06/05 until 09/09. Initially there were 10 young steers, which were joined for the last 6 weeks by 5 cow & calf pairs + 1 bull, removed from Saltmarsh early due to their falling condition. A couple of weeks after the unfortunate escape incident of 09/05, where first 23 heifers, then all 46 cows, calves & 2 bulls escaped from Broom Covert and the western Belts marshes respectively, the Station Marshes were initially heavily grazed in parts for a short period, then they settled down to a regular grazing pressure of 19 heifers. They are still currently grazing but will likely be moved off in a week or two. The western Belts herd have been on site from 05/05 until present, though the 2 bulls were removed early due to severe problems with their teats (likely caused by a combination of tall, chafing vegetation and the consequential heavy fly activity). Thankfully, pregnancy testing carried out 10/09 concluded that all 22 cows were in-calf with one having twins. It is hoped that we can retain their services for another 3-4 weeks longer than was managed last year.

Sheep are a year-round presence on the Estate. Retsoms Field has seen the bulk of their attention this year, with Walk Barn, Black Walks and Whinny Hill receiving somewhat of a rest. Most of the dyke surrounding Whinny Hill significantly dried-up in the summer drought, providing an easy escape route to the Minsmere Levels. Both Walk Barn and Black Walks were rested, partly by design (to allow an increase in vegetation structure) and partly by bad fencing issues. Sheep are currently grazing St. James' Marsh for the first time in memory, predominantly to try to compensate for the lack of cattle grazing (due to dangerous relict fencing), but also to see how they graze in such areas. Once again, for the third season, no sheep grazing was deemed necessary on Leiston Common.

- **Maintenance & Minor Repairs to Grazing Infrastructure & Crossings**

The corrals at both Retsoms/Saltmarsh and Goose Hill Marshes have once again proven their worth. The former one has been modified to double-up as a very capable sheep-handling facility also. The holding-pen at the Reservoir (Belts) continues to be a good facility. It was used 10/09 in conjunction with a temporary set-up of portable hurdles, gates and a crush to carry out pregnancy testing. This has allowed us to be able to keep the animals on site longer (they were removed at this stage last year), though it is still not suitable as a substitute for long-term safe and efficient handling operations. Hopefully, the new purpose-built cattle-handling corral at the lower (northern) edge of Leiston Common will be completed ready for the start of the 2019 season. The existing corrals at Broom Covert/Mole's Meadow and Lower Abbey Marshes could, in time, be similarly modified to provide suitable handling facilities for the required number of animals needed for grazing those areas.

After the very successful hay-cutting this year (see below), repair works will be needed to build-up the marsh crossings to provide for good access for next year. A 5-tonne digger and a tracked dumper will be hired in the next couple of weeks to begin these operations. It is hoped that the Station Marshes, at least, can be repaired, and dependent on time availability, some other areas of the Belts also. A Plan for the priority crossing works has been produced. Similarly, a Plan for the priority fencing and gateway repairs required across the Estate has also been produced.

- **Management (other than grazing) to comply with HLS Indicators of Success**

HK6 (*G05 & G07*) – HK7 (*G05*) – HK10 (*G13*) – HK15 (*G02, G05 & G07*). Following the implementation of the Grazing Marsh Restoration Plan, 5 of the 8 identified priority marshes were hay-cut, producing 318 round bales. In addition, parts of the normal annual rotationally hay-cut areas on Pump Belt were carried out, as well as the small marsh at the Reservoir (mostly as a trial to see how it responds, with a view to cutting further similar from next year). The hay-cutting period extended through an almost solid 6-week slot between 25/06 and 10/08 inclusive. Good aftermath grazing has been achieved on all hay-cut marshes as well as topping of the dominant rush and sedge regrowth.

Bracken Management was carried out on Leiston Common, along with the topping of some problem Ragwort areas. The Bracken Management on Whinny Hill was not carried out this year, it was deemed that as the regrowth was so low, it would have been more detrimental to the underlying vegetation and the sward structure to have done so. Topping of Ragwort areas was also carried out on Western Marsh (high field) and the Rearing Field. Probably due to the extended summer dry spell, Ragwort growth on Black Walks and Retsoms Field (the Norfolk Horn sheep also heavily grazed the flowering heads) was significantly reduced, so topping was not carried out in these areas.

- **Restoration of Reedbeds/Wetland Cutting Supplement (HQ4 / HQ11)**

The annual reed cutting is due to be carried-out during the second half of November. Once again, it is hoped that we can employ a 'Green Team' from one of our Corporate Partners to help us to rake and clear all the cut reed into piles for burning. A further 15-20% of the total area will again be the target. The 0.6ha area cut in 2016 is still mostly open, shallow water and mud. This is providing good feeding and breeding areas for many species of bird, mammal and invertebrates. The increase in dyke clearance work as well as the creation of the piped culvert crossings, will unfortunately mean that a second digger-scraped area will not be achieved this year. The HLS prescription target of 10-30% of open water is certainly being achieved, though getting the overall water level closer to the desired 30-100 cm target across the area for the winter (10-50 cm for the summer period) period is realistically not going to be achieved without further digger work, where the resulting spoil might be an issue?

- **HLS Bracken Management Plan**

Bracken Management was achieved on Leiston Common, but Whinny Hill and Walk Barn were given a rest.

- **Management of Permanent Grassland with Low/Very Low Inputs (EK2 / EK3)**

EK2 areas – Lower Abbey (small meadow next to Dovehill Plantation), Mole's Meadow, Rosery Cottage (hidden meadow), Old Trial Plot (south of Sandy Lane) and Rearing Field.

EK3 areas – Western Marsh (high & low marshes), Black Walks (NE & SW corners) and Whinny Hill (small square).

All these areas, apart from Old Trial Plot and Rearing Field, have been managed by the recommended grazing (cattle or sheep). Some have also been managed by mechanical cutting (topping or Ryetec 'cut & collect'), and some will be managed as such in the next few weeks to comply with the ELS prescriptions.

- **Fencing of Beach Plot for Bird-breeding (potential) & Flora**

The Beach Fence was erected on 26/03 and was removed on 03/09. As with recent years, the no target bird breeding evidence was noted (and not expected), but the floristic content has once again been excellent.

- **Maintenance of site-wide Infrastructure (gates, stiles, bridges, etc.)**

As stated above in the 'Maintenance & Minor Repairs to Grazing Infrastructure & Crossings' section, plans for the priority crossings / gates / gateways have been produced to address the related issues around the Estate.

- **Management of Natterjack Toad ponds**

A single toad was seen in the Retsom's Field pond on 27/04. The first 2 strings of spawn were noted on 08/05, turning into an estimated 4000 tadpoles by 14/05. A further 6 strings were noted on the 26/05, and another 6 noted on 04/06. The first of the season's NT toadlets were seen on 13/06. Overall estimates for the number of tadpoles produced was estimated to be at least 15000 (very conservative estimate). Estimate for emerging toadlets at any one time was around 300-500 individuals.

Newts, beetle larvae and other usual pond inhabitants were noticeably less than a normal year (though not 2017), but the most noticeable thing was the total absence of filamentous algae, in contrast to last year. Notably, it was actively decided that no attempt at providing predator protection at the pond would be erected this year. Also, we didn't add any additional water to top the pond up. The thinking behind this was, that the protection efforts seemed to be actively encouraging predators (?), and that the additional (well-sourced from Upper Abbey Farm) water may somehow have contributed to the algae problem of 2017 (?). The algal problem did not occur at all this year. The 'result' of having no predator protection at the pond was that very few (never more than 2-3 individuals) gulls or corvids were seen at any visit. With no water being added, in the height of the drought period, the pond dried-out to an estimated few tens of gallons of water in the bottom. By this time the NTs had completed their most successful season's breeding ever.

- **Maintenance of Antlion (*Euroleon nostras*) Habitat**

Monitoring of the Antlion shelter (as well as the old barns at Walk Barn) proved very fruitful. Seemingly, the Antlions had a great season, and on 01/06 we made an estimated pit-count of at least 1500 (conservative). Both the old barns and the newly erected shelter were being well utilised.

- **Maintenance of Woodland Rides / Tracks & other Permissive Paths**

The first cutting of the rides and tracks in Kenton & Goose Hills was carried out on 12/06. With the very busy season, a second cut has yet to be made this year, though is planned for after the topping of the marshes has been completed.

- **Hedgerow Management as per Management Plan**

Hedgerow Management was carried out earlier in the year, between 21/02 and 27/02 (4 days work).

- **Management of Wild Bird Cover & Pollen & Nectar Plots under ELS**

All necessary works (flailing off, ploughing, harrowing & drilling) to prepare the Wild Bird Cover Plots were carried out between 26/04 and 08/06. This equates to around 4-5 working days, including the tracking in/out of borrowed SWT machinery from off-site.

The success of the plots this year has been very poor. Possibly a result of the prolonged dry season, but almost certainly a result of lack of nutrient input on the land. Again, it is highly recommended that access to some farmyard manure (FYM) is sought prior to next year's preparations. The Pollen & Nectar Plots were managed as per NE recommendations, with half of each area being flailed off in June to stimulate late flowering. The whole area will be cut in September or October and cuttings are removed to protect the flowering plants in the sward. The areas may need to be re-sown soon, they probably have one more season of good flowering, but they are becoming rather depleted.

Biodiversity Surveys / Monitoring

- **5-Yearly – Grazing Marsh Dyke Monitoring Programme of Sizewell Belts**

The Report of the 2017 Survey (carried out by Jonny Stone on 14-16/08/17) is available. The next Survey will be in 2022.

- **Annual Water Vole Survey**

The annual Water Vole Survey was carried out on 29/05. Transects 1, 2, 3, 6, 7, 9, 10 & 11 were assessed as positive, with both 'feeding lawns' and 'latrines' recorded. The remaining Transects 4, 5, 8, & 12 were assessed as negative, with no signs at all being recorded. This is consistent with previous surveys in recent years.

- **Annual Dragonfly / Damselfly Survey**

Due to the intense work programme with hay-cutting, only a single full round of Dragonfly Surveys was carried out this year between on 21/05, 24/05 & 15/06.

Volunteer help with this activity will be recruited from 2019.

- **Annual Butterfly Surveys**

This year we have carried out 12 Surveys to-date. Not all of these have yet been entered onto the UKBMS Website but will be completed in due course.

Volunteer help will be sought for help with these Surveys from 2019.

- **Moth Trapping Survey**

Unfortunately, no surveys were undertaken in 2018.

- **Biennial Sizewell Marshes SSSI: Fen Meadow Vegetation Monitoring Programme**

Jonnie Stone completed his 'Even-Year' Survey Plots this summer on 24-25/07.

Highlight of this year was the re-found Flat Sedge (Blysmus compressus), located in the Station Marshes (L-Shaped Meadow north) for the first time since 1983. Flat Sedge is a 'Vulnerable' IUCN Red Data Book species and was added to the list of UK Biodiversity Action Plan priority species in 2007.

- **Annual Common Bird Census (CBC) Survey**

CBC Surveys were carried out again in 2018, starting on 03/04 and finishing on 24/05. The Estate is broken into 9 discreet blocks for representative coverage, with a total of 6 visits made to each block.

With the 54 visits taking between 1 & 2.5 hours each to complete, volunteer help is going to be sought for help with this significant annual task. The analysis of the maps from the 2018 season Surveys will be carried out in November/December.

- **Annual BTO: The Wetland Bird Survey (WeBS)**

The 2018/19 WeBS counts will take place for October, November, December, January, February & March beginning on 14/10/18 and finish on 24/03/19.

- **Annual Farmland Birds Survey**

The Farmland Bird Surveys for 20118/19 will take place on the same days as the WeBS counts (see above).

- **Annual Bat Box Survey**

Initial Bat Roosting Box checks were made in Kenton Hills on 04/09. Of the 37 available boxes this produced 5 Pipistrelles from 4 of the boxes; 11 other boxes had signs of recent use; 1 had a Great tit nest in with 10 dead chicks; 1 was used as a bird roost; 7 were

unusable, being broken or with lids missing; 4 were uncheckable due to a Hornets nest in 1 of a set of 3 and a further Hornets nest in an adjacent Bird box.

We are in the process of building new replacement boxes for erection early next year (17 currently complete).

- **Annual Bird Box Survey**

The 32 HLS boxes on Leiston Common and Walk Barn/Whinny Hill areas were checked, slightly later than desirable again, but we recorded an uptake of 25 boxes being used.

- **Monitoring / Control of Mink**

Mink 'rafts' have not been actively deployed on the Estate as planned this year. We hope to build a couple over the winter months ready for deployment early in 2019.

Works Carried Out for NNB (SZC)

- **Management of Reptile Mitigation Areas**

Management work within the Reptile Mitigation Plots will be carried out as part of the winter work programme. Work on the Studio Complex Management Plan was completed, apart from the planned mini-digger work for bare-ground patches. The funding and hire of the mini-digger were refused by SZC. Continuation of the Management Plan works will continue early in 2019.

Miscellaneous

- **Community**

As part of the Suffolk Walking Festival we provided two Walks this spring. A Dawn Chorus Walk was held on Saturday 12/05 and was very well attended by 19 early-risers (04:30am). A second General Wildlife Walk (which ended up being billed as a Wildflower Walk) was held on Saturday 02/06, again well attended by 23 people.

SIZEWELL LAND MANAGEMENT

ANNUAL REVIEW 2014

Natterjack toad Photo: Dayne West

FOREWORD

EDF Energy is one of the largest energy companies in the UK supplying around 6 million residential and business accounts with electricity and gas. We generate around one fifth of the UK s electricity from a nuclear, coal, gas and renewable energy portfolio. Our 8 nuclear power stations generate some 60.5TWh comprising some 73.7% of our total electricity generation. Climate change and environmental protection remain amongst the most pressing global challenges. EDF Energy is committed to leading the decarbonisation of the UK electricity sector whilst achieving an increasingly positive environmental impact from our operations across land, air and water.

We are committed to protecting our land resources by ensuring no net loss of biodiversity with our power station sites achieving the Wildlife Trust s Biodiversity Benchmark by 2018. Sizewell achieved the Biodiversity Benchmark in 2009.

Our biodiversity commitment is largely delivered under:

1. The Nuclear Generation Biodiversity Action Plan (BAP) which sets the framework for identifying the priority species and habitats, the broad objectives and key performance indicators across the whole estate, and
2. The Integrated Land Management Plans (ILMPs) which assess the importance and significance of habitats and species on each site and translate the broad requirements of the BAP into site specific management objectives and work programmes.

This annual report records the management activities undertaken during the year and results of surveillance monitoring. It assesses progress against our objectives and targets, highlights emerging or actual problems and guides future changes that may be required to work programmes to ensure continual enhancement of biodiversity. We have also tried to put the observed changes on site into context with the fate of species and habitats on the national scale.

Note: Reference to UK BAP Priority habitats and species means those identified in accordance with S41 NERC Act 2006 as of principal importance for the purpose of conserving biodiversity.

Summary of the Year

- Barn owls bred on site producing 4 chicks
- Lapwing and redshank bred on Salt Marsh
- Natterjack toads had another successful year
- A new species of butterfly, Yellow legged tortoiseshell *(Nymphalis xanthomelas)* was recorded
- Three new plant species were recorded in the fen vegetation plots and the SSSI remains in favourable condition
- A first for Suffolk, species of fungi, Tiny earth star *(Geastrum minimum)* was discovered on the beach
- New wild bird seed and pollen and nectar plots have been established on former arable fields.
- Heather litter has been used to increase the plant diversity on Studio field

Wild bird seed crop Photo: Dayne West

INTRODUCTION

The State of Nature report published in May 2013 warned that many species of our wildlife are facing extinction unless urgent action is taken. It looked at more than 3000 native species of which 60% were in long term decline. Species requiring specific habitats have fared particularly poorly, compared to the generalists, as they are less able to adapt to the country s changing environment. The threats to the UK s wildlife are many and varied, the most severe acting either to destroy valuable habitat or degrade the quality and value of what remains.

Climate change is having an increasing impact on nature in the UK. The unpredictable and erratic weather continued to provide a challenge for both the wildlife and our land management work at Sizewell. Following England s second wettest summer on record in 2012, we then experienced the coldest winter and spring for fifty years delaying the emergence of many species including butterflies. However, the warmer, sunnier summer of 2014 saw numbers of later flying butterfly species recover somewhat.

The State of Nature report serves to illustrate that with shared resolve and commitment we can save our biodiversity. There is a huge interest in wildlife almost every child is interested in animals, at least when young. So initiatives like the Hinkley Discovery programme where we can get staff and the public of all ages engaged through the resources of our sites are essential if we are to encourage everyone to be concerned about and nurture our valuable wildlife.

MANAGEMENT OF PRIORITY HABITATS AND SPECIES IN 2014

Sustainability target E5.5: We will monitor and manage the priority habitats and species on land impacted by our operations to show an overall positive contribution to the UK Biodiversity Strategy.

ILMP Objective: To further the aims of the EDF Energy Nuclear Generation BAP and to seek to achieve its objectives. To protect and enhance, by appropriate management, the wide diversity of wildlife habitats on site.

Coastal Grazing Marsh

Sizewell has 85ha of grazing marsh

NG BAP Objective
Objectives:

- Maintain the current extent of existing grazing marsh with no net loss
- Seek to improve habitat condition where not already classed as favourable
- Comply with all requirements associated with the habitat s SSSI designation
- Maintain the floristic quality of the herb-rich marshes and dykes, maintain the numbers of breeding and wintering wildfowl and waders and maintain and enhance habitat for BAP species such as water vole and otter.

Action:

- Maintain and enhance Sizewell s herb-rich marshes and ensure a varied sward structure for the benefit of breeding and over-wintering wildfowl and waders. Cut the floristically rich marsh areas for hay with aftermath grazing.
- Manage water levels through adequate maintenance of dykes and sluice management, ensuring the high water levels required. Slub out dykes on a 7-10 year

rotation, clearing one side of the dyke only. The choice of dykes for slubbing should be made annually, according to need.
- Maintain a range of successional stages throughout Sizewell s dyke system.
- Manage the site in compliance with the Natural England Higher Level Stewardship Scheme

Performance indicators:
- The extent of its coastal and flood plain grazing marshes
- The diversity of its aquatic vascular plants
- Number of transects with water voles present
- Numbers of breeding and wintering waders and wildfowl.

Summary of Actions
No loss of grazing marsh habitat has occurred

No survey was undertaken of aquatic vascular plants

The site was grazed with cattle, Pump Belt was cut for hay and aftermath grazed and the meadows topped where required

No dyke slubbing was undertaken due to problems issuing contracts. Although areas of dyke side scrub were cut or coppiced in preparation.

The numbers of water vole recorded in the transects has declined in 2014 due to high water levels

Lapwing and redshank held breeding territories again but numbers of common species such as mallard and moorhen declined.

Monitoring Results

Sizewell breeding wildfowl & waders																
Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Little Grebe	2	2	2	2	2	1	1	1	1	1	0	1	0	1	0	0
Grey heron	0	0	0	1	2	0	0	1	1	1	1	1	1	1	3	1
Mute Swan	4	4	4	4	5	3	7	5	5	4	6	4	2	2	2	5
Greylag goose	0	0	3	0	0	2	0	0	1	1	0	1	0	0	0	0
Canada goose	0	1	3	0	1	3	1	2	2	1	1	2	1	0	0	0
Shelduck	1	0	0	0	0	0	0	0	0	0	1	2	3	2	1	1
Gadwall	8	6	6	8	8	7	5	8	11	7	5	4	4	4	7	6
Teal	2	0	0	1	1	0	1	1	1	1	0	0	0	0	1	0
Mallard	32	19	17	40	37	23	28	20	24	26	15	20	17	17	21	13
Shoveler	1	0	1	0	0	3	1	1	1	0	0	0	0	0	0	1
Tufted duck	0	0	1	0	1	2	1	1	4	4	3	1	1	3	1	0
Water rail +	2	1	1	1	1	8	1	3	6	8	nc	3	1	nc	3	4+
Moorhen	28	26	32	29	36	51	53	31	36	45	32	34	22	13	22	11
Coot	3	3	3	1	1	2	0	0	0	1	2	2	1	0	0	0
Lapwing	2	2	1	1	1	0	0	1	1	0	0	3	1	0	1	1
Oystercatcher	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Redshank	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1

Sizewell WeBS 2014							
	20-Jan	17-Feb	17-Mar	08-Sep	13-Oct	10-Nov	08-Dec
Mute swan	14	5	12	9	12	15	11
Pink footed goose	0	0	1	0	0	0	0
Grey lag goose	0	2	65	0	1	0	0
Canada goose	0	2	0	0	0	0	0
Wigeon	110	80	75	0	18	4	55
Gadwall	25	14	16	2	0	2	17
Teal	70	48	50	3	20	17	13
Mallard	90	58	47	8	35	43	24
Shoveler	0	0	8	0	8	0	18
Cormorant	0	0	0	0	0	1	0
Little egret	2	1	2	3	2	4	5
Grey heron	3	4	3	3	4	4	3
Water rail	2	1	0	1	2	1	1
Moorhen	9	7	6	0	3	7	0
Coot	0	0	1	0	0	0	0
Oystercatcher	0	0	2	0	2	0	0
Lapwing	55	4	4	0	0	0	0
Jack snipe	0	0	1	0	0	0	0
Snipe	6	10	10	0	2	0	2
Woodcock	1	2	1	0	0	1	0
Curlew	1	1	1	0	0	1	1
Redshank	0	0	0	0	0	1	0
Black headed gull	0	4	0	0	0	55	4
Herring gull	0	0	0	0	0	1	0
Kingfisher	0	0	1	2	1	2	1
Marsh harrier	0	2	1	2	2	5	7
Hen harrier	0	0	0	0	0	0	1
Buzzard	0	3	2	0	0	0	0
Kestrel	0	0	1	0	0	0	0
Peregrine	0	1	0	0	0	0	0

Peak counts of wintering wildfowl & waders													
	2001/2	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14
Mute swan	27	21	19	17	14	12	14	11	10	10	11	15	15
Eur White fronted goose	66	1	43	0	0	0	0	0	0	0	0	0	0
Grey lag goose	104	104	23	172	177	95	16	152	87	87	77	34	65
Barnacle goose	0	0	0	0	0	0	1	0	0	6	6	100	0
Wigeon	350	350	30	68	75	66	27	60	36	59	11	410	110
Gadwall	52	59	50	36	66	97	84	54	60	19	14	40	25
Teal	109	148	72	72	47	54	69	117	58	52	48	180	70
Mallard	96	113	106	158	80	83	49	66	62	62	26	120	90
Shoveler	7	7	2	8	2	0	2	4	4	4	0	20	18
Little egret	0	0	0	0	0	1	1	2	1	2	2	2	5
Grey heron	7	7	5	5	7	6	4	3	4	4	3	7	3
Water rail	3	2	2	3	2	1	2	3	1	4	2	4	2
Moorhen	24	24	37	37	16	12	18	14	17	12	9	8	9
Oystercatcher	1	1	2	2	2	1	0	2	0	0	0	1	2
Lapwing	0	4	0	0	2	3	2	0	2	0	6	11	55
Snipe	24	24	39	39	20	3	11	21	18	10	16	36	10
Woodcock	0	0	3	1	0	1	1	3	5	1	6	1	2
Curlew	11	11	17	25	17	0	0	1	0	0	1	3	1
Redshank	0	2	0	0	0	0	0	0	1	0	0	11	1

Analysis and Recommendations

Unfortunately due to contractual problems all the dyke work scheduled to be carried out over two years will now have to be compressed into one operation in autumn 2015 to comply with the HLS grant.
The site has suffered from high water levels since the work to repair the Minsmere sluice was completed. Consequently the levels are too high in some of the water vole transects, but animals are still found nearby where the habitat and water level is more suitable.
Reasons for declines in mallard and moorhen are not clear but the monitoring for mink will be increased.

Lowland Heath and Dry Acid Grassland

Sizewell has 26ha of heathland and arable reversion

NG BAP Objective
Objectives:

- Conserve and enhance where feasible areas of lowland heath on the Sizewell estate.
- Manage in accordance with ESA and ELS prescriptions.

Action:

- Conserve, restore and enhance the lowland heaths and acid grassland habitats through sympathetic grazing regimes, bracken and scrub control and periodic rabbit control and in accordance with the ESA and ELS requirements.

Performance indicators:

- Numbers of breeding woodlark
- In areas of arable reversion, the frequency/cover of key heathland floral species.

Summary of Actions

The heathland areas were grazed with sheep to achieve the desired sward height.

A bracken management plan was implemented.

Studio Field was prepared and heather litter spread and incorporated into the open sward

Monitoring Results

No botanical monitoring was undertaken

A single woodlark sang over the southern section of the site in spring. Breeding was not proven.

Woodlark territories															
1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
6	3	5	2	5	4	3	3	2	1	0	0	0	0	0	1

Analysis and Recommendations
The existing heathland areas are in favourable recovering condition and are being maintained with the current management regime. The new areas will take a number of years before they are a fully functioning habitat and will require annual revision with regard to the management required.

Vegetated Shingle

Sizewell has 22ha of shingle beach and dune.

NG BAP Objective
Objectives:

- Seek to maintain the amount of existing coastal vegetated shingle in Nuclear Generation s estate
- Maintain the quality of the habitat s existing plant and invertebrate communities.
- Restore damaged habitat areas wherever possible by providing conditions for a natural recovery.
- Protect and enhance the wildlife of the vegetated shingle by minimizing disturbance.

Action:

- Protect and enhance the wildlife of the vegetated shingle by minimising disturbance through human activities by appropriate fencing, signing and interpretation to increase public awareness and understanding of the shingle habitat.

Performance indicators:

- Frequency / cover of typical vegetated shingle plant species.

Summary of Actions
The temporary fence was erected in spring to protect the vegetated shingle and provide nesting opportunity for ringed plover.

Monitoring Results
No vegetation monitoring was undertaken, however the higher density of plants inside the fence compared to outside was very evident.

No ringed plover bred this season

Analysis and Recommendations
The beach is a dynamic system subject to the ravages of the sea and so changes naturally year on year.
The beach is heavily used but the temporary fence works protecting the plants. Breeding plovers would be a bonus, but people pressure make this an unlikely event.

Fens

Sizewell has 7.5ha of fen habitat

NG BAP Objective

Objectives:

- Maintain a mosaic of fen types from dry, scrubby fen to wet reed bed
- Conserve and rehabilitate any in need of significant improvement
- Ensure appropriate water quality and water quantity for the continued maintenance of the fens habitat
- Maintain the current extent of fen habitat.

Action:
- Graze or mow fen areas. Tall scrub to be removed but small areas of willow and alder will be coppiced on rotation.
- Water levels are to be maintained appropriately for the community.

Performance indicators:
- The overall extent of Nuclear Generation s fen habitat
- Changes in the breeding population of reed bunting, reed, warbler and sedge warbler.

Summary of Actions
- Fen areas were grazed with cattle

- Sluices maintained

- Pump Belt was cut for hay and after math grazed with cattle

Monitoring Results

1. Species richness in the surveyed plots remains at similar levels to recent years. The plot in Compartment G19 in the north of the Belts recorded its highest number of species (41), while difficulties in attaining target sward structure in compartment M12 led to a marked drop in species richness, following early lodging of the tall canopy. As plots G37, G39 and G42 continue to maintain their high species numbers (46-53 species), it is also encouraging that the drier plots, closer to rush pastures in composition, are also faring well. Since 2008, for example, plot G59 far to the west of the other plots has consistently recorded 28-33 species much higher than in the preceding few years. This may represent a maximum that can be achieved by effective management in this drier part of the Belts.

2. A number of species new to particular plots were recorded, including Marsh Arrowgrass *Triglochin palustris* (G37, G42), Star Sedge *Carex echinata* (G37) and the diminutive Bristle Club-rush *Isolepis setacea* (G19, G42). The latter was recorded from open mud at the edge of a hoof-print in Plot G42 close to its sister species, Slender Club-rush *Isolepis cernua*, which continues to occupy small tussocky islands on the edge of a long-standing hollow.

3. A new plot G27 has been established just the west of the proposed Sizewell C site to provide a baseline for monitoring in the future.

Analysis and Recommendations

Although it is recognised that the positive effects of stock-keeping and cutting machinery will continue to be mediated by variations in surface water and groundwater conditions, the programme of management on Sizewell Belts continues to meet the national standards set for this conservation feature, and comfortably exceeds the threshold for floristic composition in the monitored compartments.

Reedbeds

Sizewell has 6.5ha of reedbed habitat.

NG BAP Objective
Objectives:

- Conserve and enhance where feasible reedbed areas on Nuclear Generation s landholdings.
- Maintain all stages of succession from young reed in shallow water to old reed with scrub invasion on almost dry ground over dense litter.
- Encourage and monitor species whose presence is indicative of the habitat s functionality.

Action:

- Maintain water levels at a high and stable level to ensure the continuity of this habitat.
- Cut the main reedbed areas at Sizewell on a regular rotation. The cut areas should be raked to remove the built up litter layer.

Performance indicators:

- Extent of reed bed habitat and representation of all succession stages
- Numbers of key breeding bird species

Summary of Actions

- A large area of scrub was removed from the reedbed

- An area of reed was cut and burned

Monitoring Results

Breeding reedbed birds																
Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Water rail +	2	1	1	1	1	8	1	3	6	8	nc	3	1	nc	3	4
Sedge warbler	23	18	41	35	29	34	32	21	25	23	22	10	26	9	34	`16
Reed warbler	26	24	33	25	29	34	21	30	32	32	21	29	7	4	30	9
Reed bunting	5	5	12	7	9	12	12	12	12	9	8	8	4	1	8	6

Analysis and Recommendations

The above list of species are typical regular breeders in the Sizewell reedbeds but outside influences have more of an effect on their populations than the condition of the site. Water rails have not been surveyed using calls since 2008 and so records only indicate a minimum figure. Reed and sedge warblers are migratory and so their numbers are subject to African winters and migration conditions. Reed bunting numbers can be affected by winter conditions and it would appear they are probably recovering from the 2011/12 winters.

Natterjack Toad

NG BAP Action

- Following the relocation initiative at Sizewell in 2004, maintain a comprehensive monitoring programme.
- Manage Retsom s pond as a breeding site including protection of tadpoles from predation.

NG BAP KPI

- The population of Natterjack toads on the Nuclear Generation Estate.

Monitoring Results and Recommendations

Natterjack tadpole peak counts						
2008	2009	2010	2011	2012	2013	2014
3000	3000	2500	3000	5000	5000	8000

Summary:

- 2 spawn strings laid on 28th April
- 3.5 spawn strings laid on 10th May
- 4 spawn strings laid on 12th May
- 2 spawn strings laid on 13th May
- 200+ toadlets estimated during June/July

The natterjack population appears to be thriving with numbers of tadpoles counted continually increasing. The numbers of emerging toadlets varies from year to year and is far harder to quantify as they can emerge over a period of time and so a tadpole count is considered the best form of monitoring.

Water Vole

NG BAP Action

- Maintain regular monitoring of the populations and diversity of the species on Nuclear Generation sites.
- Safeguard any existing populations on Nuclear Generation sites by appropriate and sympathetic management of bankside vegetation and riparian maintenance work. However, strike a balance between clearing ditches to promote water flow and providing adequate aquatic vegetation cover for small mammals such as water voles.
- Minimise the risk to water voles of any necessary pest control procedures.
- Safeguard water vole populations against mink predation by installing mink monitoring rafts and traps where appropriate as part of any mink control programme within the wider area.

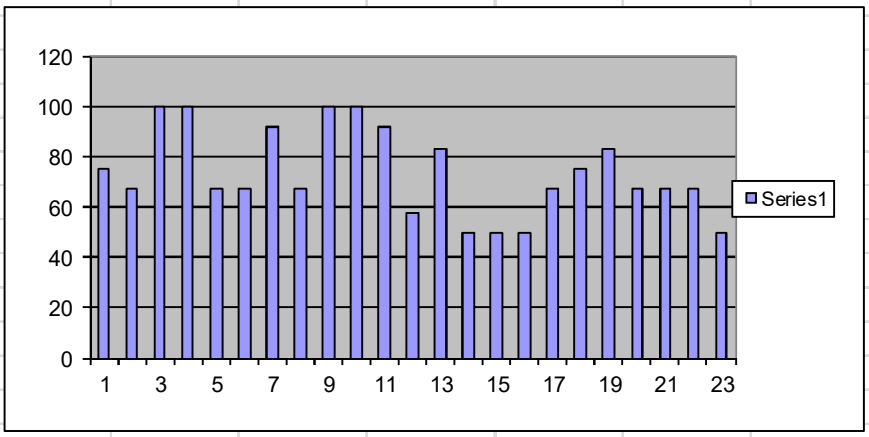
NG BAP KPI

- The number of transects with water vole.

Monitoring Results and Recommendations

Percentage of transects at Sizewell NKS for Water Voles with active signs of water vole presence at each survey 2001 - 2014

Date	Pos	Neg
Spring 01	75	25
Autumn 01	67	33
Spring 02	100	0
Autumn 02	100	0
Spring 03	67	33
Autumn 03	67	33
Spring 04	92	8
Autumn 04	67	33
Spring 05	100	0
Autumn 05	100	0
Spring 06	92	8
Autumn 06	58	42
Spring 07	83	17
Autumn 07	50	50
Spring 08	50	50
Autumn 08	50	50
Spring 09	67	33
Autumn 09	75	25
Autumn 10	83	17
Autumn 11	67	33
Autumn 12	67	33
Autumn 13	67	33
Autumn 14	50	50



positive=presence of fresh feeding signs and/or droppings

negative=no fresh field signs present

Spring=May

Autumn=September

The site has suffered from high water levels since the work to repair the Minsmere sluice was completed. Consequently the levels are too high in some of the water vole transects, but animals are still found nearby where the habitat and water level is more suitable.

Otter

NG BAP Action

- Undertake dyke clearance in a rolling programme.

NG BAP KPI

- The number of occasions evidence of otters is reported.

Monitoring Results and Recommendations

No regular monitoring undertaken.

Brown Hare

NG BAP Objectives

Actions

- Maintain mix of grassland, woodland and arable habitats.
- Maintain 6m field margins at Abbey Farms and area of bird cover crop.

KPI

- Numbers of Brown Hare on site

Monitoring Results and Recommendations

No regular monitoring undertaken, casual records of animals have been made through the year.

Linnet

NG BAP Action

- Maintain age diversity of the scrub habitat.

NG BAP KPI

- The population of breeding linnets.

Monitoring Results and Recommendations

The 2014 breeding bird survey identified 6 breeding territories on the reserve.

Linnet	2007	2008	2009	2010	2011	2012	2013	2014
	6	5	8	8	11	7	9	6

Reed Bunting

NG BAP Action

- Manage the reed bed in favourable condition

NG BAP KPI

- The number of breeding pairs of Reed Bunting.

Monitoring Results and Recommendations

The 2014 breeding bird survey recorded 6 breeding territories on the reserve, a 25% decrease on 2013

Reed	2007	2008	2009	2010	2011	2012	2013	2014
Bunting	12	9	8	8	4	1	8	6

The rotational management of ditches and reedbeds ensures there is sufficient suitable habitat available each year.

Song Thrush

NG BAP Action

- Maintain current mosaic of habitats, which supports several breeding pairs annually

NG BAP KPI

- The number of breeding pairs of Song Thrush.

Monitoring Results and Recommendations

Song Thrush	2007	2008	2009	2010	2011	2012	2013	2014
	4	12	5	6	6	13	8	4

Skylark

NG BAP Action

- Establish and maintain arable field margins at Abbey Farms and Sizewell Hall.
- Manage the lowland heath/acid grassland under an ELS or ESA scheme.
- Annually plant an area of wild bird feed crop.

NG BAP KPI

- The population of breeding skylarks on the Nuclear Generation estate.

Monitoring Results and Recommendations

The 2014 recorded 9 territories an increase on the previous 3 years probably due to the increasing areas of grassland that are being added on the estate as part of the Sizewell C habitat creation programme.

Skylark	2007	2008	2009	2010	2011	2012	2013	2014
	14	15	9	7	4	6	7	9

Small Heath Butterfly

NG BAP Objectives

Objectives

- Maintain current population levels
- Maintain population viability

Actions

- Continue / encourage annual monitoring through UKBMS
- Ensure that at Nuclear generation sites where Small Heath is present, some grassland areas are kept short and sparse and contain a mixture of fine grasses with a variety of nectar sources available throughout the year, especially yellow flowers such as dandelions and hawkbits.
- Livestock grazing is the best means of sward management for Small Heath, but grazing by rabbits is also effective.

- Where grazing opportunities are limited, grassland should be cut in late summer, early autumn, with arisings left temporally (were appropriate) to allow seeds to fall. The spreading of species rich green hay can also be undertaken to enhance sward diversity.

KPI

- Numbers of Small Heath on site

Monitoring Results and Recommendations

Only 54 records from the 2014 transect surveys, compared to a peak of 98 in 2009, from when there has been a steady decline in numbers, although 2014 does show a recovery in numbers since 2012.

Small Heath	2009	2010	2011	2012	2013	2014
	98	30	19	1	8	54

OTHER PRIORITY BAP SPECIES

A number of other UKBAP species, for which no NG BAP SAP exists, were recorded in varying numbers on or near the nature reserve during the course of the 2014 survey work.

Birds

Species	2014 Records
Bittern	One booming in spring
Lapwing	One pair held territory
Turtle dove	Two pairs held territories
Cuckoo	At least one bird held territory
Dunnock	46 territories recorded
Marsh tit	6 territories recorded
House sparrow	Minimum of 9 pairs recorded
Bullfinch	1 territory recorded
Yellowhammer	5 territories recorded

Mammals

Species	2014 Records
Barbastelle bat	Bat detector record
Noctule bat	Bat box record
Soprano pipistrelle	Bat box record
Brown long eared bat	Bat box record
Harbour porpoise	Two animals found dead on the shore

The presence of these species will be considered during future management of the reserve.

OPERATIONAL ACTIVITIES WHICH HAVE THE POTENTIAL TO IMPACT NEGATIVELY ON BIODIVERSITY

The purpose of this section is to identify operational works which have taken place which have the potential to harm the value of a feature so that an assessment of their effect can be made and appropriate controls and mitigation can be implemented in future years.

Name of works
Contractors driving onto the SSSI causing rutting etc

Action:
Contractors have been warned and no further instances have been recorded

Tree Safety Works
##############

COMMUNITY

Sustainability Target: We will work in partnership with local associations to increase the number of employees and the public engaging with wildlife through the natural resources of our sites.

ILMP Objective: To engage local stakeholders and to make a meaningful difference to the local community through promotion of biodiversity awareness, public enjoyment of the estate and community activities.
Site staff ran one guided walk and gave two talks to local interest groups

OTHER BIODIVERSITY MONITORING RESULTS 2014

January and February were wet months ending a wet winter but May and November were the wettest months of the year. In contrast March and September were the driest but overall it was a wet year with over 863.5 mm recorded.

Vegetation

The Fen vegetation monitoring programme continued and is now in its 19th year. An additional plot has been established and will be monitored biannually.
Three new species were recorded Marsh Arrowgrass Triglochin palustris (G37, G42), Star Sedge Carex echinata (G37) and the diminutive Bristle Club-rush Isolepis setacea (G19, G42).
The site was again considered to be in favourable condition.

Birds

Sizewell Bird Report 2014

The details of the breeding and wintering surveys are to be found in the appendix.
The following is a list of birds recorded on the estate during the period of this report but only refers to significant species and is not a total species list.

Systematic list;

Bittern	Birds were recorded on a number of occasions throughout the year and a single bird boomed for a short period in the spring
Little egret	Two pairs were thought to be nesting alongside the herons
Grey heron	A single pair nested but the outcome is unknown
Wigeon	Peak count of 110 birds on Salt Marsh during first winter period
Garganey	A pair were present on Salt Marsh during May
Common Buzzard	A pair nested again in Ash Wood
Peregrine falcon	A pair of birds were present throughout the first winter period and spring and are thought to have bred on Sizewell A
Hobby	A pair held territory on site
Lapwing	A single pair held territory on Salt marsh
Redshank	A single pair held territory on Salt marsh
Turtle dove	Two territories were found on site this year
Cuckoo	Two territories were found on site this year
Barn owl	A pair raised 4 chicks in a box at Upper Abbey Farm

Skylark	A minimum of 9 territories were recorded an increase on 2013.The farmland bird counts recorded a peak of 71 birds in the first quarter.
Woodlark	A bird was heard singing on several occasions at the southern end of the estate, breeding was not proven. Seven birds were recorded during the first quarter of farmland bird counts
Nightingale	A single bird held territory close to the Waste Recycling site
Cettis warbler	18 territories were found a substantial increase on 2013 as this species continues to thrive despite several recent cold winters
Willow warbler	Sadly, only 4 territories recorded of this rapidly declining species
Marsh tit	Encouragingly, this species appear to be maintaining a steady population at Sizewell with 6 territories held again in 2014
Bearded tit	Good numbers of these birds passed through the site during the autumn with 7 birds trapped and ringed on Retsoms
Yellowhammer	A flock of 25 were found feeding on stubble during the first winter period
Reed bunting	Only 6 territories recorded a 25% drop compared to 2013 but this species is making good use of the farmland bird plots in winter and so hopefully numbers will rise as the winter population increases.

Summary

The key areas of the estate are surveyed during the breeding season using the BTO s Common Bird Census method of mapping all territories with the exception of the field margins which are treated as transects as in the BTO s Breeding Bird Survey methodology

The wet spring weather meant that the recording effort was impeded at times and so only 5-6 visits were made to each of the habitats.

The number of breeding species recorded in the survey areas totalled 68, still above the sites average over the past 14 years. Casual recording around the remainder of the estate brought the figure up to 72 species, which included black redstart, and kittiwake.

Common buzzards bred on site with a pair nesting in Ash Wood and a pair of little egret nested with the grey herons in Sizewell Went despite the continued disturbance from the wind farm development.

Following the low migrant numbers in 2012 most species bounced back to their usual numbers with some species such as reed and sedge warblers well above their average for the site.

A total of 13 Biodiversity Action Plan species were recorded breeding or holding territory. Pleasingly two pairs of turtle dove were found breeding on site following a negative year in 2013.
The WeBS counts cover both winter periods where it was notably cold for the first with much of the site frozen for most counts and much milder for the second.
The farmland winter bird counts continued. This survey began in 2001 and concentrates on the arable fields at Upper and Lower Abbey farms, this year the two new HLS wild bird seed mixture plots have been included .
Of the 22 nest boxes on site 14 were occupied and by two species blue and great tits with the birds sharing them equally.

Bird Ringing on EDF Sizewell Estate 2014
A Report by Carl Powell
Bird ringing took place mainly in two locations on the Sizewell Estate during 2014.

Upper Abbey Farm.
Ringing was carried out here as part of the Foraging Farmland Bird Project (FFBP). The project involves catching birds utilising plots planted with a seed mix designed specifically to grow seed bearing plants. This is the third winter of the project. A minimum of five three hour ringing sessions between November and March each winter is required. In reality, many more sessions are carried out. All birds captured are ringed or re-processed but the target species of the project are Linnet, Tree Sparrow, Yellowhammer, Reed Bunting and Dunnock. The Project finished in March 2014 and all results are now with Waveney Bird Club who are coordinating and collecting results from those farms around Suffolk who participated. It is hoped they will produce a full report in the near future.
The year began with four sessions from the 12th January to the 24th March. Fifty two birds were either captured or recaptured during these sessions. This is the same total as the corresponding period in 2013.
A further six sessions were possible between the 20th November and the 30th December when 98 birds were captured or recaptured including some target species Yellowhammer, Dunnock and Reed Bunting. This is slightly down on the 2013 total. A change to the make-up of the seed mix used this year and a better growing season probably accounts for the increase in numbers of birds seen to be using the cover plot this autumn but sadly this was not reflected in the capture total.

Retsom s Field.
Ringing was carried out here during the autumn. The site is a small oasis of scrub and reed in the middle of open marsh and pasture and attracts both migrant and resident species. A total of 12 sessions between the 22nd August and the 12th November saw 150 birds trapped and either ringed or reprocessed. The most numerous species was Meadow Pipit with 44 captures. Meadow Pipits arrived late this year and left sooner meaning the capture rate was down on the previous year yet again. I am aware that other ringing sites along the coast also experienced lower catches than anticipated. Reed and Sedge Warbler numbers were also down with 20 and 7 respectively. Seven Bearded Tits were captured during their post breeding dispersal. Cetti s Warblers were present in good numbers this year with 12 captures in all including a bird ringed the previous year.

Barn Owls.
There are five Barn Owl boxes located around the Estate and these are checked annually with the results passed to the Suffolk Community Barn Owl Project. 2014 has been noted as a good year for Barn Owls in Suffolk and the box located in the northern meadow adjacent to Upper Abbey Farm had six eggs in April and four chicks were ringed in June.

Controls and Re-traps.
Of note during 2014 were a Robin ringed as a young bird in 2012 at Upper Abbey Farm and recaptured there in March and a Reed Bunting ringed in November 2013 on the cover plot and recaptured almost exactly a year later in the same spot. Details of two controls, a Whitethroat and a Reed Bunting are still awaited from the British Trust for Ornithology where detailed records of all birds ringed in the UK are kept.

Mammals

Otters
Spraints and foot prints were regularly found throughout the Belts indicating a year round presence.

Badgers
The original sett in Ash Wood continues to expand with several out lying holes dug throughout the wood and a second large sett is regularly occupied on the north side of the central ride. The animals have continued to expand their colonisation and additional setts have been appeared around the Estate including one in the pit beside Upper Abbey Farm. This one necessitated fencing into the arable field to prevent tractors etc dropping into the sett.

Bats
The natterers bats were in residence during the summer with the piles of droppings on the floor showing how they were moving between roosts.
The annual bat box check in Kenton Hills was carried out in October. Three species of bats were found, totalling 16 pipistrelles, 1 noctule and 51+ natterers bats. The natterers were difficult to count as save for one individual found alone in a box the remainder were all in one box and very lively when the lid was lifted.

Sea Mammals
Two dead harbour porpoises were washed ashore during the spring.
A humpback whale passed by heading north in October and is probably the same animals that was seen offshore in autumn 2013

Water voles
The National Key Site monitoring programme continued with just autumn surveys as per the Royal Holloway College recommendations. Positive transects were reduced to just 50% occupancy this year and is due to the high water levels experienced on

site since the work to repair the Minsmere sluice was completed. However a check on areas within the Belts where the habitat was optimal revealed the presence of voles and so it would seem they have just been displaced into more suitable areas.

Fungi

The first record for Suffolk of the Tiny earth star *(Gaestrum minimum)* was found on the beach at Sizewell by the county recorder.

Invertebrates

Various surveys are carried out each year, butterflies have transects that are walked on a regular basis. Moths are recorded when specialists are available although we do now have access to a trap and so ad hoc recording will take place. Occasionally other specialists visit and in 2013 Colin Lucas and Peter Vincent visited recording beetles, leaf hoppers and diptera (flies). A number of notable species were found and their results are in the appendix.

Butterflies

SWT volunteer Trudy Seagon set up butterfly transects along the Upper Abbey Farm field margins in 2004 and has repeated the survey annually since that time. A total of 22 species were recorded in 2006 and again in 2007. This is probably the peak species count having started with 19 species in 2004. The 2008 survey reflected the weather with only 16 species recorded and a total of 336 individuals compared to 1591 in 2007. The 2009 season was a great improvement with a dry summer contributing to a species total of 20 and 1889 individuals, the highest individual total since the survey began. In 2010 the numbers recorded dropped back to the 2007 level with 1537 individuals recorded however the species count increased by two to 22 equalling the previous best counts.
The total number of individuals increased to an all time high in 2011 with 2094 butterflies seen over 24 visits however only 16 species were recorded. 2012 was an average year for population density however a total of 21 species were recorded. The 2014 season again recorded 22 species and the total number recorded reached a record high with 2422 individuals counted. The first week of July found the most butterflies with meadow browns and ringlets making up the bulk of the species followed by the two skippers Small and Essex.
A transect was first set up on Sizewell Belts in 2012. However as could be predicted comparing a primarily agricultural transect with a SSSI wetland the SSSI was richer both in species and population density but the two transects will become more interesting in the coming years for comparisons particularly associated with the various weather factors. The 2014 season recorded 23 species and a total count of 1952 individuals. As with the Upper Abbey transect meadow browns and ringlets were the commonest followed by the various white species.
Both 'Upper Abbey Field-Margins' and 'Sizewell Belts' butterfly Transects have been walked once a week, (weather conditions permitting) for the entire recording season from 1st April - 31st September (26 weeks). Details of the counts are transferred to the UKBMS data-base and the results can be found in the Appendix.

Sizewell Moth Report 2014

Introduction

In recent years the Suffolk Moth Group have undertaken trapping but to date had not found their target species the Devon Carpet (*Lampropteryx otregiata)*.. As the Moth group were not able to trap this year a student Alex Jessop who is undertaking a dissertation on moth trapping deployed a variety of traps assisted by Jamie Smith. Three locations were selected covering a wide range of habitats.

Locations

The locations were carefully chosen to cover as many habitats as possible.

Reservoir

This site was chosen because of the following habitats and features

- SSSI Grazing Marsh
- Secondary Woodland (Mainly Silver Birch)
- Acid Grassland
- Mature Oaks
- Wet Woodland
- Coniferous Woodland
- Close to the coast so could attract migrants coming in off the North Sea from the continent.

Retsom s

This site is also very diverse with extensive grassland favoured by a large number of species. The trapping sessions were timed when the Heather strips were out in full flower and providing a very important nectar source.

Key habitat and features of this trap site:

- Varied structure grassland
- Heathland (Heather plots)
- Coastal aspect, a big attraction to any immigrants coming in off the continent.
- Coniferous Woodland
- Veteran Oaks
- Silver Birch Woodland
- SSSI Wetland
- Dense Gorse

Low wind speeds are an important factor for moths. This location proved to be difficult as the nature of the location is very open and susceptible to wind even on relatively calm nights, whereas the other 2 locations are reasonably sheltered.

Upper Abbey Farm

This location was enclosed by trees and shrubs surrounded by arable fields with 6-9 metre grassland buffer strips alongside mature hedges.

The key habitats and features are:

- Veteran Oaks
- Diverse mature hedgerows
- Old farm buildings
- Dense Shrub
- Grass buffer strips
-

Type of traps used

While trapping 3 different types of moth trap were used:

- **Robinson s**: This is widely recognised as the best moth trap on the market because of its usability and design. It has a white cone shape underneath the light (a 125 W mercury vapour light bulb), which reflects more light and is a more effective lure. Egg boxes are placed inside the trap to offer some protection for the moths. This trap was used on: Retsom s and Reservoir

Source: www.wildaboutbritain.co.uk

- **Skinner:** The Skinner trap uses the same light bulb as the Robinson but lacks the reflective cone so the light is only effective over a much shorter distance.

Also the moth retention isn t quite as good as the Robinson but is still a very good trap. This trap was used on: Retsom s and Reservoir.

Source: www.birdguides.com

- **Heath:** The Heath trap, unlike the other traps, uses a much lower voltage light bulb so again is less effective over long distances but works well in confined spaces. The Heath trap is once again very portable and has fairly good moth retention. This trap was used on: Upper Abbey Farm

Source: www.angleps.com

Moth Data Collected

Each location was visited at least 3 times during June, July and August and a species list compiled

Total Species Count	124
Common	97
Local	22
Immigrant	2
Nb	3
Na	0
RDB	0

Key:

Common	Recorded from more than 300 10Km squares since 1960
Local	Recorded from 101-300 10km squares since 1960
Immigrant	Considered to have reached the British Isles by natural flight
Nb	Nationally Scarce B. Recorded from 31-100 10Km squares since 1980
Na	Nationally Scarce A. Recorded from 16-30 10Km squares since 1980

RDB Red Data Book species. Known from less than 15 10Km squares.

Silver Y Moth Photo: Jamie Smith

This Silver- Y (*Autographa gamma),* this was a common species in the moth trap and is migratory species that can turn up in their thousands from the continent.

In 2007 there was a review of the BAP moth List and 71 species were added under the category: Research Only (Widespread but rapidly declining Moths) Species.

15 of those have been recorded this year on the Sizewell Estate.

Key Species Recorded:

Blood- vein	*Timandra comae*	Belts	21/05/2014	Common
Buff Ermine	*Spilosoma luteum*	Upper Abbey	05/06/2014	Common
Cinnabar Moth	*Tyria jacobaeae*	Belts	23/05/2014	Common
Crescent	*Celaena leucostigma leucostigma*	Retsoms	24/07/2014	Local
Dot Moth	*Melanchra persicariae*	Upper Abbey	02/07/2014	Common
Dusky Brocade	*Apamea remissa*	Retsoms	24/07/2014	Common
Garden Tiger	*Arctia caja*	Retsoms	24/07/2014	Common
Ghost Moth	*Hepialus humuli humuli*	Upper Abbey	18/06/2014	Common
Grey Dagger	*Acronicta psi*	Stackyard	15/07/2014	Common
Latticed Heath	*Chiasmia clathrata clathrata*	Retsoms	24/07/2014	Common
Mouse Moth	*Amphipyra tragopoginis*	Leiston Common	01/08/2014	Common
Oak Hook-tip	*Watsonalla binaria*	Leiston Common	01/08/2014	Common
Rosy Minor	*Mesoligia literosa*	Retsoms	24/07/2014	Common
Rosy Rustic	*Hydraecia micacea*	Leiston Common	01/08/2014	Common
White-line Dart	*Euxoa tritici*	Leiston Common	01/08/2014	Common

The 3 Nb. Species recorded were:

Cream-bordered Green Pea	*Earias clorana*	Upper Abbey	02/07/2014
Dotted Border Wave	*Idaea sylvestraria*	Upper Abbey	21/07/2014
Reed Dagger	*Simyra albovenosa*	Upper Abbey	02/07/2014

Source: Ukmoths.org.uk

A Cream-bordered Green Pea- an Nb species and a good find while trapping at Upper Abbey Farm.

Although only a small number of BAP and Nb. Species were recorded it shows the potential of the site if more moth trapping is undertaken in the future particularly if spread throughout the year..

Jamie Smith & Alex Jessop

Dragonflies

A dragonfly survey was undertaken on the Belts using the existing butterfly transects.A dead Willow emerald was found in a spiders web on Salt Marsh indicating this recent coloniser has spread throughout the site.

Ant lions

The number of pits varies from year to year with weather and vegetation growth however the work carried out in 2007 proved beneficial. The 2008 count was 123 pits in the cattle yard and 89 in the new area outside. This was low compared to the peak count of 900 in 2004 but weather conditions and rabbit activity were the likely limiting factors. The 2009 survey showed an overall increase with 377 pits in the cattle yard and 105 pits in the new area. The dry early summer in 2010 proved productive with a total of 1032 pits, the highest figure since the colony was discovered. The colony continued to expand with a slight increase of 1100 pits in 2011. The wet weather obviously had an impact on the 2012 season as only 550 pits were counted. In 2013 610 pits were counted but rabbit activity continues to make monitoring difficult with the ground being constantly disturbed.

The 2014 survey only found 360 pits however this was again mainly due to extensive rabbit activity.

Reptiles and amphibians

Natterjack toads

The pond was pumped out in February, however March and April were relatively dry which necessitated filling the pond with water via a bowser, prior to the toads emerging to spawn.

May became the wettest month of the year-to-date with 138mm of rainfall. There were some significant prolonged downpours. It rained during 15 of the 31 days of the month, with 6 days seeing over 10mm, 2 of which were over 20mm.

It had barely rained for the 10 days following the first spawning and the pond water level was suffering. A further 2 bowsers of water were added on the 6th. There then immediately followed a period of 7 days of rainfall, during which more spawning was noted; with 3-5 strings seen on the 10th, a further 4 strings on the 12th and 2 final strings on the 13th.

On the 22nd it was estimated that 6-8,000 (more likely 10,000+) tadpoles of varying ages were present and active in the pond.

Good numbers of varied-age toadlets were noted throughout June and into July.

A full report was submitted to regional Natterjack Toad Group and again Sizewell was the only successful site in Suffolk.

Dayne West

Natterjack tadpoles Photo: Dayne West

Appendices

Sizewell Breeding Birds 2014									
Species	Sizewell Belts	Retsoms/ S Marsh	Leiston Common	Reckham Pits Wood	Lower Abbey Marshes	Black Walks	Field margins	Other Areas	**Total**
Little Grebe									0
Bittern	1								1
Grey heron	1								1
Little egret	1								1
Mute Swan	3	1			1				5
Canada goose		1							1
Shelduck		1							1
Gadwall	3	1			2				6
Teal									0
Mallard	10	1			2				13
Garganey		1							1
Shoveler		1							1
Tufted duck									0
Common buzzard								1	1
Sparrowhawk	2								2
Kestrel			1						1
Hobby								1	1
Peregrine	1								1
Red legged partridge			1				1		2
Pheasant+									nc
Water rail +	4								4
Moorhen	7	2			2				11
Lapwing		1							1
Redshank		1							1
Snipe									0
Stock dove	5	2							7
Collared dove			1			4			5
Turtle dove*	2								2
Cuckoo*	1	1							2
Barn owl								1	1
Tawny owl+									nc
Little owl								1	1
Kingfisher	1								1
Green woodpecker	2								2
Gt spotted woodpecker	3			1		1	1		6
Skylark *		3				1	5		9
Woodlark	1								1
Meadow pipit									0
Swallow								1	1
Pied wagtail								1	1
Wren	90	18	18	13	16	9	10		174
Dunnock*	14	5	7	2	6	8	4		46
Robin	29	4	8	7	3	5	6		62
Nightingale	1								1
Blackbird	15		5		1		3		24
Song thrush*	3				1				4
Mistle thrush		1	1						2
Cettis warbler	8	6			4				18
Sedge warbler	5	2			2				9
Reed warbler	11	5			1				16
Grasshopper warbler									0
Lesser whitethroat							2		2
Whitethroat	3	2	2		5	2	1		15
Garden warbler	7	2	1		4		1		15
Blackcap	18	2	1	3	6	3	6		39
Chiffchaff	44	7	6	2	6	3	2		70
Willow warbler	2	2							4
Goldcrest	3	2	1	1		1			8
Long tailed tit	13	1	1	1	1	1	2		20
Marsh tit*	6								6
Coal tit	2	3	1	1			1		8
Blue tit	46	3	3	5	7	6	6		76
Great tit	32	2	5	4	4	4	4		55
Treecreeper	6			2					8
Jay	1								1
Magpie							1		1
Jackdaw								2	2
Carrion crow									nc
House sparrow*								9	9
Chaffinch	53	19	22	5	10	16	8		133
Greenfinch	3		2		1	3	1		10
Goldfinch	3	3	2		3	2	2		15
Linnet*		1	1		2	2			6
Siskin									0
Bullfinch*					1				1
Yellowhammer*	1		1		1	1	1		5
Reed bunting *	4	1			1				6
Species marked with an asterisk* = Birds with UK and Suffolk Biodiversity Action Plans									
Species marked with a plus sign + = Birds present but no accurate count made minimum number only									

Farmland winter bird counts Upper Abbey Farm Leiston 2014							
Species	20-Jan	17-Feb	17-Mar	08-Sep	13-Oct	09-Nov	07-Dec
Greylag goose	0	0	0	0	0	0	0
White fronted goose	0	0	0	0	0	0	0
Mallard	0	0	0	0	0	0	0
Marsh harrier	1	0	0	0	0	0	0
Buzzard	0	0	0	2	2	0	1
Kestrel	0	0	0	0	1	1	0
Peregine	0	0	0	0	0	1	0
Sparrowhawk	0	0	1	1	0	1	1
Red legged partridge	12	14	12	2	0	29	1
Pheasant	45	10	12	1	35	47	6
Lapwing	0	0	0	0	0	0	0
Woodcock	0	0	0	0	0	0	0
Curlew	0	0	0	0	0	0	0
Wood pigeon	381	287	53	56	49	77	365
Stock dove	3	0	2	0	3	0	0
Collared dove	0	0	1	0	0	0	0
Barn owl	0	0	0	0	0	0	0
Green woodpecker	0	0	0	1	1	0	0
Great spotted woodpecker	2	1	0	0	1	0	0
Skylark	71	36	19	0	8	56	7
Woodlark	7	2	0	0	0	0	0
Meadow pipit	20	0	0	4	1	3	0
Pied wagtail	17	1	6	1	6	5	2
Dunnock	10	14	3	0	7	1	2
Robin	6	4	2	9	13	3	2
Wren	3	2	4	7	4	3	2
Blackbird	7	8	13	2	8	9	12
Fieldfare	0	6	15	0	0	3	9
Song thrush	2	1	1	0	1	0	0
Redwing	2	4	9	0	1	0	0
Chiffchaff	0	0	3	0	0	0	0
Firecrest	0	0	1	0	0	0	0
Long tailed tit	0	6	0	0	7	0	0
Blue tit	10	13	12	27	23	4	0
Great tit	5	3	6	11	6	1	0
Marsh tit	0	0	0	0	0	0	0
Coal tit	0	0	2	1	6	0	0
Jay	0	4	0	0	0	0	0
Magpie	3	1	4	4	2	2	2
Jackdaw	3	6	2	0	0	53	0
Rook	0	35	0	0	0	0	0
Carrion crow	20	62	10	12	84	33	13
Starling	0	12	1	0	0	0	0
House sparrow	40	45	22	26	16	25	40
Chaffinch	37	28	16	7	71	21	29
Brambling	20	24	0	0	0	0	0
Greenfinch	0	0	0	0	2	0	0
Goldfinch	11	2	8	7	31	5	10
Linnet	60	36	15	80	0	0	50
Bullfinch	4	1	2	0	0	0	0
Yellowhammer	36	31	6	0	9	0	0
Reed bunting	45	45	2	1	3	0	0

HLS wild bird strips Eastbridge Walk							
					13-Oct	09-Nov	07-Dec
Pheasant					5	3	0
Snipe					0	1	0
Skylark					0	0	2
Meadow pipit					0	1	0
Dunnock					0	1	3
Wren					0	0	1
Redwing					0	0	3
Great tit					1	0	0
Chaffinch					26	26	53
Greenfinch					0	16	34
Goldfinch					5	0	0
Yellowhammer					0	10	4
Bullfinch					1	0	0
Reed bunting					11	3	5
HLS wild bird strips Little Mount Walk							
Pheasant					64	12	3
Skylark					0	11	2
Meadow pipit					0	0	3
Dunnock					1	0	1
Wren					1	0	0
House sparrow					32	31	7
Chaffinch					0	5	3
Greenfinch					2	0	0
Reed bunting					9	7	6
HLS wild bird strips Upper Abbey Farm							
Pheasant					0	2	0
Wood pigeon					0	2	0
Dunnock					0	0	3
Robin					0	1	2
Song thrush					0	1	4
Blue tit					0	3	1
Goldcrest					0	0	1
Jay					0	0	1
Chaffinch					0	13	44
Greenfinch					0	0	2
Goldfinch					0	0	8
Reed bunting					0	0	2

Sizewell WeBS 2014							
	20-Jan	17-Feb	17-Mar	08-Sep	13-Oct	10-Nov	08-Dec
Mute swan	14	5	12	9	12	15	11
Pink footed goose	0	0	1	0	0	0	0
Grey lag goose	0	2	65	0	1	0	0
Canada goose	0	2	0	0	0	0	0
Wigeon	110	80	75	0	18	4	55
Gadwall	25	14	16	2	0	2	17
Teal	70	48	50	3	20	17	13
Mallard	90	58	47	8	35	43	24
Shoveler	0	0	8	0	8	0	18
Cormorant	0	0	0	0	0	1	0
Little egret	2	1	2	3	2	4	5
Grey heron	3	4	3	3	4	4	3
Water rail	2	1	0	1	2	1	1
Moorhen	9	7	6	0	3	7	0
Coot	0	0	1	0	0	0	0
Oystercatcher	0	0	2	0	2	0	0
Lapwing	55	4	4	0	0	0	0
Jack snipe	0	0	1	0	0	0	0
Snipe	6	10	10	0	2	0	2
Woodcock	1	2	1	0	0	1	0
Curlew	1	1	1	0	0	1	1
Redshank	0	0	0	0	0	1	0
Black headed gull	0	4	0	0	0	55	4
Herring gull	0	0	0	0	0	1	0
Kingfisher	0	0	1	2	1	2	1
Marsh harrier	0	2	1	2	2	5	7
Hen harrier	0	0	0	0	0	0	1
Buzzard	0	3	2	0	0	0	0
Kestrel	0	0	1	0	0	0	0
Peregrine	0	1	0	0	0	0	0

Sizewell Estate	Butterfly Transect 2014 (UPPER ABBEY FARM)																									
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
Date	Apr 01	Apr 08	Apr 15	Apr 22	Apr 29	May 06	May 13	May 20	May 27	Jun 03	Jun 10	Jun 17	Jun 24	Jul 01	Jul 08	Jul 15	Jul 22	Jul 29	Aug 05	Aug 12	Aug 19	Aug 26	Sep 02	Sep 09	Sep 16	Sep 23	
Essex Skipper	0	0	0	0	0		0	0	0	0	1	0	0	0	0	0		0		0	0	0	0	0		0	1
Small/Essex Skipper	0	0	0	0	1		0	0	0	0	0	9	16	19	126	79		13		1	0	0	0	0		0	264
Large Skipper	0	0	0	0	0		0	0	0	0	0	0	8	7	22	23		1		0	0	0	0	0		0	61
Brimstone	1	1	0	0	0		0	1	0	0	0	0	0	0	0	0		0		0	0	0	0	0		0	3
Large White	0	0	0	0	1		0	8	2	1	1	1	0	4	19	18		13		1	1	3	4	2		4	83
Small White	0	0	0	3	1		1	1	3	3	1	0	0	0	15	8		5		9	1	1	2	1		0	55
Green-veined White	0	3	0	4	0		1	1	0	0	0	0	1	0	22	14		5		6	7	10	12	4		1	91
Orange Tip	0	3	1	6	0		2	4	0	0	0	0	0	0	0	0		0		0	0	0	0	0		0	16
Small Copper	0	0	0	0	0		1	1	0	0	0	0	0	1	2	1		0		0	0	1	0	2		0	9
Brown Argus	0	0	0	0	0		0	0	0	0	0	0	0	0	2	2		0		0	1	0	0	0		0	5
Common Blue	0	0	0	0	0		0	0	1	0	0	0	0	0	0	0		0		0	0	0	0	0		0	1
Red Admiral	0	0	0	0	0		0	0	1	1	0	1	2	4	5	0		2		0	5	2	2	2		8	35
Painted Lady	0	0	0	0	0		0	0	0	0	0	0	0	0	1	0		3		0	0	0	0	0		0	4
Small Tortoiseshell	23	28	4	9	10		0	0	1	4	10	31	14	11	7	4		16		29	4	0	0	0		0	205
Peacock	14	11	7	9	0		7	9	0	0	0	0	0	0	17	13		10		2	1	0	0	0		0	100
Comma	1	0	1	0	0		1	0	0	0	0	0	0	0	2	1		2		0	0	0	0	1		4	13
Speckled Wood	1	0	0	0	4		0	2	0	0	1	2	0	0	0	0		2		0	0	1	0	0		2	15
Grayling	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0		0		2	0	0	0	2		0	4
Gatekeeper	0	0	0	0	0		0	0	0	0	0	0	0	0	51	37		75		12	1	1	0	0		0	177
Meadow Brown	0	0	0	0	22		0	0	0	1	22	94	121	129	205	96		20		13	2	0	0	0		0	725
Small Heath	0	0	0	0	1		1	0	0	0	1	0	0	0	0	0		0		0	0	0	0	0		0	3
Ringlet	0	0	0	0	0		0	0	0	0	0	15	107	165	179	79		7		0	0	0	0	0		0	552
Total (Summary)	40	46	13	31	40	0	14	27	8	10	37	##	##	##	##	##	0	174	0	75	23	19	20	14	0	19	2422

Sizewell Estate	Butterfly Transect 2014 (SIZEWELL BELTS)																										
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
Date	Apr 01	Apr 08	Apr 15	Apr 22	Apr 29	May	May 13	May 20	May 27	Jun 03	Jun 10	Jun 17	Jun 24	Jul 01	Jul 08	Jul 15	Jul 22	Jul 29	Aug	Aug	Aug	Aug	Sep 02	Sep	Sep	Sep	
Small Skipper	0	0	0	0	0		0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0		0	2
Essex Skipper	0	0	0	0	0		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1
Small/Essex Skipper	0	0	0	0	0		0	0	0	0	0	0	0	0	2	0	2	1	0	0	0	0	0	0		0	5
Large Skipper	0	0	0	0	0		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		0	1
Brimstone	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		0	1
Large White	0	0	0	1	0		0	1	0	0	0	0	0	14	4	7	1	2	0	0	0	0	0	0		1	31
Small White	0	2	15	12	0		2	1	4	1	0	0	5	10	12	19	20	18	3	4	1	4	4	0		1	138
Green-veined White	0	0	15	15	0		6	4	0	0	0	0	3	1	5	8	7	15	11	7	3	12	18	7		4	141
Orange Tip	0	2	7	6	0		2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	20
Small Copper	0	1	0	4	0		2	5	2	0	0	1	2	11	9	16	5	3	0	2	0	3	1	2		2	71
Brown Argus	0	0	0	0	0		0	0	0	0	0	0	0	0	2	4	1	0	1	0	0	0	0	0		0	8
Common Blue	0	0	0	0	0		0	2	1	2	0	1	0	0	1	7	3	9	4	4	0	0	0	1		0	35
White Admiral	0	0	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		0	1
Red Admiral	0	0	0	0	1		1	2	1	1	1	0	9	2	0	2	0	3	2	1	1	1	1	0		2	31
Painted Lady	0	0	0	0	0		0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0		0	2
Small Tortoiseshell	9	8	7	4	13		0	1	5	1	13	17	17	6	2	1	3	6	1	2	0	0	0	0		0	116
Peacock	7	14	8	7	1		2	4	1	1	0	0	0	0	2	6	14	7	0	0	0	0	0	0		1	75
Comma	3	2	1	0	0		0	0	0	0	0	0	0	1	1	0	2	0	1	0	0	0	0	0		0	11
Speckled Wood	0	0	0	0	6		0	1	2	3	6	5	1	0	0	1	1	1	1	0	3	0	2	0		1	34
Grayling	0	0	0	0	0		0	0	0	0	0	0	0	0	3	8	5	4	0	1	1	0	2	0		0	24
Gatekeeper	0	0	0	0	0		0	0	0	0	0	0	0	0	9	14	22	35	15	6	1	0	0	0		0	102
Meadow Brown	0	0	0	0	14		0	0	0	2	14	30	125	90	101	125	52	29	20	4	3	1	0	0		0	610
Small Heath	0	0	0	0	2		2	2	0	0	3	0	7	9	0	0	0	0	0	3	3	7	11	0		2	51
Ringlet	0	0	0	0	0		0	0	0	0	0	10	104	111	65	109	30	11	1	0	0	0	0	0		0	441
Total (Summary)	19	29	53	49	37	0	17	25	17	11	37	67	273	258	##	328	##	144	60	34	17	28	39	10	0	14	1952

Sizewell Moth Records 2014				
Common Name	**Latin name**	**Location**	**Date**	**Status**
5- spot Burnet	*Zygaena trifolii*	Station Marshes	16/06/2014	Local
A Micro	*Catoptria pinella*	Retsoms	24/07/2014	Common
A Micro	Synaphe punctalis	Retsoms	24/07/2014	Common
Antler Moth	*Cerapteryx graminis*	Upper Abbey	02/07/2014	Common
Archer's Dart	*Agrotis vestigialis*	Retsoms	24/07/2014	Local
Beautiful Hook-tip	*Laspeyria flexula*	Upper Abbey	02/07/2014	Local
Birds Wing	*Dypterygia scabriuscula*	Upper Abbey	18/06/2014	Local
Black Arches	*Lymantria monacha*	Retsoms	24/07/2014	Local
Blood- vein	*Timandra comae*	Belts	21/05/2014	Common
Bright-line Brown-eye	*Lacanobia oleracea*	Upper Abbey	18/06/2014	Common
Brimstone Moth	*Opisthograptis luteolata*	Upper Abbey	02/07/2014	Common
Broad-bordered Yellow Underwing	*Noctua fimbriata*	Upper Abbey	02/07/2014	Common
Brown Rustic	*Rusina ferruginea*	Upper Abbey	18/06/2014	Common
Brown Silver-line	*Petrophora chlorosata*	Upper Abbey	18/06/2014	Common
Brown-line Bright-eye	*Mythimna conigera*	Upper Abbey	02/07/2014	Common
Brown-tail	*Euproctis chrysorrhoea*	Retsoms	24/07/2014	Local
Buff Arches	*Habrosyne pyritoides*	Upper Abbey	18/06/2014	Common
Buff Ermine	*Spilosoma luteum*	Upper Abbey	05/06/2014	Common
Buff Footman	*Eilema depressa*	Leiston Common	01/08/2014	Local
Buff Tip	*Phalera bucephala*	Upper Abbey	18/06/2014	Common
Burnished Brass	*Diachrysia chrystis*	Upper Abbey	18/06/2014	Common
Cabbage Moth	*Mamestra brassicae*	Leiston Common	01/08/2014	Common
Canary-shouldered Thorn	*Ennomos alniaria*	Leiston Common	01/08/2014	Common
Cinnabar Moth	*Tyria jacobaeae*	Belts	23/05/2014	Common
Clay	*Mythimna albipuncta*	Retsoms	24/07/2014	Common
Clouded Border	*Lomaspilis mariginata*	Beach	16/06/2014	Common
Clouded Magpie	*Abraxas sylvata*	Upper Abbey	02/07/2014	Local
Clouded Silver	*Lomographa temerata*	Retsoms	24/07/2014	Common
Common Footman	*Eilema lurideola*	Upper Abbey	18/06/2014	Common
Common Rustic	*Mesapamea secalis*	Retsoms	24/07/2014	Common
Common Wainscot	*Mythimna pallens*	Upper Abbey	21/07/2014	Common
Copper Underwing	*Amphipyra pyramidea*	Retsoms	24/07/2014	Common
Coronet	*Craniophora ligustri*	Leiston Common	01/08/2014	Local
Coxcomb Prominent	*Ptilodon capucina*	Upper Abbey	18/06/2014	Common
Cream-bordered Green Pea	*Earias clorana*	Upper Abbey	02/07/2014	Nb
Crescent	*Celaena leucostigma leucos*	Retsoms	24/07/2014	Local
Dark Arches	*Apamea monoglypha*	Upper Abbey	05/06/2014	Common
Dingy Footman	*Eilema griseola*	Upper Abbey	21/07/2014	Common
Dog's Tooth	*Lacanobia suasa*	Retsoms	24/07/2014	Local
Dot Moth	*Melanchra persicariae*	Upper Abbey	02/07/2014	Common
Dotted Border Wave	*Idaea sylvestraria*	Upper Abbey	21/07/2014	Nb
Double Lobed	*Apamea ophiogramma*	Leiston Common	01/08/2014	Common
Double Square-spot	*Xestia triangulum*	Upper Abbey	18/06/2014	Common
Drinker	*Euthrix potatoria*	Upper Abbey	21/07/2014	Common
Dusky Brocade	*Apamea remissa*	Retsoms	24/07/2014	Common
Dusky Sallow	*Eremobia ochroleuca*	Retsoms	24/07/2014	Common
Elephant Hawkmoth	*Deilephila elpenor*	Upper Abbey	02/07/2014	Common
Flame	*Axylia putris*	Upper Abbey	18/06/2014	Common
Garden Tiger	*Arctia caja*	Retsoms	24/07/2014	Common
Ghost Moth	*Hepialus humuli humuli*	Upper Abbey	18/06/2014	Common
Gold-spot	*Plusia festucae*	Retsoms	24/07/2014	Common
Grey Dagger	*Acronicta psi*	Stackyard	15/07/2014	Common
Heart and Dart	*Agrotis exclamationis*	Upper Abbey	05/06/2014	Common
Iron Prominent	*Notodonta dromedarius*	Retsoms	24/07/2014	Common
Large Emerald	Geometra papilionaria	Retsoms	24/07/2014	Common
Large Twin-spot Carpet	*Xanthorhoe quadrifasiata*	Upper Abbey	02/07/2014	Local

Large Yellow Underwing	*Noctua pronuba*	Upper Abbey	05/06/2014	Common
Latticed Heath	*Chiasmia clathrata clathrat*	Retsoms	24/07/2014	Common
Least Yellow- underwing	*Noctua interjecta caliginos*	Retsoms	24/07/2014	Common
Lesser Broad-bordered Yellow Unde	*Noctua janthe*	Upper Abbey	21/07/2014	Common
Lesser Swallow Prominent	*Pheosia gnoma*	Retsoms	24/07/2014	Common
Lesser Yellow Underwing	*Noctua interjecta*	Upper Abbey	18/06/2014	Common
Light Arches	*Apamea lithoxylaea*	Upper Abbey	02/07/2014	Common
Lime- speck Pug	*Eupithecia centaureata*	Retsoms	24/07/2014	Common
Little Emerald	*Jodis lactearia*	Upper Abbey	02/07/2014	Common
Lychnis	*Hadena Bicruris*	Leiston Common	01/08/2014	Common
Magpie	*Abraxas grossulariata*	Upper Abbey	05/06/2014	Common
Maiden's Blush	*Cyclophora punctaria*	Leiston Common	01/08/2014	Local
Miller	*Acronita leporina*	Upper Abbey	02/07/2014	Common
Mother of Pearl	*Pleuroptya ruralis*	Upper Abbey	21/07/2014	Common
Mother Shipton	*Callistege mi*	Ashwood	21/05/2014	Common
Mottled Beauty	*Boarmia repandata*	Retsoms	24/07/2014	Common
Mottled Beauty	*Alcis repandata rependata*	Leiston Common	01/08/2014	Common
Mottled Pug	*Eupithecia irriguata*	Upper Abbey	05/06/2014	Common
Mouse Moth	*Amphipyra tragopoginis*	Leiston Common	01/08/2014	Common
Oak Eggar	*Lasiocampa quercus*	Retsoms	24/07/2014	Common
Oak Hook-tip	*Watsonalla binaria*	Leiston Common	01/08/2014	Common
Peach Blossom	*Thyatira batis*	Upper Abbey	02/07/2014	Common
Peacock	*Macaria notata*	Leiston Common	01/08/2014	Local
Pebble Hook-tip	*Drepana falcataria*	Retsoms	24/07/2014	Common
Peppered Moth	*Biston betularia*	Upper Abbey	02/07/2014	Common
Pine Carpet	*Thera firmata*	Upper Abbey	21/07/2014	Common
Plain Golden Y	*Autographa jota*	Upper Abbey	02/07/2014	Common
Poplar Grey	*Acronita megacephala*	Upper Abbey	02/07/2014	Common
Poplar Kitten	*Furcua bifida*	Leiston Common	01/08/2014	Local
Privet Hawkmoth	*Sphinx ligustri*	Upper Abbey	18/06/2014	Common
Red Twin-spot Carpet	*Xanthorhoe spadicearia*	Leiston Common	01/08/2014	Common
Reed Dagger	*Simyra albovenosa*	Upper Abbey	02/07/2014	Nb
Riband Wave	*Idaea aversata*	Whinny Hill	17/06/2014	Common
Rosy Footman	*Miltochrista miniata*	Upper Abbey	02/07/2014	Local
Rosy Minor	*Mesoligia literosa*	Retsoms	24/07/2014	Common
Rosy Rustic	*Hydraecia micacea*	Leiston Common	01/08/2014	Common
Scalloped Hook-tip	*Falcaria lacertinaria*	Leiston Common	01/08/2014	Common
Scalloped Oak	*Crocallis elinguaria*	Leiston Common	01/08/2014	Common
Scarce Footman	*Eilema complana*	Upper Abbey	21/07/2014	Local
Sharp-angled Peacock	*Macaria alternata*	Leiston Common	01/08/2014	Local
Silver- Ground Carpet	*Xanthorhoe montana mon*	Upper Abbey	05/06/2014	Common
Silver Y	*Autographa gamma*	Station Marshes	19/05/2014	Immigrant
Single-dotted Wave	*Idaea dimidiata*	Leiston Common	01/08/2014	Common
Small Angle Shades	*Euplexia lucipara*	Leiston Common	01/08/2014	Common
Small China Mark (micro)	Cataelysta lemnata	Retsoms	24/07/2014	Common
Small Magpie	*Eurrhypara hortulaa*	Upper Abbey	21/07/2014	Common
Small Wainscot	*chortodes pygmina*	Leiston Common	01/08/2014	Common
Smoky Wainscot	*Mythimna impura*	Retsoms	24/07/2014	Common
Snout	*Hypena proboscidalis*	Upper Abbey	02/07/2014	Common
Southern Wainscot	*Mythimna straminea*	Retsoms	24/07/2014	Local
Square spot	*Paradarisa consonaria*	Upper Abbey	18/06/2014	Local
Straw Dot	*Rivula sericealis*	Retsoms	24/07/2014	Common
Straw Underwing	*Thalpophila matura*	Retsoms	01/08/2014	Common
Striped Wainscot	*Mythimna pudorina*	Retsoms	24/07/2014	Local
Swallow Prominent	*Pheosia tremula*	Retsoms	24/07/2014	Common
Swallow-tailed Moth	*Ourapteryx sambucaria*	Upper Abbey	02/07/2014	Common
Treble Lines	*Charanyca trigrammica*	Upper Abbey	05/06/2014	Common
True Lover's Knot	*Lycophotia porphyrea*	Retsoms	24/07/2014	Common

Uncertain	*Hoplodrina alsines*	Upper Abbey	18/06/2014	Common
V-pug	*Choloroclystis v-ata*	Upper Abbey	21/07/2014	Common
White Plume Moth	Pterophorus pentadactyla	Retsoms	24/07/2014	Common
White-line Dart	*Euxoa tritici*	Leiston Common	01/08/2014	Common
White-point	*Mythimna albipuncta*	Leiston Common	01/08/2014	Immigrant
Willow Beauty	*Peribatodes rhomboidaria*	Upper Abbey	05/06/2014	Common
Willow Ermine (micro)	*Yponomeuta rorrella*	Leiston Common	01/08/2014	Common
Wood Carpet	*Epirrhoe rivata*	Leiston Common	01/08/2014	Local
Yellow shell	*Camptogramma bilineata*	Beach	04/06/2014	Common
Yellow-tail	*Euproctis similis*	Upper Abbey	21/07/2014	Common

Invertebrate records	**Recorder Colin Lucas**			
Order/Family	Taxon	Date	Gridref	Qty
Beetle	Paederus riparius	16/05/2012	TM455635	1
Beetle	Lathrobium fulvipenne	16/05/2012	TM455635	1
Beetle	Xantholinus linearis	16/05/2012	TM455635	2
Beetle	Xantholinus linearis	16/05/2012	TM455635	1
Beetle	Philonthus cognatus	16/05/2012	TM455635	1
Beetle	Philonthus decorus	01/05/2013	TM4663	1
Beetle	Pterostichus diligens	16/05/2012	TM455635	7
Beetle	Pterostichus madidus	21/04/2014	TM4663	1
Beetle	Pterostichus nigrita	16/05/2012	TM4663	16
Beetle	Pterostichus nigrita	16/05/2012	TM4663	3
Beetle	Poecilus versicolor	16/05/2012	TM455635	1
Beetle	Carabus granulatus	16/05/2012	TM4663	3
Beetle	Amara tibialis	16/05/2012	TM455635	2
Beetle	Amara tibialis	16/05/2012	TM4663	4
Beetle	Harpalus rufipes	16/05/2012	TM455635	3
Beetle	Harpalus affinis	16/05/2012	TM455635	1
Beetle	Harpalus anxius	16/05/2012	TM455635	5
Beetle	Harpalus attenuatus	16/05/2012	TM455635	4
Beetle	Harpalus attenuatus	16/05/2012	TM455635	1
Beetle	Syntomus foveatus	16/05/2012	TM455635	1
Beetle	Syntomus foveatus	16/05/2012	TM455635	8
Beetle	Amara aenea	16/05/2012	TM455635	16
Beetle	Amara aenea	16/05/2012	TM455635	16
Beetle	Amara aenea	16/05/2012	TM455635	1
Beetle	Amara convexior	16/05/2012	TM455635	2
Beetle	Harpalus tardus	16/05/2012	TM455635	1
Beetle	Leistus fulvibarbis	16/05/2012	TM455635	1
Beetle	Leistus spinibarbis	16/05/2012	TM455635	1
Beetle	Nebria brevicollis	16/05/2012	TM4663	6
Beetle	Notiophilus biguttatus	16/05/2012	TM455635	1
Beetle	Notiophilus substriatus	16/05/2012	TM455635	1
Beetle	Loricera pilicornis	16/05/2012	TM4663	3
Beetle	Loricera pilicornis	16/05/2012	TM4663	2
Beetle	Dyschirius globosus	16/05/2012	TM455635	1
Beetle	Silpha atrata	16/05/2012	TM455635	2
Beetle	Silpha atrata	16/05/2012	TM455635	1
Beetle	Stenus picipes	16/05/2012	TM4663	1
Beetle	Otiorhynchus ovatus	16/05/2012	TM455635	1
Beetle	Philopedon plagiatum	16/05/2012	TM455635	2
Beetle	Philopedon plagiatum	16/05/2012	TM455635	2
Beetle	Sitona lineatus	16/05/2012	TM455635	1
Beetle	Sitona lineatus	21/04/2014	TM4663	1
Beetle *Notable B*	Hypera dauci	16/05/2012	TM455635	2
Beetle	Notaris acridulus	16/05/2012	TM455635	3
Beetle	Limnobaris dolorosa	01/07/2013	TM4663	1
Beetle	Trichosirocalus troglodyt	16/05/2012	TM455635	1
Beetle	Trichosirocalus troglodyt	16/05/2012	TM455635	1

Beetle	Rhinoncus castor	16/05/2012	TM455635	6
Beetle	Rhinoncus castor	16/05/2012	TM455635	1
Beetle	Agonum fuliginosum	16/05/2012	TM455635	2
Beetle Notable B	Gabrius osseticus	16/05/2012	TM455635	3
Beetle	Quedius fuliginosus	16/05/2012	TM455635	2
Beetle	Coccidula rufa	16/05/2012	TM455635	1
Beetle	Glischrochilus hortensis	16/05/2012	TM455635	1
Beetle	Glischrochilus hortensis	16/05/2012	TM4663	1
Beetle	Agriotes obscurus	16/05/2012	TM455635	2
Beetle	Agriotes sputator	16/05/2012	TM455635	2
Beetle	Galerucella sagittariae	21/04/2014	TM4663	1
Beetle	Phyllotreta vittula	16/05/2012	TM455635	1
Beetle	Chaetocnema hortensis	16/05/2012	TM455635	1
Beetle	Chaetocnema hortensis	16/05/2012	TM455635	3
Beetle	Ischnosoma splendidum	16/05/2012	TM455635	1
Beetle	Stenus providus	16/05/2012	TM4663	1
Beetle	Philonthus carbonarius	16/05/2012	TM455635	1
Beetle	Gabrius breviventer	16/05/2012	TM455635	1
Beetle	Tasgius morsitans	21/04/2014	TM4663	1
Diptera	Platycheirus clypeatus	21/04/2014	TM4663	1
Diptera	Chrysopilus cristatus	01/07/2013	TM4663	1
Diptera	Tipula luna	21/04/2014	TM4663	2
Diptera	Tipula vittata	16/05/2012	TM4663	1
Diptera	Tipula oleracea	16/05/2012	TM4663	1
Diptera	Tipula oleracea	21/04/2014	TM4663	2
Diptera	Tricyphona immaculata	21/04/2014	TM4663	1
Diptera	Erioconopa trivialis	21/04/2014	TM4663	1
Diptera	Molophilus obscurus	21/04/2014	TM4663	1
Diptera	Molophilus obscurus	21/04/2014	TM4663	1
Diptera	Bibio nigriventris	09/04/2014	TM455635	1
Diptera	Bibio nigriventris	21/04/2014	TM4663	1
Diptera	Scathophaga inquinata	21/04/2014	TM4663	1
Leafhopper	Philaenus spumarius	02/08/2012	TM4663	2
Leafhopper	Philaenus spumarius	01/07/2013	TM4663	3
Leafhopper	Philaenus spumarius	01/07/2013	TM4663	1
Leafhopper	Neophilaenus lineatus	02/08/2012	TM4663	1
Leafhopper	Neophilaenus lineatus	02/08/2012	TM4663	1
Leafhopper	Neophilaenus lineatus	02/08/2012	TM4663	3
Leafhopper	Neophilaenus lineatus	02/08/2012	TM4563	1
Leafhopper	Neophilaenus lineatus	01/07/2013	TM4663	1
Leafhopper	Neophilaenus lineatus	01/07/2013	TM4663	1
Leafhopper	Cicadella viridis	02/08/2012	TM4663	1
Leafhopper	Cicadella viridis	02/08/2012	TM4663	1
Leafhopper	Populicerus confusus	02/08/2012	TM4663	1
Leafhopper	Idiocerus stigmaticalis	02/08/2012	TM4563	1
Leafhopper	Anaceratagallia ribauti	02/08/2012	TM4663	2
Leafhopper	Eupelix cuspidata	02/08/2012	TM4663	1
Leafhopper	Stroggylocephalus agrest	02/08/2012	TM4663	1
Leafhopper	Doratura stylata	02/08/2012	TM4663	5

Leafhopper	Deltocephalus pulicaris	02/08/2012	TM4663	2
Leafhopper	Recilia coronifera	02/08/2012	TM4663	1
Leafhopper	Adarrus ocellaris	02/08/2012	TM4563	1
Leafhopper	Arthaldeus pascuellus	01/07/2013	TM4663	4
Leafhopper	Arthaldeus pascuellus	01/07/2013	TM4663	1
Leafhopper	Psammotettix confinis	02/08/2012	TM4663	1
Leafhopper	Conosanus obsoletus	02/08/2012	TM4663	1
Leafhopper	Conosanus obsoletus	02/08/2012	TM4663	3
Leafhopper	Conosanus obsoletus	02/08/2012	TM4663	5
Leafhopper	Conosanus obsoletus	02/08/2012	TM4563	8
Leafhopper	Euscelis incisus	02/08/2012	TM4663	1
Leafhopper	Euscelis incisus	02/08/2012	TM4663	8
Leafhopper	Euscelis incisus	02/08/2012	TM4663	5
Leafhopper	Euscelis incisus	21/04/2014	TM4663	2
Leafhopper	Macustus grisescens	16/05/2012	TM455635	3
Leafhopper	Cicadula quadrinotata	02/08/2012	TM4663	2
Leafhopper	Cicadula quadrinotata	01/07/2013	TM4663	2
Leafhopper	Cicadula quadrinotata	01/07/2013	TM4663	5
Leafhopper	Cicadula quadrinotata	01/07/2013	TM4663	8
Leafhopper	Cicadula quadrinotata	01/07/2013	TM4663	4
Leafhopper	Euconomelus lepidus	02/08/2012	TM4563	1
Leafhopper	Euconomelus lepidus	01/07/2013	TM4663	1
Leafhopper	Conomelus anceps	02/08/2012	TM4663	26
Leafhopper	Conomelus anceps	02/08/2012	TM4663	1
Leafhopper Note B	Megamelodes lequesnei	02/08/2012	TM4663	1
Leafhopper	Megamelodes quadrima	02/08/2012	TM4663	1
Leafhopper	Megamelodes quadrima	02/08/2012	TM4563	1
Leafhopper	Megamelodes quadrima	02/08/2012	TM4663	1
Leafhopper	Muellerianella fairmaire	02/08/2012	TM4663	1
Leafhopper	Javesella dubia	02/08/2012	TM4663	1
Leafhopper	Javesella dubia	01/07/2013	TM4663	1
Leafhopper	Javesella pellucida	02/08/2012	TM4663	1
Leafhopper	Javesella pellucida	21/04/2014	TM4663	6
Leafhopper	Xanthodelphax stramine	01/07/2013	TM4663	1
Leafhopper	Florodelphax leptosoma	02/08/2012	TM4663	3
Leafhopper	Florodelphax leptosoma	02/08/2012	TM4563	2
Leafhopper	Florodelphax leptosoma	02/08/2012	TM4663	2
Leafhopper	Florodelphax leptosoma	01/07/2013	TM4663	20
Leafhopper	Florodelphax leptosoma	01/07/2013	TM4663	5
Leafhopper	Florodelphax leptosoma	01/07/2013	TM4663	3
Leafhopper Note A	Florodelphax paryphasm	01/07/2013	TM4663	1
Bug (Heteroptera	Stenodema calcarata	21/04/2014	TM4663	1
Bug (Heteroptera	Kleidocerys resedae	21/04/2014	TM4663	1
Groundhopper	Tetrix subulata	21/04/2014	TM4663	1
Butterfly	Lycaena phlaeas	16/05/2012	TM4663	2
Moth	Rivula sericealis	01/07/2013	TM4663	2
Butterfly	Inachis io	16/05/2012	TM4663	1
Butterfly	Pieris napi	16/05/2012	TM4663	1
Moth	Cataclysta lemnata	01/07/2013	TM4663	2

Diptera records Recorder Peter Vincent					
Syntormon denticulatum	20-Sep-12	TM 4563	swept	woodland edge	
Campsicnemus scambus	20-Sep-12	TM 4664	swept	woodland	
Campsicnemus curvipes	20-Sep-12	TM 4664	swept	woodland	
Dolichopus plumipes	23-Jul-13	TM466635	swept	grazing marsh dyke	
Dolichopus brevipennis	23-Jul-13	TM466635	swept	grazing marsh dyke	
Dolichopus simplex	23-Jul-13	TM466635	swept	grazing marsh dyke	
Dolichopus trivialis	23-Jul-13	TM466635	swept	grazing marsh dyke	
Poecilobothrus chrysozygos	23-Jul-13	TM462633	swept	grazing marsh	
Chrysotus cilipes	23-Jul-13	TM462633	swept	grazing marsh	
Dolichopus longitarsis	23-Jul-13	TM466635	swept	woodland pool	
Campsicnemus scambus	23-Jul-13	TM466635	swept	woodland pool	
Gymnopternus aerosus	23-Jul-13	TM466635	swept	woodland pool	
Empis nigripes	23-Jul-13	TM466635	swept	grazing marsh	
Empis nuntia	23-Jul-13	TM466635	swept	grazing marsh	
Hilara nigrina	23-Jul-13	TM462633	swept	grazing marsh	
Parydra littoralis	20-Sep-12	TM 4646	swept	woodland edge	
Coenia curvicauda	23-Jul-13	TM466635	swept	woodland pool	
Notiphila maculata	23-Jul-13	TM466635	swept	woodland pool	
Ocydromia glabricula	23-Jul-13	TM466635	swept	grazing marsh	
Ellipteroides lateralis	23-Jul-13	TM466635	swept	woodland pool	
Tricyphona immaculata	23-Jul-13	TM466635	swept	grazing marsh	
Ptychoptera albimana	20-Sep-12	TM 4563	swept	woodland edge	
Ptychoptera albimana	20-Sep-12	TM 4646	swept	woodland edge	
Chrysopilus cristatus	23-Jul-13	TM466635	swept	grazing marsh dyke	
Rhagio lineola	23-Jul-13	TM466635	swept	woodland pool	
Cleigastra apicalis	23-Jul-13	TM463633	swept	grazing marsh	
Scathophaga stercoraria	23-Jul-13	TM466635	swept	grazing marsh dyke	
Elgiva solicita	20-Sep-12	TM 4563	swept	grazing marsh	
Sepedon sphegea	20-Sep-12	TM 4563	swept	grazing marsh	
Sepedon sphegea	23-Jul-13	TM466635	swept	grazing marsh dyke	
Pherbina coryleti	23-Jul-13	TM466635	swept	grazing marsh dyke	
Ilione albiseta	23-Jul-13	TM466635	swept	grazing marsh dyke	
Tetanocera silvatica	23-Jul-13	TM466635	swept	grazing marsh dyke	
Sepedon sphegea	23-Jul-13	TM462633	swept	grazing marsh	
Elgiva solicita	23-Jul-13	TM462633	swept	grazing marsh	
Themira annulipes	23-Jul-13	TM466635	swept	grazing marsh	
Sepsis fulgens	23-Jul-13	TM462633	swept	grazing marsh	
Sepsis punctum	23-Jul-13	TM462633	swept	grazing marsh	
Sepsis cynipsea	23-Jul-13	TM462633	swept	grazing marsh	
Nemotelus pantherinus	23-Jul-13	TM466635	swept	grazing marsh dyke	
Chloromyia formosa	23-Jul-13	TM462633	swept	grazing marsh	
Eristalis tenax	20-Sep-12	TM 4563	swept	woodland edge	
Episyrphus balteatus	20-Sep-12	TM 4563	swept	woodland edge	
Helophilus pendulus	20-Sep-12	TM 4563	swept	woodland edge	
Syritta pipiens	20-Sep-12	TM 4563	swept	woodland edge	
Syrphus vitripennis	20-Sep-12	TM 4664	swept	woodland edge	
Platycheirus albimanus	20-Sep-12	TM 4664	swept	woodland edge	
Tropidia scita	23-Jul-13	TM466635	swept	grazing marsh dyke	
Cheilosia albitarsis	23-Jul-13	TM466635	swept	grazing marsh dyke	
Platycheirus albimanus	23-Jul-13	TM466635	swept	grazing marsh dyke	
Tabanus autumnalis	23-Jul-13	TM463633	swept	grazing marsh	
Haematopota crassicornis	23-Jul-13	TM466635	swept	grazing marsh dyke	
Terellia tussilaginis	23-Jul-13	TM466635	swept	grazing marsh dyke	
Urophora quadrifasciata	23-Jul-13	TM466635	swept	grazing marsh dyke	

SIZEWELL LAND MANAGEMENT

ANNUAL REVIEW 2017

Suffolk Wildlife Trust

Introduction

Background

EDF Energy is one of the largest energy companies in the UK, supplying around five million residential and business accounts with electricity and gas. The company generates around one fifth of the UK s electricity from a nuclear, coal, gas and renewable energy portfolio, with the eight across seven nuclear power stations generating approximately 64.3% of EDF Energy s electricity generation. Whilst climate change and environmental protection remain amongst the most pressing global challenges, EDF Energy is committed through the Better Plan to leading the decarbonisation of the UK electricity sector while also realising an increasingly positive environmental effect from operations across land, air and water.
Ensuring no net loss of biodiversity across the estate and gaining the Wildlife Trust s Biodiversity Benchmark accreditation forms an important part of this wider commitment. Sizewell achieved the Benchmark in 2009.

The two main documents that detail the objectives and actions to maintain and enhance biodiversity across the estate are:

- The Nuclear Generation Biodiversity Action Plan (NG BAP[1]) this sets the framework for identifying site-specific biodiversity objectives targeted at Key Biodiversity Receptors and setting SMART targets to monitor progress.

- The Integrated Land Management Plan (ILMP) this assesses the importance and significance of habitats and species at each site and details the actions required to deliver the BAP objectives.

This Annual Report describes the land management, biodiversity monitoring and community engagement activities that have been completed over the course of 2017 at Sizewell Power Station. The actions and results of these activities are related to the NG BAP targets for Sizewell to determine if the annual BAP objectives are being achieved. The report highlights emerging or actual issues and guides future changes that may be required to work programmes to ensure continual progress against BAP objectives. Where appropriate, national habitat and species trends are used to place the site monitoring results into the wider context.

[1] Revision 2, 2016

Highlights of 2017:

The key highlights of 2017 at Sizewell have been:

- Grasshopper warbler held territory for the first time since 2012. Marsh tit numbers doubled with six territories; a welcome increase for this declining species. Nuthatch was recorded for the first time in 20 years.

- The Sizewell Marshes SSSI coastal grazing marshes have been assessed as in Favourable Declining condition and a Restoration Plan is to be prepared and implemented.

- The Sizewell Marshes SSSI dyke system has been assessed as meeting the SSSI designation criteria but has declined in condition since 2006 suggesting more frequent management intervention is required.

- No natterjack toads were recorded in the survey, the first year since translocation that there has been no evidence of breeding.

- 650 antlion pits were recorded; the highest number since 2013.

- The Sizewell Amenity and Accessibility Fund awarded 18,160 to five projects within the Suffolk Cast and Heaths AONB.

- 166 people attended wildlife events on the Estate.

Overview of Land Management Objectives

The management of non-operational land at Sizewell is guided by high-level objectives captured within the NG BAP and ILMPs.

Six high level biodiversity indicators have been developed within the **EDF Energy NG BAP** (Revision 2, 2016) to provide an estate-wide assessment of the overall success of Nuclear Generation s biodiversity contribution at a company level. These are based on the achievement of site specific KPIs as well as achieving more global targets.

- *Nuclear Generation will seek, wherever feasible, to conserve and enhance biodiversity at each of its principal sites, primarily through its approach to land management but also through its business operations and the development of new assets*

- *Nuclear Generation will seek to develop partnerships with selected stakeholders for the delivery of ecological improvement schemes on its land or in the vicinity of its main operational sites*

- *Nuclear Generation aims to increase the awareness of both its employees and local communities of biodiversity issues and the opportunities for its enhancement through education, participation and partnership*

- *Biodiversity gain will be delivered through the implementation of the Site Action Plans*

- *Nuclear Generation will maintain a comprehensive ecological survey programme to facilitate the regular updating of the base data for each of its sites*

- *Nuclear Generation will report to partners and stakeholders on our biodiversity performance*

A site-specific action plan has been produced for Sizewell based on the identification of Key Biodiversity Receptors associated with the site upon which management and monitoring can be focused. The objectives of the Sizewell action plan are:

- ***SIZE_1**: Maintain Sizewell Marshes SSSI grazing marsh in favourable condition*
- ***SIZE_2**: Maintain a mosaic of fen types from dry, scrubby fen to very wet reedbed*
- ***SIZE_3**: To maintain a range of successional stages throughout the dyke system*
- ***SIZE_4**: Conserve, restore and enhance the lowland heathland/ dry acid grassland mosaic habitat through arable reversion, woodland clearance, sympathetic grazing regimes and bracken and scrub control*
- ***SIZE_5**: Protect and enhance the vegetated shingle and coastal dune grassland habitats by minimising disturbance where possible by appropriate fencing, signage and interpretation*
- ***SIZE_6:** Maintain a population of Natterjack toads*
- ***SIZE_7:** Maintain a population of antlion*
- ***SIZE_8**: Manage the woodlands to maintain woodland cover, encouraging natural regeneration, in a manner which maintains or enhances their*

biodiversity value, including their habitat value for bats

- ***SIZE_9**: Maintain a breeding bird population characteristic of habitat types present*

The actions required to deliver the Sizewell site-specific objectives are detailed within the **Sizewell ILMP** (2016). This document also includes the following objectives:

- *To protect and enhance the existing and potential wildlife conservation value of the Estate through a programme of habitat and species management. To ensure that the impacts of our operations on biodiversity are assessed, opportunities for mitigation and enhancement are identified and a programme of biodiversity monitoring is implemented.*

- *To engage local stakeholders and to make a meaningful difference to the local community through promotion of biodiversity awareness, public enjoyment of the estate and community activities working in partnership with our stakeholders.*

Assessment of NG BAP Sizewell Action Plan Objectives

Objective SIZE_1: Maintain Sizewell Marshes SSSI grazing marsh in favourable condition

Key Biodiversity Receptors and KPI

- Floodplain and coastal grazing marsh Number of SSSI units in favourable or unfavourable recovering condition
- Wintering bird assemblage Number of wintering bird species
- Butterfly assemblage Number of butterfly species

Land management actions

The marshes were grazed by cattle supplied by the two local farmers under grazing licences. Grazing is organised so that each field should be grazed for at least six weeks between May and September, with the aim of achieving a sward height of 5-15cm in November. However, in 2017, one of the graziers did not provide enough stock and therefore, certain areas have not been sufficiently grazed to the detriment of the SSSI condition.

Topping was completed across the marshes where necessary and where ground conditions allowed with aftermath grazing late into the year. Grazing is preferable to mechanical topping wherever possible. Unfortunately, the poor weather in July meant it was not possible to take a hay cut which has further exacerbated the problems of under-grazing on the marshes immediately west of the power station.

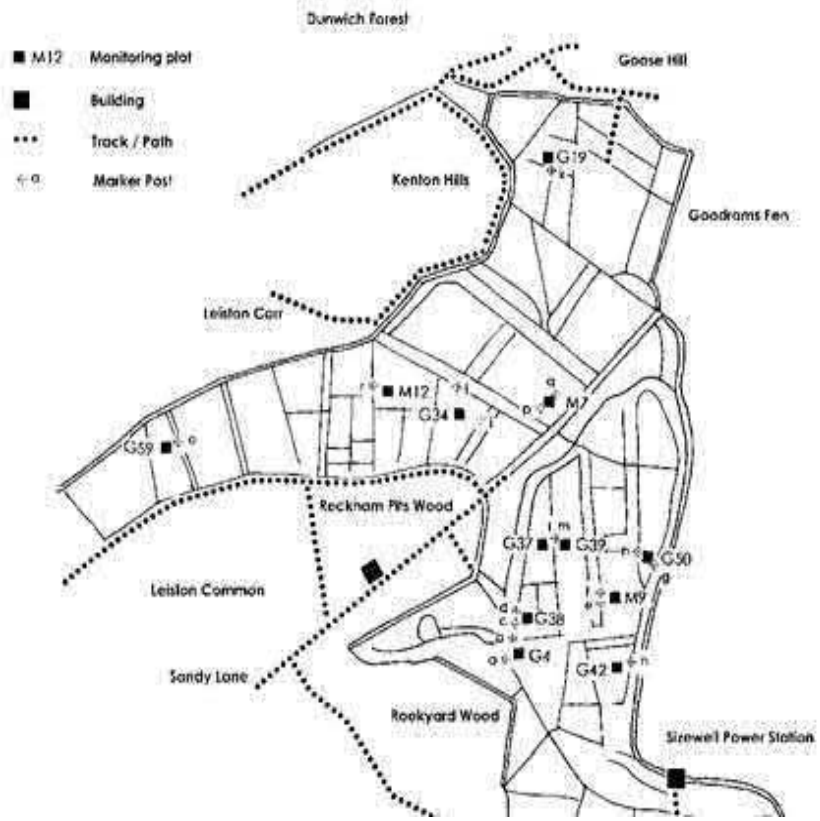
The cattle corrals that were inadequately constructed in 2016 on the Saltmarsh and near Goose Hill marshes were rebuilt again by the same contractors using an improved design.

Biodiversity monitoring results

Coastal grazing marsh - SSSI Condition monitoring

Six of the thirteen permanent plots within the SSSI (G4, G34, G38, G50, M7 & M9), were surveyed by Jonny Stone on behalf of EDF Energy and Suffolk Wildlife Trust in summer 2017 (**Figure 1 below**). The remaining seven plots within the SSSI were surveyed in 2016 and will be surveyed again in 2018 as part of the rolling monitoring programme whereby all plots are surveyed biennially.

Figure 1 SSSI compartment vegetation monitoring sites 2017



The survey recorded species diversity and sward structure within 30 random 50x50cm quadrats in each plot, as well as ground conditions (particularly soil wetness) and management effects on vegetation. The survey work was carried out on 20th-21st July 2017, within the normal timeframe for the monitoring programme, by Jonny Stone Vegetation Advisor as part of the Sizewell Marshes SSSI Fen Meadow Vegetation Monitoring Programme, initiated in 1995. Jonny Stone has undertaken this work annually since 2003.

The methodology follows agreed amendments to the original contract specification, and the report includes a partial SSSI condition assessment form, which should be combined with the following year s assessment to contribute to Natural England s condition assessment of the SSSI fen meadow/wet grassland interest feature.

The permanent plots were surveyed following generally warmer and wetter than average growing conditions. All plots were relatively dry, and the ground surface ranged from damp to moist with no standing water. There were no impediments to the monitoring survey, although Plot G34 had recently been topped and strewn plant litter partly mantled the vegetation.

A summary of the findings of the 2017 survey is presented in **Table 1** below (please note the results for Plot M7 are presented under SIZE_2).

Table 1 Sizewell Marshes SSSI 2017 Survey Summary

Plot	Species richness		Sward height (maximum is 40cm)		Total cover score for bryophyte layer		Other comments
	2015	2017	2015	2017	2015	2017	
G04	38	35 (↓8%) Slight decline	38cm	Exceeded (63cm)	140.0	116.7 (↓16%) Declined	Proportion of bare ground has risen to 20%
G34	46	39 (↓15%) Declined	14cm	Favourable (12cm)	133.3	136.7 Stable	Some areas of the compartment had thick layers of plant litter left from topping. Bare ground remains at 5%
G38	47	47 Remains stable	25cm	Favourable (27cm)	106.7	56.7 (↓47%) Declined	Plant litter remains at 5%, bare ground increased
G50	38	36 (↓5%) Slight decline	49cm	Exceeded (54cm)	83.3	30 (↓64%) Declined	Cover of plant litter has increased to 20%, increase in proportion of bare ground. Losses in species sensitive to shade
M9	35	27 (↓23%) Declined	48cm	Exceeded (60cm)	100	40 (↓60%) Declined	Bare ground has increased

The assessment makes the recommendation that Sizewell Marshes SSSI *coastal grazing marshes* conservation feature should be assessed as in ***Favourable-Declining*** condition, with the issue of reduced management and its impact on sward height and the high cover of rush tussocks being noted (**Table 2**).

Table 2 Sizewell Marshes SSSI Condition Assessment Summary

Attribute	Assessment	Comment
Floristics	All fen-meadow plots are in ***Favourable condition***, in terms of both positive and negative indicator species.	Six indicator species occur in four of the five plots. Amongst the five fen meadow plots, there has been a slight decline in the presence of positive indicator species . Negative indicator species were either absent or insignificant in the monitoring plots.
Sward composition	Indicators of waterlogging absent or in low numbers / low cover Parts of some plots and their surrounding compartments exceed the condition target of less than 80 % rush cover. Therefore this attribute is in ***Favourable- Declining condition.***	The 2017 season was very dry and no waterlogging was recorded. The issues with the lack of stock grazing has reversed the long term reduction in rush cover and there is now significant shading which is exacerbated by topping impacting on the lower growing vascular plants and bryophytes.
Sward structure	Sward litter, in terms of thatch, is likely to be limited to areas where lodging/ trampling is prevalent, or to areas where grazing is infrequent. It does not appear to be a significant or permanent feature of the Belts fen- meadows. Sward height, as measured from the average height of the rush tussocks. The national target is a maximum height of 40cm for fen meadows. It is therefore considered that this attribute is in ***Favourable- Declining condition.***	The lack of grazing has resulted in an increase in thatching. Three plots exceeded the sward height target by between 14cm and 23cm. The increase was most marked in plots G04 and M09 with increases of 65.8% and 25% recorded since 2015 respectively.

Note: Reproduced from Sizewell Marshes SSSI: Fen Meadow Vegetation Monitoring Programme, Fieldwork Report 2017

As a comparison, the other plots on site that were surveyed in 2016 were assessed as being in ***Favourable*** condition for all attributes though issues of sward height and the high cover of rush tussocks were recorded.

Due to the way in which the plots are reported biannually, the next composite record giving an overall assessment of the site will be for the years 2017-2018.

Sizewell Marshes SSSI

Wintering birds

Two types of wintering bird surveys are completed at Sizewell each year, both in line with the British Trust for Ornithology (BTO) survey methods and both undertaken between October and March; a Wetland Bird Survey (WeBS) Core Count and a Farmland Bird Survey. The WeBS survey focuses on Sizewell Belts (survey area shown in **Figure 2**). The results of the Farmland Bird Survey are presented in Appendix D.

Figure 2 WeBS Core Count Survey Area

As with previous annual reports, the results are presented for the year (2017) and therefore encompass partial results from both of the 2016/2017 and 2017/2018 winter seasons.

A total of 34 species were recorded during the WeBS counts in 2017, the highest in the last six years (Table 3), with mute swan, gadwall, teal, mallard, little egret, grey heron and meadow pipit recorded on every survey visit. The highest number of species was recorded in February, followed by March 2017 (24 and 21 species recorded respectively). The total number of individuals recorded across the surveys was 1,059 with wigeon, mallard and teal recorded in the greatest numbers. In comparison, a total of 837 individuals were recorded in 2016. Full results are included in Appendix A.

Table 3 Number of species recorded during WeBS Core Counts

	2012	2013	2014	2015	2016	2017
Number of Species	25	24	30	31	27	34

A number of target wintering bird species have been identified based on the habitat types present at Sizewell, conservation value (i.e. inclusion on S41 of NERC Act, 2006) and local importance. These are listed in **Table 4**. Comparison with previous yearly peak counts shows typical seasonal variation for most species, reflecting the severity of the winter on the continent. Both lapwing and curlew are red listed species undergoing rapid declines in population size.

Table 4 Target wetland winter bird species (peak count)

	2011	2012	2013	2014	2015	2016	2017
Marsh harrier	3	1	3	7	4	3	4
Lapwing	0	6	11	55	15	65	4
Curlew	1	1	4	1	2	1	3

Snipe	9	16	36	10	16	10	27
Gadwall	19	13	40	25	30	27	17
Teal	39	48	180	70	95	31	65

Certain species were recorded in 2017 that were not observed in 2016: hen harrier, peregrine, green sandpiper, black-headed gull, herring gull, bearded tit and reed bunting. Conversely, Canada goose, Egyptian goose and woodcock were all absent from the 2017 survey. Bearded tit have previously been recorded at the site in 2014 when good numbers were seen passing through in autumn and in 2007 when one pair held breeding territory.

Butterflies

The two Butterfly Transect Surveys were continued this season as per the Butterfly Conservation monitoring method (**Figure 3**), though somewhat curtailed by the weather conditions and by time availability. For both the Upper Abbey Farm and Sizewell Belts transects, a total of 8 surveys were completed between May and August. Upper Abbey Farm proved to have a very poor year indeed, with only 16 species recorded with a total of 144 individuals (**Figure 4**). Sizewell Belts proved a little better with 20 species recorded with a total of around 500 individuals. This gave an overall total across the site of 21 species, two less than the number of species recorded in 2016 (**Table 5 below**). Full details are in **Appendix B**.

Figure 3 Butterfly Transect Routes

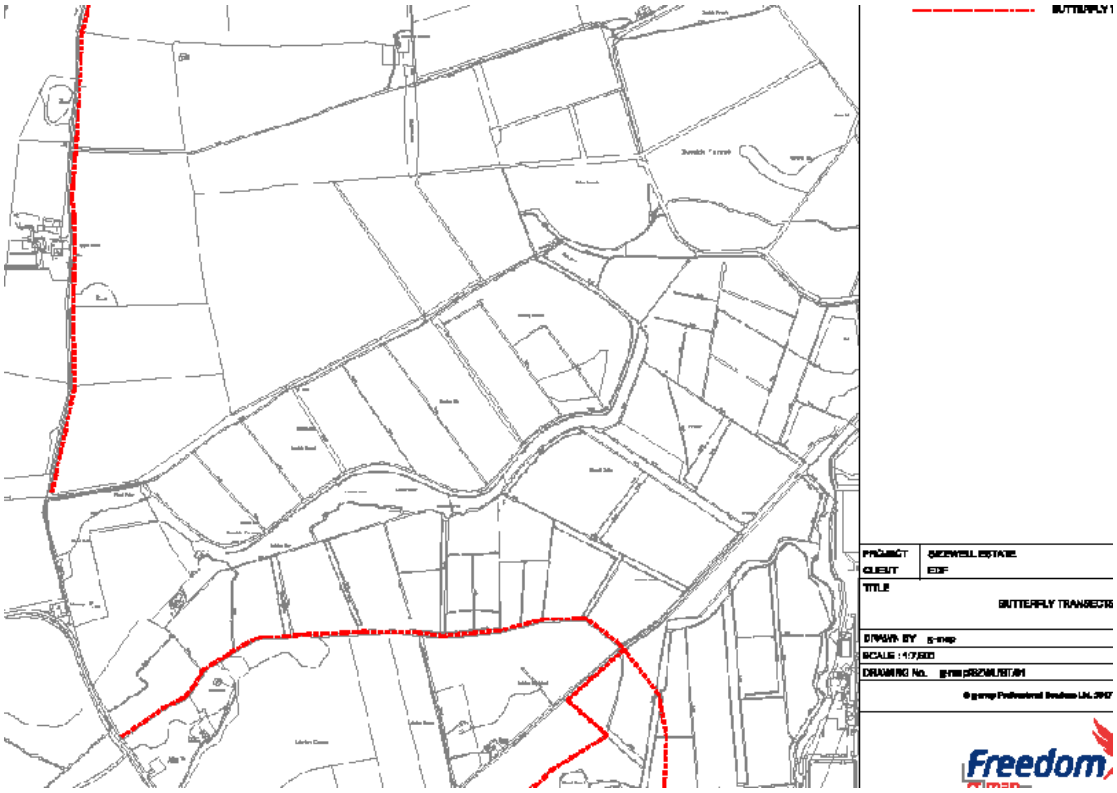
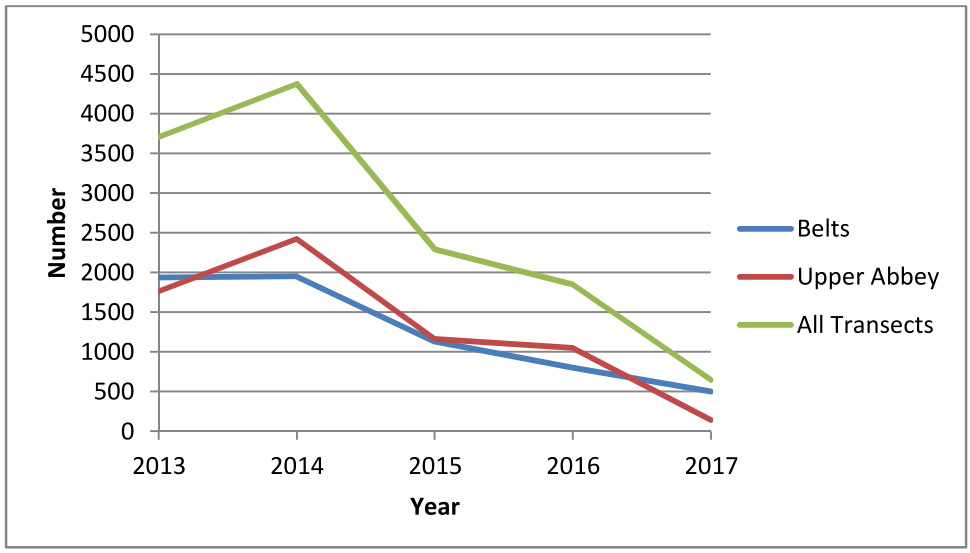


Table 5 Number of butterfly species recorded per transect and combined

	2013	2014	2015	2016	2017
Sizewell Belts	22	23	19	23	20
Upper Abbey	21	22	21	20	16
Total Number of Species across the site	22	23	23	23	21

Figure 4 Total number of individual butterflies recorded on each transect



As in 2016, meadow brown and ringlet were the most abundant species recorded but in drastically lower numbers than previously seen at the site. This situation was reflected across all species and is likely attributed to weather conditions. Total numbers of individuals from the two transects combined has fallen from 1,852 in 2016 to 647 in 2017. Therefore, there continues to be a distinct downward trend in population size over the past five years and only continued monitoring will tell if this trend continues. **Figures 5 and 6** show the trends across all species for the Upper Abbey and Sizewell Belts transects respectively.

Figure 5 Total number of individuals: Upper Abbey Transect

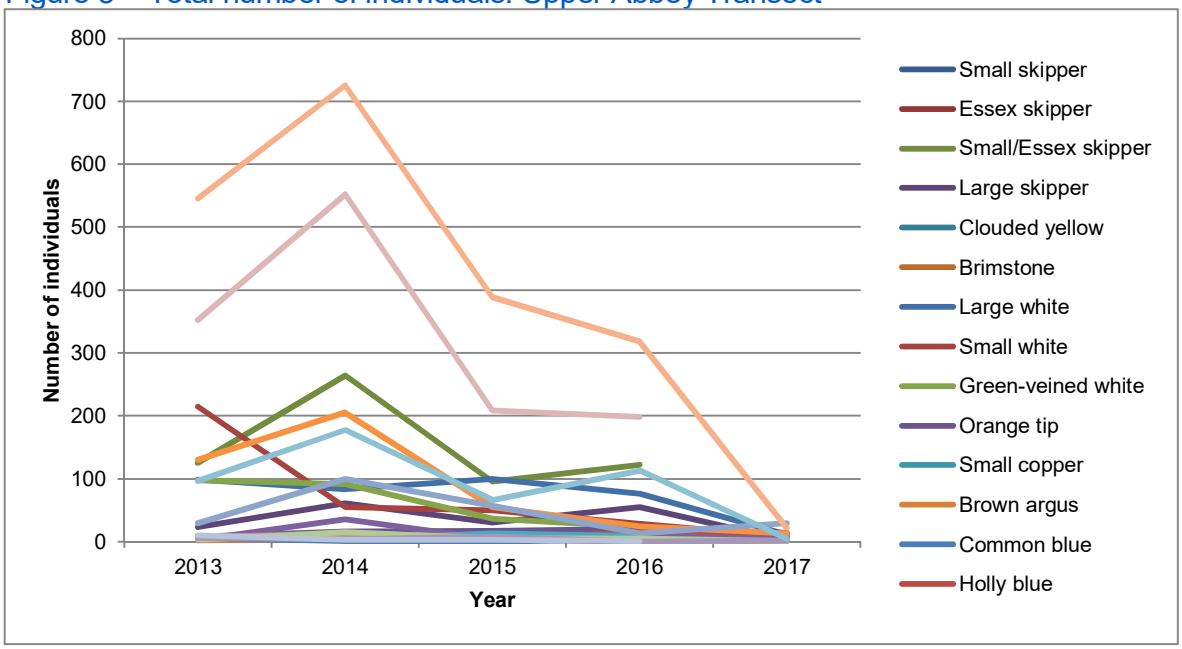
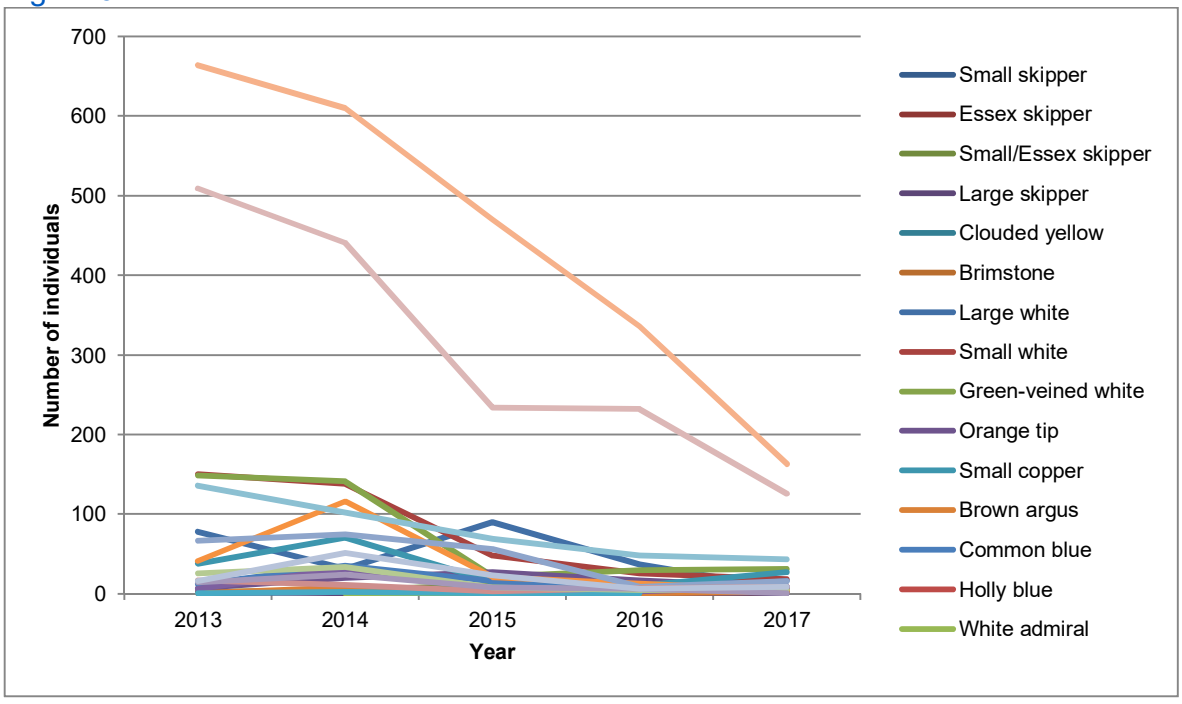


Figure 6 Total number of individuals: Sizewell Belts Transect



Analysis and Recommendations

Table 6 Objective SIZE_1 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Floodplain and coastal grazing marsh	Number of SSSI units in favourable or unfavourable recovering condition	Ensure all SSSI compartments are in favourable condition	**IN PROGRESS** Annual vegetation monitoring of the SSSI grassland units has assessed that the plots surveyed in 2017 are in ***Favourable-Declining*** Condition. The 2017-2018 combined assessment will give the overall condition of the SSSI units.
Wintering bird assemblage	Number of wintering bird species	Presence of target species annually	**ACHIEVED** All six target species were recorded in 2016, in average abundance
Butterfly assemblage	Number of butterfly species	Minimum of 20 species recorded per year	**ACHIEVED** A total of 21 butterfly species were recorded

The vegetation monitoring has demonstrated that Sizewell Marshes is now in **Favourable-Declining Condition** and that the management issues encountered in 2017 must be addressed in 2018 if the site is not to deteriorate further. Although the plots surveyed in 2016 were assessed as being in Favourable condition, the survey did highlight that some plots were starting to exceed the set targets for sward height and cover of *Juncus* spp..

The site continues to support a very diverse range of wet meadow plant species, including marsh pennywort, bog bean, bog pimpernel, ragged-robin, southern marsh orchid, jointed rush, greater bird s-foot trefoil, lesser spearwort and devil s-bit scabious.

Two common issues became apparent during the survey. The first is the apparent absence of recent management this was most evident in Plots G4, G50 and M9. It is recognised that issues with stock grazing have meant that early and mid-season grazing in some compartments has not taken place. Secondly, where topping has taken place in an effort to subdue strong rush growth and promote low-growing vegetation, thick arisings remain (even in the following season as in Plot G50). Even in low-growing vegetation, the resulting plant litter is very evident (as in Plot G34, Figure 7 below).

Compartment G34 showing swathes of cut vegetation

Although it is assumed that the taller stands will have finished the season in favourable condition, evidence is mounting that the within-growing season impact of reduced management by grazing is having a detrimental effect upon the condition of several of the monitored compartments. Typically, reduced management allows the rush tussocks to gain height and density, leading to a reduction in light levels within the sward and a corresponding decline in populations of many smaller forb and bryophyte species.

The abundance and height of rushes should continue to be monitored against the national SSSI coastal grazing marsh targets; if the targets cannot be met despite management, Natural England should be consulted to discuss appropriate targets reflecting local circumstances, requirements of other conservation features and any stipulations of grant-aided schemes.

It is possible that the provision of suitable cattle-handling corrals on the site, in particular at the northern edge of Leiston Common, would provide safe and efficient handling facilities which would allow cattle to be kept on the marshes for longer (rather than being taken off site for veterinary treatments).

A total of 34 bird species were recorded during the WeBS counts in 2017, the highest in the last six years. In addition, the number of individuals observed in 2017 increased to 1,059 compared to 837 seen in 2016. All of the target species were observed in 2017 and occurred in average numbers for the site. Despite the increases in total numbers of species and individuals recorded across the site, species such as lapwing, greylag goose and mallard have seen declines (peak counts are down 94%, 91% and 65% from 2016 respectively). Conversely, wigeon, teal, snipe and meadow pipit all saw increases in peak count numbers.

The number of butterfly species recorded at Sizewell has remained relatively constant over the last five years and the target of 20 species was easily met this year. Although a general decline in the total number of individuals has been seen since 2015, the decrease from 1,852 in 2016 to 647 in 2017 is much more significant. At Sizewell, there has been no perceptible change in habitat type or availability along the transect routes surveyed which could account for the decline in numbers seen in 2017. The number of survey visits undertaken each year has generally reduced since 2013. However, even when taking into account the slight reduction in the number of survey visits each season, the average number of individual butterflies seen on each visit has seen a decline since 2013. In 2013 an average of 135 and 161 individuals per visit were recorded on the Upper Abbey and Sizewell Belts transects respectively. In comparison, in 2017 the average number of individuals per visit dropped to 18 and 55 for Upper Abbey and Sizewell Belts transects respectively.

Maintenance of habitats on site such as the woodland rides and the nectar plots continues. However, it was noted that the two HLS Cover Plots had poor growth and production last season and that they may benefit from manure spreading prior to their drilling for the coming season. Improved productivity in these areas may help butterfly numbers.

Objective SIZE_2: Maintain a mosaic of fen types from dry, scrubby fen to very wet reedbed

Key Biodiversity Receptors and KPI

- Reedbed breeding bird assemblage Presence of target reedbed species

Land management actions

Under the HLS agreement the reedbed is managed to ensure that the cover of scrub is less than 10% and that the area of open water is between 10% and 30%. The target for the density of common reed is approximately 150 stems per square metre. The management activities completed each year, including rotational cutting, aim to maintain these targets.

The annual reed cutting was carried out on the 20th 21st November. An area of around 0.6 ha was cut with the BCS pedestrian mower. To aid in dealing with the resulting cut reed, help from a Green Team from a local digital consultancy company was very welcome. A team of 15 willing volunteers helped to rake, fork and pile an enormous amount of cut reed stems, which were later burnt or strategically placed to provide good habitat along the edges. This will prevent thatch build-up which can cause ground level rise and consequential scrub-growth as well as the potential drying-out of the reedbed. The annual cutting also provides an excellent varied-age growth structure, thereby ensuring the best diversity for the widest suite of species.

The 0.5 ha area that was cleared last season has retained some open areas of shallow water. In future seasons, it would be desirable to repeat this action in other areas of the reedbed. This would greatly help to bring the reedbed management in-line with the requirements of the HLS prescription, by lowering the ground level, thus allowing for a much wetter area overall.

Biodiversity monitoring results

Reedbed

Areas of reedbed are present at Sizewell within management compartments 3, 6 and 7 and include Plot M7 of the Condition monitoring, detailed under SIZE_1 above. This plot falls within Unit 2 of the Sizewell Marshes SSSI which is classified as Fen, Marsh and Swamp .

The SSSI Condition Monitoring generally documents the plots with an overall transition from mesotrophic grassland to fen meadow. An exception is plot M7, which records the development of an area of reedbed.

The overall species richness of the plot has fluctuated since monitoring began in 1995 but recent years have seen a general decline in the number of plant species present, as is to be expected with reedbed. Reed is now ubiquitous and its dominance has reduced the field layer. Conditions are typical of reedbeds. The number of grasses/sedges and rushes have been gradually declining since 2001.

Plot	Species richness		Sward height		Total cover score for bryophyte layer		Other comments
	2015	2017	2015	2017	2015	2017	
M7	27	25 (↓7%) Slight decline	170cm	Favourable (205cm)	33.3	13.3 (↓60%) Declined	Decline in rushes and grasses beneath the reed canopy

Breeding birds

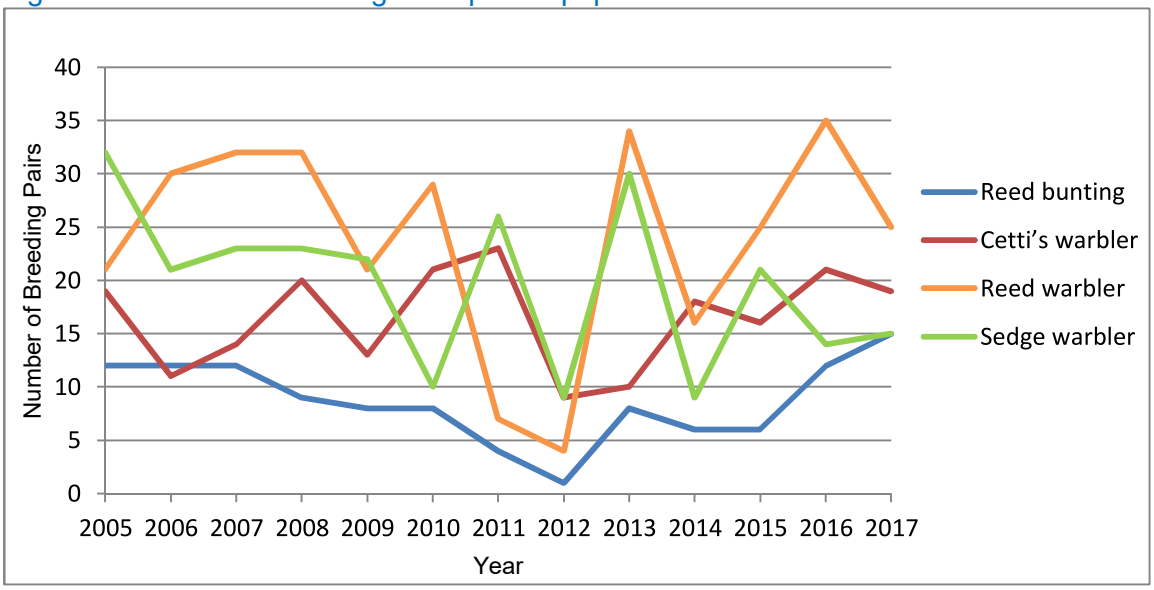
The breeding bird survey methodology is described under SIZE_9.

All four target reedbed bird species were recorded breeding in 2017, with the number of reed bunting and sedge warbler pairs increasing from those recorded in 2016 (**Table 7**). This continues an upward trend in the breeding populations of this species since 2012, when there was a sharp, but temporary, drop in breeding pairs (**Figure 8**) potentially attributable to a severe 2011/2012 winter and a wet spring. There was a decline in the number of reed and Cettti s warbler pairs in 2017, most likely due to a poor breeding season the previous year.

Table 7 Target reedbed bird species per year (2005-2017)

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Reed bunting	12	12	12	9	8	8	4	1	8	6	6	12	15
Cetti s warbler	19	11	14	20	13	21	23	9	10	18	16	21	19
Reed warbler	21	30	32	32	21	29	7	4	34	16	25	35	25
Sedge warbler	32	21	23	23	22	10	26	9	30	9	21	14	15

Figure 7 Reedbed breeding bird species population trends



Analysis and Recommendations

Table 8 Objective SIZE_2 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Reedbed breeding bird assemblage	Presence of target reedbed species	Minimum a minimum of three target species annually	**ACHIEVED** Four species were recorded, with two species showing an increase in the number of pairs

The reed cutting will be repeated in winter 2018 in an adjacent plot of reedbed to ensure that the target of 10-30% open water is achieved. Rotational management of the reedbed habitats is vital to ensure a varied structure. This, in turn, provides suitable habitat diversity for foraging and breeding birds.

Although numbers of Cetti s warbler pairs have reduced compared to 2016, their numbers are considered to be relatively stable when looking at the trend over the past five years. In addition, reed bunting have this year continued their gradual upward trend in the number of breeding pairs recorded. As in 2016, this increase reflects the national positive trends recorded by the BTO.

The fluctuation in sedge warbler numbers observed at Sizewell also mirrors the short-term fluctuations in numbers reported by the BTO. The BTO s detailed analysis of data sets has shown that much of the year-to-year variation in population size is driven by changes in adult survival rates which, in turn, are related to changes in rainfall on their wintering grounds, which lie just south of the Sahara Desert.

Objective SIZE_3: To maintain a range of successional stages throughout the dyke system

Key Biodiversity Receptors and KPI

- Floodplain and coastal grazing marsh - Presence of key aquatic floral species in dykes
- Water vole Percentage of transects with positive water vole signs

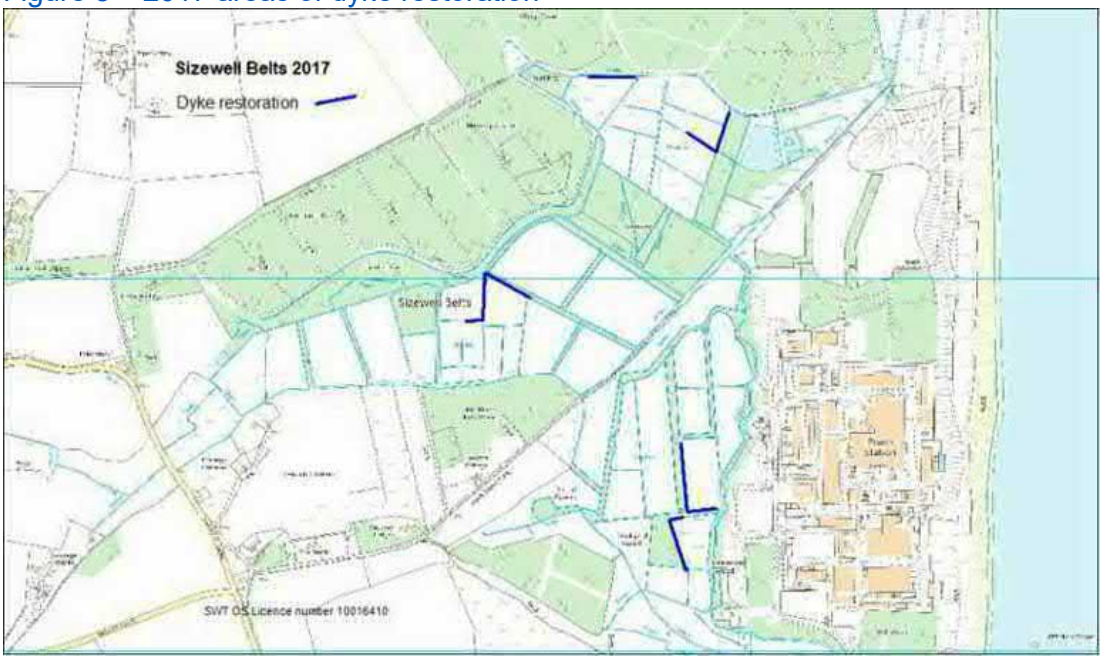
Land management actions

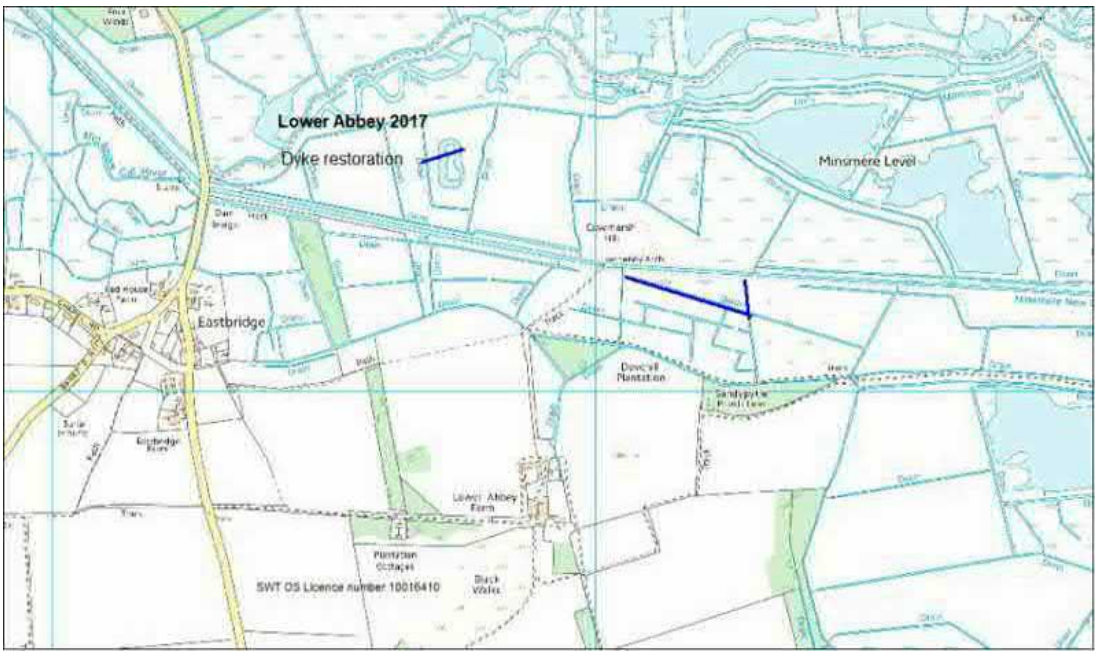
In order to ensure that there is always a range of successional stages, the dykes are managed on a ten-year rotation, in accordance with the Sizewell Belts Management Plan and the HLS scheme.

A total of 1300 metres of dykes were restored across Sizewell Belts and Lower Abbey Marshes (see **Figure 9**) during the winter, including removal of a significant amount of scrub.

In 2017, the banks of the dykes due to be slubbed were cleared of vegetation immediately prior to the works to allow access for machinery and light to the restored sections of dyke. This also allows any wildlife present to move away from the works area. Dyke management only occurs on one side of each dyke to ensure the continuity of the successional habitats.

Figure 8 2017 areas of dyke restoration





An area of Himalayan balsam was mapped and controlled by cutting and pulling. The plants were present along a watercourse at the southern end of the Estate from Pill Box field to Coronation Wood. The regrowth will be monitored, and control will continue until the plant is eradicated.

Biodiversity monitoring results

A repeat survey was undertaken for the 19 monitoring plots established in 1998 along sections of the grazing marsh ditches at Sizewell Belts. This latest survey follows the methodology and

classification adopted by the monitoring programme.

The network of grazing marsh ditches had been evaluated for the Nature Conservancy Council in 1991, and this conservation feature was found to meet the mean species diversity threshold for designation as a Site of Special Scientific Interest (SSSI). Evaluation of the survey results in both the 1998 and 2006 surveys of the monitoring plots have previously confirmed this status.

The current survey recorded 16 aquatic species, including three Nationally Scarce species (soft hornwort, fen pondweed and whorled water-milfoil), the Nationally Vulnerable frogbit and the Suffolk Rarity common bladderwort. Two stoneworts, an aquatic moss and two types of algae were also recorded as part of this aquatic group. All other emergent terrestrial plant species growing in the ditch channel were also recorded. This group of 28 species includes intermediate hook-moss (a specialist of calcareous fen and almost entirely restricted to the ditch habitat at Sizewell), three Suffolk Rarities (slender sedge, bottle sedge and slender tufted sedge) and the Nationally Vulnerable tubular water-dropwort.

Two non-native plant species were recorded in low numbers: Canadian waterweed and least duckweed. Both species have previously been recorded from Sizewell Belts and are widespread amongst neighbouring wetlands. Neither species is likely to be a threat to the native ditch flora if the current condition of the ditch structures and chemistry are maintained or improved.

The number of true aquatic species for the different survey plots was found to range from 2 to 9 species. With the addition of emergent species occurring within the sample plots, the total numbers of ditch species ranged from 2-20 species per plot, with a mean of 10.8 species. When compared to SSSI diversity rankings, the monitoring plots span the following categories[2]:

- Exceptional (4 plots);
- Good (9 plots);
- Fair (3 plots);
- Poor (3 plots).

This appears to be a considerable decline since 2006, when all plots were within the Exceptional category. However, it is apparent that the previous report used different criteria to identify what constitutes the ditch flora and no direct comparison could be made (no raw data is available to accompany the 1998 report).

Water vole

The water vole survey was carried out on 25th June 2017, during which all transects were searched for signs of water vole. The same transects are surveyed every year. Figure 10 illustrates the location of the transects and which were positive (green= positive, red= negative).

Of the 12 transects nine contained positive signs of water vole (either droppings or feeding remains). This represents 75% of transects supporting water vole, a further increase on that recorded in 2016 (**Figure 11 and Table 9**), but demonstrating an overall steady population and the species cyclical nature. The results of the survey are provided to the People s Trust for Endangered Species as part of the National Water Vole Monitoring Programme.

[2] Where Exceptional= 15 or more submerged/floating/emergent/ wet bank species per 20m, Good= 10 – 14 species, Fair= 6 – 9 species and Poor = 5 species or fewer.

Figure 9 Location of water transects and results of survey

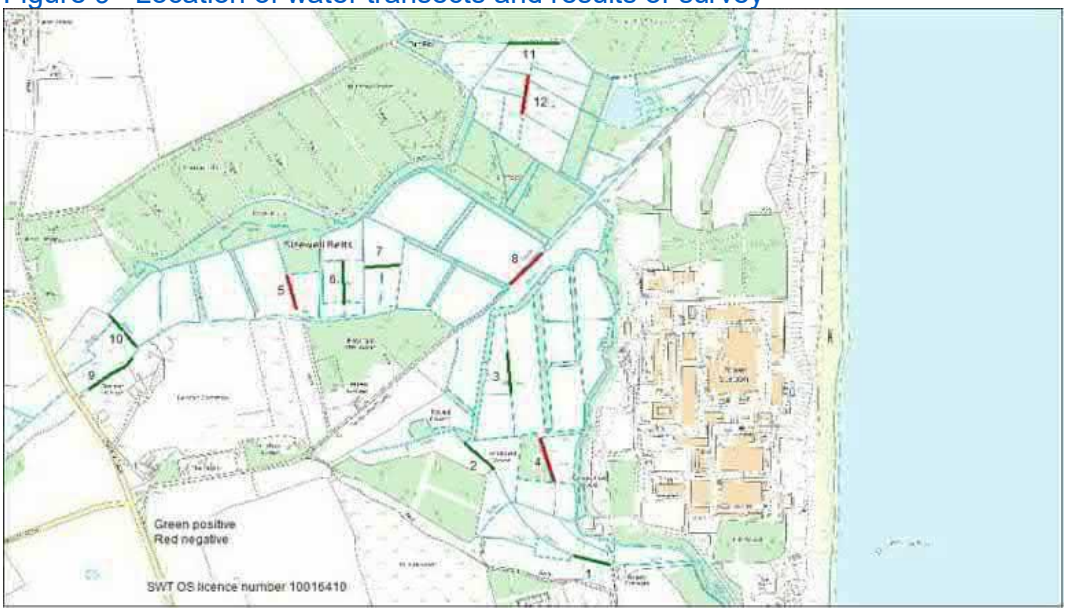


Figure 11 Percentage of transects with positive evidence of water vole

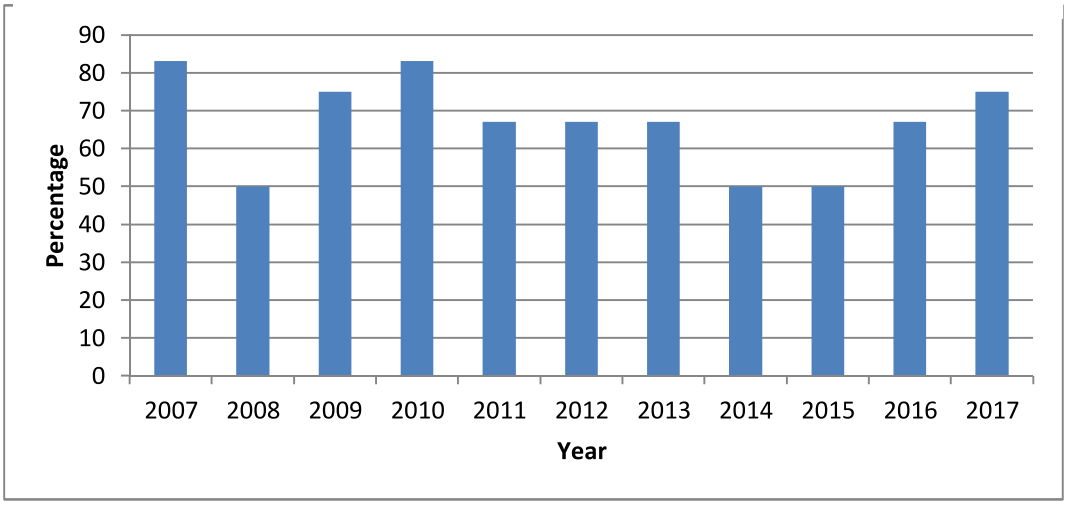


Table 9 Summary of water vole transect results (percentage of positive transects)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Spring (May)	50	67	N/A	N/A	N/A	N/A	N/A	50	67	75
Autumn (September)	50	75	83	67	67	67	50	N/A	N/A	N/A

Water vole run and feeding station

Analysis and Recommendations

Table 10 Objective SIZE_3 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Floodplain and coastal grazing marsh	Percentage of dyke survey plots achieving Exceptional or Good in line with SSSI diversity rankings	Minimum of 50% of all monitoring plots are in Exceptional or Good categories for species richness	**ACHIEVED** 68% of dyke monitoring plots in Exceptional or Good categories
Water vole	Percentage of transects with positive water vole signs	Minimum of 50% of transects with positive water vole signs	**ACHIEVED** 75% of transects contained positive signs of water vole presence.

Despite achieving the target for the dyke monitoring plots, several conservation issues were identified in the current survey and likely account for the decline in condition since 2006 when all plots were categorised as Exceptional . These issues are: abundant algal growth (1 plot); ditch occlusion (8 plots); marked loss of aquatic species (5 plots); shading by alder regrowth (4 plots); shading by established woodland (4 plots); and potentially strong colonization by common reed (1 plot). Several ditch sections were assessed as being subject to more than one issue.

The issues are largely related to the frequency of interventions required to maintain the floristic interest of the ditch network. Currently some 1000 1200m of ditch are cleared annually and this should be increased to 2000m per annum with more scrub clearance along the ditch edges.

It should also be taken into account that the 19 monitoring plots across the dyke system at Sizewell only overlap with the areas in which restoration works have been undertaken between

2015 and 2016 in two places (Plots 11 and 19). Therefore, the full benefits of the restoration works that have been implemented across the site are unlikely to be reflected in the results of the survey. Interestingly for the plots that do overlap with dyke sections where works have taken place in recent years, both are categorised as Exceptional and have either retained or increased in species richness since 2006 (Plots 11 and 19 respectively).

It is recommended that, moving forward, a plan is drawn up to show the ditches where management has taken place 2015 2017 and those proposed for clearance in 2018, 2019 and 2020. This should allow accurate rotational management of the dyke sections and will allow the results of the annual dyke monitoring surveys to be put into context.

Managing the dyke system on rotation is a vital activity to maintain the water vole population, as ditches are only suitable when they contain open water and an abundance of emergent vegetation, not when they are choked with vegetation or newly cleaned with no vegetation.

Therefore, it is important to maintain a suite of dykes in various stages of succession, so that the animals have somewhere to move to when their current dyke becomes unsuitable. The results clearly demonstrate that this management technique is maintaining a healthy water vole population within the Marshes.

Objective SIZE_4: Conserve, restore and enhance the lowland heathland/ dry acid grassland mosaic habitat through arable reversion, woodland clearance, sympathetic grazing regimes and bracken and scrub control

Key Biodiversity Receptors and KPI

- Lowland heathland/ dry acid grassland mosaic Number of indicator species

Land management actions

Heather plots on Retsoms have been fenced off from grazing animals for roughly three years. This has allowed heather that was spread 15 years ago to mature and spread, along with the heather growth, gorse has also established and is scattered across the plots. The heathland on Retsoms, Blackwalks and Whinny Hill was grazed by SWT sheep. Overall, SWT have reduced the amount of grazing on some of the heathland areas which is resulting in a much longer sward height.

The programme of bracken control continued in 2017 with bracken cut on two occasions this season (14th-15th June and 24th-25th July) at Leiston Common, Whinny Hill and Walk Barn and it was deemed that a third cut (scheduled for September) was unnecessary. The areas

continue to respond well, with the extent and strength of the bracken cover greatly reduced, allowing for the growth of more delicate and desirable species, particularly heather species on Leiston Common. Rotational bracken management by cutting and scrub management, particularly the control of birch, has also been completed across the heathland areas.

Biodiversity monitoring results

Lowland heathland/dry acid grassland mosaic

A new method for monitoring the lowland heathland/dry acid grassland mosaic habitat has been developed and will be implemented in 2018. The main indicators of condition will be the presence of positive indicator species, chosen to give coverage of lowland heath and dry acid grassland habitats, percentage cover of scattered scrub, bare ground, average sward height and the presence of any negative indicator species.

Analysis and Recommendations

Table 11 Objective SIZE_4 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Lowland heathland/dry acid grassland mosaic	Number of positive indicator species Percentage of scrub cover	Minimum of 10 positive indicator species (at least 4 species/taxa frequent and 6 species/taxa occasional throughout the sward) No more than 10% scattered scrub cover[3]	Not monitored in 2017

Objective SIZE_5: Protect and enhance the vegetated shingle and coastal dune grassland habitats by minimising disturbance where possible by appropriate fencing, signage and interpretation

Key Biodiversity Receptors and KPI

- Coastal vegetated shingle and coastal dune grassland Presence and condition of measures

Land management actions

In order to protect the vegetation and to provide an undisturbed area for ringed plover to nest, an exclusion fence was erected around an area of shingle this summer. Signs were erected to explain the reason for the exclusion.

[3] Distinct from the larger compartments of dense gorse

The steps over the coastal sand dunes were replaced using recycled plastic which will be more durable and long lasting than timber in the harsh, coastal environment.

Renewed beach steps over the dunes

Analysis and Recommendations

Table 12 Objective SIZE_5 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Coastal vegetated shingle Coastal dune grassland	Presence and condition of measures	Ensure all measures to minimise disturbance area implemented and maintained over duration of the BAP.	**ACHIEVED** Exclusion fencing was erected on the shingle with signs to explain the rationale. The beach steps over the dunes have been renewed.

As in 2016, the shingle vegetation within the area of exclusion fencing is noticeably more abundant than areas outside, which may be subject to trampling, confirming the importance of the fencing to maintain the characteristic vegetation and minimise disturbance. Unfortunately the presence of large numbers of dog walkers on the beach make it less likely that ringed plover will breed successfully.

The fencing along the berm top is in a poor state of repair and will be improved in 2018 by installing chestnut paling fencing. This will also link the fencing back to the steps, which should funnel people and dogs over the steps and further protect the vegetation.

Objective SIZE_6: Maintain a population of Natterjack toads

Key Biodiversity Receptors and KPI

- Natterjack toad Peak counts of natterjack toad tadpoles

Land management actions

As in previous years, the natterjack toad pond was pumped dry in the winter to remove predators and allowed to refill naturally. It was topped up with additional water in March in time for the toads to emerge. The surrounding terrestrial habitat is also maintained by grazing (as described under SIZE_5) and there are plenty of rabbit burrows available for hibernation.
The new natural pond to the northeast of the original pond, has acted as it was designed to do. The water levels go up and down well with the fluctuating water-table, thus hopefully creating more natural conditions for natterjack toads.

Biodiversity monitoring result

This year was sadly the first year since translocation that no breeding evidence of Natterjack toads has been recorded. The two ponds are checked on almost a daily basis (including weekends), between April 1st and the end of July, and beyond, into the late-summer (to monitor the possibility of a second brood) at a less frequent basis, but at least twice a week until around the end of August.

There was a single juvenile / small adult which was about 2.5" long (see photo) which appeared on the 19th June.

Table 13 Natterjack toad tadpole estimated peak counts

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Tadpole estimated peak counts	3000	3000	2500	3000	5000	5000	8000	3000	2500	0

Analysis and Recommendations

Table 14 Objective SIZE 6 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Natterjack toad	Peak counts of natterjack toad tadpoles	Estimated annual tadpole peak count a minimum of 3000	**NOT ACHIEVED** The estimated peak tadpole count was 0.

The population of natterjack toads has been surviving with just a few breeding females judging by the number of strings laid in previous years. No adults were seen in 2017 and consequently no spawn was laid. An immature toad was seen in June and so it is possible that there is still a population present but consisting of immature animals. Therefore, breeding could resume in the future should a sufficient number of animals reach maturity.

It was noted when the pond was cleaned out that there was a significant reduction in the number of the usual aquatic species present this year (including water boatman, diving beetles, damselflies and dragonflies). There were also no newts. The excessive amounts of filamentous green algae present during periods last season may have had some effect on their numbers, and could also be a contributory factor to the failure of the natterjack toads to spawn. There will be an action in 2018 to remove the bulk of the algae more regularly during the season to see if this improves the productivity of the pond. Additionally, a barley bale should be deployed in the pond to help improve water quality. Only continued monitoring over the next two years will prove whether the population is viable or extinct.

Objective SIZE_7: Maintain a population of antlion

Key Biodiversity Receptors and KPI

- Antlion Number of antlion pits

Land management actions

No management was required following the construction of the new shelter in 2016

Biodiversity monitoring results

The number of pits recorded in the original Walk Barns this season was c.650 (as recorded on 17th May) a considerable increase on previous years (see Table 14 below). The newly erected antlion shelter built in the winter has seen use by a good many species of insects (ants, digger wasps, etc.) as well as sheltering pheasants, dust-bathing partridges, and rabbits. Some pits were noted in the sand, although these are quite small when compared to the ones usually found in the existing Walk Barns areas. Investigation found that, after mating up in the tall pine trees in late July/early August, the adult females will oviposit their eggs in sand, taking great care to avoid other Antlion larvae already present. Larvae stay in the ground, overwintering twice and moulting into three separate instars. The larvae then hatch and begin to create pits to catch prey. It is thought that, the pit size relates to the hunger of the larvae rather than the actual size of the larvae, so it is possible that the smaller pits could relate to fresh generations of Antlion. Continued monitoring is needed.

Table 15 Number of antlion pits

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
212	482	1032	1100	550	610	360	300	250	650

Analysis and Recommendations

Table 16 Objective SIZE_7 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Antlion	Number of antlion pits	Minimum of 200 pits recorded each year	**Achieved** A total of 650 pits were recorded in 2017

A total of 650 pits were recorded in 2017, the highest number since 2011, when 1,100 pits were observed. Previous monitoring results have demonstrated that the antlion population at Sizewell (represented by the number of pits) is sensitive to poor weather and loss of habitat due to vegetation growth. Rabbit activity also affects the accuracy of the monitoring counts by constantly moving the sand, which masks the true number of pits and requires the larvae to re-construct the pits. However, some level of rabbit activity is necessary to maintain the sand in an un-compacted, loose condition so that the antlions can construct their pits.

Continued monitoring of the new antlion shelter will be carried out in the 2018 season. Additionally, it is recommended that stock-netting will be secured across the front of the shelter to prevent sheep gaining access, whilst still allowing rabbits inside.

Objective SIZE_8: Manage the woodlands to maintain woodland cover, encouraging natural regeneration, in a manner which maintains or enhances their biodiversity value, including their habitat value for bats

Key Biodiversity Receptors and KPI

- Bat assemblage Number of boxes in use

Land management actions

Paines Plantation extends to 5.0 ha and was planted as a mixed conifer and broadleaved woodland in 1993 with an extension to the woodland planted along the boundary with Lovers Lane in the following year. The woodland has been managed in the past to favour the slower growing oaks and sweet chestnut trees by reducing the competition from the conifers wherever possible. The main areas of Scots pine and Corsican pine were selectively thinned in the autumn of 2017 and the arisings were cut into cord wood lengths and left on the woodland floor. The broadleaved trees were also selectively thinned, removing dead or dying trees and reducing the competition for those trees likely to form the final canopy of the woodland. Oak and sweet chestnut trees were planted in robust groups, and the trees in the centre of a block were high pruned. The remaining trees were not pruned so that the woodland has a diverse range of tree shapes and sizes.

Thinning of conifers in Paines Plantation and high pruning of oak and sweet chestnut.

Barn Piece (0.32 ha) and Stonewalks Belt (0.60ha) are two narrow shelter belts running north to south on the edge of Kenton and Goose Hills woodland. The belts are mainly broadleaved trees with an understorey of elm. The surviving elm in both woodlands was lightly coppiced to encourage its regeneration and to maintain the woodland cover.
The three failed areas of pines in Kenton and Goose Hills woodlands, comprising approximately 1,500 trees, were restocked by planting with conifer species to maintain a consistent level of woodland cover. When woodland areas in Kenton and Goose Hills are cleared prior to restocking, any natural regeneration that emerges in the cleared areas is encouraged by protection with tree tubes.

The grassy woodland rides in Kenton and Goose Hills were managed by flailing, with the area cut reduced to a single machine width to allow a more diverse range of vegetation to develop along the ride edges. Bracken was also controlled to ensure that it does not out-compete young tree growth or spread and reduce the amount of grassland.

Deer management continued throughout the open seasons for red deer and muntjac with the deer management work co-ordinated with the RSPB as a neighbouring landowner. The management of the deer population is required to minimise their impact on biodiversity, reduce the damage they inflict on young woodlands, and to maintain the local deer population in a healthy condition.

Biodiversity monitoring results

The bat boxes were not surveyed in the autumn by Suffolk Wildlife Trust although EDF Energy were not informed until after the suitable survey window. The boxes were checked visually with regard to condition and any repairs needed will be carried out over the winter.
The three deer exclusion plots (one each in Reckham Pits, Ash Wood and Sandypytle)

were monitored for the second year to investigate the effect of deer browsing on woodland regeneration[4]. Plots were monitored both inside and outside of the fenced deer exclusion areas on 26th June and 3rd August 2017 by Amec Foster Wheeler. The methodology employed in 2017 repeated that used in 2016 except that in 2017 the vegetation inside the recently installed rabbit exclusion areas was monitored and recorded separately from that in the remainder of the deer exclusion plots. A fixed point photographic record was also established in July 2017.

Other than maybe species abundance difference associated with season, the key difference recorded was the height of tree seedlings within and outside the enclosures, with those inside being generally far taller that those outside. The height difference would seem to indicate that those seedlings inside enclosures had survived since the previous year. There appeared to be no significant difference in height between seedlings inside the rabbit enclosures compared with those inside the deer enclosure only.

Sandypytle is clear of bracken and for the first time tree seedlings (pedunculate oak and common alder) are present.

Analysis and Recommendations

Table 17 Objective SIZE_8 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Bat assemblage	Number of boxes in use	Minimum of 25% of bat boxes showing signs of recent use each year	Not assessed in 2017

The woodlands within the Estate are managed in accordance with the Sizewell Woodland Management Plan (Freedom, 2015), which aims to maintain local landscape contribution from the woodlands and improve their value for biodiversity. Given the age and quality of most of the woodlands, this in practice consists of minimal intervention management, focused on maintaining as much woodland as possible using new broad-leaved planting where appropriate.

Going forward it is recommended that the first visit to survey the deer exclusion plots is carried out earlier in the season in order to monitor any browsing evidence on vernal flora such as bluebell and dog s mercury. The second visit, with the die-back of the herbaceous vegetation, will allow as assessment of browsing damage on seedlings. In addition, marking the seedlings individually and the use of quadrats could also aid in the assessment of plant growth and abundance.

[4] Amec Foster Wheeler Environment & Infrastructure UK Limited (2017). *Technical Note: Sizewell Estate- Monitoring of deer exclusion plots 2017.*

Objective SIZE_9: Maintain a breeding bird population characteristic of habitat types present

Key Biodiversity Receptors and KPI

- Breeding bird assemblage Breeding bird assemblage list

Land management actions

As in previous years, no specific land management activities have been completed in relation to breeding birds. However, many of the activities undertaken in regard to the rest of the objectives described within this Annual Report are directly beneficial to the site bird population.

Biodiversity monitoring results

Following the BTO s Common Bird Census methodology, the breeding bird survey was undertaken between March and June. A minimum of six visits were made to each area and the species observed were recorded on visit maps. These are then transferred to a species map and the number of territories then estimated. This method has been used on site for over 20 years and the maps have always been analysed by the same person to ensure continuity.

A total of 56 bird species and 930 pairs were recording breeding in 2017, a decrease of 5 and 101 respectively from 2016 (Table 17). The mean for the seven-year period under review is 60 species and 967 territories. Eight species were lost as breeders and three species gained and so 2017 performed below the mean on both counts. The heronry did not support any grey heron or little egret nests, with building work at the Galloper Substation likely to be causing too much disturbance for the second year. The other losses were greylag goose, hobby, turtle dove, barn owl, tawny owl, woodlark and nightingale. Hobby s were absent for the first time in seven years and turtle dove were heard briefly but did not stay, a familiar story throughout the UK. No barn owl nests were found although one box in the Lower Abbey barn could not be checked as the site has been boarded up, but there is still access for the birds.

Table 18 Summary of breeding bird results

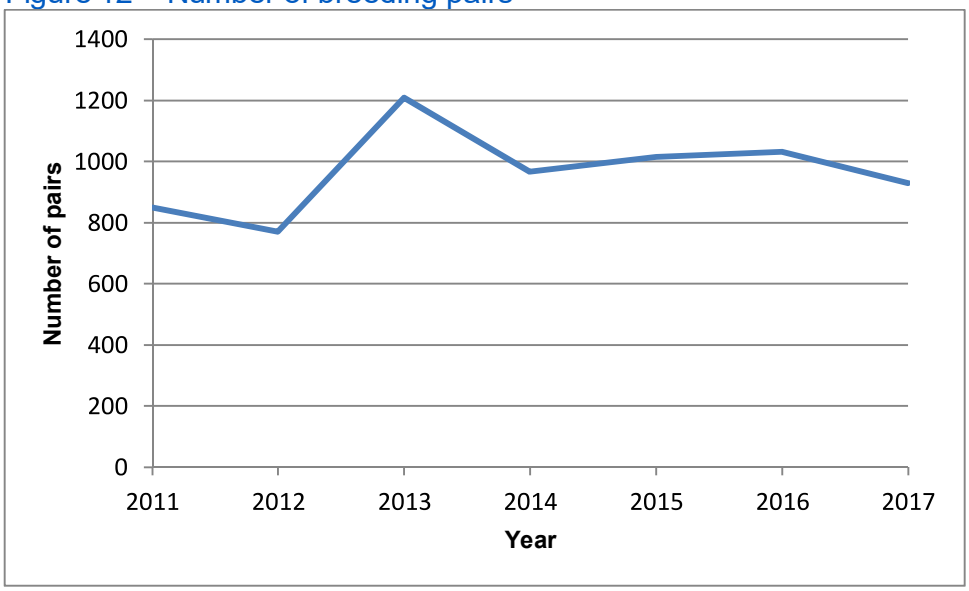
	2011	2012	2013	2014	2015	2016	2017
Number of breeding pairs	849	770	1209	966	1014	1031	930
Number of breeding bird species	60	61	63	66	59	61	56

No night time surveys were undertaken in 2017 and so it s possible that tawny owls bred undetected. Woodlark were only briefly heard but did not hold territory and sadly no nightingales arrived. Of those species gained this year, lapwing held two territories with one on the newly restored area of reedbed. Pleasingly, a grasshopper warbler held territory in the dry reed bed for the first time since 2012.

The overall species populations are very interesting; six species showed a significant gain in numbers whilst seven species showed declines. Of the six species showing an increase, song thrush and marsh tit are Red listed; stock dove, meadow pipit and reed bunting are Amber

listed; and lesser whitethroat is currently on the BTO s Green list.

Figure 12 Number of breeding pairs



Of the species recorded breeding in 2017, 11 are listed as Priority Species under Section 41 of the NERC Act 2006, including lapwing, marsh tit, and bullfinch. Full results are presented in **Appendix C**.

Analysis and Recommendations

Table 19 Objective SIZE_9 KPI assessment

Key Biodiversity Receptor	KPI	Target	KPI Assessment result
Breeding bird assemblage	Breeding bird assemblage list	Minimum of 45 species recorded per year	**ACHIEVED** 56 species recorded, of which 11 are listed on S41.

The breeding bird community at Sizewell has continued to remain reasonably steady in 2017 with a similar number of species and pairs present compared to 2016. This is as expected given the established nature of the habitats and regular long-term ongoing management activities.

Of the seven-species showing significant decline, skylark is Red listed; dunnock is Amber listed; and wren, reed warbler and chaffinch are Green listed. The remaining species, blackbird, is not currently thought to be of conservation concern. The reduction in skylark numbers is likely to be related to the sward height and density on Studio field and will need addressing if the decline is to be halted. The reduction in numbers of the remaining species is most likely due to the very poor 2016 breeding season which was cold and wet. However, our two most common birds, wren and chaffinch, have suffered a 31% and 32% decline respectively. Wrens normally succumb to cold winters and then their numbers bounce back. The 2016/17 winter was not particularly hard and so it may be down to the poor 2016 breeding season. Chaffinch however, has been in a steady decline since their peak count of 204 territories in 2012, a 55% decline in five years. This could be a result of farming practices and/or chemical use and disease which has affected several members of the finch family.

Other Land Management Activities

Sizewell B

A total of 5.7ha of bird feed cover crop was sown under the Higher Level Stewardship (HLS) Agreement at Upper and Lower Abbey Farms (Eastbridge Walk, Little Mount Walk and Upper Abbey Farm) to provide food and shelter for wintering birds. The sown mixture consisted of red and white millet, triticale, sunflower, sorghum, quinoa, wheat, kale, phacelia and perennial chicory. The areas were well used by a variety of birds during the autumn and early winter (see Other Biodiversity Records).

In addition to the sown cover crops, the Upper Abbey field margins are managed on a three- year rotational basis by cutting and collecting vegetation in late autumn. The margins have not been sown, but were originally left un-cropped and then a sward was allowed to develop thereafter. These areas form part of the Farmland Bird Winter Survey and the Upper Abbey Farm Butterfly Transect (**Figure 3**).

The trees identified in the annual TRIM report were made safe by pruning or by felling, if necessary. Trees are retained as standing dead trees wherever possible if the tree is safe.

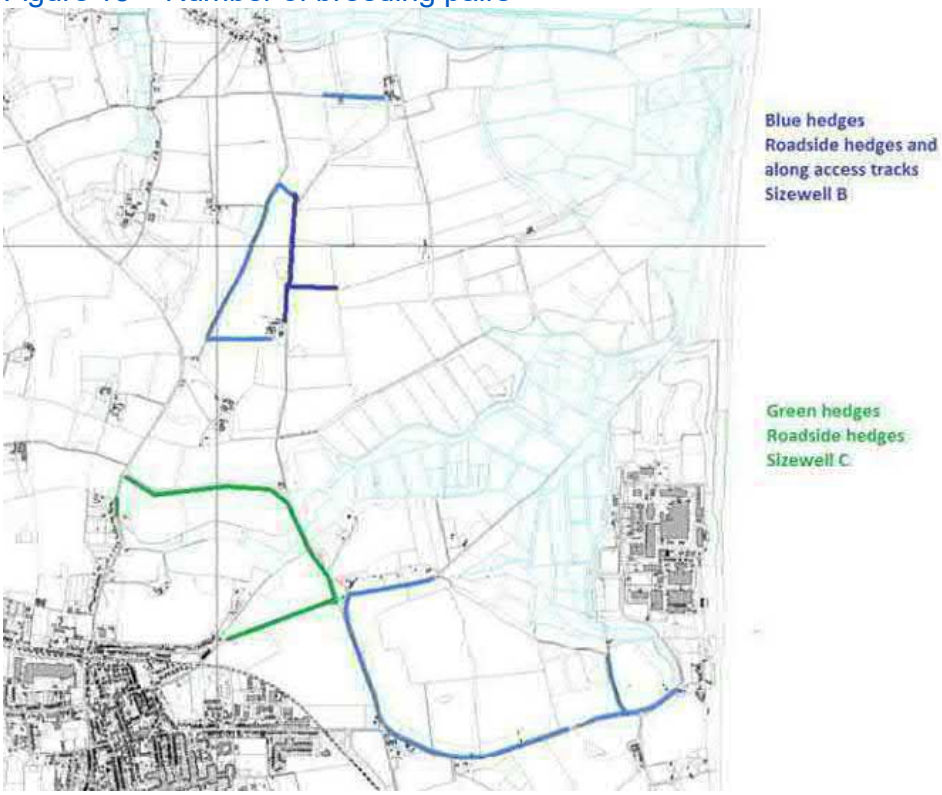
Lightning struck a mature Corsican pine in Kenton Hills and the tree was made safe by being retained as a monolith. The majority of the trees identified as potentially hazardous are small dead or dying elms. All trees are assessed for the likely presence of bats before any work is undertaken and any advice relating to bats is taken into account and the work altered accordingly.

Mature Corsican pine struck by lightning and retained as a monolith

Hedgerow management

The roadside and access track hedges were cut in 2017 as per the plan shown below.

Figure 13 Number of breeding pairs



Invasive species

The Japanese knotweed on the boundary of the yard at Common Cottages and Leiston Common was sprayed with glyphosate in September. This area will be inspected in spring to assess for any re-growth as it is likely that it will need several herbicide applications.

As reported under SIZE_3 Himalayan balsam along with the dyke between Pill Box field and Coronation Wood was cut and hand pulled in early summer before setting seed.

Sizewell C

Aldhurst Farm

The roadside hedges were flailed back in February to maintain the clearance required for the public roads surrounding the site.

85 tonnes of heather brashings were collected from Sutton and Hollesley Common SWT Reserve and spread on approximately 3.0 ha of Top and Tower Field (field 2) in an area on the southern side of the lagoons to encourage heathland species to colonise the open grassland.

Spreading heather brashing at Aldhurst Farm

Reptile Receptor Sites Studio Field, Lovers Field Halfway Field and Broom Covert

Broom Covert has been taken back in hand from the agricultural tenant and was not stocked with cattle over winter. Cattle and sheep have continued to be excluded from the area to allow the heathland/dry grassland species to recover. The grassland appears to have recovered very well and had a high proportion of Lady s bedstraw (*Galium verum*), an herbaceous perennial with yellow frothy flowers and a rich honey scent.

Lady s bedstraw in Broom Covert

Reptile Receptor Sites St James Covert and Kenton Hills

The fence around the reptile receptor sites in Kenton Hills and St James Covert was maintained by strimming around the external boundary to ensure that a vegetation bridge could not form that would allow reptiles to climb over the exclusion fence and into the site. Strimming around the boundary fences in Kenton Hills and St James Covert was undertaken slightly later this year, as the spring weather was quite dry and the vegetation did not emerge as densely as in previous years.

Management of the vegetation within the receptor site was completed over a period of three days using a vortex flail to mechanically cut and remove various areas of vegetation. Arisings were retained in situ and used to create habitat piles within the receptor site.

Strimming around reptile receptor site fencing in Kenton.

Reptile translocation site in Kenton Hills

Early Landscape Planting Sites

The new planted areas of woodland and hedgerows were maintained by herbicides to control competing vegetation. Losses were assessed and are high within the two new hedgerows, but are very low in the woodland areas established on ex-arable sites.

The losses in the hedgerow along the access track to Lower Abbey farm were assessed and then replaced with native woody species.

Other Biodiversity Records

Dragonflies

A total of five transects were established for the first time this season (T1: Reservoir , T2: Block of Four , T3: Pump Belt , T4: Saltmarsh , and T5: Goose Hill Marshes). The method follows that of the British Dragonfly Society (BDS) Dragonfly Monitoring Scheme. They recommend that transects can be counted weekly, bi-weekly or monthly from May to September annually. It was envisaged that we would make bi-weekly visits on an annual basis. Allowing for several unsuitable weeks due to weather and time constraints with other work, 22 unique survey visits were carried out (four to T1, four to T2, four to T3, five to T4, and five to T5).

Twenty species of the 33 that are found in Suffolk were recorded including Norfolk hawker. The azure damselfly was the most common species found, as would be expected. Willow emeralds were found in reasonable numbers as this recent colonist is now well established at Sizewell.

For further details please see **Appendix G**.

Wintering Farmland Birds

Two types of wintering bird surveys are completed at Sizewell each year, both in line with BTO survey methods and both between October and March; a Wetland Bird Survey (WeBS) Core Count (reported under SIZE_1) and a Farmland Bird Survey. The farmland bird survey concentrates on the fields around Upper and Lower Abbey Farms, including the areas of cover crops sown. As with previous annual reports, the results are presented for the year (2017) and therefore encompass part results from both the 2016/2017 and 2017/2018 winter seasons.

The Farmland bird survey recorded a total of 39 species (**Table 19**). The majority of the species observed are typical of farmland habitats including finches, buntings and thrushes, with a small number of waterfowl and raptors also observed. Full results are included in **Appendix D**.

Table 20 Number of species recorded during Farmland Bird Surveys

	2012	2013	2014	2015	2016	2017
Number of Species	38	45	45	50	43	39

A number of target wintering bird species have been identified based on the habitat types present at Sizewell and conservation value (i.e. inclusion on S41 of NERC Act, 2006). These are listed in **Table 20**.

Table 21 Target winter bird species (total counts)

	2012	2013	2014	2015	2016	2017
From Farmland bird data						
Linnet	176	58	241	534	473	60
Reed bunting	2	54	139	63	113	114
Skylark	62	134	212	197	268	207
Yellowhammer	6	51	96	21	21	3

NOTE: HLS strips added in late 2014 so larger area surveyed since this time

Bird ringing summary

Upper Abbey Farm

Eleven ringing visits were undertaken on Upper Abbey Farm during the year, six between 5th January and 31st March with a further five between 8th November and 13th December. A total of 119 birds were processed. Of these, 90 were new birds with the remainder being re-trapped. A series of mist nets were deployed along the edge of the cover plot adjacent to the hedge on the southern side consisting of 3x18m and 1x12m nets. Details of the birds re-trapped are shown in Appendix G. Capture rates in the second set of visits were much improved as the growth of the seed mixture was the best yet resulting in a taller, thicker crop with abundant seed heads. Reasonable catches of dunnock and reed bunting were recorded, both Amber listed species in the UK. However, numbers of yellowhammer, a Red listed species in UK, were very low this year. It is hoped that with the high availability of food within the cover crop catch rates will be better in the early part of 2018.

Retsom s Field

Unfortunately, due to a variety of reasons, ringing was not carried out on Retsom s field this year.

Barn Owls

There were no successful breeding attempts recorded on the Estate this year. No access was possible to the barn at Lower Abbey and other boxes remained unused. However, two stock dove chicks were noted in the barn owl box on Goose Hill Marsh although too small to ring at the time. Stock dove are doing well in UK but they are amber listed internationally.

Controls and Re-traps

Re-traps of note included several dunnocks over two years old and a robin three years old, all ringed at the cover plot. The recapturing of birds in the same location over long periods demonstrates the value of good habitat and a reliable food source both of which are available on the Sizewell Estate. Stars of the season were the long tailed tit initially ringed on Retsom s in October 2012 and recaptured for a second time at RSPB Minsmere in March 2017. Also of note was a reed bunting ringed on Retsom s on 10th October 2014 and recaptured at Dunwich Heath National Trust site on the 8th October 2017. A second reed bunting ringed on Retsom s in September 2016 was recaptured at RSPB Minsmere on 29th June 2017.
Appendix E gives full results.

Incidental Observations

Badgers and beetles

A dead badger was found in May and, so it was decided to monitor the fauna that aid the decomposition of the body by placing pit fall traps close by to catch and identify the various carrion beetles that help the process. Six different species were recorded over a ten-day period adding to the sites species list by when the carcass was beginning to disintegrate. The list is contained in **Appendix H**.

Moths

Moths are very often over-looked but play an incredibly vital role in our ecosystems, as pollinators and a food source for birds, bats and other insects. A staggering 2500 (ukmoths.org.uk states over 2500 moths) species of moth have been recorded in the UK meaning they occupy many different habitats. The long term monitoring of moths can provide indications of both positive and negative changes to an environment; from proving the success

of habitat management or indicating a changing climate as species are recorded further north. Moth populations are closely monitored in connection with climate change. As the 2013 publication The state of Britain s Larger Moths states:

The new State of Britain's Larger Moths 2013 report shows clearly that moths are in decline. The total number of larger moths recorded in the national network of Rothamsted trap samples decreased by 28% over the 40 years from 1968 to 2007. Declines are worse in southern Britain, with a 40% decrease in total abundance, while there was no overall change in northern Britain (where declines have been offset by increases). The Rothamsted light-trap network is one of the longest-running and most wide-ranging insect population research projects ever conducted."

With this in mind we deem it desirable that moths on the Sizewell Estate are monitored across as many of the differing habitats as possible. As previously mentioned the results can tell us how to what extent our work is contributing not only to the improvement of the ecosystems at Sizewell but also how these numbers compares to other moth data that is collected across the country.

Four sites are regularly trapped at Sizewell and the results can be summarised as follows:

Overall chart:

Number of traps carried out:	20
Number of individuals:	1158
Species Total:	148
National status breakdown:	Common: 117 Local: 20 Immigrant: 6 Nb: 4 N/A: 1
New species recorded for the Sizewell Estate:	30

More details are provided in Appendix F.

11 Hawk-moths caught in one night at Upper Abbey Farm: six elephant hawk moths, four poplar hawk moths and one pine hawk moth

Community Engagement

The wardens ran two dawn chorus walks, three general wildlife walks and two walks for SWT member s groups, all of which were well attended.

The SWT Education team ran five family events; three Coastal Explorers on the beach and a litter pick.

The Sizewell Amenity and Accessibility Fund awarded a total of 18,160 to five projects:

- Waveney Bird Club to build an access path from the North Wall to the East Hide at RSPB Minsmere.
- Autism and Nature publication of a book to help teachers, parents and carers to engage people with autism, especially children, with the historic environment of the Suffolk Coast & Heaths AONB.
- Deben Estuary Partnership to operate the Bawdsey Ferry service from November to April i.e. the winter months.
- Aldeburgh Food and Drink Fringe Festival 2017.
- Essex and Suffolk Rivers Trust a research and awareness raising project for landowners re irrigation and winter water storage.

Assessment of NG BAP Estate-Wide Action Plan Objectives

Table 22 summarises the actions that have been completed at Sizewell during 2016 which contribute to achievement of the NG BAP estate-wide action plan objectives.

Table 22 Estate-wide action plan assessment Sizewell contribution to achieving KPIs

Theme	Objective	KPI	Target	Sizewell contribution
Conserve	Nuclear Generation will seek, wherever feasible, to conserve and enhance biodiversity at each of its principal sites, primarily through its approach to land management, but also through its business operations and the development of new assets.	Number of major landholdings accredited to the Biodiversity Benchmark Standard.	Maintain accreditation across major landholdings.	Sizewell was last assessed in 2015 and retained the accreditation.
Partner	Nuclear Generation will seek to maintain and where appropriate develop further partnerships with selected stakeholders for the delivery of ecological improvement schemes on its land or in the vicinity of its main operational sites.	Number of land management meetings held per annum involving partners.	Engage with local partners at a minimum of 18 meetings per annum across all sites.	Three land management meetings were held in 2016 with attendees from Suffolk Wildlife Trust.
Communicate	Nuclear Generation aims to increase the awareness of both its employees and local communities of biodiversity issues and the opportunities for its enhancement through education, participation and partnership.	Number of people engaged with biodiversity at site (e.g. through events, volunteering etc.).	Increase number of people engaged by 10% over a five year period.	A total of 45 people attended the biodiversity events at Sizewell in 2017, with a further 121 attending the five family events.
Action	Biodiversity gain will be delivered through the implementation of the Site Action Plans.	Percentage of positive outcomes for Site Action Plan KPIs.	80% annually	67% of KPIs achieved in 2016. 25% of KPIs not assessed or in progress. 8% of KPIs (one) were not achieved in 2017.
Monitor	Nuclear Generation will maintain a comprehensive ecological survey programme to facilitate the regular updating of the base data for each of its sites.	Completion of monitoring surveys detailed in ILMPs and BAP.	80% of surveys planned each annum completed.	80% of the surveys programmed to be undertaken at Sizewell in 2017 were completed.
Report	Nuclear Generation will report to partners and stakeholders on our biodiversity performance.	Number of reports issued per annum providing information on biodiversity performance.	A minimum of one annual report per site and one mid-year update (e.g. newsletter).	Four newsletters including a summary of activities at Sizewell have been issued (Q2-Q3 and Q4) and a Sizewell annual report has been produced.

Operational Activities which have the potential to impact on biodiversity

Various activities required to support operation of the Power Station and the running of the wider Estate have been completed during 2017. All of these have been assessed to determine if there is potential for impacts on biodiversity to occur, and where potential is identified a Biodiversity Impact Assessment (BIA) has been completed. Assent for working within the SSSI has also been obtained from Natural England where required. **Table 23** summarises the operational activities.

Table 23 Summary of operational activities

Scheme	Description	BIA screening	SSSI assent received	Summary of measures implemented to reduce impacts
NGT Vegetation clearance	Vegetation clearance around base of pylons and underneath overhead lines to maintain safety clearance distances	Screened in. BIA required.	NA	Existing access tracks would be used in preference with additional access tracks being of a temporary nature, e.g. Trakway, mitigating the effects of soil damage and compaction. Vegetation removal will be kept to a minimum, under ecological watching brief, utilising existing gaps limiting these to a maximum of 10m s wide. Where possible vegetation will be retained and coppiced to a minimum height of 1m. Vegetation clearance to be undertaken within bird nesting season, as such all vegetation removal will be supervised by a suitably qualified ecologist. Should breeding birds be confirmed within the work area works will stop immediately with appropriate mitigation measures identified , e.g. works distances, screening. Monitoring of confirmed nests will take place to ensure that breeding birds are not disturbed.
Sizewell Substrate Sampling (PhD student)	Student aims to undertake sediment coring collecting a number of sediment cores (0.5m 1m in length) along a series of survey lines across the marsh, in order to characterise the sediments and collect samples for subsequent laboratory analysis as part of a PhD thesis.	Screened in. BIA required.	29/11/2017	Access to the sampling locations will be taken by foot and all works will be undertaken by hand tools. A 5m buffer will be maintained between the works and any ditches/ watercourses. Standard environmental control measures are implemented (e.g. in respect of pollution prevention). In the event that any protected species are discovered, all works should stop and the Biodiversity Manager should be contacted. Parking is to be arranged with Wildlife Trust warden Dayne West

Appendices

Appendix A Wintering bird results (WeBS)

Table A1 - Sizewell Belts WeBS Core Counts 2017

Species	16 Jan 2017	13 Feb 2017	13 Mar 2017	20 Nov 2017	11 Dec 2017	Number of visits recorded
Mute Swan	5	7	9	-	4	**4**
Greylag Goose	-	4	-	-	-	**1**
Wigeon	120	90	130	-	-	**3**
Gadwall	17	16	4	14	4	**5**
Teal	65	34	48	16	14	**5**
Mallard	40	32	24	32	31	**5**
Shoveler	12	3	17	-	-	**3**
Little Egret	2	4	5	1	3	**5**
Grey Heron	3	5	5	3	5	**5**
Marsh Harrier	-	3	1	4	2	**4**
Hen harrier	2	-	-	-	-	**1**
Sparrowhawk	2	1	-	2	-	**3**
Buzzard	6	3	4	2	-	**4**
Kestrel	1	2	1	3	-	**4**
Peregrine	-	1	-	-	-	1
Water Rail	-	1	1	1	2	**4**
Moorhen	7	8	5	-	1	**6**
Oystercatcher	-	2	-	-	-	**1**
Lapwing	-	4	-	-	4	**2**
Snipe	-	5	2	2	27	**4**
Curlew	-	-	-	-	3	1
Green sandpiper	-	-	-	2	-	1
Black headed gull	2	-	3	-	-	**2**
Herring gull	-	-	-	1	-	1
Kingfisher	2	-	2	2	1	**4**
Meadow Pipit	26	10	4	8	4	**5**
Stonechat	-	2	2	-	-	**2**
Cetti's Warbler	3	1	1	-	-	**3**
Bearded tit	14	12	-	12	-	3
Reed bunting	-	2	-	-	-	1
Total species: 34	18	24	21	17	16	

Appendix B Butterfly survey results

Table B1 Number of butterflies recorded on the Sizewell Belts transect

	2013	2014	2015	2016	2017
Small skipper	1	2			
Essex skipper		1			
Small/Essex skipper	2	5	11	6	3
Large skipper	2	1		1	1
Clouded yellow	1				
Brimstone		1		3	4
Large white	78	31	90	37	6
Small white	150	138	48	26	18
Green-veined white	149	141	22	30	31
Orange tip	7	20	27	17	9
Small copper	38	71	15	10	27
Brown argus	1	8		1	2
Common blue	12	35	16	4	16
Holly blue				1	
White admiral		1	1	1	
Red admiral	6	31	7	3	9
Painted lady	1	2	1	1	
Small tortoiseshell	41	116	21	13	5
Peacock	67	75	56	9	16
Comma	17	11	3	7	9
Speckled wood	26	34	8	5	5
Grayling	14	24	8	6	1
Gatekeeper	136	102	69	48	43
Meadow brown	664	610	470	336	163
Small heath	16	51	23	6	9
Ringlet	509	441	234	232	126
TOTAL Individuals	**1938**	**1952**	**1130**	**803**	**503**

Table B1 Number of butterflies recorded on the Upper Abbey transect

	2013	2014	2015	2016	2017
Small skipper	3				
Essex skipper		1	4		
Small/Essex skipper	125	264	95	122	
Large skipper	23	61	30	55	2
Clouded yellow	1				
Brimstone		3	4	2	1
Large white	99	83	100	76	11
Small white	215	55	50	28	8
Green-veined white	97	91	36	23	11
Orange tip	8	16	17	20	14
Small copper	6	9	10	10	1
Brown argus	2	5			
Common blue	6	1		4	7
Holly blue			4	15	13
White admiral					
Red admiral	3	35	4	9	5
Painted lady		4	13	9	
Small tortoiseshell	130	205	55	24	13
Peacock	29	100	57	13	29
Comma	7	13	7	4	
Speckled wood	3	15	5	5	1
Grayling	6	4	8		2
Gatekeeper	96	177	66	113	4
Meadow brown	545	725	388	318	22
Small heath	10	3	3	1	

Ringlet	352	552	208	198	
TOTAL Individuals	**1766**	**2422**	**1164**	**1049**	**144**

Appendix C Sizewell Breeding Birds 2017

Note: Species marked with an asterisk* = Birds with UK and Suffolk Biodiversity Action Plans.
Species marked with a plus sign + = Birds present but no accurate count made minimum number only.

Table C1 Sizewell breeding birds 2017 by area

Species	Sizewell Belts	Retsoms/ S Marsh	Leiston Common	Reckham Pits	Lower Abbey	Black Walks	Studio	**Total**
Grey heron								0
Little egret								0
Mute Swan	3	1			1			5
Grey lag goose								0
Shelduck		2				3		5
Gadwall	2	1			1			4
Teal								0
Mallard	10	2			3			15
Garganey								0
Shoveler								0
Tufted duck								0
Common buzzard	1							1
Sparrowhawk	1							1
Kestrel	1							1
Hobby								0
Peregrine								0
Red legged partridge						2	1	3
Pheasant+								0
Water rail +	2							2
Moorhen	13				1			14
Lapwing	1	1						2
Redshank								0
Stock dove	7	2	1	1	1			12
Collared dove			1					1
Turtle dove*								0
Cuckoo*					1			1
Barn owl								0
Tawny owl+								0
Little owl								0
Kingfisher	1							1
Green woodpecker	2			1	1	1		5
Gt sp woodpecker	2	1		1	1			5
Skylark *		4			2		14	20
Woodlark								0
Meadow pipit	1	1					1	3
Swallow						1		1
Pied wagtail	1					1		2
Wren	77	15	12	9	14	9		136
Dunnock*	18	3	6	1	4	7	3	42

Robin	36	7	7	5	6	6	1	68
Nightingale								0
Blackbird	10	4	3		3	2	1	23
Song thrush*	7				1			8
Mistle thrush			1					1
Cettis warbler	9	4			6			19
Sedge warbler	8	3			4			15
Reed warbler	11	11			3			25
Grasshopper warbler	1							1
Lesser whitethroat	1	1	2		1	1	1	7
Whitethroat	3	1			1		3	8
Garden warbler	8	3	1		1		1	14
Blackcap	20	5	2	4	4	3	1	39
Chiffchaff	37	8	10	7	4	3	1	70
Willow warbler	4		1					5
Goldcrest	5	4	2			2		13
Long tailed tit	5	1	2	1	1	1		11
Marsh tit*	5				1			6
Coal tit	12	2	1			1		16
Blue tit	40	5	8	6	5	7	2	73
Great tit	33	4	8	3	2	5	1	56
Treecreeper	9	2		1				11
Jay	1							1
Magpie	1							1
Jackdaw	2							2
Carrion crow		1						1
House sparrow*			2		2	3		7
Chaffinch	42	14	12	3	8	10	3	92
Greenfinch	3		1		3	1		8
Goldfinch	2	3	3		3	1		12
Linnet*		2	2		4	6		14
Bullfinch*				1	1			2
Yellowhammer*					1	1	2	4
Reed bunting *	7	5			3			15

Table C2 Sizewell breeding bird survey annual totals

	2011	2012	2013	2014	2015	2016	2017
Little grebe		1					
Bittern				1			
Grey heron	1	1	3	1	1		
little egret			2	1		1	
Mute swan	2	2	5	5	3	5	5
Greylag goose						5	
Canada goose	1			1			
Shelduck	3	2	1	1	1	2	5
Gadwall	4	4	7	6	4	3	4
Teal			1				

Mallard	17	17	21	13	15	13	15
Gargany				1			
Shoveler				1	1		
Tufted duck	1	3	1				
Buzzard		1	1	1	1	1	1
Sparrowhawk	2	2	3	2	3	3	1
Kestrel	1	1	1	1	2	1	1
Hobby	1	1	1	1	1	1	
Red-legged partridge	2	1	3	2	1		3
Pheasant		4	1		1		
Water rail	1		3	4	4	6	2
Moorhen	22	13	22	11	21	19	14
Coot	1						
Lapwing	1		1	1			2
Redshank			1	1			
Snipe			1				
Stock dove	4	1	11	7	7	8	12
Collared dove	1	1	2	5	2	1	1
Turtle dove	1	1		2	1	1	
Cuckoo	1	1	1	2	2	1	1
Barn owl	1	1	1	1	3	2	
Tawny owl			1			1	
Little owl		1		1	1		
Kingfisher	1	1	1	1	1	1	1
Green woodpecker	8	6	5	2	3	2	5
Great spotted woodpecker	6	6	5	6	5	6	5
Skylark	4	6	7	9	15	23	20
Woodlark				1		1	
Meadow pipit			1			1	3
Swallow	2	1	1	1	1	1	1
Pied wagtail	3	2	1	1	2	3	2
Wren	92	108	173	174	207	195	136
Dunnock	29	31	43	46	55	52	42
Robin	55	45	69	62	91	65	68
Nightingale	2	3		1	1	2	
Blackbird	37	22	31	24	20	32	23
Song thrush	6	13	8	4	3	3	8
Mistle thrush	1	1	2	2	1	2	1
Cetti warbler	23	9	10	18	16	21	19
Sedge warbler	26	9	30	9	21	14	15
Reed warbler	7	4	34	16	23	35	25
Grasshopper warbler		1					1
Lesser whitethroat	1	3	3	2	4	3	7

Whitethroat	19	11	23	15	14	13	8
Garden warbler	10	1	24	15	16	15	14
Blackcap	29	27	38	39	36	39	39
Chiffchaff	40	47	52	70	51	60	70
Willow warbler	5	6	7	4	3	2	5
Goldcrest	6	17	20	8	14	11	13
Long-tailed tit	14	20	25	20	21	10	11
Marsh tit	6	6	9	6	4	3	6
Coal tit	16	9	28	8	11	12	16
Blue tit	92	75	111	76	92	75	73
Great tit	54	48	60	55	42	47	56
Treecreeper	7	6	14	8	8	10	11
Jay	2	1	1	1		1	1
Magpie	3	2	1	1	1	1	1
Jackdaw	1	2	1	2	1	1	2
Carrion crow	1	1			1	1	1
House sparrow	12	5	13	9	2	8	7
Chaffinch	116	121	204	133	108	135	92
Greenfinch	10	13	15	10	6	8	8
Goldfinch	14	11	20	15	11	15	12
Linnet	11	7	9	6	15	10	14
Siskin			2				
Bullfinch	1	1		1	1	2	2
Yellowhammer	5	2	5	5	6	4	4
Reed bunting	4	1	8	6	6	12	15
Number of breeding pairs	849	770	1209	966	1014	1031	930
Number of species	60	61	63	66	59	60	56
Species in bold listed on S41 of the NERC Act 2006							

Appendix D Wintering bird results (Farmland)

Table D1 Farmland Bird Survey Upper Abby Farm 2017

Species	Jan 2017	Feb 2017	Mar 2017	Oct 2017	Nov 2017	Dec 2017
Blackbird	15	5	2	2	21	13
Blue Tit	7	5	4	5	2	0
Brambling	0	0	0	1	0	0
Bullfinch	0	0	0	1	0	0
Buzzard	4	1	4	1	0	0
Carrion Crow	15	123	24	9	53	19
Chaffinch	10	9	21	5	0	0
Coal tit	0	2	0	0	0	0
Curlew	0	0	0	2	0	0
Dunnock	6	5	5	9	2	6
Goldcrest	0	0	1	8	0	0
Goldfinch	6	0	4	5	2	4
Green woodpecker	1	0	0	1	0	0
Great Tit	0	3	2	4	0	1
House Sparrow	0	8	4	21	0	10
Jackdaw	0	50	30	50	32	45
Jay	0	0	0	1	1	0
Lapwing	0	0	0	0	2	0
Linnet	13	0	0	12	0	0
Long Tailed Tit	0	0	1	7	0	0
Magpie	4	0	5	1	2	0
Marsh harrier	1	0	0	0	0	0
Meadow Pipit	0	0	3	0	1	4
Pheasant	18	26	2	4	20	25
Pied Wagtail	0	3	0	0	0	2
Red Legged Partridge	3	9	10	2	17	8
Redwing	0	2	0	0	0	1
Reed Bunting	0	0	0	2	0	0
Robin	1	2	3	6	0	5
Rook	87	100	0	200	0	40
Skylark	67	12	15	25	48	87
Song Thrush	3	2	1	2	1	2
Sparrowhawk	1	0	1	1	0	1
Stock Dove	5	17	12	0	0	0
Woodcock	2	1	0	0	0	0
Woodpigeon	18	80	47	375	83	90
Wren	0	2	1	0	0	2
Yellowhammer	0	0	0	3	0	0

Table D2 Farmland Bird Survey Upper Abby Farm Cover Plot 2017

Species	Jan 2017	Feb 2017	Mar 2017	Oct 2017	Nov 2017	Dec 2017
Blackbird	0	0	0	0	3	2
Blue Tit	0	0	0	0	0	1
Bullfinch	1	0	0	0	0	0
Chaffinch	8	2	0	2	2	3
Dunnock	0	1	0	5	5	4
Goldfinch	0	0	0	0	0	4
Greenfinch	2	2	0	0	0	0
Linnet	0	0	0	0	0	4

Species	Jan 2017	Feb 2017	Mar 2017	Oct 2017	Nov 2017	Dec 2017
Meadow pipit	0	0	0	0	0	0
Pheasant	0	0	0	5	0	0
Redwing	0	0	0	5	0	0
Reed Bunting	0	0	0	15	26	31
Song thrush	0	0	0	1	0	0
Wren	0	1	0	0	1	0
Yellowhammer	0	0	0	0	0	0

Table D3 Farmland Bird Survey Eastbridge Walk Cover Plot 2017

Species	Jan 2017	Feb 2017	Mar 2017	Oct 2017	Nov 2017	Dec 2017
Dunnock	0	1	0	1	2	0
Linnet	0	0	0	24	0	0
Pheasant	0	0	0	9	0	0
Reed Bunting	40	0	0	2	0	0
Song thrush	1	0	0	0	1	0

Table D4 Farmland Bird Survey Little Mount Walk Cover Plot 2017

Species	Jan 2017	Feb 2017	Mar 2017	Oct 2017	Nov 2017	Dec 2017
Chaffinch	0	0	0	0	6	0
Dunnock	0	0	0	3	1	3
Linnet	0	0	0	11	0	0
Meadow pipit	0	0	0	0	1	0
Pheasant	18	0	0	24	0	0
Pied wagtail	0	0	0	0	1	0
Skylark	74	0	0	0	2	29

Appendix E Ringing Data

Table E1 - Ringing Totals Sizewell Estate 2017

Species	Full grown	Pulli (ringed in nest)	Retraps / recoveries	Total
Green woodpecker	1			1
Wren	3			3
Dunnock	18		11	29
Robin	4		4	8
Blackbird	6			6
Sing thrush	1			1
Chiffchaff	1		1	2
Goldcrest	3		1	4
Long-tailed Tit	5		2	7
Blue Tit	17			17
Great Tit	1		2	3
Chaffinch	3		2	5
Greenfinch	2			2
Goldfinch	1			1
Bullfinch	3			3
Lesser redpoll	2			2
Yellowhammer	2			2
Reed Bunting	17		2	19
Annual Total:	90		29	119

Table E2: Birds ringed/recaptured/controlled by Carl Powell

SPECIES	RING NUMBER	AGE/SEX	DATE	PLACE
Dunnock	TT02866	5	18.01.16	UA Farm
		4	25.11.17	UA Farm
Dunnock	TT02872	5	23.01.16	UA Farm
		4	25.11.17	UA Farm
Dunnock	TT02882	4	03.03.16	UA Farm
		6	05.01.17	UA Farm
		4	04.12.17	UA Farm
Dunnock	TV13120	3	29.11.16	UA Farm
		3	05.12.16	UA Farm
		4	13.12.17	UA Farm
Dunnock	TV13126	3	05.12.16	UA Farm
		4	04.12.17	UA Farm
Dunnock	TV13171	2	08.11.17	UA Farm
		3	13.12.17	UA Farm
Dunnock	TV13173	3	08.11.17	UA Farm
		3	04.12.17	UA Farm
Dunnock	TV13174	3	08.11.17	UA Farm
		3	04.12.17	UA Farm
		3	13.12.17	UA Farm
Dunnock	TV13176	3	14.11.17	UA Farm
		3	04.12.17	UA Farm
		3	13.12.17	UA Farm
Dunnock	TV13180	3	14.11.17	UA Farm

		3	25.11.17	UA Farm
Dunnock	TV13187	3	25.11.17	UA Farm
		3	13.12.17	UA Farm
Robin	D963758	3	20.11.14	UA Farm
		5	19.01.15	UA Farm
		4	25.11.17	UA Farm
Robin	S581342	3	14.11.17	UA Farm
		3	04.12.17	UA Farm
Robin	S581346	3	14.11.17	UA Farm
		3	04.12.17	UA Farm
		3	13.12.17	UA Farm
Robin	Z785699	5	18.01.16	UA Farm
		4	18.11.16	UA Farm
		6	30.01.17	UA Farm
		4	04.12.17	UA Farm
		4	13.12.17	UA Farm
Chiffchaff	EBC324	4	13.03.17	UA Farm
		4	31.03.17	UA Farm
Goldcrest	EBC358	3F	04.12.17	UA Farm
		3F	13.12.17	UA Farm
Long tailed Tit	DCA325	2	22.10.12	Retsom s
		4	31.03.16	Minsmere
		4	06.04.17	Minsmere
Long tailed Tit	EBC206	4	23.03.15	UA Farm
		4	05.01.17	UA Farm
		2	13.12.17	UA Farm
Great Tit	Z785721	5M	05.02.16	UA Farm
	6M		30.01.17	UA Farm
Great Tit	TV58656	1	02.06.16	Minsmere
		5M	16.01.17	UA Farm
Chaffinch	D963911	4M	06.07.15	UA Farm
		4M	25.11.17	UA Farm
Chaffinch	S581049	4M	05.13.16	UA Farm
		4M	18.03.17	Minsmere
Reed Bunting	D963728	3M	30.10.14	Retsom s
		2	08.10.17	Dunwich NT
Reed Bunting	Z785906	3F	13.09.16	Retsom s
		2	29.06.17	Minsmere

Note 1: 43, Abbey Road, Leiston is the home address of Carl Powell. The distance to Upper Abbey Farm ringing site is approximately 1 mile. The distance to Retsom s Field ringing site is approximately 2.3 miles.
Note 2: Minsmere is the RSPB Reserve immediately to the north of Sizewell Estate. Minsmere and Upper Abbey Farm ringing sites are approximately 2 miles apart.
Note 3: Retsom s Field is on the Sizewell Estate. Upper Abbey Farm and Retsom s ringing sites are approximately 1.5 miles apart. Retsom s and Minsmere ringing sites are approximately 1.25 miles apart.
Note 4: Ages shown are the BTO age codes and do not refer to the age in years of the bird.

Appendix F Moth Trap Data

Moth trapping method

Although only 90% of moth species are attracted to light, light trapping is the best way of surveying the species diversity. There any may different types of moth traps (using light) all doing the same thing but with varying degrees of success. At Sizewell we use a Skinner trap. Of the two traps at Sizewell one requires mains electricity; therefore, the locations it can be used are limited. This trap stays at Upper Abbey Farm and is used behind the farm buildings where mains access is available and the bright mercury vapour bulb does not negatively impact other site users. The other Skinner trap is portable, running off a car battery; this uses a different type of bulb called an actinic, whilst being less powerful as it is still enough to attract moths.

Both traps are run overnight, with either a timer or light sensor in place to switch off the traps during daylight. Early the next morning any moths that are in or surround the trap will be noted. The moths tend to settle in the trap as this is their natural instinct during day time, this makes identifying much easier. Sorting the moths early in the morning is crucial as many bird species prey on moths by entering the trap.

The number of moth species present in the UK, and the similarity between many species means that identification takes time and experience. Moth numbers vary according the time of year and weather, with the greatest abundance of species and individuals occurring in July; many moths species are more active on warm and humid nights, with higher numbers trapped when the moon is not visible (trap efficiency decreases as ambient light increases).

Moth trapping locations

Regular trapping locations provide stable long-term data sets for monitoring. Four sites are now regularly trapped at Sizewell to encompass the range of habitats in the area and thus the greatest diversity of species.

Location 1: Upper Abbey Farm
Grid Reference: TM453646
Description: Upper Abbey Farm is an ideal location due to the availability of mains and also much easier to get to. The surrounding area is a mix of Hedgerow, arable field margins, deciduous and coniferous woodland, veteran oaks & even wetland. This meant that a diverse range of species from all habitats were caught. One downside to this became apparent as hornets nested in close proximity to the trap. Moths being a prey item of hornets meant that trapping had to stop as between 40-50 hornets were being trapped most nights. Trapping was eventually stopped at this location because of it.

Location 2: Retsoms heather plot.
Grid reference: TM469651
Description: Heather plots on Retsoms have been fenced off from grazing animals for roughly 3 years now. This has allowed heather that was spread 15 years ago to mature and spread, along with the heather growth gorse has also taken and is scattered across the plots. Within close proximity to the trapping location are grazing marsh, reedbed/fringes, veteran oaks, deciduous and coniferous woodland and dry grassland. Once again this location was situated amongst many habitat types with the hope of trapping a massively diverse range of species. By trapping within the plots we hoped to find species that would indicate that our work on the plots is paying off.

Saltmarsh corral

Location 3: Saltmarsh corral
Grid reference: TM474651
Description: Saltmarsh corral was chosen due to its close proximity to the sea, it was hoped that this would encourage any migratory species into the trap as they literally came in off the sea. Other habitats within close proximity were Reedbed/fringes, grazing marsh, dry grassland, deciduous & coniferous woodland and sand dunes. One issue with this location was that the trap had to be within the corral to protect from our grazing sheep, this could of prohibited the light travel somewhat.

Location 4: Leiston Common
Grid Reference: TM460634
Description: A Bracken cutting management plan has been implemented over the past three years on Leiston common with the hope that the already present heather will mature and spread within the strip of woodland/heathland. It is hoped that long-term moth records could indicate that habitat management is having a positive effect. Within close proximity to this location is deciduous woodland, dry acid grassland, grazing marsh, fen & reedbed.

Leiston Common

Moth results and Highlights

Location 1: Upper Abbey Farm

Number of traps deployed:	9
Number of individuals caught:	533
Species total:	97
National Status breakdown:	Common: 80 Local: 12 Immigrant:3 Nb: 2

Festoon (*Apoda limacodes*)
National status: Nb
Habitat: Mature broadleaved woodlands in lowland areas as well as hedgerows with mature trees.
Larval foodplant: Oak species & Beech
This was a fantastic moth to catch, not only had it not been caught on the Sizewell estate before but it hadn t be caught within the tetrad (2km square) that Sizewell sits in. Only 1 individual was caught (23/06/2017). The large veteran Oaks along the bridleway nearby are likely to be where this moth had come from.

Cream-bordered Green Pea (*Earias clorana*)
National Status: Nb
Habitat: Fens, marshland & damp wood

Larval foodplant: Various Willow species.
Another nationally scarce b listed moth, given the habitat of this moth it shows how far some moths can travel in a night. This was a lovely moth to catch and only the second time this moth has been recorded on site. The other record was at the same location in 2016. Once again only 1 individual was caught (23/06/2017).

Location 2 Retsoms heather plot

Number of traps carried out:	6
Number of individuals caught:	407
Species total:	87
National Status breakdown:	Common: 68 Local: 12 Recent Colonist: 1 Immigrant: 3 Nb: 2 N/A: 1

Beautiful Yellow Underwing (*Anarta myrtilli*)
National status: Common
Habitat: Frequents heathland (Southern parts of UK) & moorland (Northern parts of UK)
Larval foodplant: Heather (*Calluna vulgaris*) & Bell Heather (*Erica cinerea*)
Although this is a common and widely distributed moth it is also a significant catch at Retsoms. Due to its habitat and larval foodplant this means that the work we are doing on the heather plots is working by attracting this stunning moth. There will be a large population of these on Westleton & Dunwich Heath (north of Sizewell) but it is very encouraging that we have been able to attract it to the area and specifically Retsoms.

Lunar Yellow underwing (*Noctua orbona*)
National status: Nb
Habitat: Grassland and heathland on light soils.
Larval Foodplant: Mainly fine grasses; Fescues, bents, wavy hair grass & Yorkshire fog
The Lunar Yellow Underwing was a very nice addition to this year s moth list, once again a first record for the Sizewell Estate. This moth is present through most of Suffolk but restricted to the coast and the Brecks. Once again only one individual was caught (26/08/2017).

Location 3 Saltmarsh corral:

Number of traps carried out:	3
Number of individuals caught:	97
Species total:	26
National status breakdown:	Common: 23 Local: 2 Immigrant: 1

Hummingbird Hawk-moth (*macroglossum stellatarum*)
National status: Immigrant
Habitat: Found in many habitats not only in rural areas but also urban
Larval Foodplant: Lady s Bedstraw, Hedge Bedstraw, Wild Madder and occasionally Red Valerian.

It is always a treat to see these beautiful moths. Almost certainly a moth that had just reached mainland UK and was attracted to the light. This is one of the advantages of this trapping location: migratory moths will be attracted straight off the sea. Although commonly seen its it is not as common to be found in moth traps. This particular individual unfortunately flew out of the trap when the trap was opened therefore not no photo was obtained.

Location 4 Leiston Common:

Number of traps carried out:	2
Number of individuals caught:	121
Species Total:	37
National status breakdown:	Common: 31 Local: 4 Immigrant: 1 Recent colonist: 1

Archer s Dart (Agrotis vestigialis)
National status: Local
Habitat: Coastal habitats, heathland, fen and grassland.
Larval foodplant: Various herbaceous plants.
A specialist species, restricted to the Suffolk coast and the Brecks, the species was recorded at Sizewell for the first time in 2017. Leiston common provides the necessary habitat and the species provides an indicator that habitat management is successful at the site. Five individuals were recorded in total.

Yellow Belle (*semiaspilates ochrearia*)
National status: Local
Habitat: Coastal habitats, heathland and grassland.
Larval Foodplant: Various herbaceous plants.
This was a new species for. Not only was this trapped here, but also on Retsoms.Leiston common would be a suitable area for Yellow Belle, with its mix of heathland and grassland, as well as the proximity to the coast. Only individual was recorded at Leiston common and another one at Retsoms.

Upper Abbey Farm 2017: TM453646		
Species name:	**Latin name:**	**National status:**
Hebrew Character	*Orthosia gothica*	Common
Common Quaker	*Orthosia cerasi*	Common
Clouded Drab	*Orthosia incerta*	Common
Powdered Quaker	*Orthosia gracilis*	Common
Oak Beauty	*Biston strataria*	Common
Brindled Pug	*Eupithecia abbreviata*	Common
Early Thorn	*Selenia dentaria*	Common
Early Grey	*Xylocampa areola*	Common
Shuttle- shaped Dart	*Agrotis puta puta*	Common
Pale Tussock	*Calliteara pudibunda*	Common
Lobster Moth	*Stauropus fagi*	Common
Pebble Prominent	*Notodonta ziczac*	Common
Chinese Character	*Cilix glaucata*	Common
Green Carpet	*Colostygia pectinataria*	Common
Lynchis	*Hadena bicruris*	Common
Turnip Moth	*Agrotis segetum*	Common
Poplar Grey	*Acronicta megacephala*	Common
Chocolate-tip	*Clostera curtula*	Local
White Ermine	*Spilosoma lubricipeda*	Common

Rosy Footman	*Miltochrista miniata*	Local
Brown-line Bright-eye	*Mythimna conigera*	Common
Orange Moth	*Angerona prunaria*	Local
Riband Wave	*Idaea aversata*	Common
Beautiful Hooktip	*Laspeyria flexula*	Local
Swallow-tailed Moth	*Ourapteryx sambucaria*	Common
Small Magpie	*Anania hortulata*	Common
Mother Of Pearl	*Pleuroptya ruralis*	Common
Common Emerald	*Hemithea aestivaria*	Common
Green Silver-lines	*Pseudoips prasinana*	Common
Cinnbar	*Tyria jacobaeae*	Common
Festoon	*Apoda limacodes*	Nb
Pine Hawkmoth	*Hyloicus pinastri*	Local
Elephant Hawkmoth	*Deilephila elpenor*	Common
Poplar Hawkmoth	*Laothoe populi*	Common
Large Yellow Underwing	*Noctua pronuba*	Common
Pale Oak Beauty	*Hypomecis punctinalis*	Common
Spinach	*Eulithis mellinata*	Common
Dark Arches	*Apamea monoglypha*	Common
Common Rustic	*Mesapamea secalis*	Common
Common Footman	*Eilema lurideola*	Common
White Point	*Mythimna albipuncta*	Immigrant
Grey Dagger	*Acronicta psi*	Common
Fan-foot	*Zanclognatha tarsipennalis*	Common
Uncertain	*Hoplodrina alsines*	Common
Peppered moth	*Biston betularia*	Common
Double Square-spot	*Xestia Triangulum*	Common
Buff Arches	*Habrosyne pyritoides*	Common
Buff-tip	*Phalera bucephala*	Common
Brown-tail	*Euproctis chrysorrhoea*	Local
V-pug	*Chloroclystis v-ata*	Common
Buff Ermine	*Spilosoma lutea*	Common
Clouded Brindle	*Apamea epomidion*	Common
Ghost Moth	Hepialus humuli	Common
Snout	Hypena proboscidalis	Common
Angle Shades	Phlogophora meticulosa	Common
Treble Brown spot	Idaea trigeminata	Local
Iron Prominent	Notodonta dromedarius	Common
Setaceous Hebrew Character	Xestia c-nigrum	Common
Cream-bordered Green Pea	Earias clorana	Nb
Clouded Border	Lomaspilis marginata	Common

Common Swift	Korscheltellus lupulina	Common
Tawny Marbled Minor	Oligia latruncula	Common
Spectacled	Abrostola tripartite	Common
Slender Brindle	Apamea scolopacina	Common
Heart and Dart	Agrostis exclamationis	Common
Common Wainscot	Mythimna pallens	Common
Light Arches	Apamea lithoxylaea	Common
Broad-bordered Yellow Underwing	Noctua fimbriata	Common
Blue-bordered Carpet	Plemyria rubiginata rubiginata	Common
Leopard Moth	Zeuzera pyrina	Common
Brimstone moth	Opisthograptis luteolata	Common
Minor Shoulder-knot	Brachylomia viminalis	Common
Pine Carpet	Pennithera fermata	Common
Flame Shoulders	Ochropleura plecta	Common
Yellow-tail	Euproctis similis	Common
Peacock moth	Macaria notate	Local
Lesser Broad-bordered Yellow Underwing	Noctua janthe	Common
Silver Y	Autographa gamma	Immigrant
Straw Dot	Rivula sericealis	Common
Swallow Prominent	Pheosia tremula	Common
Black Arches	Lymantria monacha	Local
Striped Wainscot	Mythimna pudorina	Local
Ear spp		
Nutmeg	Anarta trifolii	Common
Least Yellow Underwing	Noctua interjecta	Common
Rustic	Hoplodrina blanda	Common
Double-striped Pug	Gymnoscelis rufifasciata	Common
Wood Carpet	Epirrhoe rivata	Local
Willow beauty	Peribatodes rhomboidaria	Common
Light Emerald	Campea margaritaria	Common
Copper Underwing	Amphipyra pyramidea	Common
Burnished Brass	Diachrysia chrysitis	Common
Blood-vein	Timandra comae	Common
Dingy Footman	Eilema griseola	Common
Clay	Mythimna farrago	Common
Yellow Shell	camptogramma bilineata bilineata	Common
Rush Veneer	Nomophila noctuella	Immigrant
A micro moth	Acrobasis suavella	Local
National Status Totals:		

Common	80	

Local	12	
Immigrant	3	
NB	2	
Total:	97	

Retsoms 2017 Grid ref: TM469651		
Species name:	**Latin Name:**	**National status:**
Cinnabar	Tyria jacobaeae	Common
Buff-tip	Phalera bucephala	Common
Pale Tussock	Calliteara pudibunda	Common
Turnip moth	Agrotis segetum	Common
Buff Ermine	Spilosoma lutea	Common
Heart and Dart	Agrotis exclamationis	Common
Shears	Hada plebeja	Common
Large Yellow Underwing	Noctua pronuba	Common
Setaceous Hebrew Character	Xestia c-nigrum	Common
Flame Shoulders	Ochropleura plecta	Common
True Lover's Knot	Lycophotia porphyrea	Common
Rosy Footman	Miltochrista miniata	Local
Scarce Footman	Eilema complana	Local
Birds-wing	Dypterygia scabriuscula	Local
Least Yellow Underwing	Noctua interjecta	Common
Double-striped Pug	Gymnoscelis rufifasciata	Common
Ruby Tiger	Phragmatobia fuliginosa fuliginosa	Common
Shuttle-shaped Dart	Agrotis puta	Common
White-line Dart	Euxoa tritici	Common
Grey Dagger	Acronicta psi	Common
Lesser Swallow Prominent	Pheosia gnoma	Common
Barred Red	Hylaea fasciaria	Common
Common Footman	Eilema lurideola	Common
Yellow-tail	Euproctis similis	Common
Poplar Hawkmoth	Laothoe populi	Common
Oak Hooktip	Watsonalla binaria	Common
Dingy Footman	Eilema griseola	Common
Figure of Eighty	Tethea ocularis	Common
Common Wainscot	Mythimna pallens	Common
Lime-speck Pug	Eupithecia centaureata	Common
Iron Prominent	Notodonta dromedarius	Common
Pebble Hooktip	Drepana falcataria	Common
Orange Swift	Triodia sylvina	Common
Antler moth	Cerapteryx graminis	Common

Copper Underwing	Amphipyra pyramidea	Common
Brimstone	Opisthograptis luteolata	Common
Black Arches	Lymantria monacha	Local
Dogs Tooth	Lacanobia suasa	Local
Pebble Prominent	Notodonta ziczac	Common
Peacock moth	Macaria notata	Local
Square-spotted Clay	Xestia stigmatica	Nb
Heart and Club	Agrostis clavis	Common
Lesser Broad-bordered Yellow Underwing	Noctua janthe	Common
Pale Prominent	Pterostoma palpina	Common
Ear spp	a moth	N/A
Common Quaker	Orthosia cerasi	Common
White-point	Mythimna albipuncta	Recent Colonist
Straw Underwing	Thalpophila matura	Common
Gold Spot	Plusia festucae	Common
Common Rustic	Mesapamea secalis	Common
Drinker moth	Euthrix potatoria	Common
Bird Mocha	Cyclophora albipunctata	Local
Large Emerald	Geometra papilionaria	Common
Canary-shouldered Thorn	Ennomos alniaria	Common
Riband Wave	Idaea aversata	Common
Latticed Heath	Chiasmia clathrata	Common
Dusky Thorn	Ennomos fuscantaria	Common
Clouded Border	Lomaspilis marginata	Common
Beautiful Yellow Underwing	Anarta myrtilli	Common
Vines rustic	Hoplodrina ambigua	Common
Lesser Yellow underwing	Noctua comes	Common
Smoky Wainscot	Mythimna impura	Common
Rosy Rustic	Hydraecia micacea	Common
Crescent	Leucostigma leucostigma	Local
Light Emerald	Campaea margaritaria	Common
Scarce Bordered Straw	Helicoverpa armigera	Immigrant
Square-spot Rustic	Xestia xanthographa	Common
Hedge Rustic	Tholera cespitis	Common
Burnished Brass	Diachrysia chrysitis	Common
Yellow Belle	Aspitates ochrearia	Local
Brown China-mark	Elophila nymphaeata	Common
a micro moth	Lozotaeniodes formosana	Common
Ringed China-mark	Parapoynx stratiotata	Local
a micro moth	Synaphe punctalis	Local
Angle Shades	Phlogophora meticulosa	Common

Lunar Yellow Underwing	Noctua orbona	Nb
Dark Sword-grass	Agrotis ipsilon	Immigrant
Flounced Rustic	Luperina testacea	Common
Bright-line Brown-eye	Lacanobia oleracea	Common
Broad-bordered Yellow Underwing	Noctua fimbriata	Common
Six-striped Rustic	Xestia sexstrigata	Common
Silver Y	Autographa gamma	Immigrant
Rustic	Hoplodrina blanda	Common
Swallow Prominent	Pheosia tremula	Common
Archer's Dart	Agrostis vestigialis	Local
Yellow Shell	Camptogramma bilineata bilineata	Common
Feathered Gothic	Tholera decimalis	Common
National Status Totals:		
Common	68	
Local	12	
Recent Colonist	1	
Immigrant	3	
NB	2	
N/A	1	
Total:	87	

Leiston Common 2017 Grid ref: TM460634		
Species name:	**Latin name:**	**National status:**
Pine Hawkmoth	Sphinx pinastri	Local
Black Arches	Lymantria monacha	Local
Pebble Hooktip	Drepana falcataria	Common
White-line Dart	Euoxa tritici	Common
Latticed Heath	Chiasmia clathrata clathrata	Common
Light Emerald	Campaea margaritaria	Common
Dusky Thorn	Ennomos fuscantaria	Common
Swallow Prominent	Pheosia tremula	Common
Lesser Swallow Prominent	Pheosia gnoma	Common
White-point	Mythimna albipuncta	Recent colonist
Flame Shoulders	Ochropleura plecta	Common
Large Yellow Underwing	Noctua pronuba	Common
Iron Prominent	Notodonta dromedarius	Common
Setaceous Hebrew Character	Xestia c-nigrum	Common
Pale Prominent	Pterostoma palpina	Common
Uncertain	Hoplodrina octogenaria	Common
Straw Underwing	Thalpophila matura	Common
Nutmeg	Anarta trifolii	Common

Poplar Hawkmoth	Laothe populi	Common
Angle shades	Phlogophora meticulosa	Common
Vine's Rustic	Hoplodrina ambigua	Common
Oak Hooktip	Watsonalla binaria	Common
Archer's Dart	Agrotis vestigialis	Local
Brimstone moth	Opisthograptis luteolata	Common
Spectacle	Abrostola tripartita	Common
Hedge Rustic	Tholera cespitis	Common
Mouse Moth	Amphipyra tragopoginis	Common
Common Wainscot	Mythimna pallens	Common
Rush Veneer	Nomophila noctuella	Immigrant
Flounced Rustic	Luperina testacea	Common
Copper Underwing	Amphiprya pyramida	Common
Garden Dart	Xanthorhoe fluctuata	Common
Lesser Broad-bordered Yellow Underwing	Noctua janthe	Common
Rustic	Hoplodrina blanda	Common
Shuttle-shaped Dart	Agrotis puta puta	Common
Yellow Belle	Aspitates ochrearia	Local
Peacock Moth	Macaria notata	Common
National Status Totals:		
Common	31	
Local	4	
Immigrant	1	
Recent Colonist	1	
Total:	37	

Leiston Common 2017 Grid ref: TM460634		
Species name:	**Latin name:**	**National status:**
Pine Hawkmoth	Sphinx pinastri	Local
Black Arches	Lymantria monacha	Local
Pebble Hooktip	Drepana falcataria	Common
White-line Dart	Euoxa tritici	Common
Latticed Heath	Chiasmia clathrata clathrata	Common
Light Emerald	Campaea margaritaria	Common
Dusky Thorn	Ennomos fuscantaria	Common
Swallow Prominent	Pheosia tremula	Common
Lesser Swallow Prominent	Pheosia gnoma	Common
White-point	Mythimna albipuncta	Recent colonist
Flame Shoulders	Ochropleura plecta	Common
Large Yellow Underwing	Noctua pronuba	Common
Iron Prominent	Notodonta dromedarius	Common

Setaceous Hebrew Character	Xestia c-nigrum	Common
Pale Prominent	Pterostoma palpina	Common
Uncertain	Hoplodrina octogenaria	Common
Straw Underwing	Thalpophila matura	Common
Nutmeg	Anarta trifolii	Common
Poplar Hawkmoth	Laothe populi	Common
Angle shades	Phlogophora meticulosa	Common
Vine's Rustic	Hoplodrina ambigua	Common
Oak Hooktip	Watsonalla binaria	Common
Archer's Dart	Agrotis vestigialis	Local
Brimstone moth	Opisthograptis luteolata	Common
Spectacle	Abrostola tripartita	Common
Hedge Rustic	Tholera cespitis	Common
Mouse Moth	Amphipyra tragopoginis	Common
Common Wainscot	Mythimna pallens	Common
Rush Veneer	Nomophila noctuella	Immigrant
Flounced Rustic	Luperina testacea	Common
Copper Underwing	Amphiprya pyramida	Common
Garden Dart	Xanthorhoe fluctuata	Common
Lesser Broad-bordered Yellow Underwing	Noctua janthe	Common
Rustic	Hoplodrina blanda	Common
Shuttle-shaped Dart	Agrotis puta puta	Common
Yellow Belle	Aspitates ochrearia	Local
Peacock Moth	Macaria notata	Common
National Status Totals:		
Common	31	
Local	4	
Immigrant	1	
Recent Colonist	1	
Total:	37	

Saltmarsh corral 2017 grid ref: TM474651

Species name	**Latin name:**	**National status:**
White-line Dart	Euoxa tritici	Common
Mother of Pearl	Pleuroptya ruralis	Common
Flame Shoulders	Ochoropleura plecta	Common
Lesser Broad-bordered Yellow Underwing	Noctua jantha	Common
Straw Underwing	Thalpophila matura	Common
Rosy Rustic	Hydraecia micacea	Common
Uncertain	Hoplodrina octogenaria	Common
Archer's Dart	Agrotis vestigialis	Local

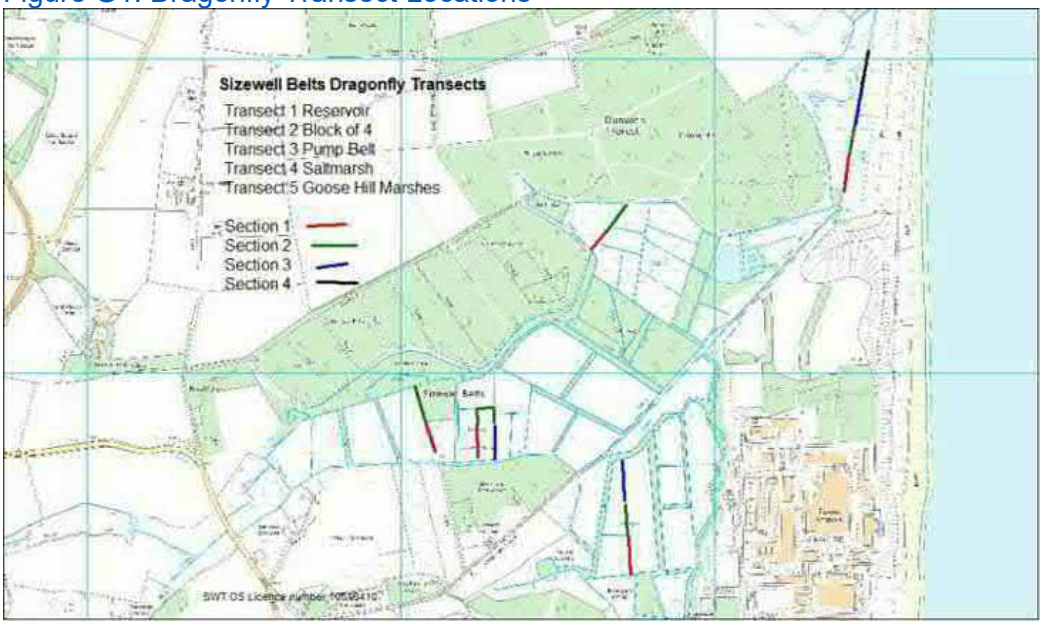
Dogs tooth	Lacanobia suasa	Local
Smoky Wainscot	Mythimna impura	Common
Vine's Rustic	Hoplodrina ambigua	Common
Setaceous Hebrew Character	Xestia c-nigrum	Common
Antler Moth	Cerapteryx graminis	Common
Hedge Rustic	Tholera cespitis	Common
Hummingbird Hawkmoth	Macroglossum stellatarum	Immigrant
Iron Prominent	Notodonta dromedarius	Common
Flounced Rustic	Luperina testacea	Common
Feathered Gothic	Tholera decimalis	Common
Latticed Heath	Chiasmia clathrata clathrata	Common
Square-spot Rustic	xestia xanthographa	Common
Orange Swift	Triodia sylvina	Common
Blood-vein	Timandra comae	Common
Chinese Character	Cilix glaucata	Common
Large Yellow Underwing	Noctua pronuba	Common
Scalloped Hooktip	Falcaria lacertinaria	Common
Six-striped Rustic	Xestia sexstrigata	Common
National Status Totals:		
Common	23	
Local	2	
Immigrant	1	
Total:	26	

Appendix G Dragonfly Data

Table G1 Dragonfly transect totals

Banded Demoiselle	52
Willow Emerald Damselfly	6
Emerald Damselfly	8
Azure Damselfly	1008
Variable Damselfly	10
Red-eyed Damselfly	42
Large red Damselfly	9
Common Blue Damselfly	129
Blue-tailed Damselfly	32
Southern Hawker	8
Brown Hawker	20
Norfolk Hawker	32
Migrant Hawker	3
Emperor Dragonfly	11
Hairy Dragonfly	1
Broad-bodied Chaser	1
Four-spotted Chaser	98
Black-tailed Skimmer	39
Ruddy Darter	184
Common Darter	54

Figure G1: Dragonfly Transect Locations



Appendix H Badger Pitfall Trap Data

Badger carcass pitfall traps							
	Grid ref: TM 45484 63533						
Common name:	**Latin name:**	**03/05/2017**	**05/05/2017**	**09/05/2017**	**10/05/2017**	**11/05/2017**	**Total:**
a groud beetle	Carabus granulatus	1	0	0	**0**	0	**1**
a carrion beetle	Thanatophilus rugosus	3	0	2	2	4	**11**
a rove beetle	Philonthus spp	1	0	0	0	1	**2**
a carrion beetle	Thanatophilus sinuatus	0	2	0	3	11	**16**
a carrion beetle	Oiceoptoma thoracicium	0	2	0	0	1	**3**
a carrion beetle	Nicrophorus humator	0	0	1	0	0	**1**
	Time after badger death:	Day 2	Day 4	Day 8	Day 9	Day 10	

SIZEWELL C DEVELOPMENT – MAIN DEVELOPMENT SITE: VOLUME 2, CHAPTER 14, APPENDIX 14A8 – Bats:

Documents included within this Annex group are as follows:

- **ANNEX 14A8.6 - PRIMARY DATA**

- Annex 14A8.6 Sizewell B Relocated Facilities Bat and Badger Technical Note [CONFIDENTIAL]
- Annex 14A8.6 Sizewell B Relocated Facilities Bat Re-entry Emergence Survey 2019 Technical Note
- Annex 14A8.6 Bat Radio Tracking Drawings February 2016
- Annex 14A8.6 Bat Radio Tracking Report May 2016
- Annex 14A8.6 Automated Bat Detector Monitoring Report 2013-2014
- Annex 14A8.6 Automated Bat Detector Monitoring Report 2013-2014 Figures
- Annex 14A8.6 Sizewell C Sandpits Technical Note [CONFIDENTIAL]

Sizewell B Relocated Facilities Bat and Badger Technical Note [CONFIDENTIAL]

This report contains confidential information. Therefore this document is only available on request to those who have a legitimate need to view the information.

Sizewell B Relocated Facilities – Bat Building Re-entry / Emergence Surveys 2019 Technical Note

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1.1 EDF Energy Nuclear Generation Limited, herein referred to as EDF Energy (NGL), submitted a planning application to East Suffolk Council (ESC) for the demolition and relocation of a number of existing facilities at Sizewell B nuclear power station (known as the Sizewell B Relocated Facilities Project and herein referred to as the Proposed Development) in April 2019 (DC/19/163/FUL). The facilities that would be relocated, demolished or replaced are ancillary to the process of electricity generation and have a broad range of functions, including industrial (within the Nuclear Licenced Site), workplace, education, cultural and infrastructure.

1.1.2 EDF Energy commissioned Arcadis Consulting (UK) Limited (Arcadis) to complete bat emergence surveys at four buildings as part of the proposed development. The purpose of the surveys was to determine the presence or absence of roosting bats within buildings identified as having potential to support roosting bats during the bat building inspections previously carried out by Arcadis, as described in the Sizewell B Relocated Facilities – Bat and Badger March 2019 Survey Technical Note (Ref. 1).

1.1.3 This Technical Note provides the results of the bat building emergence surveys within the Sizewell B Relocated Facilities site boundary (referred to as the Site throughout this technical note) and provides recommendations for further surveys and appropriate ecological mitigation to minimise any construction programme risk. Please see **Appendix A** for the site boundary and **Figure 1** for the location of the buildings surveyed.

2 PREVIOUS INFORMATION

2.1.1 Arcadis were commissioned in March 2019 to undertake internal (where access was possible) and external bat building inspections within the Site boundary, to assess their suitability to support roosting bats. Of the buildings surveyed, three buildings (Buildings 3, 4, and 12; see **Figure 1**) were assessed as having low potential to support roosting bats and Building 6.3 (see **Figure 1**) was confirmed as a common pipistrelle (*Pipistrellus pipistrellus*) roost. These buildings were recommended for further surveys. The results of the March 2019 survey can be found within the Sizewell B Relocated Facilities – Bat and Badger March 2019 Survey Technical Note (Ref. 1).

3 METHODOLOGY

3.1 Bat re-entry/emergence surveys

3.1.1 Dusk emergence surveys were undertaken for all buildings (Buildings 3, 4, 6.3 and 12) in accordance with best practice guidelines published by the Bat

Conservation Trust (Ref. 2), during the week commencing 15 July 2019 (Survey 1). Additional surveys in the weeks commencing 5 August (Survey 2) and 2 September 2019 (Survey 3) were undertaken on those buildings confirmed as supporting roosting bats during Survey 1 (Buildings 4 and 6.3 only).

3.1.2 Surveys were carried out by teams of experienced bat surveyors. Surveyors were positioned outside each building in locations that ensured optimal coverage of any identified potential bat access features. Each survey was undertaken by between three and four surveyors, depending on the number of surveyors required to appropriately cover the target building and associated features. Full spectrum Pettersson (D-240x handheld) bat detectors were used and the recording subsequently identified using associated software (BatSound). Roland R-05 digital voice recorders were used to record any bat echolocation calls and surveyor commentary for bat activity seen.

3.1.3 Emergence surveys commenced fifteen minutes before sunset and continued for one and a half hours after sunset. The re-entry surveys commenced two hours before sunrise and continued for fifteen minutes after sunrise. Survey dates, times, weather conditions and surveyor numbers are detailed in **Appendix B**.

3.2 Limitations

3.2.1 All surveys were undertaken in suitable conditions at an appropriate time of the year and as such, no limitations were identified.

4 RESULTS AND DISCUSSION

4.1 Bat re-entry/emergence surveys

4.1.1 A summary of the results of the re-entry/emergence surveys for each building are provided within **Table 4.1**Error! Reference source not found. and on **Figure 1**.

Table 4.1: Bat Re-entry/Emergence Survey Results

Building Number	Building Name	Overall re-entry emergence survey results		
		Survey 1 W/c 15 July 2019	Survey 2 W/c 5 August 2019	Survey 3 W/c 2 September 2019
3	Temporary Visitors' Centre	No bats were recorded emerging from the building.	Not surveyed.	Not surveyed.

Building Number	Building Name	Overall re-entry emergence survey results		
		Survey 1 W/c 15 July 2019	Survey 2 W/c 5 August 2019	Survey 3 W/c 2 September 2019
4	Operations Training Centre	Emergence of one bat, species unknown.	Re-entry of one bat, species unknown.	No bat emergence recorded.
6.3	Civils Workshop & Store (Civils workshop)	Seven bats (common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*)) were recorded emerging Eight bats (four common pipistrelle, one soprano pipistrelle and three unidentified species of bats) were recorded emerging.	Two bats (one common pipistrelle and one unidentified species) were recording entering the building.	Nine bats (three soprano pipistrelle and six unidentified species) were recorded emerging. There was general foraging observed within the area.
12	Technical Training Centre	No bats were recorded emerging from the building. One common pipistrelle recorded foraging in the area.	Not surveyed.	Not surveyed.

4.1.2 Further details of the specific survey results for each building are provided in the subsequent sections.

4.2 Building 3 – Temporary Visitors Centre

4.2.1 Only one survey was conducted for this building (Survey 1). No bats were recorded emerging from Building 3. Foraging activity was recorded along the hedge, north of the Building 3, throughout the survey.

4.3 Building 4 – Operations Training Centre

4.3.1 Building 4 was found to support a bat roost.

4.3.2 During Survey 1, a single bat was observed emerging from the eastern aspect of the building from a small gap above a pillar towards the south-east corner. Identification of the species was not possible as the bat did not echolocate as it emerged from the building.

4.3.3 During Survey 2, a single bat was observed entering the building in the same area as the emergence recorded on survey 1. Identification of the species was not possible as the bat did not echolocate as it emerged from the building.

4.3.4 During Survey 3, no bats were recorded entering the building.

4.4 Building 6.3 - Civils Workshop and Store (Civils Workshop)

4.4.1 Building 6.3 (confirmed in March 2019 to be a common pipistrelle roost) was found to support a small roost of common pipistrelle and soprano pipistrelle.

4.4.2 During Survey 1, seven bats were observed emerging from the civils workshop and store:

- three bats (common pipistrelle and soprano pipistrelle) were observed emerging from between the wooden soffits and the brick work on the south-east corner of the building;
- three common pipistrelle were observed emerging from the northern aspect of the building towards the north-east corner of the building; and
- one (species unknown) was observed emerging from under facia boards on the north-west corner of the building. Identification of the species was not possible as the bat did not echolocate as it emerged from the building.

4.4.3 During Survey 2, two bats were observed entering the civils workshop and store:

- one common pipistrelle was observed entering the building via an open window on the north-west of the building; and
- one common pipistrelle was observed entering the eaves of the extension on the northern elevation.

4.4.4 During Survey 3, nine bats were observed emerging from the civils workshop and store:

- one soprano pipistrelle was observed emerging from a gap under the fascia boards on the north-west of the building; and
- three bats (one soprano pipistrelle and two unidentified species) were observed emerging from a gap between the fascias and brickwork on the west side of the building. Identification of the species was not

possible as the bat did not echolocate as it emerged from the building; and

- one unidentified bat species was observed emerging from a gap above a door in a small porch pm the south side of the building. Identification of the species was not possible as the bat did not echolocate as it emerged from the building; and
- two bats (one soprano pipistrelle and one unidentified species) were observed emerging from a gap under the fascia boards on the east side of the building. Identification of the species was not possible as the bat did not echolocate as it emerged from the building; and
- two unidentified bats were observed emerging from the north side of the building. One bat was observed emerging from a gap between the fascia and brickwork and one bat was observed emerging from a gap between the fascia and a door. Identification of the species was not possible as the bat did not echolocate as it emerged from the building.

4.5 Building 12 – Technical Training Centre

4.5.1 Only one survey was conducted for this building (Survey 1). No bats were recorded emerging from Building 12. Common pipistrelle foraging activity was recorded within the vicinity of Building 12 throughout the survey.

5 DISCUSSION AND RECOMMENDATIONS

5.1.1 Building 4 (Operations Training Centre) is confirmed as supporting a common pipistrelle roost and Building 6.3 (Civils Workshop and Store (Civils Workshop)) is confirmed as supporting a common pipistrelle and soprano pipistrelle roost. These roosts will be directly impacted as a result of the proposed development.

5.1.2 Works to demolish Buildings 4 and 6.3 will require a development licence from Natural England. The licence application is to include a detailed method statement which will set out the activities to be carried out under the licence to minimise the risk of bats being harmed during demolition works. Planning consent must be obtained before an application can be submitted. It can take at least six weeks for Natural England to process a licence application and works are likely to be restricted to periods outside of critical stages in the bat lifecycle (e.g. breeding and hibernating).

5.1.3 Specific mitigation details are to be included within the detailed method statement that will accompany the licence application. These will include:

- replacement roost habitat in the form of bat boxes mounted on suitable retained trees or buildings within the Site or surrounding area under EDF Energy (NGL) control;
- demolition works will be undertaken outside of the active bat season (March – April inclusive) and the hibernation season (October – November inclusive);
- a suitably qualified and licenced Ecological Clerk of Works (ECoW) will be present on site to supervise the demolitions works; and
- to avoid disturbance to nocturnal wildlife including foraging and commuting bats, night-time working will be kept to a minimum. Construction working hours will be 07:00 to 19:00 Monday to Saturday with the exception of those activities (e.g. continuous concrete pouring and steelworks) which would require 24-hour working; however, 24-hour activity would be minimal and the avoidance of night-time working for the majority of the programme will be beneficial to nocturnal animals such as bats;
- temporary lighting would be shielded and directed away from landscape features such as trees and woodland to prevent light spill.

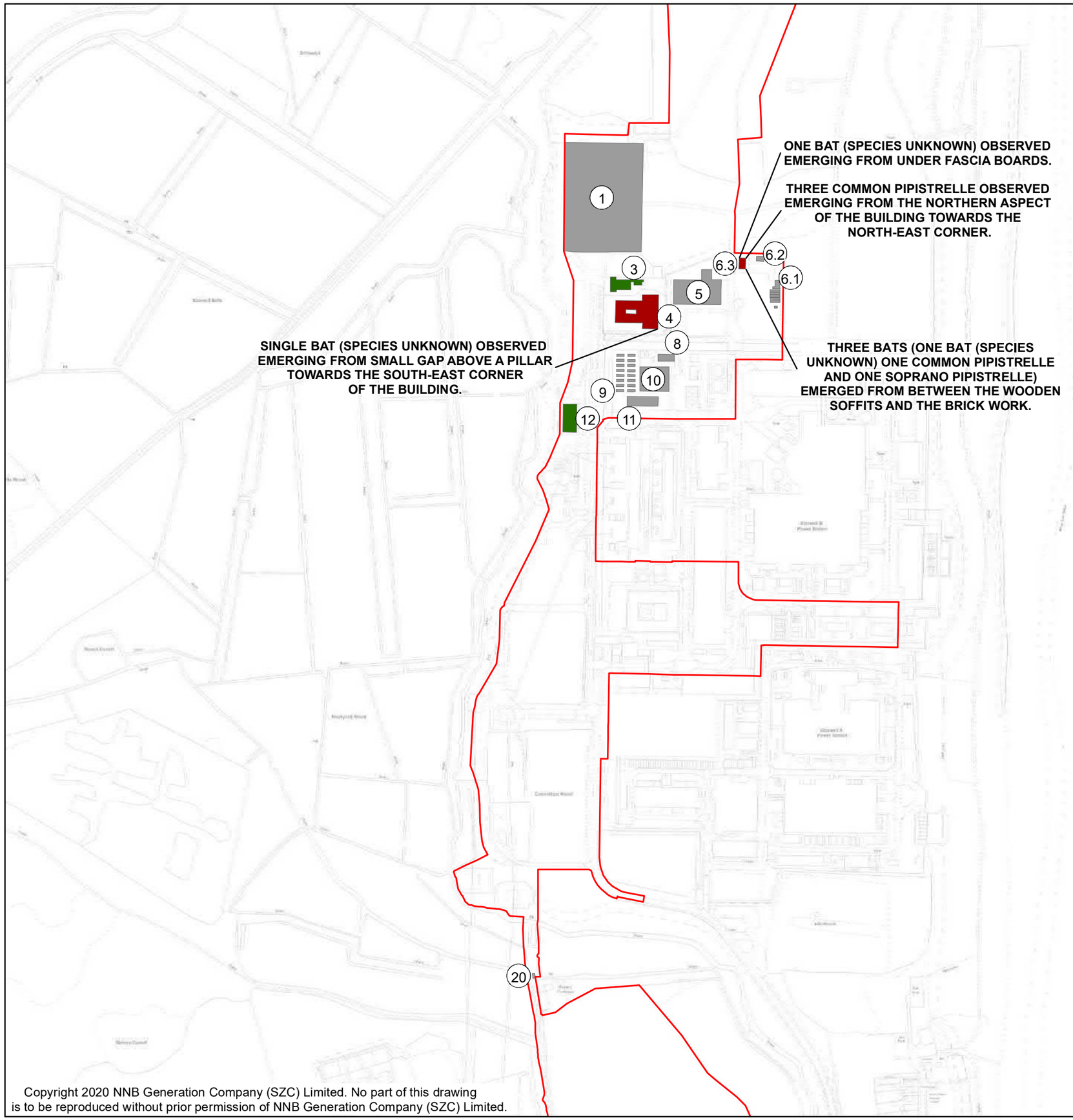
6 REFERENCE

Ref. 1 Arcadis UK Consulting. 2019. Sizewell B Relocated Facilities – Bat and Badger March 2019 Survey Technical Note

Ref. 2 Collins, J. (ed.). 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

FIGURES

FIGURE 1 – BAT EMERGENCE SURVEY RESULTS



NOTES

IN JULY 2019, ONLY BUILDINGS 3, 4, 6.3 AND 12 WERE SURVEYED BASED, ON MARCH 2019 SURVEY RESULTS. ALL OTHER BUILDING BAT POTENTIAL CLASSIFICATION COMES FROM THE MARCH 2019 SURVEY RESULTS, REPORTED IN SIZEWELL B RELOCATED FACILITIES BAT AND BADGER MARCH 2019 SURVEY TECHNICAL NOTE.
IN AUGUST AND SEPTEMBER 2019, ONLY BUILDINGS 4 AND 6.3 WERE SURVEYED, BASED ON THE RESULTS OF THE JULY 2019 SURVEY. SEE SUPPORTING REPORT, SIZEWELL B RELOCATED FACILITIES BAT BUILDING EMERGENCE SURVEYS 2019 TECHNICAL NOTE, FOR FURTHER DETAILS.

KEY

- SIZEWELL B RELOCATED FACILITIES SITE BOUNDARY
- BUILDING WITH CONFIRMED ROOST
- BUILDING WITH LOW BAT ROOST POTENTIAL
- BUILDING WITH NEGLIGIBLE BAT ROOST POTENTIAL

NOT PROTECTIVELY MARKED

DOCUMENT:
BAT BUILDING RE-ENTRY/ EMERGENCE SURVEY 2019 Technical Note

DRAWING TITLE:
BAT BUILDING RE-ENTRY/ EMERGENCE SURVEY RESULTS 2019

SHEET 1 OF 3 - JULY 2019

DRAWING NO:
FIGURE 1

DATE:	DRAWN:	SCALE :
SEPT 2019	R.M.	1:5,000 @A3

SCALE BAR
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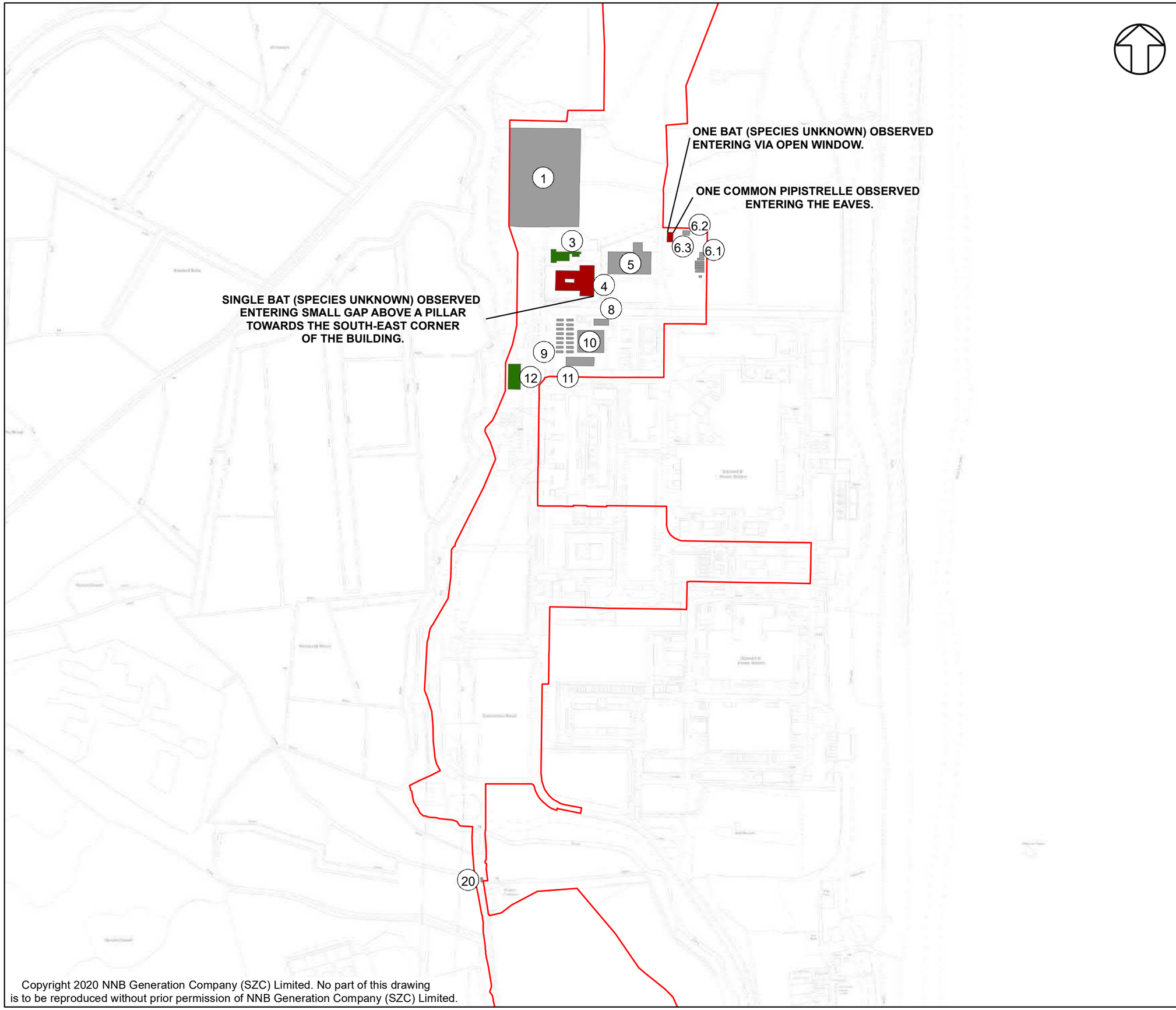

NOTES

IN JULY 2019, ONLY BUILDINGS 3, 4, 6.3 AND 12 WERE SURVEYED BASED, ON MARCH 2019 SURVEY RESULTS. ALL OTHER BUILDING BAT POTENTIAL CLASSIFICATION COMES FROM THE MARCH 2019 SURVEY RESULTS, REPORTED IN SIZEWELL B RELOCATED FACILITIES BAT AND BADGER MARCH 2019 SURVEY TECHNICAL NOTE.
IN AUGUST AND SEPTEMBER 2019, ONLY BUILDINGS 4 AND 6.3 WERE SURVEYED, BASED ON THE RESULTS OF THE JULY 2019 SURVEY. SEE SUPPORTING REPORT, SIZEWELL B RELOCATED FACILITIES BAT BUILDING EMERGENCE SURVEYS 2019 TECHNICAL NOTE, FOR FURTHER DETAILS.

KEY

- SIZEWELL B RELOCATED FACILITIES SITE BOUNDARY
- BUILDING WITH CONFIRMED ROOST
- BUILDING WITH LOW BAT ROOST POTENTIAL
- BUILDING WITH NEGLIGIBLE BAT ROOST POTENTIAL

NOT PROTECTIVELY MARKED

DOCUMENT:
BAT BUILDING RE-ENTRY/
EMERGENCE SURVEY 2019
Technical Note

DRAWING TITLE:
BAT BUILDING RE-ENTRY/
EMERGENCE SURVEY RESULTS 2019

SHEET 2 OF 3 - AUGUST 2019

DRAWING NO:
FIGURE 1

DATE:	DRAWN:	SCALE :
SEPT 2019	R.M.	1:5,000 @A3

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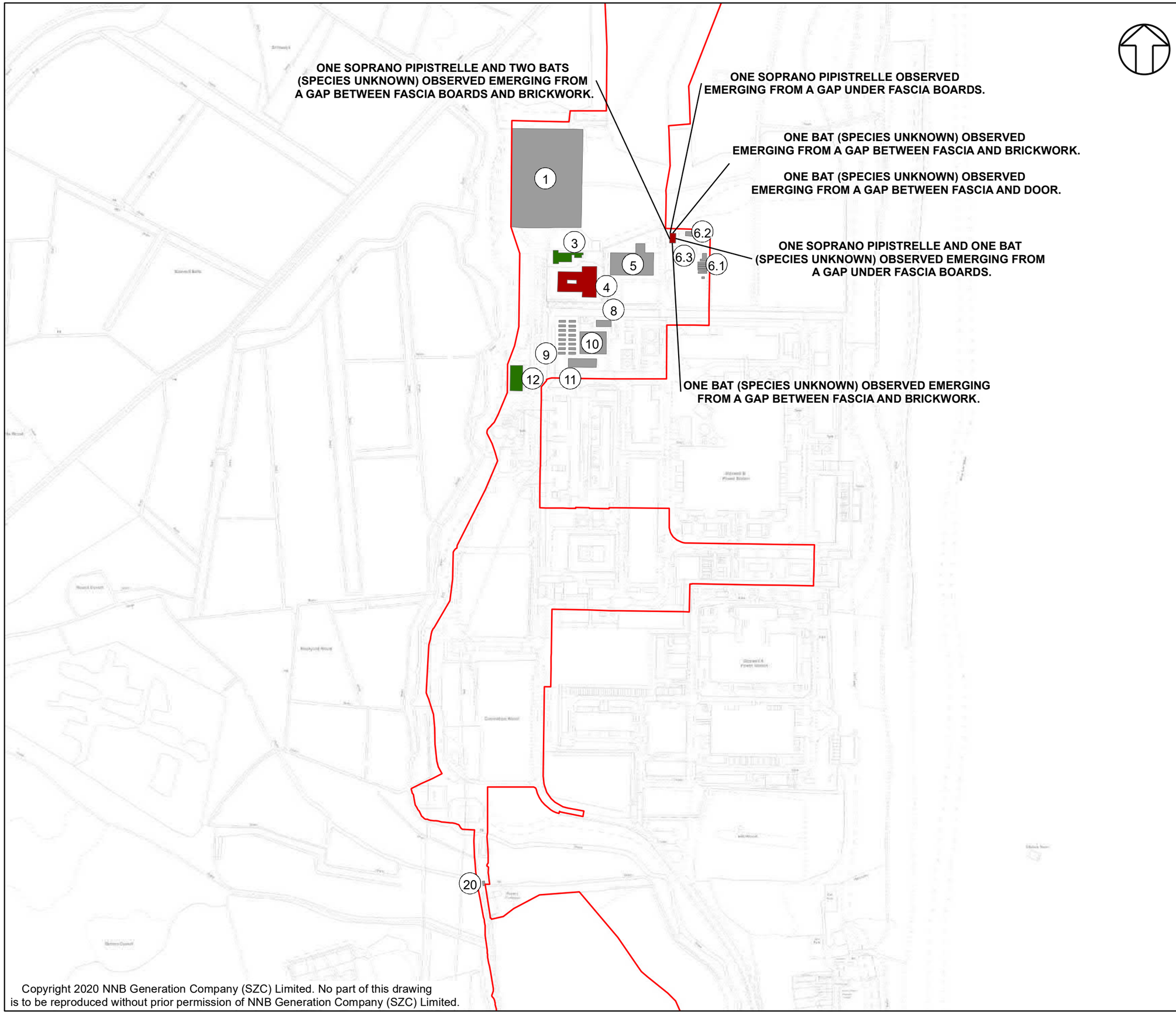


NOTES

IN JULY 2019, ONLY BUILDINGS 3, 4, 6.3 AND 12 WERE SURVEYED BASED, ON MARCH 2019 SURVEY RESULTS. ALL OTHER BUILDING BAT POTENTIAL CLASSIFICATION COMES FROM THE MARCH 2019 SURVEY RESULTS, REPORTED IN SIZEWELL B RELOCATED FACILITIES BAT AND BADGER MARCH 2019 SURVEY TECHNICAL NOTE.
IN AUGUST AND SEPTEMBER 2019, ONLY BUILDINGS 4 AND 6.3 WERE SURVEYED, BASED ON THE RESULTS OF THE JULY 2019 SURVEY. SEE SUPPORTING REPORT, SIZEWELL B RELOCATED FACILITIES BAT BUILDING EMERGENCE SURVEYS 2019 TECHNICAL NOTE, FOR FURTHER DETAILS.

KEY

- SIZEWELL B RELOCATED FACILITIES SITE BOUNDARY
- BUILDING WITH CONFIRMED ROOST
- BUILDING WITH LOW BAT ROOST POTENTIAL
- BUILDING WITH NEGLIGIBLE BAT ROOST POTENTIAL

NOT PROTECTIVELY MARKED

DOCUMENT:
BAT BUILDING RE-ENTRY/ EMERGENCE SURVEY 2019 Technical Note

DRAWING TITLE:
BAT BUILDING RE-ENTRY/ EMERGENCE SURVEY RESULTS 2019

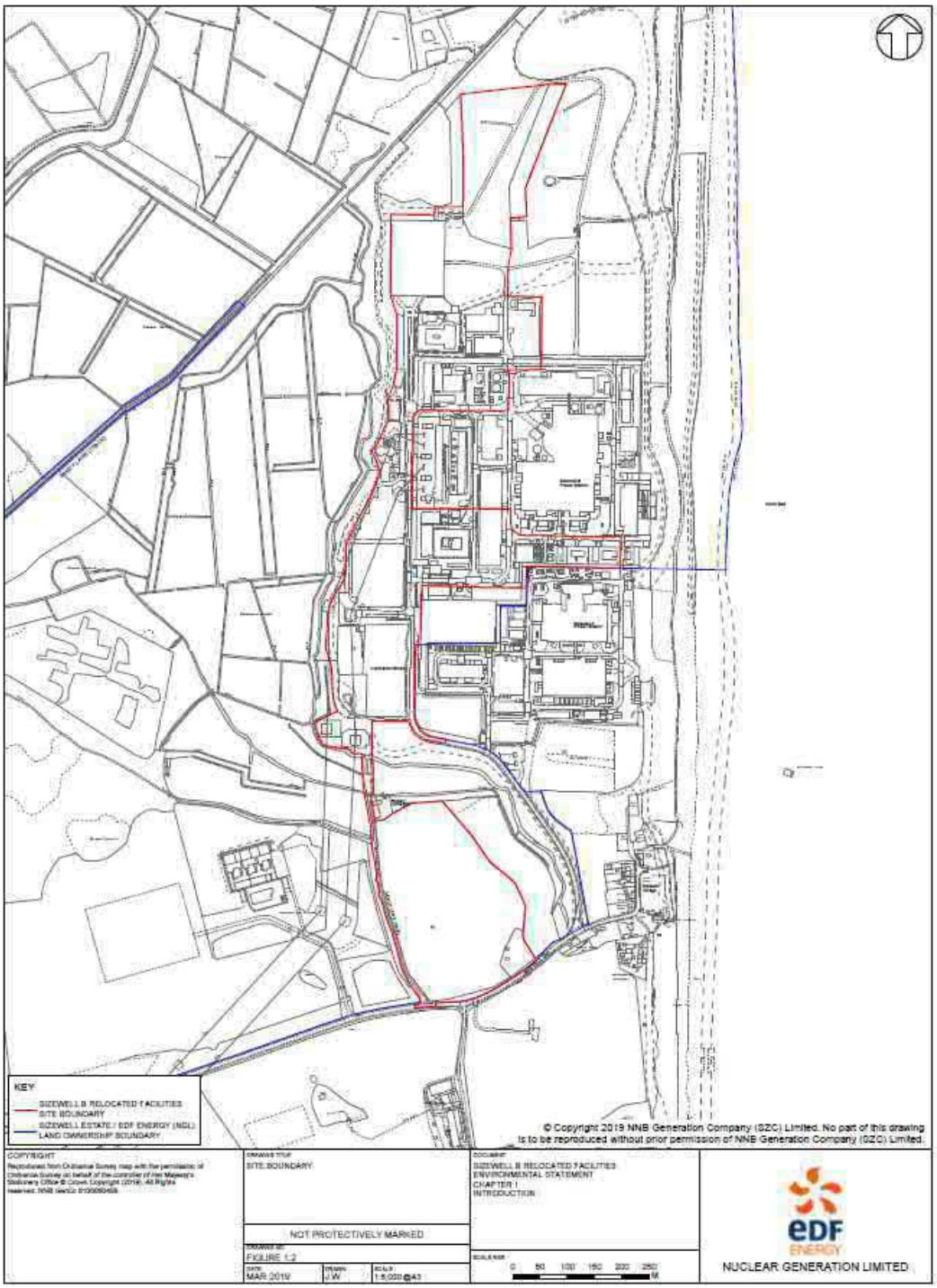
SHEET 3 OF 3 - SEPTEMBER 2019

DRAWING NO:
FIGURE 1

DATE:	DRAWN:	SCALE :
SEPT 2019	R.M.	1:5,000 @A3

SCALE BAR
0 50 100 150 200 250 M

APPENDIX A: SITE BOUNDARY (ES FIGURE)



APPENDIX B: BAT RE-ENTRY/EMERGENCE SURVEY INFORMATION

Surveys w/c 15 July 2019 (emergency surveys)

Building Number	Building Name	Date of survey	Sunset time	Number of surveyors	Weather conditions
3	Temporary Visitors' Centre	15/07/2019	21.08	3	Dry and clear, 16 C, no breeze.
4	Operations Training Centre	17/07/2019	21.06	4	Overcast, 16 C, light breeze, no rain.at the start of the survey, very light rain towards the end of the survey.
6.3	Civils Workshop & Store (Civils workshop)	18/07/2019	21.05	3	Dry, warm, 17 C and cloudy.
12	Technical Training Centre	16/07/2019	21.07	2	Dry, cloudy, light breeze.

Surveys w/c 5 August 2019 (re-entry surveys)

Building Number	Building Name	Date of survey	Sunrise time	Number of surveyors	Weather conditions
4	Operations Training Centre	07/08/2019	05:24	3	Clear, 16 C, slight breeze, and dry.
6.3	Civils Workshop & Store (Civils workshop)	08/08/2019	05:26	3	Dry, 14 C slight breeze, and clear.

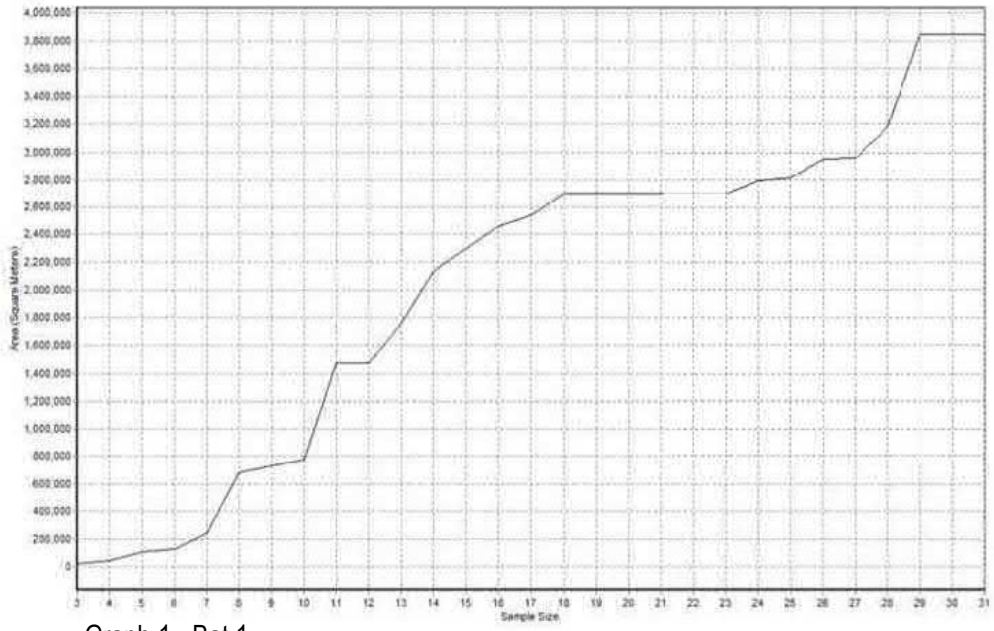
Surveys w/c 2 September 2019 (re-entry/emergence surveys)

Building Number	Building Name	Date of surveys	Sunrise/ sunset time	Number of surveyors	Weather conditions
4	Operations Training Centre	05/09/2019	06:11	4	Clear, 15 C, slight breeze, and dry.
6.3	Civils Workshop & Store (Civils workshop)	05/09/2019	19:33	3	Clear, 15 C, light breeze, and dry.

Appendix 1 - Weather data: all readings taken at or near 10am BST

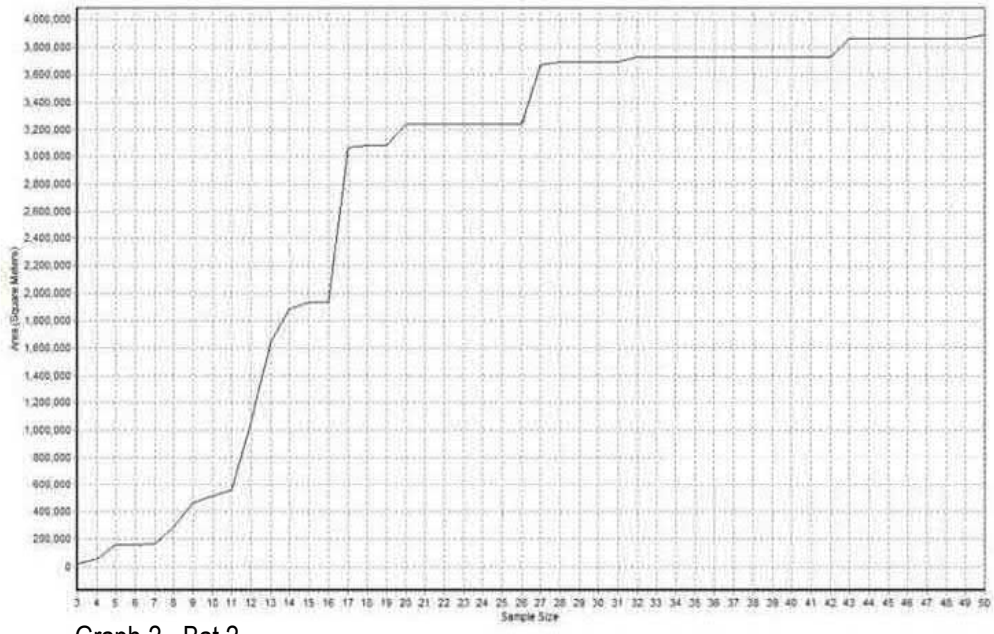
Date	Max	Min	Wind dir	W. speed mph (very approximate)	Rainfall mm
9/8/14	21.2	13.0	W	13	14.2
10/8/14	22.7	14.3	S	19	15.8
11/8/14	21.4	12.4	SW	24	2.9
12/8/14	21.3	12.0	W	19	2.0
13/8/14	No obs	No obs	No obs	No observer	No observer
14/8/14	22.1	11.7	SW	5	0.1
15/8/14	20.0	11.7	N	10	8.0
16/8/14	19.2	11.4	WSW	13	3.9
17/8/14	19.9	14.4	W	19	0
18/8/14	21.0	11.5	W	13	0
19/8/14	18.2	10.2	NW	13	Trace
20/8/14	No obs	No obs	No obs	No observer	No observer
21/8/14	19.1	7.5	SW	10	0
22/8/14	18.8	11.5	W	5	trace

Graphs 1 - 13 Asymptotes of radio-tracking data of female barbastelle bats in 2014



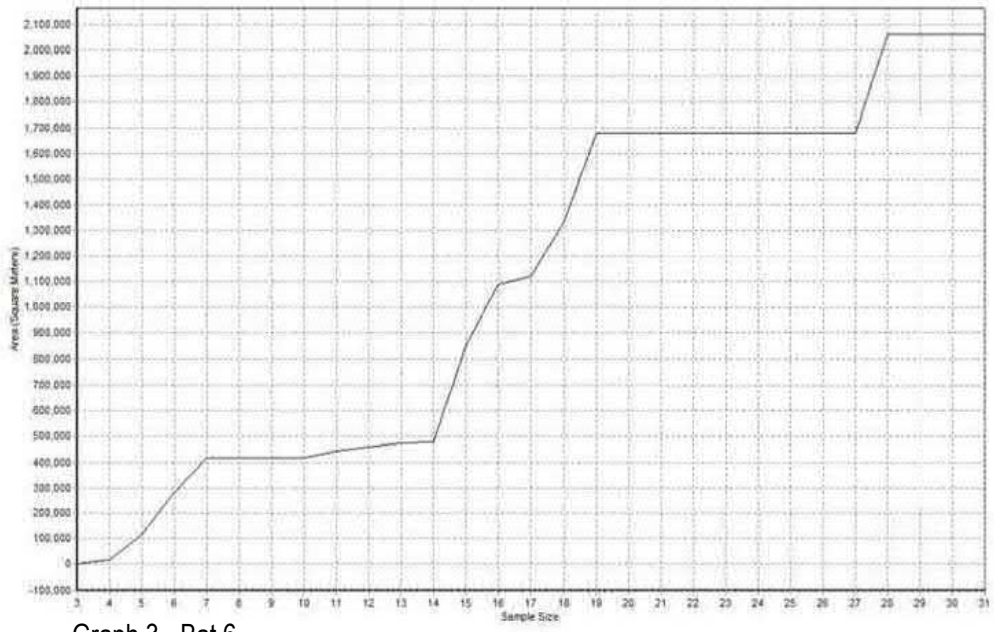
Number of bearings achieved = 81

Graph 1 - Bat 1



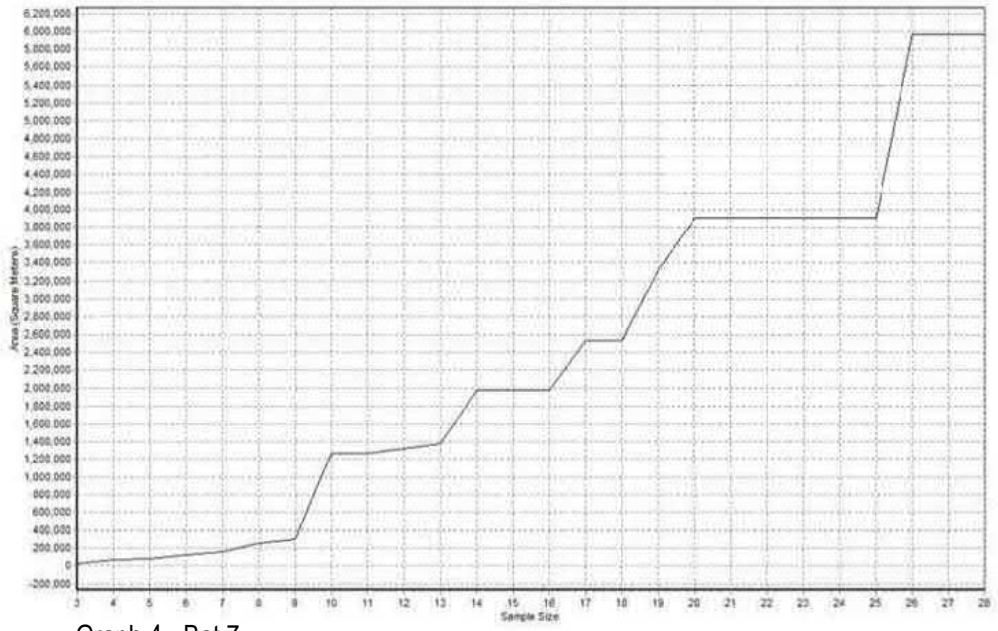
Number of achieved = 123

Graph 2 - Bat 2



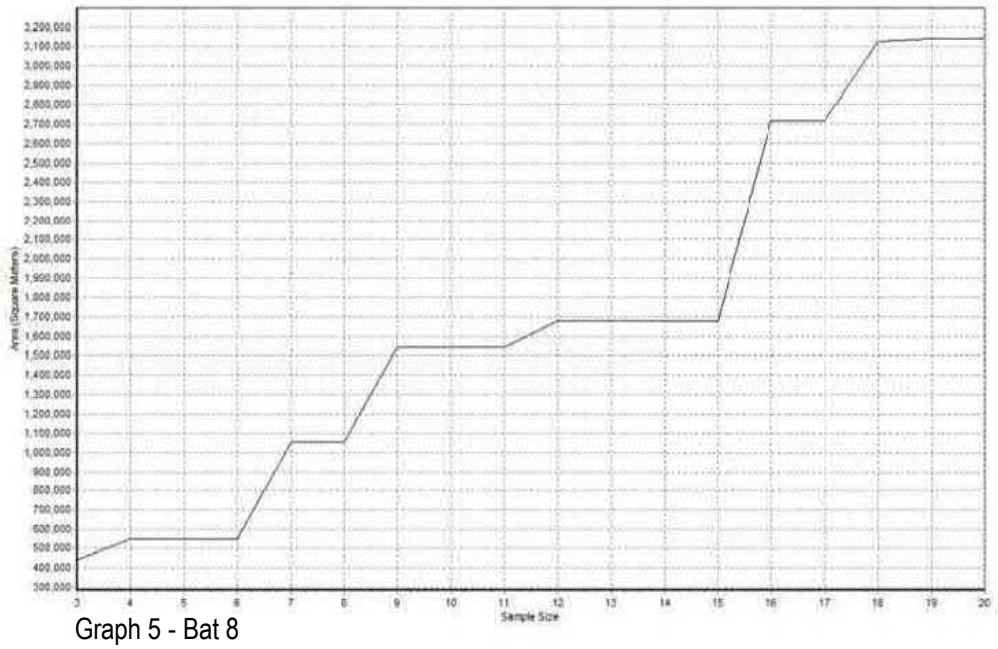
Number of bearings achieved = 89

Graph 3 - Bat 6



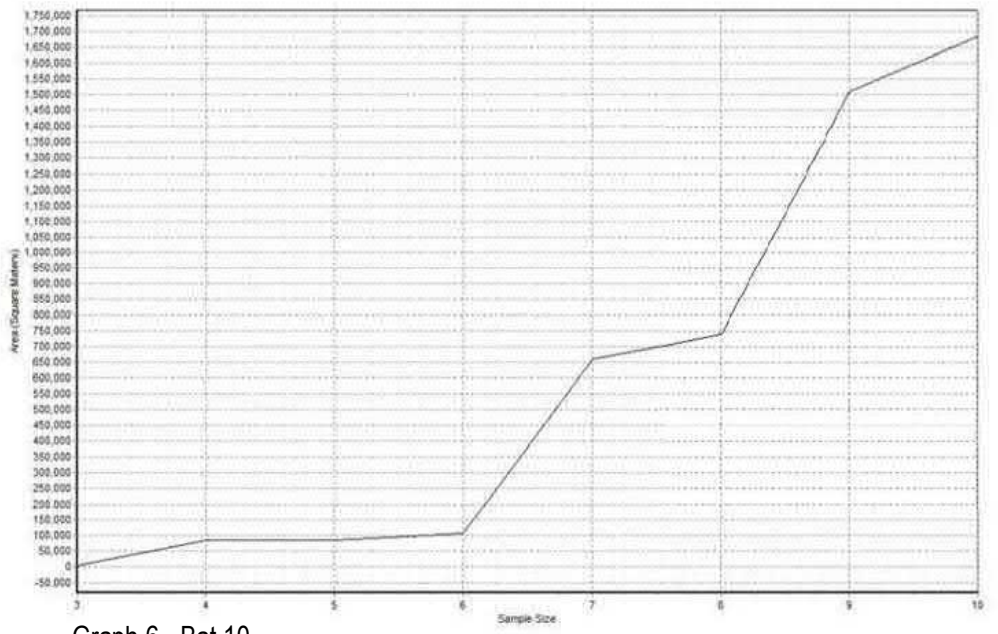
Number of bearings achieved = 78

Graph 4 - Bat 7



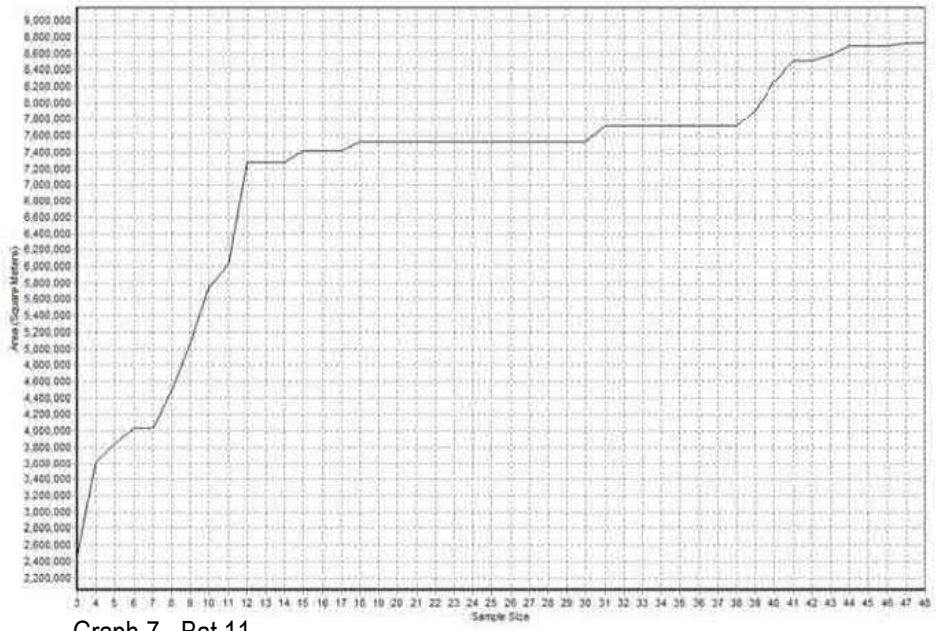
Number of bearings achieved = 45

Graph 5 - Bat 8



Number of bearings achieved = 17

Graph 6 - Bat 10

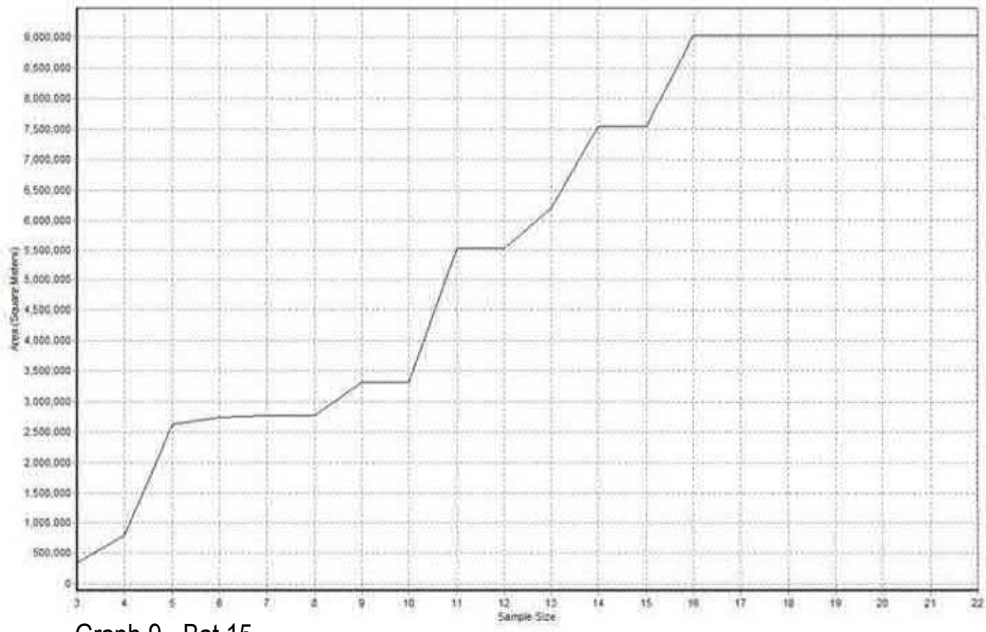


Number of bearings achieved = 94

Graph 7 - Bat 11

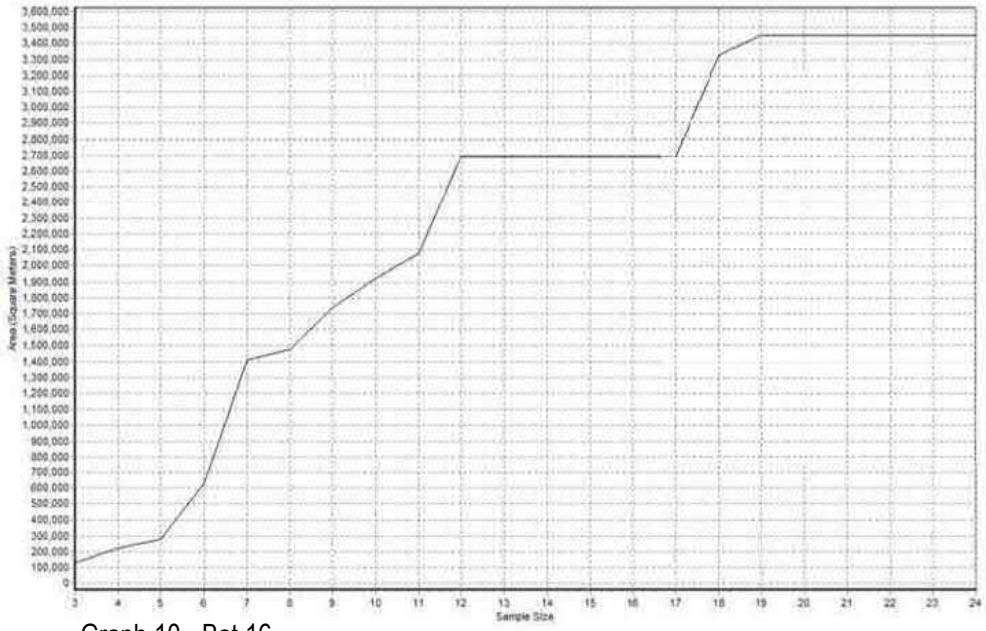
Number of bearings achieved = 78

Graph 8 - Bat 13



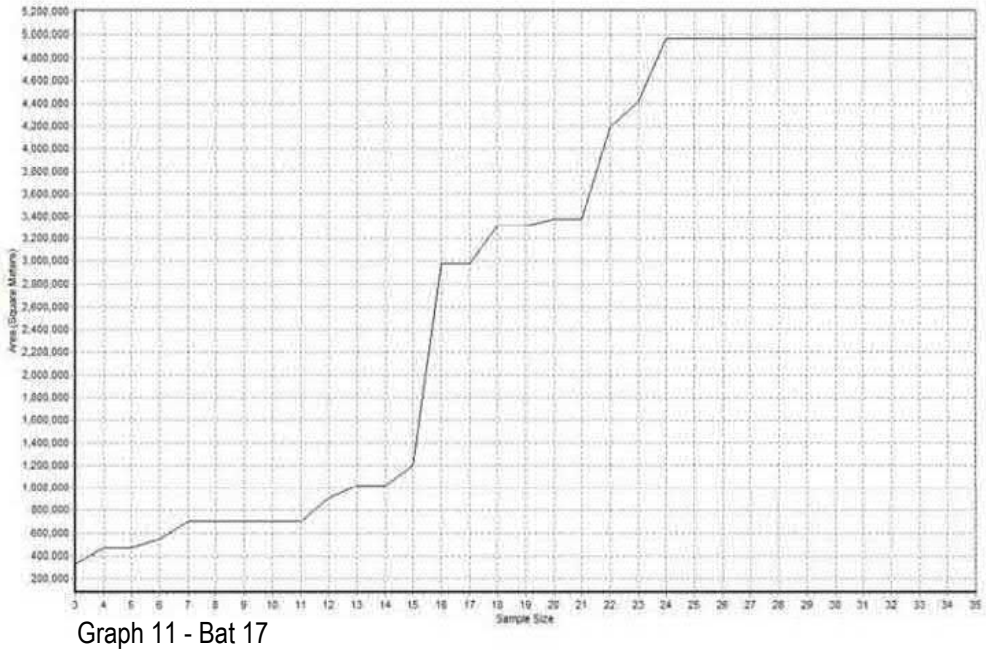
Number of bearings achieved = 53

Graph 9 - Bat 15



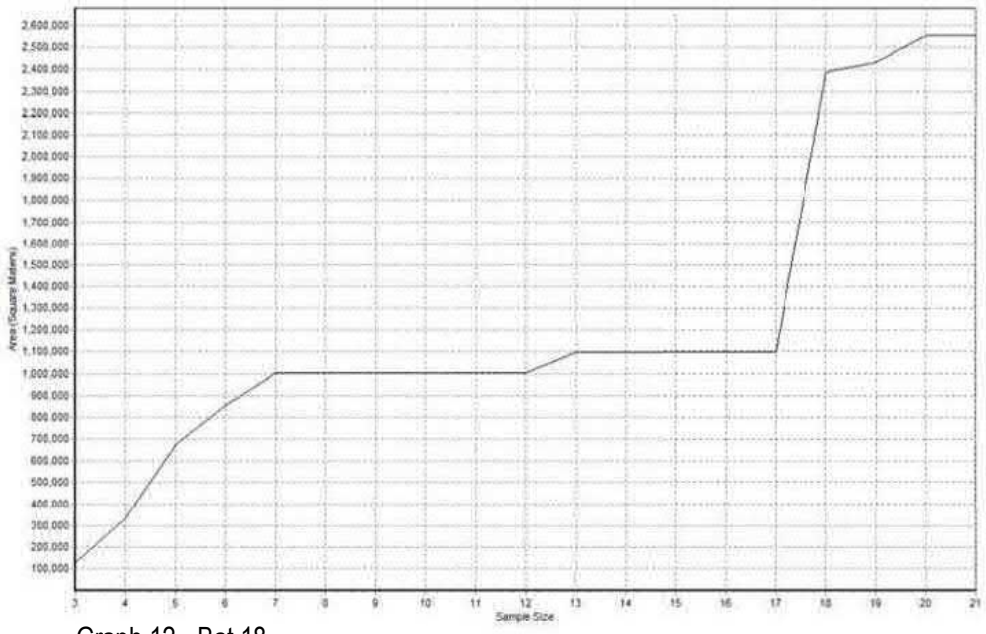
Number of bearings achieved = 68

Graph 10 - Bat 16



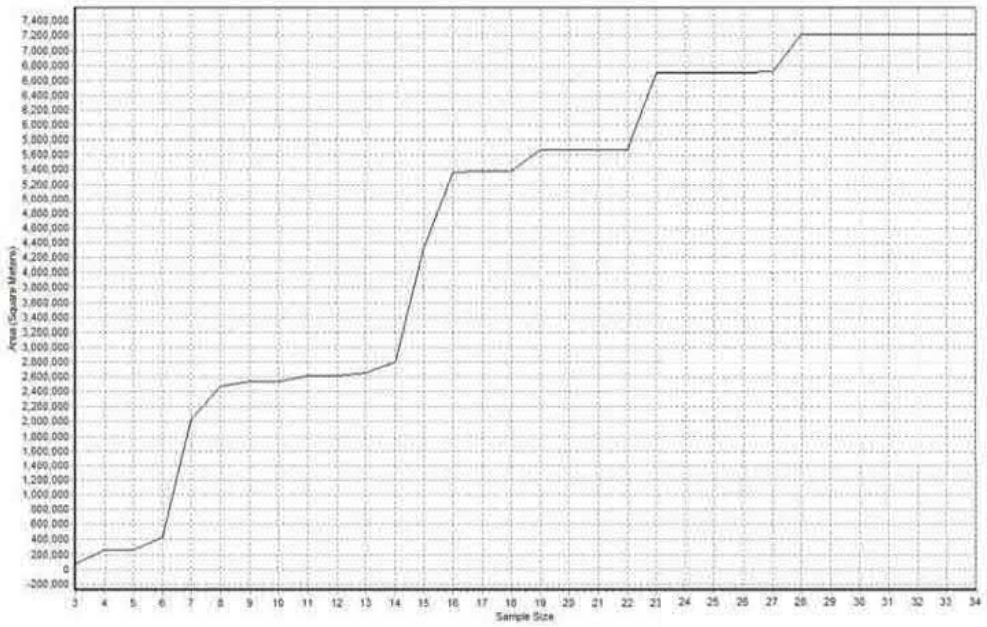
Number of bearings achieved = 98

Graph 11 - Bat 17



Number of bearings achieved = 75

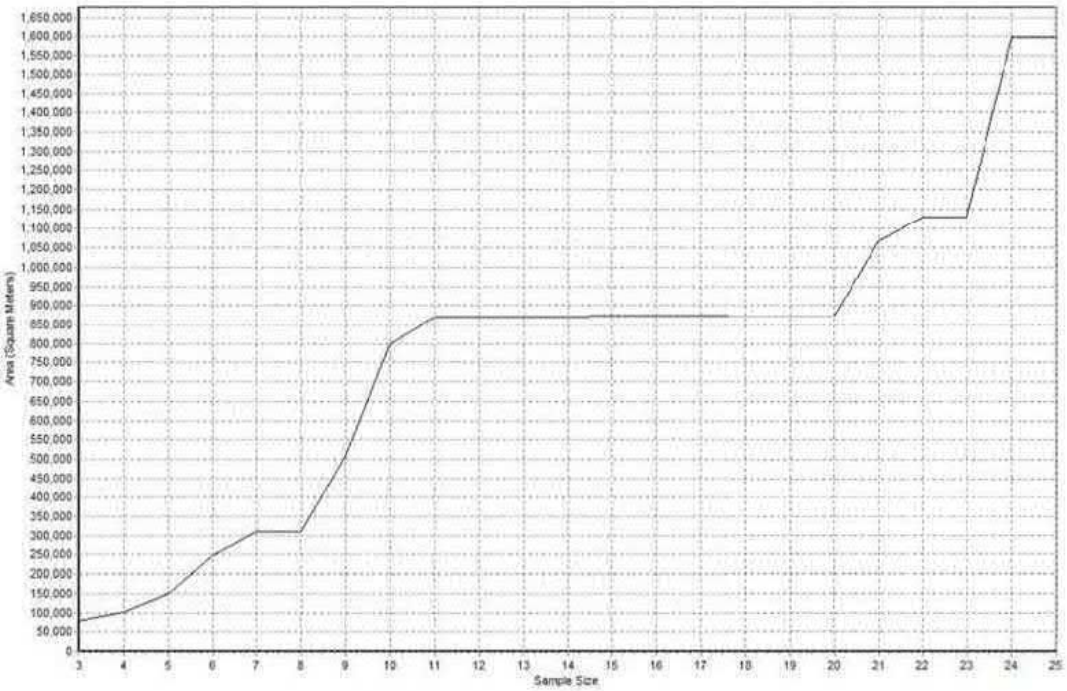
Graph 12 - Bat 18



Number of bearings achieved = 97

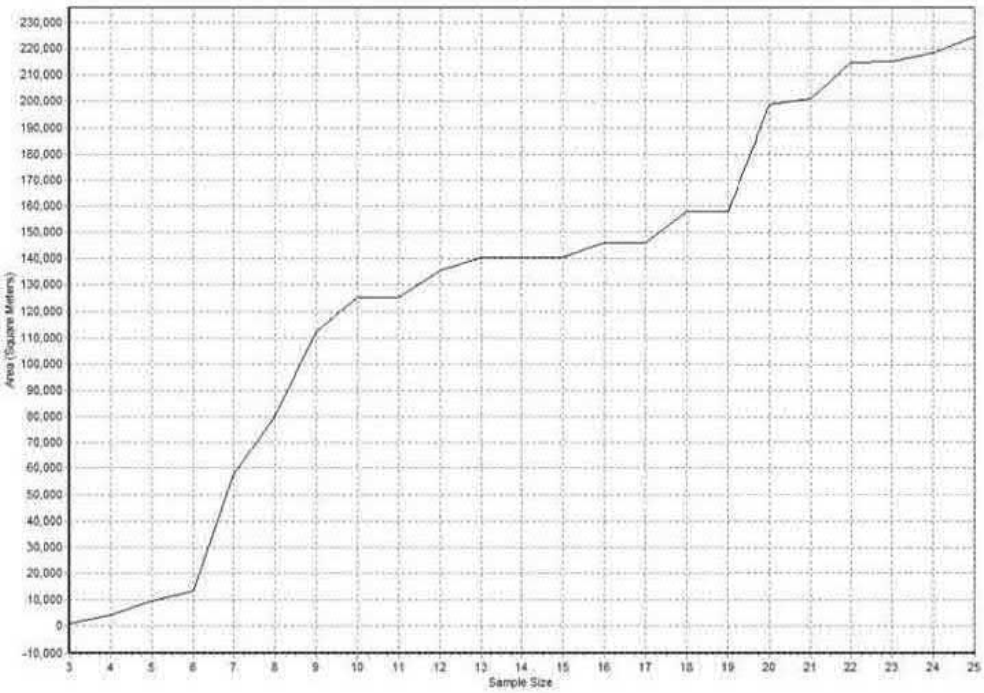
Graph 13 - Bat 19

Graphs 14 - 17 Asymptote graphs of radio-tracking data 2010



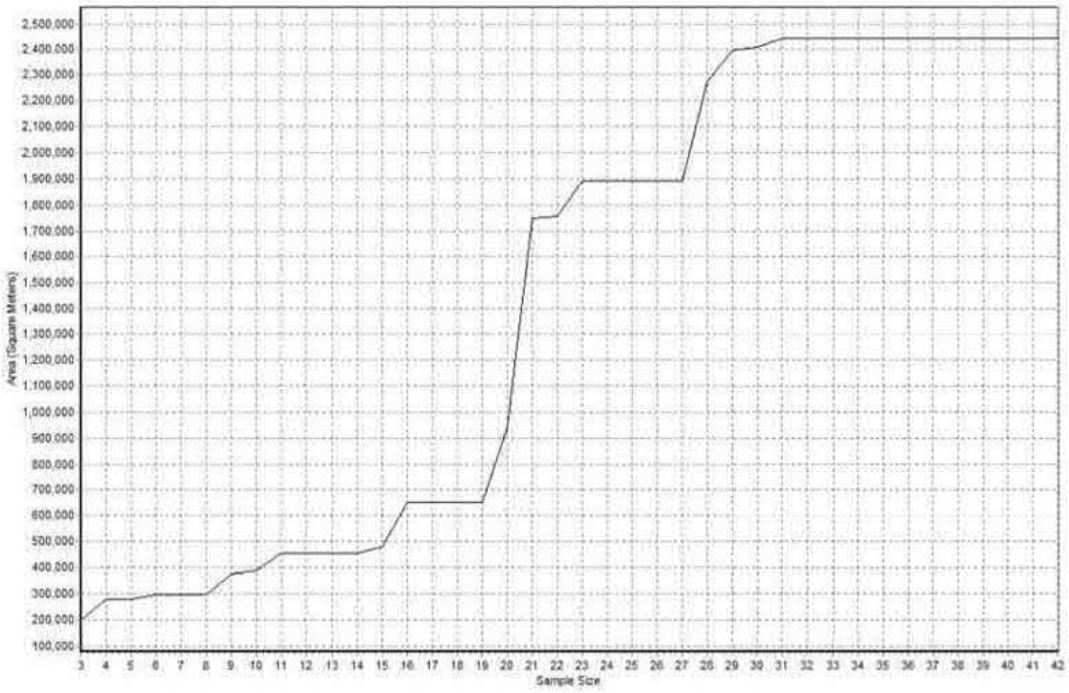
Number of bearings achieved = 32

Graph 14 - Bat 1 in 2010



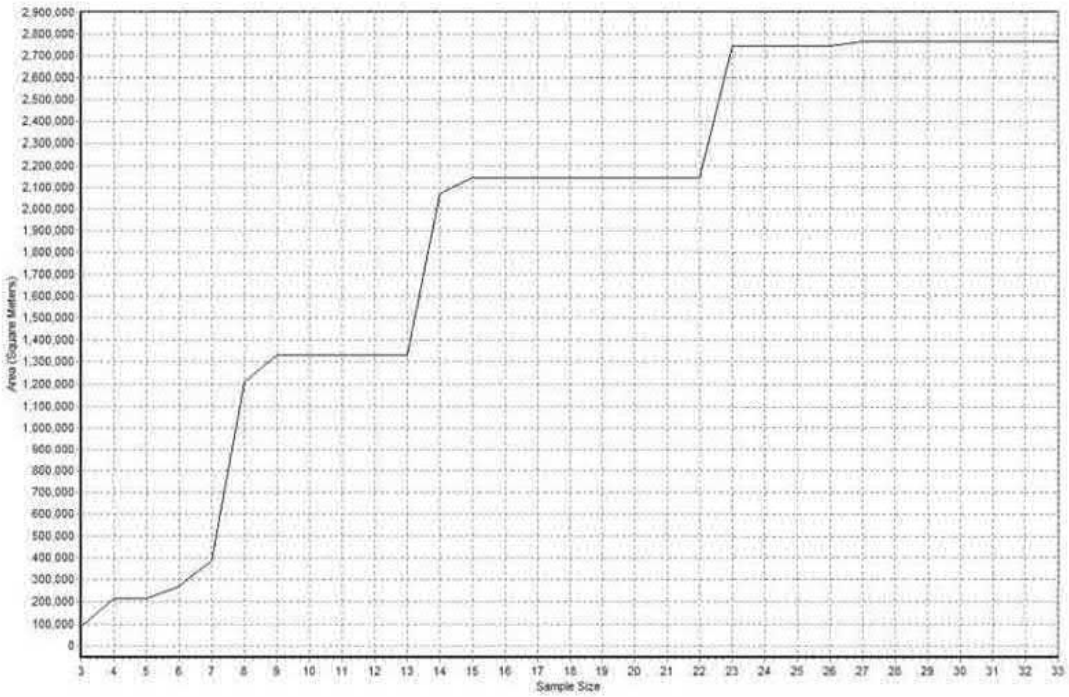
Number of bearings achieved = 33

Graph 15- Bat 2 in 2010



Number of bearings achieved = 83

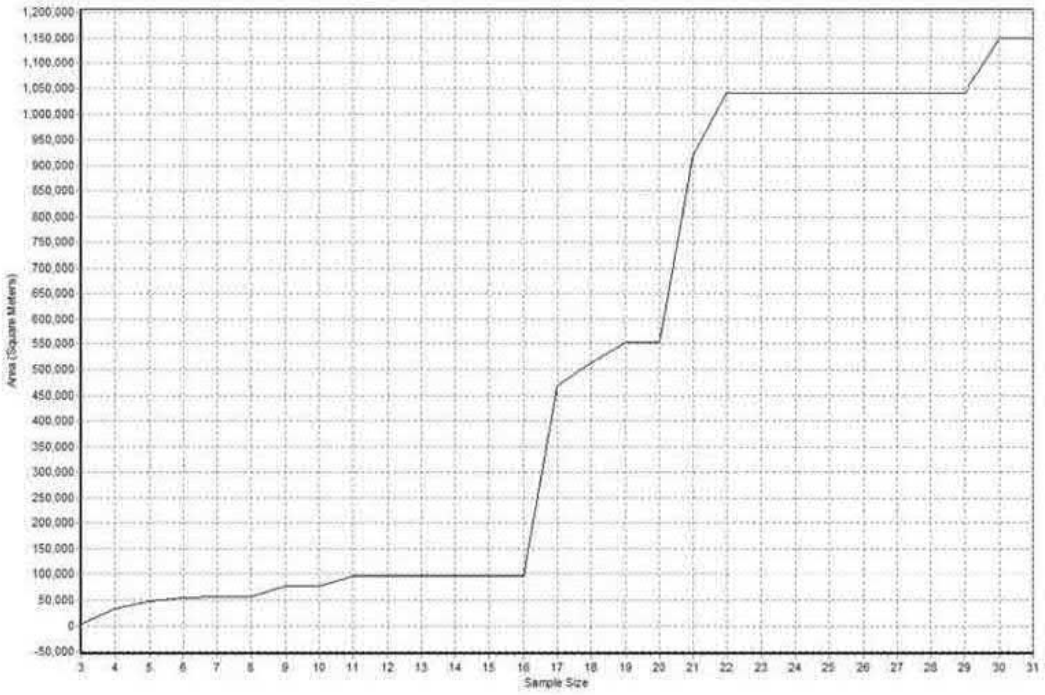
Graph 16 - Bat 5 in 2010



Number of bearings achieved = 65

Graph 17 - Bat 6 in 2010

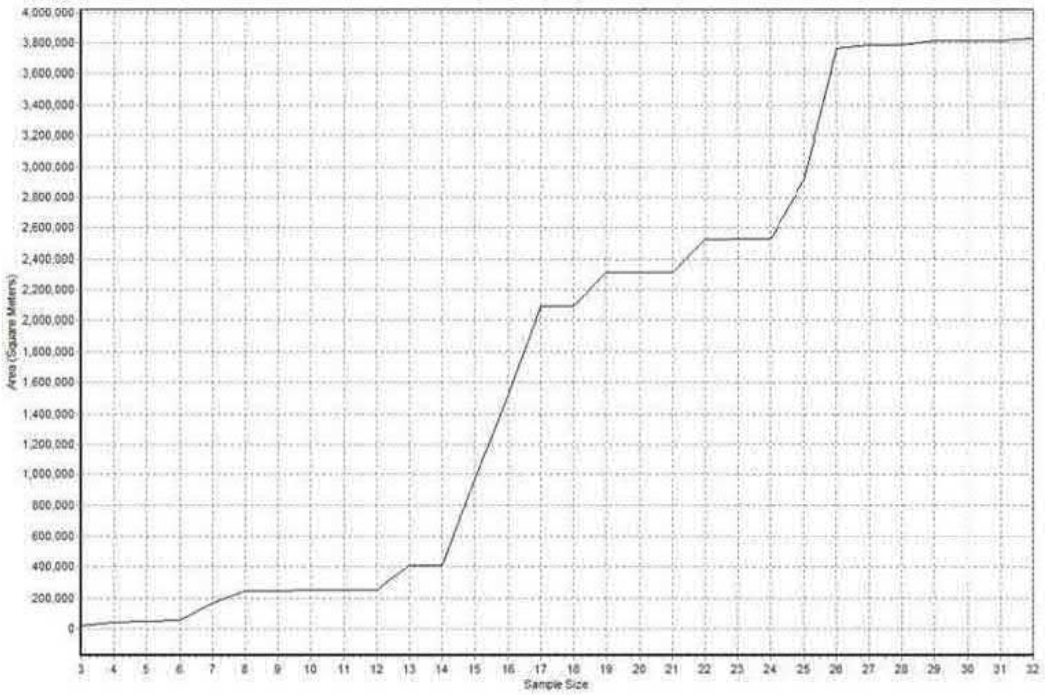
Graphs 18 - 23 -Asymptote graphs of radio-tracking 2011



Co-ordinates for tracking Aug 2011 session-Bat 6.xls

Number of bearings achieved = 48

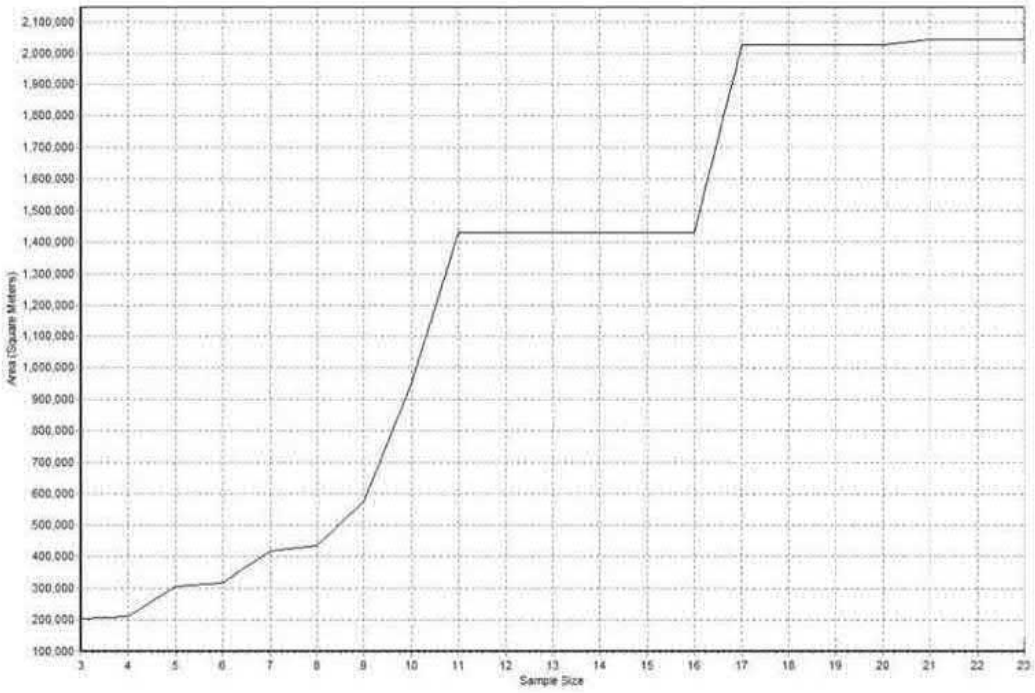
Graph 18 - Bat 6 in 2011



Co-ordinates for tracking Aug 2011 session-Bat 9.xls

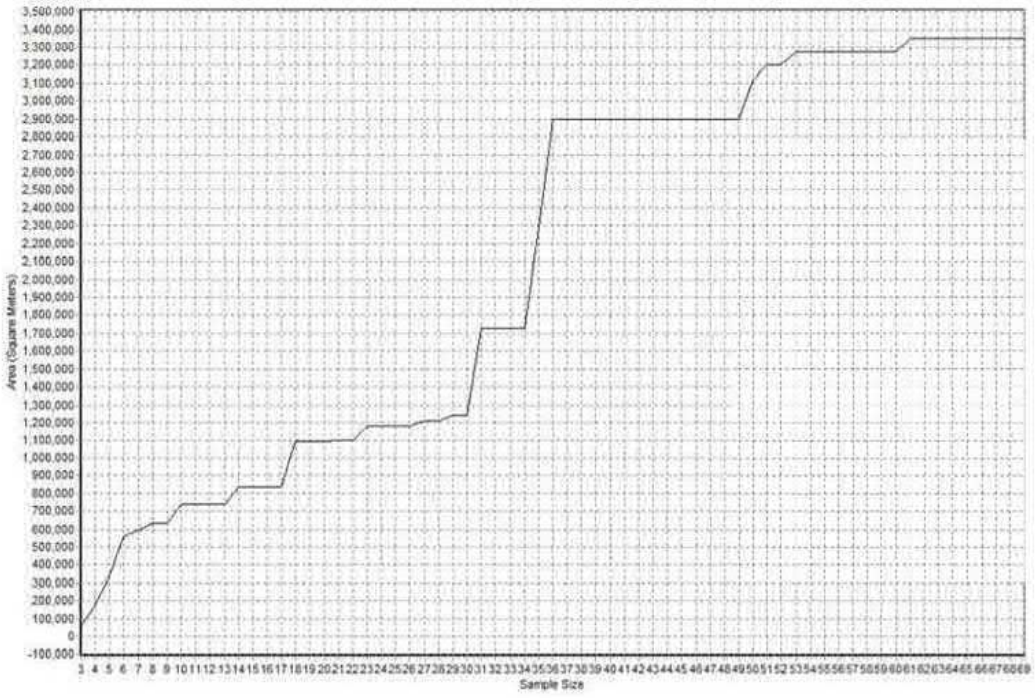
Number of bearings achieved = 42

Graph 19- Bat 9 in 2011



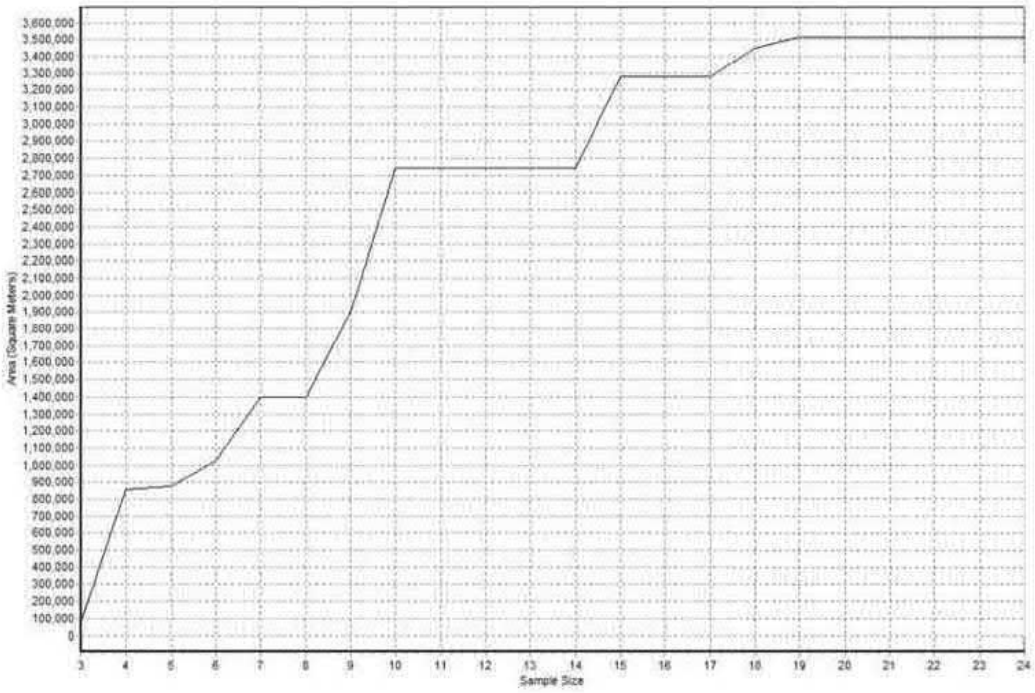
Number of bearings achieved = 33

Graph 20 - Bat 11 in 2011



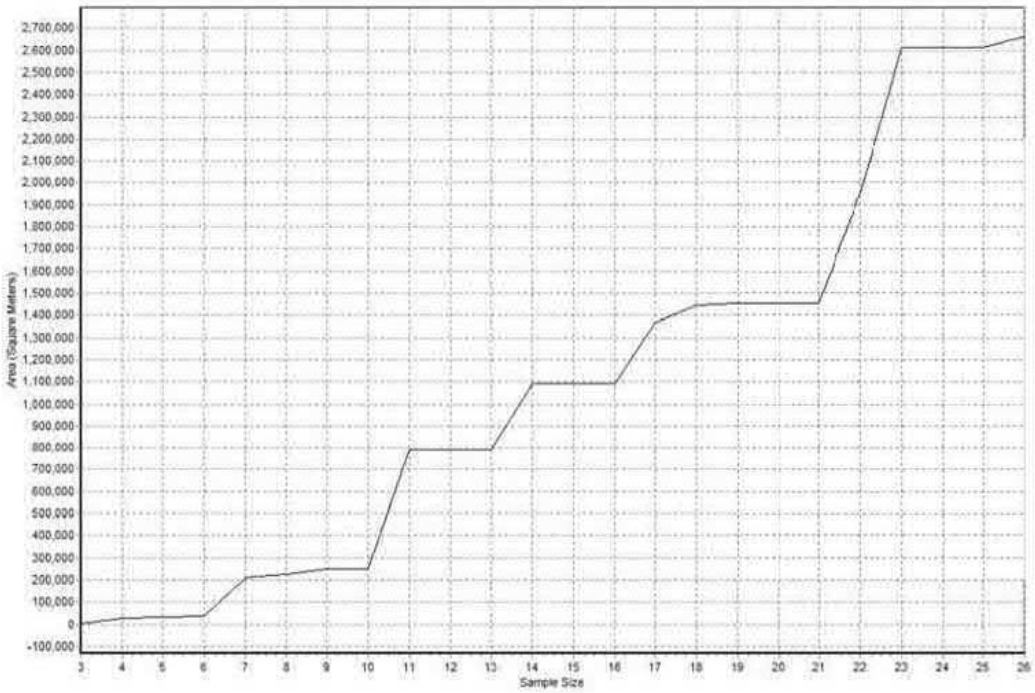
Number of bearings achieved = 121

Graph 21 - Bat 13 in 2011



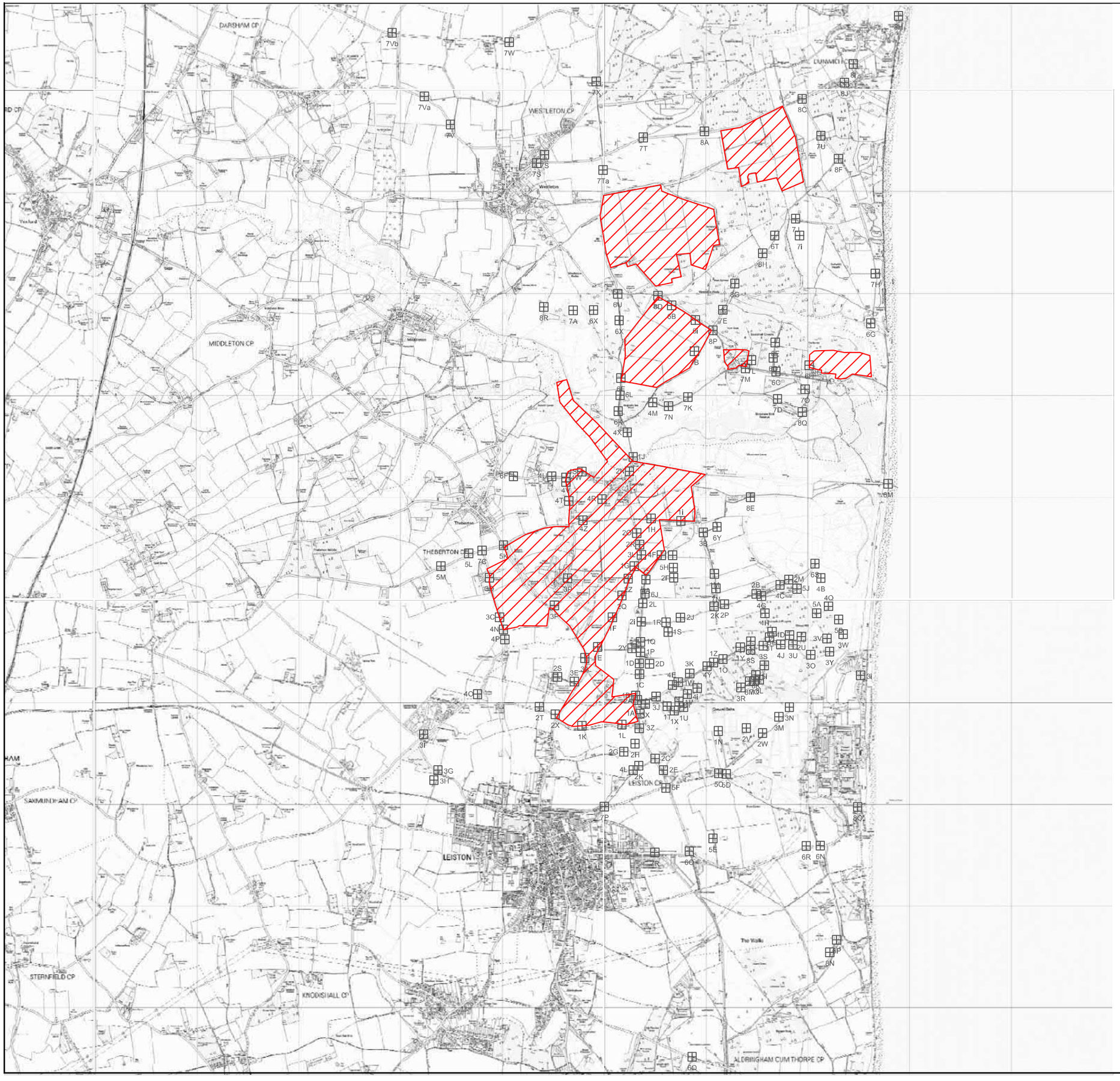
Number of bearings achieved = 30

Graph 22 Bat 17 in 2011



Number of bearings achieved = 31

Graph 23- Bat 20 in 2011



KEY

6G — Vantage point 6G

Restricted Access Areas

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5095553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell Radiotracking August 2014

Title:
Vantage Points and Restricted Acess Areas

status	drawing no.
FINAL	Figure A1

scale	size	date	drawn	checked
NTS	A3	28-05-2015	APW	HL

CAD filename: FIG1.dwg

KEY

R14 Barbastelle roosts R1-R31

R33 Approximate Location for roost

S1 Serotine roost S1

T1 Trapping locations

revision	description	date	checked by

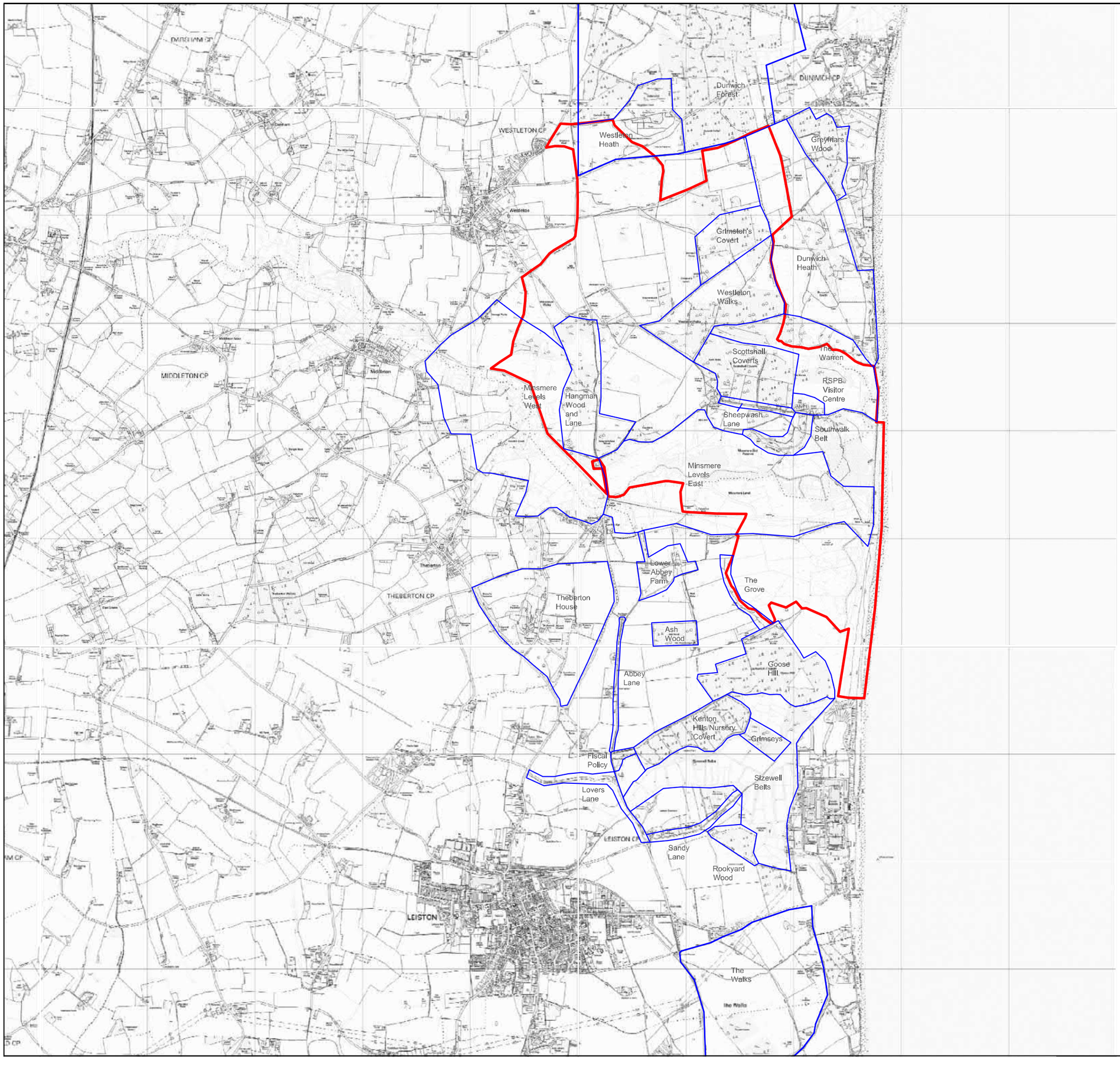
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Roosts and Trapping Locations

status	drawing no.			
FINAL	Figure A2			
scale	size	date	drawn	checked
NTS	A3	19-01-2016	APW	HL

CAD filename
FIG1.dwg



KEY

RSPB Owned Land

Referenced Areas

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5905553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:

Sizewell radiotracking August 2014

Title:

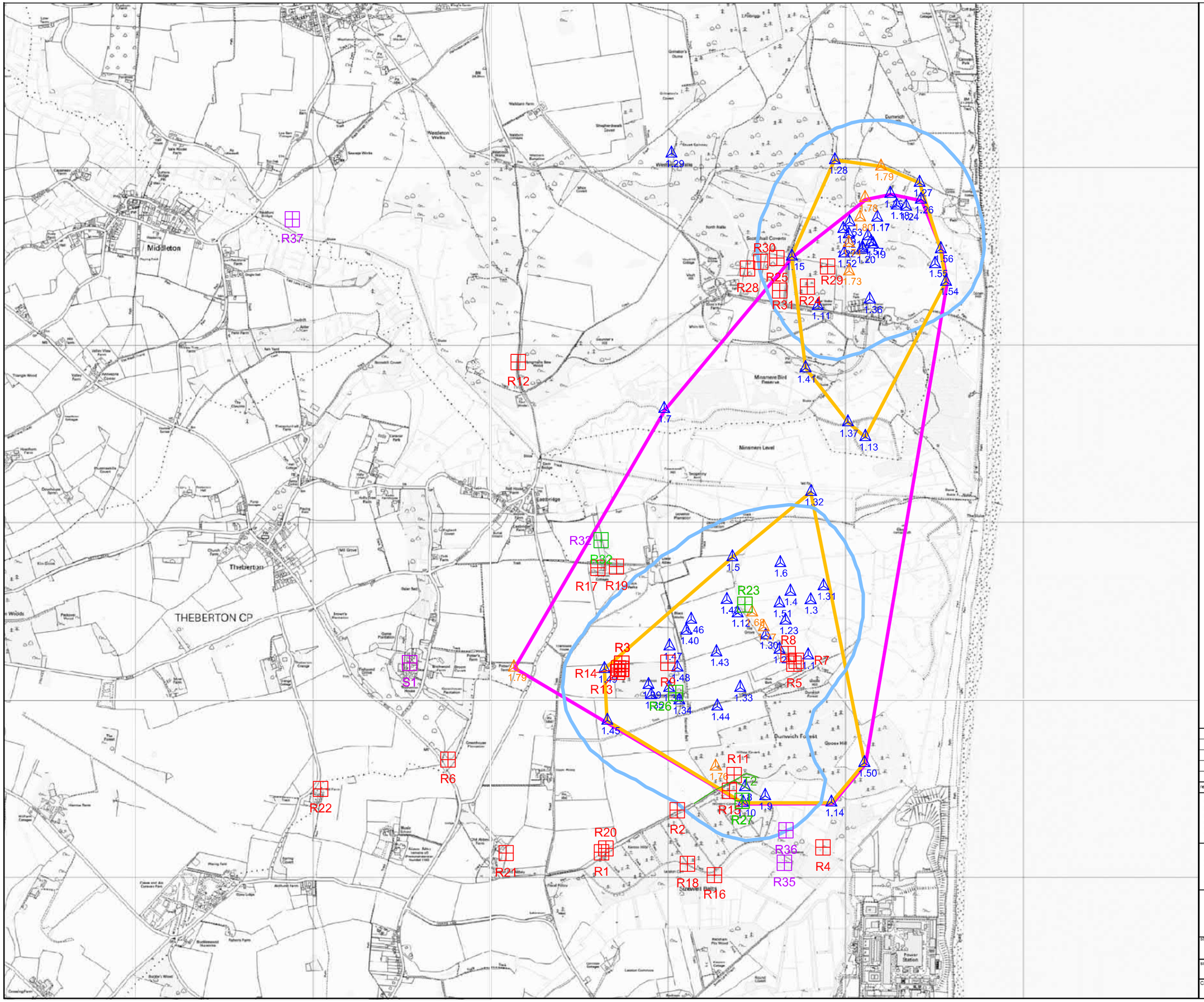
Location of Areas Described in Report

status	drawing no.
FINAL	Figure A3

scale	size	date	drawn	checked
NTS	A3	28-05-2015	APW	HL

CAD filename

FIG1.dwg



KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 1 joint bearing triangulation point 21
- Bat 1 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 1 PL Female Barbastelle - Triangulation Points

status		drawing no.			
		Figure B1			
scale	size	date	drawn	checked
NTS	**A3**	**19-01-2016**	**AW**	**HL**

CAD filename: FIG1.dwg

KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T2 — Mist net/harp trap trapping location - Bat caught here
- 2.21 — Bat 2 joint bearing triangulation point 21
- 2.21 — Bat 2 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

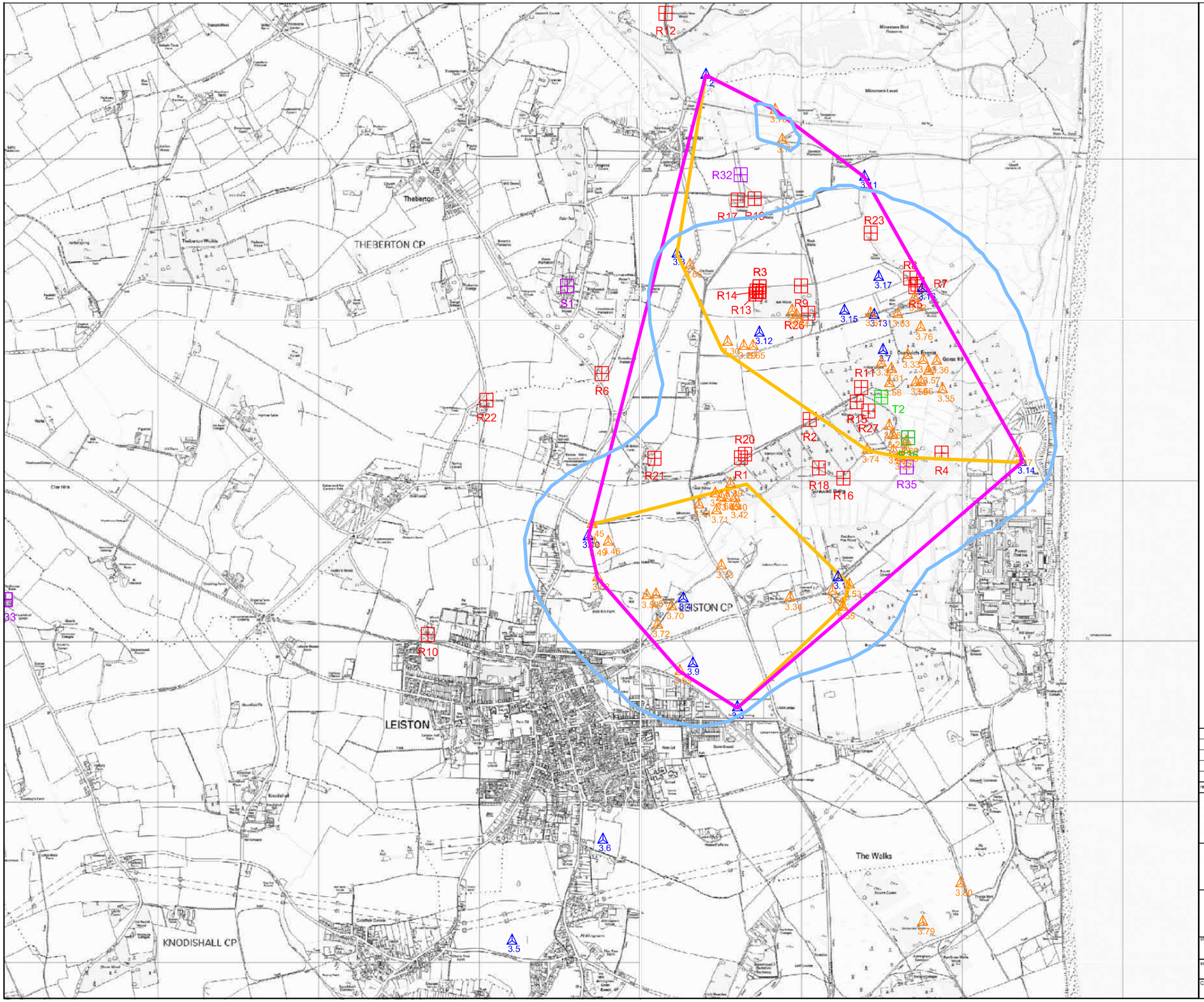
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5055553. Registered Office Herwood House, Herwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 2 PL Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B2		
scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 3 joint bearing triangulation point 21
- Bat 3 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

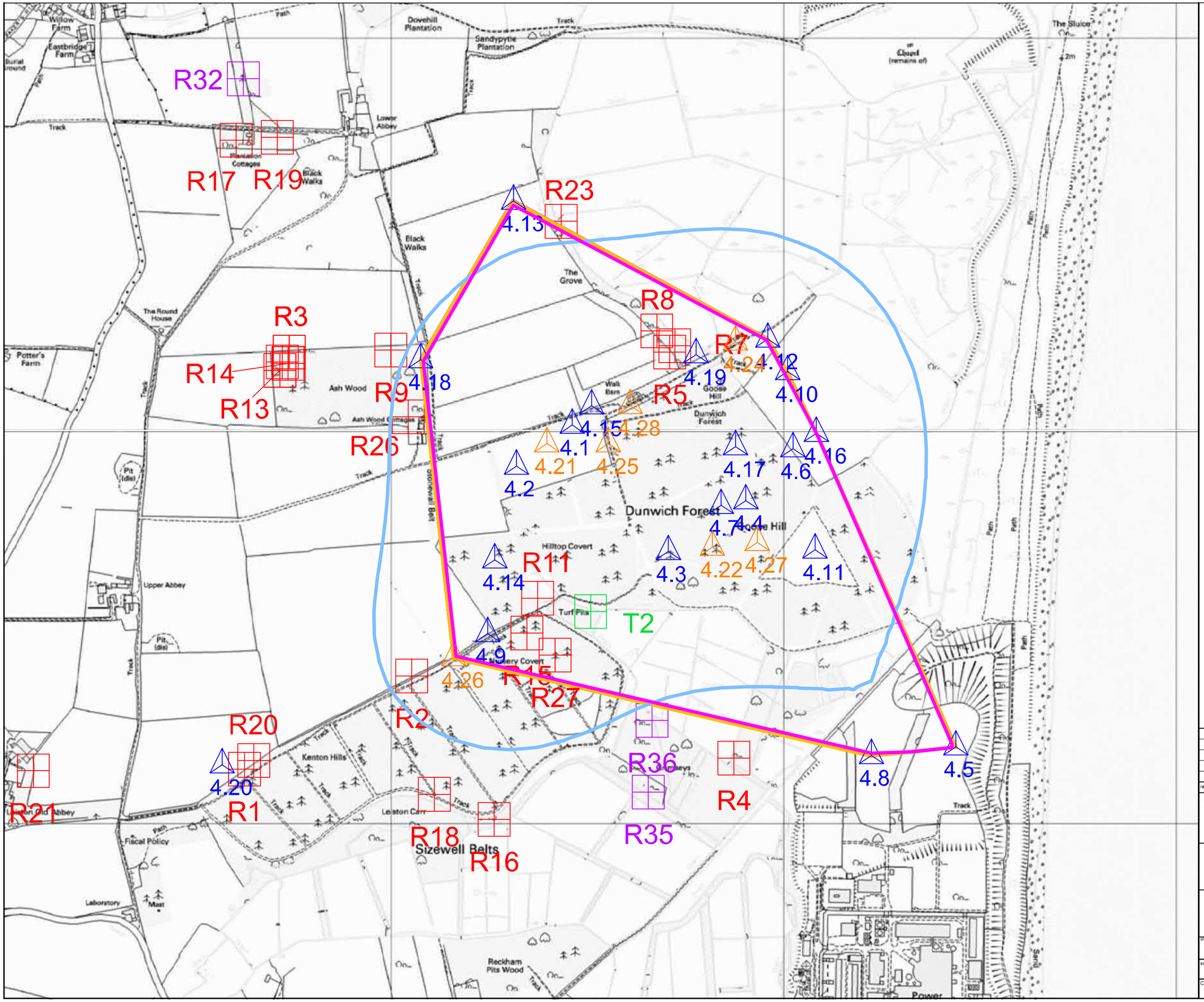
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 3 Male Barbastelle - Triangulation Points

status	drawing no.			
	Figure B3			
scale	size	date	drawn	checked
NTS	**A3**	**19-01-2016**	**AW**	**HL**

CAD filename
FIG1.dwg



KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T2 — Mist net/harp trap trapping location - Bat caught here
- 4.21 — Bat 4 joint bearing triangulation point 21
- 4.21 — Bat 4 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

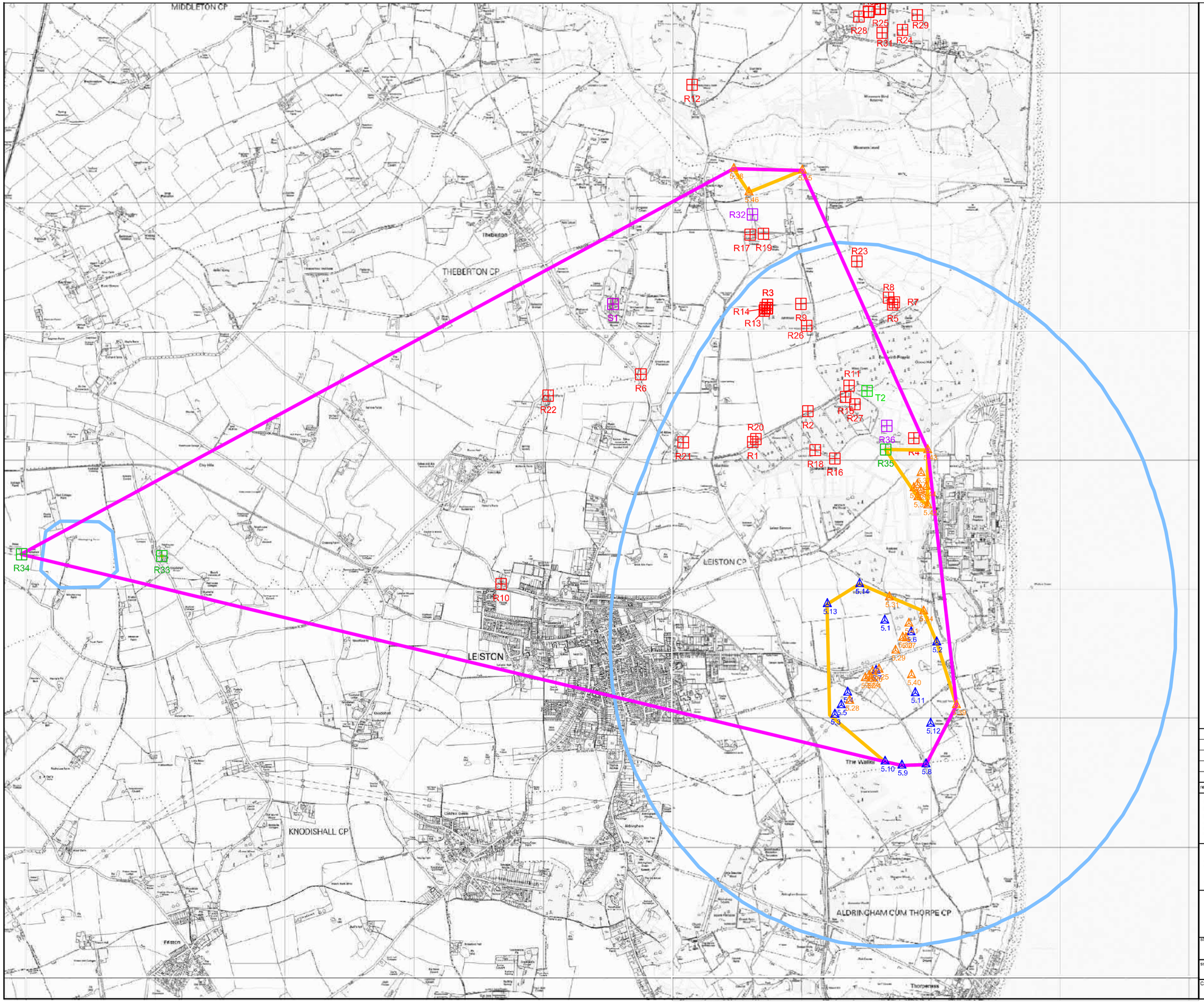
Project:
Sizewell radiotracking August 2014

Title:
Bat 4 PL Female Barbastelle - Triangulation Points

status		drawing no.	
			Figure B4

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 5 joint bearing triangulation point 21
- Bat 5 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 5 Male Barbastelle - Triangulation Points

status		drawing no.		
		Figure B5		
scale	size	date	drawn	checked
NTS	**A3**	**19-01-2016**	**AW**	**HL**

CAD filename
FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 6 joint bearing triangulation point 21
- Bat 6 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 6 PL Female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B6			
scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 7 joint bearing triangulation point 21
- Bat 7 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 7 PL Female Barbastelle - Triangulation Points

status		drawing no.	
			Figure B7

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 8 joint bearing triangulation point 21
- Bat 8 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 8 NB Female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B8			
scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename
FIG1.dwg

KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T10 — Mist net/harp trap trapping location - Bat caught here
- 9.21 — Bat 9 joint bearing triangulation point 21
- 9.21 — Bat 9 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 9 NB Female Serotine - Triangulation Points

status		drawing no.		
		Figure B9		
scale	size	date	drawn	checked
NTS	**A3**	**19-01-2016**	**AW**	**HL**

CAD filename
FIG1.dwg

KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T10 — Mist net/harp trap trapping location - Bat caught here
- 10.21 — Bat 10 joint bearing triangulation point 21
- 10.21 — Bat 10 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

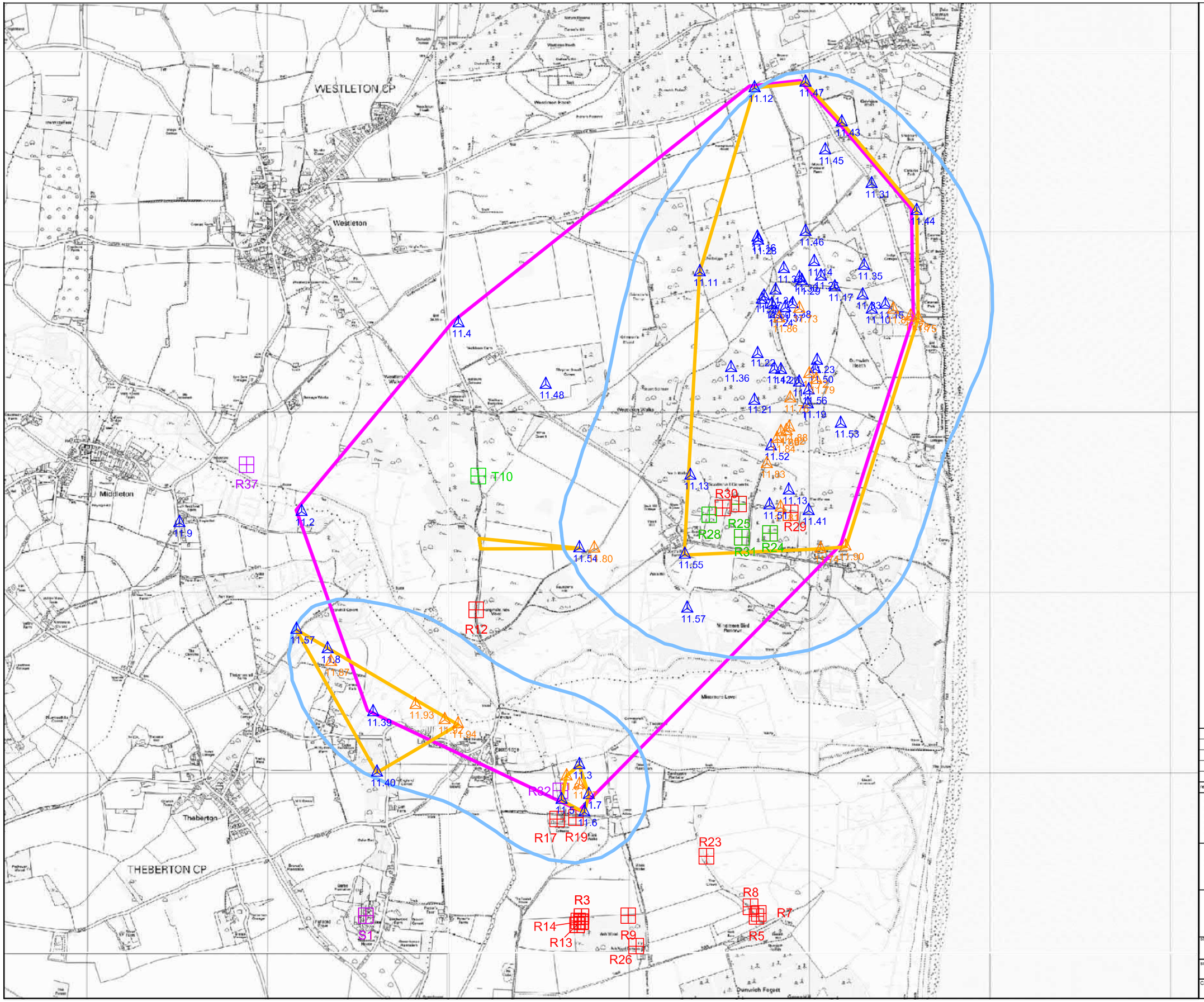
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 10 PL Female Barbastelle - Triangulation Points

status	drawing no.			
FINAL	Figure B10			
scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T10 — Mist net/harp trap trapping location - Bat caught here
- 11.21 — Bat 11 joint bearing triangulation point 21
- 11.21 — Bat 11 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

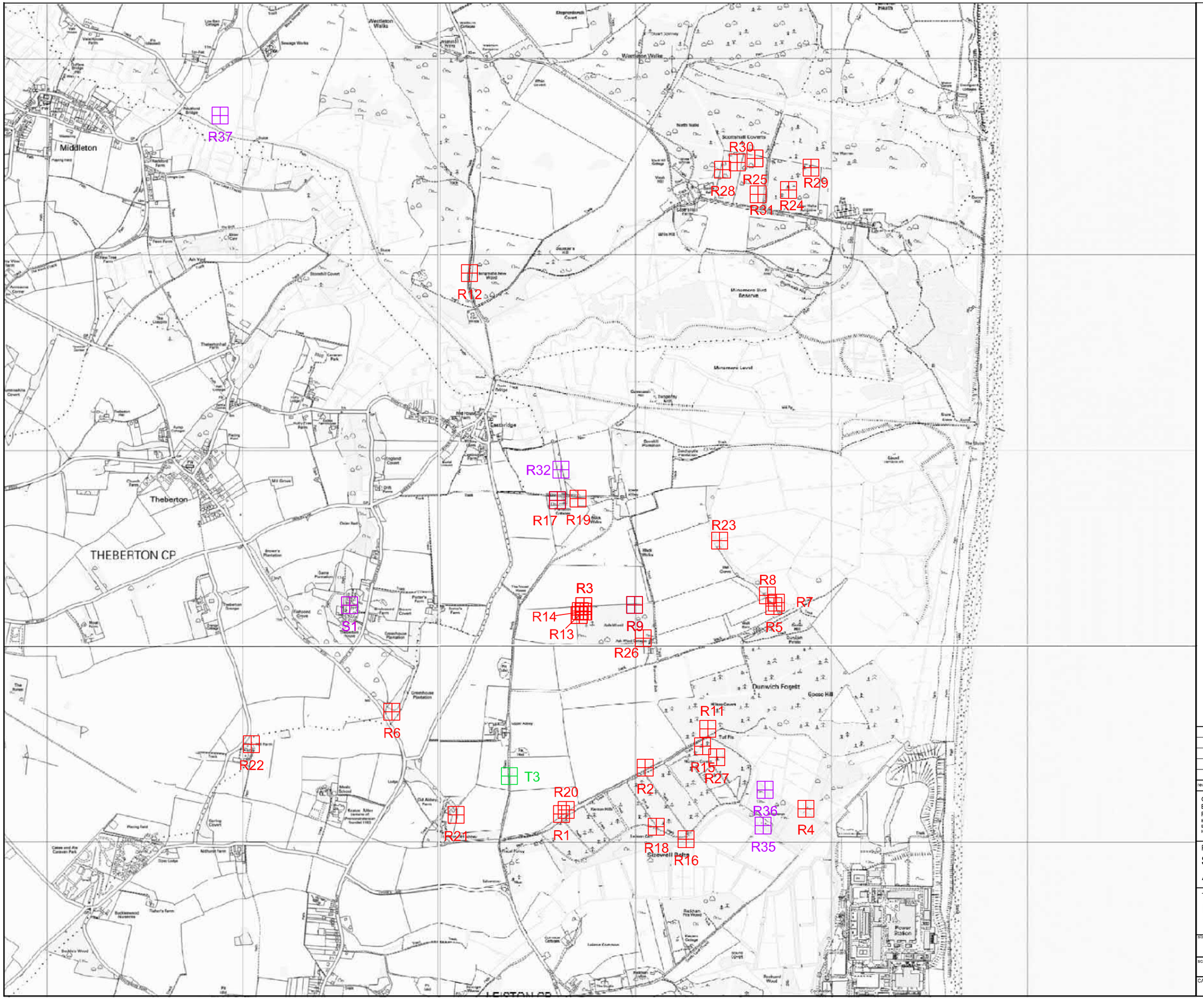
Project:
Sizewell radiotracking August 2014

Title:
Bat 11 PL Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B11

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T10 — Mist net/harp trap trapping location - Bat caught here
- 12.21 — Bat 12 joint bearing triangulation point 21
- 12.21 — Bat 12 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

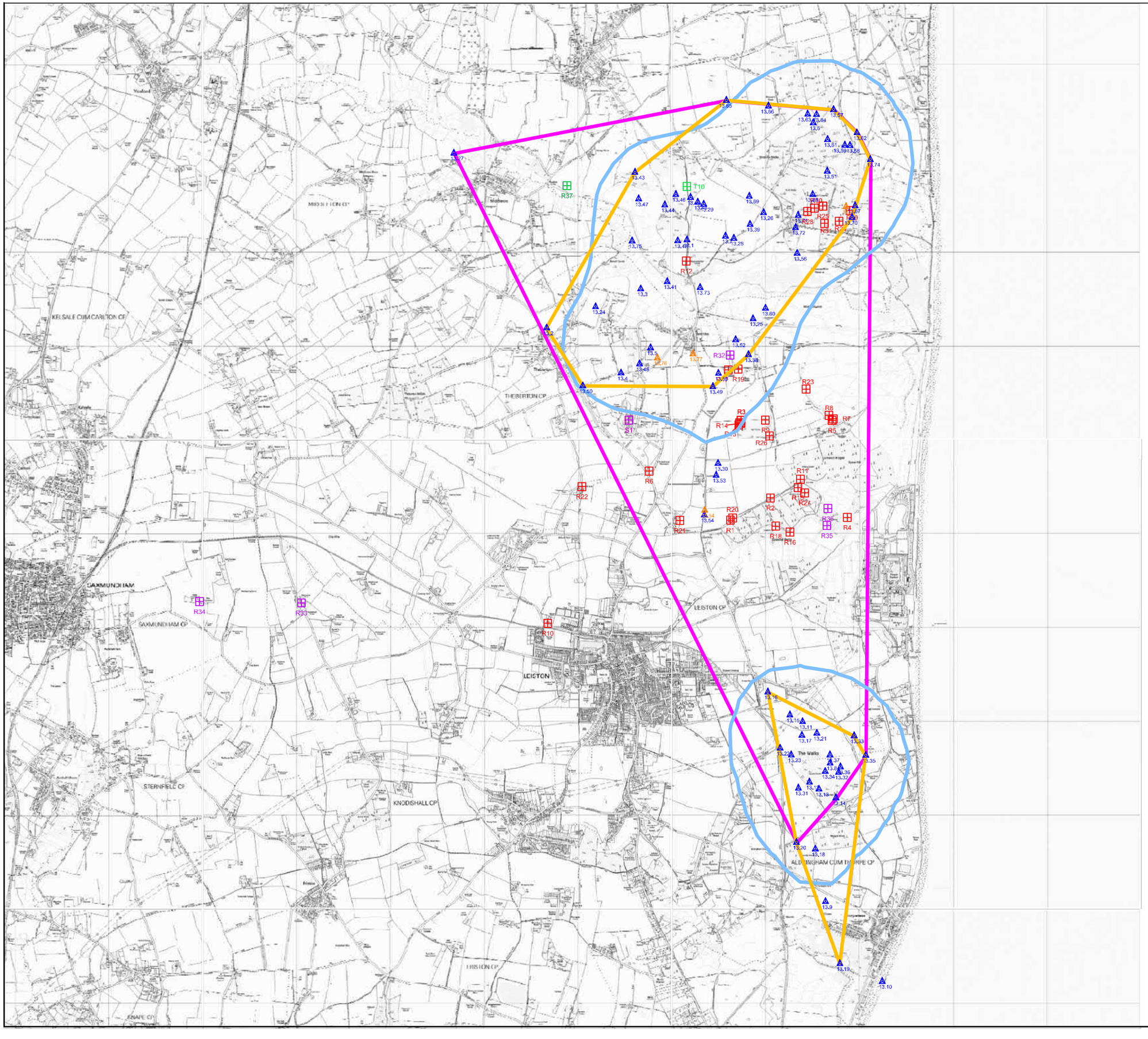
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5605553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 12 PL Female Barbastelle - Triangulation Points

status	drawing no.			
FINAL	Figure B12			
scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename
FIG1.dwg



KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T10 — Mist net/harp trap trapping location - Bat caught here
- 13.21 — Bat 13 joint bearing triangulation point 21
- 13.21 — Bat 13 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Herwood House, Herwood, Ashford, Kent TN24 8DH

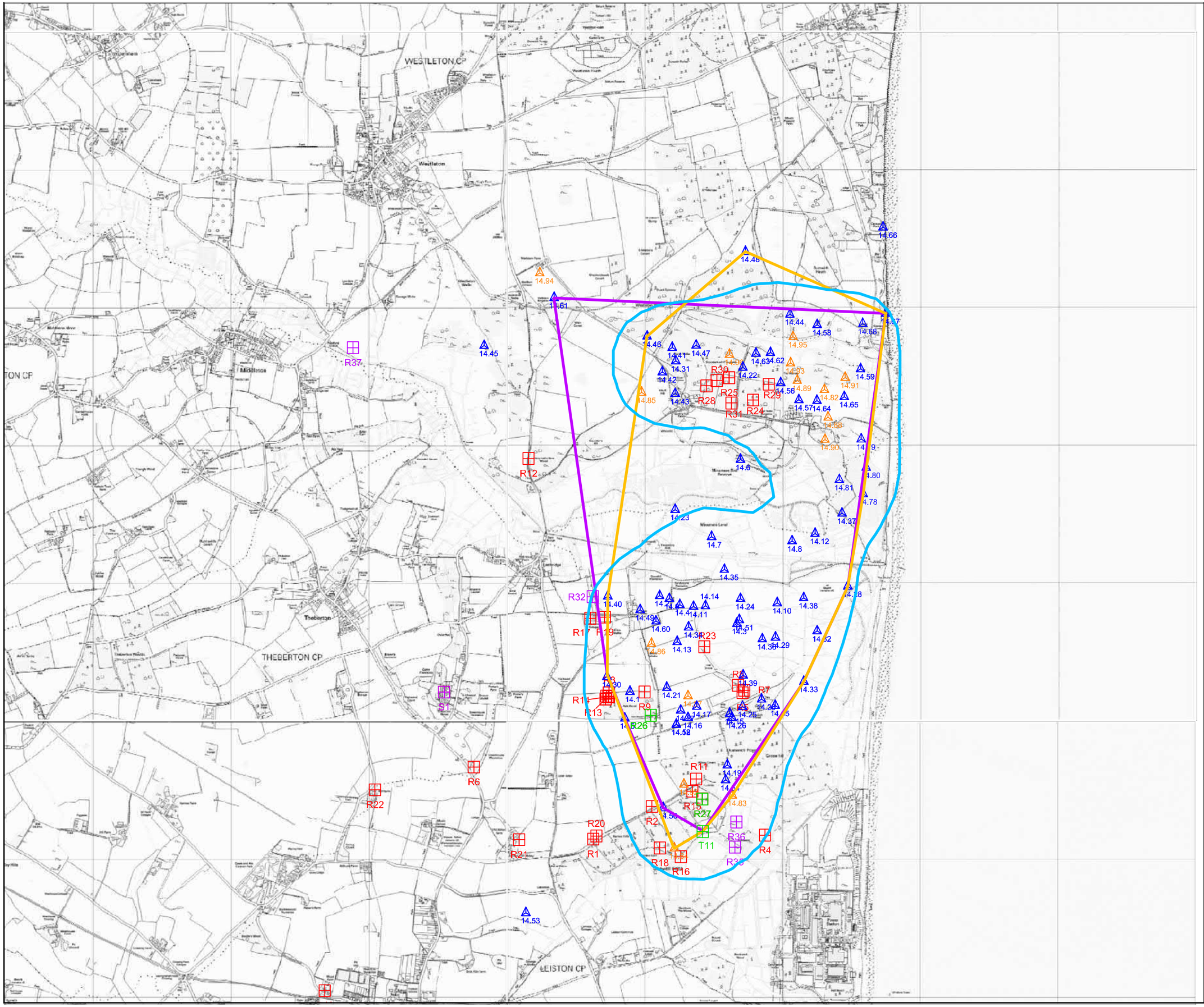
Project:
Sizewell radiotracking August 2014

Title:
Bat 13 PL Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B13

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- R9 — Roost 9
- R9 — Approximate location of Roost 9
- R1 — Roost Used by Bat
- T11 — Mist net/harp trap trapping location - Bat caught here
- 14.21 — Bat 14 joint bearing triangulation point 21
- 14.21 — Bat 14 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 14 Male Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B14

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 15 joint bearing triangulation point 21
- Bat 15 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

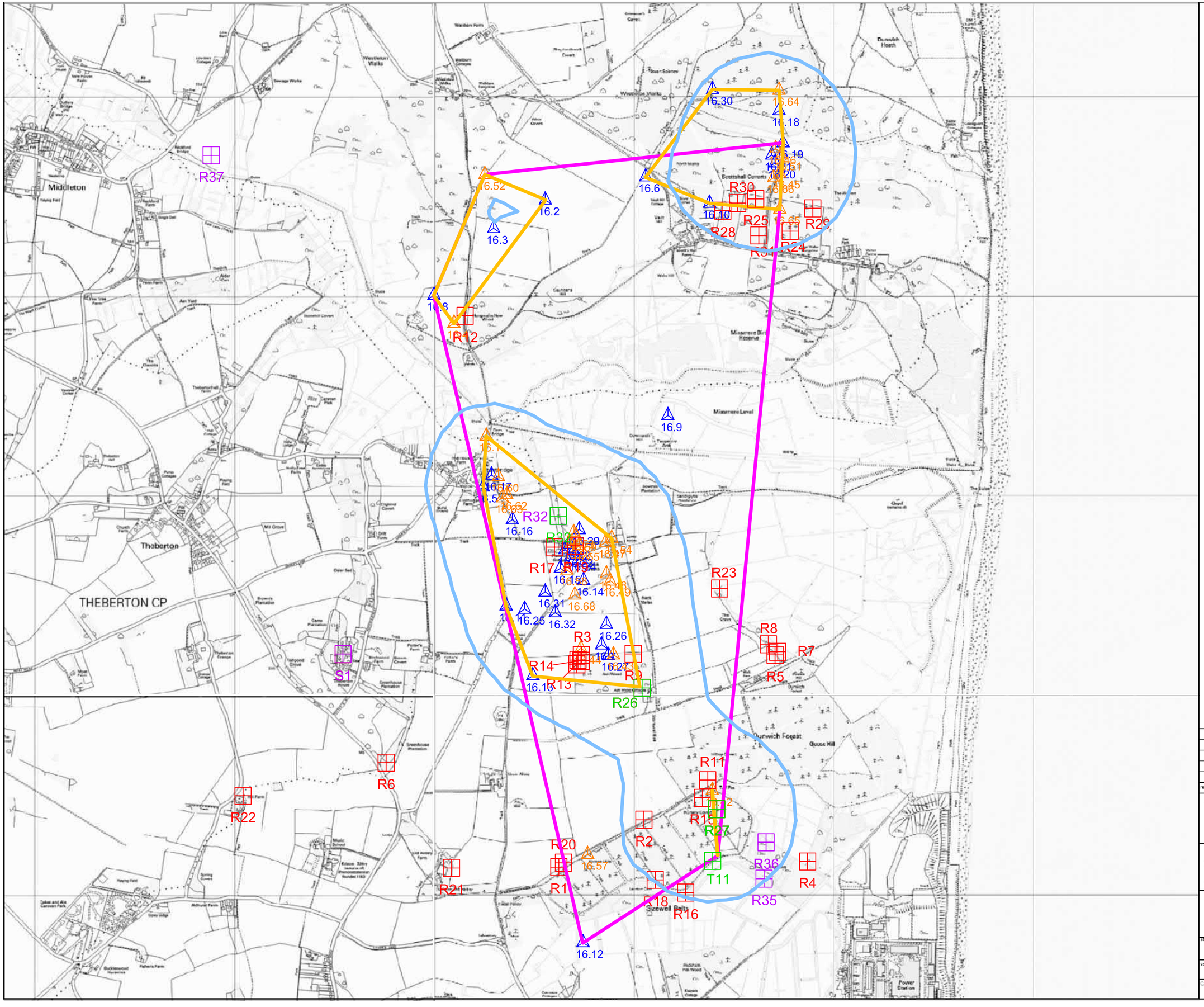
Project:
Sizewell radiotracking August 2014

Title:
Bat 15 NB Female Barbastelle - Triangulation Points

Status	drawing no.
FINAL	Figure B15

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 16 joint bearing triangulation point 21
- Bat 16 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

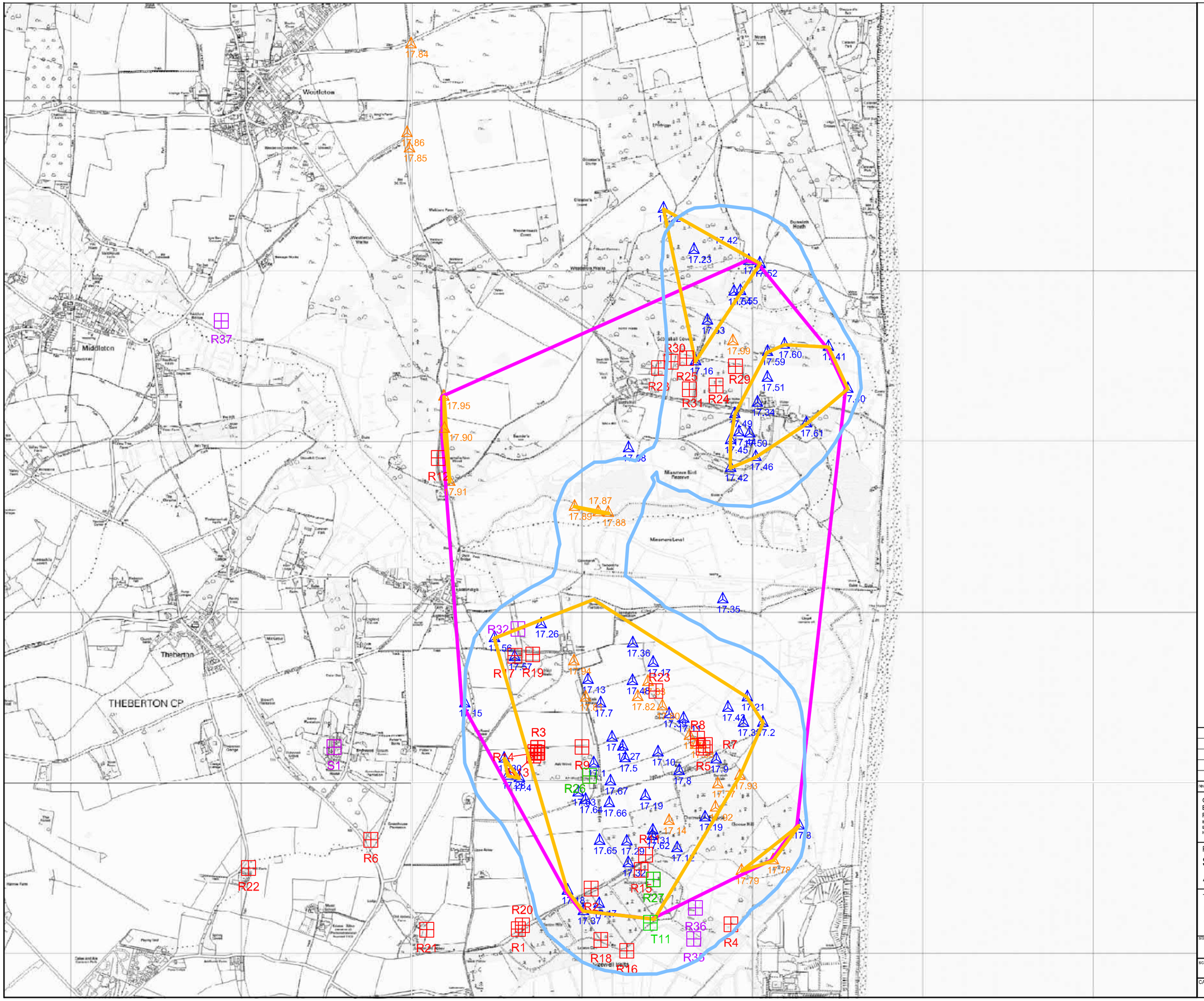
Project:
Sizewell radiotracking August 2014

Title:
Bat 16 PL Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B16

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg



KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 17 joint bearing triangulation point 21
- Bat 17 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
Sizewell radiotracking August 2014

Title:
Bat 17 PL Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B17

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 18 joint bearing triangulation point 21
- Bat 18 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
Bat 18 PL Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B18

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename: FIG1.dwg

KEY

- Roost 9
- Approximate location of Roost 9
- Roost Used by Bat
- Mist net/harp trap trapping location - Bat caught here
- Bat 19 joint bearing triangulation point 21
- Bat 19 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

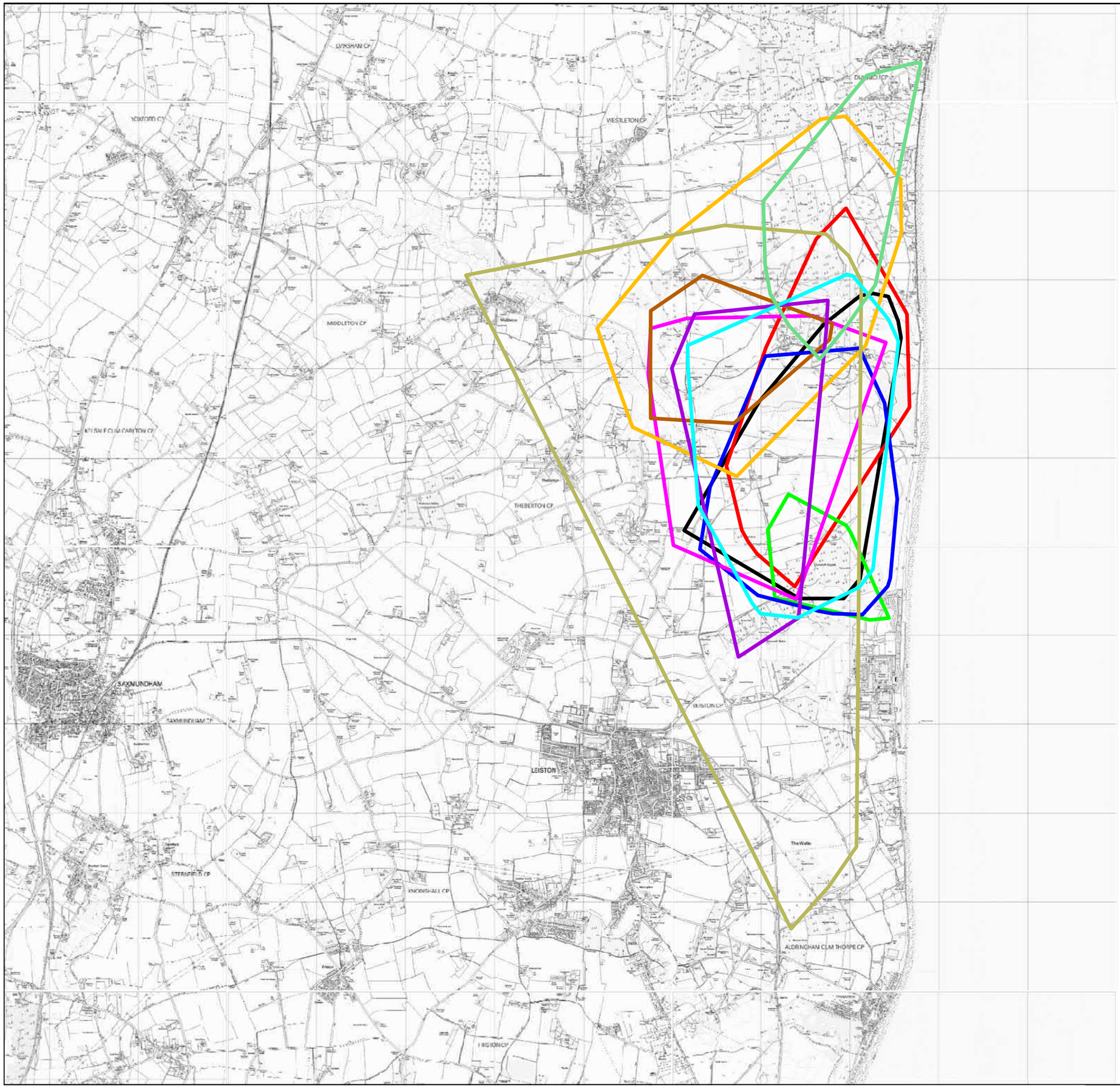
Project:
Sizewell radiotracking August 2014

Title:
Bat 19 NB Female Barbastelle - Triangulation Points

status	drawing no.
FINAL	Figure B19

scale	size	date	drawn	checked
NTS	A3	19-01-2016	AW	HL

CAD filename
FIG1.dwg



KEY

- Bat 1 95% MCP analysis
- Bat 2 95% MCP analysis
- Bat 4 95% MCP analysis
- Bat 6 95% MCP analysis
- Bat 7 95% MCP analysis
- Bat 10 95% MCP analysis
- Bat 11 95% MCP analysis
- Bat 13 95% MCP analysis
- Bat 16 95% MCP analysis
- Bat 17 95% MCP analysis
- Bat 18 95% MCP analysis

revision	description	date	checked by

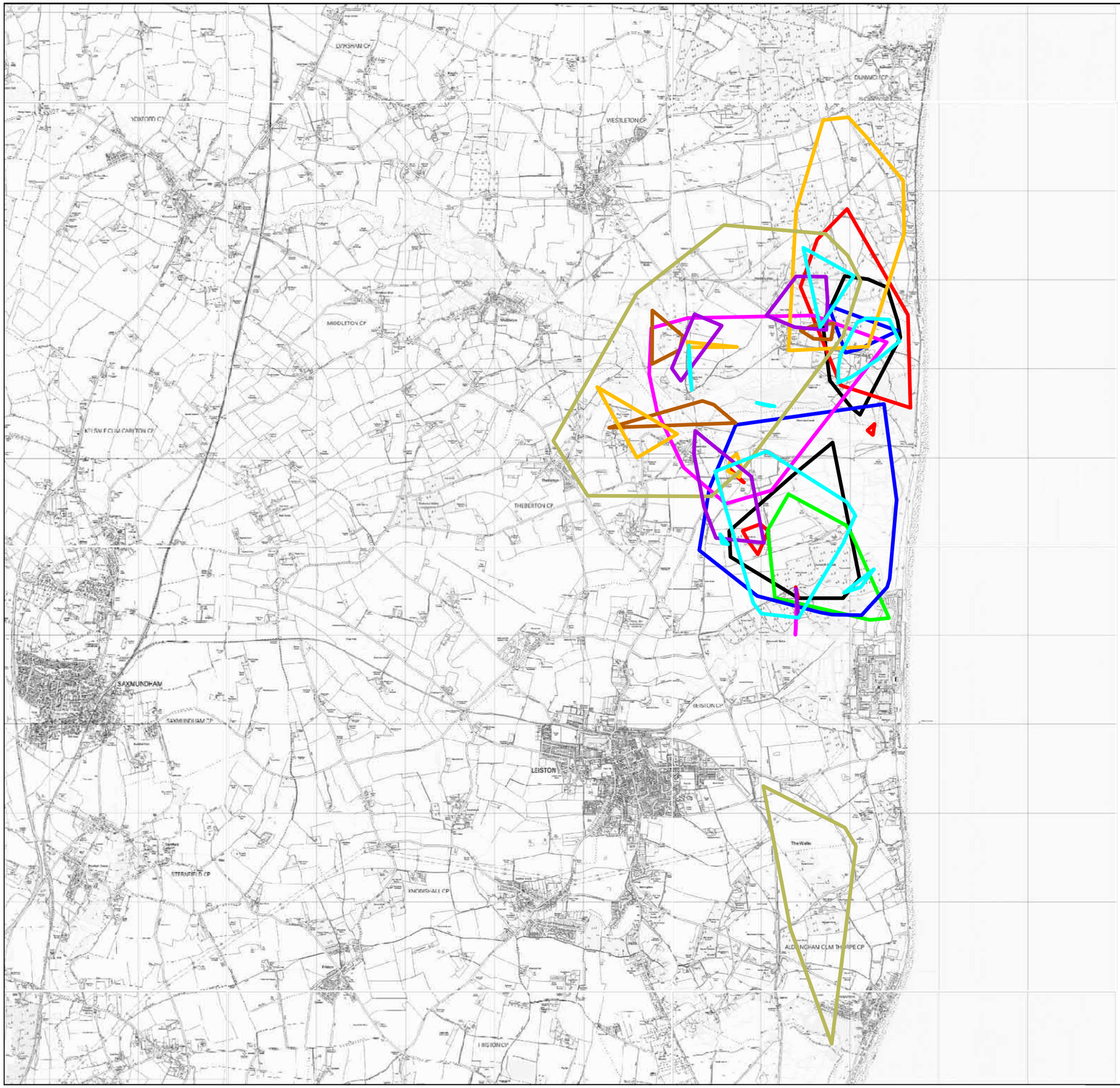
Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:
Sizewell radiotracking August 2014

Title:
C1 - Breeding female barbastelle MCP 95% analysis

status	drawing no.			
FINAL	**Figure C1**			
scale	size	date	drawn	checked
NTS	**A3**	**28-05-2015**	**AW**	**HL**

CAD filename
FIG1.dwg



KEY

- Bat 1 95% Cluster analysis
- Bat 2 95% Cluster analysis
- Bat 4 95% Cluster analysis
- Bat 6 95% Cluster analysis
- Bat 7 95% Cluster analysis
- Bat 10 95% Cluster analysis
- Bat 11 95% Cluster analysis
- Bat 13 95% Cluster analysis
- Bat 16 95% Cluster analysis
- Bat 17 95% Cluster analysis
- Bat 18 95% Cluster analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5905553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

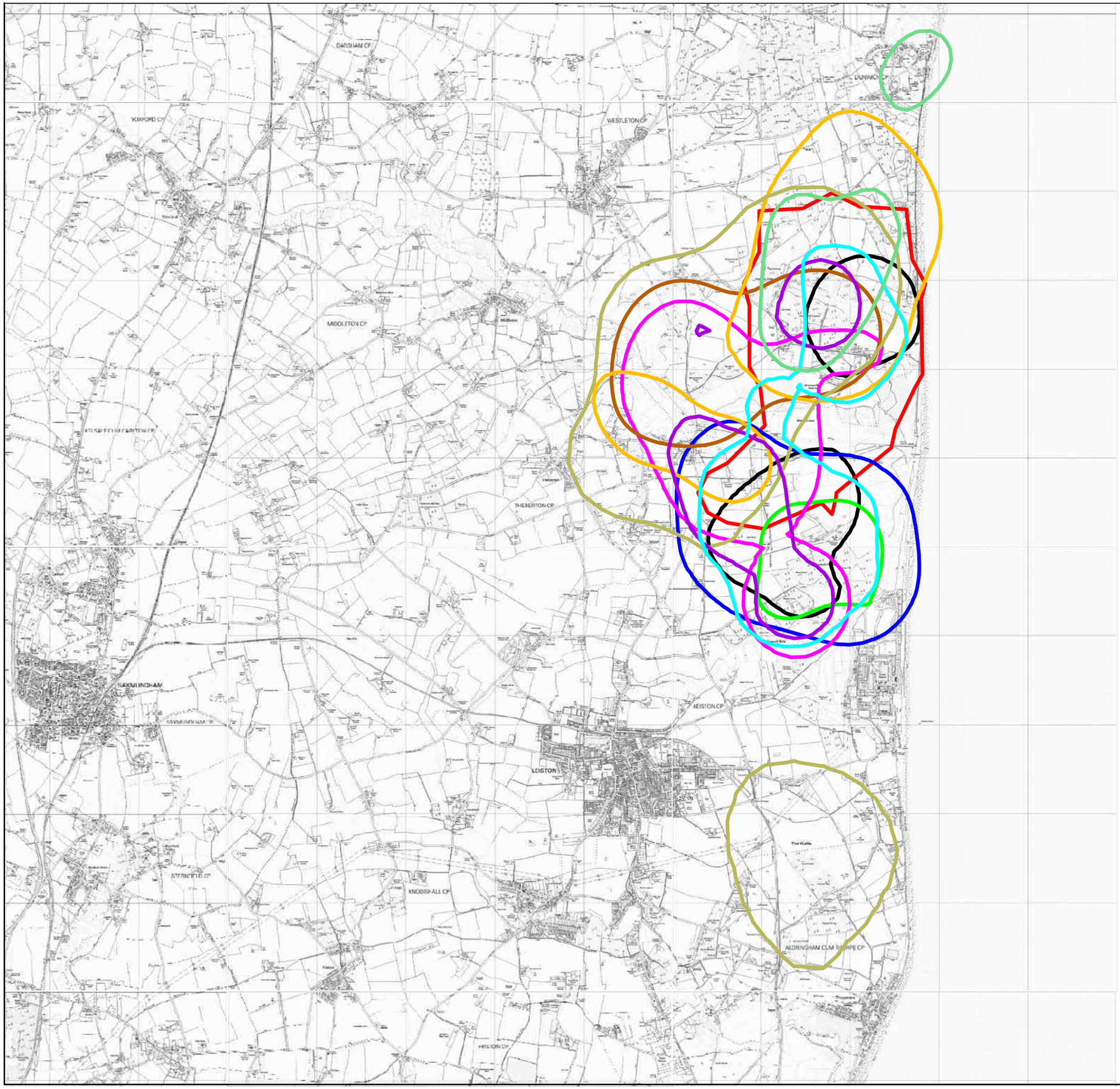
Project:
Sizewell radiotracking August 2014

Title:
C2 - Breeding female barbastelle cluster 95% analysis

status	drawing no.
FINAL	Figure C2

scale	size	date	drawn	checked
NTS	A3	28-05-2015	AW	HL

CAD filename
FIG1.dwg



KEY

- Bat 1 95% Kernel analysis
- Bat 2 95% Kernel analysis
- Bat 4 95% Kernel analysis
- Bat 6 95% Kernel analysis
- Bat 7 95% Kernel analysis
- Bat 10 95% Kernel analysis
- Bat 11 95% Kernel analysis
- Bat 13 95% Kernel analysis
- Bat 16 95% Kernel analysis
- Bat 17 95% Kernel analysis
- Bat 18 95% Kernel analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:

Sizewell radiotracking August 2014

Title:

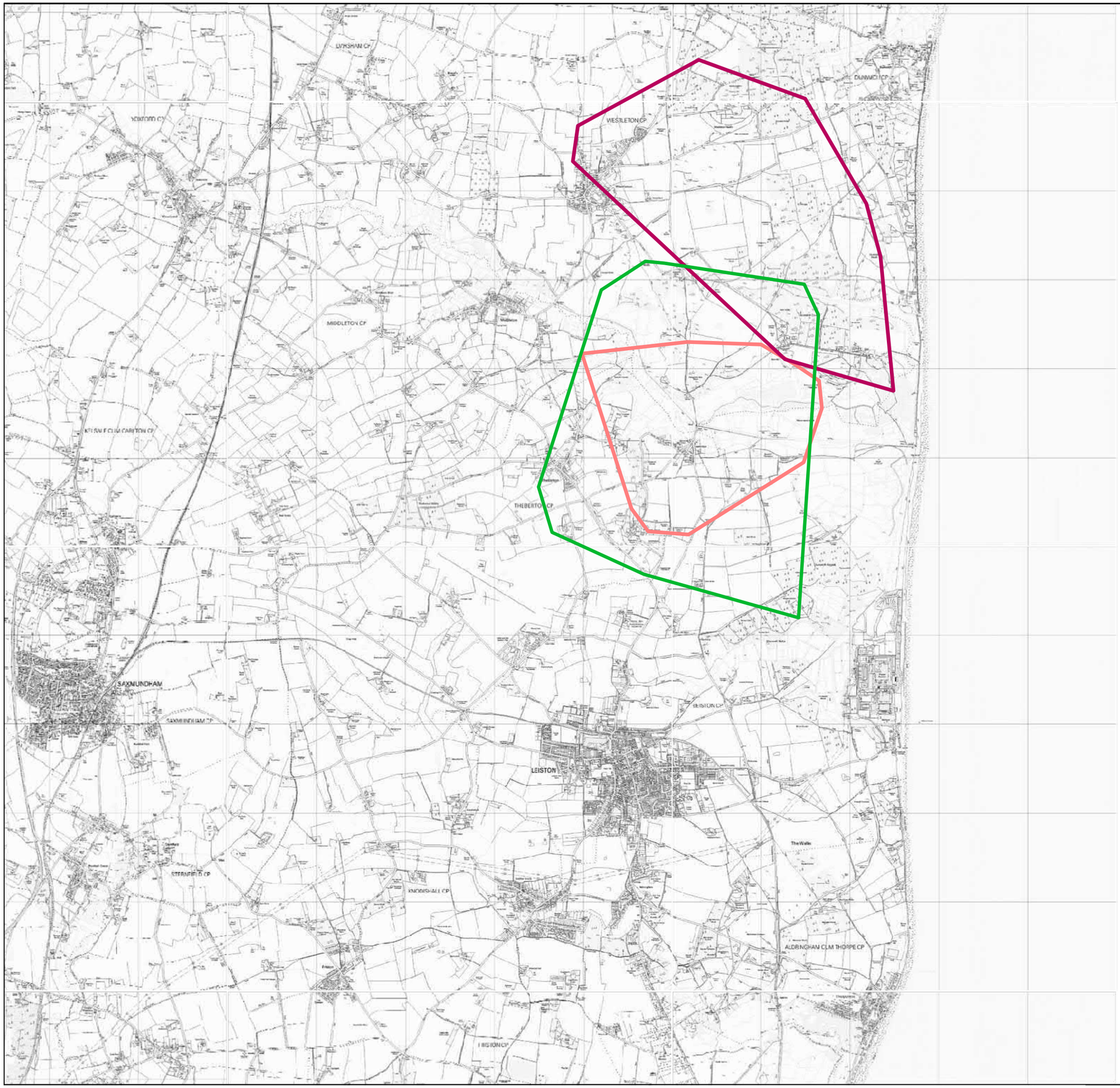
C3 - Breeding female barbastelle Kernel 95% analysis

status	drawing no.
FINAL	Figure C3

scale	size	date	drawn	checked
NTS	A3	28-05-2015	AW	HL

CAD filename

FIG1.dwg



KEY

- Bat 8 95% MCP analysis
- Bat 15 95% MCP analysis
- Bat 19 95% MCP analysis

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553. Registered Office Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:

Sizewell radiotracking August 2014

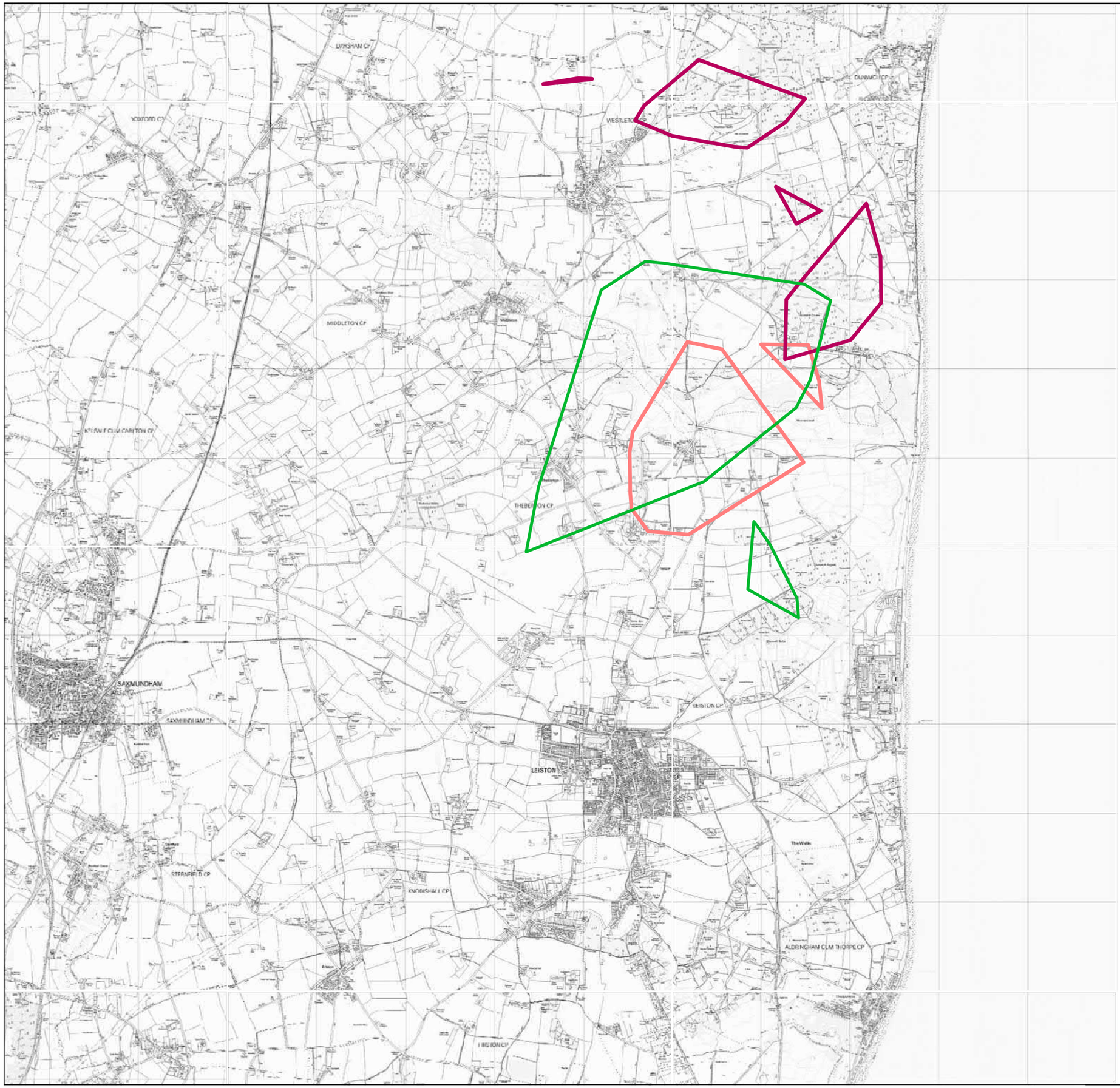
Title:

C4 - Non-breeding female barbastelle MCP 95% analysis

status	drawing no.
FINAL	Figure C4

scale	size	date	drawn	checked
NTS	A3	28-05-2015	AW	HL

CAD filename: FIG1.dwg



KEY

- Bat 8 95% Cluster analysis
- Bat 15 95% Cluster analysis
- Bat 19 95% Cluster analysis

revision	description	date	checked by

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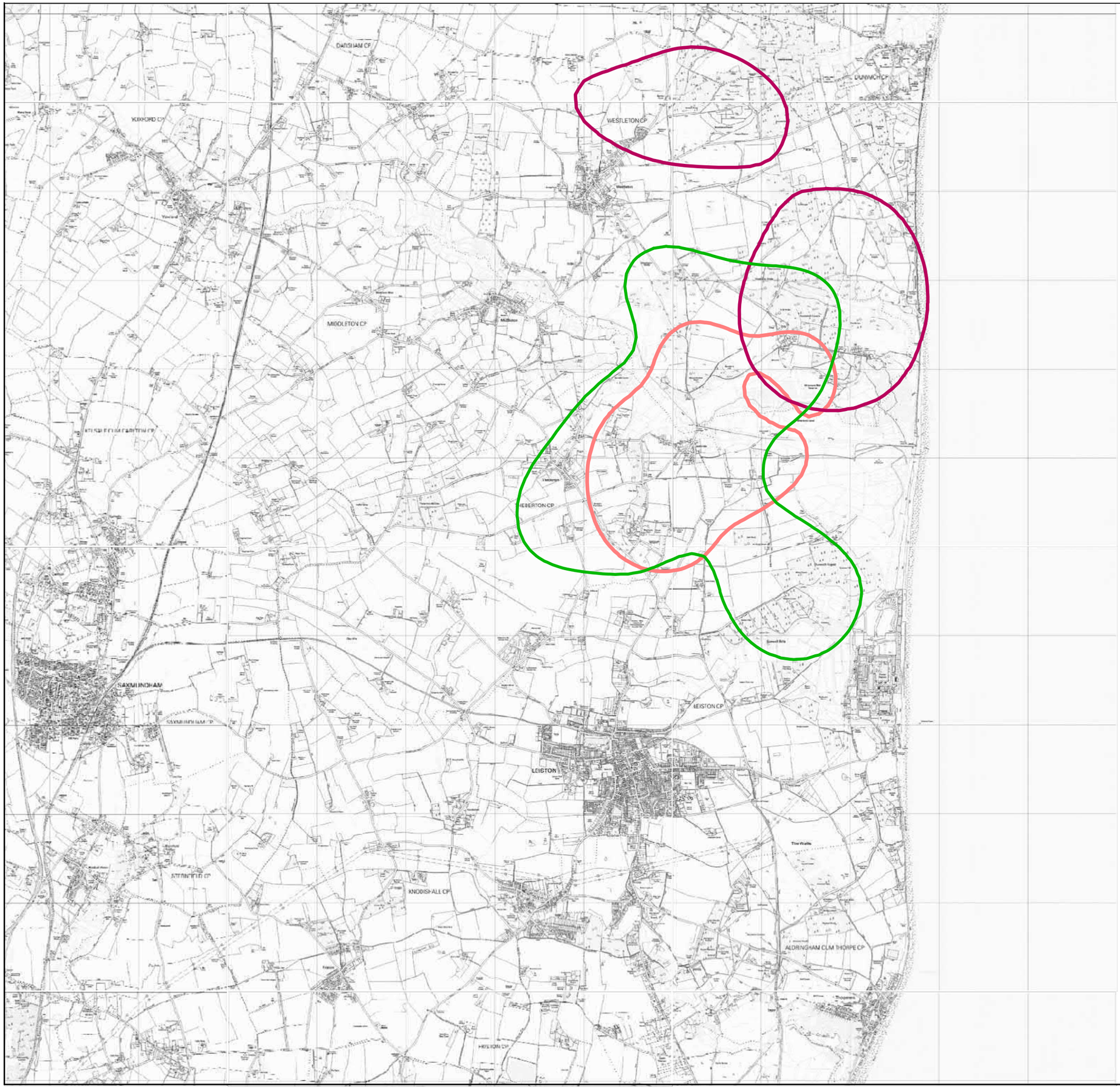
Project:
Sizewell radiotracking August 2014

Title:
C5 - non-breeding female barbastelle cluster 95% analysis

status	drawing no.			
FINAL	**Figure C5**			
scale	size	date	drawn	checked
NTS	**A3**	**28-05-2015**	**AW**	**HL**

CAD filename
FIG1.dwg



KEY

- Bat 8 95% Kernel analysis
- Bat 15 95% Kernel analysis
- Bat 19 95% Kernel analysis

revision	description	date	checked by

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Project:

Sizewell radiotracking August 2014

Title:

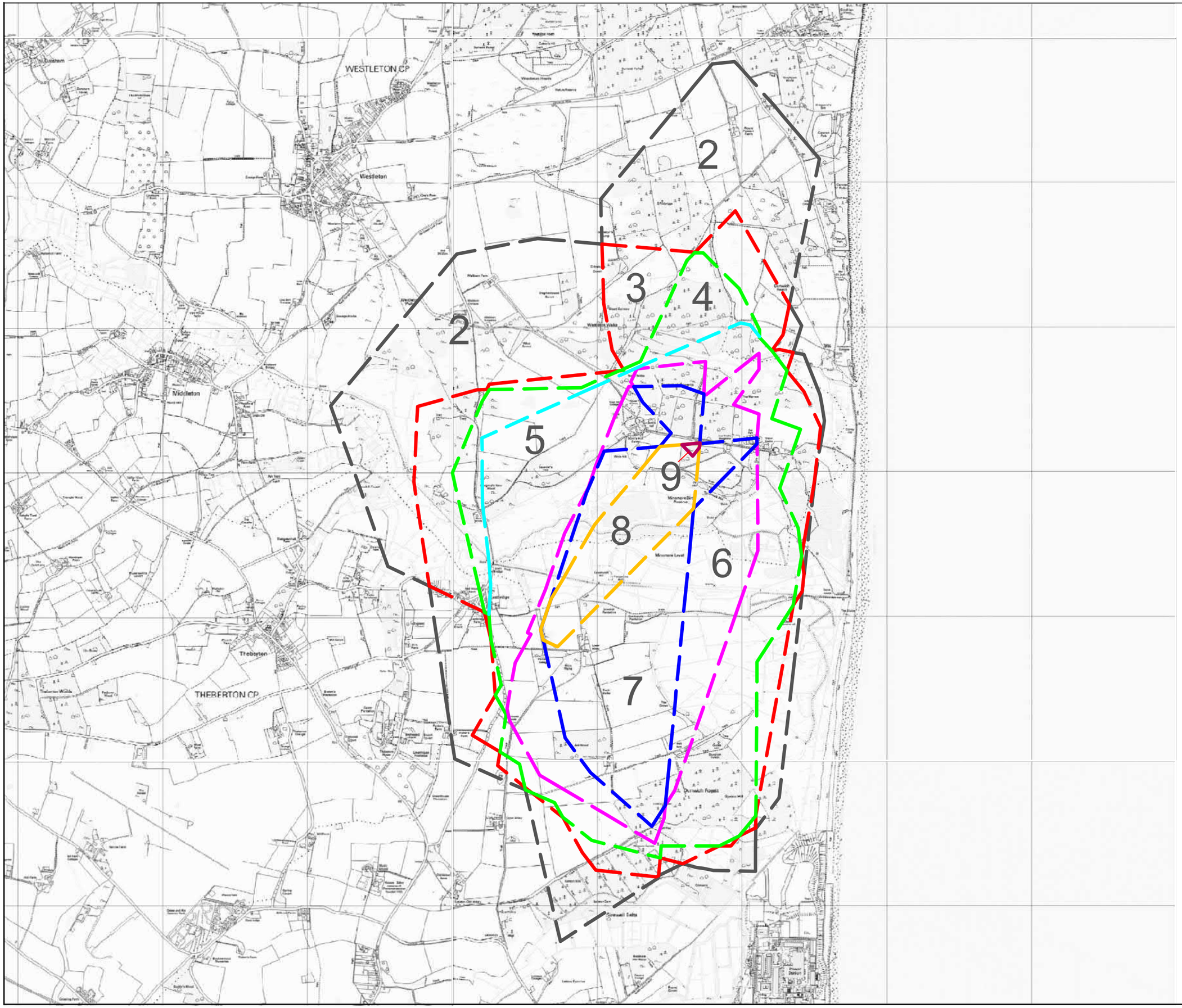
C6 - Non-breeding female barbastelle Kernel 95% analysis

status	drawing no.
FINAL	Figure C6

scale	size	date	drawn	checked
NTS	A3	28-05-2015	AW	HL

CAD filename

FIG1.dwg



KEY

- 2 Overlapping Bats
- 3 Overlapping Bats
- 4 Overlapping Bats
- 5 Overlapping Bats
- 6 Overlapping Bats
- 7 Overlapping Bats
- 8 Overlapping Bats
- 9 Overlapping Bats

revision	description	date	checked by

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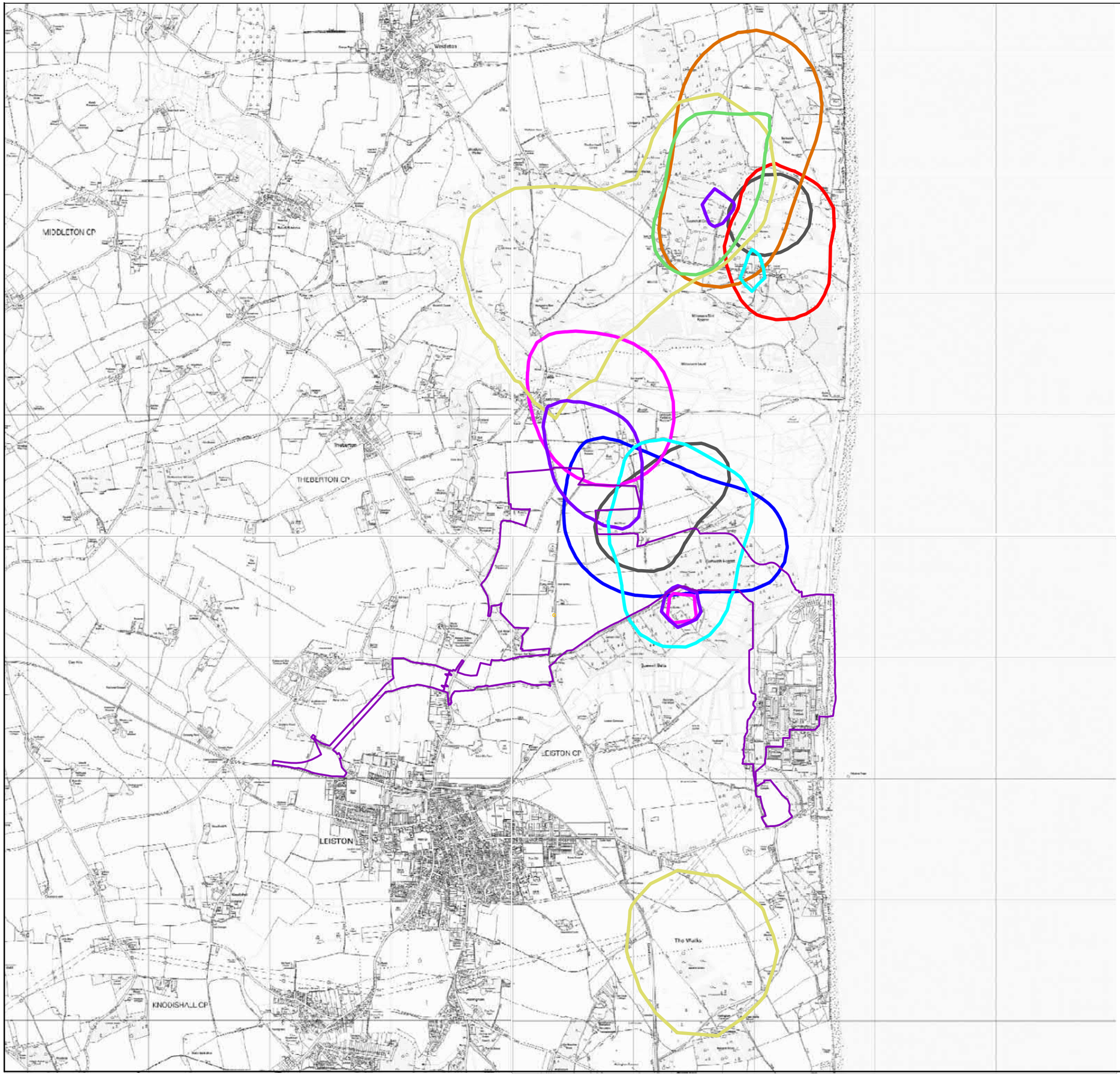
Project:
Sizewell radiotracking August 2014

Title:
95% MCP Overlapping breeding female bats 2014

status	drawing no.			
FINAL	**Figure C7**			
scale	size	date	drawn	checked
NTS	**A3**	**28-05-2015**	**AW**	**HL**

CAD filename
FIG1.dwg



KEY

- Site Boundary
- Bat 1 50% Kernel analysis
- Bat 2 50% Kernel analysis
- Bat 6 50% Kernel analysis
- Bat 7 50% Kernel analysis
- Bat 10 50% Kernel analysis
- Bat 13 50% Kernel analysis
- Bat 16 50% Kernel analysis
- Bat 17 50% Kernel analysis
- Bat 18 50% Kernel analysis

revision	description	date	checked by

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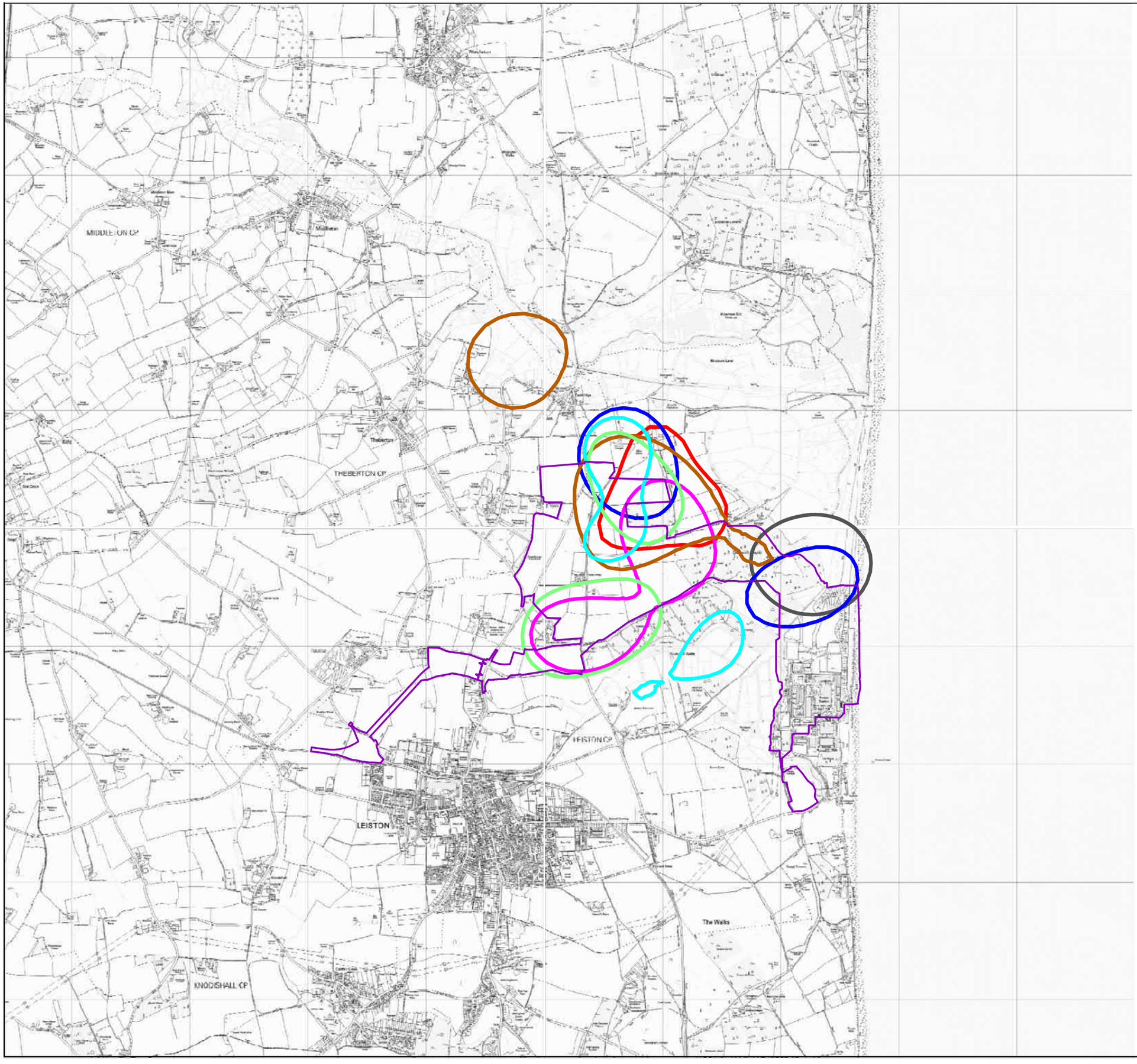
Project:
Sizewell radiotracking August 2014

Title:
C8 - Breeding female barbastelle Kernel 50% analysis 2014

status	drawing no.			
FINAL	**Figure C8**			
scale	size	date	drawn	checked
NTS	**A3**	**28-04-2015**	**AW**	**HL**

CAD filename
FIG1.dwg



KEY

- Site Boundary
- Bat 6 50% Kernel analysis
- Bat 8 50% Kernel analysis
- Bat 9 50% Kernel analysis
- Bat 11 50% Kernel analysis
- Bat 13 50% Kernel analysis
- Bat 17 50% Kernel analysis
- Bat 20 50% Kernel analysis

revision	description	date	checked by

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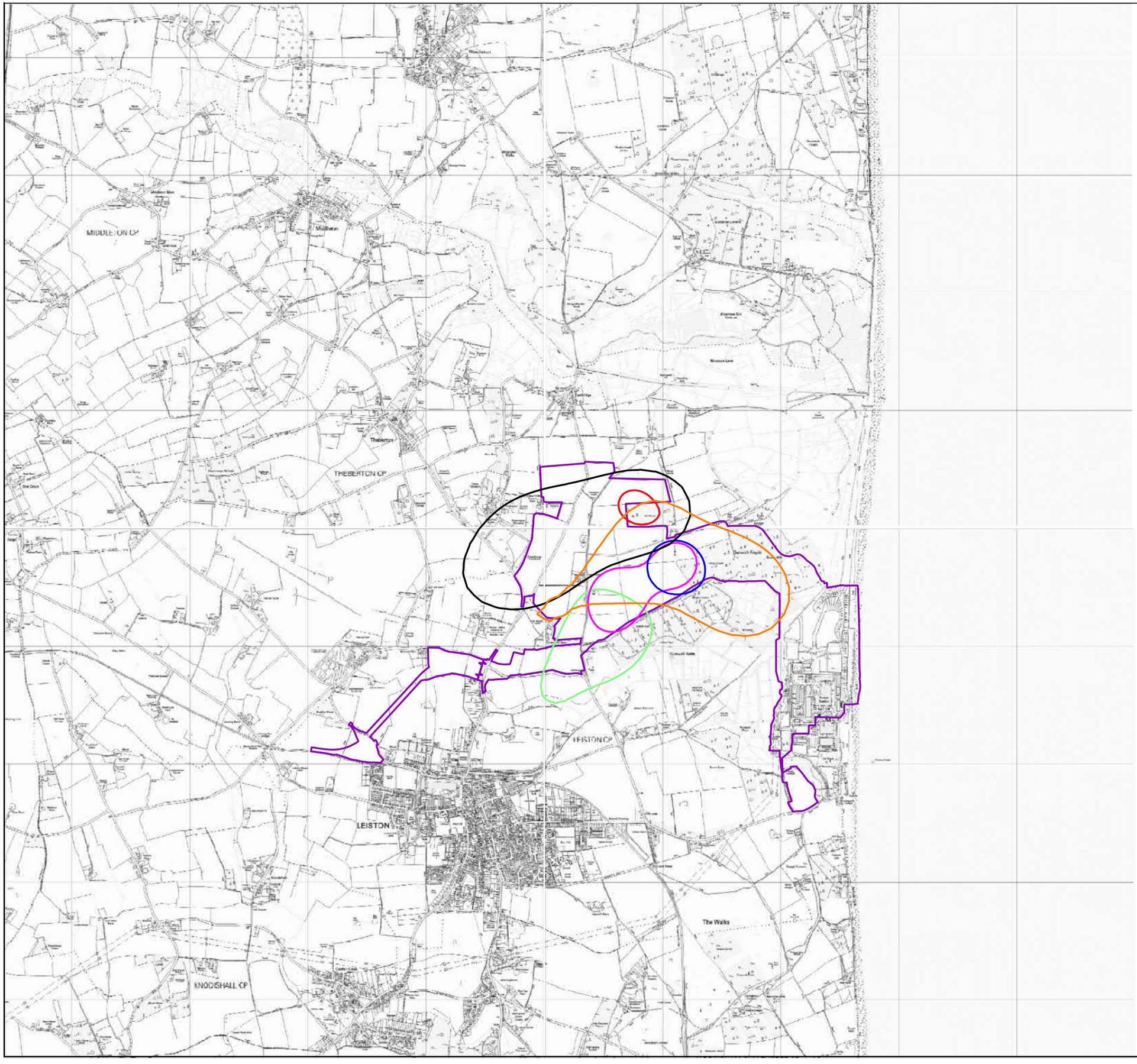
Project:
Sizewell radiotracking August 2014

Title:
C9 - breeding female barbastelle Kernel 50% analysis 2011

status	drawing no.			
FINAL	Figure C9			
scale	size	date	drawn	checked
NTS	A3	28-05-2015	APW	HL

CAD filename: FIG1.dwg



KEY

- Site Boundary
- Bat 1 50% Kernel analysis
- Bat 2 50% Kernel analysis
- Bat 3 50% Kernel analysis
- Bat 4 50% Kernel analysis
- Bat 5 50% Kernel analysis
- Bat 6 50% Kernel analysis

revision	description	date	checked by

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Project:
Sizewell radiotracking August 2014

Title:
C10 - breeding female barbastelle Kernel 50% analysis 2010

status	drawing no.
FINAL	Figure C10

scale	size	date	drawn	checked
NTS	A3	25-09-2015	APW	HL

CAD filename
FIG1.dwg

Photographs 1 - Barbastelle Tree Roosts

Tree R23

Tree R24

Tree R25

Tree R26

Tree R27

Tree R28

Tree R29

Tree R30

Tree R31

SIZEWELL

RADIO-TRACKING REPORT

For and on behalf of

Arcadis

MAY 2016

CONTENTS

Tables

Appendices

Appendix 1 – Weather data from RSPB

1.0 Executive summary

1.1 A scheme involving the construction of the new proposed Sizewell 'C' power station and associated works including access roads and other temporary construction activities and associated developments near Leiston, Suffolk is subject to an Environmental Assessment. This report summarises the radio-tracking study undertaken in 2014.

1.2 The radio-tracking study had the following objectives:

1. to capture barbastelle (*Barbastellus barbastellus*) within the EDF Energy Sizewell Estate later in the bats' active season (see para 2.1.4) to supplement the data gathered earlier in the season in 2010 and 2011 and to determine by radio-tracking the extent of habitat use.
2. to capture bats beyond the EDF Energy Sizewell Estate (subject to landowner access) and determine by radio-tracking the extent to which individual barbastelle use areas that are outside *and* within the EDF Energy Sizewell Estate.
3. to identify further roosts through the location of tagged bats during the day.
4. to determine if the activity of adult male barbastelle differs from that of adult females and juveniles
5. to examine any rings found on captured barbastelle to look at persistence in the local area.

1.3 In the licence application, it was also requested that the licence should include radio-tracking Nathusius' pipistrelle, Daubenton's bats and serotine, if trapped. The aim of tracking these species would be to find the maternity roost(s) of these species (thought to be off-site) and determine the extent of their foraging areas within the zone of influence of the proposals.

1.4 A total of 285 bats (including recaptures) were caught during six nights of trapping (9 August 2014 and 11 to 15 August 2014). Trapping locations were in two areas, Minsmere RSPB Reserve as well as the EDF Energy Sizewell Estate.

1.5 A total of 18 barbastelles and one serotine were radio-tagged. The tagged barbastelles used a total of nine confirmed tree roosts (along with six other locations), none of which had been used in the previous 2010 and 2011 surveys. The total number of roosts found over the three radio-tracking periods (June 2010, August 2011 and August 2014) is now 31 plus six approximate roost locations. Of the 18 barbastelles radio-tagged, sufficient data for 15 were collected to allow home range analysis. Four bats were regularly recorded in the Minsmere Levels north and west of Eastbridge and also further west in the area of Theberton House. The objectives for radio-tracking barbastelle were met (although no ringed bats from the 2011 survey were re-caught).

1.6 A single serotine was tagged and tracked. This individual roosted in the grounds of Theberton House (to the west of the EDF Energy Sizewell Estate) where no access was allowed. No further information was available for the roost site; however, the bat was successfully tracked during the night. No female Daubenton's bats were caught within the EDF Energy Sizewell Estate, and no Nathusius' pipistrelle were trapped in either site.

2.0 Introduction

2.1 Project Background and Purpose

2.1.1 A scheme involving the construction of the new Sizewell 'C' power station and associated works including access roads and other temporary construction activities and associated developments near Leiston, Suffolk is subject to an Environmental Assessment.

2.1.2 A considerable amount of bat survey work has been undertaken by Amec/BSG Ecology (2007-2012), and more recently by Hyder Cresswell (now Arcadis; from 2013). This has included transect surveys, static surveys and capture, mist-netting and harp-trapping (the latter activities carried out under previous licences held by Corylus Ecology).

2.1.3 The initial surveys recorded barbastelle at various locations throughout the EDF Energy Sizewell Estate on a regular basis. A session of trapping in May 2009 [under Licence No. 20091142] by Corylus Ecology resulted in a total of 42 bats from five species being caught. Over the three evening trapping sessions (half-night surveys), five barbastelles were caught: four female and a single male. All were caught in harp traps. On the first two evenings, the earliest barbastelles were removed from traps within an hour after sunset (the first, a male, was 50 minutes after sunset and the second c.58 minutes after sunset). The presence of a breeding population of this species was subsequently confirmed through radio-tracking.

2.1.4 A single session of radio-tracking was carried out by Corylus Ecology over a two-week period in June 2010 [under Licence No. 20102328]. A total of eight barbastelle bats were caught and radio-tracked and a further two were released untagged as they were considered to be too heavily pregnant to be radio-tracked. As a result of this work, it was decided that a session of radio-tracking later in the season once juvenile barbastelle bats were flying would be useful to further assess the use of the breeding colony during the key maternity and post-maternity period.

2.1.5 In 2011, a further session of trapping and radio-tracking was licensed [under Licence No. 20112929]. Eighteen barbastelle were caught (eight juveniles, seven breeding females, two non-breeding females and one adult male), of which seventeen were tagged (and sixteen ringed). As a result, a further eleven roosts were identified (ten in trees).

2.1.6 During the 2010 and 2011 radio-tracking surveys, a total of 22 roosts were found, all but two in trees. The main roosting areas recorded in 2011 for adult females and juveniles bats was centred on Ash Wood and the woodland adjacent to Plantation Cottages (to the north), with all breeding females recorded in these areas; tree roosts in Kenton Hills/Leiston Old Abbey Woods were also used. A single breeding female was also recorded roosting to the north (in 2010 only) in Hangman's New Wood, to the west of Minsmere. The

only tagged adult male was recorded briefly roosting in a barn (Hill Farm) a little to the west of the site and on the southern edge of Kenton Hills.

2.1.7 These two radio-tracking studies indicated a core foraging zone used by juveniles and breeding females extending south from the woodland adjacent to Plantation Cottages (to the north) through Black Walks, Ash Wood and into Goose Hill, Kenton Hills and the north-eastern part of the Sizewell Belts. The core foraging zone includes the areas used by juveniles when they become volant (are able to fly) but are incapable of making long commuting flights and are starting to be weaned and learn to hunt for themselves (Greenaway, 2004). There was less overlap of foraging by both breeding female and juvenile barbastelle in peripheral areas such as Sizewell Belts compared to the core foraging area.

2.1.8 Outside the core foraging area, bats were recorded in 2010 and 2011 foraging in parkland around Theberton (north-west), in Greenhouse Plantation (to the west) and to the south.

2.1.9 The radio-tracking work in 2010 and 2011 recorded the maximum distance travelled by a breeding female from a roost tree to a joint bearing at Sizewell was 3.1km; another travelled at least 2.9km into Minsmere; three others ranged over 2km. These distances appeared to be genuine rather than an artefact of the radio-tracking process. By comparison, considerable daily foraging distances (>10km) have been recorded in other studies (including bats tracked in Norfolk by Corylus Ecology). However only a sub-set of the population at Sizewell had been sampled in 2010 and 2011, therefore, further work was required to investigate foraging distances.

2.1.10 In summary, the barbastelles previously tagged (by year, gender and age) are outlined below:

Table A1 - Summary of barbastelles tagged in 2010 and 2011

Year	Adult female breeding	Adult female non-breeding	Adult male	Juvenile female	Juvenile male	Totals
2010	6		(1)			7
(Adult male in 2010 lost tag the day after tagging)						
2011	7	2	1	1	6	17
All barbastelle tracked in 2011 were also ringed with the exception of one male juvenile						
Total	**13**	**2**	**1 (+1)**	**1**	**6**	**24**

2.1.11 Very few males have been captured and tracked, which may either be a realistic representation of the population (fewer males are present to be trapped), or an artefact of the sampling effort (for example, as a result of sex-linked differences in behaviour of bats such as differences in foraging areas causing bias at capture locations). Male bats tend to range over a greater distance and are not as strongly associated

with the core breeding habitat monopolised by the females. The trapping carried out was principally within or in close vicinity to the core breeding habitat.

Other species

2.1.12 Consent was also sought in 2011 to capture and radio-track Nathusius' pipistrelle, Natterer's, brown long-eared and Daubenton's bats.

- At this point, the bat activity surveys undertaken by Amec/BSG (Arcadis, 2016, in prep.) had recorded Nathusius' pipistrelle activity throughout the summer breeding period. Currently little is known about Nathusius' pipistrelle maternity roosts in England and it was considered important to try to determine if there is a breeding roost in the vicinity of the proposals.
- The previous radio-tracking/trapping recorded good numbers of Natterer's bats and it was confirmed there was a breeding colony within the survey area. The aim of radio-tracking this species in 2011 was to try to find significant foraging areas and any key roosting areas.
- Based on trapping results and static bat detector surveys, brown long-eared bats are widespread and relatively common, and at least two maternity roosts are present.
- Only a single Daubenton's bat (a male) was caught in 2010 (traps were not set in areas specifically to catch this species). However, the activity surveys recorded this species foraging over the Sizewell Belts.

2.1.13 Four Natterer's bats and one brown long-eared bat were radio-tagged in 2011. No Daubenton's bats or Nathusius's pipistrelle were trapped, so could not be radio-tracked.

2.1.14 Nine serotine were trapped in 2011 (an unusually high number for this site) but not tagged/tracked as they were not included on the 2011 licence.

2.2 Objectives

2.2.1 During ecology workshops held with stakeholders in October 2013 and February 2014, it was agreed that carrying out additional radio-tracking in 2014 would be of benefit to the overall understanding of the EDF Energy Sizewell Estate and wider area by bats, particularly barbastelle. The study has the following objectives:

- to capture barbastelles within the EDF Energy Sizewell Estate later in the bats' active season to determine by radio-tracking the extent of habitat use beyond the boundaries of the EDF Energy Sizewell Estate;
- to capture bats beyond the EDF Energy Sizewell Estate (subject to landowner access) and determine by radio-tracking the extent to which individual barbastelles use areas that are outside *and* within the EDF Energy Sizewell Estate. The RSPB allowed access to land to the north of the EDF Energy Sizewell Estate within their Minsmere Reserve;

- to identify further roosts through the location of tagged bats during the day;
- to determine if the activity of adult male barbastelles differs from that of adult females and juveniles;
- to examine any rings found on captured barbastelles to look at persistence (the small numbers previously ringed may give an indication of population size, but not an accurate estimate).

2.2.2 In addition to the surveys of barbastelle, serotine were also targeted for radio-tracking along with Daubenton's bat and Nathusius' pipistrelle. This choice of these species was based on: the results of the previous transect/activity surveys; the 2011 radio-tracking surveys (which tracked Natterer's and brown long-eared bats); and the potential impacts of the proposals; with the objective of determining if breeding females were present and the locations of their roosts, if any, and to determine the extent of their foraging areas within the zone of influence.

3.0 Methodology

3.1 Harp-trapping and mist-netting, with additional hand-netting from tree roosts, was undertaken between 9 and 15 August with radio-tracking commencing on 12 and continuing until the 22 August.

3.2 Acoustic lures (Sussex Autobat) were used during the trapping exercise. The lures played either a synthesised barbastelle or Nathusius' pipistrelle social call and were used near to harp traps on a number of evenings specifically to attract those subject bats.

3.3 Bats were tracked throughout the night until they were lost by surveyors, and then tracked by surveyors during the day who attempted to find their roosting locations. At emergence times, surveyors also attempted to catch bats from roost trees using static hand-nets where placement was possible. This was only undertaken on the one occasion on 15 August. Two of the main tree roosts were considered impossible to climb and mist-nets were put as close to the roosts as was considered safe to catch bats emerging from these trees.

3.4 A licence for the trapping and radio-tracking study was granted to Helen Lucking of Corylus Ecology by Natural England [licence number 2014-1934-Sci-Sci] with ringing to be undertaken by Helen Lucking, Geoff Billington of Greena Ecological Consultancy or Dr Stephanie Murphy of Arbeco Ecological Services Ltd. The main accredited agents used were: Paul Spencer of Corylus Ecology; Alison Johnston, Stephanie Murphy of Arbeco Ltd; and Geoff Billington of Greena Ecology. A number of other surveyors employed by Corylus Ecology were used as accredited agents during the trapping and for radio-tracking. All radio-trackers were experienced in such work.

3.5 Biometric data were recorded from all bats caught including gender, forearm length and weight. Every bat was also examined to ascertain its breeding status, where possible. Only bats which were in healthy condition and of suitable weight were considered for tracking/ringing. Bats were tagged with radio-transmitters provided by Biotrack. Tags weighed 0.47g, 0.35g or 0.28g, and the licence granted from Natural England allowed tags to be used on bats up to a maximum of 5% body weight. Eighteen barbastelles were tagged ranging in weight from 7.4g (a male) to 10.8g. A single serotine was the only species to be tagged with a 0.47g tag which was approximately 1.8% body weight. The bats being tracked were fur-clipped and the transmitters glued between the shoulder blades using Salts Latex Adhesive Solution 833005[1] adhesive. The 0.47g and 0.35g transmitters used were designed with a battery life of at least eight days with the 0.28g tags set for five days. Care was taken to ensure that tag frequencies would not overlap. Time was allowed for the bats and transmitters to settle and for receivers to be set to the optimum frequency of each transmitter

[1] Current guidance from the Bat Conservation Trust suggests that the new formulation of SkinBond adhesive may not be safe for use with bats. The adhesive used during surveys at Sizewell was a latex-based formula which has been used successfully by the RSPCA and other UK consultants.

before releasing the bats close to where they had been caught. Each tracked bat was assigned a consecutive number to allow them to be distinguished easily during tracking.

3.6 Bats were radio-tracked using Australis and Sika radio-tracking scanning receivers with Yagi rigid directional aerials to track bats on foot. Whip omni-directional antennas were employed when searching for bats by vehicle. Hand-held sighting compasses were used to take bearings and both detailed maps and handheld GPS units were used to provide locations for both surveyors and bats. Between two and nine surveyors were used to radio-track the bats, using both close-tracking and synchronised triangulation techniques to produce joint bearings. Surveyors used long-range MITEK radio-sets and mobile phones to allow contact to be maintained while synchronised joint bearings were taken.

3.7 The key night-time radio-tracking surveyors used were experienced in multi-bat tracking studies for development and road schemes, each having a minimum of seven years' experience of similar, sustained trapping and tracking survey. Experienced day-time surveyors were used to track bats back to day roosts.

3.8 A series of safe observation points for the radio-tracking surveyors were pre-planned to allow for safe working and to provide the best receiver locations for joint bearings to be taken. However, since the 2011 surveys, access to private land around the village of Eastbridge had become more restricted and many of the pre-planned monitoring points could not be used. Surveyors were therefore positioned largely within the EDF Energy Sizewell Estate and Minsmere, or in (limited) additional areas where access had been approved. If a bat moved further to the west (around the village of Eastbridge and neighbouring farmland) such that the surveyors were unable to move to get a joint bearing, tracking was suspended until the bat moved closer to the survey area.

3.9 If a bat was recorded, then attempts were made to take synchronised, also referred to as 'joint', bearings, with another surveyor. This meant that surveyors frequently had to change locations in order to get joint bearings. It is recognised that gathering regular, accurate and triangulated fixes for foraging bats is difficult. This is because bats forage in flight and at speed, continually twisting and turning, causing fluctuations in transmitter pulse amplitude which can impede interpretation of distance and direction (Mackie & Racey, 2007). In addition, the barbastelle is a wide-ranging, fast-flying species which switches roosts frequently. Care also had to be taken to ensure that the surveyors were positioned away from overhead cables and electric fences to avoid disturbance to the compasses and radio-signals

3.10 The high number of experienced radio-trackers meant that a wide area was covered for radio-tracking, not just the EDF Energy Sizewell Estate. All surveyors were mobile, with each surveyor able to drive to new locations and were in contact with each other with long-range radios. In previous studies, if no tagged bats were in the area of the proposals, surveyors would search for bats in the wider area, although priority would always be given to those in closer proximity to the scheme. For this study, the aim was not just to record data from within the area of the proposals but to record the extent of bat foraging across the landscape. Due to access arrangements with private landowners, not all areas of the landscape could be fully surveyed. Surveyors were allowed access to land within the Minsmere and EDF Energy Sizewell Estates and at the National Trust at Dunwich. Vantage points (VPs) for taking bearings were also possible from public land such as formal road laybys or on private land where access was granted. Access was restricted around Eastbridge for the 2014 surveys (there had been no such restriction on this area during the 2010 or 2011 surveys). As a result, varying numbers of triangulation points were taken for each bat, and not all bats were followed as closely as others. However, omni-directional aerials on cars allowed the presence of bats in certain areas to be determined even if there were no public road laybys to allow a bearing to be taken (although it should be noted that vehicles did not drive between Eastbridge and the B1122 on any route during the main tracking period). Vantage points within the Minsmere Reserve and Dunwich Heath in elevated positions were used in 2014 which allowed bats in the Eastbridge area to be tracked.

3.11 Collecting tracking data on female bats was prioritised over data collection from male bats when male bats were not present within the areas where most bats were being recorded. The majority of the barbastelle population caught at Sizewell comprised females; data from previous years indicated that the females were more faithful to the habitats present within the EDF Energy Sizewell Estate, with male bats using areas away from this area. The receivers used allowed easy scrolling between the frequencies of the different tags/bats and the surveyors were constantly checking for the presence of all bats including the male tagged bats. As well as recording bats that were within range, surveyors also noted which bats were not recorded.

3.12 The local bat group representatives were contacted, in this case the local Suffolk Wildlife Trust team, to inform them of the work and to check whether any other radio-tracking was being undertaken by other surveyors who should also have contacted the same bat group representatives. No concurrent studies were reported.

Analysis

3.13 For each tagged bat, the triangulation points obtained have allowed habitat areas to be identified. Detailed statistical analysis relating to variation in home ranges (an area over which an animal or group of animals regularly travels in search of food or mates, and which may overlap with those of neighbouring animals or groups of the same species) or core areas (the area where the animal spends the majority of its time) has not been undertaken as the same level of survey effort was not carried out for each bat. Wherever sufficient information has been gathered, analysis of home ranges has been undertaken.

3.14 The data presented in this report are based on all available triangulation points. In addition, where a bat was known to be present in a given location at a given time, a data point was also generated. Where a bat was closely radio-tracked (for example, a bat foraging for a sustained period within a specific area), a triangulation point was generated for the approximate centre of the foraging area. The aim was to obtain a fix for at least every ten-minute interval. However, in real terms, this may have not been possible for every radio-tracked bat. This is because barbastelles have a tendency to move through the landscape quickly, resulting in the transmitter not being detected by the receiver. Therefore, once a radio-tagged barbastelle had been re-located it was imperative to obtain as much data as possible to establish a pattern of range use. If during the night time active tracking a number of similar fixes were achieved within a short period time, i.e. 10 minutes, then multiple fixes were discarded to correct for autocorrelation. Millspaugh and Marzluff (2001) conclude that for home range analysis adequate sampling of animal locations throughout the duration of the study is more important than determining a time interval between sampling that is statistically independent. It is important therefore that the study incorporates biological traits of the animal into the sampling schedule: for example, studying nocturnal animals in both day and night locations to prevent bias towards a particular behaviour or activity. The data was checked to make sure there were no duplicates/clumping of fixes at the roosts during the night-time tracking to eliminate overestimate of habitat use around roosts due to swarming. Selection of a sampling interval less than that required for "time to independence" (TTI – the time at which autocorrelation is non-existent in successive observations) will not invalidate kernel or MCP analysis, provided that the time frame of the study is adequate (Swihart and Slade 1997; Millspaugh and Marzluff, 2001).

3.15 Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce minimum convex polygons[2] (MCPs), neighbour linkage[3] (or clusters) and kernel contours[4]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

[2] The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

[3] A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

[4] Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

3.16 Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

Emergence surveys of barbastelle roost trees

3.17 During the 2010 and 2011 radio-tracking surveys, a total of 22 barbastelle roosts were located. Of these, two were barns used by single male bats and another was within an area of inaccessible woodland at Grimseys where two female barbastelles roosted in 2010. It was impossible to tell if more than one roost location was used in Grimseys. The other 19 roosts were all in trees which could be accessed. During the 2014 study, a further nine barbastelle tree roosts were located with a further six unspecified roost areas identified bringing the total known to 36. During 2014, emergence surveys were undertaken on six trees, including two tree roosts identified in 2011.

Survey limitations

Trapping and radio-tracking

3.18 During the radio-tracking session, the weather was unsettled after a relatively long period of warm and settled weather. One evening of trapping was cancelled due to high wind and rain when ex-hurricane Bertha passed over the UK on 10 August. Following this storm, there was an unusually long period of strong winds that restricted trapping to harp traps only and in more sheltered locations. On 14 August, a heavy sea mist came in at around 00.45hrs. Toward the end of the tracking period, night-time temperatures were also unusually low, dropping down to 5^{o}C on 19 and 20 August which resulted in ending the tracking at around 1am as the majority of bats had either returned to their roost or could not be found.

3.19 Weather data was provided by the RSPB's Minsmere Reserve following the installation but subsequent internal battery failure of a Tinytag temperature datalogger. The data provided is included in Appendix 1. The data is for daytime conditions only.

3.20 As was found during 2010 and 2011, the landscape of the area made joint bearings difficult to take in places. Much of the area is flat and there were few good vantage points from which to take bearings over the wider landscape. Although there is slightly higher ground in Nursery Covert and Goose Hill, these areas are not particularly elevated and have undulating ground. As a result the signal from tagged bats would rapidly appear and disappear as they moved below and over ridges in the woodland, and surveyors frequently had to move location to be able to take bearings. However, one location at the Coastguard Cottages on the

coast at Minsmere was used on every night as this was a high point with most bats being tracked from that location.

3.21 A significant area around Eastbridge was excluded to all surveyors even by car to avoid issues with local landowners who had revoked consent to access. This was during both day- and night-tracking. Access to a number of other areas was restricted by the RSPB to reduce disturbance to sensitive nesting bird species These areas of restricted access are shown on Figure A1. As with the 2011 radio-tracking surveys, there was electrical interference in the Fiscal Policy area which affected the receivers in this area and into Kenton Hills and Lover's Lane area. As a result the strength of the signals from the tags were much reduced.

3.22 Another constraint was the loss and failure of tags. The tag on Bat 4 appeared to be faulty as it was first detected on 16 August in the Nursery Covert area four days after it was fixed on the bat. The tag on Bat 12 was not recorded after it had been released and so no bearings were possible for this bat. Bat 10 was caught on 13 August just after midnight and its roost was found for three days before the tag appeared to fail.

3.23 Only three adult male bats were caught and therefore tagged. These bats were not radio-tracked to the full extent of their home range particularly those that roosted a considerable distance from the Sizewell area near Saxmundham.

4.0 Radio-tracking results

4.1 Trapping results

4.1.1 Full details of all bats caught are provided in **Table A2** (presented at end of document). None of the bats caught had previously been ringed. A summary of the species and the breeding status of caught bats are provided in **Tables A3** and **A4** for Sizewell and Minsmere respectively. Twenty-seven barbastelles were caught and 18 were tagged, a summary of the barbastelle bats caught is shown in **Table A5.** Vantage points for taking bearings are shown in **Figure A1.** The trapping and roost locations are shown in **Figure A2**. **Figure A3** shows locations of areas described within the report (though the boundaries shown are approximate and cannot be relied upon, particularly in relation to land ownership).

Table A3 - Summary of species and breeding status of bats caught within EDF Energy Sizewell Estate

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	7	1		3	5	1	17
Brown long-eared	2	1		6			9
Daubenton's				1	1		2
Natterer's	5		1	11			17
Common pipistrelle	4	8	5	17	2	1	37
Soprano pipistrelle	2		2	12	1		17
Serotine		1					1
Grand Total	**20**	**11**	**8**	**50**	**9**	**2**	**100**

Chart 1 – Numbers of male and female bats caught per species within EDF Energy Sizewell Estate

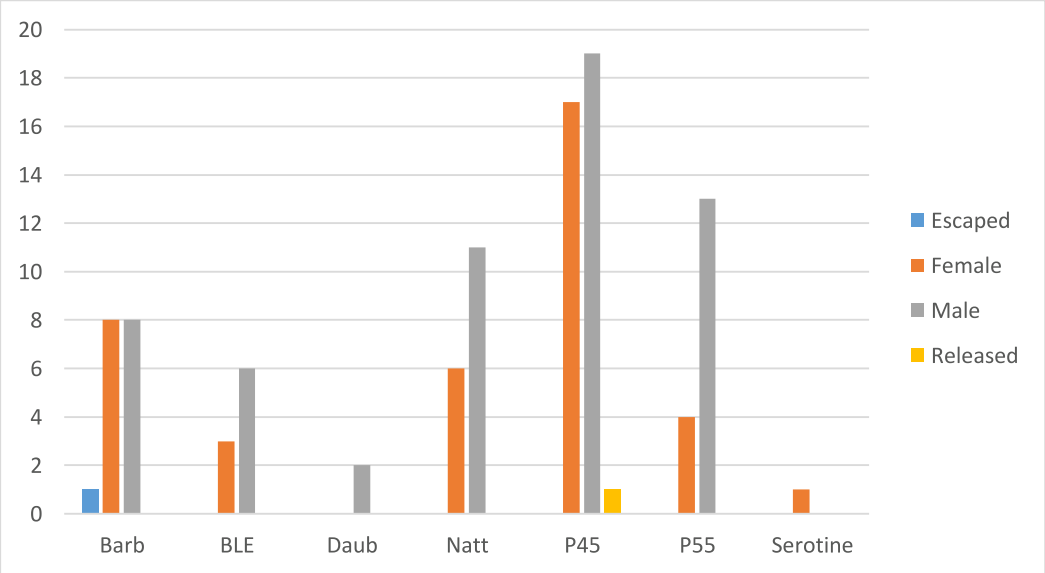
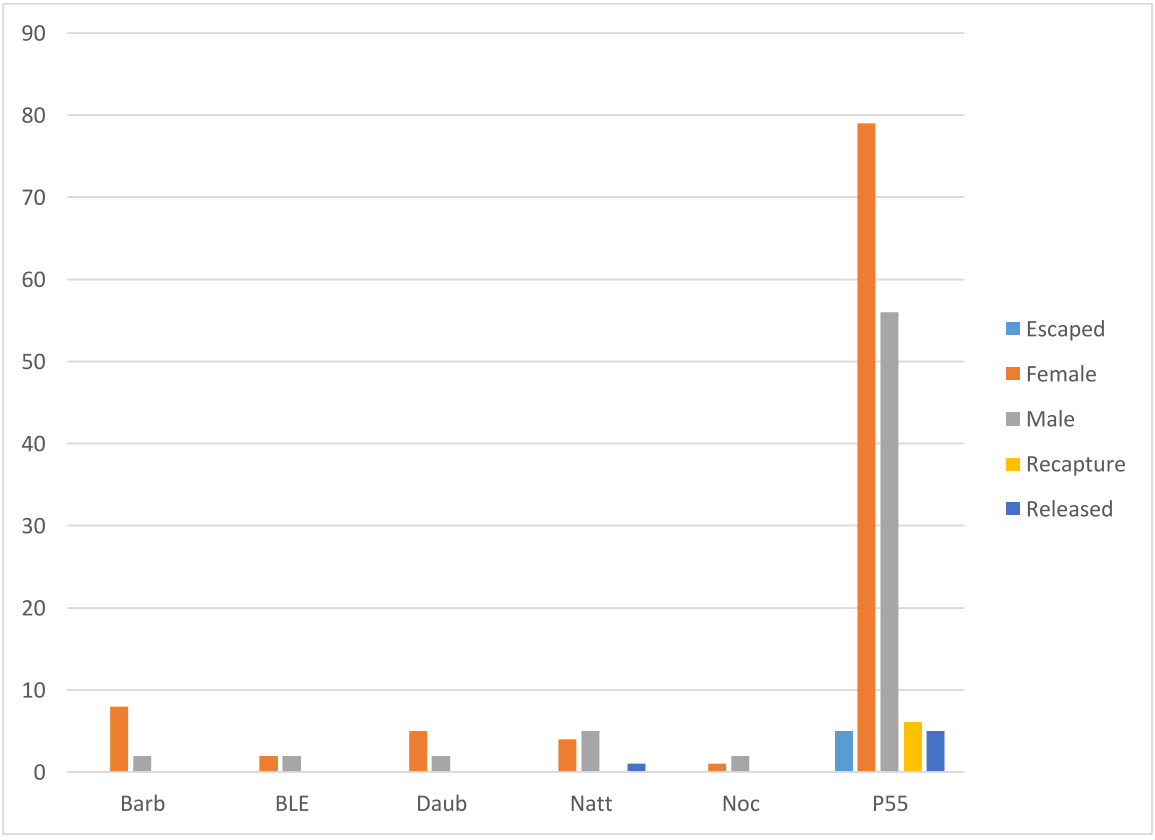


Table A4 - Summary of species and breeding status of bats caught within Minsmere

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	5	2			2	1	10
Brown long-eared	1		1	1	1		4
Daubenton's		1	4		2		7
Natterer's	1	1	2	3	2	1	10
Noctule	1			2			3
Soprano pipistrelle	3	4	72	21	35	16	151
Grand Total	**11**	**8**	**79**	**27**	**42**	**18**	**185**

Chart 2 – Numbers of male and female bats caught per species within Minsmere (note different scale to previous chart)



4.2 Trapping Overview

4.2.1 In total 285 bats were caught during the trapping exercise. This includes six bats that escaped from the nets, seven that were recaptures and seven that were caught too close to sunrise to be able to take any

biometric data and were released straight away. Seven species were caught within the EDF Energy Sizewell Estate and six within Minsmere; a total of eight across both areas. Serotine and common pipistrelle were caught at Sizewell but not at Minsmere whilst noctule was caught at Minsmere but not Sizewell. There were a total of seven trapping sites. Four of these trapping sites were within the EDF Energy Sizewell Estate: at Fiscal Policy; in the northern section of Nursery Covert; along Abbey Lane; and the southern side of Nursery Covert. There were three sites within the Minsmere Reserve: at Southwalk Belt to the south-west of the Visitor Centre; at the centre of the track leading north from Hangman's Wood; and north of Sheepwash Lane in Scottshall Covert. In addition, two trees were climbed: R26 in Ash Wood and R27 in Nursery Covert (both within the EDF Energy Sizewell Estate). Bats were only caught and tagged from one of these trees. A third tree was due to be climbed, but it was determined that the area of the likely roost would be too difficult to safely access and instead two mist-nets were installed near the tree.

9 August 2014

Fiscal Policy (T1)

4.2.2 A single male juvenile barbastelle weighing 7.8g was caught during the first trapping night at Fiscal Policy (T1). The bat was ringed (ring number T8832) but as it was a juvenile bat it was not radio-tracked. A further 20 bats were caught: eight common pipistrelle, six soprano pipistrelle, four Natterer's bat; a single juvenile male Daubenton's bat; and a single brown long-eared bat.

4.2.3 Following a night of no trapping on the 10 August due to bad weather, two trapping sites were used: Nursery Covert (Sizewell) and Southwalk Belt (Minsmere).

11 August 2014

EDF Energy Sizewell Estate - Northern side of Nursery Covert (T2)

4.2.4 A total of 27 bats were caught including eight barbastelle (four post-lactating females, two adult males and a juvenile male). One barbastelle escaped from the mist-net before it was extracted. The seven processed bats weighed between 8.1g and 10.7g but only six were tagged (Bat 1 through Bat 6). The seventh, a juvenile male was considered to be too stressed and was not weighed. It was quickly ringed (ring number T8827) and subsequently released. Bat 1 was a post-lactating female (ring number T8831); Bat 2 was a post-lactating female (T8828); Bat 3 a breeding male (T8829); Bat 4 was a post-lactating female (T8830); Bat 5 was a non-breeding male (T8981); and Bat 6 a post-lactating female (T9000). In addition four common pipistrelles, six soprano pipistrelles, five Natterer's bats and four brown long-eared were caught.

Minsmere - Southwalk Belt (T12)

4.2.5 At the second trapping site, a total of 69 bats were caught and 56 of these (81%) were soprano pipistrelle. A single juvenile male barbastelle was caught weighing 8.2g but was not tagged (ring number H5944). Other

species caught comprised three Natterer's bats, seven Daubenton's bats (one adult non-breeding female and 6 juvenile) and two brown long-eared bats.

12 August 2014

EDF Energy Sizewell Estate - Abbey Lane (T3)

4.2.6 Two trapping sites were again chosen for this night. The first located on Abbey Lane in Sizewell caught 33 bats including one post-lactating female barbastelle weighing 9.7g, tagged as Bat 12 (ring number T8954). A female adult serotine was also caught (25.1g) and tagged (Bat 9). In total, 21 common pipistrelles were caught, as well as a single soprano pipistrelle, a single adult male Daubenton's bat, six Natterer's bats and two brown long-eared bats.

Minsmere - Lane leading north from Hangman's Wood (T10)

4.2.7 A total of 96 bats were caught at this location, the most caught at any trapping site. Of these 83 were soprano pipistrelles and seven of these were recaptures. Of the six barbastelle caught, five were adults and were subsequently tagged (Bat 7, Bat 8, Bat 10, Bat 11 and Bat 13. A sixth bat was a juvenile and was not tagged (ring number H6098). Bat 7 was a post lactating female weighing 8.5g (H6100); Bat 8 was a non-breeding female weighing 9g (H6099); Bat 10 was a post-lactating female weighing 9.9g (H6097); Bat 11 was a post-lactating female weighing 10g (H6096); and Bat 13 was a post-lactating female weighing 10.8g (H6095). Other species caught comprised three Natterer's bats, one noctule and two brown long-eared bats.

13 August 2014

Minsmere - Scottshall Covert north of Sheepwash Lane (T13)

4.2.8 Again two trapping sites were chosen on this night. The first at land off Sheepwash Lane in the Minsmere Lane caught a total of 18 bats. No barbastelle were caught; however, two male noctule, four Natterer's bats and 12 soprano pipistrelles were caught.

EDF Energy Sizewell Estate - Nursery Covert Southern track (T11)

4.2.9 A total of 16 bats were caught at this location including four barbastelle. All four bats were adults and were tagged. Bat 14 was male weighing 7.4g (ring number T8963), Bat 15 was a non-breeding female weighing 8.4g (T8964); Bat 16 was a post-lactating female weighing 10.6g (T8982); Bat 17 was a post-lactating female weighing 9.8g (T8999). Other bats recorded comprised four common pipistrelles, four soprano pipistrelles, two Natterer's bats and two brown long-eared bats.

14 August

Minsmere – Tree Roost R25

4.2.10 Tree roost R25 located in Minsmere was discovered during day-time tracking. It was not possible to safely reach the likely roost area by climbing; instead two mist-nets were installed near the tree with concealed

surveyors watching for bats to enter the net to ensure they could be extracted immediately. Two adult female barbastelle bats were caught. Bat 18 was a post-lactating female weighing 10g (H6094) and Bat 19 was a non-breeding female weighing 8.5g (H6093).

Tree Roost R26 Ash Wood

4.2.11 Tree roost R26 was found during day-time tracking. A single surveyor climbed the tree but, although bats were seen emerging from the tree, none were caught.

15 August

EDF Energy Sizewell Estate – Nursery Covert Tree Roost R27

4.2.12 The roost was found during day-time tracking and was found to be a tree frequently used by tagged bats. An emergence survey was undertaken to try to determine more accurately where the bats were roosting and emerging. The same surveyor climbed the tree the following evening to attempt to catch bats from it. A total of three barbastelles were caught: all were juvenile male bats and were therefore ringed but not tagged (ring nos. T8978, T8979 and T8980). Two of these bats were under 7g in weight; however, one was a very mature juvenile bat weighing 7.9g.

4.3 Movement of Tagged Barbastelles (see Figures B1-B19)

Bat 1

4.3.1 This bat, a post-lactating female, was caught at Nursery Covert (T2) on 11 August at 20:50. The bat was recorded roosting in four tree roosts: R23 in The Grove on 12 and 14 August before moving to R26 in Ash Wood for one night. It was not found on 15 August before moving to R27 in Nursery Covert until 21 August when it moved to R32 (the unspecified tree(s) near Lower Abbey Farm). All roosts were within the EDF Energy Sizewell Estate.

4.3.2 A total of 57 joint bearings were achieved with a further 14 single bearings. It was initially recorded foraging in The Grove and Nursery Covert but in the early days of night tracking it was rapidly lost flying north in Minsmere Levels. It was recorded using night roosts, including R27, on 14 August between 02:45 and 04:25 but by the time the day-time search was undertaken it was found in R26 in Ash Wood.

4.3.3 It was tracked further north on 14 August in Scottshall Covert before it moved back south to the EDF Energy Sizewell Estate. After this point during the night-tracking surveys it was regularly recorded foraging with the Warren and Scottshall Covert in the Minsmere Reserve, moving south over Minsmere Levels back to the EDF Energy Sizewell Estate.

4.3.4 The bat was recorded returning to its roost relatively early on several nights. On 14 and 15 it was recorded returning to R27 at around 03:00 and 22 August at R 32 from 03:40 (sunrise being around 05:40 during the

period of the tracking). On 20 August when conditions were cold, it was recorded in R27 at 22:58; before this on that evening, its range was restricted as it was not recorded north of the Minsmere Levels. Bearings taken later in the night recorded that it remained in the south.

Bat 2

4.3.5 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 11 August at 20:50. It was not found in a day roost on 12 August but on 13 August it was recorded in tree roost R24 in Scottshall Covert in Minsmere. The following day, tracking recorded it in R27 in Nursery Covert (Sizewell), and it was recorded in the same location on 16 and 17 August. On 18 August, its day roost was not found; however, on 19 August it was located in an area where no access was allowed to the north of Lower Abbey Farm in the same general area as Bat 1 where it was recorded thereafter (R32 area).

4.3.6 A total of 66 joint bearings were achieved with a further 48 single bearings. The bat was not recorded on August 12 by the radio-trackers who were largely in the area of the EDF Energy Sizewell Estate. Similarly it was not recorded the following night until 03:20 when it was recorded static within Ash Wood until at least 03:47. The bat had moved locations after this, as it was found during the day-time checks in R27 in Nursery Covert.

4.3.7 The bat appeared to move rapidly from its roosting area to the main foraging area which was found to be the woodland to the south and east of the RSPB visitor centre at Minsmere, north into The Warren and Dunwich Heath and west into Scottshall Covert. On 20 August, as an example, it was in the Warren at 21:07. It was recorded occasionally returning south towards the EDF Energy Sizewell Estate but the majority of time when it was active was spent in this northern foraging area. On 19 August, after foraging in the Warren area, the bat moved back to the EDF Energy Sizewell Estate and was recorded roosting within Ash Wood at 03:00 (presumed R26) but during the day-time tracking it was found to have moved to R32. On 20 August, which was a particularly cold night, during the night-tracking it was recorded in an unspecified roost at Ash Wood at 22.33, and on 22 August it was recorded flying in Ash Wood and possibly static in the roost, but was in R32 near Lower Abbey Farm in the morning.

Bat 3

4.3.8 This bat, an adult male, was caught at Nursery Covert/Turf Pits (T2) on 11 August. The day roost(s) used by this bat were not identified except for a general area location. Bearings putting it in the area of Grimseys Wood were taken on 13, 14, 16 and 17 August, whilst on 21 August, it was in the northern section of Grimseys Wood. The area is impenetrable and no access was possible at the time of the radio-tracking.

4.3.11 A total of 17 joint bearings were achieved for this bat. The bat was found foraging south of Lovers Lane and apparently using the railway line as a foraging or commuting route. It was recorded here on several nights

including 13, 14, 17 and 22 August. It was also recorded to the south of Sandy Lane. It was often recorded moving through the EDF Energy Sizewell Estate including Fiscal Policy, Nursery Covert, Goose Hill and Dunwich Forest up to Ash Wood. Single bearings and close tracking were achieved which resulted in 78 location points being plotted. It was recorded just to the north of Eastbridge on the Minsmere Levels by a single joint bearing.

Bat 4

4.3.12 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 12 August shortly after midnight. The tag either malfunctioned or the bat dispersed from the study area. No day roosts could be found for this bat, and none of the surveyors recorded this bat after the night it was tagged and released until the night of 16 August. A total of 20 joint bearings were possible on this bat during that night. The bat was recorded to the north at the northern end of The Grove, in the Goose Hill and Kenton Hills area and to the south around the Platform Location near Sizewell.

Bat 5

4.3.13 This bat, an adult male, was caught at Nursery Covert/Turf Pits (T2) on 12 August shortly before dawn at 03:50. On 12 August, it was recorded roosting in the Grimseys Woodland area. After this time it moved between two roosts near Saxmundham; R33 at Redhouse Farm Saxmundham and R34 New Plantation at Saxmundham.

4.3.14 A total of 14 joint bearings were obtained and a further 25 single bearings. This recorded the bat in the Rookyard Woods area, south of the power station on night of 12 and 16 August. It appeared to use the area under the overhead power cables as a foraging area. Joint bearings recorded it as far south as The Walks, to the east of Leiston. Single bearings also recorded it just west of the power station and also north over the Minsmere Levels near Eastbridge. The bat was recorded in these locations on multiple nights.

Bat 6

4.3.15 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 12 August at 04.33. As with Bat 5, it flew and roosted in the Grimseys Woodland on 12 August before moving to R26, an oak tree in Ash Wood on 13 August and 14 August. A count of the tree on 14 August recorded at least 10 bats emerging from the tree. The bat was not found on 15 August but the day-tracking was curtailed due to access problems. At 03:20 on the 15 August, the bat was recorded static within Ash Wood and the first bearing achieved the following evening positioned the bat at The Grove at 21.06. On 16 August it could not be located; however, between 18 and 21 August, it was in the area to the north of Lower Abbey (R32 – approximate location) where again no access was permitted.

4.3.16 Fifty-nine joint bearings were taken over a period of nine nights, with a further 23 single-bearing estimates plotted from monitoring and close tracking. This bat flew quite widely, with joint bearings recording it north in Scottshall Coverts and the Warren, over Minsmere Levels and south into Grimseys and towards Sizewell Belts. It was also recorded further west just south of Theberton. The bat was recorded regularly returning to an unspecified night roost in Ash Wood. The exact roost was not determined as it was considered if a surveyor approached a night roost tree it would likely disturb the bat and cause them to fly. On each evening between 13 and 16 August, and 20 to 22 August (inclusive), the bat was recorded static in Ash Wood from around 01:00 or from 03.50. The bat was recorded in R26 in Ash Wood on 13 and 14 August but on 16, 20, 21 and 22 it moved location by the time of the day-time tracking.

Bat 7

4.3.17 This bat, a post-lactating female, was caught at the northern section of New Hangman's Wood (T10) on 12 August at 21:25. It was re-caught in the same general trapping area at midnight. It was recorded roosting in R27, the dead Scot's pine tree in Nursery Covert, every day it was found. It was not recorded in a day roost on 15 August when day-time tracking was curtailed due to access issues; however, it had been recorded static at 03:20 in R27 on the 15 August.

4.3.18 This bat was recorded most regularly around the Black Walks, Lower Abbey and Minsmere Levels area; however, it was also recorded north-west of Westleton and west around Middleton. Access for taking bearings was restricted both by access restrictions and landscape and it is thought that this bat foraged in this western area more regularly than the joint bearings suggest. The bat was caught in the north on the track north of Hangman's Wood and was recorded foraging in this area and over the grassland habitats to the east of the track. It was also recorded within Scottshall Coverts and east of the Minsmere Visitor Centre. It was considered likely to be foraging south of this area in the Minsmere Levels through a single-bearing recording but no joint bearings were achieved. No joint bearings were achieved in Nursery Covert as the bat appeared to move north very rapidly after emerging and was regularly recorded in the Black Walks area early in the night (for example, just after 21:00).

4.3.19 This bat was faithful to the same roost for the duration of the radio-tracking. It was recorded back in the roost tree relatively early on two nights. On 14 August it was found back in the roost at 02.33hrs and again on 18 August it was in its roost by 03:30. No other night roosts were found, but it is possible that roosts in the inaccessible western area were used, as the 2011 radio-tracking survey recorded night roosts in the area north-west of Eastbridge.

Bat 8

4.3.20 This bat, a non-breeding female, was caught at the northern section of Hangman's Wood on 12 August at 22:10. A total of 40 joint bearings were achieved with a further five single bearings. No roost was found for

this bat despite extensive searches. It is considered most likely that it was roosting somewhere in the area around Eastbridge and Theberton where access was restricted.

4.3.21 The bat was recorded foraging around the Eastbridge area south to Greenhouse Plantation and Theberton House and north into the Minsmere Reserve including the area where it had been caught and north into Westleton Walks. It is considered likely to have foraged in the area to the north-west of Eastbridge although due to access restrictions it was not possible to get many bearings of it here.

Bat 10

4.3.22 This bat, a post-lactating female was caught shortly after midnight on 13 August at Minsmere at T10 along the lane north of Hangman's Wood.

4.3.23 Only three joint bearings were successful with this bat. The tag appeared to fail after three nights. It was found roosting in R25 for two days after it was tagged (13 and 14 August) and R28 on 15 August. A record was also made some days later on 19 August again at R25 at 03:30 but no other recordings were made.

4.3.24 The three joint bearings taken were all after midnight on 15 August and all three located the bat in the woodland and open habitats to the west of Hangman's New Wood. Single bearings taken over two nights (14 and 15 August) recorded the bat within Scottshall Plantation, over the Minsmere Levels, to the west of Eastbridge and north towards Westleton Walks. It was not recorded by any of the surveyors to the south in the EDF Energy Sizewell Estate.

Bat 11

4.3.25 This bat, a post-lactating female was caught at Minsmere at T10 along the lane north of Hangman's Wood at 01:00 on 13 August. A total of 57 joint bearings were achieved with a further 27 single bearings. The bat used four roost trees. On 13 August it was found in roost R25 in Scottshall Covert. The following four days, it was recorded in R28 before moving to R24 for the next four days. On the final day it was recorded in another new roost, R31, all these roosts being within Scottshall Covert.

4.3.26 The bat was recorded ranging quite widely. Joint bearings found it ranging north as far as Dunwich and south as far as Black Walks on the EDF Energy Sizewell Estate. It was also recorded some distance out to the west between Eastbridge and Theberton, near Westleton and north of Westleton Walks. The majority of joint triangulation points recorded the bat in the woodlands to the north of Scottshall Plantation and Dunwich Heath. It was also recorded foraging over the floodplain on 13 August but, due to access restrictions, joint bearings into this area were very difficult.

4.3.27 It was recorded in roosts relatively early during three of the night-tracking sessions. On 19 August, it was recorded in R28 at approximately 03:20 before moving to R25 at 03:27 and was recorded in R24 during the daytime tracking that day. On 20 at 01:02 it was recorded static in R25, whilst on the 21 August it was recorded static, possibly in R24, at 00:41 before being recorded flying again at 00:58.

Bat 12

4.3.28 This bat, a post-lactating female, was caught at 01:35 on 12 August along Abbey Lane (T3). The tag appeared to fail or the bat dispersed from the study area as it was not recorded after being released although a very weak signal was possibly recorded on 13 August at 22:36 in a westerly direction from Kenton Hills by one tracker. None of the other trackers recorded this bat at this time or at any other time.

Bat 13

4.3.29 This bat, a post-lactating female barbastelle, was caught at Minsmere at trapping point T10 along the lane north of Hangman's Wood at 01:30 on 13 August. A total of 76 joint bearings were achieved with a further three single bearings. No roosting location was found despite extensive searching. Two bearings were possible from locations within the Minsmere Estate which located the bat somewhere in the Eastbridge/Middleton area where access was severely restricted. For the purposes of plotting the data and the home range analysis, an approximate location has been plotted for R37. The bearings taken from Minsmere cross at a point near to Reckford Bridge; however, no signal could be found from near this area during the tracking.

4.3.30 This bat was recorded over a very wide range especially in relation to the other post-lactating female bats tracked. It was recorded as far west as Middleton and north into Westleton Walks and Grimstons Covert in Minsmere. It was recorded regularly near to where it was caught and the heath and woodland habitats around Hangman's New Wood and also further east in Scottshall Coverts. The bat was also recorded to the south in the EDF Energy Sizewell Estate, specifically around Black Walks and Lower Abbey and further south down Abbey Lane. It was also recorded south of Sizewell in The Walks which is south-east of Leiston and south of Thorpeness. It was recorded in this general area on two consecutive nights at approximately the same time (23:22) and it remained in this area for several hours before moving back north.

Bat 14

4.3.31 This bat, an adult male, was caught at the southern edge of Nursery Covert (T11) on 13 August at 21:30. A total of 68 joint bearings were achieved. It was first recorded roosting in R26 in Ash Wood on 14 August but then no roost was found on 15 August when daytime tracking was curtailed. It was then recorded in R27 for the rest of the period.

3.3.32 As with the other male bats, it was recorded widely over the landscape. It was recorded as far south as Lovers Lane, as far west as Westleton Walks and north to the area just south of Dunwich around the caravan park. The majority of joint bearings were made between Goose Hill and Minsmere Levels and in Minsmere around Scottshall Coverts and North Walks.

4.3.33 There were fairly extended periods when the bat was not recorded by the surveyors and it is likely that the bat was foraging more widely than the tracking suggests.

Bat 15

4.3.34 This bat, a non-breeding female, was caught at the southern edge of Nursery Covert (T11) on 13 August. It was only recorded using roost R27 for the duration of the survey. It was not recorded on 15 August when daytime tracking was curtailed, or on 22 August when it was not possible to complete the day tracking, On 23 August it was not recorded in R27 but it was considered most likely the tag had ceased working by this point.

4.3.35 A total of 47 joint bearings were made of this bat. It was a wide-ranging bat, being recorded west and south of Theberton and in the north foraging within the woodland and heathland either side of the track extending north from Hangman's New Wood. The most numerous joint bearings located the bat around Eastbridge down to the grounds of Theberton House. It was also recorded north in Minsmere, over the Levels and around Scottshall Covert. It was also recorded to the east of Goose Hill and within Ash Wood in the EDF Energy Sizewell Estate.

Bat 16

4.3.36 This bat, a post-lactating female, was caught at Nursery Covert (T11) on 13 August just before midnight at the same time as Bat 17. A total of 30 joint bearings were achieved with a further 26 single bearings. It was first recorded roosting in R26 in Ash Wood on 14 August. It was not recorded in a day roost on 15 August when daytime tracking was curtailed due to access issues; however, it had been recorded at 03:20 on the 15 August as static at R26 in Ash Wood. It was then recorded in R27 for the rest of the period.

4.3.37 The bat was recorded foraging in both the Minsmere and EDF Energy Sizewell Estates. In Minsmere, the bat was recorded in Scottshall Coverts and into Westleton Walks and to the west around Hangman's New Wood and the surrounding woodland, heathland and grassland habitats. In Sizewell it was regularly recorded around the Black Walks and Lower Abbey area and down into Ash Wood. Night roosts were also used. On 18 August it was recorded static in Ash Wood (likely R26) at 22:55 but by 23:12 it had gone from this location. On 21 August at 01:22 the bat was again recorded static in Ash Wood (likely R26 in 2011).

Bat 17

4.3.38 This bat, a post-lactating female, was caught at Nursery Covert (T11) on 13 August just before midnight at the same time as Bat 16. A total of 67 joint bearings was achieved, with a further 23 single-point estimates. It was first recorded roosting in R26 in Ash Wood on 14 August but then no roost was found on either 15 or 16 August. It was then recorded in R27 for the rest of the period.

4.3.39 The bat was recorded foraging around the main areas of the EDF Energy Sizewell Estate which had been recorded as foraging habitat in previous surveys namely: Kenton Hills; Goose Hill; the Grove; Ash Wood and Black Walks; and Lower Abbey Farm.

Bat 18

4.3.40 This bat, a post-lactating female bat, was caught from tree roost R25 on 14 August. It was confirmed using tree roost R28 from 15 August through 23 August. A total of 25 joint bearings were achieved. A further 40 single-point estimates were plotted in areas where few joint bearings had been achieved. The single-point data has been analysed and the information from this added into the text below. The bat was recorded widely between Scottshall Coverts and Westleton Walks and north to Dunwich. It was not recorded to the south of Minsmere by any of the surveyors and its main foraging areas were not found initially as it was lost in a general northwards direction on 17 and 18 August relatively soon after emerging from the roost. It was targeted on 20 August and recorded foraging within Dunwich Heath, the Warren and Scottshall Coverts after it had emerged usually sometime between 20:39 and 20:50 for roughly half an hour before moving further north. The bat was tracked down to Dunwich and appeared to be foraging in the area to the east of Dunwich in Greyfriars Wood, using the foreshore. It was also recorded in Dunwich Forest and near Broom Hill to the west of Dunwich although, due to the landscape and the bat moving rapidly between this area to the west and back to the south and east of Dunwich, no joint bearings were successfully achieved in the area to the west. Once the bat had been tracked to this area, single surveyors periodically drove to the area and took single bearings on this bat. The bat would move between the Dunwich area and the Minsmere area through the night. It was not recorded flying south of Scottshall Covert at all during the tracking.

Bat 19

4.3.41 This bat, a non-breeding adult female, was caught in a mist-net near to tree roost R25 on 14 August. Fifty-one joint bearings were achieved with a further 36 single-point estimates. It was confirmed using tree roosts R29, R30, R24 and R31 which are all within Scottshall Coverts from 15 August through 23 August.

4.3.42 During the first nights of night-time tracking, the bat was recorded moving north after emerging and was lost shortly afterwards. On 16 August, it was tracked down to the north and north-east of Westleton in Dunwich Forest and Westleton Heath. Its area extended to farmland to the north and north-west of Westleton. Once the bat had been tracked to this area, single surveyors periodically drove to the area and took single bearings

on this bat. It spent time moving between Scottshall Covert and Dunwich Forest during the night. It was not recorded flying south of Scottshall Covert regularly but one joint bearing recorded the bat flying in the wetland area of the Minsmere Reserve

4.3.43 It was recorded returning to its roost relatively early (around 03.15) on two nights (sunrise being around 05.40 during the radio-tracking period). On morning of 19 August, the bat returned to roost R25 at 03.15 before then moving to roost R24 at 03.20 where it remained. On 21 August, the bat returned to its roost early, shortly after midnight (this was the night when temperatures fell considerably).

4.4 Other species

Bat 9 – Serotine

4.4.1 This bat, a non-breeding female serotine, was caught at 22:35 on 12 August at Abbey Lane in the EDF Energy Sizewell Estate. The exact location of its roost was not determined due to restricted access and limited stopping points on roads in the area around Theberton and Eastbridge. However, it was determined that it was roosting within the grounds of Theberton House, and there is a known maternity roost within a building at Theberton House. It is considered likely that the tag failed some time on 21 August.

4.4.2 During the radio-tracking, the bat was regularly recorded static in the roost area. On 20 August it remained static from 21:54 (approximately 90 minutes after sunset) until at least midnight; similarly on 19 August, it was recorded flying early in the evening but from 22:08 it was recorded static again in the roost area.

4.4.3 The bat otherwise covered a fairly wide range over the Minsmere Levels, down to Dunwich Forest within the EDF Energy Sizewell Estate and up into Minsmere.

4.5 Roost Information

4.5.1 Tree roosts were found in both the Minsmere Reserve and the EDF Energy Sizewell Estate. A total of nine confirmed tree roosts and six other unconfirmed locations (likely trees) were used during the radio-tracking survey. None of the roosts found in 2010 or 2011 were re-used in 2014; however, Grimseys could not be safely accessed in 2014 and bat roosts were confirmed in this area in previous years. The roost numbers given to the 2014 tree roosts follow on consecutively from those found in the earlier ratio-tracking surveys which for 2014 means roosts R23 through to R37. Access to six of these (R32 through to R37) were restricted so the exact roost was not identified.

4.5.2 A combined list of the tree roosts and their descriptions is provided in **Table A6,** whilst information regarding which tree roost was used per day by each bat is given in **Table A7 (**at the end of the document). In total, there are now 28 confirmed trees known to have been used as roosts and two buildings used by single male bats in 2010 and 2011. In addition, there are four roosts not confirmed due to access restrictions but all

are in areas of woodland and therefore classified as 'likely tree roosts'. Another two roosts could not be confirmed as either tree or building roosts.

Table A6 – Tree roosts and descriptions

Roost number	Bat number 2014	Area/Location	Grid Reference	Tree Species	Diameter at Breast Height (cm)	Height of feature	Description of roost feature
R23	1	Sizewell: The Grove - eastern side northern end	TM46438, 65519	Dead alder (*Alnus glutinosa)*	85	6-7m	Large expanses of lifted bark with few holes on north-east and north-west side.
R24	2, 11, 19	Minsmere: Scottshall Covert. East of main ride	TM46785, 67324	Pedunculate Oak (*Quercus robur*)	40	Huge split down entire length of main stem	Large split down entire south face plus loose bark signal strongest and mid-point at 6m.
R25	10, 11	Minsmere: Scottshall Covert. West of main ride	TM46625, 67490	Pedunculate Oak (*Quercus robur*)	96-100	20+	Large standard; 3 main central limbs. The middle limb has loose bark on west and SW-face signal strong here near a dead pole; (snapped) loose bark.
R26	1, 6, 14, 16, 17	Sizewell: Ash wood. South-east corner next just north of Ash Wood Cottage	TM46032, 65041	Pedunculate Oak (*Quercus robur*)	60	6m	Woodpecker hole and loose bark on north-west face; feature runs 2m in length.
R27	1 ,2, 7, 14, 15, 16, 17	Sizewell: Nursery Covert. North-west corner at the edge of track near bend of woodland ride	TM46404, 64411	Dead Scots pine pole (*Pinus sylvestris*)	110	15m	Dead pole, decay holes, missing loose bark. Roost holes on NNW face.
R28	10, 11, 18	Minsmere: Located on the western edge of Scottshall Covert wood.	TM46447, 67427	Pedunculate Oak (*Quercus robur*)	40	6-8m	The tree is approximately 10m high, single stem and intact; there are multiple areas of lifted bark on the north face of the stem between 6m and 8m; signal strongest at this point.
R29	19	Minsmere: Located on the northern edge on Scottshall Covert towards the eastern side, right on edge of woodland with open grassland to the north.	TM46899, 67439	Pedunculate Oak (*Quercus robur*)	50	6m	The top of the tree at approximately 8m high has snapped off completely; there is lifted bark from 4m high on the stem to the top on the southern face of the tree, facing the woodland. The signal was strongest from the lifted bark at approx. 6m high
R30	19	Minsmere: Scottshall Covert – north-west corner	TM46522, 67465	Pedunculate Oak (*Quercus robur*)	60	9m	Feature is a large split that runs the entire length of the stem, caused by possible lightning strike. Tag signal was strongest approximately 9m high on main stem and on the northern face.
R31	11,19	Minsmere: Scottshall Covert. West of main ride near Sheepwash Lane	TM46645, 67292	Pedunculate Oak (*Quercus robur*)	80	12-14M	At the top of the tree, 12m, within a large branch that extends to the north: this limb has split with raised bark

Roost number	Bat number 2014	Area/Location	Grid Reference	Tree Species	Diameter at Breast Height (cm)	Height of feature	Description of roost feature
R32	1, 2, 6, 16	Area north of Lower Abbey - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R33	5	Redhouse Farm Saxmundham - exact location not known	Restricted Access	Unknown	-	-	Restricted Access
R34	5	New Plantation - Saxmundham - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R35	5	Sizewell: Grimseys	Restricted Access	Likely tree roost	-	-	Restricted Access
R36	3 , 6	Sizewell: North Grimseys - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R37	13	Close to Reckford Bridge/Eastbridge Marshes and East of Middleton	Restricted Access	Unknown			Restricted Access

EDF Energy Sizewell Estate Roosts

4.5.3 Five trees were confirmed to be used by roosting bats within the EDF Energy Sizewell Estate in 2014. The tracking surveys recorded a new tree roost in Ash Wood taking the total number of known roosts here to five. Within Nursery Covert, a single additional roost was found. At least two tree roosts were used in Grimseys (although access was restricted in this area, it could be determined that bats were in different locations within the wood). In addition, another tree roost (R23) was confirmed in the northern end of the The Grove taking the total number in this woodland to four recorded during the three sessions of radio-tracking.

4.5.4 Within the EDF Energy Sizewell Estate, Ash Wood and the woodland adjacent to Plantation Cottages are relatively isolated, whilst Leiston Old Abbey Woodland links directly to Fiscal Policy and into Kenton Hills. The Grove is a thin strip of woodland connected to coniferous plantation on its southern side, and used infrequently by tagged barbastelles in 2010 and 2014 but not in 2011. In 2014, a single bat roosted in R23 in The Grove on a single night immediately after being caught.

Minsmere Roosts

4.5.5 Within Minsmere, six roost trees were confirmed to be used in 2014. All were within oak trees and all were within one area of woodland, Scottshall Covert (R24, R25, R28, R29, R30 and R31). One bat was recorded static for a short period in Southwalk Belt in Minsmere although the exact location was not found. The area of woodland where it was recorded has a number of large oak trees with features suitable for bats (including raised bark which is favoured by barbastelles). Previously only a single tree roost had been found within the

Minsmere Reserve during the 2010 and 2011 surveys (used by a single tagged bat). That single tree was in New Hangman's Wood in the western part of the RSPB Reserve.

Roosts beyond the EDF Energy Sizewell Estate / Minsmere

4.5.6 Four additional sites were confirmed to be used by roosting bats beyond the EDF Energy Sizewell Estate in 2014, though the precise locations for each were not identified. One (R32), a likely tree roost, was located in the area north of Lower Abbey. Two (R33, R34) were in the vicinity of Saxmundham (one a likely tree roost; the other unknown). The fourth (R37, also uncharacterised) was located in the area around Reckford Bridge/Eastbridge Marshes, east of Middleton (on the western edge of Minsmere, but outside the RSPB reserve).

Locations of Roosting Features

4.5.7 Of the nine tree roosts that were confirmed in 2014, eight were behind loose/lifted or flaking bark with only R30 confirmed in a large spilt on the main stem. The apparent preference shown towards roosting behind raised bark is similar to findings of other radio-tracking studies of this species (Russo 2004, Greenaway and Hill, 2004) as well as the previous radio-tracking surveys at Sizewell.

4.5.8 None of the confirmed roosting positions were below 6m above ground level (agl). Of nine features, six were between 6m and 10m (see **Table A8)** and three were above 10m.

Table A8 - Distance from the nearest woodland edge of known roost trees used in 2014; height of roost (agl)

Tree roost no.	Distance from nearest edge (m)	Height of roost area (agl)
R23	10	6-7m
R24	18	Large split down entire south side of tree
R25	20	20+
R26	33	6m
R27	100	15m
R28	28	6-8m
R29	16	6m
R30	52	9m
R31	25	12-14m
R32	Unknown	Unknown
R33	Unknown	Unknown
R34	Unknown	Unknown
R35	Unknown	Unknown

R36	Unknown	Unknown
R37	Unknown	Unknown

Use of tree roosts and movement between roosts

4.5.9 Tree roost R27 was used by the highest number of tagged bats, with both males and females recorded here. This is a large dead pine pole located in Nursery Covert with a peak of seven tagged bats on the 17 August with at least six bats recorded on five consecutive days from 14 August (five bats on the 21 August). Commonly recorded in this roost were Bats 1, 2, 7, 15, 16 and 17 (all breeding females) and Bat 14 (male) which was recorded here on most days. Trapping at this tree roost caught three bats (all juvenile which were therefore not tagged). The tree with the next highest number of recorded bats was R26, with five on the 14 August. This tree was not used by radio-tagged bats again after the 15 August. Roost R32 was used by four radio-tagged bats with a peak of four radio-tagged bats on the 21 August.

4.510 Barbastelles are known to move roost regularly, and one key aim of this study was to establish if there was interaction between bats in Minsmere with bats in the EDF Energy Sizewell Estate. Bat 2, a female bat caught in Nursery Covert on 11 August, was the only bat that roosted in both areas. On the 13 August, it was confirmed as roosting in R24 in Scottshall Covert in Minsmere. Between 14 and 17 August, Bat 2 was found roosting in R27 located in Nursery Covert in the EDF Energy Sizewell Estate (it was not found on 15 August). Between 19 and 21 August, Bat 2 was then recorded roosting in R32 in between Minsmere and Sizewell in a small strip of woodland extending north of Black Walks and Plantation Cottages near Lower Abbey Farm. The distance between R24 and R27 where Bat 2 recorded on successive nights is approximately 2.92km and is the longest distance between two confirmed roosts used by breeding female bats within the study area.

4.5.10 The smallest distance between roost switches of breeding females in 2014 was 175m (between Roosts 25 and 28 in Scottshall Covert). Other than the distance flown by Bat 2, the next largest distance recorded by a breeding female bat was 1.7km, between Roost 27 and R32. The average distance between roost switches of breeding females was 1079m.

4.5.12 Bat 5 was a male barbastelle caught in Nursery Covert on 11 August and was recorded the following day roosting in Grimsey's. The following day it was recorded in R34, 6.74km to the west near to Saxmundham but never returned to roost within the Site.

4.5.13 The straight line distances between roost switches between consecutive days was measured. For example, Bat 1, a breeding female, roosted in R23 on 13 August but on 14 August it had moved to R26. The straight line distance between these two trees is 632m. The distances between each tree roost switch recorded are given in **Table A9**. There are significant clusters of trees with potential for supporting barbastelles in these

woodland blocks with Ash Wood supporting the greatest number of potential trees within the EDF Energy Sizewell Estate. Scottshall Covert similarly has a high number of mature oak trees with potential for barbastelles.

Table A9 – Distances between barbastelle roost switches between consecutive days in 2014

Roosts	Distance	Location of Trees	Status
R23 - R26	632	The Grove to Ash Wood	Breeding Female
R26 - R27	714	Ash Wood to Nursery Covert	Breeding Female
R24 - R27	2920	Minsmere Scottshall Covert to Nursery Covert	Breeding Female
R27 - R32	1678	Nursery Covert to N of Plantation Cottages	Breeding Female
R28 - R24	353	Within Scottshall Covert	Breeding Female
R25 - R28	175	Within Scottshall Covert	Breeding Female
R25 - R29	290	Within Scottshall Covert	Non-breeding Female
R29 - R30	378	Within Scottshall Covert	Non-breeding Female
R30 - R24	304	Within Scottshall Covert	Non-breeding Female

Distances travelled

4.5.43 The distances travelled from roosts are presented in Table 10. The distances measured are straight-line distances between the furthest recorded location and the roost used during the daytime beforehand. The maximum distance recorded from a roost in this study was by a breeding female (Bat 13), travelling 9.1km. The mean maximum distance for breeding females was 4.4km (excluding Bat 4), similar to that of non-breeding females (though the sample size is small). The mean maximum distance for the male bats in 2014 was 5.2km (range 4.0 to 7.2km).

Table A10 - Distance travelled from roost

Bat No	Date	Distance in km	Roost	Joint Bearing number
Breeding Females				
Bat 1	18/08/2014	3.7	R27	1.29
Bat 2	17/08/2014	4.4	R36	2.17
Bat 6	17/08/2014	4.8	R37	6.33
Bat 7	17/08/2014	5.1	R27	7.20
Bat 10	15/08/2014	2.6	R25	10.14
Bat 11	18/08/2014	3.2	R33	11.9
Bat 13	15/08/2014	9.1	R37	13.10
Bat 16	20/08/2014	3.6	R27	16.30
Bat 17	18/08/2014	3.9	R27	17.22
Bat 18	22/08/2014	3.5	R28	18.19
Mean distance		**4.4**		

Non-breeding female				
Bat 15	18/08/2014	4.1	R27	15.18
Bat 19	16/09/2014	4.3	R29	19.7
Mean distance		**4.2**		
Male				
Bat 3	15/08/2014	4.0	R36	3.5
Bat 5	14/08/2014	7.2	R37	5.8
Bat 14	22/08/2014	4.4	R27	14.66
	Mean distance	**5.2**		

4.6 Foraging areas and home ranges of barbastelle bats

4.6.1 Bats were recorded using a wide variety of habitats during the radio-tracking surveys. The areas used are summarised in **Figures B1** to **B19** which illustrate triangulation points, extent of ranges and the MCP, neighbourhood linkage (clusters) and kernels for each bat radio-tracked. The total number of bearings achieved (including night and day roosts used) have also been shown. These data are set out in **Table A11** below.

Table A11 - 95% Home Range Analysis (areas in ha)

Breeding females				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
1	81	480	246	349
2	123	508	173	614
4	28	117	117	153
6	89	509	434	516
7	78	601	373	617
10	17	232	37	433
11	94	820	284	720
13	78	2020	819	1275
16	68	472	105	309
17	98	685	235	549
18	56	330	154	293
Mean	-	616	270	530
Mean of breeding females without Bat 4				
Mean	-	*666*	*286*	*567*

Non breeding females				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
8	45	415	284	502
15	53	951	680	1049
19	97	744	231	665
Mean	-	703	398	739

Males				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
3	80	610	400	715
5	47	1782	115	1875
14	96	631	425	615
Mean	-	1008	313	1068

4.6.2 The 2014 data for female bats with full data sets (i.e. excluding Bats 4 and 10) was run through the software BIOTAS which calculates areas at various points through the tracking period. The results were then plotted as graphs (see Graphs 1 – 13) to see if the data reached an asymptote: i.e. the point at which the addition of further locational data would not significantly alter the results. As per Kenward (2001), the asymptote of range size has been carried out on each tracked animal as opposed to cohorts. For example, the asymptote was reached at 28 joint bearings for Bat 6 (Graph 3) which had 59 joint bearings and a further 11 single bearings. The graphs for Bats 1, 7 and 18 are less clear. For Bat 1 a total of 57 joint bearings and a further 14 single bearings were achieved. Its location was regularly checked between 11 August and 20 August, and found to be continually using the same areas. It can be determined from reviewing the data collected against Graph 1 that the asymptote was reached at around 30 fixes. Bat 7 in comparison shows an asymptote may not have been reached. This bat was recorded flying north-west between Eastbridge and Middleton where access for surveyors was restricted, and only a small number of fixes were achieved. The bat regularly moved into this area after midnight; activity before this being within the Minsmere and EDF Energy Sizewell Estates. The extent of where it flew in this area between Eastbridge and Middleton could not be recorded. It was not, however, recorded further afield; for example, north of Middleton or near Westleton where other bats were recorded and where surveyors regularly checked. Bat 18 was radio-tracked between 13 and 23 August (10 nights). It was recorded foraging in Dunwich Heath and Westleton Walks on most nights but it took several nights to track it to where it went to at around midnight. It was finally tracked around Dunwich village and was recorded flying to this area each night thereafter. Although the graph shows a large step in the size of the area, it is considered that this is due to the late find of the foraging area to the north at Dunwich. There may be additional areas used which is considered quite typical of bat behaviour (i.e. they occasionally make excursions from their most regularly used foraging areas) which could have resulted in a slight increase at the end of the tracking period. Some individuals may increase their foraging range, especially in August as individuals start to make more excursions and therefore may have not reached asymptote but the general trend was that, for 86% of tagged bats, an asymptote was reached and it is considered that the home ranges have been well-recorded during the period of the survey.

4.6.3 Subsequently the data from the 2010 and 2011 radio-tracking surveys were run through the same software. The 2010 data (Graphs 14 to 17) similarly shows those bats with full data sets reached an asymptote. Bats 3 and 4 had incomplete data sets with only eight and ten bearings achieved respectively. An asymptote appears to have been reached with Bat 1 which had 32 bearings, whilst Bat 2 appears to have just reached an asymptote with 33 bearings achieved. Bats 5 and 6 have significantly larger data sets with 83 and 65 bearings, and an asymptote has clearly been reached. Of the six breeding female bats tracked in 2011, 67% had more than 30 bearings and 33% had more than 40 bearings taken. For the 2011 surveys, of the seven breeding female barbastelles tracked, 86% had more than 30 bearings and 43% had more than 40 bearings. Only one of the bats had fewer than 30 bearings (29 were achieved for Bat 8). The analysis

(Graphs 18 to 23 excluding Bat 8) shows that an asymptote was reached in most instances, with the exception of Bat 20 which had limited data collection (the tag was lost after three nights of tracking).

4.6.4 Whilst the radio-tracking undertaken followed the bats for only a relatively short period of time, the data collected shows some patterns to barbastelle behaviour in the site.

4.6.5 Only a single bat was recorded roosting in both Minsmere and Sizewell (Bat 2, a breeding female). This bat also foraged in both areas, although its main foraging area appeared to be in The Warren area of Minsmere north of the Visitor Centre.

4.6.6 Less activity was recorded around the Sizewell Belts area south of Kenton Hills than during the previous two radio-tracking studies. This may have been influenced in part by windy conditions which meant that trapping was not possible in the more exposed areas around Goose Hill and Sandlings Walks using mist-nets or the triple-high sky net. These locations had been trapped at in 2010 and 2011. This may have reduced the likelihood of catching bats whose foraging area were centred over the Sizewell Belts. However, on reviewing the trapping locations of those bats radio-tracked in the Sizewell Belts and to the east of Goose Hill in 2011, only one of six bats recorded foraging regularly in these areas was caught in Goose Hill. The rest were caught in Ash Wood (from a tree roost), in Nursery Covert which was successfully trapped at in 2014 and along Abbey Lane, also successfully trapped at in 2014. It is therefore unclear whether the windy conditions made foraging in the Sizewell Belts less favourable for foraging during the 2014 tracking or whether there was a shift in activity away from the Sizewell Belts in late summer, compared to the 2011 surveys.

4.6.7 Millspaugh and Marzluff (ed 2001) suggests that more than 100 fixes are required to obtain reliable estimates of home range size using MCP analysis, while the kernel analysis is useful when a smaller sample size is obtained and, along with cluster analysis, are useful at identifying multiple centres of activity, particularly in heterogeneous environments. A 95% MCP analysis was carried out instead of a 100% MCP as this eliminates outliers. **Figure C1** shows the MCPs for adult breeding female barbastelles. The sample size was good for the 75% of tagged breeding female bats: this includes single as well as joint bearings, roosts and night roosts. Of the 25% where the sample size was poor, Bats 4, 10, and 12 had issues with the tags. Only 28 and 17 bearings were achieved with Bats 4 and 10 respectively and the tag failed or the bat left the survey area permanently shortly after Bat 12 was released so no bearings were obtained. The remaining bats all had over 60 locations, with Bat 16 recording fewest points (68). Four bats (33% of all breeding female barbastelles tagged) had over 90 locations recorded: Bat 2 with 123 locations plotted.

4.6.8 The MCP areas for Bats 4 and 10 (measuring 117ha and 232ha) do not represent the full home range of these bats. The average MCP area for the remaining 10 breeding females (i.e. excluding Bats 4 and 10)

was 714ha. The greatest MCP area was generated by Bat 13 with a home range of 2020ha. Bat 13 was recorded foraging extensively in the Minsmere area north of the Visitor Centre into Westleton Walks and in the areas of woodland, heathland and either side of the lane north of New Hangman's Wood; also some distance east of Middleton and around the Eastbridge area and Minsmere Levels. It was also recorded further south around The Walks to the south-east of Leiston and south to Thorpeness.

4.6.9 Three non-breeding female adult bats were tracked; Bats 8, 15 and 19. The average MCP area recorded for the non-breeding female bats was 703ha ranging from 414ha to 951ha. Bat 19 was caught near tree roost R25 in Minsmere and was not recorded south of Minsmere during the tracking. Bat 15 was caught on the lane north of New Hangman's Wood but was consistently recorded roosting in R27 in Nursery Covert whilst Bat 8 was not tracked to a roost (considered likely to be in an area of restricted access) but was caught on the lane north of New Hangman's Wood and recorded in Minsmere, Black Walks and south of Eastbridge. The 95% MCP of Bat 19 was recorded as 744ha and was recorded for part of the foraging time in similar areas to Bat 18 (a breeding female) particularly in Scottshall Coverts, Dunwich Heath and Westleton Walks. The amount of overlap of the MCP of Bat 18 by Bat 19 was 47%. The non-breeding female (Bat 19) ranged more widely around Westleton using hedgerows around arable fields and into Dunwich Forest west of Dunwich.

4.6.10 The male bats, Bats 3, 5 and 14, were not radio-tracked to the full extent of their home range particularly those that roosted a considerable distance from the Sizewell area near Saxmundham. However, they were tracked when they came close to or within the site. In addition, surveyors drove around the wider area to try to locate any distinct foraging areas that may be used. Where areas for foraging by the male bats were located away from the main Sizewell and Minsmere areas, these were periodically visited to check that they were present on most nights. Minimum home range sizes for the male bats were as follows: 610ha, 1782ha and 631ha. Bat 3 was caught in Nursery Coverts and roosted within the Grimseys area of woodland; a total of 80 points were recorded. It was regularly located within the EDF Energy Sizewell Estate, but also as far north as the Minsmere Levels and south of Leiston near Aldringham, and to the south of the EDF Energy Sizewell Estate in an area called The Walks. Bat 5, also caught in Nursery Covert, was found regularly foraging to the south of the EDF Energy Sizewell Estate in The Walks whilst it roosted towards Saxmundham. It was recorded in The Walks on three nights, foraging for extended periods of time; in contrast, it was located in the north on the edge of the Minsmere Levels only very briefly on three separate occasions. A total of 47 points were achieved for this bat. There were, however, periods when this bat was not found within the EDF Energy Sizewell and Minsmere Estates or in the areas which were searched such as The Walks, around Leiston and Lovers Lane or to the north. On occasion, a night-time surveyor moved further west towards Saxmundham but no tagged bats were recorded here. The third male bat, Bat 14, was recorded roosting within the EDF Energy Sizewell Estate. A total of 96 points were achieved, the majority

within the EDF Energy Sizewell and Minsmere Estates but also further afield south of Lover's Lane, north west towards Westleton and north-east along the coast.

4.6.11 The 95% kernel analysis (see **Figure C3**) recorded home range sizes of the breeding female bats of between 153ha and 1275ha with a mean of 530ha. The kernel analysis extends the home ranges of those bats that were foraging close to the sea wall as being out at sea; the size of the kernel home ranges has not been adjusted for this. The non-breeding female bats resulted in kernel home range sizes from 502ha to 1049ha with a mean of 739ha.

4.6.12 The 95% kernel analysis of the adult male barbastelle bats recorded home ranges between 615ha and 1875ha and a mean of 1068ha.

4.6.13 The core area size (based on a 95% cluster analysis) of the breeding female barbastelles ranged from 37ha to 819ha, with the number of core areas per bat ranging from 1 to 7. Whilst a number of these cluster core areas overlap, there may be some partitioning of foraging habitat which can be seen on **Figure C2**. However, it should be noted that only a subset of the population of barbastelle bats is tracked at any given time and it is not known how many other non-tagged bats may have been foraging in these areas. During the 2014 survey two key roosting areas were found, Scottshall Covert (Minsmere) and Ash Wood/Nursery Covert (EDF Energy Sizewell Estate). The main areas identified for foraging were:

1) The Minsmere area of Scottshall Covert extending up into Westleton Walks and Dunwich Heath;
2) Kenton Hills, Nursery Covert and Ash Wood (Sizewell);
3) Around Plantation Covert and Black Walks (just to the north of Sizewell);
4) The area of the levels north-west of Eastbridge; and
5) Parts of the Minsmere Levels between Sizewell and Minsmere.

4.6.14 The 2014 data, in contrast to the previous radio-tracking surveys, showed less foraging activity by any of the cohorts of bats (breeding/non-breeding females or males) within the Sizewell Marshes SSSI.

4.6.15 During the 2011 radio-tracking surveys, the main roosting areas were identified within Ash Wood, Nursery Covert, Black Walks and Leiston Abbey. The trapping during that survey session was restricted to the EDF Energy Sizewell Estate and was undertaken slightly earlier in the season when juvenile bats were less well developed, both of which are likely to have strongly influenced the roosting areas found.

Habitat use

4.6.16 At Sizewell, barbastelles have been recorded using a wide variety of habitats for foraging and commuting. The core foraging zone consists of woodland blocks, adjacent scrubby habitats and the sheltered grazing marsh such as that enclosed by Grimseys and Goose Hill/Nursery Covert. The area of Black Walks which

is part of the core foraging zone supports a sheep-grazed field with patchy areas of scrub and bracken, whilst east of Ash Wood, the habitat is of young plantation giving a scrubby appearance. To the south, Sizewell Belts is grazed pasture with a ditch network and tree lines and areas of scrub sheltered by the adjacent woodland habitats and the power station.

4.6.17 Within the Minsmere area, the areas being used for foraging were over the mixed woodland, heath and unimproved grassland habitats to the north as well as the Minsmere Levels between Minsmere and the EDF Energy Sizewell Estate which is more open grazing marsh habitat with reedbeds and with a ditch network and open wetland pools.

4.7 Interchange between Sizewell and Minsmere

4.7.1 During the 2014 surveys, a single bat was recorded roosting in both the EDF Energy Sizewell Estate and the Minsmere Reserve. Bat 2, which was caught in Nursery Covert in Sizewell, was recorded roosting in R24 in Scottshall Covert on a single day; otherwise she was roosting either in R27 (Nursery Covert) or in the area of R32 (area north of Plantation Cottages).

4.7.2 A number of bats were recorded moving between Sizewell and Minsmere during the night-time tracking, as summarised in **Table A12**.

Table A12 – Interchange between tracked barbastelle bats between Sizewell and Minsmere

Minsmere caught female bats	**Roosting**	**Foraging**
Bat 7	EDF Energy Sizewell Estate	Minsmere and Sizewell
Bat 8	Unknown roost	Minsmere and Sizewell
Bat 10	Minsmere	Minsmere
Bat 11	Minsmere	Minsmere and Sizewell
Bat 13	Unknown roost	Minsmere and Sizewell
Bat 18	Minsmere	Minsmere and northwards only
Bat 19	Minsmere	Minsmere and northwards only
Sizewell caught female bats	**Roosting**	**Foraging**
Bat 1	EDF Energy Sizewell Estate	Minsmere and Sizewell
Bat 2	Minsmere and Sizewell	Minsmere and Sizewell
Bat 4	Unknown	Sizewell (limited data)
Bat 6	Sizewell (plus unknown location to west towards Middleton)	Minsmere and Sizewell
Bat 15	EDF Energy Sizewell Estate	Minsmere and Sizewell
Bat 16	EDF Energy Sizewell Estate	Minsmere and Sizewell

Minsmere caught female bats	Roosting	Foraging
Bat 17	EDF Energy Sizewell Estate	Minsmere and Sizewell
Sizewell caught male bats	**Roosting**	**Foraging**
Bat 3	EDF Energy Sizewell Estate	Sizewell and Minsmere Levels
Bat 5	Saxmundham	Sizewell and Minsmere Levels
Bat 14	EDF Energy Sizewell Estate	Minsmere and Sizewell

4.8 Emergence surveys of barbastelle roost trees

4.8.1 A series of emergence surveys were undertaken on a number of the trees including tree roosts recorded during the earlier radio-tracking studies to determine whether it would be worth catching from these tree roosts. No simultaneous combined emergence survey of all trees was undertaken as the emphasis was on the radio-tracking to ascertain habitat use. The emergence surveys assisted with determining where bats were roosting for trapping purposes.

Table A13 – Emergence Survey Results

Date of Emergence Survey	Roost Number	Results
12th August 2014	R3	0
	R13	0
	R14	Single common pipistrelle emerged from top of tree
13th August 2014	R17	0
	R19	0
14th August 2014	R26	At least 10 barbastelle emerged
18th August 2014	R26	0
	R27	17 barbastelle emerged. First at 20:38, 23 minutes after sunset, a further two at 20:38 all from relatively high in the tree. The following 14 bats emerged from approximately 6 m agl on the west face from under a loose plate of bark.
	R28	At least four bats emerged from this tree roost. The first bat emerged at 20:20 with Bat 18 emerging at 20:44

4.9 Breeding status

4.9.1 The bats during the 2014 survey were tracked in the post-lactation period. Of the 15 female barbastelle captured, 12 (80%) had bred in 2014. Juvenile barbastelle bats that were caught appeared to be well-developed. Early breeding had been recorded in bats due to the good conditions in early summer and it was observed that juvenile bats caught were a good weight and in many the fusing of the finger joints was advanced.

4.9.2 In previous years, too few barbastelle were caught in 2009 or 2010 to look at breeding ratios (though all eight females caught in 2010 were pregnant). In 2011, of the 9 female barbastelle caught, 7 (78%) were

post-lactating (again, samples are too small to be other than indicative). Four of the female bats were caught from trapping locations in the woodlands, along with one juvenile; a further five adult female and seven juvenile bats were caught from tree roosts.

4.10 Serotine

4.10.1 The serotine caught and radio-tagged was a non-breeding female bat caught on 12 August 2014 along Abbey Lane. The bat was tracked back to the Theberton House area (where no access was allowed, and so no further information was available). It has been confirmed by the Suffolk bat group that there is a known serotine maternity roost at this property.

4.10.2 The bat was recorded foraging widely into the Minsmere Reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood, with bearings putting it along the coastal edge. The bat was recorded static within the general roost area, returning after short stints of foraging. The bat was 26.1g which is a good weight for the species. Dietz *et al*. (2009) record the normal weight range for serotine as being 18-25g. It is therefore considered likely that the bat did not need to spend long periods foraging and restricted its activity to the early periods of the evening when foraging is most productive.

4.11 Other species trapping information

4.11.1 In addition to the 27 barbastelles caught, 37 common pipistrelles, 168 soprano pipistrelles, nine Daubenton's bats, 27 Natterer's bats, 13 brown long-eared bats, three noctule and one serotine were caught. One hundred of the bats were caught within the EDF Energy Sizewell Estate; the remaining 185 bats were caught within the Minsmere Reserve and, of these, 139 were soprano pipistrelle bats caught at two locations.

4.11.2 For both common and soprano pipistrelles, roughly equal numbers of males and females were caught (as illustrated in Section 4.1, Charts 1 and 2). However, of the 168 soprano pipistrelle bats caught (excluding those escaped and recaptured), only five post-lactating female and four non-breeding female bats were recorded compared to 110 juvenile bats. The majority of these were recorded within the Minsmere Reserve, with 64 juvenile bats caught on the lane north of Hangman's Wood and 37 at Southwalk Belts. A pipistrelle roost was reported by a walker in one of the cottages at the southern end of Hangman's Wood which probably accounts for the high number of juvenile bats caught here. Of the 36 common pipistrelle bats caught, only seven were juvenile bats.

4.11.3 The 2014 trapping sessions caught Daubenton's bats. Only a single male Daubenton's had been caught previously at Sandy Lane (T7) in 2011. Of the nine Daubenton's bats caught in 2014, only two were caught within the EDF Energy Sizewell Estate, one each in Fiscal Policy and Abbey Lane. Both of these were male

bats, one adult and one juvenile and were not radio-tagged for this reason. The remaining seven caught in Minsmere consisted of one adult breeding female, four juvenile female and two juvenile male bats.

4.11.4 Thirteen brown long-eared bats were caught; five males and eight females, (three post-lactating females). Only two juvenile brown long-eared bats were caught. Nine adult bats were caught within EDF Energy Sizewell Estate, the remaining four bats caught at Minsmere.

4.11.5 It was noted that, on the first night of trapping at Fiscal Policy, which was undertaken following an extended period of very good weather conditions, of the 21 bats caught only two adult female bats were caught, both common pipistrelle and only one of these was a breeding bat. All other bats were either juvenile or adult male bats, all with large testes. Breeding female bats have been recorded in the past at Fiscal Policy in 2009, 2010 and 2011.

5.0 EVALUATION

5.1 Barbastelle

5.1.1 The EDF Energy Sizewell Estate has been used by breeding barbastelle throughout the three periods of radio-tracking: in the pre-breeding period in 2010, early August in 2011 and mid to late August 2014. The radio-tracking undertaken in 2014 has confirmed that the RSPB Minsmere Reserve supports breeding barbastelle bats. The tracking has also confirmed the interchange of bats between the two areas both for foraging and roosting.

Habitat use

5.1.2 At Sizewell, barbastelles have been recorded using a wide variety of habitats for foraging and commuting. During June 2010, the tracking of seven adult female bats resulted in the discovery of pre-maternity roost areas with several trees found at Kenton Hills, Ash Wood and the Grove with additional roosts recorded near Greenhouse Plantation, Nursery Covert and Hangman's Wood. Two bats were also recorded day roosting in Grimseys Wood, but the individual trees were not located, as the area could not be safely accessed. It is possible that several trees were used in this area. The females were recording switching between trees regularly although the distances between the roosts was greater than other published available data for the pre-lactating period. Key foraging areas were identified through the radio-tracking, with bats recorded regularly flying from Ash Wood/The Grove in the north through Dunwich Forest to the sheltered eastern section of Sizewell Belts north of Grimseys. This area was used regularly for early foraging before bats moved to other foraging areas. Periods of sustained foraging were recorded elsewhere with frequent visits back to the roost areas of Ash Wood and the Grove.

5.1.3 The core foraging zone identified in 2011 consisted of woodland blocks, adjacent scrubby habitats and the sheltered grazing marsh (such as that enclosed by Grimseys and Goose Hill/Nursery Covert). Black Walks (also part of the core foraging zone) supports a sheep-grazed field with patchy areas of scrub and bracken, whilst east of Ash Wood the habitat is of young plantation giving a scrubby appearance. The foraging areas of breeding females and juveniles were centered on Ash Wood and the woodland adjacent to Plantation Cottages at Lower Abbey Farm with the juvenile bats foraging consistently in these areas before extending their foraging areas further afield. The breeding female bats were all recorded in these areas, with tree roosts in Kenton Hills also being used; the majority of bats moved roosts from Ash Wood to the woodland adjacent to Plantation Cottages before moving to Leiston Old Abbey woods and there was a good deal of movement between the roost in Leiston Old Abbey woods and those at Plantation Cottages.

5.1.4 The main foraging areas for the breeding females at the end of the breeding season in 2014 appeared to be centered at a number of locations: around Kenton Hills and Goose Hill towards Ash Wood; around Lower Abbey Farm and Black Walks; to the north of Eastbridge; and in Minsmere around Scottshall Covert and north into Dunwich Heath. A number of more wide-ranging bats provided clusters of activity north around Dunwich into Dunwich Forest and south around The Walks south-east of Leiston. The woodlands are mixed

with some broad-leaved and some coniferous plantations. Unlike 2011, there was limited movement in 2014 in the Leiston Old Abbey area. There was limited activity within the Sizewell Marshes SSSI in 2014 compared to previous radio-tracking sessions, and little activity in the southern part of the EDF Energy Sizewell Estate.

5.1.5 The more-open grazing marsh habitats have also been well used. During the 2010 and 2011 surveys, the areas to the east of Goose Hill and The Grove and around the Sizewell Belts were used by many of the bats. The area north-east of Eastbridge also appeared to be significantly used for foraging by the breeding females and the juveniles in 2011 as they extended their range from the core foraging zone to have multiple centres of activity. In contrast, in 2014, the area of the Minsmere Levels both to the north-west and to the east of Eastbridge was used more widely and frequently than previously recorded. Even when considering only those bats caught within the EDF Energy Sizewell Estate (with the exception of Bat 4 where there was limited data), all six female bats caught in the EDF Energy Sizewell Estate were recorded using Minsmere Levels during the 2014 surveys. The Minsmere Levels comprises more-open grazing marsh habitat with a ditch network and open wetland pools.

5.1.6 The preference for foraging in wetland habitat by barbastelle has been recorded at other locations. Zeale *et al.* (2012) recorded a strong preference to forage in riparian vegetation and deciduous woodland at two sites (Hampshire and Devon). Barbastelle were found to forage predominantly in vegetation on the periphery of water bodies rather than over open water bodies; it was considered that this was due to riparian and deciduous woodland habitats typically supporting high moth abundance. Unimproved grassland was also preferentially used for foraging at one of Zeale's study areas. At the second, improved grassland was often used for foraging, though bats were thought to be using the adjacent hedgerows with the field margins and woodland edge habitat supporting relatively high densities of moths. It is likely that where arable and improved grassland were used at Sizewell that the hedgerows with field margins were the target area.

5.1.7 Within the coniferous plantation, the rides and edges were well used by barbastelle bats. The areas of heathland, broad-leaved woodland and grassland habitat (particularly that set aside for stone curlew) within the Minsmere Reserve (and beyond the Levels) were extensively used, along with the heathland areas south near Leiston around The Walks south-east of Leiston (see Figure A3).

Roost selection

5.1.8 All of the confirmed barbastelle roost trees located in 2014 were pedunculate oak except for a single pine tree (R27) which appeared to be one of the main breeding roost trees within Nursery Covert. It appears to have been subject to extensive tree surgery in the past. This preference for oak trees is similar to the results of the 2010 and 2011 surveys. During the 2011 surveys, eight tree roosts were located and all were pedunculate oak except for a single sweet chestnut tree (R17) and a pine tree (R14 used by a female on a

single day after being tagged and not considered to be a regularly used breeding roost). In 2010, the 13 tree roosts found were all pedunculate oak trees except a single dead elm (R11) and an unidentified dead tree (R6). Eight of the trees found in 2014 had raised bark. This brings the total number of tree roosts comprising raised/loose bark to 20 across the 2010, 2011 and 2014 surveys. Two of the 2011 roosts were in vertical splits in the main stems of large trees (R13 and R21); a further similar roost was found in 2014 (R30 in Scottshall Covert). The apparent preference shown towards roosting behind raised bark is similar to that found in other radio-tracking research of this species in Italy (Russo *et al.* 2004), Germany (Kerth & Melber, 2009), and England (Billington, 2002; Greenaway 2008; Greenaway & Hill, 2004) where barbastelle nursery roosts tended to be within splits in trees or under loose bark. Russo *et al* 2004 found 20 out of 27 tree roosts of breeding female bats were under raised bark.

5.1.9 Other research has found that breeding roosts are found in quiet locations well away from the woodland edges and surrounded by dense cover (Russo *et al* 2004; Greenaway 2008) but this was not found to be the case in the radio-tracking surveys undertaken at Sizewell/Minsmere to date. In 2014, seven of the nine tree roosts were found within approximately 30m of a woodland edge; two were recorded beyond this. R30 in Scottshall Covert is approximately 50m from a woodland edge, this roost supporting only a single tagged non-breeding female during the tracking. R27 the main roost tree in Nursery Covert is approximately 100m from a woodland edge; however, it was located immediately adjacent to a relatively open ride. In 2010, of the 11 tree roosts found, three were on the northern edge of woodland blocks and seven were within 30m of woodland edge. In 2011, two of the 2010 tree roosts were re-used by tagged barbastelle bats: R9 and R13 which were both within 20m of the edge of the woodland edge of Ash Wood and both on the northern side of the woodland. Of the eight additional tree roosts found in 2011, two were on the edge of woodland, whilst two were approximately 11m from the woodland edge. Two were 35m and 39m from woodland edge habitat respectively. The roosts were all in high canopy woodland which is similar to that found in the Mens SAC (Greenaway, 2008). As with the 2010 and 2011 surveys, it was noted that in the majority of cases there was dense ground cover of bracken or bramble.

5.1.10 The height of the roosting positions were generally high (above 6m) with three between 12 and 20m high. This was similar to the roost trees found in 2010 and 2011. In 2011 the roosting positions were also generally above 6m with three up to 13m high. No particularly low roosts were found during 2014 (at R27 bats were recorded emerging from some 6m agl as well as higher up in the tree). In 2011, a single roost tree some 4m agl was found.

5.1.11 The weather conditions during the radio-tracking were generally varied following a long period of calm, warm and dry weather during the summer. The tail of Hurricane Bertha affected trapping at the beginning of the survey period and, following this, the weather was unsettled with night temperatures dropping on a number of nights. During the cooler conditions, it was noted that the bats returned to roost areas earlier in the night and were often within the roost trees well before dawn.

5.1.12 Breeding female bats need to remain homeothermic, i.e. in a state maintaining a high body temperature rather than going into torpor and allowing it to fall, as non-breeding bats do to save energy. This is in order to allow foetal development and later lactation, and it has been suggested that breeding barbastelle bats select warmer areas for roosting to limit the costs of homeothermy (Russo *et al*., 2004). In spring 2010, although the majority of roosts with breeding females were on the southern side of trees, several were on the northern and eastern sides of the trees. Although all tree roost sites benefited from woodland cover at least on one aspect, all were close to a woodland edge and some, for example, Roosts R1 and R2 were on the extreme northern edge. During the tracking in 2011, which was timed to be shortly after breeding had taken place in early August 2011, there did not appear to be any pattern to the direction in which the roost feature was facing. For example, the loose bark on R14 (used by five of the 2011 tagged bats) was on the south side of the tree, whilst on R17 the raised bark extended mainly around the east and north of the tree. The vertical split on R21 was on the northern side, whilst the snapped limb on R18 was on the south-west side. During the later summer tracking in 2014, there did not appear to be any pattern to the direction in which the roost feature was facing. Loose bark was recorded on both north and south sides of trees. The orientations and locations of tree roosts found at Sizewell during the three tracking surveys do not appear to show any clear correlation with those in Russo's study.

Movements between roosts

5.1.13 Barbastelle are known to move roosts regularly even during the period when their young cannot fly (Russo *et al*., 2004). The mean distance moved between trees by female bats in central Italy ranged between 31m and 626m, with distances contracting during the main lactating period (Russo *et al*., 2004). This suggests that female barbastelles, in order to continue to move roosts regularly, need a large number of suitable roost trees relatively close to each other during the whole breeding season, but particularly during the main lactating period. Russo *et al.* also found that barbastelle roosts were most frequently found within unmanaged woodland where the dead trees occurred most frequently, in comparison with managed woodland and pasture woodland, and where clusters of larger trees occurred. Greenaway and Hill (2004) found that the roosts tended to be located within a distinct area which they refer to as a "loyalty area". Loyalty areas will gradually change over time as woodlands develop, and Greenaway and Hill (2004) suggest that management plans for nursery roosting sites should include areas of five to ten times the area that bats are presently using.

5.1.14 The distances between roost-switches (movements between roosts located in Sizewell and/or Minsmere) in 2014 are given in **Table A9**. The distances between roost-switches in all three years of tracking are summarised in **Table A14** below.

Table A14 – Summary of distances between roost-switches by breeding females over 3 years

Year	Minimum (m)	Maximum (m)	Mean (m)	Number of switches
2010	488	2006	1203	13
2011	264	1741	915	13
2014	175	2920	1079	6

5.1.15 Russo *et al.* (2005) found during the late lactation/post lactation phase that the range for distances between roost switches was between 0 (sic) and 352m with a mean of 89m. In both 2011 and 2014, three of the combinations of roost switches (in 2014, all within Scottshall Plantation) fell within the distance range found by Russo *et al.* (2004) and 14 of the switches were greater. Tracked barbastelles at Sizewell and Minsmere therefore switched roosts on a regular basis as found in other studies, but over larger distances than reported in some. However, a study in Germany found that female barbastelles could cover much large distances (up to 9.0km between consecutive day roost locations: Kerth & Melber, 2009), and it seems likely that there is a great deal of variation between colonies, probably reflecting the relative availability of roost sites.

5.1.16 Only a single bat (2014 Bat 2) was recorded roosting in both the EDF Energy Sizewell Estate and Minsmere during 2014. This confirms that at least one breeding female was able to roost in either area in late summer. In 2010 (early June), a single female barbastelle was recorded in a tree roost in the Minsmere Reserve (R12) for a single day. This bat (Bat 5 2010) had been caught from R3 within Ash Wood and on all other days was recorded roosting in trees within the EDF Energy Sizewell Estate. This suggests that the behaviour is not restricted to one season.

Colony structure and size

5.1.17 Barbastelle maternity colony sizes are difficult to estimate (as discussed in Greenaway, 2008), largely due to the numerous roost changes. Although simultaneous emergence surveys of all known tree roosts were not undertaken in 2014, emergence surveys carried out in 2014 recorded a peak of 10 bats emerging from a roost in Scottshall Covert (R26) and 17 from roost R27 in Nursery Covert (on different days). A simultaneous emergence survey on 18 August of both R27 and R28 was carried out, the combined count of these two trees (17 and four bats emerged respectively) plus the known tagged bats in the other trees equates to 27 bats including known male bats. This is a little lower than the highest emergence count to date (2011) which recorded 31 barbastelle bats, and included some juvenile bats. However, on the days during which the majority of bats were tracked to a day roost in 2014 (14 to 21 August), at least four, and up to seven, different day roosts were being used on any one day. All of these counts are therefore likely to have represented only a proportion of the population in the wider Sizewell/Minsmere area. None of the bats caught in 2014 were those ringed in 2011.

5.1.18 Russo *et al. (*2004) found the number of bats in a maternity colony over seven different counts throughout July and August was 16.7 bats ± 4.2 (range 12-23 bats). Billington (pers. comm.) counted 26 bats within a single tree roost in Somerset. Greenaway (2008) studied two maternity colonies in Sussex, and estimated counts of at least 64 breeding females in one maternity colony and at least 80 breeding females in the other. These colonies were further divided into sub-groups of 16-25 breeding females (Greenaway, 2008, Greenaway & Hill, 2004). Bats have been recorded changing sub-groups between different years, but never changing nursery colonies (Greenaway, 2004; Greenaway, 2008; Greenaway & Hill, 2004). It is not known whether the Sizewell colony supports the sub-group theory; those papers discussing sub-groups generally are of high-quality habitats covering larger areas such as the Ahringsbachtal Special Area of Conservation (SAC) in Germany and the Mens and Ebernoe Common SACs in England.

5.1.19 During the 2011 radio-tracking surveys, non-breeding female bats were recorded within the maternity roost trees and appeared to move with other breeding female bats and juvenile bats into different tree roosts. During the 2014 surveys, three non-breeding female barbastelles were tracked, for one (Bat 8) no roost was found (thought likely to be in area of no access around Eastbridge); Bat 15 remained in R27 for the duration of the tracking along with other breeding female bats; and Bat 19 moved between roosts within Scottshall Covert but did not appear to move with any of the other tagged bats that were roosting in this area. However, it is not possible to know the movements of untagged bats. Non-breeding females have been recorded roosting within maternity colonies (Greenaway, 2008), but have also been recorded roosting with small groups of males (Parsons *et al*., 2003).

5.1.20 The trapping and radio-tracking studies provide very useful data, but on an unknown proportion of the population caught from a small number of trapping locations. Barbastelle bats are notoriously adept at evading traps/nets and therefore difficult to catch (Billington, pers. comm.). There are a limited number of ideal trapping locations on the EDF Energy Sizewell Estate on flightlines that are used regularly and where bats find it difficult to evade capture, i.e. on rides where there is dense vegetation both above and to the sides. The use of a Sky-net in the coniferous plantation woodland increased trapping success in 2011; however, in 2014 (due to the windy weather) the use of mist-nets was restricted. It is likely that the available trapping locations are not used by all of the barbastelles and therefore only a proportion of the total barbastelle population has been sampled by trapping.

Foraging areas and home ranges

Foraging areas

5.1.21 As described above, the main foraging areas for the breeding females in 2014 appeared to be centered at a number of locations: around Kenton Hills and Goose Hill towards Ash Wood; around Plantation Cottages and Black Walks; to the north of Eastbridge; and in Minsmere around Scottshall Covert and north into Dunwich Heath. A number of more wide-ranging bats provided clusters of activity north around Dunwich

and south around The Walks south-east of Leiston. As the barbastelle bats caught in 2010 were not ringed it is not possible to determine whether any of the same bats have been radio-tracked during the two latter tracking periods. None of the bats ringed during 2011 were re-caught in 2014 so it is known that none of the bats tracked in 2011 were tracked in 2014.

5.1.22 Only very limited movement of bats into the Minsmere area had been recorded during the previous radio-tracking surveys. Access into and through Minsmere and Dunwich Heath was permitted during both the 2010 and 2011 tracking surveys; however, no VP sites to the north were plotted as no bats were recorded when surveyors searched in these areas. During the 2010 radio-tracking surveys, a pregnant female (2010 Bat 5) was the only bat recorded flying to the north. It was recorded roosting in Hangman's Wood and foraging over the Minsmere Levels at the bridge at Eastbridge. During the 2011 radio-tracking, a breeding female (2011 Bat 8) regularly moved away from the main site and was not tracked down. It was recorded to the north in Minsmere towards Westleton Walks on one occasion but further tracking was not achieved and it returned to the EDF Energy Sizewell Estate shortly afterwards. Bat 13 from 2011 was recorded during the first four nights of tracking within the EDF Energy Sizewell Estate but from the fifth night onwards the bat appeared to move to the north west of Eastbridge over the Minsmere Levels West where it remained for large parts of the nights whilst roosting in Leiston Old Abbey Woods. Occasional forays into Hangman's Wood were also recorded. This reason for this shift in foraging area is not known.

5.1.23 The 2014 surveys confirmed regular interchange between Minsmere and the EDF Energy Sizewell Estate. This increased evidence of interchange may be due to the fact that during 2014 trapping was carried out in Minsmere for the first time but it may also be a real effect arising from seasonal changes in foraging strategy. At least one breeding female in 2014 (2014 Bat 13) foraged much more widely than previously recorded: she spent the first nights she was tracked foraging around the EDF Energy Sizewell Estate, with occasional forays towards Minsmere Levels and northwest of Eastbridge before moving to fly more regularly around the Minsmere Old River to the north-west of Eastbridge and north into Hangmans New Wood within the Minsmere Reserve.

Home ranges: breeding females MCP and kernel analyses

5.1.24 Home Range Analysis was undertaken for all bats where sufficient bearings were collected. A comparison of the data from 2010, 2011 and 2014 is given below (Table A15). These can be compared with data from other radio-tracking studies. The other studies typically used 100% MCPs, rather than (as here) 95% MCPs to eliminate outliers. The data for 2010 and 2011 are at the lower end of the ranges recorded for adult female barbastelles in the Mens (range 260-2,928ha; mean: 1,236ha); and are similar to the mean recorded in Germany (222ha; Kerth & Melber, 2009). The 2014 results (range 329 – 2020ha; mean 714ha) are

similar to that recorded at Ebernoe Common (range: 45 - 2,521ha; mean: 779.5ha; [5]Greenaway, 2008).. The results for all years at Sizewell are much higher than that recorded in Switzerland (mean: 8.8ha); Sierro & Arlettaz, 1997).

Table A15 – Mean Home Ranges for breeding females recorded in 2010, 2011 and 2014. All areas in ha.

Status	Year	2010	2011	2014
Breeding females (excl. Bats 4 and 10 in 2014)	95% MCP Mean (range)	221 (76-388)	272 (128-547)	714 (329-2020)
	95% Kernel Mean (range)	256 (101 – 410)	336 (203-508)	582 (309-1275)
	95% Cluster mean (range) No. of nuclei/cluster	68 (4 – 175) 1 - 4	128 (20 – 227) 1 - 6	313 (105 -819) 1 - 7

Home Ranges recorded in other studies						
Status	**Analysis Type**	**Mens**	**Ebernoe**	**Hillen *et al.***	**Kerth *et al.***	**Norwich NDR**
Breeding females	100% MCP Mean (range)	1,236 (260 – 2928)	779.5 (45 – 2521)	-	222	904 (393 - 1637) 95% MCP
	95% Kernel Mean (range)			403 (125 – 2551)	108.6 (90% Kernel)	884 (460 - 2119)

5.1.25 The 2011 and 2014 home range kernel analysis results are similar to the home ranges recorded for 12 female barbastelle bats at the site in Germany, although a wider range of values were recorded (kernel 95%: range: 125-2551ha; median: 403ha; Hillen *et al*., 2009). Another site in Germany recorded a smaller mean home range (90% kernel mean: 108.6ha) (Kerth & Melber, 2009)

Core areas defined through kernel analyses

5.1.26 Core areas are those where an animal spends the majority of its time. Hillen's radio-tracking study of barbastelle (Hillen *et al*., 2009) looked at core areas used within each bat's home range. In that study, the core area was defined as 50% and home range was defined as 95% of the kernel density estimate. On that basis, the median number of core areas per bat was two with a range of one to five core areas per bat

[5] Note the MCP% analysis is not given in Greenaway 2008 or Sierro and Arlettaz 1997 but given as 100% MCP in Kerth and Melber 2009)

tracked per year. The core area size ranged from 5ha to 285ha. They found that all the home ranges of radio-tracked females (breeding and non-breeding) overlapped with at least one other home range but that only 41% of the core areas overlapped with another female's core area, suggesting a degree of partitioning. Although the sample size for the study was small (19 data sets from 12 female bats), Hillen *et al.* 2009 determined that female barbastelles partition foraging areas and keep individual hunting areas constant over time. The same analysis was undertaken of the 2014 Sizewell data , using the 50% kernel area of nine breeding female barbastelle bats. This resulted in 61% of core areas having no overlap and therefore 39% being overlapped by at least one other core area, a very similar result to the Hillen study. Figure C8 shows the 50% kernel areas of the breeding female barbastelle bats.

5.1.27 It should be noted that for both studies it is not known how many untagged bats were foraging in these core areas. Therefore it is possible that there is a greater degree of overlap in individual foraging areas than is otherwise indicated by the data presented here. The Hillen and Sizewell studies differ because at Sizewell the bats were radio-tracked over the same time period with multiple surveyors allowing the bats to be tracked simultaneously, whilst the Hillen study tracked either single bats or pairs of bats at any one time. The Hillen study did, however, track the same bat over different years with one bat tracked in each of the four years of the study, one during three of the four years and three during two of the four years. The researchers concluded that fidelity between years appeared to be more important in determining home range than intraspecific competition. None of the bats at Sizewell have been knowingly caught and tracked over different years as ringing did not take place during the 2010 capture/tracking session.

Cluster analyses: breeding females

5.1.28 Cluster analysis creates a number of nuclei or clusters for each bat. The cluster area size defined by a 95% cluster analysis of breeding female barbastelle ranged from 105 to 819ha with the number of nuclei ranging from 1 to 7 (as shown on **Figure C2)**. Although there is overlap between the nuclei of individual bats, there does appear to be some partitioning of foraging habitat away from the main roosting areas. By way of comparison, during 2011, the 95% cluster analysis of breeding females resulted in between 1 to 6 nuclei with the total areas ranging from 20ha to 227ha. Again, there appeared to be some partitioning of foraging habitat away from the main roosting area. During the 2010 pre-lactation radio-tracking period (based on results of bats with functioning tags), the 95% cluster analysis of all breeding females resulted in between 1 to 4 nuclei with total areas ranging from 4ha to 175ha. There was some east-west partitioning of foraging habitat in the belts area north of Grimseys, Leiston Old Abbey woodland and around Eastbridge Road, Theberton House and the fields north of Leiston Abbey. Areas of overlap occurred around Ash Wood and the field system north of Kenton Hills and around Abbey Farm Track in 2010. Areas of overlap in 2011 were similar but extended out to Goose Hill more than in 2010. In 2014, the areas of overlap occurred around Kenton Hills and Goose Hill towards Ash Wood, around Lower Abbey Farm and Black Walks, to the north of Eastbridge and in Minsmere around Scottshall Covert and north into Dunwich Heath.

Non-breeding female barbastelles (MCP, Kernel and Cluster analysis)

5.1.29 Three non-breeding female bats were radio-tracked in 2014: Bats 8, 15 and 19. These had 95% MCP home ranges averaging 703 ha, comparable with the breeding female bats. The 95% cluster analysis resulted in larger average cluster size of 398ha compared to the mean size for breeding females of 313ha (excluding Bats 4 and 10 with the limited tracking data). The kernel analysis similarly recorded a larger area 739ha compared to 582 for the breeding females. Greenaway (2008) found that there was greater variability in MCP size for non-breeding barbastelles (both male and female). The lower metabolic demands of non-breeding bats mean that they do not require such large foraging areas; conversely a tendency to 'wander' in the late summer to find mating opportunities means they can also have quite large ranges as defined by MCP. For example, it was determined that non-lactating female noctules used more marginal and less preferred habitats significantly more than lactating bats (Mackie & Racey, 2007), although there was little difference in timing of foraging activity or distances travelled.

Male barbastelles (MCP)

5.1.30 The male bats at Sizewell in 2014 had 95% MCPs ranging between 558ha and 1782ha (mean 990ha). This is typically larger than those of the female bats tracked in 2014 (mean 714ha breeding female and 703ha non-breeding female). Male bats tend to range over much greater distance and tend not to be associated with the core breeding habitat monopolised by the females. Greenaway (2004) proposed that the foraging areas used by the male may more frequently be in sub-optimal habitats when compared to those used by the females; however, in this instance and as with the 2011 tracking, there appears to be a greater degree of overlap at this site than occurs in the Sussex sites. During the 2014 surveys, only three adult male barbastelles were caught, most likely due to the trapping being principally in or in close vicinity to the core breeding habitat. The male barbastelles were recorded flying in the areas of habitat used by the female tracked bats: male Bat 3, for example, roosted in the Grimseys Wood area and was recorded regularly in Fiscal Policy, Goose Hill and Ash Wood. Male Bat 5 was recorded around Sizewell Belts, to the east of Eastbridge and also regularly to the south in The Walks (south-east of Leiston) where Bat 13 a breeding female was also recorded. Bat 14 spent most days roosting in tree R27 and was recorded regularly in Goose Hill, Minsmere Levels and Scottshall Coverts in Minsmere as well as south to Lovers Lane and west to Westleton Walks. However, all three were also recorded some distance away from the EDF Energy Sizewell and Minsmere Estates. Bat 3 was recorded south of Leiston near Aldringham whilst Bat 14 was recorded towards Westleton to the north west and north east along the coast near Dunwich. Bat 5 roosted near Saxmundham and, due to the distance from the EDF Energy Sizewell Estate, this bat was not tracked from its roost. As a result there were periods when the bat could not be located either within the EDF Energy Sizewell Estate or in the more distant locations such as The Walks where it was regularly recorded. Bat 14 roosted regularly in tree R27. Given that up to five of the breeding female bats and one non-breeding female roosted within R27 at the same time as Bat 14, it is possible that this was a mating roost, although the bat

was not noted as having swollen testes when it was caught. It is interesting that juvenile male bats were also caught out of this tree.

Distances travelled

5.1.31 Barbastelle bats radio-tracked from The Mens Woodland SAC ranged widely (range: 2.64-11.98km; mean: 7.1km), as did those from Ebernoe Common SAC (range: 1.17-10.46; mean: 5.1) (Greenaway, 2008). The average flight distances for pregnant or lactating females at the same locations were 7.67km and 5.09km respectively (Greenaway, 2008). From Paston Barn near Cromer (Norfolk), female barbastelles flew a maximum of 2.75km to their foraging site, while males were tracked 4.75km (Parsons *et al*., undated). At two sites in southern England, the home ranges varied considerably with bats travelling between 1 and 20km to reach foraging areas with the average range span being 6.8km (Zeale *et al.,* 2012). In Norfolk, the maximum distance travelled by a breeding female bat was 9.4km (average 5.84km), whilst for a male it was 13km (BSG 2010). In comparison, at Sizewell/Minsmere, the maximum distance recorded from a roost area was 9.1km for Bat 13, whilst the mean maximum distance for breeding females was 4.4km (excluding Bat 4). In 2011 (earlier in the breeding season), the furthest flight distance recorded by a breeding female was 3.1km, with a mean distance of 2.3km. The mean maximum distance for the male bats in 2014 was 4.2km. The 2011 distances recorded were considerably smaller than the mean recorded at the Mens and Ebernoe (based on 20 bats tracked in small batches between May and September 2008). The results of the 2014 survey are consistent with the results of previous studies (Greenaway, 2004; 2008 and Zeale *et al.*, 2012). The habitats at Ebernoe and the Mens are more extensive and less fragmented than at Sizewell, and it is considered from the data available that the colonies at these two sites are larger. In addition, the 2011 survey at Sizewell was undertaken when juvenile bats were recently volant and still dependent on their mothers. Therefore the data is for a set time period and at a time when it would be expected that the breeding female bats would not forage as far afield.

5.1.32 Research in Sussex suggested that breeding females dispersed from the roost area along established flight lines to foraging areas often several kilometres away; the female repeatedly using the same flight line, and juveniles following the mothers out along the flight lines to become familiarised with the routes and foraging zones (Greenaway 2004). Whilst the flight lines may be shared, they were generally found to end in a section used by a single bat to access the most distant foraging area (Greenaway 2004). The radio-tracking surveys at Sizewell to date have not found this, with bats flying widely within the landscape: that is, the tracked barbastelle did not tend to follow linear features and did not seem to follow predetermined routes. They appeared to be less reliant on linear features to commute to foraging areas than has been suggested for other studies. As stated above, the habitats at Ebernoe and the Mens are more extensive and less isolated than at Sizewell. It is therefore considered more likely that the quality of the available habitat limits the need for the bats to use specific flightlines at Sizewell/Minsmere. There is limited high-quality foraging habitat available away from these areas meaning they do not commute to more distant foraging areas. At Sizewell and in Norfolk (BSG, 2010), foraging over less high-quality foraging habitat has been recorded,

with foraging over arable land being recorded in both instances. The occurrence of the arable habitat within the EDF Energy Sizewell Estate within the core area does not restrict the movement of the bats, and they do not appear to use specific linear corridors to move between the areas of higher quality habitat which are all situated relatively close to each other.

5.1.33 During the summer season, Greenaway (2004) records that male barbastelle tend to be active for fairly short periods of the night, and appeared to forage entirely in woodlands within 1km of their roost site. In the present study, although the male bats were not continuously followed, they were regularly recorded throughout the night, and were clearly foraging further from their roost than the Greenaway study. Bat 5, which roosted towards Saxmundham, was recorded at least 7km from its roost whilst Bats 3 and 14, which roosted within the EDF Energy Sizewell Estate, were both recorded 4km from their roost areas, and in all cases appeared to be spending considerable periods of time foraging in areas within or close to Sizewell/Minsmere. Bats 3 and 5 were both recorded to the south in The Walks whilst Bat 14 was regularly recorded to the north in Minsmere. In comparison, the single adult male bat caught and tracked in early August 2011 travelled a maximum distance of 2.77km. The level of activity recorded varied for that bat: it was sometimes recorded throughout the night, and at other times, it returned to the roost early and made occasional flights from the roost later. It is likely that there are a number of factors affecting the distances the male bats move. It is possible, given the later time-frame for the 2014 survey, that the male bats were starting to mate (Bat 3 was noted as having swollen testes). During this period, it seems reasonable to assume they will travel further and visit the core area more regularly.

Home range overlap and partitioning

5.1.34 The 95% MCP home ranges for the breeding female barbastelles have been overlaid and the areas of overlapping has been measured. (**Table A16 –** see **Figure C7**).

Table A16 - Areas of overlapping ranges of breeding female MCPs

No of bats overlapping	Area ha 95% MCP
2	1271
3	842
4	678
5	520
6	364
7	217
8	58
9	0.6

5.1.35 Excluding the data from Bats 4 and 10, the area where the MCPs for the remaining nine breeding female bats caught in both Minsmere and Sizewell overlapped covers an area of just <1 ha in Minsmere to the south of Scottshall Covert. The area where the MCPs for eight breeding female bats overlapped covers an

area of 58ha, covering an area extending from Lower Abbey Farm to Scottshall Covert (this lies outside the proposed SZC construction boundary). The area increases quite substantially where seven breeding female bats are overlapping to 217ha. This area extends south to include Ash Wood and Goose Hill. The difference between at least 6 bats overlapping and 7 bats overlapping is relatively small. The area of overlap between at least six breeding female bats extends to the northern end of Nursery Covert, Goose Hill, Ash Wood, through Black Walks into Minsmere Levels and north to Minsmere to Scottshall Covert, The Warren and North Walks.

5.1.36 The 50% kernels of the 2014 breeding females when overlaid show two distinct core areas, one to the north at Minsmere and one to the south within the EDF Energy Sizewell Estate (**Figure C8**). The sizes of these core areas and the % overlap by at least two bats has been calculated.

Table A17 - % overlap of 50% kernel core areas of breeding female barbastelles in 2014

	Total Area (Ha)	Area of overlap by at least 2 bats (Ha)	% core area overlapped
Sizewell	325.3	214.27	65%
Minsmere	264.5	143.78	54.4%

5.1.37 The core area in the south covers a relatively wide area extending from Eastbridge to Nursery Covert and Goose Hill. In the north the core area is focussed on Scottshall Covert, towards Dunwich Heath and The Warren.

5.1.38 The same analysis of the 2011 data has been carried out. The 50% kernels of breeding females (**Figure C9** and **Table A18**) in 2011 found three core areas. One towards Leiston Old Abbey, one to the north over Ash Wood and Black Walks and the third to the east over Goose Hill and the grazing marsh to the east.

Table A18 - % overlap of 50% kernel core areas of breeding female barbastelles in 2011

	Total Area (Ha)	Area of overlap by at least 2 bats (Ha)	% core area overlapped
Leiston Old Abbey	75	52	69%
Ash Wood/Black Walks	127	106	83%
Goose Hill	78	39	50%

5.1.39 The 2011 radio-tracking found a core foraging zone used by juvenile and breeding female bats that extends south from the woodland adjacent to Plantation Cottages through Black Walks, Ash Wood and into Goose Hill and Kenton Hills. It was considered during that survey that this area was the critical productive foraging zone providing the juvenile and shared breeding female foraging areas as described by Greenaway (2004). The radio-tracking in 2014 confirmed the importance of this area for breeding barbastelle, although the overall area of foraging habitat regularly used by the bats in 2014 extended further north into Minsmere and into the area north west of Eastbridge than previously recorded.

5.1.40 The 2011 surveys concluded that, whilst there appeared to be some partitioning of the foraging resource, there was also a higher degree of overlapping than is suggested from research at other sites. Key areas of overlap included Ash Wood, Upper Abbey and Leiston Old Abbey, Dunwich Forest/Goose Hill and the Kenton Hills area. Some partitioning was considered likely, with some distinct areas used in the north-east around Eastbridge, over Sizewell Belts, and to the west and south-west towards the sewage works and Greenhouse Plantation. The 2011 surveys concluded that the majority of activity was concentrated on the area to the south of the Lower Abbey Farm roosting areas with less activity to the north over the Minsmere Levels and north-west of Eastbridge. However, it was considered likely that there could be some seasonal variations to habitat use for foraging due to temperature/food availability and this supposition was based on the apparent movement of foraging female bats from the Belts area to the Eastbridge area in the latter part of the 2011 radio-tracking. The 2014 radio-tracking surveys seem to confirm this, with a higher level of foraging occurring over the Minsmere Levels than previously recorded. The area of overlap is high given that data from only radio-tracked bats can be measured (i.e. excluding non-tracked bats from the colony). The overlaps recorded are 65% at Sizewell and more than 54% at Minsmere. Given this data has been produced from only a sub-set of the colony there is likely to be a higher level of overlap if non-tracked bats are considered. This would suggest that there is a low level of resource partitioning and a high demand on the habitat available in this landscape.

5.1.41 Seasonal diet changes in barbastelle have been researched and it has been found that they selectively predate larger moth species even during periods when smaller moth species are more abundant (Andreas *et al.,* 2012). It was found that, whilst there was generally no abrupt seasonal changes in their diet within season, the exception is in autumn, when the larger moths are replaced by smaller moths. It is considered that this is due to prey availability as most moth species cease to fly and only the smaller species are still flying during this time. Larger moths are still present but display limited flying activities. This autumn period is reported as being into November in the study area within the Czech Republic. Whilst the radio-tracking of barbastelles at Sizewell/Minsmere has not extended later into the Autumn period, it is likely that there will be seasonal and weather-related changes to key foraging areas throughout the year.

Foraging areas and home ranges in relation to the site boundary

5.1.42 An analysis was undertaken of the percentage of each bat's core area(s) that was overlapped by the proposed SZC construction site footprint (Figures C8 (2014),C9 (2011) and C10 (2010)). [Core areas here are defined using 50% kernel analysis; it is important to note that the home ranges can be considerably larger.]

5.1.43 In 2010 when tracking took place before the bats had given birth, the percentage overlap of core areas (as defined above) with the construction footprint ranged from 3ha to 91ha (six bats included in analysis) Bats 3 (17ha) and 4 (3ha) had a restricted number of fixes achieved (8 and 10 respectively).

5.1.44 In 2011, when tracking took place later in the year (females had given birth and juvenile bats were flying but fairly recently flying), the percentage overlap of core areas (as defined above) with the construction footprint ranged from 28ha to 88ha (seven bats included in analysis).

5.1.45 In 2014, when tracking took place later in the year (when young bats are (or largely are) independent), the percentage of overlap of core areas (as defined above) with the construction footprint ranged from 0ha to 87ha (nine bats included in analysis). Four of the five bats whose core areas showed no or minimal overlap with the construction site footprint were caught in Minsmere; one was caught in Sizewell. The four bats with at least 17ha overlap of their core areas with the construction footprint were caught in Sizewell.

Table A19 – Area in ha of 50% kernel core areas of adult breeding female barbastelle with proposed SZC construction site footprint

2014 50% Core Overlap (in order of greatest overlap)		
Bat Number	**Total Area ha**	**Overlap Area ha**
Bat 6	177	87
Bat 17	159	55
Bat 16	79	16
Bat 1	110	17
Bat 7	127	1
Bat 2	90	0
Bat 10	209	0
Bat 13	128	0
Bat 18	94	0
2011 50% Core Overlap (in order of greatest overlap)		
Bat Number	**Total Area ha**	**Overlap Area ha**
Bat 11	113	88
Bat 17	128	71
Bat 13	163	63
Bat 9	108	46
Bat 6	67	30
Bat 8	79	29
Bat 20	77	28
2010 50% Core Overlap (in order of greatest overlap)		
Bat 6	137	91
Bat 5	145	85
Bat 2	37	36
Bat 1	58	28
Bat 3	18	17
Bat 4	8	3

5.2 Serotine

5.2.1 The serotine bat caught was a non-breeding female and appeared to return to its roost relatively early each evening during the tracking. The home range analysis has been undertaken based on 31 points including an estimated location for its roost. Suffolk Bat Group has confirmed there is a known maternity roost at Theberton House.

Table A20 – Serotine home range sizes

MCP	Kernel	Cluster
570.3ha	820.4	421 (2 nuclei)

5.2.2 Research indicates that serotine usually hunt within 4.5km of the roost (occasionally up to 12km, Dietz *et al.,* 2009*)*. Individual home ranges of this species (MCP) have varied from 0.16 to 47.58km2 (4758ha) (Robinson and Stebbings, 1997). The home range recorded at Sizewell was 570ha; however, the bat was recorded returning early to its roost on a number of nights and was often within the area where no access was allowed. It is likely that home range has been underestimated. Distances recorded between roost sites and foraging areas in one study were 8km with a maximum distance of over 41km with up to 10 feeding sites being visited each night (Robinson and Stebbings 1997) whilst Catto *et al.* (1996) found that feeding sites were all within 4km of the day roost. The furthest distance from the roost site visited by Bat 9 was only 3.5km; however, the bat was recorded foraging widely into the Minsmere reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood with bearings putting it along the coastal edge. Successful joint bearings within the coastal area were difficult to achieve due to the limited number of locations where surveyors could stand to get bearings in this areas.

5.2.3 The bat also spent considerable time flying in the grounds of Theberton House. Studies at a site in Brighton East Sussex (Catto *et al.,* 1996) recorded that bats used the breeding roost for night roosting interspersed with short repeated flights of between 1 and 20 minutes close to the resting place. This study also found that temperature had a significant effect on the total time spent away from the roost and time spent in continuous flight. The Sussex research found that mean times away from the roost site varied between the two study sites, with the Brighton bats spending a mean time of 189.5 minutes / night away from the roost with resting periods spent away from the day roost,; bats from the Lewes study site spent 59.4 minutes/night away from the roost but returned to the day roost to rest. The findings at Sizewell appear to display the same general behaviour, with very limited time flying away from the roost on cooler nights such as 19 and 20 August. The bat was recorded more widely in the Minsmere Levels and coastal areas on 15, 16 August and south towards Goose Hill on 17 August, before moving rapidly north to Minsmere before returning to the Theberton House area some 20 minutes later at 21.47hrs (approximately 1 ½ hrs after sunset).

5.2.3 No breeding serotine bats were caught during the 2014 trapping sessions, and no serotine bats were caught at all in the Minsmere area. When higher numbers of serotine bats were caught in 2011, they were nearly all caught in a triple-high sky-net in the Goose Hill area. Serotine bats have regularly been recorded flying high often 10 – 15m above the ground when commuting and the inability to use these higher nets in 2014, and thus the trapping sites in Goose Hill, would have reduced the success of catching the species. In addition, the Sussex research found that when winds were of medium strength (4/5 on the Beaufort scale), serotines foraged closer to the roost and reduced their foraging time, which also would have reduced the likelihood of being trapped.

6.0 CONCLUSION

Barbastelle Bats

6.1 The radio-tracking undertaken in 2014 largely achieved the five objectives set out in para 1.2, as follows:

6.2 Bats were caught later in their active season (mid-August 2014) than had previously been the case (2010 – June; 2011 – late July/early August). Over the three years, these three periods covered pre-breeding, post-breeding, and the commencement of colony dispersal / mating. Bats were trapped both within the EDF Sizewell Estate and (for the first time) to the north, within the RSPB Minsmere Reserve. A total of 27 barbastelle bats were caught: three adult male, twelve breeding female and three non-breeding female bats were tagged. The remaining eight untagged bats were seven juvenile male barbastelle and a single bat which escaped before biometrics could be taken.

6.3 The EDF Energy Sizewell Estate was confirmed to be used throughout all three periods of radio-tracking by barbastelle bats. The 2010 and 2011 surveys, which only captured animals for radio-tracking from within the EDF Energy Sizewell Estate, confirmed the importance of the estate to barbastelle during the main breeding period. The trapping and tracking in 2014 determined that Minsmere also supports breeding barbastelle bats both in terms of roosts and foraging habitat.

6,4 The radio-tracking undertaken in 2011, earlier in the season, found there was a core foraging zone used by the juvenile and breeding female bats that extended south from the woodland adjacent to Plantation Cottages (near Lower Abbey Farm) through Black Walks, Ash Wood and into Goose Hill and Kenton Hills. Outside that core foraging zone, there was a degree of overlap of foraging by both breeding female and juvenile barbastelles into the Sizewell Belts area. While there did appear to be some partitioning of the foraging resource, there appeared to be a higher degree of overlapping of habitat in the open grazing meadows than is indicated in previously published research.

6.5 The 2014 analysis indicated core areas both in the south, covering a relatively wide area extending from Eastbridge to Nursery Covert and Goose Hill, and to the north, focussed on Scottshall Covert, towards Dunwich Heath and The Warren. This was not solely the result of trapping in these two different areas, as the tracking confirmed there was significant interchange between the two areas, with more foraging occurring over the Minsmere Levels and the Eastbridge area than previously recorded.

6.6 A total of fifteen new roosts (or approximate roost locations) were identified in 2014: five in Sizewell; six within Minsmere, and four others.

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6.7 The three male bats were all caught within the EDF Energy Sizewell Estate: two from the northern side of Nursery Covert and the third from the southern edge of the same block of woodland. Two of the male bats were found roosting within the EDF Energy Sizewell Estate, one within Grimseys and one within Nursery Covert. The third was recorded roosting further away near Saxmundham. The male bats had generally larger home ranges than the female bats, flying more widely within the wider landscape; all three were recorded in Minsmere as well as Sizewell.

6.8 None of the 27 barbastelle trapped in 2014 were ringed and it can be deduced from this that none of the bats radio-tracked in 2014 were radio-tracked in 2011. A minimum count from emergence surveys also indicated 27 bats (though these were not necessarily the same 27 as those trapped). It is not possible to generate a population estimate from these data alone.

Serotine bat

6.6 A single non-breeding female serotine bat was caught and tracked. No other serotine bats were caught. The bat roosted for the duration of the tracking within the grounds of Theberton Farm. No access was permitted in this area although there is a known serotine maternity roost at this property. The bat was recorded foraging widely into the Minsmere Reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood with bearings putting it along the coastal edge.

Other bat species caught

6.7 Over six nights of trapping, 285 bats of eight species caught. This is considered to be a high number of bats trapped particularly given the weather conditions experienced. Of these, 139 were soprano pipistrelle bats caught at two locations within the Minsmere Reserve. Only male Daubenton's bats were caught in the EDF Energy Sizewell Estate, whilst a single non-breeding adult female was caught in the Minsmere Reserve along with six further juvenile Daubenton's bats. Prior to the 2014 surveys only a single male Daubenton's had been caught to the south of the EDF Energy Sizewell Estate along Sandy Lane. No Nathusius' pipistrelle were trapped in either site. The objective to track these bat species if caught was therefore not met.

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LARGE TABLES FOLLOW

Table A2 – Bat trapping data (Key: SZC – Sizewell; Mm – Minsmere; PL – post-lactation; NB – non-breeding, T1 - testes not swollen, T2 – testes intermediate, T3 – testes swollen)

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
09/08/2014	SZC - Fiscal Policy	1	20:50	P55	Male	Adult	T3	30.5	4.6			
09/08/2014	SZC - Fiscal Policy	2	20:50	P45	Female	Adult	NB	31.9	2.1			
09/08/2014	SZC - Fiscal Policy	3	21:00	P55	Male	Adult	T3	32.8	4.9			
09/08/2014	SZC - Fiscal Policy	4	21:00	P55	Male	Adult	T3	30.8	5.2			
09/08/2014	SZC - Fiscal Policy	5	21:00	P45	Female	Adult	PL	32.2	5.2			
09/08/2014	SZC - Fiscal Policy	6	21:00	P45	Female	Juvenile	NB	32.2	5.1			
09/08/2014	SZC - Fiscal Policy	7	21:00	Natt	Male	Adult	T3	39.3	8.1			
09/08/2014	SZC - Fiscal Policy	8	21:00	Barb	Male	Juvenile	T2	38.4	7.8	-	T8832	Very small ear discs
09/08/2014	SZC - Fiscal Policy	9	21:00	BLE	Male	Adult	T3	39.6	8.1			
09/08/2014	SZC - Fiscal Policy	10	21:00	Daub	Male	Juvenile	T3	37.9	6.7			
09/08/2014	SZC - Fiscal Policy	11	21:20	P55	Female	Juvenile	NB	32.5	5.1			
09/08/2014	SZC - Fiscal Policy	12	21:50	Natt	Female	Juvenile	NB	40.2	7.6			Mature juvenile
09/08/2014	SZC - Fiscal Policy	13	22:00	P55	Female	Juvenile	NB	31.0	4.4			
09/08/2014	SZC - Fiscal Policy	14	22:00	Natt	Male	Adult	T3	37.4	6.3			
09/08/2014	SZC - Fiscal Policy	15	22:00	P45	Male	Adult	T3	29.9	5.3			
09/08/2014	SZC - Fiscal Policy	16	22:20	P45	Female	Juvenile	NB	32.3	5.4			
09/08/2014	SZC - Fiscal Policy	17	22:20	P45	Female	Juvenile	NB	31.9	5.0			
09/08/2014	SZC - Fiscal Policy	18	22:50	P45	Male	Adult	T3	31.0	5.1			
09/08/2014	SZC - Fiscal Policy	19	22:50	Natt	Male	Adult	T3	40.0	8.3			
10/08/2014	SZC - Fiscal Policy	20	00:40	P55	Male	Adult	T3	30.2	4.8			
10/08/2014	SZC - Fiscal Policy	21	02:00	P45	Released	Released	Released					Released as taking down traps due to rain.
11/08/2014	SZC - Nursery Covert North	22	20:50	Barb	Female	Adult	PL	39.7	9.8	1	T8831	Ear discs
11/08/2014	SZC - Nursery Covert North	23	20:50	Barb	Female	Adult	PL	38.9	9.7	2	T8828	
11/08/2014	SZC - Nursery Covert North	24	20:50	Barb	Escaped	Escaped	Escaped					Escaped from mist net
11/08/2014	SZC - Nursery Covert North	25	20:50	Barb	Male	Juvenile	T1	38.4			T8827	Very stressed so not weighed
11/08/2014	SZC - Nursery Covert North	26	21:30	Barb	Male	Adult	T3	38.3	8.1	3	T8829	
11/08/2014	SZC - Nursery Covert North	27	21:30	P55	Male	Juvenile	T1	31.8	5.0			
11/08/2014	SZC - Nursery Covert North	28	22:25	Natt	Male	Adult	T1	40.2	9.1			
11/08/2014	SZC - Nursery Covert North	29	22:45	P45	Female	Juvenile	NB	33.5	4.8			
11/08/2014	SZC - Nursery Covert North	30	22:55	P45	Female	Adult	NB	32.5	5.6			
11/08/2014	SZC - Nursery Covert North	31	22:55	P45	Female	Adult	NB	31.5	5.0			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
11/08/2014	SZC - Nursery Covert North	32	23:15	Natt	Female	Adult	PL	39.4	8.2			
11/08/2014	SZC - Nursery Covert North	33	23:30	P45	Female	Adult	NB	32.2	5.5			
11/08/2014	SZC - Nursery Covert North	34	23:45	BLE	Male	Adult	T1	40.6	7.3			
12/08/2014	SZC - Nursery Covert North	35	00:15	P55	Male	Adult	T1	31.8	4.8			
12/08/2014	SZC - Nursery Covert North	36	00:15	P55	Male	Adult	T1	29.1	4.3			
12/08/2014	SZC - Nursery Covert North	37	00:53	Barb	Female	Adult	PL	38.8	9.4	4	T8830	
12/08/2014	SZC - Nursery Covert North	38	01:20	Natt	Male	Adult	T1	38.3	7.6			
12/08/2014	SZC - Nursery Covert North	39	01:20	P55	Male	Adult	T3	31.4	5.0			
12/08/2014	SZC - Nursery Covert North	40	01:20	P55	Male	Adult	T3	30.7	4.9			
12/08/2014	SZC - Nursery Covert North	41	01:30	BLE	Female	Adult	PL	37.6	8.2			
12/08/2014	SZC - Nursery Covert North	42	01:30	Natt	Female	Adult	PL	40.0	8.9			
12/08/2014	SZC - Nursery Covert North	43	01:30	BLE	Male	Adult	T1	38.6	7.1			
12/08/2014	SZC - Nursery Covert North	44	01:45	BLE	Male	Adult	T1	37.9	6.4			
12/08/2014	SZC - Nursery Covert North	45	01:50	Natt	Female	Adult	PL	39.1	9.0			
12/08/2014	SZC - Nursery Covert North	46	01:50	P55	Male	Adult	T1	32.7	5.0			Swollen glands
12/08/2014	SZC - Nursery Covert North	47	03:50	Barb	Male	Adult	T1	39.0	9.6	5	T8981	
12/08/2014	SZC - Nursery Covert North	48	04:33	Barb	Female	Adult	PL	38.6	10.7	6	T9000	
11/08/2014	Mm - RSPB Southwalk Belt	49	21:00	Barb	Male	Juvenile	T1	37.2	8.2		H5944	No ear discs
11/08/2014	Mm - RSPB Southwalk Belt	50	21:00	Daub	Female	Juvenile	NB	37.0	6.5			
11/08/2014	Mm - RSPB Southwalk Belt	51	21:00	Daub	Female	Juvenile	NB	36.2	7.0			
11/08/2014	Mm - RSPB Southwalk Belt	52	21:00	P55	Female	Juvenile	NB	32.7	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	53	21:00	P55	Female	Juvenile	NB	31.2	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	54	21:40	BLE	Female	Juvenile	NB	39.2	7.0			
11/08/2014	Mm - RSPB Southwalk Belt	55	21:50	P55	Female	Juvenile	NB	32.4	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	56	21:50	P55	Female	Juvenile	NB	32.1	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	57	22:00	P55	Female	Juvenile	NB	30.1	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	58	22:00	P55	Female	Juvenile	NB	31.4	6.1			
11/08/2014	Mm - RSPB Southwalk Belt	59	22:10	P55	Female	Juvenile	NB	31.4	5.1			
11/08/2014	Mm - RSPB Southwalk Belt	60	22:10	P55	Male	Juvenile	T1	31.0	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	61	22:15	P55	Male	Juvenile	T1	30.0	4.1			
11/08/2014	Mm - RSPB Southwalk Belt	62	22:15	P55	Female	Juvenile	NB	31.4	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	63	22:15	P55	Female	Juvenile	NB	31.6	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	64	22:15	P55	Female	Juvenile	NB	30.5	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	65	22:15	P55	Male	Juvenile	T1	31.0	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	66	22:40	P55	Female	Juvenile	NB	31.3	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	67	22:40	P55	Female	Juvenile	NB	30.5	5.5			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
11/08/2014	Mm - RSPB Southwalk Belt	68	22:40	P55	Male	Adult	T2	32.9	4.0			
11/08/2014	Mm - RSPB Southwalk Belt	69	22:40	P55	Male	Juvenile	T1	30.3	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	70	22:40	P55	Female	Juvenile	NB	31.0	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	71	22:40	P55	Escaped	Escaped	Escaped					Escaped
11/08/2014	Mm - RSPB Southwalk Belt	72	22:40	P55	Female	Juvenile	NB	31.1	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	73	22:40	Daub	Female	Adult	NB	37.4	9.5			
11/08/2014	Mm - RSPB Southwalk Belt	74	22:40	P55	Female	Juvenile	NB	31.1	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	75	23:00	P55	Female	Adult	NB	37.4	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	76	23:00	Daub	Female	Juvenile	NB	31.1	9.5			
11/08/2014	Mm - RSPB Southwalk Belt	77	23:00	P55	Male	Juvenile	T1	31.8	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	78	23:30	Daub	Male	Juvenile	T1	37.2	8.0			
11/08/2014	Mm - RSPB Southwalk Belt	79	23:40	P55	Male	Juvenile	T1	29.5	4.9			
11/08/2014	Mm - RSPB Southwalk Belt	80	23:40	P55	Female	Juvenile	NB	30.5	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	81	23:40	P55	Male	Adult	T3	30.5	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	82	23:40	P55	Male	Adult	T3	29.4	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	83	00:08	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	84	00:08	BLE	Female	Adult	PL	39.3	9.0			
12/08/2014	Mm - RSPB Southwalk Belt	85	00:08	P55	Female	Juvenile	NB	30.6	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	86	00:10	P55	Male	Adult	T2	31.2	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	87	00:40	P55	Male	Adult	T2	30.5	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	88	00:40	Natt	Female	Juvenile	NB	37.9	7.8			
12/08/2014	Mm - RSPB Southwalk Belt	89	01:05	P55	Male	Adult	T2	29.8	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	90	01:10	Daub	Female	Juvenile	NB	39.1	9.0			
12/08/2014	Mm - RSPB Southwalk Belt	91	01:50	P55	Male	Juvenile	T1	29.7	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	92	02:20	P55	Male	Adult	T2	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	93	02:40	P55	Male	Adult	T2	29.4	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	94	02:40	P55	Female	Juvenile	NB	32.0	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	95	03:00	P55	Male	Adult	T1	30.6	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	96	03:30	P55	Female	Adult	NB	31.2	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	97	03:30	Natt	Male	Juvenile	T1	40.4	8.3			
12/08/2014	Mm - RSPB Southwalk Belt	98	04:00	P55	Female	Adult	NB	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	99	04:00	P55	Female	Juvenile	NB	30.5	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	100	04:00	P55	Male	Adult	T1	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	101	04:20	P55	Male	Juvenile	T1	30.7	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	102	04:20	Daub	Male	Juvenile	T1	36.0	8.0			
12/08/2014	Mm - RSPB Southwalk Belt	103	04:30	Natt	Male	Juvenile	T1	39.4	8.0			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	Mm - RSPB Southwalk Belt	104	04:30	P55	Male	Juvenile	T1	29.5	4.7			
12/08/2014	Mm - RSPB Southwalk Belt	105	04:30	P55	Female	Adult	PL	31.0	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	106	04:45	P55	Female	Juvenile	NB	31.2	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	107	04:45	P55	Male	Juvenile	T1	29.0	5.3			
12/08/2014	Mm - RSPB Southwalk Belt	108	04:50	P55	Female	Juvenile	NB	31.1	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	109	04:50	P55	Male	Juvenile	T1	31.0	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	110	04:50	P55	Female	Juvenile	NB	33.0	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	111	04:50	P55	Female	Juvenile	NB	31.9	4.0			
12/08/2014	Mm - RSPB Southwalk Belt	112	04:50	P55	Female	Juvenile	NB	32.1	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	113	04:50	P55	Female	Juvenile	NB	31.4	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	114	04:50	P55	Female	Juvenile	NB	31.7	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	115	04:55	P55	Male	Adult	T2	31.1	4.8			
12/08/2014	Mm - RSPB Southwalk Belt	116	04:55	P55	Male	Adult	T1	29.0	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	117	05:20	P55	Male	Adult	T1					Released as caught late
12/08/2014	SZC - Abbey Lane	118	21:00	Natt	Male	Adult	T3	38.4	7.8			
12/08/2014	SZC - Abbey Lane	119	21:00	P45	Female	Adult	PL	32.1	5.0			swollen glands
12/08/2014	SZC - Abbey Lane	120	21:00	P45	Male	Adult	T3	31.0	4.6			swollen glands
12/08/2014	SZC - Abbey Lane	121	21:00	P45	Male	Adult	T3	30.7	4.9			
12/08/2014	SZC - Abbey Lane	122	21:00	P45	Male	Adult	T3	30.9	5.0			
12/08/2014	SZC - Abbey Lane	123	21:00	P45	Male	Adult	T3	32.4	4.6			
12/08/2014	SZC - Abbey Lane	124	21:00	P45	Female	Adult	PL	31.1	5.0			
12/08/2014	SZC - Abbey Lane	125	21:00	P45	Male	Juvenile	T1	29.8	4.1			
12/08/2014	SZC - Abbey Lane	126	21:00	P45	Male	Adult	T3	29.0	4.3			Swollen glands
12/08/2014	SZC - Abbey Lane	127	21:00	P45	Male	Adult	T3	31.9	4.5			Swollen glands
12/08/2014	SZC - Abbey Lane	128	21:00	BLE	Male	Adult	T3	37.0	6.7			
12/08/2014	SZC - Abbey Lane	129	21:00	P45	Female	Juvenile	NB	31.0	5.1			
12/08/2014	SZC - Abbey Lane	130	21:45	P45	Male	Adult	T3	31.2	5.4			
12/08/2014	SZC - Abbey Lane	131	21:45	Natt	Male	Adult	T1	39.7	7.4			
12/08/2014	SZC - Abbey Lane	132	21:45	P45	Female	Adult	NB	33.6	6.9			
12/08/2014	SZC - Abbey Lane	133	21:45	Natt	Male	Adult	T3	39.1	6.9			
12/08/2014	SZC - Abbey Lane	134	21:45	Natt	Male	Adult	T3	38.3	7.5			
12/08/2014	SZC - Abbey Lane	135	22:15	P55	Male	Adult	T3	30.3	5.0			
12/08/2014	SZC - Abbey Lane	136	22:35	Serotine	Female	Adult	NB	55.5	26.1	9		
12/08/2014	SZC - Abbey Lane	137	23:15	P45	Male	Adult	T3	32.1	4.8			Swollen glands
12/08/2014	SZC - Abbey Lane	138	23:15	Natt	Male	Adult	T1	38.6	7.2			
12/08/2014	SZC - Abbey Lane	139	23:15	P45	Male	Adult	T1	32.1	4.7			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	SZC - Abbey Lane	140	23:15	P45	Male	Adult	T2	32.6	5.1			Swollen glands
12/08/2014	SZC - Abbey Lane	141	23:55	P45	Male	Adult	T2	29.6	4.3			
12/08/2014	SZC - Abbey Lane	142	23:55	Daub	Male	Adult	T1	37.3	10.1			
13/08/2014	SZC - Abbey Lane	143	00:15	P45	Male	Adult	T2	30.1	4.3			Swollen glands
13/08/2014	SZC - Abbey Lane	144	01:00	P45	Female	Adult	NB	31.2	4.8			Swollen glands
13/08/2014	SZC - Abbey Lane	145	01:35	Barb	Female	Adult	PL	38.5	9.7	12	T8954	
13/08/2014	SZC - Abbey Lane	146	01:45	P45	Male	Juvenile	T1	32.3	4.5			
13/08/2014	SZC - Abbey Lane	147	02:15	P45	Male	Adult	T3	31.6	4.7			Swollen glands
13/08/2014	SZC - Abbey Lane	148	03:28	BLE	Female	Adult	NB	39.4	7.3			Bred before, not 2014
13/08/2014	SZC - Abbey Lane	149	04:10	P45	Male	Adult	T3	32.6	5.2			Swollen glands
13/08/2014	SZC - Abbey Lane	150	04:21	Natt	Male	Adult	T1	41.0	8.6			
12/08/2014	Mm - North of Hangmans Wood	151	20:30	P55	Female	Juvenile	NB	31.2	4.5			
12/08/2014	Mm - North of Hangmans Wood	152	21:00	P55	Male	Juvenile	T1	32.1	3.0			
12/08/2014	Mm - North of Hangmans Wood	153	21:00	P55	Male	Juvenile	T2	30.5				
12/08/2014	Mm - North of Hangmans Wood	154	21:00	P55	Female	Juvenile	NB	31.4	5.0			
12/08/2014	Mm - North of Hangmans Wood	155	21:00	P55	Female	Juvenile	NB	31.3	5.0			Signs of breeding
12/08/2014	Mm - North of Hangmans Wood	156	21:10	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	157	21:25	Barb	Female	Adult	PL	39.6	8.5	7	H6100	Small ear tags
12/08/2014	Mm - North of Hangmans Wood	158	21:25	P55	Female	Juvenile	NB	32.1	5.0			
12/08/2014	Mm - North of Hangmans Wood	159	21:36	P55	Female	Juvenile	NB	30.2	5.0			
12/08/2014	Mm - North of Hangmans Wood	160	21:36	P55	Female	Juvenile	NB	32.0	5.5			
12/08/2014	Mm - North of Hangmans Wood	161	21:36	P55	Male	Juvenile	T1	30.1	4.0			
12/08/2014	Mm - North of Hangmans Wood	162	21:36	P55	Female	Adult	PL	31.0	6.0			
12/08/2014	Mm - North of Hangmans Wood	163	21:36	P55	Female	Juvenile	NB	32.0	6.0			
12/08/2014	Mm - North of Hangmans Wood	164	21:36	P55	Female	Juvenile	NB	30.5	5.0			
12/08/2014	Mm - North of Hangmans Wood	165	22:00	P55	Male	Adult	T1	31.9	5.5			
12/08/2014	Mm - North of Hangmans Wood	166	22:00	P55	Female	Juvenile	NB	31.9	5.0			
12/08/2014	Mm - North of Hangmans Wood	167	22:00	P55	Male	Juvenile	T2	29.4	4.8			
12/08/2014	Mm - North of Hangmans Wood	168	22:00	P55	Male	Adult	T2	29.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	169	22:00	P55	Male	Juvenile	T1	31.6	5.0			
12/08/2014	Mm - North of Hangmans Wood	170	22:00	P55	Male	Juvenile	T1	30.2	4.0			
12/08/2014	Mm - North of Hangmans Wood	171	22:00	P55	Female	Juvenile	NB	31.6	5.0			
12/08/2014	Mm - North of Hangmans Wood	172	22:00	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	173	22:00	Noc	Female	Adult	PL	53.9	26.0			
12/08/2014	Mm - North of Hangmans Wood	174	22:10	P55	Female	Adult	PL	31.9	5.0			
12/08/2014	Mm - North of Hangmans Wood	175	22:10	P55	Female	Juvenile	NB	32.1	5.5			Fur trimmed

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	Mm - North of Hangmans Wood	176	22:10	P55	Female	Juvenile	NB	30.6	3.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	177	22:10	P55	Female	Juvenile	NB	28.9	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	178	22:10	Barb	Female	Adult	NB	38.7	9.0	8	H6099	
12/08/2014	Mm - North of Hangmans Wood	179	22:30	P55	Male	Juvenile	T1	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	180	22:30	P55	Female	Juvenile	NB	31.2	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	181	22:30	P55	Male	Juvenile	T1	31.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	182	22:30	P55	Male	Juvenile	T1	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	183	22:30	P55	Female	Juvenile	NB	31.7	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	184	22:30	P55	Female	Juvenile	NB	30.9	5.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	185	22:30	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	186	22:30	P55	Female	Juvenile	NB	31.5	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	187	22:30	P55	Male	Juvenile	T1	31.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	188	22:30	P55	Female	Adult	NB	32.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	189	23:00	P55	Male	Juvenile	T1	31.3	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	190	23:00	Natt	Male	Adult	T2	41.2	7.0			
12/08/2014	Mm - North of Hangmans Wood	191	23:00	P55	Female	Juvenile	NB	31.2	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	192	23:00	P55	Female	Juvenile	NB	31.1	5.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	193	23:00	P55	Female	Juvenile	NB	30.7	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	194	23:00	P55	Female	Juvenile	NB	32.5	6.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	195	23:10	P55	Male	Juvenile	T1	30.0	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	196	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	197	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	198	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	199	23:40	P55	Female	Juvenile	NB	31.9	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	200	23:40	P55	Female	Juvenile	NB	31.5	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	201	23:40	P55	Female	Juvenile	NB	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	202	23:40	P55	Female	Juvenile	NB	32.7	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	203	23:40	Natt	Female	Juvenile	NB	38.4	7.5			
12/08/2014	Mm - North of Hangmans Wood	204	23:40	P55	Female	Juvenile	NB	31.2	5.5			Recapture
12/08/2014	Mm - North of Hangmans Wood	205	23:40	P55	Female	Juvenile	NB	31.5	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	206	23:55	Barb	Male	Juvenile	T1	38.3	8.0		H6098	small ear tags
12/08/2014	Mm - North of Hangmans Wood	207	23:55	P55	Male	Juvenile	T1	32.0	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	208	23:55	P55	Female	Juvenile	NB	31.9	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	209	00:00	Barb	Female	Recapture	Recapture			7		Recapture
13/08/2014	Mm - North of Hangmans Wood	210	00:00	BLE	Male	Juvenile	T1	38.8	7.0			
13/08/2014	Mm - North of Hangmans Wood	211	00:10	P55	Female	Juvenile	NB	31.7	5.0			Fur trimmed

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
13/08/2014	Mm - North of Hangmans Wood	212	00:45	P55	Male	Juvenile	T1	30.1	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	213	00:45	P55	Female	Juvenile	NB	22.1	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	214	00:47	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	215	00:47	P55	Female	Juvenile	NB	31.9	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	216	00:47	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	217	00:47	Barb	Female	Adult	PL	38.7	9.9	10	H6097	Small ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	218	01:00	Natt	Male	Adult	T1	39.8	7.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	219	01:00	P55	Male	Juvenile	T1	30.5	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	220	01:00	Barb	Female	Adult	PL	39.6	10.0	11	H6096	Moderate ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	221	01:20	P55	Female	Juvenile	NB	30.9	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	222	01:20	P55	Female	Juvenile	NB	31.2	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	223	01:30	P55	Female	Juvenile	NB	31.8	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	224	01:30	P55	Male	Juvenile	T1	31.4	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	225	01:30	Barb	Female	Adult	PL	40.6	10.8	13	H6095	Small growth, not even a tag & brown colouring
13/08/2014	Mm - North of Hangmans Wood	226	01:30	P55	Male	Juvenile	T1	30.0	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	227	02:10	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	228	02:10	P55	Male	Juvenile	T1	31.4	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	229	02:10	P55	Female	Juvenile	NB	33.0	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	230	02:10	P55	Male	Adult	T2	30.8	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	231	02:10	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	232	02:10	P55	Female	Juvenile	NB	31.8	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	233	02:40	P55	Female	Juvenile	NB	31.9	6.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	234	02:45	P55	Male	Juvenile	T1	30.9	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	235	02:45	P55	Male	Juvenile	T1	31.6	4.8			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	236	04:20	P55	Female	Juvenile	NB	32.2	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	237	04:20	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	238	04:30	P55	Male	Juvenile	T1	31.7	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	239	04:30	P55	Female	Juvenile	NB	32.4	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	240	04:30	P55	Female	Juvenile	NB	31.1	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	241	04:30	P55	Male	Juvenile	T1	31.7	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	242	04:30	P55	Female	Juvenile	NB	31.7	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	243	04:30	BLE	Male	Adult	T1	38.7	8.0			
13/08/2014	Mm - North of Hangmans Wood	244	05:00	P55	Released	Released	Released					released as caught late
13/08/2014	Mm - North of Hangmans Wood	245	05:00	P55	Released	Released	Released					released as caught late

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
13/08/2014	Mm - North of Hangmans Wood	246	05:00	P55	Released	Released	Released					released as caught late
13/08/2014	Mm - North of Sheepwash Lane	247	21:30	P55	Male	Adult	T2	30.1	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	248	21:30	P55	Male	Adult	T2	30.0	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	249	22:50	Natt	Male	Adult	T1	39.6	7.5			
13/08/2014	Mm - North of Sheepwash Lane	250	22:50	P55	Male	Juvenile	T1	33.1	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	251	22:50	P55	Male	Adult	T2	31.5	4.6			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	252	23:15	P55	Male	Juvenile	T1	29.7	5.0			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	253	23:47	Natt	Female	Adult	PL	40.1	8.5			
13/08/2014	Mm - North of Sheepwash Lane	254	23:47	Natt	Female	Adult	NB	41.3	8.5			
14/08/2014	Mm - North of Sheepwash Lane	255	00:00	P55	Male	Adult	T2	30.0	5.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	256	00:00	P55	Male	Adult	T1	31.1	4.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	257	00:43	P55	Recapture	Recapture	Recapture					
14/08/2014	Mm - North of Sheepwash Lane	258	01:05	Noc	Male	Adult	T2	52.5	26.5			
14/08/2014	Mm - North of Sheepwash Lane	259	01:10	Noc	Male	Adult	T2	52.9	28.5			
14/08/2014	Mm - North of Sheepwash Lane	260	01:45	P55	Female	Juvenile	NB	31.8	5.5			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	261	01:45	P55	Female	Juvenile	NB	30.9	5.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	262	04:30	Natt	Released	Released	Released					Released as captured late
14/08/2014	Mm - North of Sheepwash Lane	263	04:30	P55	Released	Released	Released					Released as captured late
14/08/2014	Mm - North of Sheepwash Lane	264	04:30	P55	Released	Released	Released					Released as captured late
13/08/2014	SZC - Nursery Covert South	265	21:30	Barb	Male	Adult	T1	37.2	7.4	14	T8963	
13/08/2014	SZC - Nursery Covert South	266	22:40	Natt	Female	Adult	PL	39.5	8.4			
13/08/2014	SZC - Nursery Covert South	267	23:14	Barb	Female	Adult	NB	39.3	8.4	15	T8964	
13/08/2014	SZC - Nursery Covert South	268	23:35	P45	Female	Adult	NB	33.7	5.3			
13/08/2014	SZC - Nursery Covert South	269	23:35	P45	Female	Adult	NB	31.4	5.7			
14/08/2014	SZC - Nursery Covert South	270	00:00	Barb	Female	Adult	PL	39.6	10.6	16	T8982	
14/08/2014	SZC - Nursery Covert South	271	00:00	Barb	Female	Adult	PL	39.1	9.8	17	T8999	
14/08/2014	SZC - Nursery Covert South	272	00:38	P55	Male	Adult	T1	31.8	5.3			
14/08/2014	SZC - Nursery Covert South	273	00:38	P45	Female	Adult	PL	31.4	4.9			
14/08/2014	SZC - Nursery Covert South	274	01:10	Natt	Female	Adult	PL	40.6	8.3			
14/08/2014	SZC - Nursery Covert South	275	01:10	BLE	Male	Adult	T1	39.1	7.4			
14/08/2014	SZC - Nursery Covert South	276	01:20	P55	Female	Adult	PL	32.8	6.1			
14/08/2014	SZC - Nursery Covert South	277	02:15	P55	Male	Adult	T3	30.4	4.6			Swollen glands
14/08/2014	SZC - Nursery Covert South	278	02:45	P45	Male	Adult	T3	32.1	4.6			Swollen glands
14/08/2014	SZC - Nursery Covert South	279	02:45	P55	Female	Adult	PL	32.1	5.5			Swollen glands
14/08/2014	SZC - Nursery Covert South	280	02:45	BLE	Female	Adult	PL	38.5	10.9			
14/08/2014	Mm - Roost 25	281	21:00	Barb	Female	Adult	PL	39.6	10.0	18	H6094	Small ear tags

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
14/08/2014	Mm - Roost 25	282	21:10	Barb	Female	Adult	NB	39.5	8.5	19	H6093	Small ear tags
15/08/2014	SZC - Roost R27	283	21:00	Barb	Male	Juvenile	NB	38.7	7.9		T8980	Very mature juvenile
15/08/2014	SZC - Roost R27	284	21:00	Barb	Male	Juvenile	NB	37.8	6.3		T8979	
15/08/2014	SZC - Roost R27	285	21:00	Barb	Male	Juvenile	NB	37.6	6.8		T8978	

Table A5 - Summary of barbastelle bats caught (Key: SZC – Sizewell; Mm – Minsmere; PL – post-lactation; NB – non-breeding, T1 - testes not swollen, T2 – testes intermediate, T3 – testes swollen)

Date	Trapping Location	Time Caught	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring no	Comments
09/08/2014	SZC - Fiscal Policy	21:00	Male	Juvenile	T2	38.4	7.8	-	T8832	Very small ear discs
11/08/2014	MM – RSPB	21:00	Male	juvenile	T1	37.2	8.2	-	H5944	No ear discs
11/08/2014	SZC - Nursery Covert North	20:50	Female	Adult	PL	39.7	9.8	1	T8831	Ear discs
11/08/2014	SZC - Nursery Covert North	20:50	Female	Adult	PL	38.9	9.7	2	T8828	
11/08/2014	SZC - Nursery Covert North	20:50	Escaped	Escaped	Escaped			-		Escaped from mist net
11/08/2014	SZC - Nursery Covert North	20:50	Male	Juvenile	T1	38.4		-	T8827	Very stressed so not weighed
11/08/2014	SZC - Nursery Covert North	21:30	Male	Adult	T3	38.3	8.1	3	T8829	
12/08/2014	SZC - Nursery Covert North	00:53	Female	Adult	PL	38.8	9.4	4	T8830	
12/08/2014	SZC - Nursery Covert North	03:50	Male	Adult	T1	39.0	9.6	5	T8981	
12/08/2014	SZC - Nursery Covert North	04:33	Female	Adult	PL	38.6	10.7	6	T9000	
12/08/2014	Mm - North of Hangmans Wood	21:25	Female	Adult		39.6	8.5	7	H6100	Small ear tags
12/08/2014	Mm - North of Hangmans Wood	22:10	Female	Adult	NB	38.7	9.0	8	H6099	
12/08/2014	Mm - North of Hangmans Wood	23:55	Male	Juvenile	T1	38.3	8.0	-	H6098	small ear tags
13/08/2014	Mm - North of Hangmans Wood	00:00	Recapture	Recapture	Recapture			7		Recapture
13/08/2014	Mm - North of Hangmans Wood	00:47	Female	Adult	PL	38.7	9.9	10	H6097	Small ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	01:00	Female	Adult	PL	39.6	10.0	11	H6096	Moderate ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	01:30	Female	Adult	PL	40.6	10.8	13	H6095	Small growth, not even a tag & brown colouring
13/08/2014	SZC - Abbey Lane	01:35	Female	Adult	PL	38.5	9.7	12	T8954	
13/08/2014	SZC - Nursery Covert South	21:30	Male	Adult	T1	37.2	7.4	14	T8963	
13/08/2014	SZC - Nursery Covert South	23:14	Female	Adult	NB	39.3	8.4	15	T8964	
14/08/2014	SZC - Nursery Covert South	00:00	Female	Adult	PL	39.6	10.6	16	T8982	
14/08/2014	SZC - Nursery Covert South	00:00	Female	Adult	PL	39.1	9.8	17	T8999	
14/08/2014	Mm - Roost 25	21:00	Female	Adult	PL	39.6	10.0	18	H6094	Small ear tags
14/08/2014	Mm - Roost 25	21:10	Female	Adult	NB	39.5	8.5	19	H6093	Small ear tags
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	38.7	7.9	-	T8980	Very mature juvenile
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	37.8	6.3	-	T8979	
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	37.6	6.8	-	T8978	

Table A7 - Roosts by day

Bat no	Sp		Breeding or Non-breeding	11/08/2014	12/08/2014	13/08/2014	14/08/2014	15/08/2014	16/08/2014	17/08/2014	18/08/2014	19/08/2014	20/08/2014	21/08/2014	22/08/2014	23/08/2014
1	Barb	F	PL	Caught SZC Nursery Covert	R23	R23	R26	R27 (at 3.20)	R27	R27	R27	R27	R27	R32		
2	Barb	F	PL	Caught SZC Nursery Covert	-	R24	R27		R27	R27		R32	R32	R32		
3	Barb	M		Caught SZC Nursery Covert	-	R36	R36		R36	R36	R36	R36	-	R36		
4	Barb	F	PL	Caught SZC Nursery Covert	-	-	-	-	-	-	-	-	-	-		
5	Barb	M		Caught SZC Nursery Covert	R35	-	R34	R34	R34	-	R33	R33		R34		
6	Barb	F	PL	Caught SZC Nursery Covert	Grimseys area	R26	R26	R26 (at 3.20)	-	R32	R32	R32	R32	R32		
7	Barb	F	PL		Mm track N of Hangman's Wood	R27	R27	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		R27
8	Barb	F	NB		Mm track N of Hangman's Wood	-	-	-	-	-	-	-	-	-		
9	Sero	F	NB		Caught Abbey Lane	In restricted land(browns plantation)	In restricted land(browns plantation)		In restricted area	In restricted area	In restricted area	In restricted area	In restricted area	poss failed tag		
10	Barb	F	PL		Mm track N of Hangman's Wood	R25	R25	R28	-	-	-	-	-	-		
11	Barb	F	PL		Mm track N of Hangman's Wood	R25	R28	R28	R28	R28	R24	R24	R24	R24		R31
12	Barb	F	PL		Caught Abbey Lane	-	-		-	-	-	-	-	-		
13	Barb	F	PL		Mm track N of Hangman's Wood	-	-		-	Towards eastbridge marshes R37	-	-	-	-		
14	Barb	M				Caught SZC Nursery Covert South	R26	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		R27
15	Barb	F	NB			Caught SZC Nursery Covert South	R27	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		
16	Barb	F	PL			Caught SZC Nursery Covert South	R26	R26 (at 3.20)	R27	R27	R27	R27	R27	R32		
17	Barb	F	PL			Caught SZC Nursery Covert South	R26		-	R27	R27	R27	R27	R27		R27
18	Barb	F	PL				Caught from R25	R28	R28	R28	R28	R28	R28	R28	R28	R28
19	Barb	F	NB				Caught from R25	R29	R30	R30	R24	R24	R24	R24		R31
Minimum number of roosts known to be used on any night							6	5	5 (6)	5 (6)	6 (7)	6(1)	4 (5)	5	1	3

NB. No daytime tracking was possible on 22/8/14