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Greater Norwich Local Plan Representation

Project:	Racecourse Plantations, Plumstead Road East, Norwich
Subject:	Greater Norwich Local Plan Representation 2018
On behalf of:	SCC Norwich LLP and the Thorpe & Felthorpe Trust
Date:	March 2018

CONTENTS

A. INTRODUCTION AND SUMMARY

1. This document is in response to the Greater Norwich Local Plan Growth Options and Site Proposals consultation (January 2018). It has been prepared by DLBP Ltd on behalf of SCC Norwich LLP and the Thorpe & Felthorpe Trust.

2. These representations focus on the site at Racecourse Plantations (Ref: GNLP0442) and the proposal of up to 300 new homes and a Community Woodland Park (see site location plan at appendix 01). We strongly disagree that the site is heavily constrained as per page 98 of the Site Proposals Document (2018).

3. The proposal for the site is to create a residential development of 300 new homes (including 99 affordable) within a woodland setting, supporting a significant enhancement of the green infrastructure in this key location in the Growth Triangle, contributing to the multi-functional network of green spaces and green links connecting to Norwich and the rural hinterland as envisaged in the Growth Triangle Area Action Plan.

4. The proposal includes a fundamental change from the current commercial forestry management and paintball and archery activities at Racecourse Plantations, which are not sympathetic to the site's existing biodiversity values, to a use with a specific ecological focus where nature conservation is paramount, creating ecological benefits.

5. In addition to ecological benefits and the Community Woodland Park, the proposed development at Racecourse Plantations can contribute 300 new high quality homes to the 7,222 new homes identified within the Growth Options document, on sites that are not already allocated. Given that the draft Annual Monitoring Report 2016 - 2017 sets out that the Norwich Policy Area can only demonstrate a housing land supply of 4.61 years when calculated against the Joint Core Strategy (2014), this contribution to the housing supply is significant.

6. As set out below, we agree to the broad visions and objectives set out in the Greater Norwich Local Plan and hope to positively contribute to these aspirations.

B. SITE CONTEXT

7. The site at Racecourse Plantations measures approximately 70.22 ha and is located to the east of Norwich, along Plumstead Road which connects Norwich City Centre with Thorpe St Andrew and Thorpe End. The site comprises Racecourse, Belmore, and Brown's Plantations.

8. The site was originally contiguous with Mousehold Heath, which was once a much larger area surrounding the site, now largely built upon or converted to farmland.

9. The site is currently in use as a commercial forestry plantation, with forestry operations (a mixture of clear felling, selective felling and coppicing) taking place annually and a licence to continue these operations has been granted until August 2023.

10. There are also paintball and archery businesses on the site. These uses are accommodated within the centre and eastern part of Racecourse Plantations, with boundaries delineated by fencing / screening fixed to the trees, with associated paraphernalia (obstacles, targets etc) scattered around.

11. Racecourse Plantation was designated a County Wildlife Site (Ref.2041) in 1997, as well as Belmore and Brown's Plantation (Ref. 2042). The survey was updated in 2011 for Racecourse Plantation only.

12. To the south side of Plumstead Road, within the northern section of Belmore Plantation, is a well-used but informal footpath known locally as the 'Trod'. This narrow and uneven path provides informal pedestrian and cycle access along Plumstead Road, including connections to Pound Lane which in turn leads southwards towards Thorpe St Andrew High School and the Oasis Sports and Leisure Club.

13. The site is mostly surrounded by existing development, and further development is proposed on sites to the north and east of Racecourse Plantations.

14. SCC Norwich LLP and the Thorpe & Felthorpe Trust have submitted an appeal (Ref: APP/K2610/W/17/3188235) against the refusal of an outline planning application for the erection of up to 300 new homes and the creation of a new community woodland park at Racecourse Plantations, Plumstead Road East, Thorpe St Andrew, NR7 9LW (Broadland Council Ref: 20161896). This appeal is due to be heard at inquiry on 22 May 2018.

C. RESPONSE TO SITE PROPOSALS DOCUMENT

15. The site at Racecourse Plantations - Ref: GNLP0442 has been assessed in the Site Proposals Document and at paragraph 3.38 (Thorpe St. Andrew).

16. The Site Proposals Document states (page 98):

> *"The other submitted sites, GNLP0228 and 0442, are heavily constrained, chiefly by their ecological value and the County Wildlife Site status of Thorpe Woodlands."*

17. We strongly disagree that the site is *"heavily constrained"* as a result of its designation as a County Wildlife Site, as suggested in the assessment in the Greater Norwich Local Plan documents.

18. During the planning application process in relation to the proposal for the erection of up to 300 new homes and the creation of a new community woodland park (Broadland Council ref 20161896), technical assessments of the site were undertaken by ecology experts to understand and assess the impacts the proposed development would have on the site, in particularly in ecological terms. The Technical Ecology Report (appendix 02) demonstrated that the proposal, far from resulting in ecological harm, would actually create ecological benefits.

19. Importantly, this includes a fundamental change from the current commercial forestry management and paintball and archery activities, which are not sympathetic to the site's existing biodiversity values, to one with a specific ecological focus where nature conservation is paramount. In doing so, the proposal seeks to enhance the County Wildlife Site to achieve a long-term maintenance or enhancement of the local biodiversity baseline.

20. In terms of protected animal species interests and sensitivities, the key species across the three plantations are birds, bats and herpetofauna - notably great crested newt and grass snake. Species survey work indicates that the proposed development area within Racecourse Plantation is of relatively limited protected species interest (lower sensitivity) compared to woodland areas beyond the development site.

21. The proposed development area has, therefore, in terms of its overall scale and location, avoided the most valuable and sensitive habitats, and areas of greatest protected animal species interest.

22. The proposal for this site also includes a Community Woodland Park which seeks to contribute to a multifunctional green infrastructure network, in line with Policy GT2 of the Growth Triangle Area Action Plan, that recognises the importance of the site as a hub within a network of routes, through including areas of retained woodland and trees, open space, swales, wildlife resources and effective linkages between them including connections to adjoining areas. The management of the Community Woodland Park will provide for the long-term maintenance of the green infrastructure network .

23. This position is strengthened by the finding of the Secretary of State who confirmed (on 6 September 2016) that the proposal was not EIA development (see appendix 03). In doing so, he noted that the site is not within a sensitive area and does not enjoy any statutory protection in terms of landscape, heritage or importance to protected species. A significant environmental effect in relation to the County Wildlife Site was not considered likely, and that in cumulation with other developments nearby this development would not affect populations of protected species to the extent that a significant environmental effect is likely.

24. We therefore disagree with this assessment within the Site Proposals Document and consider the site Ref: GNLP0442 to be a suitable and sustainable location for residential development and the provision of a country wildlife park, and would create ecological benefits to the site.

D. RESPONSE TO QUESTIONS AND GROWTH OPTIONS

25. In the interest of brevity and succinctness, this section only responds to the questions of relevance to the current proposals for Racecourse Plantations.

Question 1: Do you agree with the draft vision and objectives for the plan below?

26. We agree with the draft vision and objectives for the plan shown on page 17 in the Growth Options document. The draft vision includes the delivery of high quality homes, to grow vibrant healthy communities giving people a high quality of life in well designed developments with good access to jobs, services and facilities, and to protect and enhance the natural environment.

27. The proposal at Racecourse Plantations is for 300 homes and a Community Woodland Park and would deliver high quality homes, and enable a vibrant healthy community to grow, within a high quality, well designed development. The proposal is in line with the draft visions and objectives of the Greater Norwich Local Plan and as such we support them, and seek to contribute to their delivery.

Question 2: Do you support the broad strategic approach to delivering jobs, homes and infrastructure set out in paragraphs 4.1 to 4.7?

28. We specifically agree with the broad strategic approach to delivering homes as set out in paragraphs 4.1 to 4.7 in the Growth Options document. The documents states that the strategy will deliver 42,865 new homes on sites across the districts. Taking into account sites which are already permitted or allocated, the strategy will need to identify new sites for 7,222 homes.

29. We support this objective and the proposal at Racecourse Plantations can contribute to these aspirations, and deliver 300 high quality homes that will form part of the 7,222 new homes needed. These homes can be delivered within the next five year period as the first homes will be delivered at the end of 2021 should the development be permitted at the end of 2018.

Question 4: Do you agree that the OAN for 2017-2036 is around 39,000 homes?

30. The Objectively Assessed Need (OAN) for 2017- 2036, at stated in the Growth Options document, has been calculated using the government's standardised formula in the 2017 consultation "Planning for the Right Homes in the Right Places" (14 September 2017). We agree that this method of calculating the OAN is a good starting point to assess housing need in the emerging plan. However the draft Framework indicates at paragraph 61 that:

> *"In determining the minimum number of homes needed, strategic plans should be based upon a local housing need assessment, conducted using the standard method in national planning*

guidance – unless there are exceptional circumstances that justify an alternative approach which also reflects current and future demographic trends and market signals."

31. The draft Framework does not explicitly say what this standardised formula will be, and does not confirm that the formula will be the same as the 2017 consultation "Planning for the Right Homes in the Right Places". By the time the Great Norwich Local Plan reaches examination stage the new Framework will have been adopted and as such the OAN will need to respond to the formula and wording agreed in the new Framework.

Question 5: Do you agree that the plan should provide for a 10% delivery buffer and allocate additional sites for around 7,200 homes?

32. We do not agree that the plan should provide for a 10% delivery buffer, as we suggest this should be 20% to reflect past shortfall. We do agree that the plan should allocate additional sites for around 7,200 homes in addition to sites already allocated and permitted.

33. Broadland Council, Norwich City Council and South Norfolk Council cannot currently demonstrate a five year housing land supply, as per the draft Annual Monitoring Report 2016 - 2017, and therefore we agree with the provision of an additional buffer through the Greater Norwich Plan, however we think this buffer should be 20% and not the 10% suggested. This higher buffer will make it more likely that the objectively assessed housing needs will be met.

34. We consider a higher buffer is appropriate given the under-delivery of housing across the districts in recent years. Given that the authorities have failed to demonstrate a five-year housing land supply, and a subsequent shortfall in the delivery of housing over the past eight years we consider a 20% buffer to be more appropriate.

35. We also consider the number of *"around 7,200"* to be vague, and as such consider the higher number set out in the Growth Options document at paragraph 4.21 of 7,222 homes to be more appropriate.

36. The 300 homes proposed at Racecourse Plantations will contribute to the housing supply in the district and the site presents a suitable and sustainable site for residential development.

Question 6: Do you agree that windfall development should be in addition to the 7,200 homes?

37. We agree that windfall development should be in addition to the 7,200 homes to be delivered on additional sites. Given that Broadland Council, Norwich City Council and South Norfolk Council only have a 4.61 years supply of land for housing (draft Annual Monitoring Report 2016 - 2017), the Greater Norwich Local Plan should attempt to boost the supply of housing across the districts, in compliance with paragraph 47 of the National Planning Policy Framework.

38. The provision of smaller "windfall" sites can provide further certainty that the housing requirements will be met, and also smaller sites can support small local builders which positively impacts the local economy. The site at Racecourse Plantations is not considered to be a small "windfall" site, however the proposal can contribute positively to the 7,222 additional homes that are not yet allocated, and will provide 300 high quality homes.

Question 8: Is there any evidence that the existing housing commitment will not be delivered by 2036?

39. At the current time the Norwich Policy Area, consisting of Broadland Council, Norwich City Council and South Norfolk Council only have a 4. 61 year housing land supply when calculated against the Joint Core Strategy (draft Annual Monitoring Report 2016 - 2017). Therefore there is no certainty that the existing housing commitments across these areas will be delivered by 2036.

40. The inability to demonstrate a five year supply of housing land means that the Councils are not proactively driving and supporting sustainable economic development to deliver the homes needed in the Norwich Policy Area. The Norwich Policy Area makes up a large proportion of the Greater Norwich Local Plan area, and therefore the lack of sufficient identified land for housing is sufficient evidence that the existing housing requirement may not be delivered by 2036.

41. By refusing planning permission for developments outside of the settlement limits, and continuing to apply the Liverpool methodology in calculating its five year housing land supply requirement,Broadland Council is not making every effort to meet its housing need. The proposal at Racecourse Plantations would assist in addressing this housing need, by contributing 300 new homes.

Question 9: Which alternative or alternatives (growth options) do you favour?

42. Option 1 (Concentration Close to Norwich) and option 2 (Transport Corridors) are the growth options that are considered the most appropriate. This is because both options provide good access to services and jobs, which are key planning considerations. If the new homes are close to Norwich, or located near transport corridors, residents will have good access to jobs, services and other facilities that are necessary for a good quality of life.

43. Both of these options allocate 1,200 new homes to the North East of Norwich which consists of Growth Triangle, Thorpe St. Andrew and elsewhere in the North East.

Question 37: Which approach to affordable housing thresholds do you prefer?

44. In line with national guidance, we consider option AH2 to be the most appropriate approach to affordable housing thresholds across Greater Norwich. The Planning Practice Guidance is quite clear on the guidance and policy recommendations for affordable housing (Paragraph: 031 Reference ID: 23b-031-20161116) and states:

"contributions should not be sought from developments of 10-units or less, and which have a maximum combined gross floorspace of no more than 1,000 square metres (gross internal area)".

45. This position is also favoured by the draft Framework at paragraph 64 that sets out that provisions of affordable housing should not be sought for developments that are not on major sites.

46. If the threshold was lowered, to sites of five dwellings or more for example, it has the potential to deter smaller developments from coming forward and being delivered on windfall sites. This would jeopardise the housing delivery across Greater Norwich and cause a shortfall. The alternative approach (AH1) could make small sites less attractive to develop, as they would not be as profitable, thereby reducing the incentive for a developer to build and consequently causing a negative impact on delivery.

47. As detailed in the Growth Options document, windfall sites are crucial to the delivery of new housing and ensuring housing requirements are met, and as such imposing policies that make smaller sites unviable will have a negative impact on the housing delivery and local economy.

Question 38: Which approach do you favour for affordable housing percentages?

48. We consider the approach AH4 to be the most appropriate option for affordable housing percentages. As stated in the Growth Options document, not all allocated sites are able to meet a 27% requirement on viability grounds. Therefore, requiring a higher affordable housing percentage on major sites would help to mitigate the under-delivery of affordable housing on sites that cannot meet the requirements (e.g. 27%) on viability grounds.

49. The proposal at Racecourse Plantations would deliver 33% affordable housing, which equates to 99 units. The tenure split for these affordable units will be 85% social-rented and 15% intermediate tenure in accordance with Policy 4 of the Broadland, Norwich and South Norfolk Joint Core Strategy. The remaining 67% of housing would be market housing (201 units).

50. This is a significant amount of affordable housing, and will positively contribute to the aspirations of the Greater Norwich Local Plan regardless of which affordable housing percentage is adopted.

Question 53: Which option (for protecting designated nature conservation sites) do you support?

51. We support option NC1 that requires housing developments to provide additional green space on site to address the impact of housing growth on designated nature conservation sites.

52. Nearly all of Racecourse Plantations (Ref: GNLP0442) is a County Wildlife Site, and in compliance with this option, the proposal currently subject to an appeal (Ref: APP/K2610/W/17/3188235) also includes the provision of a Community Woodland Park in addition to the 300 new homes.

53. The new Community Woodland Park would provide a significant local recreational and nature conservation resource by facilitating the management of the site for public access, recreation and ecological enhancements, instead of the existing forestry management associated with its current use as a plantation. This Park will be provided at no cost to the tax payer, with the initial costs being funded by the current owner and the maintenance costs being paid for through a service charge on the homes in the new development. The Park will be managed by a community trust that will receive the service charge and will employ the services of a specialist maintenance contractor.

54. Furthermore, the proposed Community Woodland Park seeks to contribute to a multifunctional green infrastructure network, and the site is a hub within a network of routes, through including areas of retained woodland and trees, open space, swales, wildlife resources and effective linkages between them including connections to adjoining areas. The management of the Community Woodland Park will provide for the long-term maintenance of the green infrastructure network.

55. We therefore support option NC1 as this is inline with the proposals for Racecourse Plantations, with the Community Woodland Park being central to the scheme, ensuring that new development does not have a negative impact on the County Wildlife Site.

Question 54: Do you think any changes should be made to the Green Infrastructure network?

56. We support the current Green Infrastructure network as set out in the Joint Core Strategy (2014) on page 33. We also support the proposed changes to the network, and consider the Green Infrastructure Mapping Project that will allow for the expansion of this network to be appropriate given the feedback from members of the public, as set out in paragraph 6.154 of the Growth Option document which states:

> *"Attendees at the Issues workshops believed there to be a deficiency of green infrastructure in Greater Norwich."*

57. The site at Racecourse Plantations includes a network of routes, through including through areas of retained woodland and trees, open space, swales, wildlife resources and effective linkages between them including connections to adjoining areas.

58. However, considering the current status of the site (Ref: GNLP0442) with no formal public access, limited private recreation, generally unmanaged woodland structure and on-going forestry activity, it is clear that the function of these Green Infrastructure assets are significantly restricted.

59. The appeal scheme will improve the multifunctional role of these Green Infrastructure assets. It will create landscape and ecological benefits to improve the Green Infrastructure network in line with the aspirations of the Greater Norwich Local Plan.

Question 55: Which of these options (for the protection of landscape character) do you favour?

60. We consider Option LA1 to be the favoured option for the protection of landscape character because this presents a consistent approach. We agree that maintaining the setting of Norwich in relation to its rural hinterland is important, but that development may still be appropriate subject to the sensitivity of the area being recognised. The proposal at Racecourse Plantations will contribute to the multi-functional network of green spaces and green links connecting to Norwich and the rural hinterland as envisaged in the Growth Triangle Area Action Plan.

61. We also agree with the Growth Options document that a "hierarchy" approach to policies should be practised, reflecting the distinctions between national and local landscape designations, but with the protection of landscape character applying to both local and national designations. In this context we consider that local level landscape character should not be over protected.

APPENDIX 01 SITE LOCATION PLAN

Notes:

Do not scale from this drawing for Construction purposes.

N

0 100m

Application site boundary of 32.39 hectares

Adjacent land controlled by Applicant

revisions

client SCC Norwich LLP
and the Thorpe & Felthorpe Trust

project

RACECOURSE PLANTATIONS

TAYLOR ARCHITECTURE & URBANISM

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title

APPLICATION SITE BOUNDARY PLAN

drawing no. (1602) PL01

scale 1:2500@A1

date 20/10/16

APPENDIX 02 TECHNICAL ECOLOGY REPORT (APPLIED ECOLOGY LTD)

Racecourse Plantations

Technical Ecology Report

Produced for SCC Norwich LLP and Thorpe & Felthorpe Trust

By Applied Ecology Ltd

October 2016

Document Control:

Version	Date	Version Details	Prepared by	Checked by	Approved by
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Executive Summary

Racecourse Plantations is located along Plumstead Road East, on the eastern side of Norwich and comprises three woodland blocks, namely Racecourse Plantation, Belmore Plantation and Brown's Plantation. It is currently designated as two separate County Wildlife Sites (CWS) - Racecourse Plantation CWS (Ref.2041, 57.78 ha) and Belmore & Brown's Plantations CWS (Ref.2042, 25.7 ha). The woodland is currently managed as commercial forestry with an existing forestry licence operational until 2023.

A comprehensive and robust ecological baseline has been established by Applied Ecology Ltd over the period 2011-2016. Aside from the inherent value of these woodlands, their key ecological features can be summarised as:

- Small sections of open rutted woodland rides within Racecourse Plantation that supports botanically interesting damp acid grassland, including the notable plants chaffweed and allseed, and occasional remnants of heathland vegetation.
- Over 30 species of breeding bird, including 10 species of conservation concern (Amber or Red-listed), and a bird assemblage of Local value in overall terms.
- A medium-sized breeding population of great crested newt within a large pond at the southern end of Brown's Plantation.
- A widely distributed medium-sized population of grass snake.
- A bat assemblage dominated by common bat species that forage and breed within and/or close to the plantations, including a confirmed maternity roost of brown long-eared bats known to day roost in three mature beech trees in Brown's Plantation.
- Over 200 species of invertebrate, including three Nationally Notable category B species and one Nationally Scarce species. The majority of the invertebrate interest is associated with wetland, open dry sandy ground, dead wood, and mosaics and transitions with woody vegetation, and not areas of dense woodland.

The nature conservation and biodiversity interests of the Site have been acknowledged from the outset of the project, with the over-riding objective to deliver a high quality small scale residential scheme, alongside long-term recreational and ecological benefits.

Proposed development would be restricted to lower value habitats, notably conifer and mixed plantation woodland within Racecourse Plantation that is already damaged by paintball activity. Habitat impacts would therefore be minimised through sensitive development scaling and placement, as well as through sympathetic internal layout and detailed design. This embedded design mitigation also avoids / reduces associated impacts on protected animal species, with any negative effects on habitats, plants and faunal species to be further reduced by adopting best practice approaches during development construction.

An ambitious package of ecological compensation and enhancement has been set out in outline as part of the Ecological Enhancement Strategy and the associated Community Woodland Park (CWP) proposal. The CWP would include the creation of substantial new

areas of open heathland, areas of woodland reserve with restricted public access designed to protect sensitive habitat areas and species, and a range of species specific measures.

These compensation and enhancement proposals would create a more varied mix of higher value heathland habitats, while retaining and enhancing the Site's overall woodland character. They would support the existing CWS designations and the Site's existing value as a green hub and connectivity function, while offering substantial benefits to new residents and the local community.

In summary, the ecological benefits of the scheme as set out in this application would represent a positive outcome when compared to existing and ongoing forestry management and would significantly outweigh the negative effects on the County Wildlife Sites, habitat and species associated with the residential development as currently proposed.

1 Introduction

Background

1.1 Racecourse Plantations in Thorpe St Andrew, Norwich is formed of Racecourse Plantation, Belmore Plantation and Brown's Plantation, and is a privately-owned commercial forestry plantation with an active forestry licence in place until 2023.

1.2 The ecology study area (the Site) covers the full extent of these three plantation blocks amounting to 81.5 ha in total. The planning application boundary excludes an area of woodland located on the western side of Racecourse Plantation as this area is not owned or under the control of Socially Conscious Capital (SCC) Norwich LLP and Thorpe & Felthorpe Trust. The proposed development (the Development site) sits within the application boundary and is defined as the area of permanent development-related habitat loss to housing and associated infrastructure and is confined to an area of Racecourse Plantation. The boundaries of the Site, land ownership and the Development site are shown by **Figure 1.1**.

Development Proposal

1.3 Socially Conscious Capital (SCC) Norwich LLP and Thorpe & Felthorpe Trust are planning to build a residential development within the woodland setting, providing up to 300 new homes of the highest quality, including family and affordable homes for local people, focused in an area of damaged coniferous plantation of low ecological value within Racecourse Plantation.

1.4 The remaining 150 acres will be given to the local community to provide a new Community Woodland Park, dedicated in perpetuity to public recreation and nature conservation - paid for through service charges on the new homes. This will result overall ecological benefits by protecting existing flora and fauna, creating new habitats and supporting the existing County Wildlife Site designations.

1.5 The proposals will also result in the improvement of local cycle and pedestrian links between Thorpe St Andrew, Thorpe End, Sprowston and the Dussindale Estate, through the enhancement of an existing informal walkway along Plumstead Road East called the Trod, and the creation of new routes through Belmore Plantation.

Sources of Ecological Information and Survey Scope

1.6 The flora and fauna of Racecourse Plantations was studied by independent ecological consultants in 2001[1], with a follow up assessment in 2011[2]. A specific investigation into the

[1] Bioscan (UK) Ltd (July 2001) *Racecourse Plantation, Plumstead Road, Norwich – Ecological Appraisal*. Bioscan Report No. E1030R1. Commissioned by Thorpe and Felthorpe Trust.

[2] Applied Ecology Ltd (November 2011) *An Ecological Assessment of Thorpe Woodlands, Norwich*. Report for Thorpe and Felthorpe Trust.

history of the Site was reported in 2012[3] which confirmed that Racecourse Plantation was not Ancient Woodland, and two recent independent botanical surveys of the Site have been completed by The Norfolk Flora Group.

1.7 In order to support the planning application, Applied Ecology Ltd (AEL) was commissioned to complete an update of the 2011 ecological survey work over the period August 2015 to August 2016. The findings of these studies are reported in the following chapters, with a final chapter assessing the impact of the proposed development on ecological receptors. The report contains the following chapters:

- Chapter 2 - Designated wildlife sites;
- Chapter 3 - Habitats and plants;
- Chapter 4 - Bats;
- Chapter 5 - Breeding birds;
- Chapter 6 - Wintering birds;
- Chapter 7 - Great crested newt;
- Chapter 8 - Reptiles;
- Chapter 9 - Invertebrates;
- Chapter 10 - Impact Assessment.

1.8 It is of note that specific searches of the Site for evidence of badger have been completed on numerous occasions over the period 2011-2016, and a watching brief maintained by AEL during the course of other ecological fieldwork. A suspected former six-hole badger sett was present on bare sloping ground within open woodland in the southeast corner of Brown's Plantation in 2011. No evidence of use by badger was found in association with this potential sett at the time, with only evidence of use by fox. This former sett has been revisited by AEL on a number of occasions, including in 2016, and no evidence of badger use has been observed. Badgers are therefore currently considered to be absent from the Site.

Relevant Legislation & Planning Policy

Legislation

1.9 The main two pieces of legislation relating to wildlife in the UK are the Wildlife and Countryside Act (1981) as amended (the WCA 1981) and the Conservation of Habitats and Species Regulations 2010 (The Habitat Regulations).

1.10 The Wildlife and Countryside Act 1981 (as amended) provides the main legal framework for nature conservation and species protection in the UK. The Site of Special Scientific Interest (SSSI) is the main statutory nature conservation designation in the UK. Such sites are notable for their plants, or animals, or habitats, their geology or landforms, or a combination of these. Natural England is the key statutory agency in England for advising Government, and for acting as the Government's agent in the delivery of statutory nature conservation designations.

[3] Applied Ecology Ltd & Professor Oliver Rackham (December 2012) *Racecourse Plantation, Thorpe-next-Norwich – Review of site History.* Report for Thorpe and Felthorpe Trust.

1.11 Designation of a SSSI is a legal process, by which sites are notified under the Wildlife and Countryside Act 1981. The 1981 Act makes provision for the protection of sites from the effects of changes in land management, and owners and occupiers receive formal notification specifying why the land is of special scientific interest, and listing any operations likely to damage the special interest.

1.12 The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

1.13 The Countryside and Rights of Way Act 2000, and The Natural Environment and Rural Communities (NERC) Act 2006, provide supplementary protected species legislation. Specific protection for badgers *Meles meles* is provided by the Protection of Badgers Act 1992.

Habitats and Species of Principal Importance in England

1.14 The Natural Environment and Rural Communities (NERC) Act came into force on 1 October 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act.

1.15 The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

1.16 Fifty-six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows to lowland mixed deciduous woodland, and freshwater and marine habitats such as ponds and sub-tidal sands and gravels.

1.17 There are 943 species of principal importance included on the S41 list. These are the species found in England which were identified as requiring action under the UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. In addition, the hen harrier *Circus cyaneus* has also been included on the list because without continued conservation action it is unlikely that the hen harrier population will increase from its current very low levels in England.

1.18 In accordance with Section 41(4) the Secretary of State will, in consultation with Natural England, keep this list under review and will publish a revised list if necessary.

National Policy

1.19 The National Planning Policy Framework (NPPF) was published in March 2012 and replaces previous planning policy guidance (PPS 9) on biodiversity. NPPF states the following in relation to biodiversity and planning:

"When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;*
- *development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;*
- *opportunities to incorporate biodiversity in and around developments should be encouraged;*
- *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss;*
- *the following wildlife sites should be given the same protection as European sites:*
  - *potential Special Protection Areas and possible Special Areas of Conservation;*
  - *listed or proposed Ramsar sites;*
  - *sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*

1.20 The presumption in favour of sustainable development does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined."

Green Infrastructure

1.21 The NPPF, in the first bullet of para 114, directs LPAs to set out a strategic approach "*planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure*" and defines Green Infrastructure (pp52) as "*a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits to local communities.*"

1.22 The Ecological Network Mapping Project for Norfolk 2006 (the 'Econet' report) by Norfolk Wildlife Trust (NWT) identified priorities for Broadland District as enhancing:

- wetland habitat associated with the rivers, tributaries and Broads;
- a mosaic of heathland, wood pasture and woodland within the Horsford/Felmingham area;
- creating woodland in the core central areas north of Foxley and at Weston Longville,
- and grassland in the west of the District;
- maintaining existing greenspace and creating new greenspace in the Norwich fringe.

1.23 In 2007 NWT undertook an ecological network mapping exercise for Broadland District Council which recognised the Biodiversity Action Plan (BAP) priorities for the county and particularly opportunities for habitats/species which occur within the District. These include two habitats that Racecourse Plantations has a very small amount of, namely eutrophic ponds, and potential for heath.

Area Action Plan

1.24 The adopted Area Action Plan (AAP) (proposed modifications version Nov 2015) includes a stated aim of delivering "*An effective Green Infrastructure Network, which mitigates future recreational impact on international wildlife sites.*" It is envisaged that delivery will be through the co-ordinated provision of open space "*as part of development*" (para 1.6, bullet 4).

1.25 This is a high level aim (lesser habitat or landscape designations are not mentioned) and recognises that delivery can realistically only be achieved through the value raised by development.

1.26 Thorpe Woodlands (Racecourse, Belmore and Brown's Plantations) are recognised as an area of wildlife importance with the designation of County Wildlife Site (para 3.3) and as a "*sensitive habitat*" (para 4.13).

1.27 The AAP recognises that the provision of "*large new set piece parks and semi-natural open spaces coupled with improved walking and cycling links to these*" must be delivered to mitigate the potential for increased recreational pressure on the Broads while striking an "*appropriate balance…between meeting development needs and protecting important wildlife assets, landscapes and townscapes and improving linkages between green spaces for wildlife and people*" (para 4.14 and 4.15). Para 4.22 reiterates the emphasis on providing permeable walking and cycle friendly developments to encourage access to local services by means other than the private car.

1.28 Delivery of housing need in the District has fallen short in the period 2008-13 by 135 dwellings per annum (para 3.12) and will be further challenged by the Growth Triangle's requirement for a minimum of a further 7,000 (and preference for 10,000) dwellings by 2026.

1.29 The key constraint on both residential and employment development is perceived to be the absence of adequate utilities and transport infrastructure (para 4.5). In addition, existing communities are concerned about the impact of growth and it is therefore recognised that existing residents should be able to share in the benefits of new services, facilities and

infrastructure, including better connectivity for cycling and walking and access to public open space.

1.30 The Vision for the Growth Area includes a desire that, "*Development within the Growth Triangle will have* ***grown out of and reflect existing places and communities. Important landscape and heritage assets will have been preserved and enhanced. A multi-functional network of greenspaces and green links*** *connecting to Norwich and the rural hinterland will have been provided. This green network will be* ***supporting local wildlife, having improved habitat connectivity****. The communities within the Growth Triangle will have* ***a shared sense of identity rooted in respect for existing features of the area and its settlements and the enhancements and benefits provided by new development. New buildings will have been built to high sustainability standards****, decentralised low carbon and renewable energy will be contributing to the energy needs of development, water resources will have been managed to reduce stress upon the water environment in terms of quality and quantity, and public transport will be offering a real alternative to the use of the private car.* ***Management and governance structures in new developments will be giving residents the opportunity to actively participate in the governance and management of their communities.***" (Our emphasis in bold).

Broadland DC's Statement on Green Infrastructure for the Growth Area

1.31 In December 2014 Broadland District Council produced a Statement on Green Infrastructure for the Growth Area (Old Catton, Sprowston, Rackheath, Thorpe St Andrew), addressing four key issues that GI is concerned with:

- landscape - setting of development;
- ecology - connectivity of habitat;
- recreation - needs of residents;
- connectivity - walking and cycling.

1.32 Recommendations that are pertinent to Racecourse Plantations, include objectives to:

- significantly increase the connectivity of woodland in core areas;
- increase area of heathland and wood pasture in suitable areas.

1.33 Green Infrastructure mapping has led to Racecourse Plantations having a primary Green Infrastructure corridor to the north (Mousehold to the Broads) which is crossed by a secondary green corridor running north-south (Thorpe Woodlands to Hobbs Beck via Harrisons Plantation) that links it to Racecourse Plantation.

1.34 To the south is a further primary green infrastructure corridor (Thorpe Ridge) which converges on Belmore and Racecourse Plantations and then splits into two secondary green infrastructure corridors, one leading south west (Thorpe Woodlands to Witton Run) and the other west (Thorpe Woodlands to Hobbs Beck via Rackheath Park).

Racecourse Plantations

Site location

- study area
- ownership boundary
- development area

Figure 1.1

Map Scale @ A4: 1:10,000

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	

AEL0748_007-00_SiteLocation_20160930 A4 11-Oct-16

2 Designated Wildlife Sites

Statutory Wildlife Sites

2.1 The location of statutory wildlife sites in relation to Racecourse Plantations is shown by **Figure 2.1**.

2.2 In summary, the Site is not covered by any statutory wildlife site designation. The nearest statutorily designated site of local importance is Mousehold Heath Local Nature Reserve (LNR) which is located 1.1 km to the west. The closest nationally important biological statutory site is the Yare & Broads Marsh Site of Special Scientific Interest (SSSI) which is a component of the Broads Special Area of Conservation (SAC) and the Broads Special Protection Area (SPA). This wetland SSSI, SAC and SPA is located 4.7 km to the south east of the Site, separated from the Site by suburban infrastructure, industrial development and a main road (A47).

Non-Statutory Wildlife Sites and Ancient Woodland

2.3 The location of non-statutory wildlife sites and Ancient Woodland in close proximity of the Site is shown by **Figure 2.2**.

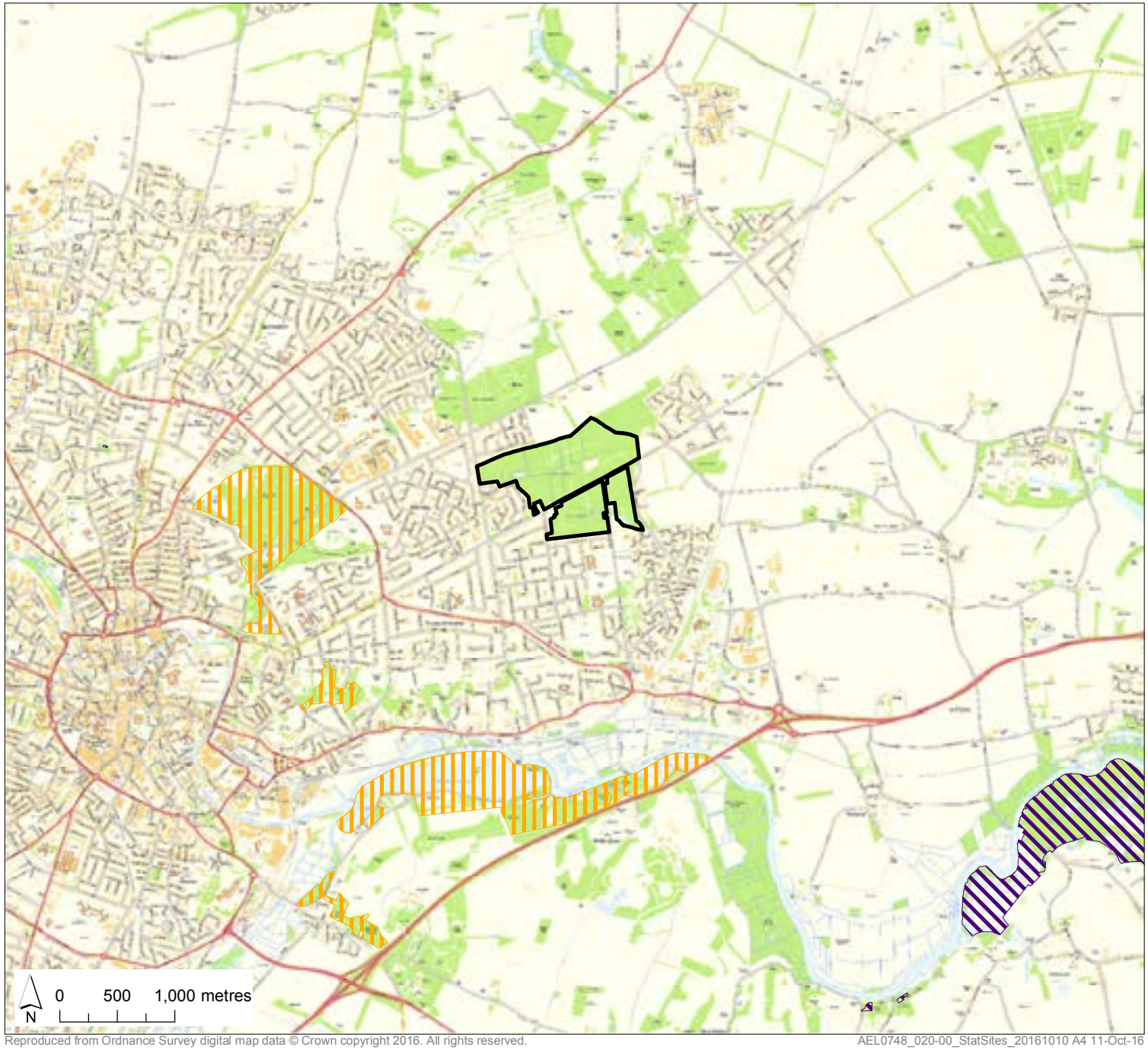
2.4 The Site is currently designated as two separate County Wildlife Sites (CWS), namely Racecourse Plantation CWS (Ref.2041, 57.78 ha) and Belmore & Brown's Plantations CWS (Ref.2042, 25.7 ha). Aside from the inherent value of these woodlands, a key feature of Racecourse Plantation CWS is reported to be the network of rides and paths which support components of dry heath and damp acid grassland.

2.5 Evidence that part of Racecourse Plantation is planted Ancient Woodland was submitted to Natural England (NE) in 2011[4,5]. The evidence presented, which essentially hinged on the presence of large numbers of Ancient Woodland plants, was temporarily accepted by NE resulting in the eastern-side of the plantation being included on the Ancient Woodland register.

2.6 However, desk-top and field investigations undertaken by AEL and Oliver Rackham in 2012 (as cited above) refuted the Ancient Woodland status concluding that map regression evidence was at odds with the indicator species found on Site. It was noted that the majority of the Ancient Woodland indicator species were associated with machine rutted rides, and had most likely been brought in from other sites on the wheels of machinery during past forestry operations. Oliver Rackham also noted that the main ecological interest of the Site was its heathland flora rather than its woodland habitat per se.

2.7 The additional evidence was considered by NE, and the woodland was subsequently removed from the Ancient Woodland register.

[4] John Allaway (August, 2011). *Racecourse Plantation: Evidence that this is a Planted Ancient Woodland Site*.
[5] Kate Scrivener (July, 2011). *A Landscape Archaeological Investigation of Thorpe Woodlands, Thorpe St. Andrew, Norwich.*



Racecourse Plantations

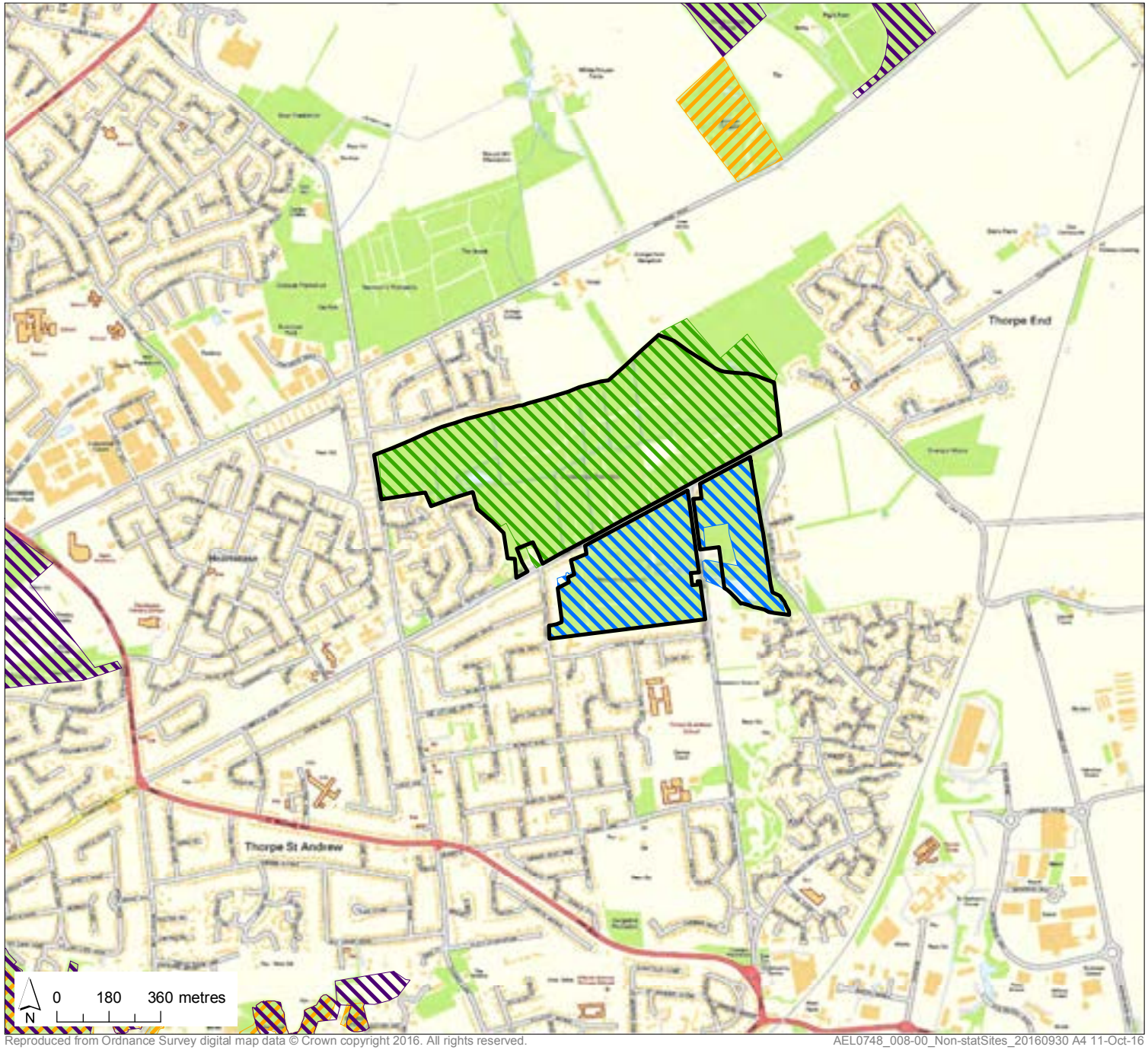
Statutory Wildlife Sites

- study area
- Yare Broads and Marshes SSSI
- Local Nature Reserves

Figure 2.1

Map Scale @ A4: 1:50,000

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	



Racecourse Plantations

Non-statutory Wildlife Sites and Ancient Woodland

study area

Site designations

- Belmore & Brown's Plantation CWS
- Racecourse Plantation CWS
- other County Wildlife Sites
- ancient woodland

Figure 2.2

Map Scale @ A4: 1:20,000

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	

3 Habitats and Plants

Background

3.1 A number of habitat and botanical surveys of Racecourse Plantations have been undertaken since 2001. Habitat mapping was completed by AEL in June 2011, with a specific search for Ancient Woodland indicator species undertaken in May, June and July 2012, and verification / update habitat surveys completed in October 2015 and June 2016.

3.2 The Norfolk Flora Group (NFG) led by the Botanical Society of the British Isles recorder for East Norfolk has visited the Site on two separate occasions on 2 June and 16 August 2016. The data collected by the NFG on 2 June has been made available to AEL, together with records of the notable plants, chaffweed *Centunculus minimus* and allseed *Radiola linoides*, made during the 16 August visit.

Survey Approach

3.3 The habitats have been mapped according to standard Phase 1 Habitat categories[6], with up to date aerial photographs and forestry survey information used to help determine the proportion of conifers and broadleaved trees, and help differentiate stands of broadleaved (10% or less conifer), mixed (10-90% either broadleaved or conifer) and coniferous woodland (10% or less broadleaved) in line with the Phase 1 definitions.

3.4 Although the woodland is of plantation origin, large areas have developed semi-natural woodland character due to a lack of active forestry management in recent years and the development of a well-defined understorey through natural regeneration and self-seeding. The proportion of planted and self-sown trees is often difficult to determine, but broadleaved stands dominated by mature trees with a varied and layered structure have typically been mapped as semi-natural woodland.

3.5 It is of note that active forestry management resumed in 2014 with substantial selective felling, thinning, coppicing and replanting having been undertaken since this time which has changed the species composition and structure of certain woodland areas. An overlay of the forestry work undertaken over the period 2014-17 is provided on the habitat map.

3.6 The habitat map and key areas of forestry management have been digitised and presented using a Geographical Information System (ArcMap GIS).

Survey Findings

3.7 The Phase 1 Habitat map, including an overlay of the forestry work undertaken over the period 2014-17, is shown by **Figure 3.1**. The habitat areas present within the Site, including a breakdown for each plantation are summarised in **Table 3.1**, and a description of the habitats types within each plantation is provided below.

[6] JNCC (1993). *Handbook for Phase 1 Habitat Survey: a technique for environmental audit.* JNCC, Peterborough. Revised reprint, 2010.

Table 3.1: Habitat types present within each plantation.

Habitat type	Area (ha)			
	Racecourse Plantation	Belmore plantation	Brown's plantation	Total
bare ground	0.69	0.05	-	0.74
broad-leaved plantation woodland	-	-	1.72	1.72
broad-leaved semi-natural woodland	31.71	5.28	1.93	38.92
coniferous plantation woodland	8.00	-	1.13	9.13
continuous bracken	1.01	-	-	1.01
dense scrub	0.22	0.43	-	0.66
marshy grassland	0.24	-	-	0.24
mixed plantation woodland	12.78	9.40	3.99	26.17
scattered scrub / bare ground	-	1.34	-	1.34
semi-improved neutral grassland	-	0.37	-	0.62
semi-improved grassland / tall ruderal	0.62	-	-	0.37
standing water	-	0.17	0.41	0.58
Total	**55.27**	**17.04**	**9.19**	**81.49**

Racecourse Plantation

3.8 Racecourse Plantation is dominated by mature plantation woodland with a mix of broadleaved and coniferous species which reflect a complex history of woodland expansion, formalisation, commercial planting and various past silvicultural management treatments. Some areas the woodland have developed a distinct semi-natural component, as a result of management neglect and natural colonisation, with patches of self-sown, mainly broadleaved species often forming a distinct understorey. Parts of the woodland are affected by on-going commercial paintball activity and more recently the resumption of commercial forestry management.

3.9 The former plantation includes a range of broadleaved and coniferous tree species including various proportions of Scots' pine *Pinus sylvestris*, Corsican pine *Pinus nigra*, Norway spruce *Picea abies*, European larch *Larix decidua*, Douglas fir *Pseudotsuga menziesii*, western red-cedar *Thuja plicata*, western hemlock-spruce *Tsuga heterophylla*, pedunculate oak *Quercus robur*, sweet chestnut *Castanea sativa*, sycamore *Acer pseudoplatanus*, beech *Fagus sylvatica* and horse-chestnut *Aesculus hippocastanum*.

3.10 The few remaining stands of relatively pure planted conifers consist mostly of semi-mature spruce and cedar. These stands possess a dense canopy with a sparse and species-poor

ground layer beneath consisting of scattered plants of bracken *Pteridium aquilinum*, broad buckler-fern *Dryopteris dilatata*, chickweed *Stellaria media* and bramble *Rubus* sp. amongst the needle litter.

3.11 Occasional more mature conifer blocks, mostly of pine, larch and fir, are also present, and with the exception of areas damaged by paintball activity, these stands typically support a more varied structure with occasional young broadleaved trees and shrubs, including elder *Sambucus nigra*, holly *Ilex aquifolium*, rowan *Sorbus aucuparia*, goat willow *Salix caprea* and birch. The ground layer in these mature conifer stands is also usually better developed, with more extensive patches of bracken and bramble, and often scattered plants of honeysuckle *Lonicera periclymenum*, broad buckler-fern, foxglove *Digitalis purpurea*, herb-Robert *Geranium robertianum* and rosebay willowherb *Chamerion angustifolium*.

3.12 Areas of the woodland classified as semi-natural woodland are dominated by a range of broadleaved trees and shrubs, with only occasional conifers. Although these areas are of plantation origin, they typically possess well-defined canopy and understorey layers, and a well-developed and more diverse woodland ground flora. The most common broadleaved species overall are oak and birch, but sweet chestnut (some of which had been coppiced in the past), rowan and beech are locally prominent, together with small groups of horse chestnut and grey poplar *Populus* x *canescens*. The presence and composition of understorey shrubs is variable, but in addition to the species mentioned above, hawthorn *Crataegus monogyna*, coppiced hazel *Corylus avellana* and holly *Ilex aquifolium* are usually present. Stands of natural regeneration, mainly of silver birch *Betula pendula* and downy birch *Betula pubescens*, are also present in areas damaged by past wind-throw, and stands that had been clear-felled but not re-stocked. Patches of rhododendron *Rhododendron ponticum*, probably planted in the past for game cover or ornamentation, are also present locally.

3.13 The woodland ground layer is typically dominated bracken and bramble, together with a range of other common woodland species such as wood avens *Geum urbanum*, lords-and-ladies *Arum maculatum* and broad buckler-fern *Dryopteris dilatata*. A number of Ancient Woodland Indicator (AWI) species are also present, but the majority are almost exclusively associated with woodland edge and rides, and are thought most likely to have been introduced and spread as a consequence of past forestry operations. AWI species recorded from the woodland include wood millet *Millium effusum*, pendulous sedge *Carex pendula*, remote sedge *Carex remota*, wood speedwell *Veronica montana*, crab apple *Malus sylvestris*, wood sedge *Carex sylvatica*, giant fescue *Festuca gigantea*, early dog-violet *Viola reichenbachiana*, tutsan *Hypericum androsaemum,* sanicle *Sanicula europaea*, three-nerved sandwort *Moehringia trinervia*, wood sorrel *Oxalis acetosella* and wood forget-me-not *Myosotis sylvatica*. A number of other woodland / damp ground ferns also occur along ride edges, ditch banks and raised bank features, including male-fern *Dryopteris filix-mas*, scaly male-fern *Dryopteris affinis* subsp. *borreri*, narrow buckler-fern *Dryopteris carthusiana*, lady-fern *Athyrium filix-femina* and hart's-tongue *Phyllitis scolopendrium*.

3.14 It is also of note that a number of uncommon bramble species have been recorded from the Site in recent years and during the 2016 NFG meeting, including *Rubus iceniensis* and *R. malvernicus*.

3.15 Recent forestry work has focused on the select removal of conifers, particularly in the western part of the woodland, together with some conifer restocking in larger felled blocks.

The ground in these areas has been damaged by forestry machinery, with a thick layer of tree brashings and chips derived from tree processing covering the ground. This wood chip layer typically favours the growth of ruderal species and bramble, and does not promote the development of an ecologically interesting ground layer. However, in locations where soil is exposed evidence of colonising heather *Calluna vulgaris* and cross-leaved heath *Erica tetralix* was seen in 2016.

3.16 The majority of the former forestry rides are in neglected and overgrown condition and support rank grass dominated vegetation, often with damp wheel rutted ground and with encroaching scrub. As highlighted above, these rides support occasional AWI species and a few widespread species indicative of damp somewhat acid ground conditions, but overall are of limited botanical interest being dominated by a range of commonplace grasses and herbs including Yorkshire-fog *Holcus lanatus*, silverweed *Potentilla anserina*, pill sedge *Carex pilulifera*, common bent *Agrostis capillaris*, rough meadow-grass *Poa trivialis*, herb-Robert, wood avens, white clover *Trifolium repens*, self-heal *Prunella vulgaris*, yarrow *Achillea millefolium*, false brome *Brachypodium sylvaticum*, slender St John's-wort *Hypericum pulchrum*, soft-rush *Juncus effusus* and greater bird's-foot-trefoil *Lotus pedunculatus*.

3.17 The ride of greatest botanical interest is the main east-west ride which runs roughly parallel to the woodland's northern boundary c.150m south of the woodland edge. This ride forms a wide corridor and has been recently disturbed by forestry machinery with wheel rutted ground and patches of damp bare ground and shallow open water pools. The dominant plant species overall are creeping bent *Agrostis stolonifera*, common bent, creeping buttercup, self-heal, soft-rush, common centaury *Centaurium erythraea* and Yorkshire-fog. However, a wide range damp/acid ground associates of elevated botanical value are also present including heather *Calluna vulgaris*, bell heather *Erica cinerea*, cross-leaved heath *E. tetralix*, yellow sedge *Carex viridula* subsp. *oedocarpa*, trailing St John's-wort *Hypericum humifusum*, velvet bent *Agrostis canina*, bristle club-rush *Isolepis setacea*, corn mint *Mentha arvensis*, marsh thistle *Cirsium palustre*, bog stitchwort *Stellaria uliginosa*, glaucous sedge *Carex flacca*, heath-grass *Danthonia decumbens,* trailing tormentil *Potentilla anglica,* tormentil *Potentilla erecta* and the hybrid *Potentilla x mixta*.

3.18 Of particular note along this ride, is the presence of chaffweed *Centunculus minimus* and allseed *Radiola linoides*[7], which are both nationally notable species. These species are of significant importance at the County level, with chaffweed recorded only at this location within Norfolk and allseed at this location and one other. The locations of these species, as recorded by AEL in 2011 and by the NFG in 2016, are shown by **Figure 3.2**.

3.19 In the centre of Racecourse Plantation is a clearing occupied by a former outdoor karting track, which is dominated by open grassland, mixed tall ruderal vegetation and young scattered scrub. The western part of the clearing is currently used as the hub for a commercial paintball operation, with an area of conifer and mixed plantation woodland located to the west of the clearing used for holding paintball games. The eastern part of the woodland is also used by a local archery club with targets and ranges set within the woodland. The paintball and archery areas both have associated built infrastructure

[7] Chaffweed is a near Threatened species in GB and an Endangered species in England and allseed is a near Threatened species in GB and a Vulnerable species in England.

notably: bare ground parking areas, access tracks, storage containers and informal wooden structures.

3.20 Other habitats and features to note within Racecourse Plantation include a large unplanted bracken dominated clearing in the west of the Site, a seasonally wet, probably former ornamental, shaded pond in a late stage of hydroseral succession and with abundant grey willow *Salix cinerea,* and a network of interconnected dry ditches.

Belmore Plantation

3.21 Belmore Plantation supports a range of broadleaved woodland types, but is mostly dominated by mixtures of birch and sycamore, together with occasional beech, sweet chestnut, Scots' pine and other conifers. The majority of the woodland has a well-developed and varied understorey, despite this woodland currently being the most heavily use of the three woodlands for public recreation.

3.22 Stands of younger birch regeneration are also present in areas damaged by wind-throw and/or cut and cleared, for example in the northeast corner and central areas. A stand of mature planted oak is present along the woodland's western side, and the area surrounding two dry and shaded former ornamental ponds in the eastern part of the woodland supports a number of mature planted trees, mainly beech and lime *Tilia* species, together with some conifers. An earth bank along Pound Lane which formed the eastern boundary to the woodland supported a number of mature coppice beech.

3.23 The shrub layer is variable, with patches of holly, birch and hazel the most common species overall, but hornbeam *Carpinus betulus*, yew *Taxus baccata*, elder, hawthorn and rhododendron all present locally. In general, the ground layer is typical of the wider woodland complex, being dominated by patches of bracken and bramble and other commonplace shade tolerant species. However, a number of species associated with long established woodland are also present, such as wood speedwell, wood melick, wood dock *Rumex sanguineus*, wood avens and wild strawberry *Fragaria vesca*.

3.24 A relatively large stand of mature conifer plantation dominated by a mix of Scots' pine and Corsican pine, with occasional broadleaved trees and shrubs, is present just north of the woodland's centre. It has a dense and even-aged canopy, with a sparse and species-poor understorey characterised by locally abundant rhododendron, and patches of bramble.

3.25 The rides consist of a network of informal paths used by locals for access through the wood, and for dog walking. The majority are relatively narrow scrub or bramble fringed tracks with a heavily trampled bare earth surface. Plant cover is restricted to a few plants of annual meadow-grass and greater plantain - both species that are able to tolerate heavy trampling. Less well used ride sections support a grass and woodland herb community characterised by rank grassland of cocksfoot *Dactylis glomerata*, Yorkshire-fog, rough meadow–grass, ground-ivy *Glechoma hederacea*, wood dock and bramble. No rides support vegetation indicative of the damp acid ground conditions present in Racecourse Plantation.

3.26 A large open clearing is present in the centre of the woodland and supports colonising tall ruderal and sprawling bramble over forestry brash. It has recently been replanted with Douglas fir. A few patches of neutral and semi-improved acid grassland also occur in this location, and are dominated by common-bent, sweet vernal-grass A*nthoxanthum*

odoratum and Yorkshire-fog, togather with a range of other typical associates. A range of sedge species are also present within the clearing including pill sedge, common yellow-sedge, green-ribbed sedge *Carex binervis*, prickly sedge *Carex muricata* subsp. *lamprocarpa* and oval sedge *Carex ovalis*.

Brown's Plantation

3.27 Brown's Plantation is dominated by a mix of deciduous and mixed plantation types. The majority is less than 100 years old, and consists of mixed stands of self-sown birch with numerous mature oak, beech and lime with occasional conifers of variable height and structure. The understorey consists largely of birch, with some holly, hawthorn, rowan and locally abundant rhododendron. A small area of birch regeneration is present in the northwest corner of the woodland, and a stand of mature Scots' pine is located to the south of this.

3.28 The oldest parts of the wood include an ornamental avenue of mature lime and beech running north-south close to the eastern boundary, and a small area of mature lime and beech adjoining the western edge of this avenue, known formerly as Round Clump. To the west of Round Clump is a more recently planted double avenue of western red cedar. The historic avenue plantings are no longer distinct on the ground however having been subsumed within more recently developed woodland.

3.29 The ground flora throughout is relatively species-poor and of the ubiquitous bracken and bramble type. Other plants present include nettle *Urtica dioica*, herb-Robert, ground-ivy, broad buckler-fern, rough meadow-grass, Yorkshire-fog and creeping soft-grass *Holcus mollis*.

3.30 A large, neglected and shaded ornamental pond was located in the southern part of the woodland and was surrounded by mature mixed plantation woodland, supporting a range of native and ornamental tree species.

Discussion

3.31 Racecourse Plantations supports a mix of broadleaved, mixed and coniferous woodland, which, with the earlier hiatus in active forestry management, has developed semi-natural woodland character in some locations.

3.32 Overall, the woodland supports a wide range of broadleaved and coniferous tree species, and native shrubs, but lacks a well-established and diverse assemblage of AWI plant species, which although present as a relatively varied assemblage along woodland rides, are thought to have been introduced and spread as result of past forestry operations.

3.33 Stands of coniferous plantation are of least ecological value in habitat and protected species terms, with areas of semi-natural woodland dominated by native trees and shrubs of greater value, particularly where a well-developed and varied understorey has developed (e.g. parts of Belmore Plantation). However, much of the woodland lacks a well-developed understorey of woody shrubs, and has relatively poor structural diversity, with some areas also supporting patches of rhododendron that further reduce the wildlife value of these areas.

3.34 Parts of Racecourse Plantation have and continue to be used for paintball and archery, and these activities, in particular the paintball, have resulted in significant habitat damage.

3.35 Recent forestry management has focused on the select removal of conifers and conifer replanting in parts of Racecourse and Belmore Plantations. These areas have been negatively affected by forestry operations due to the presence of a dense layer of forestry brash covering the ground which favours the establishment of tall ruderal plants and bramble patches, and precludes the establishment of more interesting ground flora, and potentially heathland.

3.36 However, the main habitat and botanical values of the Site relates to areas of open vegetation along woodland rides and include relicts of open heath vegetation. The key areas of habitat and botanical interest are within Racecourse Plantation and are associated with disturbed, damp acid ground conditions, in particular along the main east-west ride which runs roughly parallel to the woodland's northern boundary c.150m south of the woodland edge. Areas supporting this community type appear to have shifted in response to changes in forestry management over the past 10 years, with management neglect leading to its disappearance in the Site's northwest section (where damp acid communities were recorded in 2001), and more recent machine related damage along a central section of this ride creating new habitat conditions. In particular, the notable species chaffweed and allseed were present along this ride section in 2011 and 2016, although outlying records further west in 2016 by the NFG may be the result of the recent forestry operations in this area.

Racecourse Plantations

Phase 1 habitat map and recent forestry management

study area

development area

Habitats

broad-leaved semi-natural woodland

broad-leaved plantation woodland

coniferous plantation woodland

mixed plantation woodland

dense scrub

scattered scrub / bare ground

semi-improved neutral grassland

semi-improved grassland / tall ruderal

marshy grassland

standing water

continuous bracken

bare ground

Forestry management

2014/15 selective felling / thinning

2015 coppicing / thinning

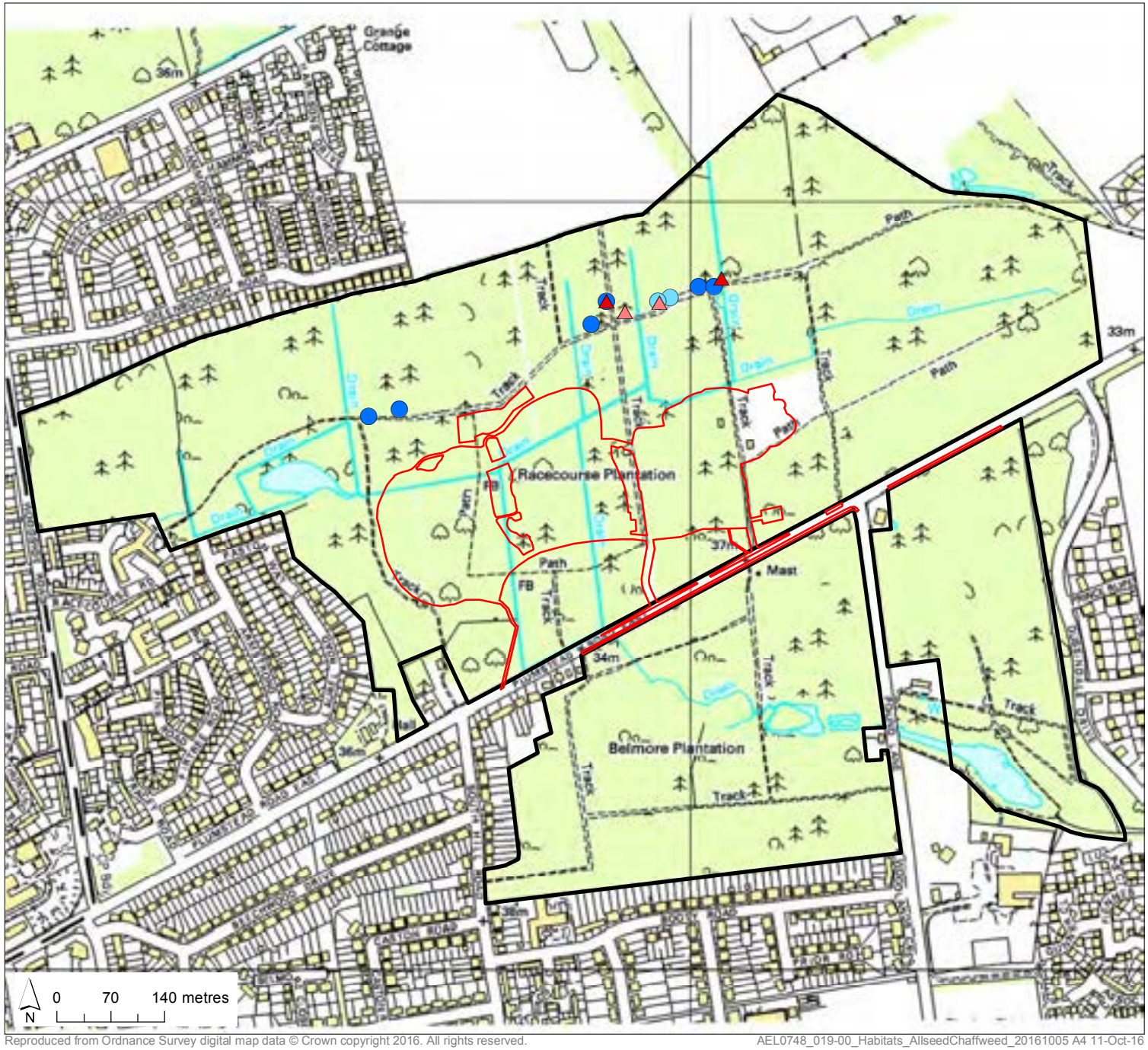
2015 replanting (Douglas fir)

2016/17 thinning / coppicing

Figure 3.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	



Racecourse Plantations

Locations of chaffweed and allseed

site boundary

development boundary

2016 locations

allseed

chaffweed

2011 locations

allseed

chaffweed

Figure 3.2

Map Scale @ A4: 1:7,500

Surveyed by: AEL & NFG	
Survey date: 2011 & 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

4 Bats

Background

4.1 Bat activity survey was completed in 2011 involving the use of tree mounted automated bat detectors and two separate bat catching surveys. Results confirmed that bat activity across the Site was dominated by common and soprano pipistrelle bats.

4.2 The 2011 automated bat detector survey work provided strong evidence that the rare bat species barbastelle (known to occur locally) did not depend on the Site in a significant way for foraging or roosting, with only one set of calls of this species recorded on one occasion over the entire 54 night recording period (20 April to 12 June).

4.3 The capture of lactating female brown long-eared bats in 2011, along with occasional calls of the same species from all recording locations, suggested that a maternity roost of this species occurred close to the Site.

Survey Approach

4.4 Comprehensive bat surveys have been completed over the period August–September 2015 and May–August 2016, an outlined below.

Bat activity survey

Walked transect

4.5 A walked transect survey, combined with fixed detector recording stations, was completed to record bat activity across Racecourse Plantation during the bat active period in August-September 2015 and May-July 2016. Two transect routes were positioned to sample the range of distinct habitat types present, with a focus on linear woodland rides and other features likely to be of greatest value to foraging and commuting bats. One transect route (and three detector locations 2, 3 and 4) was adjusted slightly in 2016 in order to cross through land within the defined Development site (see locations 2a, 3a and 4a). The transect routes and automated bat detector recording stations are shown by **Figure 4.1**.

4.6 The transect survey was repeated on five separate occasions during the 2015-16 bat active period. Survey dates and associated weather conditions were as follows:

- 6 August 2015 – sunset 20:39: wind Beaufort 0 (still), no rain, air temp range 20.5–14.5˚C;
- 23 September 2015 – sunset 18:51: wind Beaufort 0 (still), no rain, air temp range 19.5–11.5˚C;
- 17 May 2016 – sunset 20:49: wind Beaufort 0 (still), no rain, air temp range 15.5-11.8˚C;
- 18 July 2016 – sunset 21:07: wind Beaufort 0 (still), no rain, air temp range 20.5–18.0˚C;
- 26 July 2016 – sunset 20:55: wind Beaufort 0 (still), no rain, air temp range 18.25–17.0˚C.

4.7 The surveyors were each equipped with a hand-held Pettersson D230 electronic bat detector set in frequency division with ear-phones, and a SD2 electronic bat detector set to constantly record bat calls. Six automated Anabat Express electronic bat detectors were set-up on 2 m high tripods along each transect route (12 in total on each survey occasion) to automatically record all bat calls from 15 minutes before sunset until the end of the survey on each transect survey occasion. Two tripod-mounted Anabat Express detectors were also set up in Belmore Plantation during each transect survey to provide a comparison, but no transect routes were walked in this woodland area.

4.8 Transect surveys commenced 10 minutes before sunset with surveyors remaining stationary at the start of each route for 30 minutes after sunset to specifically watch for bats commuting onto and/or within the woodland. After 30 minutes the surveyors commenced the transect walk – walking slowly and stopping at or close to one of the six automated detector locations along the route for a five minute recording period to note bat activity.

4.9 The start and end location and direction of the transect route was alternated between each transect survey visit.

4.10 Weather conditions were suitable for bats to be active during all transect surveys.

4.11 All bat calls recorded by the hand-held and tripod mounted automated detectors were analysed using Analook software and identified to the highest practical taxonomic level in accordance with Russ (2012)[8].

Long-term automated bat detector survey

4.12 A paired automated bat detector survey of Racecourse Plantation was completed using two Anabat SD1 electronic bat detectors (one located within the Development site and one outside the Development site) housed in tree mounted weather proof boxes over the periods August-September 2015 and May-August 2016. Detectors were set up on trees on the edge of rides or woodland clearings around 3 m above the ground in locations considered likely to be suitable for bat activity. The detectors were powered by 12 volt batteries inside the detector housing. The locations of long-term static detectors are shown on **Figure 4.1**:

- Station A (within Development site) – 35 recording nights from 14 August 2015;
- Station B (outside Development site) – 40 recording nights from 14 August 2015;
- Station C (within Development site) – 16 recording nights from 11 May 2016;
- Station D (outside Development site) – 16 recording nights from 11 May 2016;
- Station E (within Development site) – 16 recording nights from 27 May 2016;
- Station F (outside Development site) – 27 recording nights from 27 May 2016;
- Station G (within Development site)– 46 recording nights from 7 July 2016;
- Station H (outside Development site) – 46 recording nights from 7 July 2016.

4.13 A total of 113 recording nights was achieved by static detectors located within the Development site, and 129 nights by detectors located outside the Development site. The

[8] Russ (2012). *British Bat Calls A Guide to Species Identification*: Pelagic Publishing.

difference in the total recording nights between areas was due to differences in battery longevity.

Bat catching survey

4.14 In order to verify the use of Racecourse Plantation by rare bat species (in particular barbastelle), specialist bat catching and radio tracking surveys were undertaken over three separate 2-3 night sessions in June and August 2016.

4.15 The work was completed by a specialist bat consultant with particular experience in catching and radio tracking barbastelle bats using mist nets, harp traps and sonic lures, and was completed under a specific Natural England project licence. The survey was completed over eight separate nights and included a total of 29 different trapping locations across Racecourse Plantation as shown by **Figure 4.2**. The survey dates and methods employed can be summarised as follows:

- 8 June 2016 – 3 harp traps with sonic lures;
- 9 June 2016 – 3 harp traps with sonic lures, 1 mist net without sonic lure;
- 10 June 2016 – 4 harp traps with sonic lures, 1 mist net without sonic lure;
- 11 August 2016 – 3 harp traps with sonic lures;
- 12 August 2016 – 3 harp traps with sonic lures;
- 13 August 2016 – 3 harp traps with sonic lures;
- 25 August 2016 – 2 harp traps with sonic lures, 2 mist nets without sonic lures;
- 26 August 2016 – 2 harp traps with sonic lures, 2 mist nets without sonic lures.

4.16 Sonic lures were used to play ultrasonic bat calls in order to attract bats to the harp traps.

4.17 All bats captured were aged, sexed and a note made of their breeding status before being released. Non pipistrelle bat species that were found to be lactating were radio-tagged in order to enable their day roosts to be located using radio-tracking equipment.

Bat tree roost assessment

4.18 A daytime visual assessment of all standing mature trees scheduled for removal within or close to the Development site was undertaken by AEL on 24 August 2016.

4.19 All large broadleaf and conifer trees that were likely to be removed to as part of construction (as identified by the tree survey plan and development layout available at that time) were subject to a preliminary ground level roost assessment using binoculars to assess their bat roost potential in accordance with the protocol for visual inspection of trees due to be affected by arboricultural work (Collins, 2016)[9]. The surveyor looked for features suitable for roosting bats, including natural holes, woodpecker holes, cracks/splits in major limbs, loose bark, dense thick stemmed ivy, hollows/cavities and dense epicormic growth.

4.20 The trees were then categorised following best practice guidance as shown in **Table 4.1**.

[9] Collins, J (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd Edition.* Bat Conservation Trust.

Table 4.1: Categories of tree value to bats (after Collins, 2016).

Tree category	Description
Known or confirmed roost	n/a
High	A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Moderate	A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only).
Low	A tree of sufficient size and age to contain one or more potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Negligible	Trees with no potential to support bats.

4.21 In addition to the trees, all buildings (B1) and built structures within Racecourse Plantation were subject to a building inspection survey by an AEL ecologist and licenced bat worker on 24 August 2016.

4.22 The inspection of buildings to assess their suitability for use by roosting bats can be conducted at any time of year, according to the best practice survey guidance (Collins, 2016[10]). However, finding evidence of bats (e.g. their droppings) on external surfaces that are unprotected from rainfall may be restricted if undertaken outside the main bat active season (May to September) and/or after periods of wet weather. Bat droppings inside buildings may also quickly disintegrate in damp conditions. The current survey was undertaken during the peak of the bat active period in summer when bats would be active and evidence of their presence in the form of droppings visible.

4.23 A systematic survey of the exterior and interior of the buildings identified above was undertaken using ladders, torches (Exposure 800, 875 and 1300 lumen models), small dental mirrors and an endoscope (Ridgid micro CA-300) as necessary to search for evidence of bats.

4.24 Evidence of bats searched for included bat droppings on floors, walls and other exposed surfaces, staining (caused by bat fur oils and/or urine spots), the characteristic odour of accumulated bat droppings in confined (typically poorly ventilated) spaces, bat insect feeding remains (such as discarded moth/butterfly wings and spider exoskeletons), live and dead bats (e.g. roosting against ridge beams and/or in cracks and crevices in brickwork and structural timbers).

[10] Collins, J (2016) *Bat Surveys for Professional Ecologists – Good Practice Guidelines – 3rd Edition*. Bat Conservation Trust, London

Survey Findings

Walked transect

4.25 The transect survey identified three commuting routes of bats from suspected off-site roost locations as shown by **Figure 4.3**. All three commuting routes were used by small numbers of common pipistrelle and soprano pipistrelle bats, and one (commuting route no. 1) was used by an individual noctule bat that entered the woodland from an off-site roost to the north.

4.26 Bat activity recorded by the transect surveys was dominated by foraging individual common and soprano pipistrelle bats, with the majority of the activity consisting of only sightings and calls of single bats. Occasionally, small numbers of foraging bats (up to five individuals) were observed in the air together, with the greatest number being associated with an area of open, recently felled, plantation woodland at the western end of the Development site. Typically, however, bats were heard and not seen during the transect walks because of low light levels and limited views of the sky when walking beneath a dense tree canopy.

4.27 Over the course of the surveys, pipistrelle bat foraging activity (albeit comprising only single or small numbers of bats) was found to be more or less constant along sheltered open rides and woodland clearings (particularly in the wetter western parts), but was less frequent in areas of dense mixed woodland. Bat activity was largely absent within areas of conifer plantation, particularly in stands that lacked a significant understorey.

4.28 The results of the static detectors positioned along the two transect routes in 2015/16 in Racecourse Plantation are summarised by **Table 4.2** and **Figure 4.4**. The data confirms that the most frequently recorded species (78.3% of all recorded calls by all detectors) was common pipistrelle, followed by soprano pipistrelle - 12.8%. It is important to note that the pie charts shown on **Figure 4.4** do not indicate the total number of recorded bat passes for each location, and in some instances, for example at detector location 3a (where call passes were largely of noctule bat), the pie chart is based on a very small number of calls only.

4.29 A total of seven individual call files of barbastelle bat were recorded over the five survey sessions which represents 0.2% of all recorded bat call files across Racecourse Plantation over the five surveys.

Long-term automated bat detector survey

4.30 The results of the long-term static detectors are summarised by **Table 4.3** and **Figure 4.5**. The data are consistent with the transect survey findings (albeit they recorded proportionally fewer brown long-eared bat calls), and verify that the Racecourse Plantation bat assemblage was dominated by common pipistrelle (79.2% of all recorded calls) followed by soprano pipistrelle (19.9%). Barbastelle bat made up 0.2% of the total number of calls with a total of 66 separate call files recorded over the entire survey period. The locations of barbastelle bat call registrations (including both transect and long-term static detector locations) are shown by **Figure 4.6**.

4.31 Brown long-eared bat calls (0.1%) were less frequently recorded than barbastelle, but as this species will typically make no or very quiet calls (unless social calling), they will always be under-recorded by electronic bat detectors. Brown long-eared bats were a significant

component of the bats captured during the bat catching surveys, and the results of the automated bat detector surveys for this species confirm that brown long-eared bats were under-recorded by the automated bat detectors. Barbastelle bat is not a quiet or whispering bat and was unlikely to have been under recorded by the detectors.

Table 4.2: Total bat call files from all transect stopping locations.

Species	Total no. of call files	Proportion of total calls (%)
Common pipistrelle	3,391	78.3
Soprano pipistrelle	554	12.8
Noctule	219	5.1
Brown long-eared	103	2.4
Serotine	44	1.0
Myotis sp.	15	0.3
Barbastelle	7	0.2
Total	**4,333**	-

Table 4.3: Total bat call files from all long-term automated detectors.

Species	Total no. of call files	Proportion of total calls (%)
Common pipistrelle	33,289	79.2
Soprano pipistrelle	8,353	19.9
Noctule	192	0.5
Myotis species	78	0.2
Barbastelle	66	0.2
Serotine	44	0.1
Brown long-eared	32	0.1
Nathusius' pipistrelle	3	<0.1
Total	**42,057**	-

4.32 The relative importance of habitats within the proposed development footprint and the wider Site for foraging bats has been investigated through statistical analysis. Analysis of the paired automated bat detector survey results confirm that there was no statistically significant difference between bat species diversity and number of call files recorded from

inside and outside the Development site. However, statistically significant differences between the two areas were recorded in May and June 2016 with greater bat species diversity recorded outside of the Development site.

Bat tree and building roost assessment

4.33 The results of the tree and building inspections are summarised on **Figure 4.7**.

4.34 In summary, no obvious bat roost features were seen in association with trees scheduled for removal within or close to the proposed Development site.

4.35 A number of large broadleaved trees, were however found to be of Low Bat Roost Potential i.e. of sufficient size and age to contain one or more potential roost features but with none seen from the ground. These trees will be subject to follow-up above ground inspection (tree climbing or cherry picker) in advance of being felled in order to confirm the presence/absence of potential bat roost features, and verify the need for further after-dark survey, and/or appropriate risk avoidance measures.

4.36 The building (B1) located within the paint ball area was subject to a building inspection survey on 24 August 2016, and was found to contain around 20 moth and butterfly wing remains scattered across its floor indicating recent use by a night roosting/feeding brown long-eared bat/s that could easily access inside the building though openings in its external walls. The building lacked any obvious features about its exterior and interior that would be attractive to crevice day roosting bats, and lacked physical evidence of bats about its exterior to suggest its use by day roosting bats. In summary, building B1 was confirmed as supporting a brown long-eared bat night roost (of low conservation significance) but was considered to be of negligible value as a day roost.

4.37 All other buildings and structures within the paintball and archery areas were of negligible bat roost value and lacked evidence of roosting bats.

Bat catching survey

Bat species assemblage

4.38 A total of 87 individual bats of five species were captured over the three catching sessions in June and August 2016. The species composition was as follows:

- common pipistrelle (28 bats, 32.2%);
- brown long-eared (24 bats, 27.6%);
- soprano pipistrelle (23 bats, 26.4%);
- noctule (10 bats, 11.5%);
- natterers (2 bats, 2.3%).

4.39 For one species, natterers, only two bats were caught demonstrating that the bat population present is likely to be very low.

4.40 No barbastelle, serotine or nathusius' pipistrelle bats (all species recorded during the activity surveys) were captured during the survey. This result, in combination with the very small number of bat calls recorded by the automated bat detector surveys, confirms that Racecourse Plantation is not an important site for these species with numbers of bats using the Site being extremely low.

4.41 The trapping results showed a general pattern of increased bat activity in the more northern and north-eastern parts of Racecourse Plantation outside of the Development site where the woodland supported a high proportion of broadleaved trees. Lowest levels of bat activity were found in the central area (within the Development site) where conifer and sweet chestnut were the dominant canopy species and/or the ground layer had been degraded by paintball activity and lacked understorey shrubs.

Maternity roosts

4.42 In June 2016 a single pregnant common pipistrelle bat and two pregnant soprano pipistrelle bats were caught – these bats were not tagged because they were pregnant and of low species interest. In August, juvenile common pipistrelle, soprano pipistrelle, noctule and brown long-eared bats were caught along with lactating adult female brown long-eared bats and post lactating adult common pipistrelle, brown long-eared and noctule bats. The bat catching survey has demonstrated that maternity groups of these species are partly dependent on Racecourse Plantation for foraging, and have day roosts on or close to the Site.

4.43 Two different lactating brown long-eared bats were captured in Racecourse Plantation on 11 August and 25 August 2016, and were radio-tagged and tracked to help establish their day roost locations on a number of different occasions in August.

4.44 The first tagged bat (11 August) was tracked to a mature beech tree within Brown's Plantation (Roost 1) which it used consistently for day roosting for over a week before the bat could no longer be detected anywhere within Racecourse Plantations. The tree was subject to a bat roost emergence survey on 19 August 2016 using infra-red lamps and camcorders, but the potential bat roost feature was located high up the trunk of the tree, and was partly obscured from sight by the canopy making it impossible to see or film bats emerging from the feature.

4.45 The second brown long-eared bat (a different individual that lacked evidence of previous fur clipping associated with fitting a radio tag) was caught, tagged and tracked to the same tree in Brown's Plantation (Roost 1) the following day (26 August), and the roost was subject to a return to roost survey on 27 August 2016 using infra-red camcorders. The return to roost survey of Roost 1 confirmed long-eared bats showing interest in the roost feature high up the trunk, but it was not possible to count the number of bats that entered the tree because the roost could not be clearly seen. The only conclusions that could be drawn were that a number of brown long-eared bats did enter Roost 1, but a number also left the area at dawn and did not use Roost 1 on that day.

4.46 The second radio-tagged bat was not present at Roost 1 at dawn on 27 August and was tracked to a second mature beech tree (Roost 2) in Brown's Plantation later the same day. Roost 2 was subject to a bat roost emergence survey with infra-red cameras on the evening of 27 August, which confirmed the emergence of 27 brown long-eared bats from a rot hole in the main trunk.

4.47 On the 29 August the second radio-tagged brown long-eared bat was tracked to a third mature beech tree (Roost 3) in Brown's Plantation.

4.48 In summary, the same radio-tagged bat was found to occupy three different beech trees in Brown's Plantation, confirming the presence of a maternity colony of brown long-eared

bats (of a minimum of 27 individuals) that regularly switches tree roost sites within Brown's Plantation.

Discussion

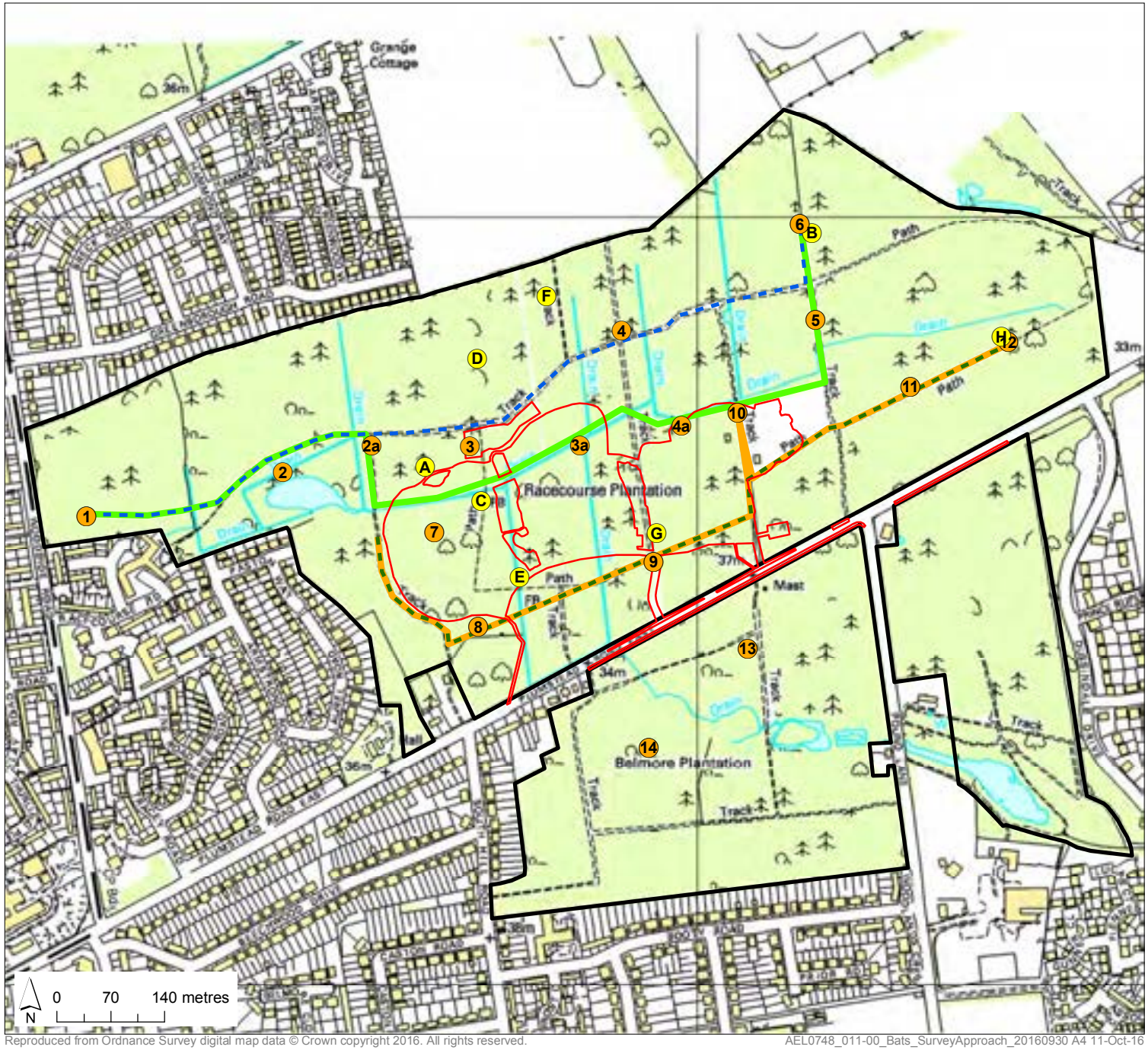
4.49 The combination of comprehensive transect surveys, the use of long-term automated bat detectors and bat catching surveys undertaken over the period 2015-16 provides a very robust baseline picture of the bat species using Racecourse Plantation and their levels and type of activity.

4.50 The 2015-2016 bat survey results are consistent with the findings of the 2011 bat survey, and demonstrate that the bat species assemblage of Racecourse Plantation is dominated by the UKs most common bat species (common pipistrelle, soprano pipistrelle and brown long-eared bat) that make use of the Site for foraging and have maternity roosts close by. Of the rarer bat species, only noctule bat has been confirmed as having a maternity roost within range of Racecourse Plantation, with barbastelle, natterer's, serotine and nathusius' pipistrelle being rare visitors to the site in low numbers with no evidence of breeding.

4.51 The brown long-eared bat maternity tree roost within Brown's Plantation is a feature of County value. The bat assemblage making regular foraging use of the Site is also assessed as being of County value as it regularly supports a number of rarer bat species, notably noctule bat. The brown long-eared building night roost is a feature of Local value, and the Site is considered to be of Local value for commuting bats.

4.52 Automated bat detector surveys undertaken by AEL in 2011 and 2015/16 have confirmed that the rare bat species, barbastelle, does use Racecourse Plantation, but that the number of barbastelle bats making use of the Site is very low with only very infrequent visits to the Site being recorded.

4.53 It is of note that available radio-tracking data generated from studies undertaken as part of the Norwich Distributor Road (NDR) scheme found that barbastelle bats (three radio tracked bats) had parts of their range within or close to Racecourse Plantations, but that the majority of their ranges appeared to fall within open countryside to the east of the Site. The findings of the NDR studies and the bat survey work undertaken to support the Racecourse Plantation proposal are broadly similar, and confirm that Racecourse Plantations are not important to maintaining the integrity of the local barbastelle bat population.



Racecourse Plantations

Bat survey methodology

- site boundary
- development boundary
- long-term static bat detector
- transect survey static bat detector

2015 transect routes

- transect 1
- transect 2

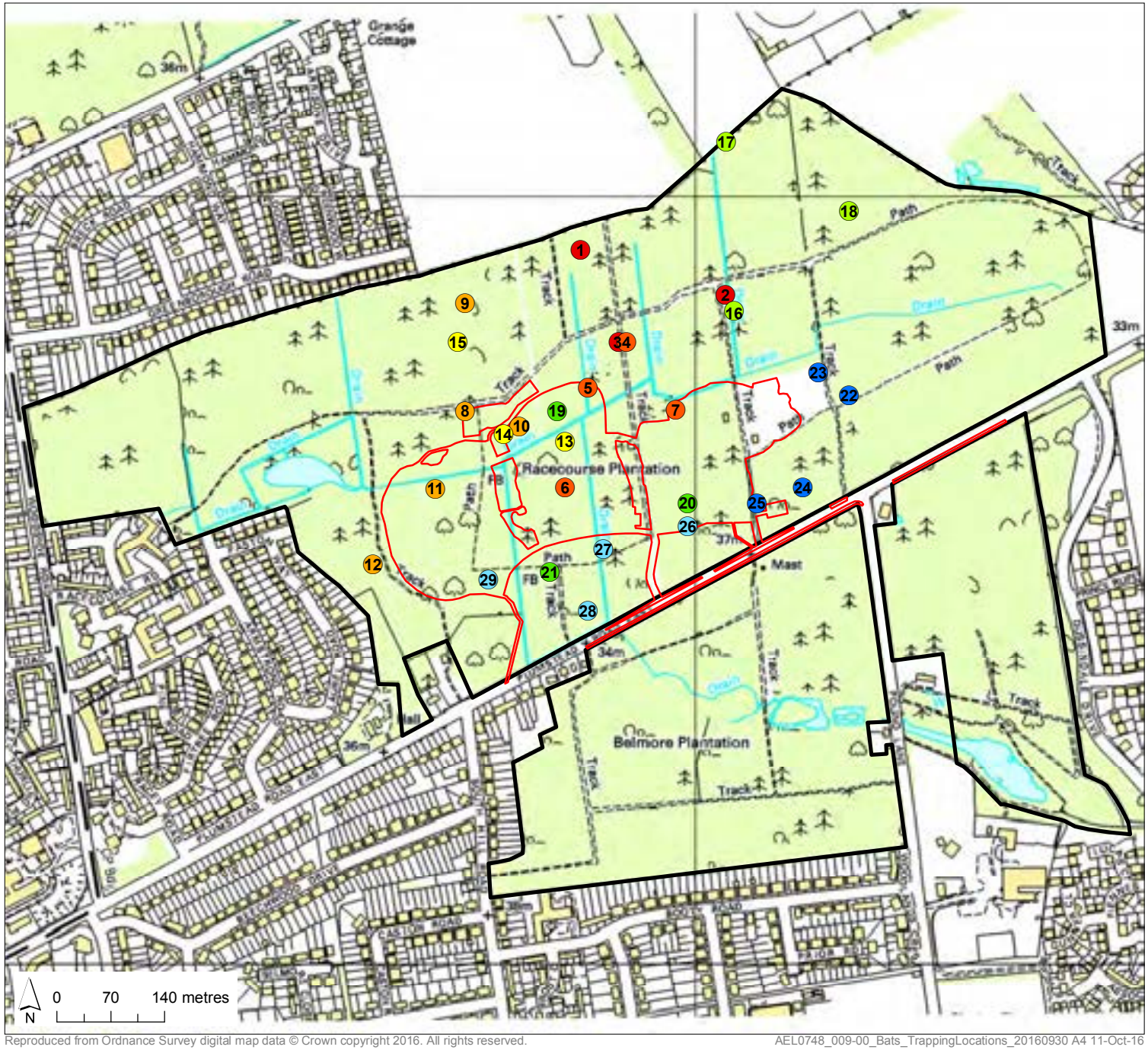
2016 transect routes

- transect 1
- transect 2

Figure 4.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2015/16	
Drawn by: CW/RD	
Checked by: DP	
Status: Final	



Racecourse Plantations

Bat survey - trapping locations

site boundary

development area

Trapping locations

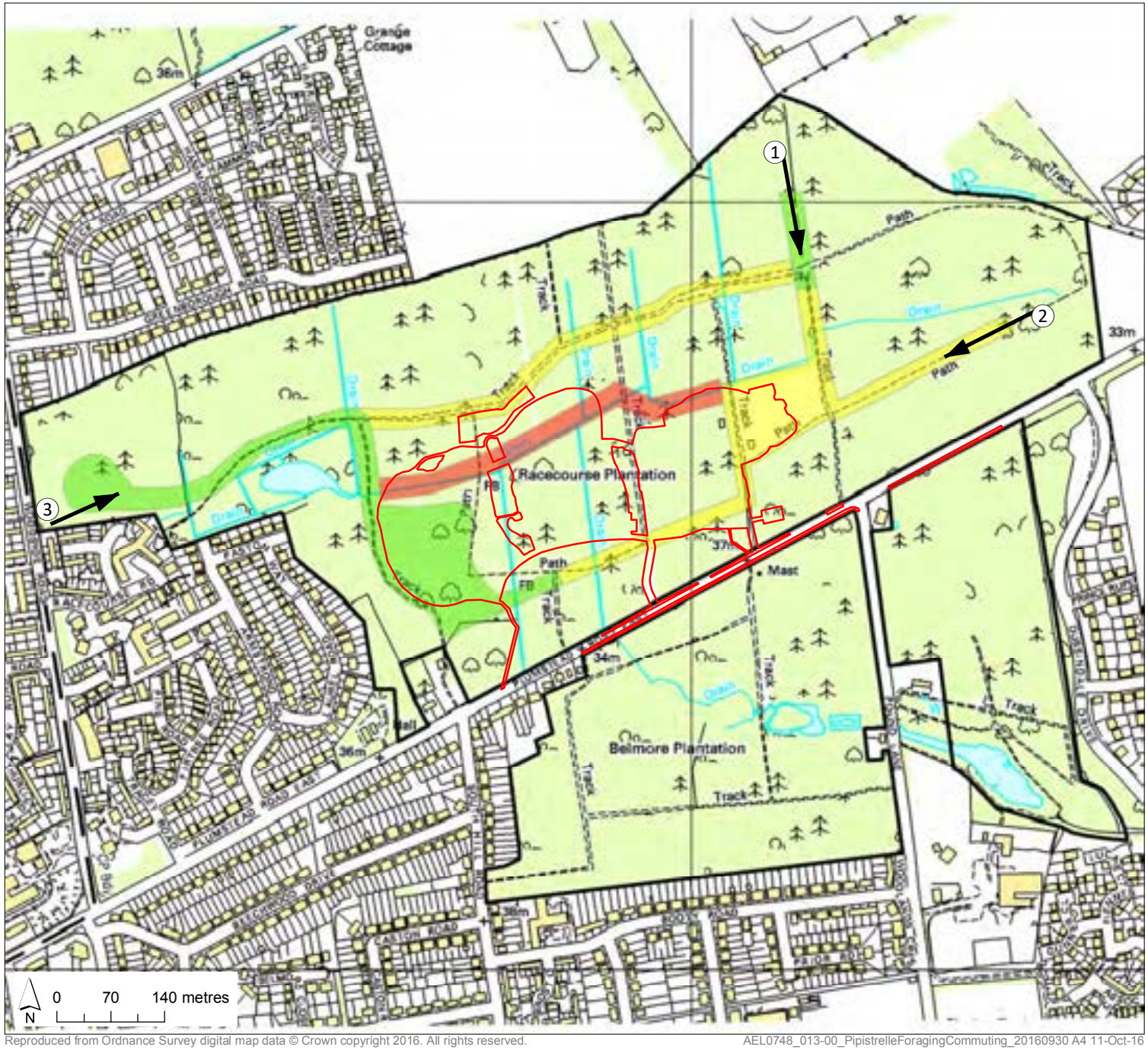
- 8 June
- 9 June
- 10 June
- 11 August
- 12 August
- 13 August
- 25 August
- 26 August

Figure 4.2

Map Scale @ A4: 1:7,500

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	

AEL0748_009-00_Bats_TrappingLocations_20160930 A4 11-Oct-16



Racecourse Plantations

Pipistrelle foraging and commuting activity

study area

development area

Bat foraging activity

high

low

none

Numbers of commuting bats

individual

small

large

Bat commuting routes

1 common pipistrelle
soprano pipistrelle
noctule

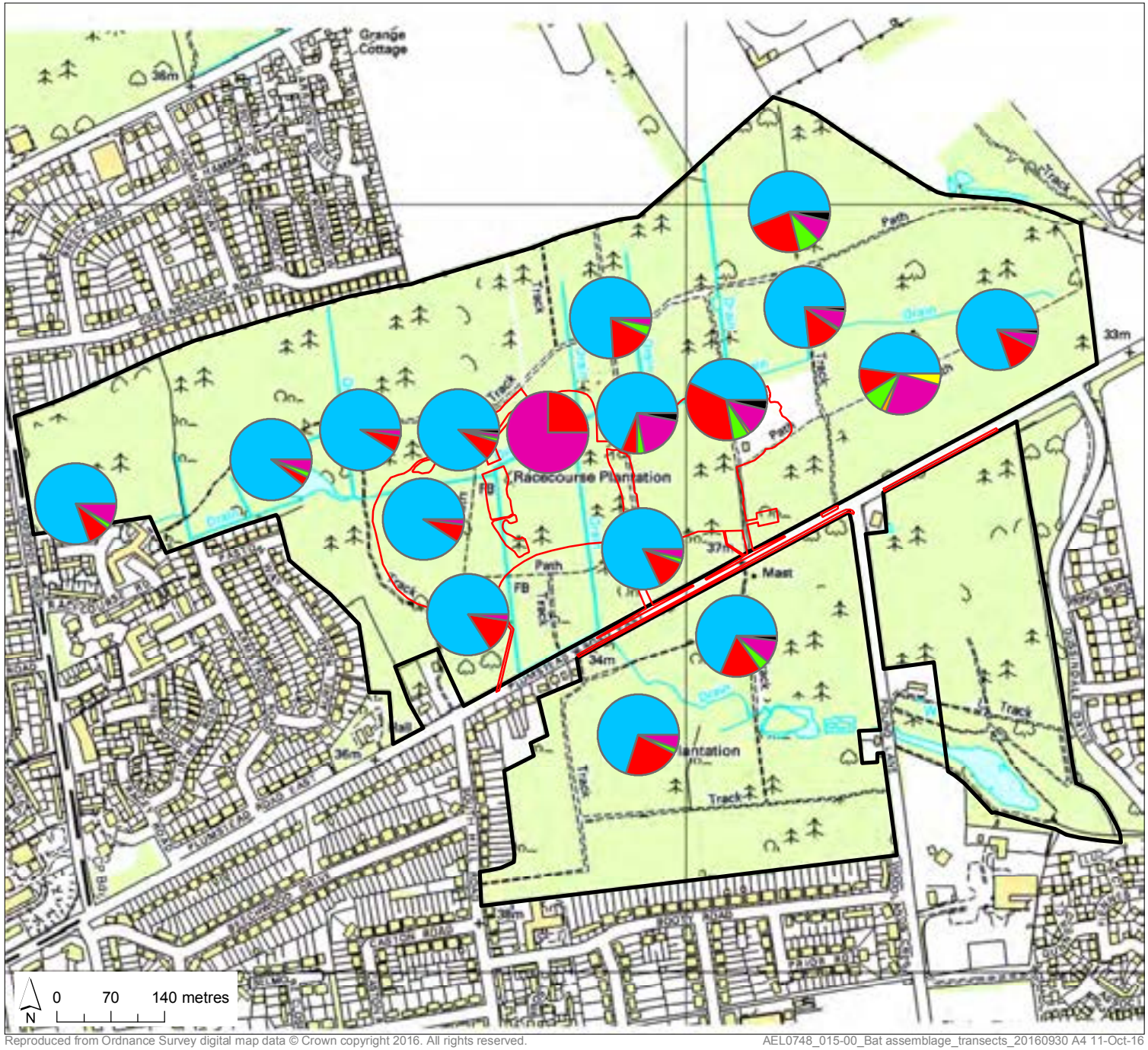
2 common pipistrelle
soprano pipistrelle

3 common pipistrelle
soprano pipistrelle

Figure 4.3

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2015 & 2016	
Drawn by: CW	
Checked by: DP	
Status: Final	



Racecourse Plantations

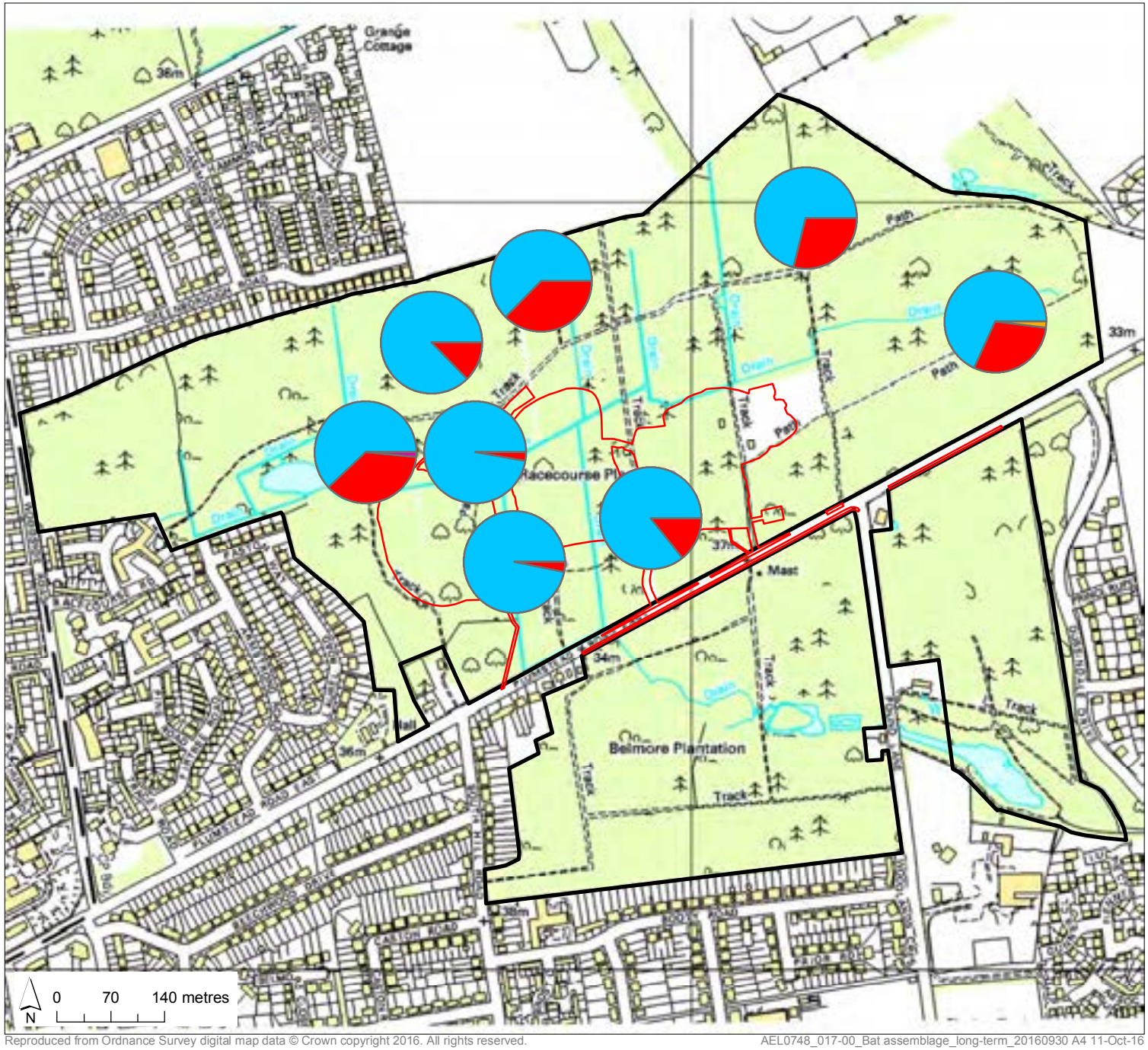
Bat species assemblage for transect static detectors

- study area
- development area
- common pipistrelle
- soprano pipistrelle
- brown long-eared
- Myotis sp.
- noctule
- barbastelle
- serotine

Figure 4.4

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2015/16	
Drawn by: CW	
Checked by: DP	
Status: Final	



Racecourse Plantations

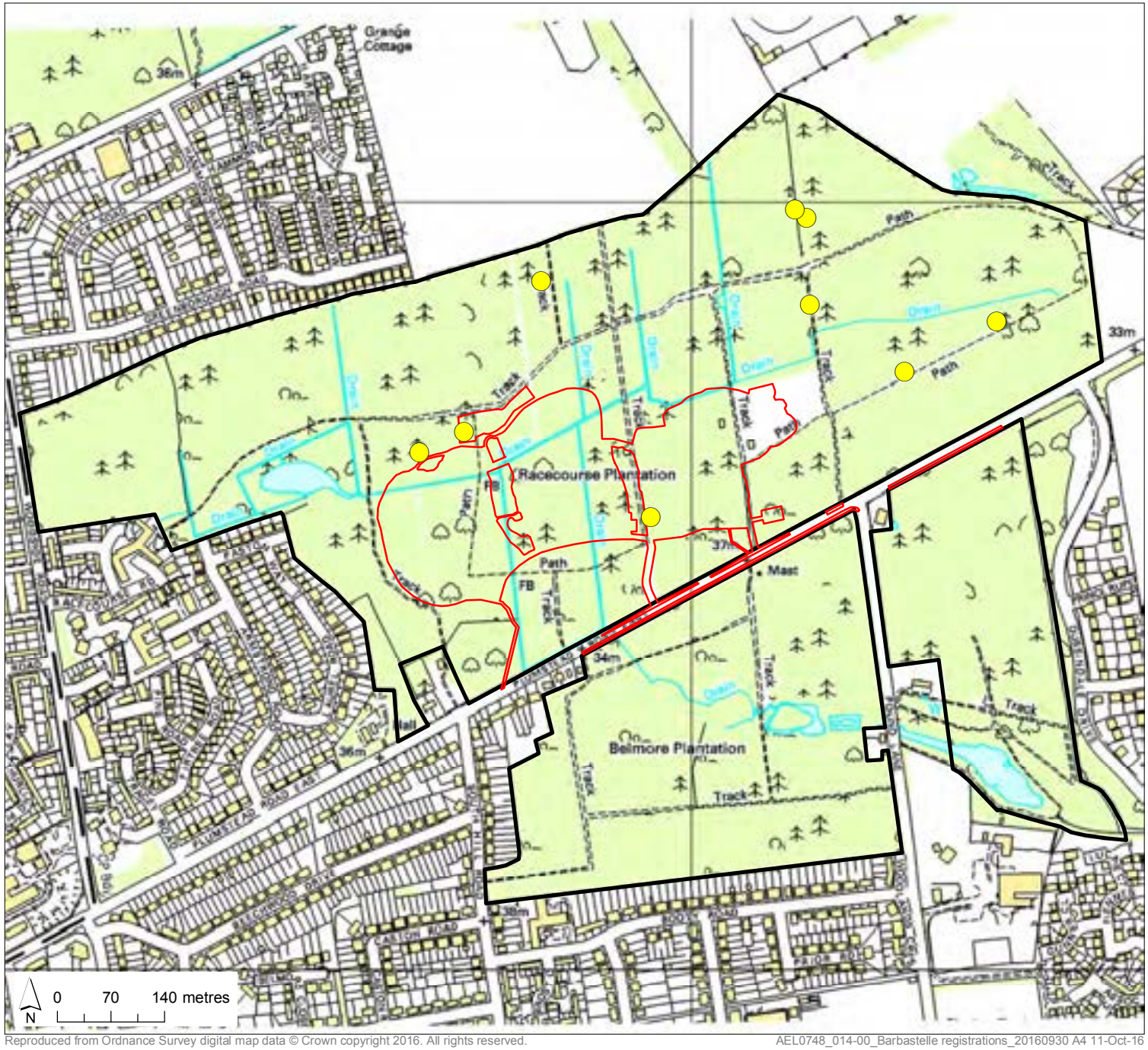
Bat species assemblage for long-term automated detectors

- study area
- development area
- common pipistrelle
- soprano pipistrelle
- brown long-eared
- Myotis sp.
- noctule
- Nathusius' pipistrelle
- barbastelle
- serotine

Figure 4.5

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2015/16	
Drawn by: CW	
Checked by: DP	
Status: Final	



Racecourse Plantations

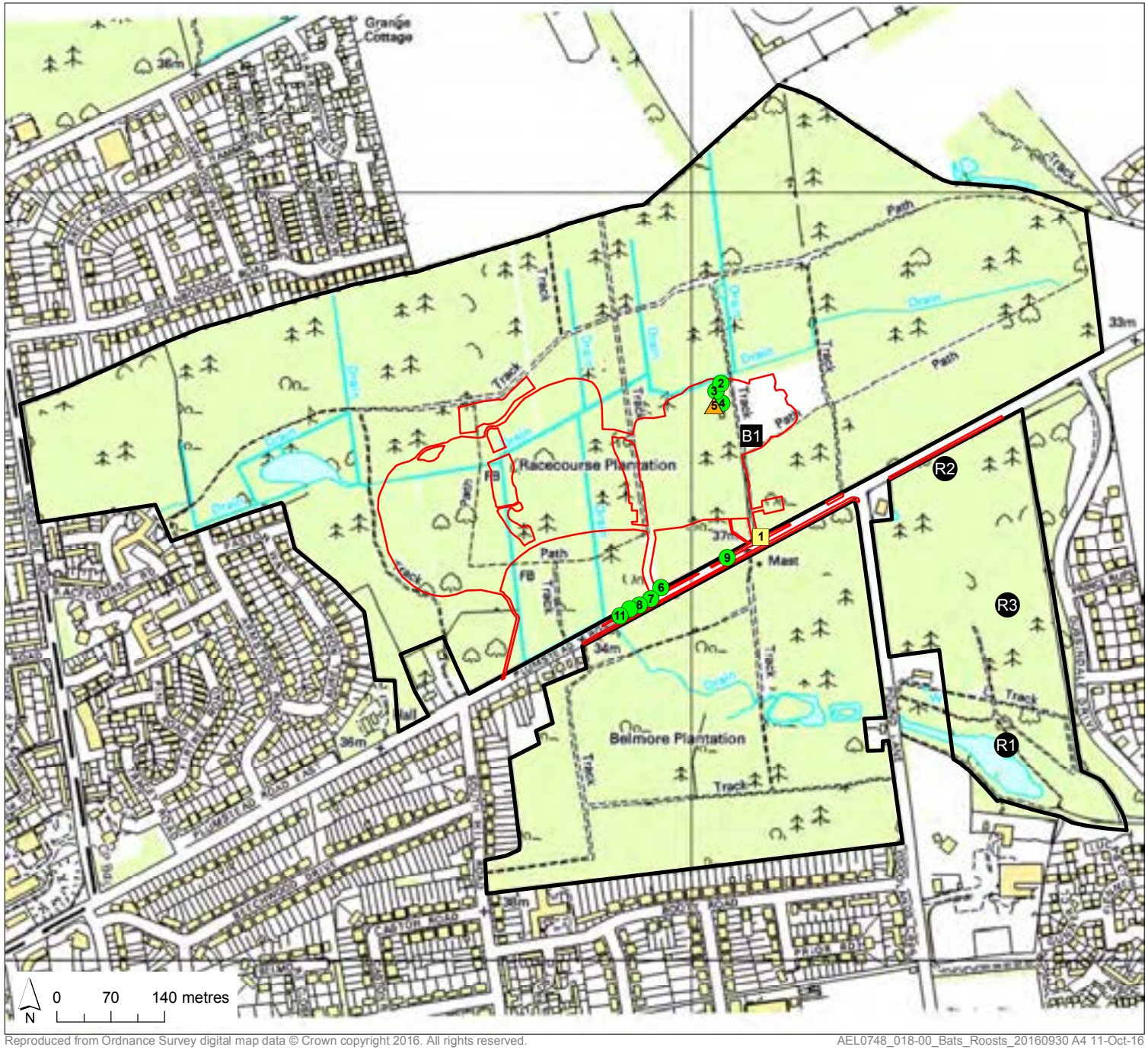
Barbastelle registrations

- study area
- development boundary
- barbastelle call location

Figure 4.6

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2015/16	
Drawn by: CW	
Checked by: DP	
Status: Final	



Racecourse Plantations

Bat roost locations

- study area
- development area
- tree roosts
- building roost
- tree requiring above ground inspection to assess bat value
- dead larch pole with potential to develop bat features
- tree requiring initital inspection to confirm bat value

Figure 4.7

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: Aug-Sept 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

5 Breeding Birds

Background

5.1 A breeding bird survey of the Site was completed by AEL during April–June 2011[11]. This survey recorded a total of 34 bird species, with 25 species judged to be confirmed or probable breeders in Racecourse Plantation, 29 in Belmore Plantation and 27 in Brown's Plantation. The Site as a whole, and the individual plantations, were assessed to be of Local importance in respect of the diversity of species present using the criteria set out by Fuller (1980)[12]. In terms of bird population size and species rarity the Site did not possess any particular value under Fuller's criteria.

5.2 Specific searches for rarer woodland specialist species, including lesser spotted woodpecker *Dendrocopos minor*, marsh tit *Poecile palustris*, willow tit *Poecile montanus*, spotted flycatcher *Muscicapa striata*, firecrest *Regulus ignicapilla*, crossbill *Loxia curvirostra* and hawfinch *Coccothraustes coccothraustes*, were made during these and other surveys during 2011, but none were recorded.

Survey Approach

General approach

5.3 An update breeding bird survey was undertaken during 2015/16 bird breeding season, for which a standardised Breeding Bird Survey (BBS) methodology[13] was used as the basis for the survey. Four breeding season visits were completed, on 25 June 2015 and 22 April, 11 May and 2 June 2016 during weather conditions that were generally fine with light cloud and free of rain, with good visibility.

5.4 A transect route was planned to adequately cover all accessible parts of the Site, the same as the route used in 2011, as shown by **Figure 5.1**.

5.5 The methodology was combined with aspects of the Common Birds Census (CBC) in which the positions, age, sex and behaviour of individual birds were recorded on large-scale field maps, using a new map on each visit. All birds detected by sight and sound were recorded; however, species flying over the Site were not transcribed onto the final map unless it was clear the birds were feeding over the Site or were flying to or had originated on or near the Site.

5.6 Only adult birds are reported here, as fledged young of earlier breeding species might give a false impression of abundance for such species. Particular attention is given in this report to species of conservation importance.

[11] Applied Ecology Ltd (2011). *An Ecological Assessment of Thorpe Woodlands, Norwich*. Applied Ecology Ltd, Cambridge.

[12] Fuller, R. J. (1980). *A Method for Assessing the Ornithological Interest of Sites for Conservation*. Biological Conservation, 17: 229–239.

[13] Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods: a manual of techniques for key UK species*. RSPB, Sandy, Bedfordshire.

5.7 Each survey started within an half an hour of sunrise to coincide with the peak period of bird activity, and took approximately two hours to complete. The route was walked slowly, with frequent stops, and all species seen and heard were identified and recorded on field maps using the British Trust for Ornithology (BTO) two-letter code nomenclature. Every effort was made, using the surveyor's judgement and the BTO field recording methodology, to record any individual bird once only.

5.8 Once survey visits were completed, the information on each target species was transcribed from the field maps onto one map. Registrations fall into clusters of spatially distinct groups indicating the activity of particular individual or pairs of birds. For many species, dependant on breeding ecology, these clusters are indicative of territories.

5.9 Numbers of breeding territories were estimated from these spatially linked clusters of records (using only the 2016 data) as well as counts of singing birds across the three visits. There is a degree of uncertainty in many of these estimates, particularly for some species less prone to prolonged periods of territorial song, as a three-visit survey is not designed with full territory mapping in mind.

5.10 Depending on the behaviour observed, species were allocated levels of breeding confirmation using slightly adapted BTO guidelines[14] as shown by **Table 5.1**.

Table 5.1: Breeding evidence for bird species.

Breeding status	Breeding evidence
Non-breeder	• Flying over. • Suspected to be on migration. • Summering non-breeder. • Definitely not nesting within site boundary (but potentially close by).
Possible breeding	• Species observed in suitable nesting habitat or singing male present.
Probable breeding	• Pair in suitable breeding habitat. • Permanent territory presumed through registration of territorial behaviour (song etc.) on at least two different days a week or more apart at the same place or many individuals on one day. • Courtship and display. • Visiting probable nest site. • Agitated behaviour or anxiety calls from adults, suggesting presence of nest or young nearby. • Nest-building or excavating nest-hole.
Confirmed breeding	• Distraction display of feigning injury. • Used nest of eggshells found (occupied or laid during period of survey). • Recently fledged young (nidicolous species) or downy young (nidifugous species) • Adults entering or leaving nest site in circumstances indicating occupied nest, or adults seen incubating. • Adult carrying faecal sac or food for young. • Nest containing eggs. • Nest with young seen or heard.

[14] www.bto.org/volunteer-surveys/birdatlas/methods/breeding-evidence

Survey Findings

Overview

5.11 The species recorded on each visit, their numbers and an evaluation of their likely breeding status are presented in **Table 5.2**.

5.12 A total of 37 species were recorded within the Site or close enough that part of the bird's nesting or foraging territory is likely to have been within the Site. Twenty-four species were recorded on the single 2015 visit and a total of 36 species in 2016.

5.13 The range of species recorded was broadly similar to 2011 (36 species in 2015/16, 34 in 2011), comprising largely of woodland generalist species. Just five species – robin *Erithacus rubecula*, wren *Troglodytes troglodytes*, woodpigeon *Columba palumbus*, blue tit *Cyanistes caeruleus* and blackbird *Turdus merula* – comprised 58% of all individual birds recorded.

5.14 A total of 17 species were confirmed as breeding at the Site, with a further eight species considered probable breeders. A further ten species were considered possible breeders and of these it is likely that a number, such as lesser redpoll *Acanthis cabaret*, siskin *Carduelis spinus*, spotted flycatcher *Muscicapa striata* and willow warbler *Phylloscopus trochilus* were passage migrants, while others, such as carrion crow *Corvus corone* and magpie *Pica pica* were more likely to have bred on Site or very close by.

5.15 **Table 5.3** shows the breakdown of estimated breeding territories for all species recorded for each woodland block. For species marked with an asterisk the number of territories is based on additional data. In the case of tawny owl *Strix aluco* this comprises calling birds heard during various nocturnal bat surveys during 2016. For sparrowhawk *Accipiter nisus* the number of territories is based on the three known nest sites found within Racecourse and Belmore plantations during various surveys in 2015/16.

Species of conservation concern

5.16 The key findings of the 2016 survey visits as regards species of conservation concern (Amber and Red-listed species) are indicated in **Figure 5.2**.

5.17 In summary, a total of ten species of conservation concern were recorded during the surveys. Red-listed species were lesser redpoll, mistle thrush *Turdus viscivorus*, song thrush *Turdus merula* and spotted flycatcher. Amber-listed species were bullfinch *Pyrrhula pyrrhula*, dunnock *Prunella modularis*, kestrel *Falco tinnunculus*, mallard *Anas platyrhynchos*, stock dove *Columba oenas*, tawny owl and willow warbler.

Bullfinch

5.18 This is an unobtrusive species and, as is typical, singles or pairs were recorded at various points during the surveys in both Racecourse and Belmore plantation. It is likely that the species breeds at low density and uses all three woodland blocks during the breeding season.

Table 5.2: Breeding bird species recorded and total counts per visit.

Species (* denotes Schedule 1 species)	UK Conservation Designation	Minimum count per visit				2016 maximum count	2016 breeding status
		June 2015	April 2016	May 2016	June 2016		
Blackbird *Turdus merula*	Green	26	48	40	29	48	Confirmed
Blackcap *Sylvia atricapilla*	Green	23	28	32	20	32	Confirmed
Blue tit *Cyanistes caeruleus*	Green	36	62	36	41	62	Confirmed
Bullfinch *Pyrrhula pyrrhula*	Amber	-	1	-	4	4	Probable
Carrion crow *Corvus corone*	Green	4	3	2	2	3	Possible
Chaffinch *Fringilla coelebs*	Green	22	21	24	12	24	Probable
Chiffchaff *Phylloscopus collybita*	Green	19	22	19	16	22	Confirmed
Coal tit *Periparus ater*	Green	30	32	12	20	32	Confirmed
Collared dove *Streptopelia decaocto*	Green	1	3	4	2	4	Probable
Common buzzard *Buteo buteo*	Green	-	2	-	1	2	Possible
Dunnock *Prunella modularis*	Amber	3	3	2	6	6	Probable
Goldcrest *Regulus regulus*	Green	18	28	22	19	28	Confirmed
Great spotted woodpecker *Dendrocopos major*	Green	1	4	5	3	5	Probable
Great tit *Parus major*	Green	21	42	19	25	42	Confirmed
Green woodpecker *Picus viridis*	Green	-	-	2	2	2	Probable
Grey heron *Ardea cinerea*	Green	-	1	-	-	1	Non-breeder
Jackdaw *Corvus monedula*	Green	-	2	-	-	2	Possible
Jay *Garrulus glandarius*	Green	13	10	5	5	10	Probable
Kestrel *Falco tinnunculus*	Amber	-	1	-	1	1	Possible

Species (* denotes Schedule 1 species)	UK Conservation Designation	Minimum count per visit				2016 maximum count	2016 breeding status
		June 2015	April 2016	May 2016	June 2016		
Lesser redpoll *Acanthis cabaret*	Red	-	1	-	-	1	Possible
Long-tailed tit *Aegithalos caudatus*	Green	6	12	13	10	13	Confirmed
Magpie *Pica pica*	Green	9	4	-	1	4	Possible
Mallard *Anas platyrhynchos*	Amber	-	3	2	2	3	Confirmed
Mistle thrush *Turdus viscivorus*	Red	-	2	-	-	2	Possible
Moorhen *Gallinula chloropus*	Green	1	-	-	-	1	Non-breeder
Nuthatch *Sitta europaea*	Green	4	-	1	1	1	Confirmed
Robin *Erithacus rubecula*	Green	71	77	81	64	81	Confirmed
Siskin *Carduelis spinus*	Green	-	3	1	-	3	Possible
Song thrush *Turdus philomelos*	Red	16	19	21	15	21	Confirmed
Sparrowhawk *Accipiter nisus*	Green	-	-	-	2	2	Confirmed
Spotted flycatcher *Muscicapa striata*	Red	-	-	1	-	1	Possible
Stock dove *Columba oenas*	Amber	3	1	5	3	5	Confirmed
Tawny owl *Strix aluco*	Amber	1	-	-	1	1	Confirmed
Treecreeper *Certhia familiaris*	Green	1	2	1	2	2	Probable
Willow warbler *Phylloscopus trochilus*	Amber	-	1	-	-	1	Possible
Woodpigeon *Columba palumbus*	Green	52	75	56	60	75	Confirmed
Wren *Troglodytes troglodytes*	Green	68	75	73	75	75	Confirmed

Table 5.3: Breeding bird species recorded and estimated breeding populations, by plantation.

Species (* denotes Schedule 1 species)	UK Conservation Designation	Estimated number of territories in 2016				2016 breeding status
		Racecourse	Belmore	Brown's	Total	
Blackbird *Turdus merula*	Green	10–14	15–18	3–4	28–36	Confirmed
Blackcap *Sylvia atricapilla*	Green	16–20	13	3	32–36	Confirmed
Blue tit *Cyanistes caeruleus*	Green	20–30	14–18	8–10	42–58	Confirmed
Bullfinch *Pyrrhula pyrrhula*	Amber	1–2	0–1	1	2–4	Probable
Carrion crow *Corvus corone*	Green	1	0	1	2	Possible
Chaffinch *Fringilla coelebs*	Green	9–12	3–4	4–5	16–21	Probable
Chiffchaff *Phylloscopus collybita*	Green	14–18	5	4	23–27	Confirmed
Coal tit *Periparus ater*	Green	15–25	3–4	3	21–32	Confirmed
Collared dove *Streptopelia decaocto*	Green	1	2	1	4	Probable
Common buzzard *Buteo buteo*	Green	0–1	0	0	0–1	Possible
Dunnock *Prunella modularis*	Amber	1	1–3	0–1	2–5	Probable
Goldcrest *Regulus regulus*	Green	12–16	4–5	3–4	19–25	Confirmed
Great spotted woodpecker *Dendrocopos major*	Green	2–3	2	1	5–6	Probable
Great tit *Parus major*	Green	12–16	6–8	5–7	23–31	Confirmed
Green woodpecker *Picus viridis*	Green	1	0–1	-	1–2	Probable
Grey heron *Ardea cinerea*	Green	0	0	0–1	0–1	Non-breeder
Jackdaw *Corvus monedula*	Green	0	0–1	0	0–1	Possible
Jay *Garrulus glandarius*	Green	3–5	1–2	1–2	5–7	Probable
Kestrel *Falco tinnunculus*	Amber	0–1	0	0	0–1	Possible

Species (* denotes Schedule 1 species)	UK Conservation Designation	Estimated number of territories in 2016				2016 breeding status
		Racecourse	Belmore	Brown's	Total	
Lesser redpoll *Acanthis cabaret*	Red	0	0	0	0	Possible
Long-tailed tit *Aegithalos caudatus*	Green	3–5	1–2	1–2	5–9	Confirmed
Magpie *Pica pica*	Green	1–2	0–1	0	1–3	Possible
Mallard *Anas platyrhynchos*	Amber	0	0	1	1	Confirmed
Mistle thrush *Turdus viscivorus*	Red	0	0	1	1	Possible
Moorhen *Gallinula chloropus*	Green	0	0	0–1	0–1	Absent
Nuthatch *Sitta europaea*	Green	0	1	0–1	1–2	Confirmed
Robin *Erithacus rubecula*	Green	40–50	15–20	5–8	60–78	Confirmed
Siskin *Carduelis spinus*	Green	0	0	0	0	Possible
Song thrush *Turdus philomelos*	Red	6	7	2	15	Confirmed
Sparrowhawk *Accipiter nisus**	Green	2	1	0	3	Confirmed
Spotted flycatcher *Muscicapa striata*	Red	0	0	0	0	Possible
Stock dove *Columba oenas*	Amber	1	0–1	1	3	Confirmed
Tawny owl *Strix aluco**	Amber	3+	1+	1+	5+	Confirmed
Treecreeper *Certhia familiaris*	Green	1–2	1–2	0	2–4	Probable
Willow warbler *Phylloscopus trochilus*	Amber	0	0	0	0	Possible
Woodpigeon *Columba palumbus*	Green	15–20	11–13	5–7	31–40	Confirmed
Wren *Troglodytes troglodytes*	Green	40–50	22–24	5–7	67–81	Confirmed

Lesser redpoll

5.19 A single individual of this species was recorded on the April survey visit and, although it can be difficult to confirm breeding, it seems highly likely that this was a passage migrant.

Mistle thrush

5.20 A single territory was recorded of this recently Red-listed species, with one holding territory in Belmore plantation. It is worth noting that this species may hold large territories and range widely when foraging.

Spotted flycatcher

5.21 The only rare woodland specialist recorded during the survey was a single spotted flycatcher, a Red-listed species, in Racecourse plantation in May 2016. This individual was not exhibiting any territorial behaviour and was searched for on the June 2016 visit without success. It is considered likely that this was a passage migrant - spotted flycatcher is amongst the latest migrant species to arrive in spring.

Song thrush

5.22 Compared to 2011 this species had increased, particularly in Racecourse and Belmore plantations. The territories were concentrated in areas with the highest proportion of broadleaved trees, with few recorded in purely coniferous areas.

Dunnock

5.23 This species was scarce throughout, with only the areas adjacent to gardens in Belmore plantation, and the former go-carting track clearing in Racecourse Plantation producing regular records.

Kestrel

5.24 Individuals were observed on several dates hunting over clearings in Racecourse Plantation, but it is not thought that a nesting pair was present within the site boundary.

Mallard

5.25 A pair bred successfully on the large pond in the southern part of Brown's Plantation.

Stock dove

5.26 Confirmed territories were present in Racecourse and Brown's Plantations, typically in association with large mature trees which are required for nesting.

Tawny owl

5.27 Roosting individuals were recorded twice during the survey but the species was regularly heard calling on nocturnal bat survey visits in 2015 and 2016, including young birds calling in Racecourse Plantation in August 2016.

Willow warbler

5.28 This is a bird of young woodland and scrub rather than mature woodland or plantations. A single individual holding territory on the north-east border of Racecourse Plantation in April 2016 was not recorded subsequently and is likely to have been a passage migrant.

Species diversity and population density

5.29 The numbers of individual birds and the diversity of species recorded during the 2016 survey within the three woodland blocks are indicated in **Table 5.4** and **Table 5.5**.

Table 5.4: Individual breeding birds / ha, by plantation.

Area	Individual birds recorded per / ha			
	April 2016	May 2016	June 2016	Mean
Racecourse Plantation	6.26	4.56	4.87	5.23
Belmore Plantation	9.67	9.32	5.86	8.28
Brown's Plantation	8.81	8.38	7.62	8.27

Table 5.5: Number of breeding species recorded, by plantation.

Area	Species recorded			
	April 2016	May 2016	June 2016	Total
Racecourse Plantation	24	22	27	31
Belmore Plantation	21	18	18	24
Brown's Plantation	17	20	17	25

5.30 The density of birds recorded was greater in the southern two plantations, which may be partly associated with the edge effect, as the smaller woodland blocks by definition have more transitional edge habitats. Of particular note were the numbers of birds recorded in Belmore Plantation despite the fact that much of the northern part of this block was either open brash and grassland being colonised by sparse, low bramble scrub that proved to be devoid of any birds throughout the survey, or tall, recently selectively felled but very homogeneous, sycamore dominated plantation woodland that had a very limited sub-canopy and shrub layer.

5.31 The majority of the birds in Belmore Plantation were recorded to the south of the plantation, in an area of largely broadleaved woodland with a higher frequency of mature trees that, over the 2015/16 winter, had been in part selectively felled, removing the majority of the coniferous trees but protecting some of the sub-canopy and shrub layer to retain a relatively heterogeneous structure. This was the area of the Site most subjected to recreational disturbance, largely from numerous dog walkers from the adjacent housing.

5.32 In Brown's Plantation the varied structure and variety of habitats around the large pond in the south created a similar effect, and this area held a much higher proportion of the birds recorded here compared to the more homogeneous northern section of this woodland area. Brown's Plantation appeared to be much less subject to recreational disturbance than Belmore plantation.

5.33 Racecourse Plantation, as the largest woodland block held the most species, but at a lower density than the southern plantations. Once again, the highest diversity and density of birds appeared to be in the more heavily broadleaved-dominated areas, where a less uniform and more natural structure was evident. There were various recreational pressures at work here, including paintball and archery, but it appeared less subject to regular disturbance from dog walkers than Belmore Plantation.

5.34 These findings are well illustrated by **Figure 5.2**, which, despite only displaying species of conservation concern, shows clear clusters of territories and sightings in the east of Racecourse plantation and particularly the southern halves of both Belmore and Brown's Plantations.

5.35 It is of note that woodland located within the Development site supported fewer breeding species and low bird densities than was typical of the wider Site, in particular areas of semi-natural broadleaved woodland. With the exception of 2-3 pairs of song thrush that held territory on the edges of the Development site (but did not nest within it), the area lacked red-listed bird interest.

5.36 The numbers of individual birds and the diversity of species recorded during the 2016 survey within the proposed development boundary and outside the development boundary are shown in **Tables 5.6** and **5.7.**

Table 5.6: Individual breeding birds / ha within and outside of the Development site.

Area	Individual birds recorded / ha			
	April 2016	May 2016	June 2016	Mean
Development site	5.17	4.42	3.20	4.26
Outside Development site – Racecourse Plantation only	6.52	4.60	5.27	5.46
Outside Development site – all plantations	7.77	6.39	5.87	6.68

Table 5.7: Number of breeding bird species recorded within and outside of the Development site.

Area	Species recorded			
	April 2016	May 2016	June 2016	Total
Development site	13	15	10	17
Outside Development site – Racecourse Plantation only	24	19	27	31
Outside Development site – all plantations	30	25	29	36

5.37 The survey results have been modelled in order to test the significance of the apparent difference of number of individuals present within and outside the proposed Development site using a generalized linear mixed effects model.

5.38 The overall number of birds present, corrected for species and area differences, was statistically significantly lower within the Racecourse Plantation Development site compared to that in the surrounding plantations (est = 3.66±0.50, z=-7.29, p<0.001; Generalised linear effects model, random effects=species nested in site, Poisson error structure)[15]. This is perhaps unsurprising, given the relatively homogenous nature of the largely coniferous plantation woodland within this area, compared to the more structurally diverse mixed and broadleaved woodland more prevalent over the wider Site.

Discussion

5.39 Fuller[16] devised standard procedures for evaluating bird communities. Recording the number of species on a site can provide a simple measure of species diversity from which to confer a level of conservation importance. For breeding birds, the standard qualifying levels provided by Fuller are as follows:

- National Importance, 85+ species;
- Regional Importance, 70–84 species;
- County Importance, 50–69 species;
- Local Importance, 25–49 species.

5.40 As well as those species for which evidence of confirmed or probable breeding was obtained, it is considered likely that a number of the possibly breeding species did indeed breed within the Site or had breeding territories than covered some part of the Site. The overall breeding assemblage of the Site is considered to be in the range of 30–32 species, meaning the Site falls within the band of Local importance with respect to its diversity of breeding birds. It is worth noting that few purely woodland sites would be able to register

[15] Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']. Family: poisson (log). Formula: count ~ development plan + (1 | subsite/species). Number of observations: 216, groups: species:site = 216; subsite = 6

[16] Fuller, R J (1980). *A Method for Assessing the Ornithological Interest of Sites for Conservation*. Biological Conservation, 17: 229–239.

as of more than Local importance for species diversity because of the limited habitat diversity of pure woodland.

5.41 In terms of bird population size and species rarity the Site did not possess any particular value under Fuller's criteria.

5.42 No notable birds, such as Schedule 1 species, held breeding territory within the Site, and those species of conservation concern that were breeding, though warranting consideration when assessing impacts associated with future development, were all relatively common species.

Racecourse Plantations

Bird survey transect route

study area

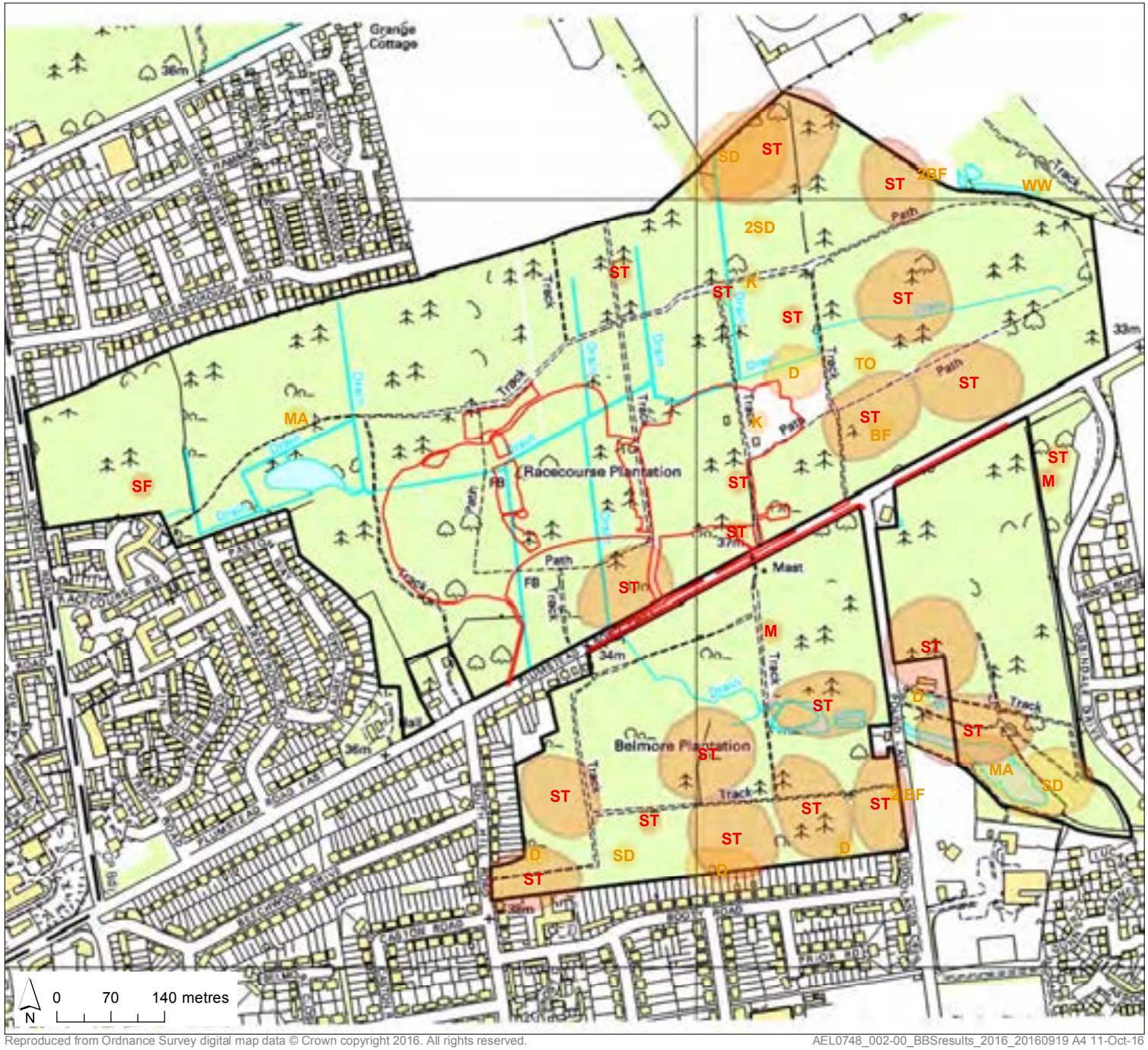
development area

transect route

Figure 5.1

Map Scale @ A4: 1:8,000

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	



Racecourse Plantations

Breeding Bird Survey 2016
Key Findings

study area

development area

Individual sightings

Red-listed species

Amber-listed species

Indicative territories

Red-listed species

Amber-listed species

Species

BF	bullfinch
D	dunnock
K	kestrel
M	mistle thrush
MA	mallard
SD	stock dove
SF	spotted flycatcher
ST	song thrush
WW	willow warbler

Figure 4.2

Map Scale @ A4: 1:7,500

Surveyed by: RD	
Survey date: April-June 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

6 Wintering Birds

Background

6.1 A wintering bird survey of the Site was completed during the winter of 2010/11[17]. Two survey visits were made, in December 2010 and February 2011, and a total of 24 species were recorded over the two visits, 21 in Racecourse plantation, 19 in Belmore plantation and 16 in Brown's plantation.

6.2 The species recorded comprised resident species typical of the mixed woodland and associated edge habitats present. The Site fell short of the minimum criteria set out by Fuller (1980)[18] for Local importance for its diversity, population size or rarity of wintering birds.

6.3 No particular sections of any plantation held significantly large concentrations of wintering birds, and in general, the bird species recorded were mobile and foraging throughout the woodlands, though with higher numbers along woodland edges and rides.

Survey Approach

6.4 An update four-visit winter bird survey of the Site was completed by AEL on 19 November and 21 December 2015, and the 25 January and 23 February 2016.

6.5 The methodology used was based on that of the British Trust for Ornithology (BTO) Common Birds Census (CBC)[19] in which the positions, age, sex and behaviour of individual birds were recorded on large-scale field maps, using a new map on each visit.

6.6 All birds detected by sight and sound were recorded; however, birds flying over the Site were not transcribed onto the final map unless it was clear the birds were associated with the Site or were flying to or had originated on or near the Site. The survey was based on the same transect route as the breeding bird survey as shown by **Figure 5.1**.

6.7 Each visit was started between half an hour and an hour after sunrise and finished up to six hours later. The route was walked slowly, with frequent stops, and all species seen and heard were identified and recorded on field maps using the BTO two-letter code nomenclature.

6.8 Weather conditions during the surveys were generally cool and bright, and, except for very brief periods, free of rain. Visibility was good and these were suitable conditions for bird surveying.

[17] Applied Ecology Ltd (2011). *An Ecological Assessment of Thorpe Woodlands, Norwich*. Applied Ecology Ltd, Cambridge.

[18] Fuller, R. J. (1980). *A Method for Assessing the Ornithological Interest of Sites for Conservation*. Biological Conservation, 17: 229–239

[19] Gilbert, G, Gibbons, D W & Evans, J (1998). *Bird Monitoring Methods: a manual of techniques for key UK species*. RSPB, Sandy, Bedfordshire.

6.9 Specific searches for rarer woodland specialist species (lesser spotted woodpecker, marsh tit, willow tit, crossbill and hawfinch) were made during these surveys, and particular attention is given in this report to species of conservation importance.

Survey Findings

Overview

6.10 A total of 37 species were recorded over the course of the four survey visits. Numbers, particularly of flocking species, were variable, with large counts associated with encountering large, mobile mixed species feeding flocks. The total numbers of birds of each species recorded within the Site are shown by **Table 6.1**, with a breakdown for each plantation provided in **Table 6.2**.

6.11 The autumn of 2015 was notable for large influxes of goldcrest *Regulus regulus* and siskin *Carduelis spinus*, and this was apparent during the survey, with higher numbers of both species recorded during the survey than in 2011. Goldcrests were a common component of mixed flocks, particularly in conifer-dominated areas, and a large flock of siskins was present in conifers in the centre of Racecourse Plantation in November and December 2015. Numbers of both species declined through the winter.

6.12 Other winter visitors – woodcock *Scolopax rustica*, redwing *Turdus iliacus*, lesser redpoll and brambling *Fringilla montifringilla* – were recorded more sporadically and in smaller numbers.

6.13 Numbers of resident species such as wren, robin, blue tit and great tit *Parus major* were highest during February, as birds began to sing and exhibit other territorial behaviour and become more conspicuous.

6.14 The selective felling of a number of conifer-dominated woodland blocks in Racecourse Plantation and Belmore Plantation during the winter reduced the suitable habitat for conifer specialist species such as goldcrest and coal tit and their numbers appeared to decline accordingly.

Species of conservation concern

6.15 A total of 11 species of conservation concern were recorded during the surveys. Red-listed species were lesser redpoll, mistle thrush, redwing, song thrush and woodcock. Amber-listed species were bullfinch, dunnock, green woodpecker, kestrel, mallard and stock dove. However, none of these species were present in significant numbers, and it should be noted that BoCC status most often relates to negative trends in breeding numbers and/or range, and only rarely (mainly in relation to wildfowl) to a negative trend in wintering use.

6.16 None of the rarer woodland specialists were found during the survey, although some of these species, notably crossbill, are irruptive and numbers vary markedly from year to year.

Table 6.1: Wintering bird species recorded and total counts per visit.

Species	UK Conservation Designation	Count				Maximum count
		Nov 2015	Dec 2015	Jan 2016	Feb 2016	
Blackbird *Turdus merula*	Green	12	18	20	26	26
Blue tit *Cyanistes caeruleus*	Green	53	44	72	64	72
Brambling *Fringilla montifringilla*	Green	-	-	-	3	3
Bullfinch *Pyrrhula pyrrhula*	Amber	4	-	6	2	6
Carrion crow *Corvus corone*	Green	1	2	-	3	3
Chaffinch *Fringilla coelebs*	Green	13	18	19	23	23
Coal tit *Periparus ater*	Green	22	37	23	19	37
Common buzzard *Buteo buteo*	Green	1	-	-	1	1
Collared dove *Streptopelia decaocto*	Green	1	5	-	2	5
Dunnock *Prunella modularis*	Amber	2	1	3	4	4
Goldcrest *Regulus regulus*	Green	58	47	30	25	58
Goldfinch *Carduelis carduelis*	Green	-	3	6	-	6
Great spotted woodpecker *Dendrocopos major*	Green	3	4	3	9	9
Great tit *Parus major*	Green	45	26	50	43	45
Greenfinch *Chloris chloris*	Green	-	2	4	-	4
Green woodpecker *Picus viridis*	Amber	1	1	-	1	1
Jay *Garrulus glandarius*	Green	12	9	15	6	15
Jackdaw *Corvus monedula*	Green	2	-	4	1	4
Kestrel *Falco tinnunculus*	Amber	-	1	-	1	1

Species	UK Conservation Designation	Count				Maximum count
		Nov 2015	Dec 2015	Jan 2016	Feb 2016	
Lesser redpoll *Acanthis cabaret*	Red	-	-	4	-	4
Long-tailed tit *Aegithalos caudatus*	Green	27	13	22	17	27
Mallard *Anas platyrhynchos*	Amber	-	-	-	3	3
Magpie *Pica pica*	Green	-	3	2	-	3
Mistle thrush *Turdus viscivorus*	Red	-	-	-	1	1
Moorhen *Gallinula chloropus*	Green	-	-	1	-	1
Nuthatch *Sitta europaea*	Green	1	3	4	3	4
Redwing *Turdus iliacus*	Red	23	6	-	43	43
Robin *Erithacus rubecula*	Green	39	49	54	67	67
Siskin *Carduelis spinus*	Green	76	60	8	-	76
Song thrush *Turdus philomelos*	Red	3	3	10	9	10
Sparrowhawk *Accipiter nisus*	Green	-	1	1	1	1
Stock dove *Columba oenas*	Amber	-	2	1	2	2
Tawny owl *Strix aluco*	Green	-	-	2	-	2
Treecreeper *Certhia familiaris*	Green	1	1	1	3	3
Woodcock *Scolopax rusticola*	Red	-	1	2	2	2
Woodpigeon *Columba palumbus*	Green	46	70	43	67	70
Wren *Troglodytes troglodytes*	Green	30	37	49	61	61

Table 6.2: Wintering bird species / visit, by plantation.

Species	Count											
	Racecourse				Belmore				Brown's			
	Nov	Dec	Jan	Feb	Nov	Dec	Jan	Feb	Nov	Dec	Jan	Feb
Blackbird *Turdus merula*	6	8	8	9	4	8	10	13	2	2	2	4
Blue tit *Cyanistes caeruleus*	32	18	40	41	18	18	20	19	3	4	6	10
Brambling *Fringilla montifringilla*	-	-	-	3	-	-	-	-	-	-	-	-
Bullfinch *Pyrrhula pyrrhula*	2	-	4	-	-	-	2	2	2	-	-	-
Carrion crow *Corvus corone*	1	1	-	2	-	1	-	-	-	-	-	1
Chaffinch *Fringilla coelebs*	10	13	9	19	2	5	8	3	1	-	2	1
Coal tit *Periparus ater*	22	16	12	14	3	6	7	2	3	10	4	3
Common buzzard *Buteo buteo*	1	-	-	1	-	-	-	-	-	-	-	-
Collared dove *Streptopelia decaocto*	-	2	-	1	1	2	-	1	-	1	-	-
Dunnock *Prunella modularis*	-	-	1	1	2	1	2	2	-	-	-	1
Goldcrest *Regulus regulus*	40	38	25	12	8	3	3	4	10	6	2	3
Goldfinch *Carduelis carduelis*	-	-	6	-	-	3	-	-	-	-	-	-
Great spotted woodpecker *Dendrocopos major*	2	1	1	3	1	2	2	4	-	1	-	2
Great tit *Parus major*	25	17	30	26	16	6	12	13	4	3	8	4
Greenfinch *Chloris chloris*	-	2	-	-	-	-	4	-	-	-	-	-
Green woodpecker *Picus viridis*	1	-	-	1	-	1	-	-	-	-	-	-
Jay *Garrulus glandarius*	6	7	10	4	5	2	3	2	1	-	2	-
Jackdaw *Corvus monedula*	-	-	-	-	2	-	4	1	-	-	-	-

Species	Count											
	Racecourse				Belmore				Brown's			
	Nov	Dec	Jan	Feb	Nov	Dec	Jan	Feb	Nov	Dec	Jan	Feb
Kestrel *Falco tinnunculus*	-	1	-	1	-	-	-	-	-	-	-	-
Lesser redpoll *Acanthis cabaret*	-	-	4	-	-	-	-	-	-	-	-	-
Long-tailed tit *Aegithalos caudatus*	21	-	12	5	6	13	-	8	-	-	10	4
Mallard *Anas platyrhynchos*	-	-	-	-	-	-	-	-	-	-	-	3
Magpie *Pica pica*	-	1	2	-	-	2	-	-	-	-	-	-
Mistle thrush *Turdus viscivorus*	-	-	-	-	-	-	-	1	-	-	-	-
Moorhen *Gallinula chloropus*	-	-	-	-	-	-	-	-	-	-	1	-
Nuthatch *Sitta europaea*	-	1	-	-	1	2	3	2	-	-	1	1
Redwing *Turdus iliacus*	3	6	-	31	20	-	-	12	-	-	-	-
Robin *Erithacus rubecula*	20	32	29	39	16	12	20	21	3	5	5	7
Siskin *Carduelis spinus*	76	60	8	-	-	-	-	-	-	-	-	-
Song thrush *Turdus philomelos*	3	2	6	5	-	1	3	3	-	-	1	1
Sparrowhawk *Accipiter nisus*	-	1	-	1	-	-	1	-	-	-	-	-
Stock dove *Columba oenas*	-	2	1	1	-	-	-	1	-	-	-	-
Tawny owl *Strix aluco*	-	-	1	-	-	-	-	-	-	-	1	-
Treecreeper *Certhia familiaris*	1	-	-	2	-	1	-	1	-	-	1	-
Woodcock *Scolopax rusticola*	-	-	2	1	-	-	-	-	-	1	-	1
Woodpigeon *Columba palumbus*	26	46	19	20	15	9	21	17	5	15	3	10
Wren *Troglodytes troglodytes*	21	16	33	41	6	8	12	16	3	1	4	4

Species diversity and population density

6.17 The numbers of individual birds and the diversity of species recorded during the survey within the three woodland blocks are shown by **Table 6.3** and **Table 6.4**.

Table 6.3: Individual wintering birds / ha, by plantation.

Area	Individual birds recorded per / ha				
	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mean
Racecourse Plantation	5.77	5.27	4.76	5.14	5.24
Belmore Plantation	7.39	6.21	8.03	8.68	7.58
Brown's Plantation	4.03	6.53	5.77	6.53	5.41

Table 6.4: Wintering bird species, by plantation.

Area	Species recorded				
	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mean
Racecourse Plantation	20	22	22	25	33
Belmore Plantation	17	21	18	22	28
Brown's Plantation	11	11	16	17	23

6.18 The density of birds recorded was consistently higher in Belmore Plantation, particularly in January and February 2016 as resident territorial species became more conspicuous. However, it is worth noting that these three plantations form a single woodland feature and the wintering populations of birds present are in many cases highly mobile and likely to rove throughout the woodlands during the course of the winter.

6.19 The diversity of species recorded correlates with the size of the respective woodland blocks and diversity of habitats within them, with the highest species diversity found in Racecourse Plantation, and the lowest in Brown's Plantation.

Discussion

6.20 Fuller[20] devised standard procedures for evaluating bird communities. Recording the number of species on a site can provide a simple measure of species diversity from which to confer a level of conservation importance to a site. For wintering birds, the standard qualifying levels provided by Fuller are as follows:

- National Importance, 115+ species;
- Regional Importance, 85–114 species;
- County Importance, 50–84 species;

[20] Fuller, R J (1980). *A Method for Assessing the Ornithological Interest of Sites for Conservation*. Biological Conservation, 17: 229–239

- Local Importance, 25–54 species.

6.21 As a single site holding a wintering population of 37 species, the Fuller criteria confer the site importance at the Local level with respect to its species diversity. As individual woodland blocks, Racecourse Plantation and Belmore Plantation also qualify at the Local level on this criterion, with wintering populations of 33 and 28 species respectively. However, in terms of wintering birds, the site represents a single ecological feature and its wintering bird populations are best evaluated across the whole woodland rather than its component parts.

6.22 In terms of bird population size and species rarity, the site did not possess any particular value under Fuller's criteria.

6.23 None of the rarer woodland specialist species were recorded during the survey, and the species of conservation concern present were in small numbers. While worthy of consideration when assessing impacts associated with future development, all were relatively common species.

6.24 Belmore Plantation consistently held the highest concentrations of wintering birds, but in general the species recorded were mobile, foraging throughout the woodlands, though with numbers higher along woodland edges and rides within the plantations.

7 Great Crested Newt

Background

7.1 Great crested newt (GCN) survey of eight ponds across the Racecourse Plantations was completed in 2011[21], and verified the presence of GCN in one pond in the south of Brown's Plantation, with a maximum count of 40 individuals equating to a *medium-sized* population. The 2011 survey also verified GCN absence from another six ponds on or close to the Site.

7.2 In 2015 a GCN survey of three ponds (Ponds 5–7 on **Figure 7.1**) in Belmore and Brown's Plantations[22] was completed to inform an off-site development unrelated to development in Racecourse Plantations. The 2015 survey findings were entirely consistent with the 2011 survey findings, with GCN being confirmed as absent from Ponds 5 and 6, and present as a medium sized population in Pond 7.

Survey Approach

7.3 On 22 April 2016 the five ponds not surveyed in 2015 were surveyed by a licenced surveyor from Applied Ecology Ltd for GCN. The ponds surveyed are, labelled 1–4 and 8 in **Figure 7.1**.

7.4 Visual inspections of accessible waterbodies in order to confirm their suitability for GCN (a so called Habitat Suitability Index (HSI) assessment) was undertaken on the 22 April 2016. The HSI method is based on criteria developed by Oldham *et al* (2000)[23] and uses ten key habitat criteria that have a bearing on the suitability of waterbodies for breeding GCN, as follows:

- SI1 = geographic location;
- SI2 = pond area;
- SI3 = pond permanence;
- SI4 = water quality;
- SI5 = pond shading;
- SI6 = number of waterfowl;
- SI7 = occurrence of fish;
- SI8 = pond density;
- SI9 = proportion of 'newt friendly' terrestrial habitat;
- SI10 = macrophyte content.

7.5 The HSI scores for each waterbody are evaluated against the five suitability categories set out by the Amphibian and Reptile Groups of the United Kingdom (ARG, 2010) which are:

[21] Applied Ecology Ltd (2011). *An Ecological Assessment of Thorpe Woodlands, Norwich*. Applied Ecology Ltd, Cambridge.
[22] Wild Frontier Ecology Ltd (2015). *Belmore Plantation and Brown's Plantation – Great Crested Newt Survey Results.* Wild Frontier Ecology Ltd, Fakenham.
[23] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the great crested newt *Triturus cristatus*. *Herpetological Journal.* 10 (4) (143–155).

- Poor suitability for breeding GCN - HSI score below 0.5
- Below average – 0.5 – 0.59
- Average – 0.6 – 0.69
- Good – 0.7 – 0.79
- Excellent – Above 0.8

7.6 The HSI score is calculated using the geometric mean of ten suitability indices: HSI = $(SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$.

7.7 All ponds that were considered to be potentially suitable for GCN were subject to Environmental DNA (eDNA) analysis using test kits supplied and analysed by ADAS. Natural England (NE) has approved this method for the determination of GCN presence / absence based on analysis of a water sample which is collected following a specific protocol. The water samples were collected by a licenced GCN surveyor from AEL following this protocol on the 22 April 2016

Survey Findings

7.8 According to the HSI assessment criteria:

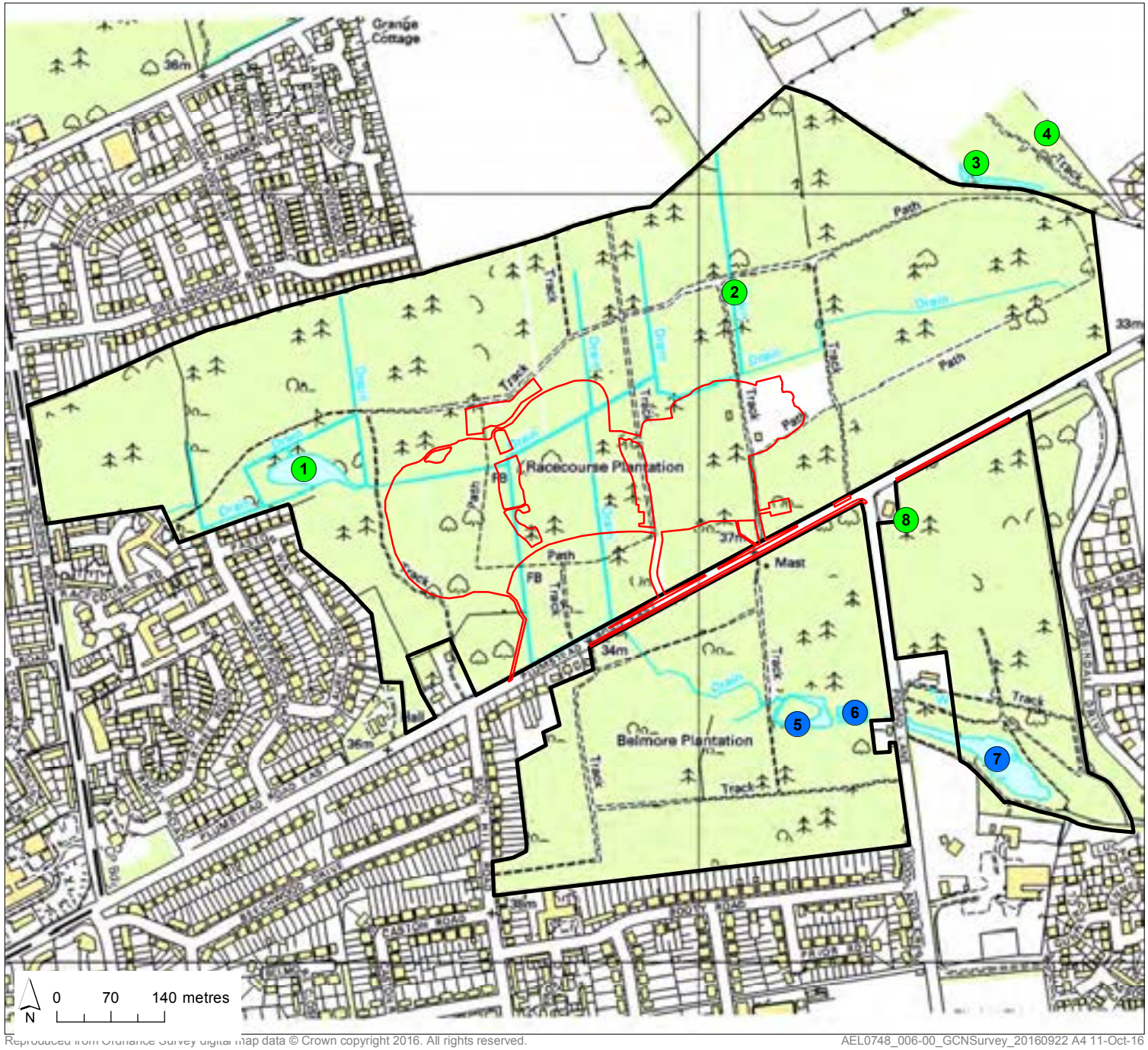
- Pond 1 had a score of 0.56, which equates to Below Average suitability for GCN;
- Pond 2 had a score of 0.58 which equates to Below Average suitability for GCN;
- Pond 3 had a score of 0.65 which equates to Average suitability for GCN;
- Pond 4 was found to be dry at the time of survey and was not assessed or subjected to eDNA survey;
- Pond 8 was found to be dry at the time of survey and was not assessed or subjected to eDNA survey.

7.9 The three ponds (Ponds 1-3) subject to eDNA survey returned negative results, and GCN can be considered absent from these ponds, and the terrestrial habitat surrounding them in Racecourse Plantation.

7.10 **Figure 7.2** confirms the location of GCN within Racecourse Plantations and a 50m and 250m zone of terrestrial habitat around the pond which can be considered likely to be used by GCN in their terrestrial life stages. Most terrestrial GCN will be found in suitable habitats within 50m of their breeding ponds, but will also typically extend in decreasing numbers beyond this. General consensus amongst conservationists is that the majority of a breeding pond's GCN population will be found in suitable habitat within 250m of the pond.

Discussion

7.11 A medium-sized population of GCN is present in the pond in the south of Brown's Plantation. The GCN pond and Brown's Plantation are unaffected by the proposed development in Racecourse Plantation and would be managed in perpetuity for nature conservation as part of the proposed woodland management strategy for the wider Site.



Racecourse Plantations

Great crested newt survey ponds

study area

development area

Potential GCN Ponds

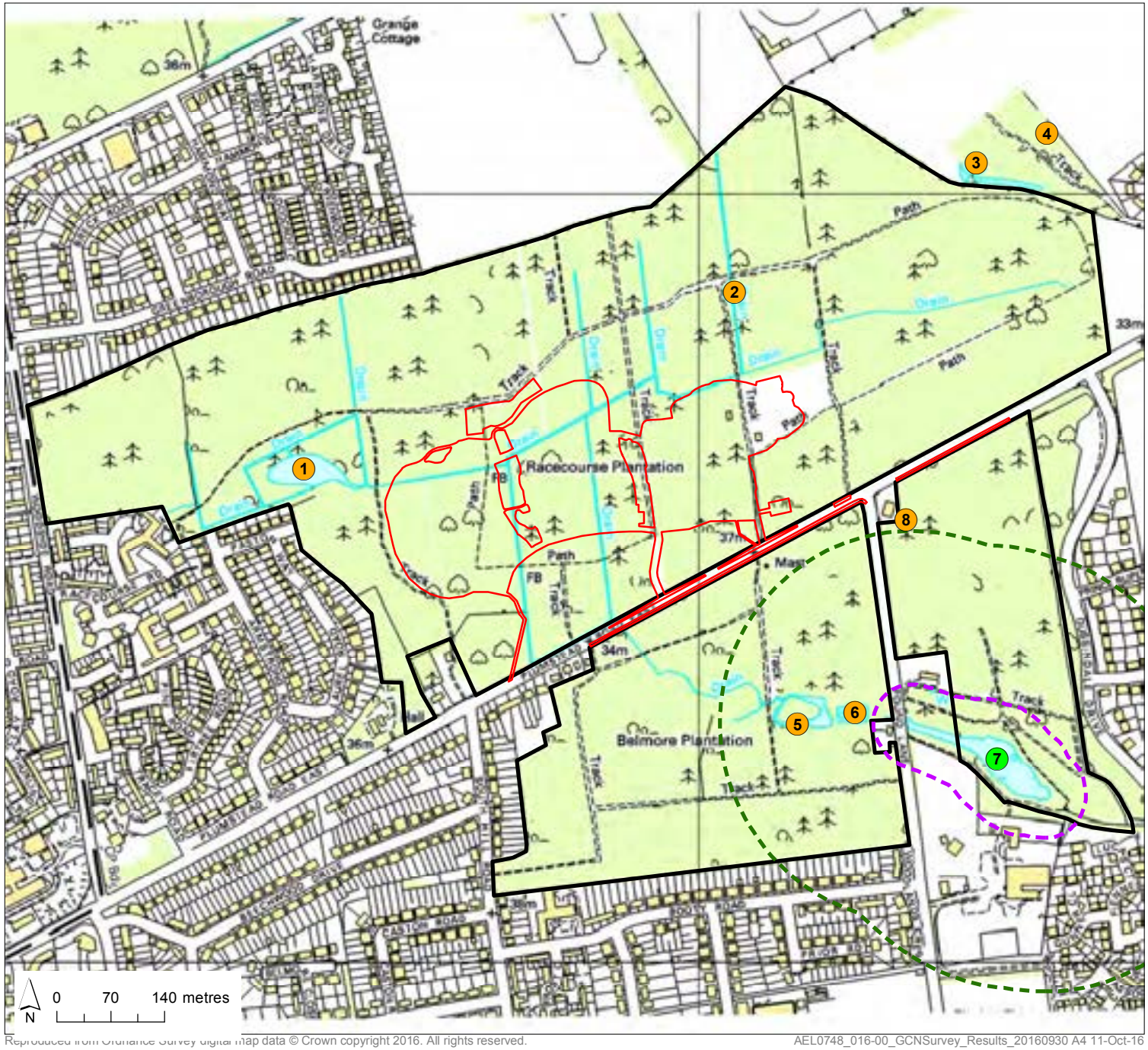
surveyed 2011 & 2015

surveyed 2011 & 2016

Figure 7.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2011, 2015 & 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	



Racecourse Plantations

Great crested newt results

study area

development area

Pond survey results

GCN present

GCN absent

250 m buffer from GCN pond

50 m buffer from GCN pond

Figure 7.2

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2011, 2015 & 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

8 Reptiles

Background

8.1 The site was surveyed for reptiles in 2011[24] and confirmed grass snake *Natrix natrix* to be widely distributed across Racecourse Plantations. The maximum number of individuals found on any one survey visit was eight, suggesting the site supports a *medium-sized* population. No other reptile species were found to be present on site during the 2011 survey.

Survey Approach

8.2 In 2015 a reptile survey of suitable habitat in Racecourse Plantation was completed in order to update the 2011 survey. A watching brief for reptiles was also maintained during other survey work undertaken in 2016.

8.3 A seven-visit reptile presence/absence survey of all potentially suitable habitat areas was undertaken in 2015 in-line with guidelines provided by the Herpetofauna Groups of Britain and Ireland[25] (HGBI), as per the current recommendation provided on the Natural England website, as well as advice provided by Froglife (1999)[26].

8.4 An initial walkover survey of the study area was undertaken in June 2015 to record areas of potentially suitable reptile habitat that would need to be subject to specific reptile survey.

8.5 Several open areas, most recently clear-fell plantation, were identified as being potentially suitable reptile habitat and were subject to reptile survey, as shown by **Figure 8.1**.

8.6 The forestry management regime had resulted in a number of changes to the woodland structure between 2011 and 2015 that had a bearing on the suitability of Racecourse Plantation for reptiles. In summary recently clear-felled areas in the north and west of Racecourse Plantation looked more suitable for reptiles, while previously suitable habitat areas had become densely shaded and overgrown by woodland regrowth in the intervening years.

8.7 The optimal months for reptile survey are April, May and September, and during these months the recommended times to check artificial refuges are from 08:30 to 11:00 in the morning, and from 16:00 to 18.30 in the evening, to avoid the heat of the midday sun. Note that checking at other times is acceptable providing weather conditions are suitable. Survey should also ideally take place when the air temperature is between 9°C and 18°C. However, changes in weather type can also influence the results, with the likelihood of seeing reptiles increasing, for example, on hot days following a cooler spell; or in showery weather conditions following a prolonged dry spell.

[24] Applied Ecology Ltd (2011). *An Ecological Assessment of Thorpe Woodlands, Norwich*. Applied Ecology Ltd, Cambridge.

[25] Herpetofauna Groups of Britain and Ireland (1998). Evaluating local mitigation/translocation programmes: Maintaining best practice and lawful standards. HGBI advisory notes for Amphibian and Reptile Groups (ARGs). HGBI, c/o Froglife, Halesworth. Unpubl.

[26] Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

8.8 A total of 80 refugia (1m x 0.5m sheets of roofing felt) were set across five separate areas considered suitable for reptiles (Areas A-E) out at the start of August 2015 and left in situ for four weeks to allow any reptiles present sufficient time to locate them prior to the first survey visit on 4 September 2015. A total of seven separate checks of the refugia were made in September 2015. Sightings of grass snake made during bird and other survey visits in 2016 were also recorded.

8.9 During each visit, all refugia were checked for reptiles basking on or sheltering underneath them and the number, age category, species and location of any reptiles found was recorded.

Survey Findings

8.10 The results of the reptile survey, including dates and times of visits, weather conditions, species observations, and locations are summarised in **Table 8.4**. In addition, locations of reptiles sighted during other survey work in 2016 are included in **Figure 8.1**.

8.11 In summary, small numbers of grass snakes were found to be present in Racecourse Plantation. The maximum number of grass snake recorded on a single visit was three.

8.12 According to the definitions provided by Froglife (1999), the site was found to support a small grass snake population.

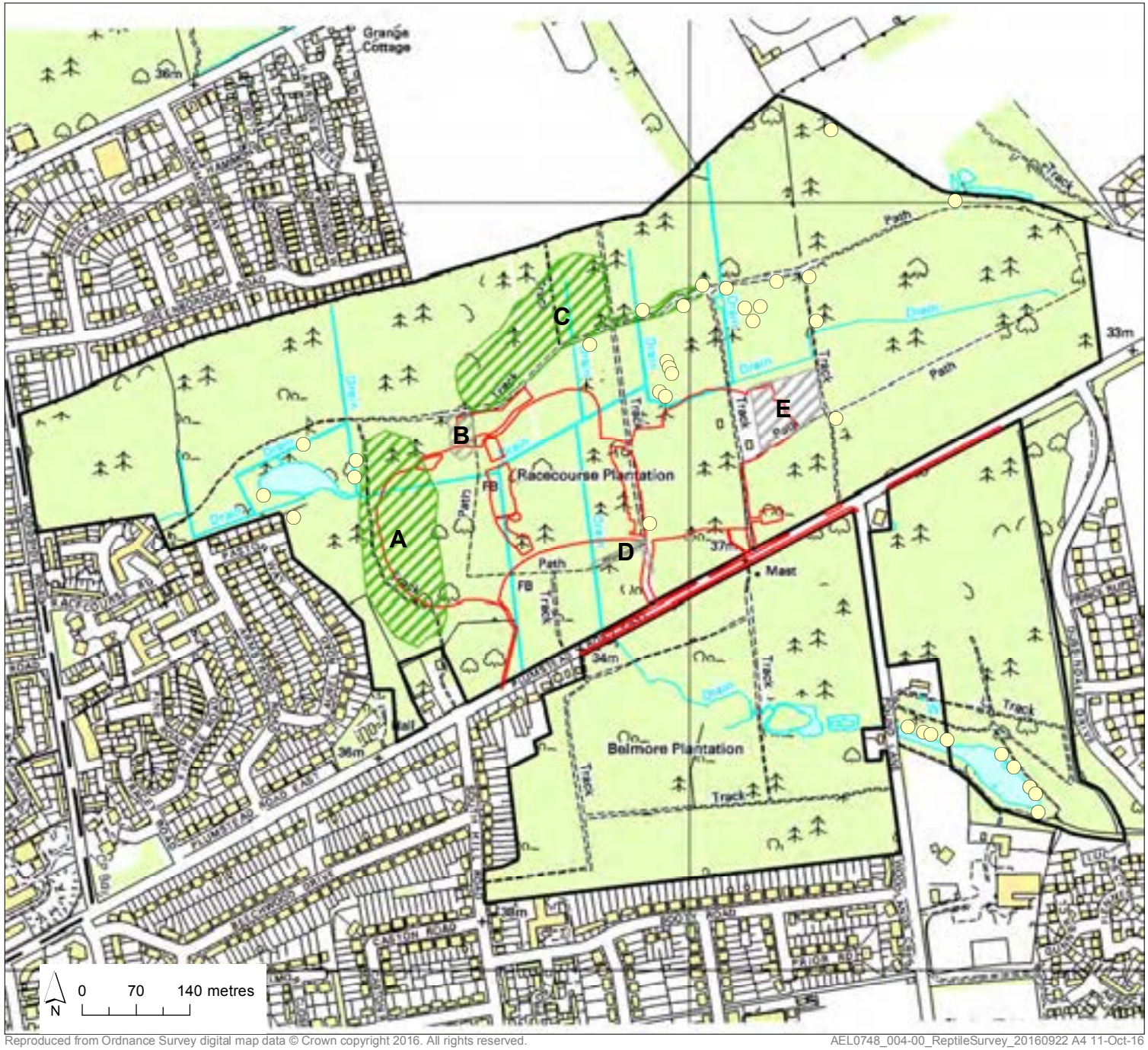
Table 8.1: Summary of reptile survey results.

Date (2015) and start time of visit	Temp (°C)	Weather conditions	Findings
4 Sept 15:30	14	95% cloud, breezy, light showers	One juvenile grass snake, Section C
8 Sept 14:30	15	100% cloud, dry	One juvenile grass snake, Section C
10 Sept 13:45	20	20% cloud, dry	No reptiles seen
15 Sept 15:00	16	20% cloud, dry	One juvenile and one sub-adult grass snake, Section A
23 Sept 16:00	13	95% cloud, dry	One juvenile grass snake, Section C
27 Sept 15:30	13	60% cloud, dry	One juvenile grass snake, Section A
28 Sept 16:00	14	20% cloud, dry	One sub-adult grass snake, Section A

Discussion

8.13 Racecourse Plantations supports a breeding population of grass snake that is most closely associated with aquatic habitats where its preferred prey species, amphibians, are found.

8.14 The size of the grass snake population appears to have declined slightly over the survey period between 2011 and 2015.



Racecourse Plantations

Reptile survey key findings

study area

development area

2011 grass snake locations

2015/16 reptile survey areas

no reptiles present

grass snakes present

Figure 8.1

Map Scale @ A4: 1:7,500

Surveyed by: RD	
Survey date: 2011, 2015 & 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

9 Invertebrates

Background

9.1 Specialist invertebrate survey using a variety of different survey techniques was completed in 2011 and confirmed that the majority of invertebrates identified were commonly occurring species with wide habitat preferences.

9.2 The 2011 report was reviewed by a consultant entomologist (Dr Peter Kirby) as part of an update invertebrate survey in 2015-16 and the following comments were made.

"The 2011 invertebrate report of Racecourse Plantations somewhat over-states the significance of "woodland" as opposed to just trees or habitat mosaic. A number of the invertebrate species described in 2011 as woodland specialists are not as tied to pure woodland as is suggested. In particular the bug Elasmostethus interstinctus can be found on isolated trees, including those in parks and gardens. Lasiorhynchites cavifrons is associated mostly with well-structured woodland, but is mostly recorded from rides and margins and should be catered for by a woodland fringe.

The spiders Pachygnatha listeri and Pardosa saltans are quite interesting, being both rather strongly (though seemingly not absolutely) associated with old or ancient woodland sites. Hemaris fuciformis is the single most important species on the list, and deserves a bit of individual consideration. It was listed amongst the woodland specialists, which to a degree is true, but it is found in open space within woodland rather than under trees, and is also recorded from somewhat scrubby heathland; sheltered sunny conditions with scrambling honeysuckle are what it needs. Open heath with a woody fringe and a scattered mosaic ought to be reasonably to its liking, but its needs might argue for a little more of the mosaic and a little less of the open, perhaps with rotational management to maintain the rather transitional conditions it likes.

Of other species specifically mentioned in the report, the spider Walckenaeria dysderoides and the glow-worm Lampyris noctiluca are associated more with open habitats than woodland. The rove beetle Syntomium aeneum and the spider Tenuiphantes alacris are both fairly woodland-associated, but are nationally common enough and really of interest only because they are relatively infrequent in eastern England. Norfolk has a tendency to throw up outliers of distribution for species mostly occurring in the north and west, but unless they are uncommon nationally they are of rather more academic, biogeographical, interest that conservation value. The report includes the fly Neuroctena analis (now Dryomyza anilis) in this set of predominantly western species unexpected in the east, but it seems likely that this impression is at least partly a quirk of recording; it is found frequently enough in Cambridgeshire woods and is Nationally common.

The saproxylic click beetle Ampedus balteatus breeds in dead wood of both conifers and broadleaves, and favours fairly open sunny habitats - it is a regular associate of scattered dead wood on heathland, for example. The crab spider Xysticus lanio is not seriously uncommon, and though associated with woodland, likes bushy growth and low foliage rather than high canopy, so should appreciate open space and wood fringe. The weevil

Temnocerus nanus is not especially local and not particularly specialist in habitat terms, often associating with invasive birch scrub rather than woodland, and is not fond of shade.

The report makes a case for the value of the woodland for invertebrates. However, in view of the fact that most of the site is covered in woodland, it is particularly noticeable that a lot of the recorded species, including a good number of the less common species, are associated with open conditions, and very few need woodland as such.

Two Nationally Scarce species: the wood-boring beetle Hedobia imperialis (dry standing timber of a range of broadleaved trees and shrubs) and the weevil Graptus triguttatus (reasonably open grassy habitats), are overlooked by the report. Both have changed their names since they were given their statuses, which might account for the oversight, and both species might be said to be pushing at the limits of national scarcity."

Survey Approach

9.3 Dr Peter Kirby was commissioned in 2015/16 to review the previous invertebrate survey findings and to complete a walkover site visit to Racecourse Plantation. Following an initial review of the data, PK suggested that water traps should be set out across the Site to help supplement the previous survey findings.

9.4 On this recommendation, a total of ten plastic yellow tray water traps were set out across Racecourse Plantations in pairs at five locations in August 2015 and May/June and July 2016. A total of seven different locations were used over the course of the three survey periods, but only five locations per period. The traps were left to passively collect insects for 21 days in August 2015, 22 days in May/June 2016 and eight days in August 2016 before being retrieved, strained through a fine muslin net and preserved in 70% IMS. Invertebrates were picked and sorted by Applied Ecology staff and identified by Peter Kirby.

9.5 A walkover survey of the Racecourse Plantation was undertaken by Peter Kirby in August 2016.

Survey Findings

9.6 A total of over 200 species of invertebrates have been recorded from Racecourse Plantation during the 2015-16 trapping and walkover survey. Of these, three are Nationally Notable category B, one is Nationally Scarce and 20 are considered local as listed in **Table 9.1**. None is of especial rarity or very great individual interest, either nationally or at the county level. This is not an unusual level of interest in general surveys in eastern England. The habitat requirements of the scarcer species recorded reflect the characteristics of the site, and include wetland, open dry sandy ground, dead wood, and mosaics and transitions with woody vegetation. **Appendix 1** is a complete, annotated, list of the species recorded.

9.7 Though the list includes many species regularly found in woodland, most are either more specifically associated with trees or shrubs, and can be found where the appropriate plants grow, whether in woodland or not; or are associated with woodland margins and open space, rather than within areas of shade.

9.8 The species most consistently found beneath woodland canopy are flies, especially *Dryomyza anilis* and the long-footed flies *Xanthochlorus ornatus* and *X. tenellus*, but all can

be found in other sheltered habitats. The hoverfly *Chalcosyrphus nemorum* is very characteristic of wet woodland and scrub. The robber-fly *Neoitamus cyanurus* is perhaps the most interesting of the assemblage of species associated with open space in woodland, being especially characteristic of ancient woodland. Even this species, though, can sometimes be found amongst quite young scrub if it has a good mosaic structure.

9.9 The number of species on the list which are, to a greater or lesser extent, intolerant of shade is considerable. They are perhaps best exemplified by the bees, wasps and their allies, (Hymenoptera Aculeata), which are for the most part a very heliophilic group. There are 47 members of this group on the list, including 34 solitary bees and wasps, some preferring or requiring bare or sparsely vegetated sandy ground for nesting.

Table 9.1: Summary of notable invertebrates.

Taxon	Status	Notes
Platyrhinus resinosus (a beetle)	Nationally Scarce category B (Nb)	Saproxylic; usually developing in the fungus *Daldinia concentrica* on ash.
Priocnemis schiodtei (a spider wasp)	Nb	Typically, a species of unshaded habitats on sandy soils, but also found in open areas in woodland and on limestone grassland; a ground-nesting species; the Nationally Scarce status is becoming less certainly appropriate as records accumulate.
Sphecodes crassus (a bee)	Nb	A parasite of solitary bees of the genus *Lasioglossum*, found in a wide range of reasonably open habitats, usually on light soils; the formal status is no longer appropriate.
Lophosia fasciata (a fly)	Nationally Scarce (N)	A parasite of shieldbugs, recorded from downland, coastal grassland and dry woodland.
Agabus nebulosus (a water beetle)	local	Aquatic; especially characteristic of recently created or fluctuating still waters on a mineral substrate.
Argogorytes mystaceus (a wasp)	local	Sheltered transitions, especially woodland edges and rides; ground-nesting in dry banks; a predator of froghoppers.
Caliadurgus fasciatellus (a spider wasp)	local	Open habitats on sandy or sand/clay soils; nests in burrows, and preys on orb-web-spinning spiders; an elusive and under-recorded species, much more easily caught by traps than by active search.
Cerceris arenaria (a wasp)	local	Open sunny habitats on dry sandy soils with bare ground, where nest burrows are dug; a predator of weevils.
Chalcosyrphus nemorum (a hoverfly)	local	Typically, in wet woodland, where larvae develop under the bark of water-sodden dead roots or timber; adults may wander into drier areas.
Dipogon variegatus (a spider wasp)	local	Recorded from a wide range of reasonably open habitats; nests in almost any sort of pre-existing cavity, and a predator of the common crab spider *Xysticus cristatus.*

Taxon	Status	Notes
Drymus ryei (a bug)	local	Open dry woodland, rides and fringes.
Euplectus karstenii (a beetle)	local	Saproxylic; beneath the bark of broadleaved trees.
Gonatopus bicolor (a wasp)	local	A parasite of planthoppers of the family Delphacidae; there appear to be rather few, scattered recent records of this species, but it is a member of an unpopular group and it is impossible to apply a status to it with any great degree of confidence.
Heringia sp. (a hoverfly)	local?	Two females were captured, and cannot confidently be identified to species; all members of the genus appear to be at least local, but are undoubtedly under-recorded; where the biology of the larvae is known, all are predators of aphids in tree canopies.
Melanophora ruralis (a fly)	local	A parasite of woodlice; local, but records are very widely scattered and suggestive of significant under-recording; habitat preferences are unclear, but some records seem to be from open sandy habitats.
Mimumesa vatia (a spider)	local	Tall herbaceous vegetation with flowers, especially at transitions and in scrub/grass mosaics.
Neoitamus cyanurus (a fly)	local	Clearings and rides in woodland.
Nomada leucophthalma (a bee)	local	Reasonably open habitats with flowering sallows; a parasite of *Andrena clarkella* and *A. apicata.*
Oiceoptoma thoracica (a beetle)	local	Carrion; found chiefly in moist or sheltered habitats, and, in the south-east, most frequent in woodlands and wetlands.
Phasia hemipteran (a fly)	local	Primarily a species of habitat mosaics and transitions, most frequent in woodland rides and clearings, but also recorded from more open grassland; a parasite of shieldbugs.
Platydracus stercorarius (a beetle)	local	Open habitats with well-drained dry or damp, nutrient-poor soils.
Tenthredo zona (a sawfly)	local	Open dry habitats; larvae on *Hypericum*.
Typhaeus typhoeus (a beetle)	local	Open habitats, especially heathland; burrows in sandy ground; larvae develop in stored dung, usually of rabbits.
Xysticus lanio (a spider)	local	Bushes and young trees, usually at the margins of open space in woodland.

Discussion

9.10 In view of the very long period of decline that this site has suffered, through land use changes and neglect, it is unlikely that a great deal of the original heathland fauna has survived, and it would be quite surprising if the woodland that has largely replaced it had accumulated an assemblage of substantial value.

9.11 Much of the site is under a continuous or near-continuous canopy of woody vegetation. Where there is sufficient light penetration for the development of a substantial understorey or herb layer, this tends to be dense, tangled and of limited floristic variety. The detailed character of the vegetation varies considerably, from dense birch-dominated tall scrub to vegetation-free leaf-littered woodland floor beneath the heavy shade of mature trees, and the character of the fauna must be similarly varied, but the high level of canopy cover will always be a limiting factor on invertebrate interest. Such conditions tend to favour a lowest-common denominator fauna of shade-tolerant species.

9.12 Three features of the woodland raise its potential, at least locally, above the rather low level suggested by this initial, all-embracing judgement.

9.13 Some of the individual trees and shrubs in parts of the site are of potential individual interest. These include substantial beeches, limes, and sweet chestnuts, especially in the eastern parts of Belmore Plantation and Racecourse Plantation, laid beeches along the top of the bank along the sunken Pound Lane, hazel stools which appear to be of some age, oaks along the Plumstead Road East which, although unexceptional at present, are old enough to be well on their way to becoming interesting, and even some of the planted conifers, especially Scots' pine, which have the potential to develop interest quite soon as they age or fall.

9.14 Parts of the site are very wet. Some of the tracks contain shallow pools which are, if not absolutely permanent, at least of long duration. A wet overlay can increase the potential of otherwise unprepossessing habitats, and such conditions raise the potential of localised areas of the woodland, though perhaps not by a very substantial amount. Wet conditions would more effectively raise the potential of any open areas created.

9.15 The woodland has tracks, edges and open space. Whatever the limitations of the interior of a woodland, sheltered fringes and open space are likely to provide well-structured habitat.

9.16 This impression of generally low value in the densely wooded (or densely scrubbed) parts of the site is enhanced, or provided with a counter-point, by the obviously higher potential of those areas where such cover is absent. The recently cleared area in Belmore Plantation and the clear-fell in Racecourse Plantation are the two most obvious, and most substantial, such areas. Both are of recent origin and are in the early stages of development. It is far from clear how much invertebrate interest they are likely to have developed, and almost certain that this interest will increase if the habitats are kept open and in good condition. Their potential is considered substantial. Areas where trees have been substantially thinned are also far better-structured and of higher potential for invertebrates than un-thinned areas, and relatively high levels of invertebrate activity were immediately apparent in them, but the character of the vegetation amongst the remaining trees suggests a rather

rapid progression to brambles and dense tall herbs in the absence of continued management.

9.17 Special mention needs to be made of the former outdoor karting track, centred on TG27101072. Here, the combination of bare ground, sheltered open space, abundant flowering plants, and a diverse flora provides expectations of interest, perhaps especially for phytophagous bugs and beetles and for solitary bees and wasps. Habitat quality in this area is in decline, as scrub cover increases, but it remains very well-structured, and in the recent past, shortly after the cessation of karting, may well have been the most interesting part of the site for invertebrates.

9.18 In contrast to these open areas of high potential, the area of dense bracken towards the western end of Racecourse Plantation (TG26271069) appeared of very low potential when visited in August, but might have had greater appeal earlier in the year, and might be greatly improved by determined management.

9.19 Despite the mitigating factors which ameliorate the limited potential of the poorly-structured woodland, the site gives the impression that existing woodland cover is of relatively low value, that open space is likely to be more valuable, and that open conditions of relatively high potential can appear, or return, rapidly when opportunity is provided.

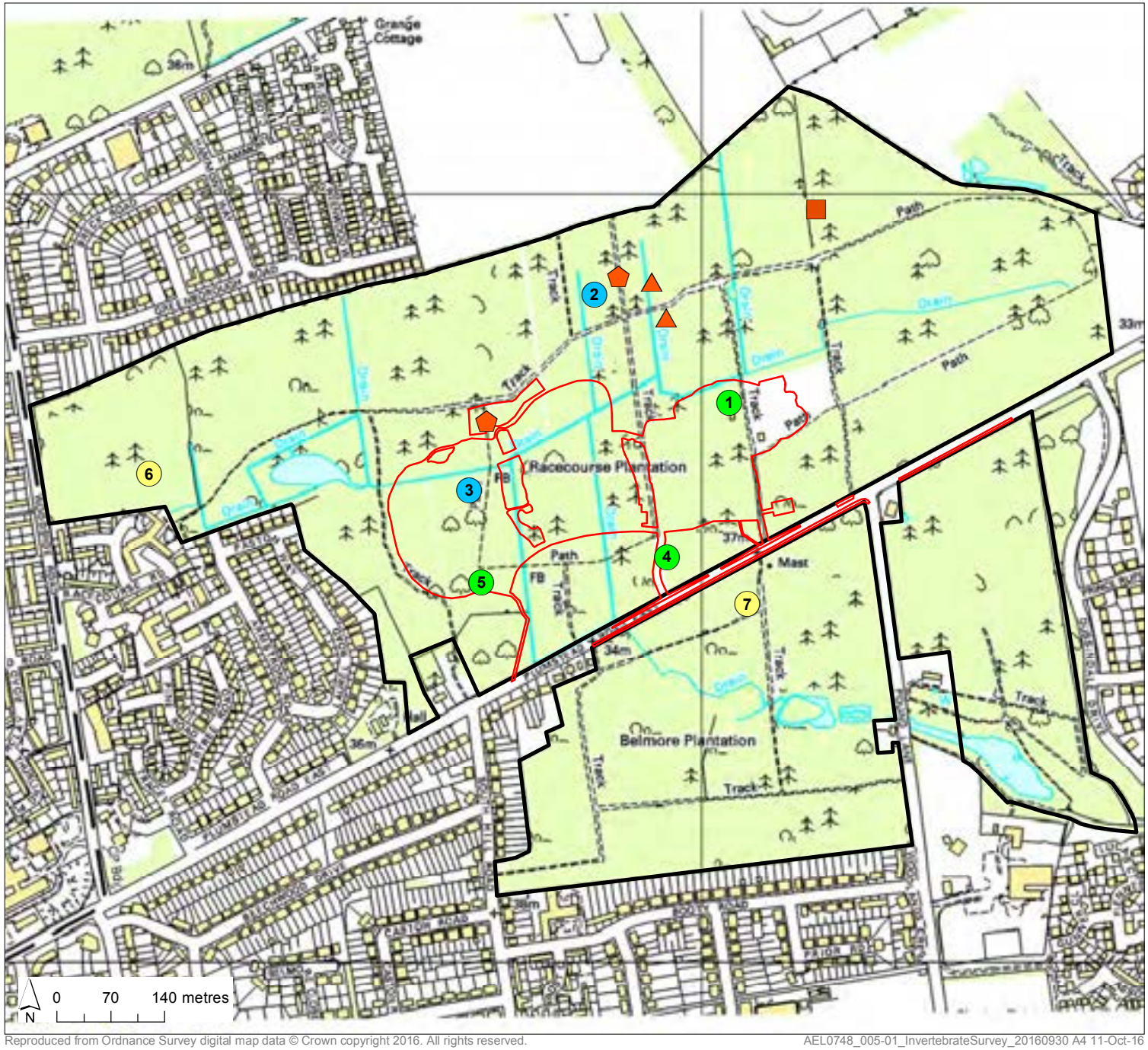
9.20 Reference to Norfolk County Council's historic maps website (www.historic-maps.norfolk.gov.uk) provides some historical support for the overall impressions gained of the site. On the Faden map of 1797 (based on survey work between 1790 and 1794) the whole area is shown as part of the then vast Mousehold Heath, with no indication of woodland. The Bryant map of 1826 (surveyed 1824-1826) shows the first rectangle of planting in Belmore Plantation. By the time of the first edition Ordnance Survey (mapped in 1881) Belmore Plantation occupied rather more than its current area and the eastern part of Racecourse Plantation was largely in place. The western part of what is now Racecourse Plantation, however, was still heathland except for a partial narrow fringe and an area around the western pool. Subsequent editions of the Ordnance Survey maps suggest progressive loss of the remaining open space, though it is perhaps impossible to reliably distinguish between successional change and planting. The northern part of Brown's Plantation, which was a fringe of trees surrounding open space – not marked as heathland – in 1881, seems to have been planted, or at least recognised as having been planted, between 1905 and 1912. All maps through to the 1946 edition O.S. map show what appears to be considerable open space within the plantations, though it impossible to quantify its extent or to know how far it results from the long-term retention of open space and how far from the changes associated with felling, re-planting and woodland management. Aerial photographs from 1946, though they are of rather poor resolution and it is difficult to interpret the vegetation cover, appear also to show considerable open space. It is quite likely that the arrival of myxomatosis in the 1950s hammered the final nail into the coffin of any substantial areas of remaining heathland vegetation, as it did in so many other localities. There seems no reason to believe that any substantial part of the site is ancient woodland.

9.21 The fact that the woodland is of recent origin does not preclude the possibility of it holding significant invertebrate interest, but it does considerably reduce the likelihood that this might be the case. A reasonably diverse foliage fauna is likely to be present, though it is unlikely to include any species of great rarity and some of the woody plants – notably sweet

chestnut and beech – are, from this point of view, largely wasted space. Invertebrate interest in woody plants, though, tends to be rather heavily concentrated in saproxylic species, associated with dead wood in one way or another. Large diameter dead wood tends to be the most important, and the most sort of large diameter dead wood is that on standing, preferably living, trees. High quality saproxylic assemblages are usually found in sites with a long historical continuity of old trees and dead wood.

9.22 There is a considerable amount of dead wood within these woodlands. Much is of small diameter and scattered across the woodland floor, but there are standing and fallen dead trees and a number of substantial trees with considerable standing dead wood. Any trees surviving from the first plantings, in the early years of the nineteenth century, may now be quite old enough to provide useful habitat. There seems little reason, however, to suspect that there has been long-term continuity. There may have been some old trees in the old heathland landscape which might provide a degree of dead wood continuity, but there is no obvious reason to believe this to be the case.

9.23 Habitat continuity aside, the main limitation on the interest of the fauna of foliage and dead wood alike is that the trees and shrubs are in woodland. For these invertebrates in general – though there are exceptions – a wood is not a good place to keep a tree; the associated fauna of all types is much better represented on open-grown trees and shrubs in sunny but sheltered conditions. The potential of the better trees is thus higher than that of the woodland as a whole in which they contained, and their actual current interest is likely to be limited by the second-rate infilling of younger trees and shrubs.



Racecourse Plantations

Invertebrate survey locations

study area

Water trap locations 2015/16

- 2015 only
- 2015 & 2016
- 2016 only

development area

Trap locations 2011

- pitfall traps
- water traps
- vane trap

Figure 9.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: 2011, 2015 & 2016	
Drawn by: RD	
Checked by: DP	
Status: Final	

10 Impact Assessment

Background

10.1 This chapter draws on the results of ecology baseline as set out in Chapters 2-9 of this report and provides an Ecological Impact Assessment (EcIA) of the proposed development at Racecourse Plantations. The development masterplan, highlighting the area of development-related habitat loss, is shown by **Figure 10.1**.

Scope of Assessment

Study area and Zone of Influence

10.2 Definitions of the ecology study area (the 'Site'), the land ownership boundary and the extent of development-related habitat loss (the 'Development site') are provided in Chapter 1 of this report, and are shown by **Figure 1.1**.

Assessment Methodology

Data sources and guidance

10.3 This EcIA has been carried out in accordance with CIEEM (2016)[27]. Methods for identifying Important Ecological Features (IEFs), characteristics of impacts and impact significance have all been derived from this guidance.

10.4 This chapter also takes into account relevant legislation and policy, including European and domestic environmental legislation, UK nature conservation policy and local biodiversity guidance.

Field survey

10.5 This EcIA has been informed by a number of field surveys which are described in detail in Chapters 2-9 of this Technical Report. The following IEFs are assessed in full in this chapter:

- designated sites;
- habitats;
- notable plants;
- bats (roosting, commuting and foraging);
- breeding birds;
- wintering birds;
- great crested newt;
- reptiles;
- invertebrates.

[27] CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

10.6 Surveys for the species/groups listed above were undertaken in accordance with the best practice methodologies current at the time of commissioning, by experienced and qualified ecologists, in accordance with the Code of Professional Conduct of the CIEEM.

Assessing Ecological Impacts

10.7 EcIA requires six steps:

- identifying and characterising Important Ecological Features (IEFs);
- identifying and characterising impacts and their effects;
- identifying measures to avoid and mitigate impacts and their effects;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset still significant residual effects;
- identifying opportunities for ecological enhancement.

Identifying Important Ecological Features (IEFs)

10.8 Ecological receptors are normally valued according to specific 'biodiversity benefits' that they provide to the environment, people or wider society. These benefits can include the conservation of genetic diversity, people's enjoyment or understanding of biodiversity, or the health benefits of biodiversity. A summary of an approach to valuing ecological receptors is presented in **Table 10.1**. The table shows how ecological value can be ascertained using a combination of statutory measures (legally protected sites and species) and non-statutory but widely accepted measures, such as the presence of notable habitats and species listed in local BAPs.

10.9 Use can also be made of the "Ratcliffe Assessment Criteria"[28] which provide a standardised way of assessing and selecting sites with nature conservation value. The method assesses value according to ten attributes, namely size, diversity, naturalness, rarity, fragility, typicality, recorded history, position in an ecological / geographical unit, potential value and intrinsic appeal. All these criteria can vary at different geographical scales.

[28] Ratcliffe, D. A. (1977). *A Nature Conservation Review*. Cambridge University Press, Cambridge.

Table 10.1: An approach to valuing Important Ecological Features.

Level of value	Examples
International	An internationally designated site or candidate site (Special Protection Area (SPA), potential Special Protection Area (pSAC), Special Area of Conservation (SAC), candidate Special Area of Conservation (cSAC), potential Special Area of Conservation (pSAC), Ramsar site, Biogenetic Reserve) or an area which Natural England (NE) has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of that ecological resource. Any regularly occurring population of an internationally important species, i.e. those listed in Annex 1, 2 or 4 of the Habitats Directive
National	A nationally designated site (Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve) or a discrete area which NE has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified. A regularly occurring population of a nationally important species i.e. a priority species listed in the former UK BAP and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act, or a UK Red Data Book species.
County / Regional	Non-statutory designated wildlife sites (e.g. Local Wildlife Sites (LWSs), Sites of Nature Conservation Interest (SNCIs) and Site of Importance for Nature Conservation (SINCs)), and areas of semi-natural Ancient Woodland greater than 0.25 ha. Viable areas of key habitats identified in local/county BAPs or smaller areas of such habitats that are essential to maintain the viability of that ecological resource. Any regularly occurring, locally significant population of a species listed as being nationally scarce (occurring in 16-100 10 km squares in the UK) or in a relevant former local/county BAP on account of its rarity or localisation.
Local	Other sites which the designating authority has determined meet the published ecological selection criteria for designation at the local level. Sites/features that are scarce within the local area or which appreciably enrich the local area's habitat resource.
Neighbourhood	Commonplace and widespread semi-natural habitats e.g. scrub, poor semi-improved grassland, coniferous plantation woodland and intensive arable farmland.
Less than neighbourhood / Negligible	Habitats of little or no ecological value e.g. amenity grassland or hard-standing.

Identifying impacts and their effects

10.10 Characterising impacts refers to the changes expected in the extent and integrity of an IEF. It takes into consideration the fact that different impacts on different IEFs can result in permanent or temporary effects of differing magnitudes, and this is also dependent on their timing and/or frequency of occurrence, and whether or not they can be reversed.

10.11 Impacts have been defined here as being high, medium, low or neutral, as summarised in **Table 10.2**. Impacts may be negative (detrimental) or positive (beneficial).

Table 10.2: Criteria for describing impacts and effects on Important Ecological Features.

Impact type	Description
High	High impacts may include those that result in large-scale, permanent changes in an IEF, and likely to change its ecological integrity. These impacts are likely to result in overall changes in the conservation status of a species population or habitat type at the location(s) or geographical scale under consideration.
Medium	Medium impacts may include moderate-scale permanent changes in an IEF, or larger-scale temporary changes, but the integrity of the feature is not affected. This may mean that there are temporary changes in the conservation status of a species-population or habitat type at the location(s) or geographical scale under consideration, but these are unlikely to be irreversible or long-term.
Low	Low impacts may include those that are small in magnitude, have medium-scale temporary changes, and where integrity is not affected. These impacts are unlikely to result in overall changes in the conservation status of a species population or habitat type at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required.
Neutral	There is no perceptible change in the ecological receptor.

10.12 Different impacts and their outcomes also have different probabilities of occurring. It is rarely possible to quantify probability accurately in the natural world in the absence of large, long-running data sets, and therefore for the purposes of this EcIA, probabilities are simply assessed qualitatively and relatively, using the terms defined in **Table 10.3** below.

Table 10.3: Criteria for categorising the probability of effects occurring.

Impact type	Description
Certain	It is reasonable to conclude that these effects will occur as a result of the proposals.
Likely	It is reasonable to conclude that these effects are more likely to occur than not occur.
Unlikely	It is reasonable to conclude that these effects are less likely to occur than to occur.

Significance of effects

10.13 In accordance with CIEEM 2016, a "significant effect" is one which supports (positive) or undermines (negative) biodiversity conservation objectives for a stated IEF, or for biodiversity generally if this is more relevant to the circumstances being assessed. These significant effects are considered by an ecological professional to be sufficiently important to warrant explicit assessment and reporting so that a decision-maker is adequately informed of the environmental consequences of a proposed project.

10.14 The significance of an effect on an IEF is given with reference to a specific spatial scale, which may or may not be related to the geographical scale used to define the IEF. However, mitigation and compensation solutions may need to be applied so as to ensure outcome consistency with the scale at which the significant effect has been identified.

Baseline Conditions

10.15 Full details of the baseline ecological conditions for the Development can be found in Chapter 2-9 of this report.

Importance of ecological features

10.16 A summary of the level of importance of designated sites, and habitat and species features within the Site are provided in **Table 10.4** and **Table 10.5**, respectively.

Table 10.4: Importance levels of designated sites and habitat features within the Site.

Designation / habitat	Ecological importance level	Description
Racecourse Plantation CWS	County	A non-statutory wildlife site that meets Norfolk CWS selection criteria and contributes to the CWS network.
Belmore and Brown's Plantations CWS	County	A non-statutory wildlife site that meets Norfolk CWS selection criteria and contributes to the CWS network.
semi-natural broadleaved woodland	Local	Areas of non-ancient broadleaved woodland that support a range of native woody species, with good structural diversity and a range of common woodland plants.
marshy grassland (damp acid grassland)	Local	Small sections of open and rutted ride within Racecourse Plantation that support species-rich damp acid grassland assemblages of significant botanical interest.
broad-leaved plantation woodland	Neighbourhood	Typically relatively species-poor, even-aged broadleaved woodland with poor structural diversity and a limited range of common woodland plants.
mixed plantation	Neighbourhood	Typically relatively species-poor, even-aged mixed woodland with poor structural diversity and a limited range of common woodland plants.
coniferous plantation	Neighbourhood	Typically species-poor, even-aged conifer woodland with poor structural diversity and a limited range of common woodland plants.
dense scrub	Neighbourhood	Small areas of species-poor scrub.
standing water	Neighbourhood	Areas of standing water within the Site are relatively poor examples of their type, but contribute to overall habitat diversity within a Neighbourhood context.
continuous bracken	Less than Neighbourhood / Negligible	Common and widespread habitat of limited ecological value.
scattered scrub / bare ground	Less than Neighbourhood / Negligible	Common and widespread habitat of limited ecological value.
semi-improved neutral grassland	Less than Neighbourhood / Negligible	Common and widespread habitat of limited ecological value.
SI grassland / tall ruderal	Less than Neighbourhood / Negligible	Common and widespread habitat of limited ecological value.
bare ground	Less than Neighbourhood / Negligible	Common and widespread habitat of limited ecological value.

Table 10.5: Importance levels of flora and fauna features within the Site.

Species	Ecological importance level	Description
Notable plant species, including chaffweed and allseed	County	Within the County chaffweed is only known to occur within Racecourse Plantation, and allseed is only known from Racecourse Plantation and one other site.
Bats	County	Using standard assessment criteria, the brown long-eared bat (BLE) maternity roost in Brown's Plantation is assessed as being of County importance. The Site overall is assessed as being of County importance for foraging bats and of Local value for commuting bats. The building BLE night roost is assessed as being of Local importance.
Breeding birds	Local	The range of breeding species present, including 10 birds of conservation concern (Amber or Red-listed) is assessed as being of Local value.
Wintering birds	Local	The range of wintering species present is assessed as being of Local value.
Great crested newt	Local	This species is present locally across Norfolk, particularly in central and south-eastern areas.
Reptiles – grass snake	Neighbourhood	A relatively widespread and common reptile species.
Invertebrates	Local	A range of invertebrates including four Nationally scarce / notable species, albeit none of great rarity or interest either nationally or at the County level.

Modifying influences

10.17 In the absence of the proposed development, the Site will continue to be managed under the existing forestry licence that runs up to 2023. It is important to note that not all management to be implemented under the forestry licence is positive from an ecological perspective. In particular, the layer of dense forestry brash left after felling encourages the growth of sprawling nettle and tall ruderal species such as rose-bay willowherb, and prevents the establishment of a heathland type ground flora. It is clear that the ecological potential of the Site will not be maximised if current forestry management continues, and continued forestry management could potentially be detrimental to the Site's overall nature conservation interests in the longer-term.

Information gaps and assumptions

10.18 It is considered highly unlikely that features with an importance rating of less than Neighbourhood value will be associated with significant impact effects. These features are therefore not considered to be IEFs and are not considered any further in this EcIA.

Design Mitigation

10.19 The nature conservation and biodiversity interests of the Site have been acknowledged from the outset of the project, with the over-riding objective to deliver a high quality small scale residential scheme, alongside long-term recreational and ecological benefits.

10.20 In 2015, as part of the initial master-planning process, a biodiversity off-setting metric calculator was used to help determine in broad terms the extent and location of development-related habitat loss that could potentially be offset through the delivery of on-site mitigation, enhancement and compensation measures, and result in a biodiversity enhancement overall.

10.21 The results of the offsetting calculations indicated that the habitat loss impact associated with a single development plot of just over 9 ha positioned in an area of lower value woodland habitat in Racecourse Plantation could potentially be offset by new habitat creation, restoration and long-term management improvements across the remainder the Site. This area was adopted as part of the initial masterplan proposal.

Assessment of Impacts and Effects

Construction phase impacts and effects

10.22 Potential direct impacts and effects of construction include:

- direct loss of part of Racecourse Plantation CWS;
- direct habitat loss through land take for construction of the built development and its associated infrastructure and landscaping;
- direct loss, disturbance or harm of species through construction activities.

10.23 Potential indirect impacts and effects of construction include:

- negative effects on the local green infrastructure and landscape scale connectivity;
- increased pollution risk associated with accidental spillage of fuels, oils, and increases in silt laden run-off and dust emission;
- disturbance impacts on faunal species through noise, lighting or vibration.

Designated sites

10.24 There will be no direct impacts on statutory designated wildlife sites, or Ancient Woodland, during the construction phase as no such sites are present within the Site. Indirect impacts on such sites are not predicted give the distance between the Site and the closest statutory wildlife site is 4.7km.

10.25 The development would result in the direct loss of 8.78 ha of Racecourse Plantation CWS to buildings, hard-standing and formal amenity greenspace which equates to a loss of 15.2% of the total area of Racecourse Plantation CWS. According to the Criteria for the Selection of County Wildlife Sites in Norfolk (version 2010) the remaining area of Racecourse Plantation (49 ha) would still qualify under the woodland CWS criteria as it would still be in excess of 20 ha in overall size which is a size qualification threshold for non-ancient woodland sites.

10.26 This is a medium impact, but is not considered significant at the County Level (as the integrity of the CWS would not be significantly affected), but the effect (prior to mitigation) is considered significant (certain, negative) at the Local level.

Habitats

10.27 The construction phase habitat loss impacts associated with the proposed development are provided in **Table 10.6**. In summary, the proposed development would not directly impact marshy grassland, broadleaved plantation woodland, dense scrub, standing water, bracken, scattered scrub and semi-improved grassland, and these habitats together with habitats of less than Neighbourhood / Negligible value are not included in the habitat loss table.

10.28 Development construction (excluding road edge habitat effected by the footpath improvements, see below) would result in the permanent loss of a total area amounting to 8.78 ha of land (10.8% of the total study area) with 0.78 ha of this comprising habitats of negligible value (semi-improved grassland/tall ruderal and bare ground). The effect of this overall habitat loss impact is assessed against the CWS designation (see above), with an assessment of the effects on individual habitats provided below.

10.29 The loss of 4.14 ha of coniferous woodland (45.3 % of the total area of this habitat type), a receptor of Neighbourhood value, is considered a high impact and is a significant (certain, negative) effect at the Neighbourhood level. However, it should be noted that the area of coniferous woodland within the Development site is already degraded and damaged as a result of paintball activity, and it represents a poor example of this habitat type in the context of other area within the wider Site.

10.30 The loss of 2.76 ha of mixed plantation woodland (10.5 % of the total area of this habitat type), a receptor of Neighbourhood value, is considered a medium impact and is a significant (certain, negative) effect at the Neighbourhood level.

10.31 The loss of 1.10 ha of broad-leaved semi-natural woodland (2.8 % of the total area of this habitat type), a receptor of Local value, is considered a low impact and is not considered a significant effect at the Local level, but is significant (certain, negative) at the Neighbourhood level.

10.32 Habitat loss could also result in effects on ecological connectivity. However, the development footprint is relatively compact and sits in the centre of Racecourse Plantation such that extensive areas of woodland habitat would remain around all sides of the development footprint. In addition, existing mature trees of ecological and landscape value will be retained and protected through the centre of the development in the form of two north-south greenways/wildlife corridors, which along with new drainage channels, will ensure that there will be no significant loss of ecological connectivity across Racecourse Plantation, across the Development site itself or with respect to the wider (off-site) landscape beyond Racecourse Plantations.

10.33 The impact of the development on ecological connectivity within the Site and between the Site and the wider landscape is not therefore considered a significant effect.

Table 10.6: Summary of construction phase effects on designated sites and habitats prior to mitigation.

Habitat type (Importance level)	Area within Site (ha)	Loss to development (ha)	Proportion of habitat to be lost (%)	Impact scale and certainty	Effect significance prior to mitigation
Racecourse Plantation CWS (County)	57.78[29]	8.78	15.2	Medium, certain	Negative significant effect at the Local level
broad-leaved semi-natural woodland (Local)	38.92	1.10	2.8	Low, certain	Negative significant effect at the Neighbourhood level
mixed plantation woodland (Neighbourhood)	26.17	2.76	10.5	Medium, certain	Negative significant effect at the Neighbourhood level
coniferous plantation woodland (Neighbourhood)	9.13	4.14	45.3	High, certain	Negative significant effect at the Neighbourhood level

10.34 In addition to the habitat loss impacts outlined above, improvements to the existing informal footpath, known as the 'Trod' which is located along the southern side of Plumstead Road, are proposed. Specific ecological assessment of these footpath improvements have not been undertaken to date, however the existing footpath corridor comprises bare ground and improved grassland of low ecological value. Detailed arboricultural assessment of this footpath corridor has been undertaken as part of the Arboricultural Impact Assessment and confirms that significant tree loss can be avoided by adopting sensitive construction methods, with tree loss likely to comprise the loss of three individual trees, a semi-mature sycamore and two young / semi-mature ash trees. A visual inspection of these trees will be completed to confirm the presence / absence of features of potential value to bats when full details of this proposal are known.

Species

10.35 A summary of the construction phase impacts on species receptors are shown in **Table 10.7**.

Notable plants – chaffweed and allseed

10.36 The section of damp ride supporting the assemblage of damp acid grassland, including these two notable species, is outside of the proposed development area and will not be

[29] Total area of CWS. A small area of the CWS is located outside of the Site boundary.

impacted by development construction and therefore a significant effect on these plants is not predicted during the construction phase.

Bats

10.37 Three beech trees used by a maternity colony of brown long-eared bats (County value) are located within Brown's Plantation and will be retained and protected as part of the Development.

10.38 Building B1 has been confirmed as supporting a brown long-eared bat night roost of Local value and will need to be removed to accommodate the proposed development. The impact of removing of this building is assessed as a medium impact, and is a significant (likely, negative) effect at the Local scale.

10.39 No important bat commuting routes (Local value) have been identified within the Development site and therefore the impact of the proposed development on commuting bats is considered low, and is not a significant effect.

10.40 It is clear that the majority of the bat foraging activity (County value) was, as would be expected, recorded within woodland clearings and wide rides. In overall terms the bat activity and catching data and subsequent analysis suggests that woodland within the Development site is of relatively low value to foraging bats when compared to the wider Site. The loss of 8.78 ha of woodland and associated habitats within Racecourse Plantation is assessed as a medium impact on foraging bats, and is considered a significant (likely, negative) effect at the Local scale.

Breeding birds

10.41 The loss of woodland to development would result in the loss of bird nesting and foraging opportunities (Local value), and there may also be disturbance to breeding birds through construction noise, vibration and possibly lighting.

10.42 The overall impact of the development on breeding bird diversity and numbers is considered to be low, and is a significant (likely, negative) effect only at a Neighbourhood scale. In particular, individual species that favour coniferous woodland, for instance goldcrest and coal tit (which are both common and widespread species within the Site and nationally) are likely to experience a small decline in numbers as a result of the proposed development. However, opportunities for other species, including the red-listed species such as house sparrow and starling, which are currently absent from the Site, will be created as these species exploit nesting and foraging opportunities associated with areas of human occupation.

Wintering birds

10.43 The loss of 8.78 ha of woodland will reduce the extent of foraging habitat available for wintering birds (Local value), in particular those wintering species that favour coniferous over broadleaved woodland such as goldcrest, coal tit and siskin. However, the Site did not support large flocks of wintering birds, and the overall impact is considered to be low, and is a significant (likely, negative) effect only at the Neighbourhood scale.

Great crested newt

10.44 The Development site is located over 250 m from the water-body within Brown's Plantation that supports breeding GCN (Local value). Plumstead Road is located between this water-

body and the Development site, and given the distance between the GCN population and the Development site and the abundance of closely located GCN friendly terrestrial habitat adjoining and in close proximity to GCN water-body, the impact on GCN is considered to be low (likely, negative), and not significant.

Reptiles

10.45 Grass snake is a highly mobile species that is utilising woodland clearings, and margins of open water within the Site (Neighbourhood value). The loss of a small area of open, selectively-felled woodland on the western side of the development is considered to be a low impact in overall terms, and is not a significant effect at any scale.

Invertebrates

10.46 The majority of the invertebrate interest (Local value), and notable species associations, comprise species typical of open sandy and damp ground and woodland edge habitats, and not woodland specialists. Given the majority of the higher value open habitat areas will be unaffected by the proposed development, the overall impact on invertebrates is considered to be low (likely, negative), and is significant only at the Neighbourhood scale.

Table 10.7: Summary of construction phase effects on faunal species prior to mitigation.

Species / group (Importance level)	Impact(s)	Effect(s)	Impact scale and certainty	Effect significance prior to mitigation
Bats – foraging (County)	Construction related habitat loss	Loss of bat forage habitat	Medium, likely	Negative significant effect at the Local level
Bats – commuting (Local)	Construction related habitat loss	Habitat loss and severance	Low, likely	No significant effect
Bats – building roosting (Local)	Construction related habitat loss	Loss of building with confirmed BLE night roost	Medium, likely	Negative significant effect at the Local level
Breeding birds (Local)	Construction related habitat loss	Loss of bird nesting habitat	Low, certain	Negative significant effect at the Neighbourhood level
	Noise, lighting or vibration	Disturbance	Low, likely	Negative significant effect at the Neighbourhood level
Wintering birds (Local)	Construction related habitat loss	Loss of overwintering habitat	Low, likely	Negative significant effect at the Neighbourhood level
Great crested newt (Local)	Construction related habitat loss	Loss of terrestrial habitat >250m from breeding ponds	Low, likely	No significant effect

Species / group (Importance level)	Impact(s)	Effect(s)	Impact scale and certainty	Effect significance prior to mitigation
Reptiles – grass snake (Neighbourhood)	Construction related habitat loss	Habitat loss	Low, likely	No significant effect
Invertebrates (Local)	Construction related habitat loss	Habitat loss	Low, likely	Negative significant effect at the Neighbourhood level

Construction phase mitigation, compensation and enhancement

Mitigation proposals

10.47 A summary of the mitigation proposals that relate to habitat and species protection during the development construction phase are set out below. Further details, including a range of good practice measures aimed at environmental protection, will be set out in detail by a Construction Environmental Management Plan (CEMP) to be prepared and agreed in advance of development proceeding.

10.48 A suitably qualified Project Ecologist would be appointed prior to the start of construction of the Development, and would oversee the derivation of ecological protection plans, covering all relevant habitats and species, for incorporation into the Development's CEMP. The Project Ecologist would monitor the construction phase to ensure that good practice measures with regards to biodiversity are implemented, and be on call to advice on any specific ecological issues or concerns.

Designated sites and habitats

10.49 Areas of CWS and habitat outside of the Development site, as well as retained trees and habitat features to be retained and protected within the Development site itself, would be protected from damage and excessive disturbance in line with best practice under the auspices of a tree protection plan[30] and the CEMP. This would include a process of careful micro-siting to minimise impacts where possible, and the protected of sensitive areas from accidental damage and disturbance using appropriate barrier fencing and signage.

Notable plants - chaffweed and allseed

10.50 In advance of development preceding, a precautionary search for notable plant species, including chaffweed, allseed and notable species of bramble, would be completed at an appropriate time of year (June-August) in areas to be effected by development construction.

10.51 If any notable plants deemed to warrant protection are found, appropriate protection measures in the form of barrier fencing and signage would be installed to ensure areas of higher value vegetation and notable plant species are, where possible, adequately protected during construction. If any notable plant species are found within the

[30] A draft tree protection plan has been prepared as part of the Arboricultural Impact Assessment submitted with the application.

Development site in areas where damage is unavoidable, specialist advice would be sought and if necessary individual plants would be translocated to other parts of the Site.

Bats

10.52 Further pre-commencement ground level and tree climbing inspections of all mature trees scheduled for tree works / felling would be undertaken in advance of their removal, with follow-up emergence / return survey completed if required in line with best practice guidance.

10.53 A pre-construction check of building B1 would be completed prior to its demolition in order to confirm continued bat use or a change in level of use. Depending on the findings, further survey may be required and the removal of the building may need to be completed under a low impact class licence or full EPS licence, as considered necessary by an experience licenced bat ecologist.

10.54 As part of the overall ecological enhancement package, a proportion of new residential units (with a target of one in 10 units) will be used to house integral bat boxes (e.g habibat bat boxes http://www.habibat.co.uk/category/bat-boxes).

Birds

10.55 The removal of all potential bird nesting habitat within the Development site would be completed outside of the bird breeding season to avoid killing and/or injuring birds during this sensitive and vulnerable period in line with a CEMP. All habitat clearance would be supervised by the Project Ecologist.

10.56 A range of bird boxes would be provided within the residential area, including house sparrow terraces built in to new buildings, and external boxes in retained mature trees within the Development site and around the landscaped perimeters.

Great crested newt

10.57 No impacts on great crested newt (GCN) are predicted as a result of the proposed development which is located more than 250 m away from the breeding pond in Brown's Plantation. However, it is of note that Brown's Plantation would be specifically protected as a woodland reserve with restricted access, partly in recognition of its value for GCN.

Reptiles

10.58 A watching brief for reptiles would be maintained during the construction phase with any individual grass snakes seen to be caught and moved to suitable areas in the wider Site.

Compensation and enhancement proposals

Ecological Enhancement Strategy

10.59 High level compensation and enhancement proposals for the Development site and the wider Site have been set out in an Ecological Enhancement Strategy (EES) for the scheme. The full EES report is provided in **Appendix 2**, but the key EES principles can be summarised as follows:

- The creation of a more biodiverse and ecologically valuable habitat mix across the Site, including new heathland creation.

- A fundamental shift from commercial forestry led management to ecological driven management that would enable the Site's ecological potential to be realised, for instance protection of existing higher value habitats, retention of desirable broadleaved tree / shrub species and promotion of woodland structure and ground flora interests.
- Maintaining the Site's overall woodland character and connectivity.
- Protection of undeveloped woodland in perpetuity with management control handed to an appropriate management vehicle.
- The potential future extension of the CWS site boundary in Brown's Plantation to incorporate an area of proposed heathland creation that is currently coniferous plantation of limited ecological value.
- A range of species specific enhancement measures.

10.60 These principles have been embedded in the development masterplan and landscape proposal for the scheme and demonstrate a clear commitment to ecological protection and enhancement as part of development delivery.

Community Woodland Park

10.61 The principles set out by the EES for the undeveloped parts of the Site have been incorporated into a proposal for a Community Woodland Park which would be protected from further development in perpetuity and provide an important nature conservation legacy. The Community Woodland Park would be managed by an appropriate management body to meet nature conservation and recreational objectives.

10.62 In broad terms the proposal is that Belmore Plantation will be managed for the provision of public recreation, Brown's Plantation will be managed for nature conservation (including GCN), and the undeveloped part of Racecourse Plantation will be managed for a mix of nature conservation and recreation.

10.63 The intention to create new open heathland / acid grassland in areas of existing woodland is a potentially controversial proposal as substantial tree removal would be required to achieve this outcome. However, this proposal is supported by the findings of the 2011-16 ecology survey work and by expert opinion, which confirms that the Site's most valuable habitats and species are not specifically associated with woodland, but rather small areas of relict heathland, acid grassland and open damp ground.

10.64 Of particular note is the view of the national invertebrate expert Dr Peter Kirby who, based on his walkover assessment in 2016, describes a theoretical scenario of the ideal state of Racecourse Plantation for invertebrates as being as follows:

"A narrow fringe of woodland would be maintained. Land surrounding the site tends to be hostile – mostly roads and housing – and a buffering band of woodland would be useful. It would also provide shelter for other habitats, and would include some of the areas with the best claim to independent interest. Within this protective barrier, the majority of the trees would be removed – 90% would be a reasonable minimum – to leave small scattered groups and isolated individuals, selectively retaining the oldest and illest trees. Birch, oak and Scots' pine are the trees most preferred; beech and sweet chestnut would be retained if mature or partly dead, but not otherwise encouraged or maintained in the long term. The large pools, already largely lost and of negligible value because of shading, are an

undesirable addition to the landscape and would be allowed to vanish. In general, though, wet conditions would be encouraged by blocking drains or allowing them to fall into disuse.

Such a state would potentially allow the re-establishment of a heathland fauna while enhancing conditions for the more recently established fauna of woody vegetation. It might prove difficult to maintain in good condition, however, unless livestock were introduced – hardy cows would be preferred – to graze and browse the heathland. Considerable management input would otherwise be needed, especially in the early years following clearance of woody vegetation. In drier areas, invertebrate interest could be maintained or increased by encouraging high levels of visitor access and not surfacing the paths; in dry heathland, scarcer invertebrates tend to be rather heavily concentrated along trampled and eroded paths.

This scenario is not described in the hope or expectation that it will be put into place over any substantial part of the site in the near future, but merely to emphasize how far removed the site is from its preferred state for invertebrates, and to indicate the general direction that management of the site might ideally take. The current management proposals can be considered a move in the right direction. The proposal to re-create heathland is excellent, and management of woodland to improve its quality is welcome, provided that this improvement means reducing tree cover and dramatically increasing the amount of open space. It is arguably desirable, indeed, that heathland recreation proceeds in manageable steps rather than attempting too much at once, with the effort that implies and the potentially unsightly early consequences. It would perhaps be possible to consider heathland recreation over a wider area, not through dramatic one-off clearance but through the gradual opening up and linking of open space over time and a change in management of the open space created. It is considered that the proposals as they currently stand should be a first step in a progressive reduction in woodland cover to create a predominantly open landscape.

Though "heathland" has been used to describe the open habitat which might be created after clearance, and though an approximation, at least, to the heathland conditions which were present on the site prior to planting and successional change must be considered the ideal state after restoration, a classic dwarf-shrub heathland is not a necessary pre-requisite for the development of substantial invertebrate interest. Open wetland, dry grassland, bare sandy ground and well-structured transitions to woody vegetation would be quite sufficient to support a rich fauna which could overlap very largely with that of true heathland."

10.65 While this scenario advocates a dramatic shift from woodland to open heathland and supports the proposal to create areas of open heathland by select woodland removal and thinning, the intention of the Community Woodland Park would be to retain the Site's overall woodland character and enhance its biodiversity value (habitats and species interests) through improved management, alongside enhancing habitat diversity including through the creation of pockets of new connected heathland.

10.66 Full details of habitat creation and management proposals for the Community Woodland Park would be provided in a Landscape and Ecological Management Plan (LEMP) following planning approval. The following key themes would be covered and developed by the LEMP.

- **Protection of ecologically sensitive areas** – The eastern part of Racecourse Plantation and Brown's Plantation would be managed as wildlife reserves with restricted public access.
- **Recreational strategy** – Recreational facilities, details of footpath provision and anticipated visitor use would be considered together with measures required to prevent conflict with ecological objectives.
- **Habitat creation** – Details and methods of proposed of new habitat creation, including new open heathland, damp acid grassland, ponds, watercourses and wetland.
- **Woodland restoration** – Detailed proposals for enhancing areas of retained woodland, potentially including thinning, select removal of conifers / undesirable broadleaved species and reinstatement of coppicing.
- **Habitat management** – Long-term management proposals for areas of woodland, open heathland, damp acid grassland, ponds, watercourses and wetland.
- **Other ecological enhancements within the CWP** – A range of species specific enhancements will be considered alongside habitat creation and management proposals, including specific measures to benefit notable plants, breeding birds, bats, GCN, reptiles and invertebrates.
- **Development site opportunities** - Details of new habitats and features to be incorporated into the Development site, including:
  - SUDs ponds, amenity spaces and green corridors;
  - built-in bird and bat nesting boxes to be incorporated into the fabric of buildings across the development site;
  - planting of appropriate native street trees and shrubs;
  - 'invertebrate hotels', holes in garden walls for hedgehogs, and the potential for other measures (to be appraised fully at matters reserved stage).
- **Ecological monitoring** – Proposals for monitoring of habitats and species would be set out in order to assess the success of new habitat creation and enhancement and to inform future management.

Residual construction phase effects

10.67 A summary of the significance of construction impacts on ecological receptors, together with proposed mitigation, compensation and enhancement proposals and resulting residual impacts is provided in **Table 10.8**.

Table 10.8: Residual effects of development construction.

Ecological receptor	Effect significance prior to mitigation	Summary of mitigation, compensation and enhancement proposals	Residual effect
Racecourse Plantation CWS	Negative significant effect at the Local level	Protection of retained CWS under CEMP. Substantial compensation and enhancement to be provided within the CWP.	Positive significant effect at the Local level.
Coniferous woodland	Negative significant effect at the Neighbourhood level	No specific mitigation as higher value habitats are targeted as part of the CWP proposal.	Negative significant effect at the Neighbourhood level.
Mixed plantation woodland	Negative significant effect at the Local level	Substantial compensation and enhancement to be provided within the CWP.	Positive significant effect at the Local level.
Broad-leaved semi-natural woodland	Negative significant effect at the Neighbourhood level	Substantial compensation and enhancement to be provided within the CWP.	Positive significant effect at the Local level.
Marshy grassland / open heathland	No significant effect	Substantial compensation and enhancement to be provided within the CWP.	Positive significant effect at the Local level.
Notable plant species, including chaffweed and allseed	No significant effect	Precautionary check for notable plants, with appropriate protection to be provided, and translocation if required. New habitat suitable for these species to be specifically targeted as part of CWP proposal.	Positive significant effect at the County level.
Bats – tree roosting	No significant effect	Further ground level tree inspections and climbing surveys to be completed, as necessary.	No significant effect
Bats – building roosting	Negative significant effect at the Local level	Precautionary inspection of building B1 to be completed. Building to be removed under low impact / EPS licence, as necessary. Integral bat boxes to be provided as part of new housing provision.	Positive significant effect at the Local level.

Ecological receptor	Effect significance prior to mitigation	Summary of mitigation, compensation and enhancement proposals	Residual effect
Bats - foraging	Negative significant effect at the Local level	New areas of valuable bat forage / commuting habitat to be created within the CWP.	Positive significant effect at the Local level.
Bats – commuting	No significant effect	New areas of valuable bat forage / commuting habitat to be created within the CWP.	Positive significant effect at the Local level.
Breeding birds	Negative significant effect at the Neighbourhood level	Ecologist supervised sensitive habitat clearance under CEMP. Bird box provision, including house sparrow terraces. Improved and more varied bird nesting / feeding habitat to be provided as part of CWP proposal.	Positive significant effect at the Neighbourhood level.
Wintering birds	Negative significant effect at the Neighbourhood level	New habitats to be created with the CWP may provide benefits for wintering birds.	No significant effect.
Great crested newt	No significant effect	Protection of Brown's plantation as a wildlife reserve with restricted public access.	No significant effect.
Invertebrates	Negative significant effect at the Neighbourhood level	Improved and more varied terrestrial invertebrate habitat, including a range of more open habitats, to be provided within the CWP.	Positive significant effect at the Local level.
Reptiles – grass snake	No significant effect	New habitats to be created within the CWP would include well-connected open heath and grassland habitats of significant benefit to reptiles.	Positive significant effect at the Neighbourhood level.

Operational phase impacts and effects

10.68 Potential impacts and effects of the development operational phase include:

- damage and degradation of the CWSs as a result of increased public use;
- damage and degradation of retained woodland and newly created habitats as a result of inappropriate recreational use;
- an increase in disturbance, including noise, after-dark lighting and fire, and associated effects on sensitive and nocturnal wildlife;
- spread of invasive plant species from gardens and displacement of native flora;
- an increase in the predation of nesting birds and reptiles by domestic cats.

Designated sites

10.69 No direct or indirect impacts on statutorily designated sites are anticipated in relation to the Development's operational phase.

10.70 An increase in public use of the Site and its promotion as a new Community Woodland Park is likely to result in increased use of the Site, and could result in inappropriate recreational use of the two CWSs. This could cause damage and degradation to these CWS, and in turn affect their importance as an ecological hub and their landscape connectivity function. This could be a high impact and represent a significant (likely, negative) effect at the County scale.

Habitats

10.71 Individual habitats, including those of elevated importance such as damp acid grassland and semi-natural broadleaved woodland (Local value), could be subject to a high level impacts (damage and degradation) as a result of increased public use and result in significant (negative) effects on habitats overall.

10.72 The potential effect of habitat damage and degradation is considered a significant (negative) effect at the Local level.

Species

10.73 Impacts on specific species and species groups, in particular in relation to notable plants and faunal species in general, mainly relate to negative effects associated with habitat damage, degradation and disturbance, as discussed above.

10.74 It is of note however that notable plant species such as chaffweed and allseed, as well as other plant species and invertebrates associated with damp acid grassland and heathland vegetation that would be promoted / created as part of the development proposal, and are partly reliant on and may benefit from periodic and moderate levels of disturbance, including trampling.

10.75 Impacts on specific species / groups could occur in relation to after-dark lighting (bats) and cat predation (birds and reptiles). A summary of the operational phase impacts on species and species groups is provided in **Table 10.9**.

Table 10.9: Summary of operational phase effects on designated sites, habitat and species prior to mitigation.

Species / group	Impact type	Impact scale and certainty	Effect significance prior to mitigation
Racecourse Plantation CWS and Belmore & Brown's Plantation CWS	Damage and degradation of the CWS and associated ecological functions.	High, likely	Negative significant effect at the County level
Habitats (general)	Damage and degradation of the CWS and associated ecological functions.	High, likely	Negative significant effect at the Local level
Notable plant species, including chaffweed and allseed	Habitat degradation, excessive disturbance, invasive plants and fire damage.	Medium, likely	Negative significant effect at the Neighbourhood level
Bats – tree roosting	Habitat degradation, disturbance (noise and after-dark lighting)	Medium, likely	Negative significant effect at the Local level
Bats – commuting and foraging	Habitat degradation, disturbance (noise and after-dark lighting)	Medium, likely	Negative significant effect at the Local level
Bats – building roosting	Disturbance (noise and after-dark lighting)	Medium, likely	Negative significant effect at the Local level
Breeding birds	Habitat degradation, general disturbance and cat predation	Medium, likely	Negative significant effect at the Neighbourhood level
Wintering birds	Habitat degradation and general disturbance	Medium, likely	Negative significant effect at the Neighbourhood level
Great crested newt	Habitat degradation and general disturbance	Low, likely	No significant effect
Invertebrates	Habitat degradation and excessive disturbance	Low, likely	No significant effect
Reptiles – grass snake	Habitat degradation, general disturbance and cat predation	Low, likely	No significant effect

Operational phase mitigation, compensation and enhancement

10.76 The potential negative effects associated with the development's operational phase (as listed in para.10.68) essentially relate to an increase in public use of the Site for recreation. It is important to note however, that the negative effects associated with increased use are already likely to occur due to an expanding local population around Racecourse Plantations as a consequence of other consented and allocated residential schemes. In fact, the Racecourse Plantation proposal offers an opportunity to mitigate these potential effects, which would otherwise be un-mitigated and could cause significant harm to the County Wildlife Sites in the medium and long-term.

10.77 Measures to avoid / minimise potential impacts on ecological receptors during the development's operational phase have already been carefully considered as part of the development design and master-planning, including embedded design mitigation to avoid sensitive habitat and species. Other specific impact avoidance measures already incorporated into the development design to help mitigate negative operational effects and ameliorate the consequences of increased recreational pressure within the Community Woodland Park include:

- Designing the residential development to be outward facing (i.e. houses to front surrounding woodland) in order to prevent problems of back fence rubbish tipping and garden encroachment.
- Design of a sympathetic lighting including low level street lighting and dark woodland interfaces.
- Maintaining areas beyond the Development site as dark and unilluminated, where possible.
- Restricting formal recreation provision to Belmore Plantation, which is already the most heavily used part of the Site by dog-walkers and locals more generally.
- Providing only informal paths through Racecourse Plantation to discourage high levels of use.
- Protecting large areas of woodland and new heathland within the Community Woodland Park, particularly the most ecologically sensitive areas (e.g. Brown's Plantation and part of Racecourse Plantation), within wildlife reserves where public access will be restricted.

10.78 Further more detailed proposals to avoid potential negative effects of habitat degradation and disturbance in relation to increased recreational use will be considered as part of the detailed landscape design and site management proposals under the LEMP, building on the current Landscape Strategy and Illustrative landscape plan. Such measures may include:

- Installation of low-level rustic log fences along ride sides to prevent cyclists straying from the paths.
- The creative use of new native species scrub planting to discourage public access in sensitive areas.
- The use of appropriate signage and interpretation to inform local users of the ecological sensitivities of the Site and to describe any management works underway or completed.
- To encourage local ownership and responsibility through education, guided walks and establishing a resident's volunteer group to help undertake specific management tasks.

Residual operational phase effects

10.79 A summary of the significance of operational impacts on ecological receptors, together with proposed mitigation, compensation and enhancement proposals and resulting residual impacts is provided in **Table 10.10**.

Table 10.10: Residual effects of development operation.

Ecological receptor	Effect significance prior to mitigation	Summary of mitigation, compensation and enhancement proposals	Residual effect
Racecourse Plantation CWS and Belmore and Brown's CWS	Negative significant effect at the County level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Habitats (general)	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Notable plant species, including chaffweed and allseed	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Bats – tree roosting	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Bats – commuting and foraging	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Bats – building roosting	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect

Ecological receptor	Effect significance prior to mitigation	Summary of mitigation, compensation and enhancement proposals	Residual effect
Breeding birds	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Wintering birds	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Great crested newt	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Invertebrates	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Reptiles – grass snake	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect

Cumulative Impacts and Effects

10.80 A number of approved planning permissions and proposed site allocations are located within the area covered by the Growth Triangle Area Action Plan and are relevant to the Racecourse Plantations scheme. There is potential interaction between the application site and these nearby consented and pipeline schemes. This interaction could be through traffic generation and sharing road capacity, but could mainly arise through shared ecological impacts due to the green infrastructure networks that exist in this location.

10.81 The connectivity of the Site to the surrounding proposed allocations (GT6, GT7 and GT8) does not appear to have been assessed as part of the Growth Triangle Area Action Plan. However the proposal offers opportunities to improve the wider green infrastructure network, while mitigating against negative ecological effects from surrounding sites which would otherwise have the potential to have a detrimental impact upon the Site and its County Wildlife Site designation.

10.82 Full consideration to the potential use of Racecourse Plantations and the proposed new Community Woodland Park by residents of the current scheme and existing and adjoining new development would be considered as part of the preparation of the LEMP. However, it is considered entirely feasible that appropriate ecological protection measures can be established to ensure the ecological importance of the Site is retained and enhanced in line with the proposals outlined in this application, while providing an important green space for resident of the Racecourse scheme and other local users.

10.83 In the absence of the Racecourse Plantations scheme, and the associated opportunity to manage and control recreational use, it is likely that unmitigated negative effects on the County Wildlife Sites could occur due to the expanding local population and increased informal use of the Site, with further potential consequences locally if informal public access is prohibited.

Summary of Residual Impacts and Effects

10.84 Residual ecological effects are summarised in **Table 10.11**. Assuming all measures proposed here are implemented, the development will in the long-term have a significant positive effect for designated sites, higher value habitats, notable plants, bats, breeding birds, amphibians (including GCN), reptiles and invertebrates, principally as a result of the long-term compensation and enhancement proposals to be delivered through the Community Woodland Park.

Table 10.11: Summary of residual impacts and effects.

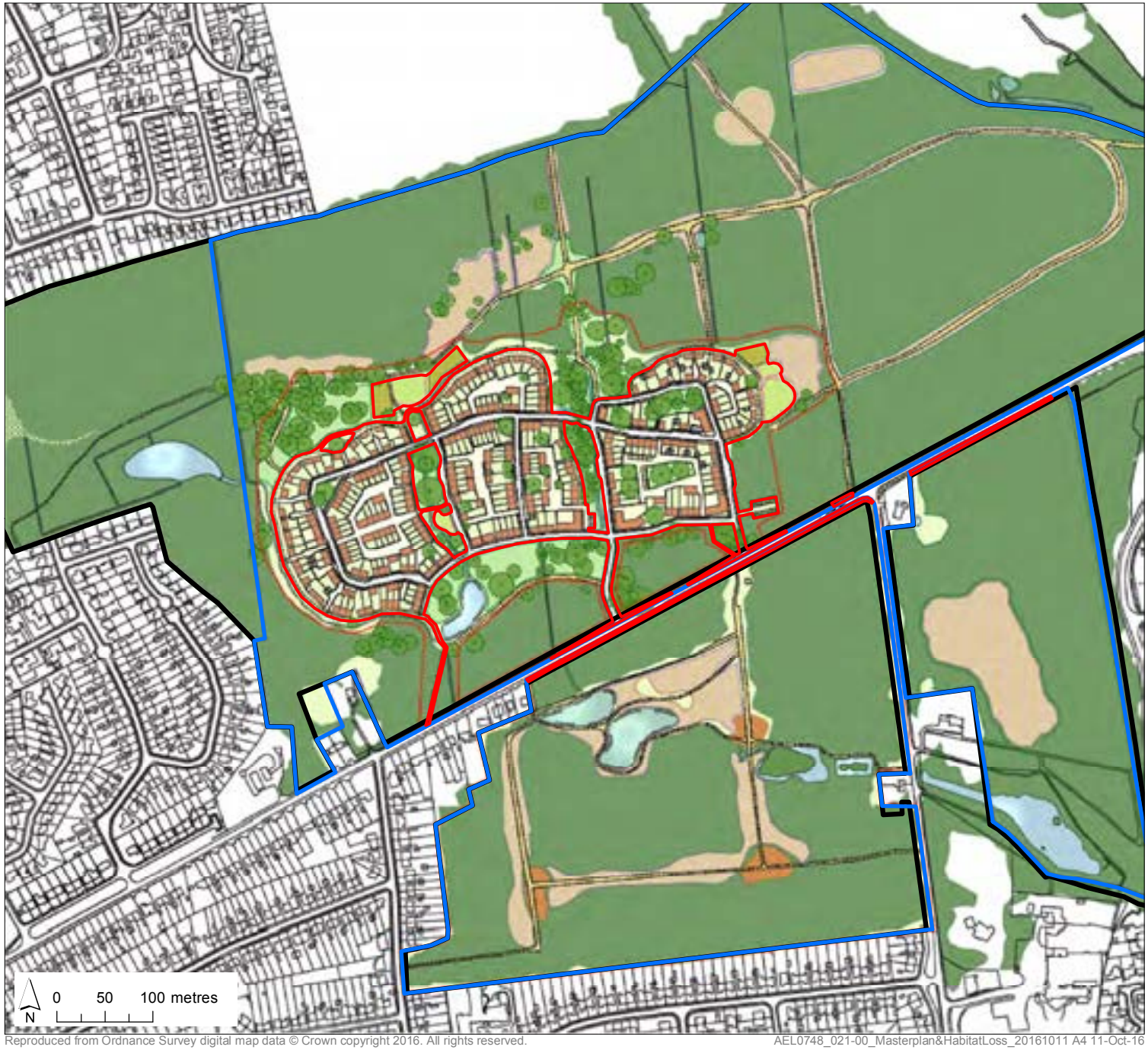
Important Ecological Feature	Pre-mitigation significance	Mitigation, compensation or enhancement (in addition to Good Practice Measures)	Residual impact significance
Construction Phase			
Racecourse Plantation CWS	Negative significant effect at the Local level	Protection of retained CWS under CEMP. Substantial compensation and enhancement to be provided within CWP.	Positive significant effect at the Local level.

Important Ecological Feature	Pre-mitigation significance	Mitigation, compensation or enhancement (in addition to Good Practice Measures)	Residual impact significance
Coniferous woodland	Negative significant effect at the Neighbourhood level	No specific mitigation as higher value habitats are targeted as part of the CWP proposal.	Negative significant effect at the Neighbourhood level.
Mixed plantation woodland	Negative significant effect at the Local level	Protection of unaffected habitats from accidental damage. Substantial compensation and enhancement to be provided within CWP.	Positive significant effect at the Local level.
Broad-leaved semi-natural woodland	Negative significant effect at the Neighbourhood level	Protection of unaffected habitats from accidental damage. Substantial compensation and enhancement to be provided within CWP.	Positive significant effect at the Local level.
Marshy grassland / open heathland	No significant effect	Protection of unaffected habitats from accidental damage. Substantial compensation and enhancement to be provided within CWP.	Positive significant effect at the Local level.
Notable plant species, including chaffweed and allseed	No significant effect	Pre-cautionary check for notable plants, with appropriate protection to be provided, and translocation if required. Substantial compensation and enhancement to be provided within CWP.	Positive significant effect at the County level.
Bats – tree roosting	No significant effect	Further ground level inspections and climbing surveys to be completed, as necessary.	No significant effect
Bats – building roosting	Negative significant effect at the Neighbourhood level	Precautionary inspection of building B1 to be completed. Building to be removed under low impact / EPS licence, as necessary. Integral bat boxes to be provided as part of new housing provision.	Positive significant effect at the Local level.
Bats - foraging	Negative significant effect at the Local level	New areas of valuable bat forage / commuting habitat to be created within the CWP.	Positive significant effect at the Local level.
Bats – commuting	No significant effect	New areas of valuable bat forage / commuting habitat to be created within the CWP.	Positive significant effect at the Local level.

Important Ecological Feature	Pre-mitigation significance	Mitigation, compensation or enhancement (in addition to Good Practice Measures)	Residual impact significance
Breeding birds	Negative significant effect at the Neighbourhood level	Ecologist supervised sensitive habitat clearance under CEMP. Bird box provision, including house sparrow terraces. Improved and more varied bird nesting / feeding habitat to be provided as part of CWP proposal.	Positive significant effect at the Neighbourhood level.
Wintering birds	Negative significant effect at the Neighbourhood level	New habitats to be created within the CWP may provide benefits for wintering birds.	No significant effect.
Great crested newt	No significant effect	Protection of Brown's Plantation as a wildlife reserve with restricted access.	No significant effect.
Invertebrates	Negative significant effect at the Neighbourhood level	Improved and more varied terrestrial invertebrate habitat, including a range of more open habitats, to be provided within the CWP.	Positive significant effect at the Local level.
Reptiles – grass snake	No significant effect	New habitats to be created within the CWP would include well-connected open heath and grassland habitats of significant benefit to reptiles.	Positive significant effect at the Neighbourhood level.
Operational Phase			
Racecourse Plantation CWS and Belmore & Brown's Plantation CWS	Negative significant effect at the County level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Habitats (general)	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Notable plant species, including chaffweed and allseed	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect

Important Ecological Feature	Pre-mitigation significance	Mitigation, compensation or enhancement (in addition to Good Practice Measures)	Residual impact significance
Bats – tree roosting	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Bats – commuting and foraging	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Bats – building roosting	Negative significant effect at the Local level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Breeding birds	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Wintering birds	Negative significant effect at the Neighbourhood level	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Great crested newt	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect
Invertebrates	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect

Important Ecological Feature	Pre-mitigation significance	Mitigation, compensation or enhancement (in addition to Good Practice Measures)	Residual impact significance
Reptiles – grass snake	No significant effect	Embedded design mitigation, sympathetic development master-planning / design / zoning, and appropriate management of recreational use within the CWP, with full details to be set out and implemented under a LEMP.	No significant effect



Racecourse Plantations

Development masterplan and habitat loss

study area

ownership boundary

development area

Figure 10.1

Map Scale @ A4: 1:6,000

Surveyed by: n/a	
Survey date: n/a	
Drawn by: RD	
Checked by: DP	
Status: Final	

Appendix 1
Invertebrates Recorded 2015-16

Invertebrates recorded 2015-16

Each of the species recorded has been assigned a status. The better-known groups of invertebrates were assessed for formal conservation status in Red Data Books and National reviews from the mid-1980s onwards, using criteria from the IUCN for the rarest (Red Data Book) species, and defining species believed to occur in 100 or fewer 10-kilometres squares of the National Grid as Nationally Scarce (Notable). The earlier IUCN criteria have been superseded, but only a fraction of the British invertebrate fauna has as yet been assessed, in published reviews, under the newer criteria.

Only two formal statuses, from the older system, is used in this report:

- **Nationally Scarce category B (Nb)** - Taxa which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and are thought to occur in between 31 and 100 10km squares of the National Grid or, for less well-recorded groups, between eight and twenty vice-counties.
- **Nationally Scarce (N)** - For less well-recorded groups, the Nationally Scarce category was not sub-divided (Na being applied to species believed to occur in 16 – 30 10km squares) and this simpler category was used.

Species not falling into a formal conservation category have been designated as either common or local. These statuses have no formal definitions, but have been applied as far as possible in accordance with published opinions, tempered by personal experience.

The list has also been checked for any Priority species in the UK Biodiversity Action Plans (Biodiversity Reporting and Information Group, 2007). These are also species listed as "species of principal importance for the conservation of biodiversity" in the NERC Act, 2006. No such species were recorded.

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Araneae				
Linyphiidae				
Linyphia triangularis	common		x	Low bushes and tall herbs in a range of habitats
Neriene clathrata	common		x	On the ground and amongst low vegetation in a range of habitats
Lycosidae				
Alopecosa pulverulenta	common	x		Ground-dwelling in a wide range of open habitats
Pardosa lugubris	common	x		
Pardosa prativaga	common	x		Found on the ground and amongst low herbage in a wide range of reasonably open habitats, including grassland, heathland, woodland clearings and rides, and wetlands
Pardosa pullata	common	x		Found on the ground and amongst low herbage in a wide range of reasonably open habitats, including grassland, heathland, woodland clearings and rides, and wetlands
Metidae				
Metellina mengei	common	x		Found in a very wide range of habitats; orb webs are spun amongst herbaceous vegetation and in low shrub foliage

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Metellina segmentata	common		x	Found in a very wide range of habitats; orb webs are spun amongst herbaceous vegetation and in low shrub foliage
Pisauridae				
Pisaura mirabilis	common	x		A wide range of reasonably open habitats with vegetation of at least moderate heights, such as rough grassland, woodland rides
Salticidae				
Euophrys frontalis	common	x		Found in a wide range of open habitats, especially frequent in grassland and heathland
Thomisidae				
Mimumesa vatia	local		x	Tall herbaceous vegetation with flowers, especially at transitions and in scrub/grass mosaics
Xysticus cristatus	common		x	Found in a wide range of reasonably open habitats
Xysticus lanio	local	x		Bushes and young trees, usually at the margins of open space in woodland
Opiliones				
Leiobuninae				
Leiobunum rotundum	common	x		Occupies a wide range of habitats, but usually where there are trees, shrubs, or walls, and scarce or absent in very open areas
Phalangiidae				
Mitopus morio	common	x		Found in a very wide range of habitats
Opilio parietinus	common	x		Found in a range of habitats; often synanthropic
Paroligolophus agrestis	common	x		Found in a very wide range of open and shaded habitats, and in all levels of vegetation from leaf litter to tree canopies
Phalangium opilio	common	x		Found in a wide range of habitats
Platybunus triangularis	common	x		Ground and field layers of damp woodland
Crustacea				
Philosciidae				
Philoscia muscorum	common	x		Predominantly a species of grassland, and especially associated with calcareous or neutral substrates, and intolerant of heavy shade
Porcellionidae				
Porcellio scaber	common		x	Found in a very wide range of habitats
Coleoptera				
Anthribidae				
Platyrhinus resinosus	Nb	x		Saproxylic; usually developing in the fungus *Daldinia concentrica* on ash
Cantharidae				
Malthinus seriepunctatus	common	x		Found in the canopy of broadleaved trees and shrubs, both in woodland and in more open conditions in hedgerows and parkland

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Rhagonycha fulva	common	x	x	Found in a wide range of reasonably open habitats, favouring taller grassland and habitat transitions with nectar flowers
Carabidae				
Bradycellus harpalinus	common	x		Ground-dwelling in open habitats, especially on well-drained substrates, including arable field margins, grassland and heathland
Pterostichus madidus	common	x		Ground-dwelling in a very wide range of habitats
Trechus quadristriatus	common	x		Ground-dwelling in open habitats, including arable field margins, brownfield and open grassland
Chrysomelidae				
Chaetocnema concinna	common		x	Found on various members of the Polygonaceae in a range of reasonably open habitats
Oulema melanopus agg.	common	x		The single female was not identifiable to species; the two possible species, *O. melanopus* and *O. rufocyanea*, are both widely distributed grass-feeding species found in a wide range of grasslands, other grassy habitats, and cereal fields
Psylliodes napi	common	x		Found on various members of the Brassicaceae in a range of reasonably open habitats
Cerylonidae				
Cerylon ferrugineum	common		x	Saproxylic; beneath the bark of broadleaved trees
Coccinellidae				
Coccinella septempunctata	common	x		A ubiquitous species found in almost any habitat
Propylea quattuordecimpunctata	common	x		A ubiquitous species found in almost any habitat, though mostly on herbaceous vegetation
Curculionidae				
Euophryum confine	common		x	Saproxylic; in decaying wood of a range of trees and shrubs
Sitona lepidus	common	x		A widespread and often abundant species of grasslands and other open habitats, feeding on species of *Trifolium*, especially *T. pratense* and *T. repens*
Sitona lineatus	common	x		A ubiquitous species found in all but heavily shaded habitats, feeding on a wide range of Fabaceae and a minor pest of peas and beans
Strophosoma capitatum	common	x		Woodlands and mosaic habitats, feeding on a wide range of broadleaved, and occasionally coniferous, trees and shrubs, including dwarf shrubs such as *Calluna* and *Erica*
Dytiscidae				
Agabus bipustulatus	common		x	Aquatic; found in a wide range of still water bodies
Agabus nebulosus	local		x	Aquatic; especially characteristic of recently created or fluctuating still waters n a mineral substrate
Dytiscus marginalis	common		x	Aquatic; breeds in a range of permanent or near-permanent still waters; mobile and sometimes transient
Hydroporus palustris	common		x	Aquatic; found in a wide range of still and slow-moving waters

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Hydroporus planus	common		x	Aquatic; often in small pools, sometimes temporary
Hydroporus pubescens	common		x	Aquatic; usually in small pools, often temporary
Hygrotus impressopunctatus	common		x	Aquatic; found in a range of still and slow-moving water, typically weedy and with a mineral substrate
Elateridae				
Agriotes pallidulus	common	x		Found in a range of habitats, most frequent at habitat transitions, woodland rides, and other sheltered but reasonably open habitats
Melanotus castaneipes	common	x		Saproxylic; in decaying wood of broadleaved trees
Geotrupidae				
Typhaeus typhoeus	local	x		Open habitats, especially heathland; burrows in sandy ground; larvae develop in stored dung, usually of rabbits
Gerridae				
Gerris substriatus	common		x	Aquatic; still or slow-flowing water bodies of reasonable size with large areas of open surface
Histeridae				
Hister unicolor	common	x		Carrion and dung; a mobile species found in a wide range of habitats
Margarinotus striola	common	x		Carrion and dung; a mobile species found in a wide range of habitats
Hydrophilidae				
Anacaena globulus	common		x	Aquatic; well-vegetated margins of still water
Anacaena limbata	common		x	Aquatic; margins of still water
Hydrobius fuscipes	common		x	Aquatic; well-vegetated shallow still water
Sphaeridium lunatum	common	x		Dung, usually of large herbivores
Leiodidae				
Nargus wilkini	common	x		A common species in leaf litter in woodland, and found more widely amongst dead and decaying vegetation
Sciodrepoides watsoni	common	x		Almost invariably present in leaf litter in woodland, and found more widely loose accumulations of leafy material
Malachiidae				
Malachius bipustulatus	common	x		Found in a wide range of reasonably open habitats; larvae reportedly in dead wood
Silphidae				
Nicrophorus vespilloides	common	x		Carrion; found in a fairly wide range of habitats
Oiceoptoma thoracica	local	x		Carrion; found chiefly in moist or sheltered habitats, and, in the south-east, most frequent in woodlands and wetlands
Silpha atrata	common	x		Found in a range of habitats, but most typical of woodland; a snail predator
Staphylinidae				
Euplectus karstenii	local	x		Saproxylic; beneath the bark of broadleaved trees

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Gabrius splendidulus	common		x	
Mycetoporus lepidus	common	x		A widely distributed species found on fungi and in decaying vegetable material in a range of habitats
Ontholestes murinus	common	x		Dung and carrion in a range of mostly open habitats; a predator of the larvae of other insects
Philonthus cognatus	common	x		A wide range of semi-natural habitats on damp soils
Philonthus decorus	common	x		
Philonthus tenuicornis	common	x		Dung, litter piles and other patch or transient habitats with high prey concentrations
Platydracus stercorarius	local	x		Open habitats with well-drained dry or damp, nutrient-poor soils
Tasgius morsitans	common	x		
Xantholinus elegans	common	x		Open early successional habitats and grassland
Throscidae				
Trixagus dermestoides	common	x		In a range of habitats, but especially open space in woodland; larvae have been reported to develop at the mycorrhizal surface of tree roots
Dermaptera				
Forficulidae				
Forficula auricularia	common		x	The common earwig; found in a wide range of habitats
Diptera				
Asilidae				
Machimus atricapillus	common	x	x	Open and mosaic habitats on dry soils
Neoitamus cyanurus	local	x		Clearings and rides in woodland
Bibionidae				
Bibio marci	common	x		Found in a wide range of open habitats; larvae in leaf litter and the surface layers of soil
Dilophus febrilis	common	x		Found in large numbers in a wide range of habitats; larvae in soil and leaf litter
Calliphoridae				
Calliphora vomitoria	common	x		A carrion -feeder, especially in woodland and other shady places
Lucilia caesar	common	x		A carrion-feeder, especially in open sunny habitats
Conopidae				
Sicus ferrugineus	common	x		Found in a wide range of reasonably open, flowery habitats; a parasite of bumblebees
Dolichopodidae				
Chrysotus gramineus	common	x		Found in a very wide range of reasonably sunny habitats; larvae are probably soil-dwelling predators
Dolichopus trivialis	common	x		Wetland

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Medetera truncorum	common	x		Adults on the trunks and branches of trees; larvae are predators of bark-burrowing beetles
Sciapus platypterus	common	x		Woodland and trees
Xanthochlorus ornatus	common	x		Woodland, especially damp woodland, and scrub
Xanthochlorus tenellus	common	x		Woodland, especially damp woodland, and scrub
Dryomyzidae				
Dryomyza anilis	common	x		Predominantly a woodland species, always in shady, often moist, habitats; larvae develop in a wide range of decaying organic material, including carrion, dung, and fungi
Opomyzidae				
Opomyza germinationis	common		x	Found in a wide range of open grassy habitats
Opomyza florum	common	x		Found in a wide range of open grassy habitats
Rhagionidae				
Rhagio lineola	common	x		Tree and shrub foliage at woodland margins, in hedges, and similar transitions; larvae soil-dwelling
Rhagio tringarius	common	x		Typically, a species of damp habitats with lush herbage, such as marshes and wet grassland, often in sheltered areas or at wood margins; occasional records from drier habitats may indicate use of ground which is only seasonally wet, but could be strays
Rhiniphoridae				
Melanophora ruralis	local	x		A parasite of woodlice; local, but records are very widely scattered and suggestive of significant under-recording; habitat preferences are unclear, but some records seem to be from open sandy habitats
Sarcophagidae				
Metopia argyrocephala	common	x		A cleptoparasite of a range of predominantly ground-nesting solitary bees and wasps, found in a range of open habitats
Sarcophaga haemorrhoa	common	x		A snail predator, reared from *Cepaea hortensis*; mostly a species of reasonably open habitats
Sarcophaga incisilobata	common	x		Larvae develop in dung, though there are records of rearing from a snail and a grasshopper; found in a range of mostly open habitats
Sarcophaga nigriventris	common	x		A predator, parasite or scavenger of a rather wide range of invertebrates, apparently including snails, grasshoppers, beetles and bees; found in a wide range of mostly open habitats
Sarcophaga roselleri	common	x		
Sarcophaga subvicina	common	x		Larval requirements uncertain, though related species are earthworm predators; found in a wide range of habitats
Sarcophaga vagans	common	x		A snail predator, reared from amber snails (Succineidae), but not confined to wetlands so probably with a wider host range
Sarcophaga variegata	common	x		A predator of earthworms, found in a wide range of habitats

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Stratiomyidae				
Chloromyia formosa	common	x		Found in a wide range of reasonably open, sunny habitats; lavae have been recorded from cow dung, rotting vegetation and grass tussocks
Chorisops tibialis	common	x		Adults are found amongst tree foliage and beneath tree canopies; lavrvae have been recorded from tree rot holes and grass tussocks
Syrphidae				
Chalcosyrphus nemorum	local	x	x	Typically, in wet woodland, where larvae develop under the bark of water-sodden dead roots or timber; adults may wander into drier areas
Episyrphus balteatus	common	x		Ubiquitous in reasonably open habitats; larvae aphidophagous
Eristalis interruptus	common		x	Adults wander widely, and are found wherever there are nectar flowers; larvae are aquatic
Eristalis tenax	common	x	x	Adults wander widely, and are found wherever there are nectar flowers; larvae are aquatic
Helophilus pendulus	common	x	x	Larvae are aquatic; found in a very wide range of wetlands, but intolerant of dense shade
Heringia sp.	local?	x		Two females were captured, and cannot confidently be identified to species; all members of the genus appear to be at least local, but are undoubtedly under-recorded; where the biology of the larvae is known, all are predators of aphids in tree canopies
Melanostoma mellinum	common	x		Ubiquitous in a wide range of habitats; larvae aphidophagous
Melanostoma scalare	common	x		Found in a wide range of habitats, but especially amongst lush vegetation in sheltered situations; larvae aphidophagous
Meliscaeva auricollis	common	x		Found near trees, in woodland, hedgerows and gardens; larvae aphidophagous
Meliscaeva cinctella	common	x		Woodland rides and margins, and habitat mosaics; larvae are aphid predators in tree and shrub canopies
Merodon equestris	common	x		Larvae develop in the bulbs of a wide range of plants; especially frequent in gardens
Myathropa florea	common		x	Usually saproxylic; larvae develop in water-filled tree hollows, rot-holes and decaying roots, but sometimes also in compost heaps and cow dung
Neoascia podagrica	common	x		Found in a wide range of reasonably open habitats; larvae are semi-aquatic in organically enriched conditions, such as wet compost heaps, cow dung, and manure
Platycheirus albimanus	common	x		Found in a very wide range of habitats; larvae are general aphid predators on herbaceous and woody plants
Platycheirus scutatus	common	x		Woodland edge and scrub, including hedges, parks and gardens; larvae aphidophagous
Syrphus ribesii	common	x		Found in a very wide range of habitats; larvae are general aphid predators on herbaceous and woody plants

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Xylota segnis	common	x	x	A primarily saproxylic species, the larvae especially in decaying sap and sap runs, and found in almost any habitat where there is suitable woody vegetation; also known to breed in other sorts of decaying vegetable material, such as silage and rotting potatoes
Tachinidae				
Eriothrix rufomaculata	common	x		Especially frequent in grassland, but recorded from a wide range of reasonably open habitats; a parasite of Lepidoptera larvae, but the host range seems surprisingly poorly known for such a common species
Lophosia fasciata	N	x		A parasite of shieldbugs, recorded from downland, coastal grassland and dry woodland
Phasia hemiptera	local	x		Primarily a species of habitat mosaics and transitions, most frequent in woodland rides and clearings, but also recorded from more open grassland; a parasite of shieldbugs
Tachina fera	common	x		A parasite of Lepidoptera larvae, found in a wide range of reasonably open habitats
Tipulidae				
Tipula fascipennis	common	x		Woodland edges and rides, hedgerows and similar mosaic/transition habitats, usually on moderately damp soils
Hemiptera				
Aphrophoridae				
Aphrophora alni	common	x		Habitat transitions and mosaics
Philaenus spumarius	common		x	Found in a range of reasonably open habitats; polyphagous on herbaceous plants
Cicadellidae				
Anoscopus albifrons	common	x		Dry to damp grassland, mostly on neutral to calcareous substrates
Aphrodes makarovi	common	x		Polyphagous on herbaceous plants; ground-dwelling; ubiquitous
Cicadella viridis	common		x	Juncus spp. in reasonably open damp habitats
Doratura stylata	common		x	Dry grassland
Evacanthus acuminatus	common	x		Moderate to tall herbaceous vegetation
Graphocephala fennahi	common	*x*		Rhododendron
Oncopsis flavicollis	common		x	Birch
Oncopsis tristis	common		x	Birch
Psammotettix confinis	common		x	Short dry grassland and other open habitats
Speudotettix subfusculus	common	x		Trees and shrubs, especially at wood margins and transitions or on isolated trees
Coreidae				
Coreus marginatus	common		x	Polygonaceae in reasonably open habitats
Corixidae				

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Hesperocorixa sahlbergi	common		x	Aquatic; typically, in shaded or organically rich still waters over mud
Delphacidae				
Conomelus anceps	common		x	Juncus spp. in reasonably open damp habitats
Javesella pellucida	common		x	Found in a wide range of reasonably open grassy habitats
Gerridae				
Gerris lacustris	common		x	Found on the surface of a wide range of still and slow-moving waters
Hydrometridae				
Hydrometra stagnorum	common		x	At well-vegetated margins of still and slow-moving water
Lygaeidae				
Cymus claviculus	common		x	*Juncus bufonius* in open, damp habitats
Cymus melanocephalus	common		x	*Juncus* spp. in reasonably open damp habitats
Drymus ryei	local	x		Open dry woodland, rides and fringes
Miridae				
Plagiognathus arbustorum	common		x	Found in a wide range of habitats on moderately tall herbaceous vegetation
Plagiognathus chrysanthemi	common		x	Open dry habitats
Stenodema laevigata	common		x	Found in a very wide range of grassy habitats
Trigonotylus ruficornis	common		x	Unshaded grassland
Nabidae				
Nabis limbatus	common	x		Damp grassland, heathland, marshes, woodland rides
Notonectidae				
Notonecta glauca	common		x	Aquatic; found in a wide range of still and slow-moving waters
Pentatomidae				
Pentatoma rufipes	common	x	x	Canopies of broadleaved trees
Psyllidae				
Cacopsylla melanoneura	common	x		Hawthorn
Hymenoptera				
Andrenidae				
Andrena dorsata	common	x		Open, dry flowery habitats with bare or sparsely vegetated ground for nesting
Andrena haemorrhoa	common	x		Found in a wide range of habitats; usually nests in grassland
Andrena minutula	common	x		Found in a wide range of habitats; nests in dry soil
Andrena scotica	common	x		Found in a wide range of flower-rich habitats
Apidae				

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Anthophora furcata	common	x		Found in a wide range of reasonably open, flower-rich habitats; nests in dead wood
Apis mellifera	common	x		The honey bee; found anywhere with flowers and at least moderate light penetration
Bombus campestris	common	x		The field cuckoo bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus hortorum	common	x		The garden bumble bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus lapidarius	common	x		The red-tailed bumble bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus lucorum	common	x		The white-tailed bumble bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus pascuorum	common	x		The common carder bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus terrestris	common	x		The buff-tailed bumble bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Bombus vestalis	common	x		The vestal cuckoo bee; found in various habitats, provided they are reasonably flower-rich and not heavily shaded
Nomada flava	common	x		Found in a wide range of reasonably open habitats; a parasite of mining bees
Nomada flavoguttata	common	x		Found in a wide range of reasonably open habitats; a parasite of small mining bees
Nomada leucophthalma	local	x		Reasonably open habitats with flowering sallows; a parasite of *Andrena clarkella* and *A. apicata*
Chrysididae				
Chrysis angustula	common	x		Found in a wide range of reasonably open habitats; adults often on walls, trees, posts and the like; believed to be a parasite of potter wasps, but the host associations are unclear
Colletidae				
Hylaeus communis	common	x		Found in a wide range of reasonably open and sunny habitats; nests in hollow plant stems, beetle burrows in wood, and walls
Hylaeus confusus	common	x		Found in a wide range of reasonably open and sunny habitats; nests in hollow plant stems and beetle burrows in dead wood
Hylaeus hyalinatus	common	x		Found in a wide range of reasonably open and sunny habitats; nests in the ground in light soils, in walls and cliffs
Crabronidae				
Argogorytes mystaceus	local	x		Sheltered transitions, especially woodland edges and rides; ground-nesting in dry banks; a predator of froghoppers

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Cerceris arenaria	local	x		Open sunny habitats on dry sandy soils with bare ground, where nest burrows are dug; a predator of weevils
Crossocerus megacephalus	common	x		A predator of flies, nesting in old beetle burrows in dead wood, and found in almost any reasonably open habitat where there are suitable nesting holes
Crossocerus podagricus	common	x		A predator of flies, nesting in dead wood and often using old beetle burrows; found in almost any reasonably open habitat where there are suitable nesting sites
Crossocerus quadrimaculatus	common	x		A ground-nesting species, found in a wide range of reasonably open habitat, predominantly on sandy soils; in woodland, partial to nesting in exposed soil on the root-plates of fallen trees
Mimumesa dahlbomi	common	x		Found in a wide variety of habitats, but usually in the vicinity of trees or shrubs; usually nests in dead wood, and preys on planthoppers (Delphacidae) and leafhoppers (Cicadellidae)
Pemphredon lugubris	common	x		Nests in dead wood, and is a predator of aphids and leafhoppers; found in almost any reasonably open habitat where its nesting requirements are met
Rhopalum clavipes	common	x		Nests in stems and old beetle borings, and is a predator of a range of small insects, especially Psocoptera; found in a wide range of reasonably open and sunny habitats, perhaps with a preference for mosaics and transitions
Trypoxylon attenuatum	common	x		Nests in hollow stems, and is a predator of small spiders; found in a very wide range of reasonably open habitats
Dryinidae				
Gonatopus bicolor	local	x		A parasite of planthoppers of the family Delphacidae; there appear to be rather few, scattered recent records of this species, but it is a member of an unpopular group and it is impossible to apply a status to it with any great degree of confidence
Formicidae				
Formica fusca	common	x		Found in a wide range of reasonably open habitats on dry ground, especially where stones, logs or stumps provide nest sites
Lasius flavus	common	x		Ground-nesting and largely subterranean; typically a grassland species, but found in a wider range of reasonably open sunny habitats
Lasius niger	common	x		A widely distributed species with a very wide habitat range, absent only from very damp and very shaded places
Myrmica ruginodis	common	x		A very tolerant, found in a wider range of habitats and avoiding only very wet, very dry and very heavily shaded habitats; a frequent species in woodland, where it nests preferentially in stumps and logs
Halictidae				
Lasioglossum calceatum	common	x		Found in a wide range of flower-rich open habitats; ground-nesting
Lasioglossum morio	common	x		Found in a wide range of reasonably open habitats; nests are clustered in patches of exposed soil

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Lasioglossum parvulum	common	x		Found in a wide range of reasonably open flower-rich habitats; ground-nesting, usually in sparsely-vegetated south-facing banks and slopes
Sphecodes crassus	Nb	x		A parasite of solitary bees of the genus *Lasioglossum*, found in a wide range of reasonably open habitats, usually on light soils; the formal status is no longer appropriate
Megachilidae				
Chelostoma florisomne	common	x		Nests in dead wood, feeds from buttercups; chiefly found at woodland/grassland interfaces, in open spaces amongst trees, or along hedgerows
Pompilidae				
Anoplius concinnus	common	x		Especially associated with places where dry open habitats abut water margins, nesting under stones and preying on lycosid spiders, but recorded from a wider range of open dry habitats, not always in the immediate vicinity of water
Anoplius nigerrimus	common	x		Found in a wide variety of reasonably open habitats, including dry grassland, scrub, brownfield, heathland and moorland; it nests in pore-existing cavities in, on or near the ground, and preys on a range of spiders
Arachnospila anceps	common	x		Reasonably open habitats on most soil types; ground-nesting, and preying of a wide range of spiders
Caliadurgus fasciatellus	local	x		Open habitats on sandy or sand/clay soils; nests in burrows, and preys on orb-web-spinning spiders; an elusive and under-recorded species, much more easily caught by traps than by active search
Dipogon variegatus	local	x		Recorded from a wide range of reasonably open habitats; nests in almost any sort of pre-existing cavity, and a predator of the common crab spider *Xysticus cristatus*
Evagetes crassicornis	common	x		Found in a wide range of open habitats; a cleptoparasite of other spider-hunting wasps of the genus *Arachnospila*
Priocnemis exaltata	common	x		A ground-nesting species found in a wide range of reasonably open habitats, and preying on hunting spiders from several families
Priocnemis schiodtei	Nb	x		Typically, a species of unshaded habitats on sandy soils, but also found in open areas in woodland and on limestone grassland; a ground-nesting species; the Nationally Scarce status is becoming less certainly appropriate as records accumulate
Tenthredinidae				
Ametastegia carpini	common	x		Larvae feed on species of *Geranium*, including *robertianum*, *pratense* and *sylvaticum*; widely distributed in a range of habitats
Athalia cordata	common	x		Larvae polyphagous on herbaceous plants, including *Plantago*, *Ajuga*, *Antirrhinum*; widespread in a range of habitats, often common in gardens
Priophorus pallipes	common	x		Larvae on woody Rosaceae, also recorded from birch; widespread in a range of habitats
Rhogogaster viridis	common	x		Larvae feed on a range of broadleaved trees and shrubs

Taxon	Status	Trap samples 2015–16	Casual records 16/8/16	Notes
Tenthredo zona	local	x		Open dry habitats; larvae on *Hypericum*
Vespidae				
Vespula vulgaris	common	x		A social wasp found in a wide range of habitats
Lepidoptera				
Elachistidae				
Agonopterix arenella	common	x		Found in a wide range of habitats, and feeds on a wide range of substantial Asteraceae, including thistles, knapweeds and burdocks
Nymphalidae				
Aglais io	common		x	The small tortoiseshell; *Urtica dioica* in unshaded places
Pararge aegeria	common		x	The speckled wood; grassy shaded places, especially woodland rides
Polygonia c-album	common	x	x	The comma; larvae on *Humulus*, *Ulmus*, occasionally *Urtica*; most frequent in habitat mosaics and transitions, especially hedgerows and woodland edge
Pyronia tithonus	common		x	The gatekeeper; grassy habitats in mosaics and transitions, especially hedgerows, woodland edges and rides and scrub-invaded grassland
Pieridae				
Pieris brassicae	common		x	The large white; feeds on a range of Brassicaceae in many open habitats; adults wide-ranging
Pieris napi	common		x	The small white; feeds on a range of Brassicaceae in many open habitats; adults wide-ranging
Mecoptera				
Panorpidae				
Panorpa communis	common	x		Habitat transitions and mosaics
Panorpa germanica	common	x		Habitat transitions and mosaics
Odonata				
Libellulidae				
Sympetrum striolatum	common		x	The common darter; breeds in a wide range of still water bodies; adults wander widely
Orthoptera				
Tetrigidae				
Tetrix undulata	common	x		The common groundhopper; found in reasonably open habitats with bare ground, usually in places that are at least seasonally damp
Tettigoniidae				
Meconema thalassinum	common	x		The oak bush-cricket; canopies of broadleaved trees
Psocoptera				
Caeciliusidae				
Caecilius fuscoapterus	common	x		Trunks and branches of broadleaved trees

Appendix 2

Racecourse Plantations Ecological Enhancement Strategy

Racecourse Plantations, Norwich

Ecological Enhancement Strategy
Summary Paper

Produced for SCC Norwich LLP and Thorpe & Felthorpe Trust

By Applied Ecology Ltd

July 2016

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Contents

Figures

1 Introduction

Background

1.1 The following report sets out an intended framework for the Ecological Enhancement Strategy (EES) for Racecourse Plantations, Plumstead Road East, Norwich, in relation to proposed residential development within the site.

1.2 The site consists of Belmore Plantation, Brown's Plantation and part of Racecourse Plantation, with a total area of approximately 70ha. Development would only take place on a small part of Racecourse Plantation, about 10ha of land, with the remaining 60ha being given over for recreation and nature conservation in perpetuity.

1.3 Significant opportunities exist for enhancing the site's overall biodiversity value as part of the proposal and alongside recreational provision, primarily through new habitat creation and a fundamental change from commercial forestry led management to one with specific ecological focus.

1.4 This EES framework provides a summary of the site's nature conservation status and ecological interests, and outlines the key principles that have guided early stages of development master-planning. The ecological benefits of the scheme are summarised with details of how these could be delivered as part of the proposal going forward.

2 Ecology Baseline

Nature Conservation Designations

County Wildlife Site

2.1 The site is currently designated as two separate County Wildlife Sites (CWS), namely Racecourse Plantation CWS (Ref.2041, 57.78ha) and Belmore & Brown's Plantations CWS (Ref.2042, 25.7ha).

2.2 Aside from the inherent value of these woodlands, a key feature of Racecourse Plantation CWS is reported to be the network of rides and paths which support components of dry heath and damp acid grassland.

Ancient Woodland

2.3 Evidence that part of Racecourse Plantation is planted Ancient Woodland site was submitted to Natural England (NE) in 2011[1, 2]. The evidence presented, which essentially hinged on the presence of large numbers of Ancient Woodland plants, was initially accepted by NE resulting in the eastern-side of the plantation being included on the Ancient Woodland register.

2.4 However, desk-top and field investigations undertaken by AEL and Oliver Rackham in 2012 refuted the Ancient Woodland status concluding that the map regression evidence was at odds with the indicator species found on site. It was noted that the majority of the Ancient Woodland indicator species were associated with machine rutted rides, and had most likely been brought in from other sites on the wheels of machinery during past forestry operations. Oliver Rackham also noted that the main ecological interest of the site was its heathland flora rather than its woodland habitat per se.

2.5 The additional evidence was considered by NE, and the woodland was subsequently removed from the Ancient Woodland register.

Habitats and Plants

2.6 All three woodland blocks support a mix of semi-natural broadleaved woodland, mixed plantation and conifer plantation, reflecting various combinations of past land use, active forestry management and periods of management neglect.

2.7 Stands of coniferous plantation are of least ecological value in habitat and protected species terms, with areas of semi-natural woodland dominated by native trees and shrubs of greater value, particularly where a well-developed and varied understorey has developed (e.g. parts of Belmore Plantation). However, much of the woodland lacks a well-developed understorey of woody shrubs, and has relatively poor structural diversity, with

[1] John Allaway (August, 2011). *Racecourse Plantation: Evidence that this is a Planted Ancient Woodland Site*.
[2] Kate Scrivener (July, 2011). *A Landscape Archaeological Investigation of Thorpe Woodlands, Thorpe St. Andrew, Norwich.*

some areas also supporting patches of rhododendron that further reduce the wildlife value of these areas.

2.8 Parts of Racecourse Plantation have and continue to be used for paintball and archery, and these activities, together with recent forestry operations, have resulted in habitat damage and trampling in some locations. A summary of the woodland types and disturbance factors is illustrated by **Figure 2.1**.

2.9 Overall, the woodland lacks a diverse and/or well established field layer of Ancient Woodland indicator species, which are largely restricted to open woodland rides for the reasons discussed above. The majority of the former forestry rides are in a neglected and overgrown condition supporting rank, neutral grassland, often with damp grassland patches in old wheel ruts, and with encroaching scrub. These rides are of limited botanical interest being composed of a range of commonplace grasses and herbs including Yorkshire-fog, silverweed, common bent, rough meadow-grass, herb-Robert, wood avens, white clover, self-heal, yarrow, false brome, soft-rush and greater bird's-foot-trefoil.

2.10 Some rutted rides in the northern part of Racecourse Plantation continue to support botanically-rich damp acid plant assemblages, with characteristic species including common yellow sedge, trailing St John's-wort, velvet bent, bristle club-rush, bog stitchwort, glaucous sedge and heath-grass, and very locally the notable species chaffweed and allseed.

Protected Animal Species

2.11 Protected species survey work has been completed in 2011 and is currently being updated. However, the main protected species interest across the three plantations site can be summarised as the presence of birds, bats and herpetofauna – notably great crested newt and grass snake.

2.12 Species survey work to date tends to support the habitat assessment completed as part of the biodiversity off-setting exercise (see Chapter 3) and indicate that the proposed development area within Racecourse Plantation is of relatively limited protected species interest compared to woodland areas beyond the development site.

Birds

2.13 Recent bird survey work has been completed to assess wintering and breeding bird use of the entire woodland complex (Racecourse, Belmore and Brown's Plantations) and enable comparison to be made of the value of the proposed development area within Racecourse Plantation with the rest of the site.

2.14 The analysis of these data is ongoing, but initial assessment of the current breeding bird data confirms a total of 37 species present across the three plantations (Racecourse 31 breeding species; Belmore 25; and Brown's 24). This means the site as a whole can be classed as being of Local value to breeding birds according to standard assessment criteria.

Racecourse Plantations
Norfolk

Habitats and key disturbances

Recent management and disturbances

- ARCH - archery
- CF - clear fell
- PB - paintball
- SF - selective fell
- TS - timber store

Habitats

- broad-leaved semi-natural woodland
- broad-leaved plantation woodland
- mixed plantation woodland
- coniferous plantation woodland
- dense scrub
- semi-improved grassland / tall ruderal
- continuous bracken
- marshy grassland
- semi-improved neutral grassland
- open water
- bare ground

Figure 2.1

Map Scale @ A3: 1:5,000

Surveyed by: RJH	
Survey date: 2 & 13 October 2015	
Drawn by: RJH/RD	
Checked by: DP	
Status: Final	

2.16 The proposed development area within Racecourse Plantation supports 20 species which is less than Local importance. It is also important to note that the proposed development area within Racecourse was found to support no breeding species that were not recorded anywhere else within Racecourse outside the development boundary meaning that the overall breeding bird species diversity of Racecourse Plantation is unlikely to be detrimentally impacted by habitat loss resulting from the proposed development.

2.17 Statistical analysis of total numbers of adult birds recorded per unit area confirm that total numbers on average are statistically significantly less ($p<0.05$) inside the proposed development area when compared to outside, with an average of 4.50 birds per hectare inside the development boundary compared to 6.65 per hectare outside.

2.18 Another point to note is that the highest breeding bird densities and numbers of woodland specialist bird species were recorded in Belmore Plantation despite this woodland area being disturbed by recreational users of the site (notably dog walkers) and being partly clear felled and thinned. We attribute this to the fact that Belmore has a more structurally diverse woodland understorey compared to Racecourse which itself is dominated by rhododendron in some locations or completely lacking an understorey as in the conifer dominated paintball area.

Bats

2.19 Concern has been raised that Racecourse Plantation forms an important bat flight corridor for rare bats and in particular barbastelle bat. This concern has been raised following historic bat catching and radio-tracking survey findings completed as part of ecological baseline assessment for the Norwich Northern Distributor Road. Our analysis of the available data suggests that this view is not supported by the 2012 radio-tracking data.

2.20 Three barbastelle bats were captured from locations outside Racecourse Plantation in 2012 and were radio-tagged and tracked. Of these bats only one had any tracked range that overlapped with Racecourse Plantation. This bat was referred to as Bat 43 and had a total calculated range of 660 ha of which 19 ha (3%) was within Racecourse Plantation, and only 1.2 ha (0.2%) coinciding with the proposed development area.

2.21 Automated bat detector survey completed across Racecourse and Brown's Plantation by AEL over the period April to June 2011, and bat catching survey work completed in Racecourse Plantation in July 2011 also indicates that Racecourse Plantation is not important habitat for barbastelle bats, with no barbastelle bats being caught during the two bat catching surveys, and only a single barbastelle bat call recorded on one occasion after 51 nights consecutive recording from two woodland ride edge locations inside Racecourse Plantation.

2.22 Bat catching survey work is currently ongoing in Racecourse Plantation with one of three programmed bat catching sessions using sonic lures, harp traps and mist nets having been completed to date in early June 2016. A total of 17 bats of four species (common pipistrelle (seven bats), soprano pipistrelle (five bats), brown long-eared (four) natterer's (one)) were captured over three consecutive nights from 12 trap locations.

2.23 The specialist consultant employed by AEL to complete the work is a nationally recognised bat ecologist with extensive experience conducting bat catching surveys across England. His initial observations of the proposed development area within Racecourse Plantation

was that it was not of high ecological value for bats - "*the woodland has a high proportion of non-native species with there being places throughout the wood having notable areas of Rhododendron present. The woodland species mix was not considered ideally suited for many bat species with a high proportion of the woodland consisting of sweet chestnut and conifer, there were notably fewer areas with native broadleaf woodland which is identified as being more highly suited for bats (as having higher insect abundance and diversity) and in many cases these areas consisted of immature trees or semi-mature plantations*".

2.24 While the bat catching work is ongoing and these are initial observations they are in line with the results of previous bat surveys of the site, and indicate that Racecourse Plantation is not important for barbastelle bat, and that the proposed development area is of limited value for bats compared to more mature broadleaf woodland.

2.25 Automated bat detector work is also currently underway in Racecourse Plantation. Results collected so far (May-June 2016) have been analysed and verify that bat species diversity is significantly greater ($p<0.05$) outside the proposed development boundary than within it. Six bat species were recorded outside the development site and three within in it. Despite the difference in bat species diversity, there was no statistically significant difference between total numbers of bat calls recorded within and outside the development site over the May-June survey period.

2.26 In terms of bat species diversity the automated bat call recordings from across the site are dominated by common pipistrelle calls (90% of all calls) followed by soprano pipistrelle (9.5%). With the remaining 0.5% being made up by *Nyctalus*, *Myotis*, serotine and barbastelle.

2.27 So far only a single set of barbastelle bat calls have been recorded by the automated bat detectors in 2016. This was a single pass in early June from a detector located outside the development site in Racecourse Plantation.

2.28 In summary, bat survey results so far confirm that proposed development site location within Racecourse Plantation woodland is not important for barbastelle bat, and that development of this woodland area for residential would not have any significant adverse impact on the integrity of the local barbastelle bat population.

Herpetofauna

2.29 Historic reptile surveys of the site have verified the presence of a widely distributed grass snake population across the site. Current reptile survey has confirmed that grass snake continues to be widely distributed within the site, with a breeding population centred in the more open areas of Racecourse Plantation (outside the proposed development area), and around the lake within Brown's Plantation.

2.30 Historic amphibian surveys have verified that great crested newt (GCN) is present in a single waterbody within Brown's Plantation and is absent from elsewhere in the wider site. Current survey work completed in 2015-2016 has verified GCN presence in the same waterbody within Brown's Plantation and GCN absence from all other standing waterbodies across the wider site.

2.31 GCN can be considered to be absent from Racecourse Plantation on the basis of historic and current GCN survey, and is not a material consideration with respect to the proposed residential development in Racecourse Plantation.

3 Ecological Enhancement Strategy

Design Principles

3.1 The nature conservation and biodiversity interests of the site have been acknowledged from the outset of the project, with the over-riding objective to deliver a high quality small scale residential scheme, alongside long-term recreational and ecological benefits.

3.2 The scale of development currently proposed was established using a biodiversity off-setting metric to determine the level of development-related impact that could be offset through onsite measures alone, and result in biodiversity benefits overall. An illustration of the resulting development scenario is shown by **Figure 3.1**.

3.3 Proposed development would be restricted to lower value habitats, notably conifer and mixed plantation woodland that is already damaged by paintball activity. Similarly, proposed areas of new heathland creation, and other management enhancements, focus on lower value habitats where greatest enhancement can be achieved.

3.4 The current plans are that Belmore Plantation will be managed for the provision of public recreation, Brown's Plantation will be managed for nature conservation (including GCN), and the undeveloped part of Racecourse Plantation will be managed for a mix of nature conservation and recreation.

3.5 In order achieve the level of enhancement required, public access to ecologically sensitive areas may need to be restricted by zoning and/or select use of fencing to restrict human-related damage and disturbance effects, and potentially deer browsing.

Key Ecological Benefits

3.6 The potential ecological benefits that could be delivered as part of the proposed development are to be agreed, but in essence are unlikely to be achieved without the security of future funding enabled by the proposed residential development, and can be summarised as:

- The retention of a woodland landscape type across Racecourse Plantation with existing ecological connectivity maintained from north to south and east to west across the woodland.
- The creation of a more biodiverse and ecologically valuable habitat mix across the site, including the creation of substantial areas of new open heathland habitat that would be managed in perpetuity to meet agreed ecological and biodiversity objectives.
- The potential future extension of the CWS site boundary in Brown's Plantation to incorporate an area of proposed heathland creation that is currently coniferous plantation of limited ecological value.
- Species specific enhancement measures, including:
  - pond restoration and management for the benefit of great crested newt and other wetland wildlife;
  - creation of open habitats and connected rides for the benefit of reptiles; and

  - provision of integrated bat and bird boxes into new buildings and on retained trees across the site to enhance bat roosting and bird nesting opportunity.
- A fundamental shift from commercial forestry led management to ecological driven management that would enable the sites ecological potential to be realised, for instance protection of existing higher value habitats, retention of desirable broadleaved species and promotion of woodland structure and ground flora interests.
- Protection of the undeveloped woodland in perpetuity with management control handed to an appropriate management vehicle.

3.7 It is clear that the sensitive development planning that has been undertaken to date will ensure that the development will:

- result in only a minor loss of poor quality woodland from within the CWS;
- maintain the most important ecological and biodiversity receptors within the CWS;
- maintain existing ecological connectivity and wildlife corridors across the CWS;
- enable new ecologically valuable habitats to be created to compensate for development related ecological losses such that the overall integrity of the CWS and its current function as an ecological hub will be maintained and enhanced; and
- secure the long-term future and ecological integrity of the CWS through an agreed and funded management plan.

Racecourse Plantations
Norfolk

Illustration of development scenario

- Development area
- Heathland creation (mainly in areas of conifer plantation)
- Current woodland condition to be improved by management
- Current condition to be maintained (or improved) by management

Figure: 3.1

Map Scale @ A3: 1:5,000

Surveyed by:	
Survey date:	
Drawn by: RJH	
Checked by: DP	
Status: Final	

APPENDIX 03 SECRETARY OF STATE DIRECTION WRITTEN STATEMENT

Town & Country Planning (EIA) Regulations 2011
Secretary of State Screening Direction – Written Statement

Application name:	Racecourse Plantation
SoS case reference:	NPCU/EIASCR/K2610/76944
Schedule and category of development:	Schedule 2 10b – Urban development projects

Full statement of reasons as required by 4(5)(a) of amended EIA Regulations including conclusions on likeliness of significant environmental effects.

Planning Practice Guidance states that for urban development projects an Environmental Impact Assessment is unlikely to be required for the redevelopment of land unless the new development is on a significantly greater scale than the previous use, or the types of impact are of a markedly different nature or there is a high level of contamination.
Sites which have not previously been intensively developed:
(i) area of the scheme is more than 5 hectares; or
(ii) it would provide a total of more than 10,000 m^2 of new commercial floorspace; or
(iii) the development would have significant urbanising effects in a previously non-urbanised area (e.g. a new development of more than 1,000 dwellings). Key issues to consider are Physical scale of such developments, potential increase in traffic, emissions and noise.

(a) – (f) regarding characteristics of development

The proposed development involves up to 300 homes and the creation of a community woodland park on a site comprising a commercial forestry plantation.

Having regard to the characteristics of the development, the Secretary of State does not consider that a significant environmental effect is likely in terms of use of natural resources, the production of waste or the risk of accidents. In terms of pollution and nuisances, the Secretary of State accepts that there is likely to be some impact on air quality resulting from the increase in traffic generated. However, the site is not within an Air Quality Management Area and there is no information to suggest that any parts of the highway network susceptible to congestion or other environmental constraint would be affected to the extent that a significant environmental effect is likely.

Planning Practice Guidance states that the local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development. The Secretary of State notes that, in its screening opinion, the Council refers to three sites allocated in the Growth Triangle Area Action Plan (AAP) (July 2016), which forms part of Broadland District Council's Local Plan. The sites (GT6, 7 and 8) are identified for over 2000 new homes and lie to the north and east of Racecourse Plantation. While it appears that only one of the sites allocated in the AAP has planning permission, the Secretary of State accepts that it is reasonably foreseeable that they will be developed.

However, the site is not within a sensitive area and does not enjoy any statutory protection in terms of landscape, heritage or importance to protected species. While the site is a County Wildlife Site, and cumulative impact in this respect cannot be ruled out, the Secretary of State is not persuaded that this is a matter which in itself suggests that a significant environmental effect is likely. He considers that this matter can be addressed through the normal planning process without requiring an environmental statement. The Secretary of State does not consider that the proposal in cumulation with approved and reasonably foreseeable development would affect populations of protected species to the extent that a significant environmental effect is likely.

The Secretary of State does not consider that there is sufficient information to suggest that a

significant environmental impact is likely in terms of the cumulative impact on the highway network designated as air quality management areas or which are susceptible to congestion or any other environmental constraint. Additionally, while the Council, in its Screening Opinion, refers to facilities and provisions that are likely to be used by this development and others approved or reasonable foreseeable, the Secretary of State does not consider that there is sufficient information to suggest that a significant environmental effect is likely for this reason. *2 (a)-(c) (i) – (viii) regarding location of development* The site is not within a sensitive area and on the basis of the information, the Secretary of State does not consider that a significant environmental effect is likely in terms of landscapes of historical, cultural or archaeological significance. Although the site is within a County Wildlife Site, the Secretary of State does not consider that there is information to suggest that populations of protected species would be affected to the extent that a significant environmental effect is likely necessitating an environmental statement. *3(a) –(e)regarding characteristics of potential impact* Having regard to the scale and characteristics of the development, the Secretary of State considers that the extent of the impact would be contained mainly within the local area. He does not consider that a significant environmental effect is likely having regard to the magnitude and complexity of the proposals.

Is an Environmental Statement required?	No

Name	Dave Moseley
Date	6 September 2016