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Technical Note

Project:	**Land at Lynchmead Farm, Weston-Super-Mare**
Title:	**Response to ecological comments made by North Somerset Council**
Date:	20 October 2021
Client:	Mead Realisations Ltd
Reference:	211013_P886_Lynchmead Farm_Ecology Response: October 2021
Prepared:	Lauren Stothert BSc MCIEEM
Approved:	Dr. Matt Cowley CEnv MCIEEM

1 Introduction

1.1 This Technical Note has been prepared by EAD Ecology on behalf of Mead Realisations Ltd in relation to the proposed development at Lynchmead Farm, Weston-super-Mare (North Somerset Council (NSC) planning reference 20/P/1579/OUT).

1.2 A previous Technical Note was issued on 31 March 2021 to address the formal consultation response from Susan Stangroom of North Somerset Council.

1.3 Kate Jeffreys of North Somerset Council provided a second formal consultation response to the application in relation to ecological to matters on 01/09/2021. A meeting was also held on 16 September 2021 to discuss this response. This Technical Note addresses matters raised in the additional consultation response and meeting.

NSC comment	Response
Habitats Regulations Assessment	
"There remains a lack of sufficient information to enable NSC to determine the ecological effects and to complete the necessary Habitat Regulation Assessment."	The information in the following sections, together with the previously submitted EcIA report (April 2020) and March 2021 consultation response, provide sufficient information to enable NSC to undertake the Habitats Regulations Assessment, in accordance with its role as the competent authority. In summary: **Severn Estuary SAC/SPA** It was agreed at the meeting of 16 September that NSC will identify and cost suitable mitigation in relation to the potential in-combination impacts of increased recreational pressure on the Severn Estuary SAC/SPA. As discussed at the meeting, it is considered that there would be no risk of such effects for the development in-isolation, but that proportionate mitigation should be applied to all new residential development within the zone of influence of the estuary. It is understood that the zone of influence has not been established by NSC to date, but that a 7.7km zone has been identified by Stroud District Council, and it would be appropriate to adopt this zone in the absence of additional evidence from NSC. The applicant has agreed that a contribution towards the strategic mitigation (e.g. for measures at Woodspring Bay) can be provided. This will enable NSC to conclude that there would be no effect on the integrity of the Severn Estuary European Sites as a result of this impact pathway. The site assessment and surveys set out in the EcIA confirm that the site is very unlikely to be used by significant populations of waterfowl associated with the Severn Estuary assemblage. The development would not, therefore, impact 'functionally linked land' associated with the estuary. NSC can therefore conclude no likely significant effect in respect of this impact pathway. In accordance with the conclusions of the EcIA, no water quality impacts on the estuary are predicted, through implementation of standard pollution control measures, during and post-construction. NSC can therefore conclude no likely significant effect in respect of this impact pathway.

NSC comment	Response
	North Somerset and Mendip Bats SAC As set out in the EcIA, the site lies outside of the area identified as a 'Bat Consultation Zone' (BCZ) in respect of North Somerset and Mendip Bats SAC. The distance from the closest component of the SAC (5.7km) indicates that it is unlikely that horseshoe bat species recorded using the site would be associated with the core designated population. Nonetheless, the development incorporates measures to ensure continued permeability of the site to light-sensitive species, including greater horseshoe bats; further information is provided in the following sections. While these measures are not proposed as mitigation in relation to the SAC, they would also ensure that if bats associated with the SAC use the site, there would be no significant effect on their ability to pass through the site, and no effect on the conservation objectives for the qualifying bats would be likely. Accordingly, NSC can conclude that there would be no likely significant effect on the SAC as a result of the proposed development.
Clarification regarding the ecological assessment of the application site in relation to the wider survey area	
A request was made to make a clear distinction between the application site and the wider surveyed area.	The survey area for the ecological surveys detailed in the EcIA report which was submitted with the planning application extended beyond the proposed development site boundary. The boundaries for the survey area and the application area are shown on the appended survey plans (Appendix 1). This variation can be attributed to Mead Realisations Ltd initially exploring the possibility of a larger application area. By the time the current application area had been finalised, Phase 2 ecological surveys of the wider area had commenced. This was not considered to be a limitation, as the ecological survey data for the wider area did not vary significantly from that from the application area, and in fact provided information from the surrounding habitats which would not otherwise be available. The variations in the ecological survey results between the application area and the survey area are summarised below: • Plants; no notable or invasive plant species were recorded or considered likely to occur within the survey area or application area. • Invertebrates; the habitats within the survey area and application area were likely to provide habitat for common and widespread invertebrates. The presence of notable species was considered unlikely within either area. • Amphibians; suitable terrestrial habitat for common amphibians was recorded within the survey area and application area. Great crested newt was considered absent from both areas. • Reptiles; field margins within the survey area and application area supported a 'Low' population of grass snake (maximum count of two within the application area).

NSC comment	Response
	• Birds; both survey area and application area provided foraging and nesting habitat for a range of species, including widespread but declining bird species. Neither area was considered to be of importance to waterfowl species listed on the citation for the Seven Estuary SPA, and snipe was only recorded within the wider survey area, outside of the application boundary. • Hazel dormouse; not recorded within either survey area or application area, and considered absent from both areas. • Badger; a two-entrance outlier sett was recorded within the application area, and a partially-used subsidiary badger sett was recorded within the wider survey area; both areas provided foraging habitat and movement corridors for badgers. • Bats; At least ten species were recorded foraging or commuting within the application area and the survey area, including greater and lesser horseshoe, barbastelle, noctule, soprano pipistrelle and long-eared bat, which are Priority Species. No significant differences in activity levels or species diversity were observed between the two areas. An updated review of the bat survey data for the application area only is provided in Appendix 2. A number of trees within the survey area were identified as having bat roost suitability. Further dusk emergence surveys were undertaken of one tree (Tree 13) within the application area which would be impacted by the development. No bat roosts were identified within Tree 13. • Otter and water vole; not recorded within either survey area or application area, and considered absent from both areas. • Hedgehog and water shrew; both the survey area and application area provided suitable habitat for these species, and their presence was assumed. BNG calculations for the proposed development, using the Defra Metric 2.0, were provided in the previous Technical Note, which confirmed that the development has potential to achieve 'net gain' >10% in respect of both area habitats (33.32% gain) and hedgerows (51.87% gain). These relate only to the application area.

NSC comment	Response
Reinterpretation of the existing bat data for both sites, to provide increased detail, as requested by the NSC Ecologist and Natural England.	
"The interpretation of the [bat] data, and the bat mitigation measures, including with regard to lighting, are currently too vague to determine with confidence the likely effects of the development on bats and whether the suggested mitigation is sufficient. There is also no information on whether any bat calls were recorded close to sunset or sunrise, which might indicate a nearby roost."	An updated review of the bat data is provided in Appendix 2, which includes only data collected from the application area, and excludes data from the wider survey area. Within Appendix 2 are tables which show greater horseshoe bat (GHS) registrations per night and the number of registrations occurring within one hour of sunset/sunrise. An Excel spreadsheet with the dates and times of all bat registrations recorded within the application area will also be provided. • Analysis of the temporal activity patterns of GHS registrations are generally indicative of commuting and foraging activity within the application area, with relatively low number of registrations recorded within one hour of sunset/sunrise. The results are not generally indicative of GHS commuting from a roost in the local area. The desk study did not identify any GHS roosts within a 4km search radius of the survey area (BRERC, 2018). • GHS were recorded at both static detector locations, although activity was highest at Static Detector Position 2, located in the centre of the site. • Overall seasonal variation in GHS activity within the application area exhibited a peak in activity levels in April/May and August and it is considered that suitable habitats within the application area are used for commuting and foraging throughout the spring / summer activity period.
Updated Parameters Plan to identify the 0.5 lux zones within the development.	
It was agreed at the meeting that full lighting details are not required at this stage. However, NSC requested additional lighting details via a parameters plan, including details of how areas of 0.5 lux lighting levels can be realistically retained.	An updated Parameters Plan for the development has been prepared (refer to Appendix 3), to show the areas of the site identified as 'dark corridors', within which lighting levels would be maintained at under 0.5 lux at ground level and at 2m above the ground. These dark corridors would allow permeability of the site for bats and other nocturnal wildlife, providing multiple north-south and east-west routes. Where new roads cross these dark corridors, bat 'hop-overs' will be created with short sections of road remaining unlit. These dark corridors would be achieved through the use of the following lighting design features: • Narrow Spectrum lights with no UV content; e.g. warm white (<3500K) LED. • Variable lighting regimes (motion sensors or part night lighting) in areas close to hedgerows and trees. • Directional downlights - illuminating below the horizontal plane. • Reducing the height of light units (whilst ensuring light does not spill above the vertical plane). • Use of use of fore/rear shields to restrict light direction. • Avoidance of upward light (e.g. ground mounted floodlights up-lighting trees, buildings and vegetation).

NSC comment	Response
	In addition, landscape proposals would be designed to provide additional screening, e.g. through new native hedgerow planting alongside corridors (see Appendix 3). As detailed in the EcIA report, separate construction and operation phase lighting plans would be prepared following receipt of outline planning approval, and would be subject to review by an ecologist with any lighting along adopted highways subject to agreement with North Somerset Council. The lighting design for the site during operation would seek to provide adequate lighting within the public highways for basic security and orientation of residents, whilst controlling light spill to the ecologically sensitive areas. The design team have reviewed the dark corridors plan and subject to detailed design at the reserved matters stage are content that appropriate dark corridors could be achieved. Full adherence to the parameters set out above and in Appendix 3 could be secured by Planning Condition.
Further detail of the proposed habitat creation for greater horseshoe bats.	
Further detail was requested by NSC regarding the area and types of proposed habitat creation which would be suitable for greater horseshoe bats.	As outlined above, a significant proportion of the development site has been designated as a dark corridor. The dark corridors would total 1.29ha (26% of the total site area), and would comprise areas of new landscape planting suitable for foraging bats, including wildflower meadow, wetland habitats comprising both new swale network and associated marginal habitats, native shrub and hedgerow planting, and new orchard. Approximate areas of new habitat creation within the development suitable for foraging bats are provided below: • Wildflower meadow: 1.34ha • Native scrub planting: 0.19ha • Wetland habitats, including swale network and marginal habitats: 0.51ha • Community orchard: 0.04ha • Native species-rich hedgerow: 1.43km These habitats would be suitable for a range of invertebrate species and would provide suitable foraging habitat for a range of bat species, including greater horseshoe bat. A Landscape and Ecological Management Plan (LEMP) would be produced to detail how retained and proposed habitats will be managed in the long-term. All detailed measures would align with the parameters set out above, and could be secured by Planning Condition.

NSC comment	Response
Additional information to confirm that grassland within Lynchmead Farm would not qualify as the Priority Habitat 'Coastal and Floodplain Grazing Marsh'.	
"Much of the study area is clearly shown on the MAGIC website as Coastal and Floodplain Grazing Marsh under the 'habitats and species' tab…. there is the distinct possibility that much of the site comprises Coastal and Floodplain Grazing Marsh priority habitat and should be treated as such by the applicants, including appropriate consideration within the BNG calculations. More information is required from the applicants to address this issue."	The UK Biodiversity Action Plan Priority Habitat description for 'Coastal Floodplain Grazing Marsh' defines grazing marsh as "*periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed and some are cut for hay or silage. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds; although they may abut with fen and reed swamp communities*." Data set out in the previous Technical Note provided evidence that the site is not periodically inundated, and an update botanical survey of the grassland and ditches within the application area was undertaken on 29.09.21 to provide further evidence that the ditches onsite have a low botanical diversity. The full results of this survey are provided in Appendix 4. The grassland within all four fields was considered to be species poor, dominated by perennial rye-grass, Yorkshire fog, creeping thistle, cocksfoot and creeping bent, with broad-leaved dock and false oat-grass also frequent. Vegetation within the ditches was dominated by the grassland species already listed, and woody species from the associated hedgerows, comprising elder, hawthorn, blackthorn, elm, ash, field maple, dogwood, rose sp., poplar sp., willow sp. and bramble. Aquatic vegetation was limited to floating sweet-grass and common reed (both recorded as rare and only within one ditch). We have also reviewed the Countryside and Community Research Institutes document 'Evaluating the Contribution from AES to the conservation of Coastal & Floodplain Grazing Marsh' (CCRI, 2020)[1], produced on behalf of Defra/Natural England, which contains a list of 'key characteristics' of grazing marsh landscapes, provided in the sub-table below. None of the attributes match the grassland and ditches within the application area. This document also states that '*Potentially, a large amount of the area that is currently mapped in NE's Habitat Inventory as 'grazing marsh' does not conform to this standard and in some cases the wildlife value may be quite low*.' We believe this to be the case with the habitat within the application area.

[1] Short C, Roberts V, Breyer J, Staddon P, Tooze G, James N, Nolan T and Metcalf K. (2020) Evaluating the Contribution from AES to the conservation of Coastal & Floodplain Grazing Marsh, Report to Defra/Natural England. Countryside and Community Research Institute: Cheltenham.

<table>
<tr><th>NSC comment</th><th>Response</th></tr>
<tr><td></td><td>
<table>
<tr><th>‘Key characteristics’ of grazing marsh landscapes, as described in the CCRI (2020) document</th><th>Comparison with application site</th></tr>
<tr><td>‘Periodic flooding’ and a sufficiently high and dependable water table to maintain aquatic life in the ditches.
and
Water levels that may be managed to a greater or lesser extent, or could follow natural hydrological functioning.</td><td>The Flood Risk Assessment for the site states that the "site is at risk of tidal flooding, but it is protected by defences which are designed to prevent inundation from this source. It is not impacted by river/fluvial flooding. It has limited susceptibility to surface water flooding. Therefore, the site will not become periodically inundated from flooding.” Anecdotally, it is also noted that the landowner states that the land hasn’t been flooded for somewhere in the region of 60 years.</td></tr>
<tr><td>Hosts a range of breeding waders (e.g. snipe, lapwing and curlew) and/or wintering wildfowl (e.g. Bewick’s and whooper swans).</td><td>The wintering bird surveys recorded no waterfowl species listed on the citation for the Seven Estuary SPA / Ramsar Site on, or adjacent to, the site or wider survey area. The only species recorded within the application area that are associated with coastal and estuarine habitats were herring gull and black-headed gull, which were recorded flying over the site, however these species were not recorded foraging on-site. The site is unsuitable for breeding waders.</td></tr>
<tr><td>Undulating topography and a sufficiently high-water table to sustain temporary or permanent open water and/or swamp.</td><td>The site has a flat topography, and as detailed above, has limited susceptibility to surface water flooding but is not subject to frequent inundation. There are no areas of permanent open water or swamp within the application area or immediately adjacent, and the wet ditches onsite were shallow with very limited aquatic vegetation,</td></tr>
<tr><td>Contain rich plant and invertebrate assemblages in the ditches.</td><td>As shown by the botanical survey (full results and photographs provided in Appendix 4), the grassland is species poor and the ditches have a very limited aquatic vegetation. Due to the heavy shading of these ditches by the associated hedgerows, the invertebrate assemblage is also considered likely to be limited.</td></tr>
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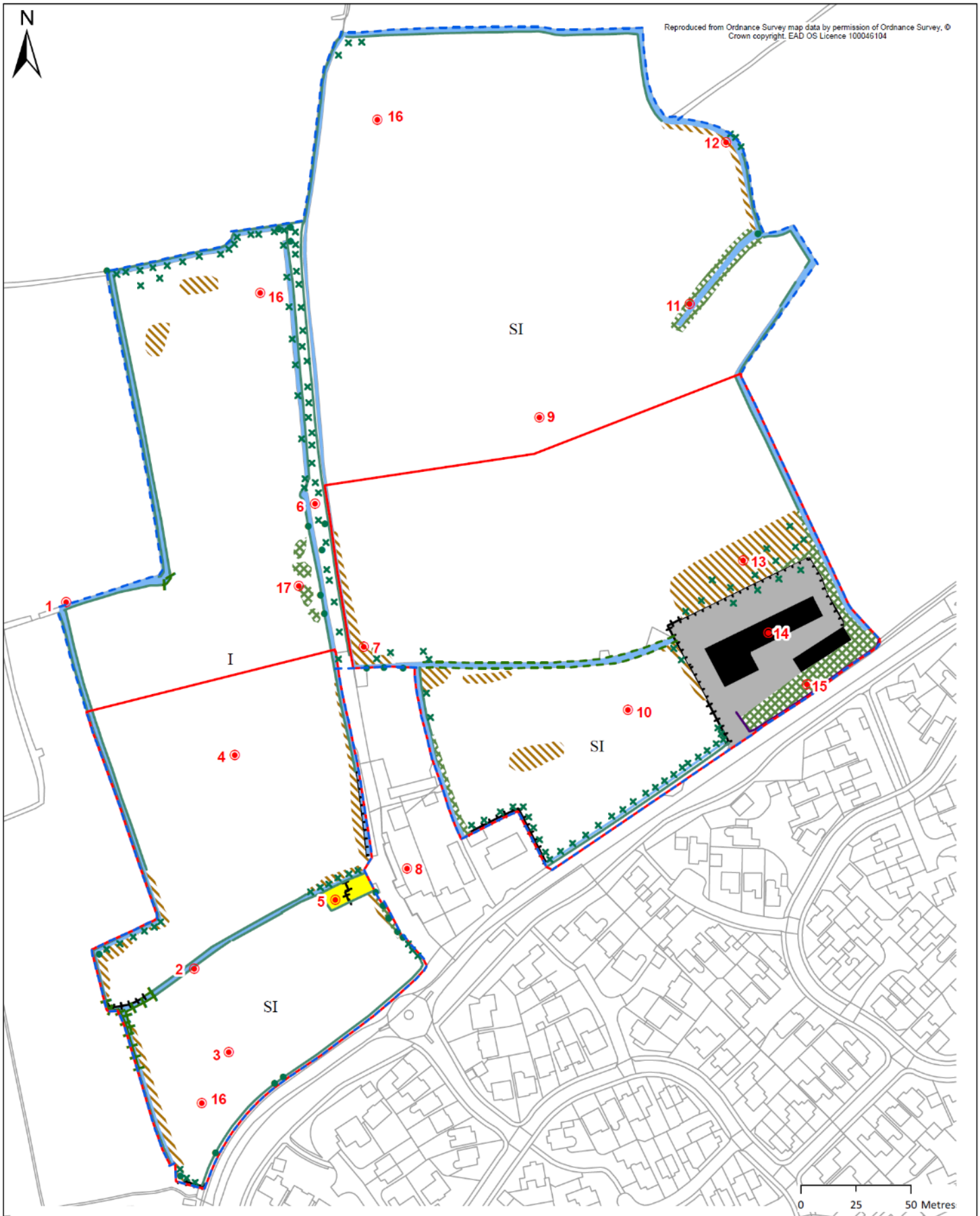
NSC comment	Response
Confirmation of mitigation to be provided for brown hare and harvest mouse	
"The applicants refer to 'the retention of grassland habitat to the north' (EAD TN March 21) but it is not clear whether this meets the detailed recommendations as set out in NSC advice (Feb 21). If the mitigation proposals set out by EAD do not meet these standards, then information as to how they would differ, and how their proposals could none-the-less deliver biodiversity net gain would be helpful."	Removal of habitats within the site would reduce the area of habitat for brown hare, although the majority of hedgerows would be retained and there is abundant alternative habitat in the vicinity, including the fields to the immediate north of the application area which support similar habitats. It is acknowledged that mitigation for the loss of brown hare habitat cannot be reliably provided in the long term in a residential setting due to disturbance effects as well as habitat suitability. However, the habitat creation proposals include 1.34ha of wildflower grassland, of which buffers around the northern margins would be managed for a longer sward with one late-summer hay cut. The site is currently managed as sheep and cattle-grazed pasture with the majority of the grassland sward onsite kept short. The grassland habitat to the north of the application area would be retained and is likely to continue to be managed to a similar regime. The creation of longer grassland margins on the northern boundary of the development would provide potential cover habitat for brown hare, as well as suitable habitat for harvest mouse and foraging bats. All detailed landscape proposals could be secured by Planning Condition.

Appendix 1: Survey plans with application area boundary



Key

- Amenity grassland
- Building
- Dense scrub
- Fence
- Hardstanding
- I — Improved grassland
- SI — Poor semi-improved grassland
- Scattered broadleaved trees
- Scattered scrub
- Species-poor hedgerow
- Species-poor hedgerow (defunct)
- Species-poor hedgerow with trees
- Survey boundary
- Tall ruderal
- Target note
- Wall
- Wet ditch
- Application area boundary

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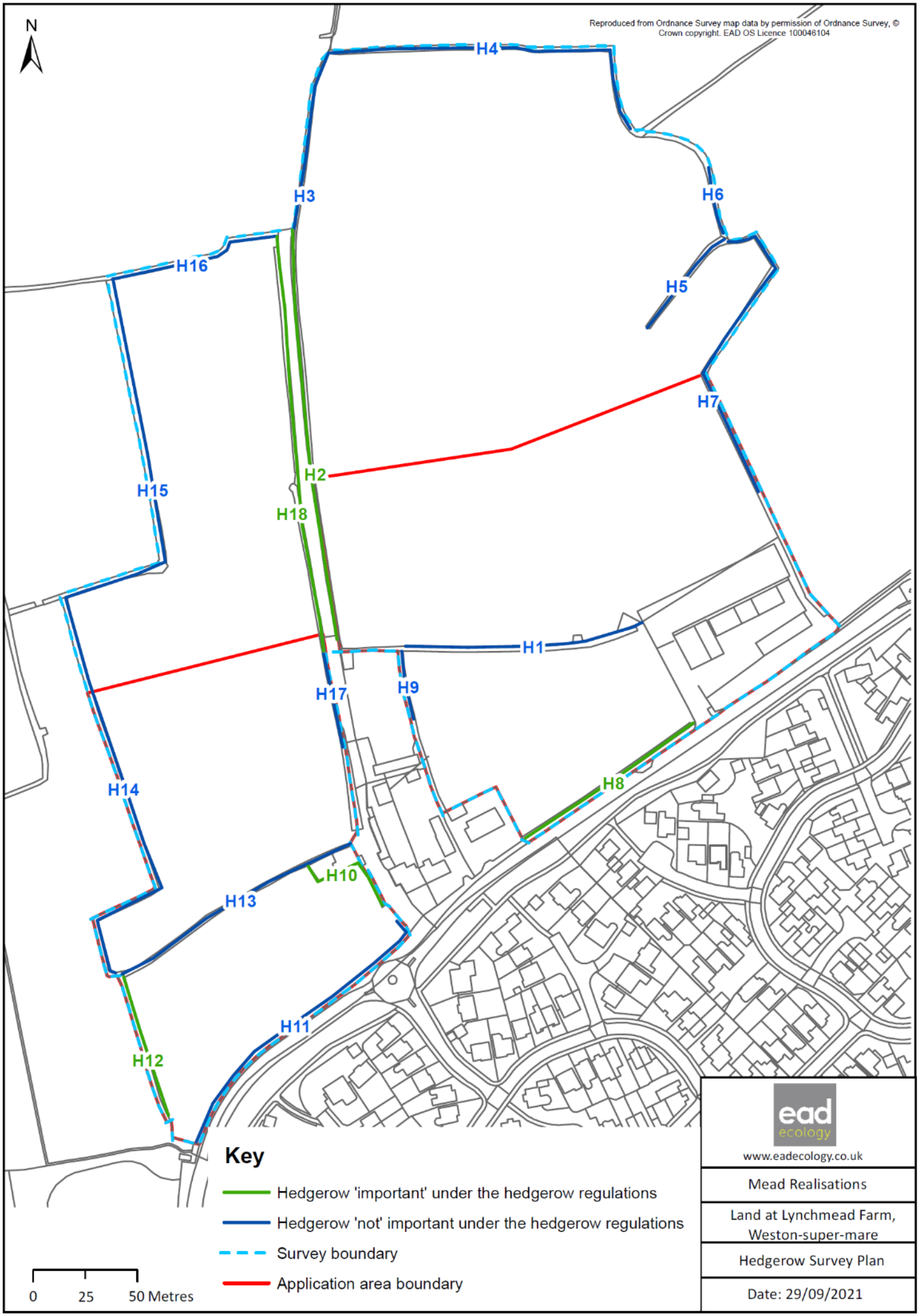
Mead Realisations

Land at Lynchmead Farm, Weston-super-mare

Phase 1 Habitat Plan

Date: 29/09/2021


N
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H4
H3
H6
H5
H16
H7
H15
H2
H18
H1
H17
H9
H14
H8
H10
H13
H11
H12
Key
Hedgerow 'important' under the hedgerow regulations
Hedgerow 'not' important under the hedgerow regulations
Survey boundary
Application area boundary
0
25
50 Metres
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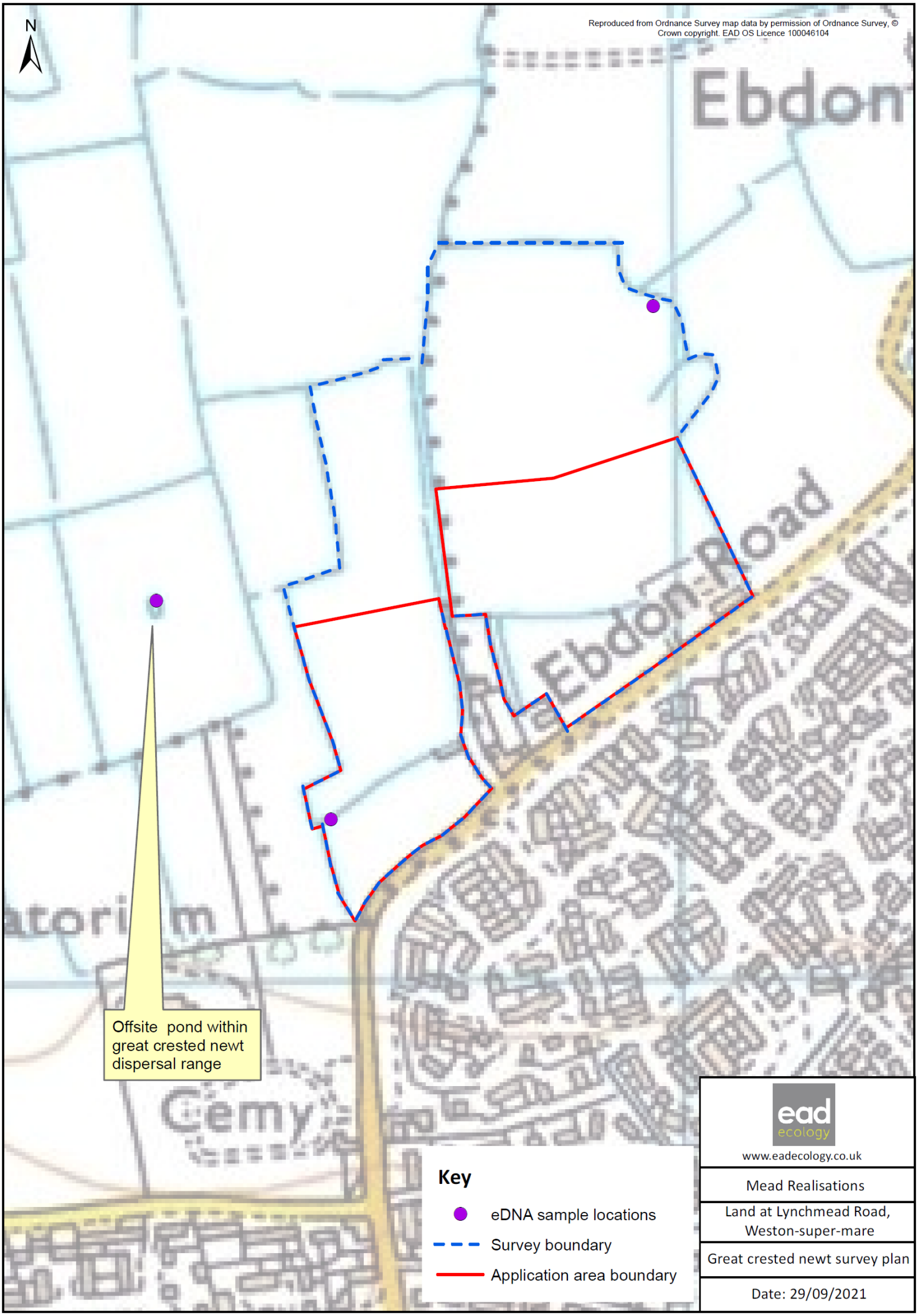
Mead Realisations
Land at Lynchmead Farm, Weston-super-mare
Hedgerow Survey Plan
Date: 29/09/2021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Ebdon Road
Offsite pond within great crested newt dispersal range
Key
eDNA sample locations
Survey boundary
Application area boundary
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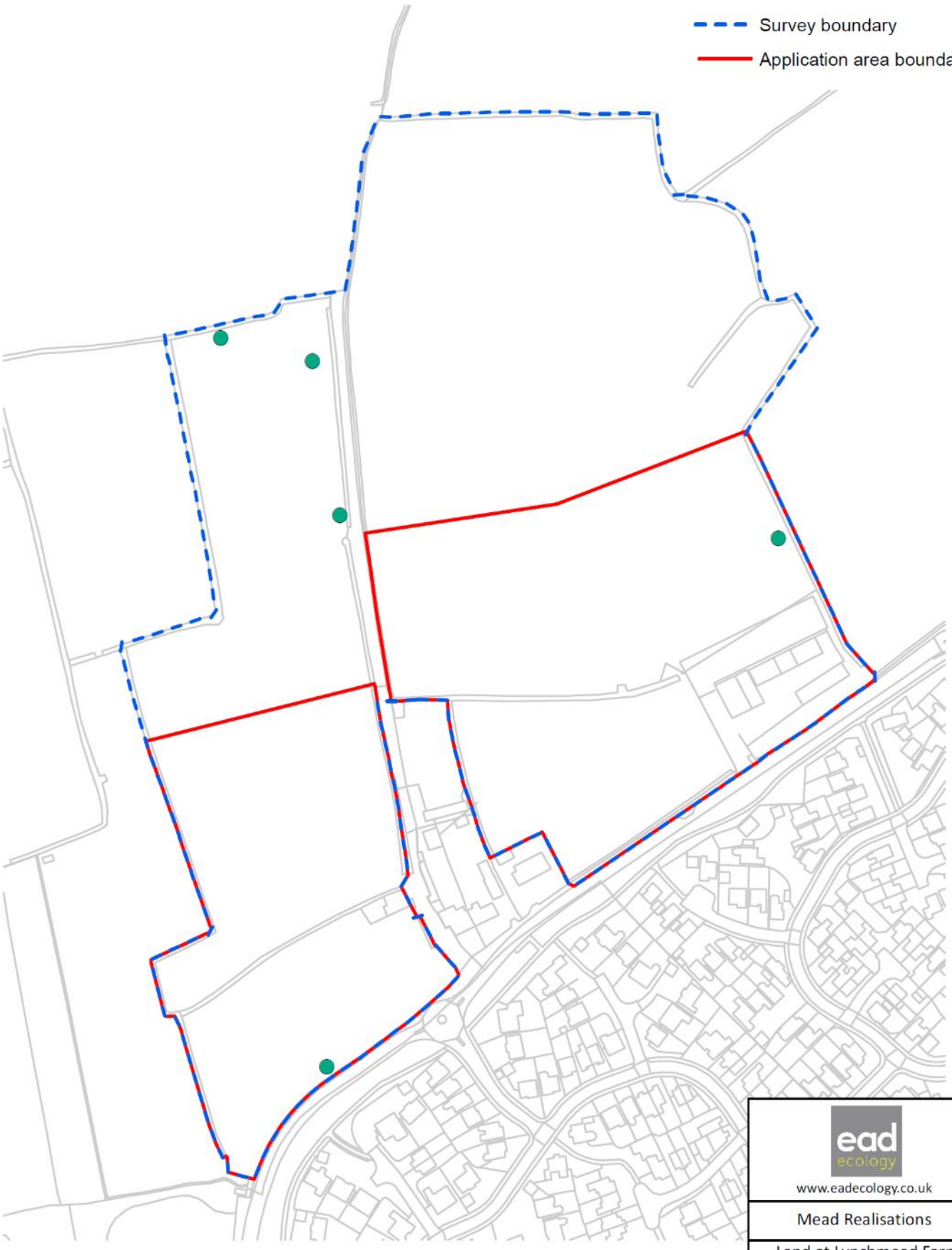
Mead Realisations
Land at Lynchmead Road, Weston-super-mare
Great crested newt survey plan
Date: 29/09/2021

N

Key

- Grass snake location
- Survey boundary
- Application area boundary



0 50 100 Metres

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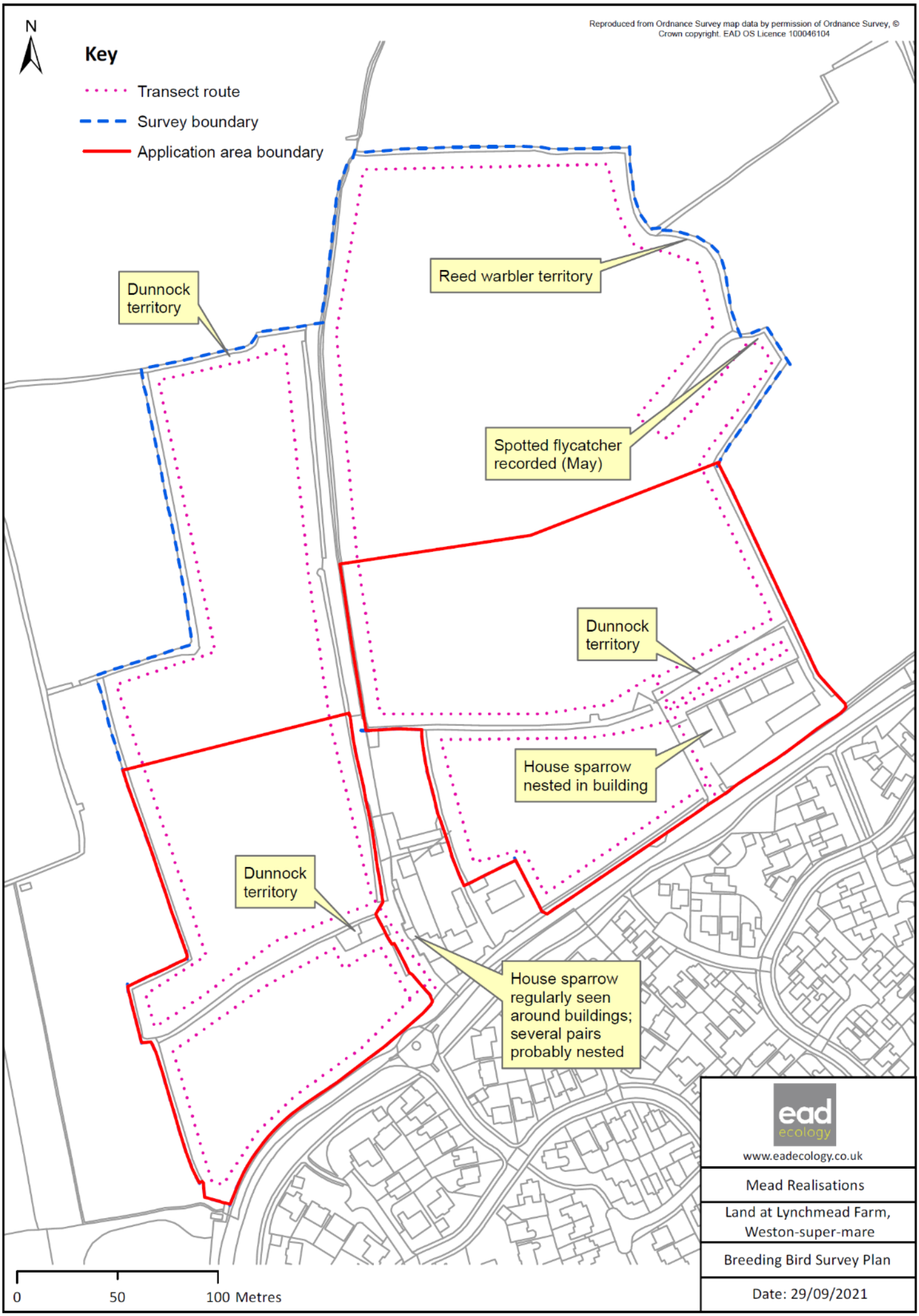
Land at Lynchmead Farm, Weston-super-mare

Reptile Survey Plan

Date: 29/09/2021


N
Key
Transect route
Survey boundary
Application area boundary
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Dunnock territory
Reed warbler territory
Spotted flycatcher recorded (May)
Dunnock territory
House sparrow nested in building
Dunnock territory
House sparrow regularly seen around buildings; several pairs probably nested
0
50
100 Metres
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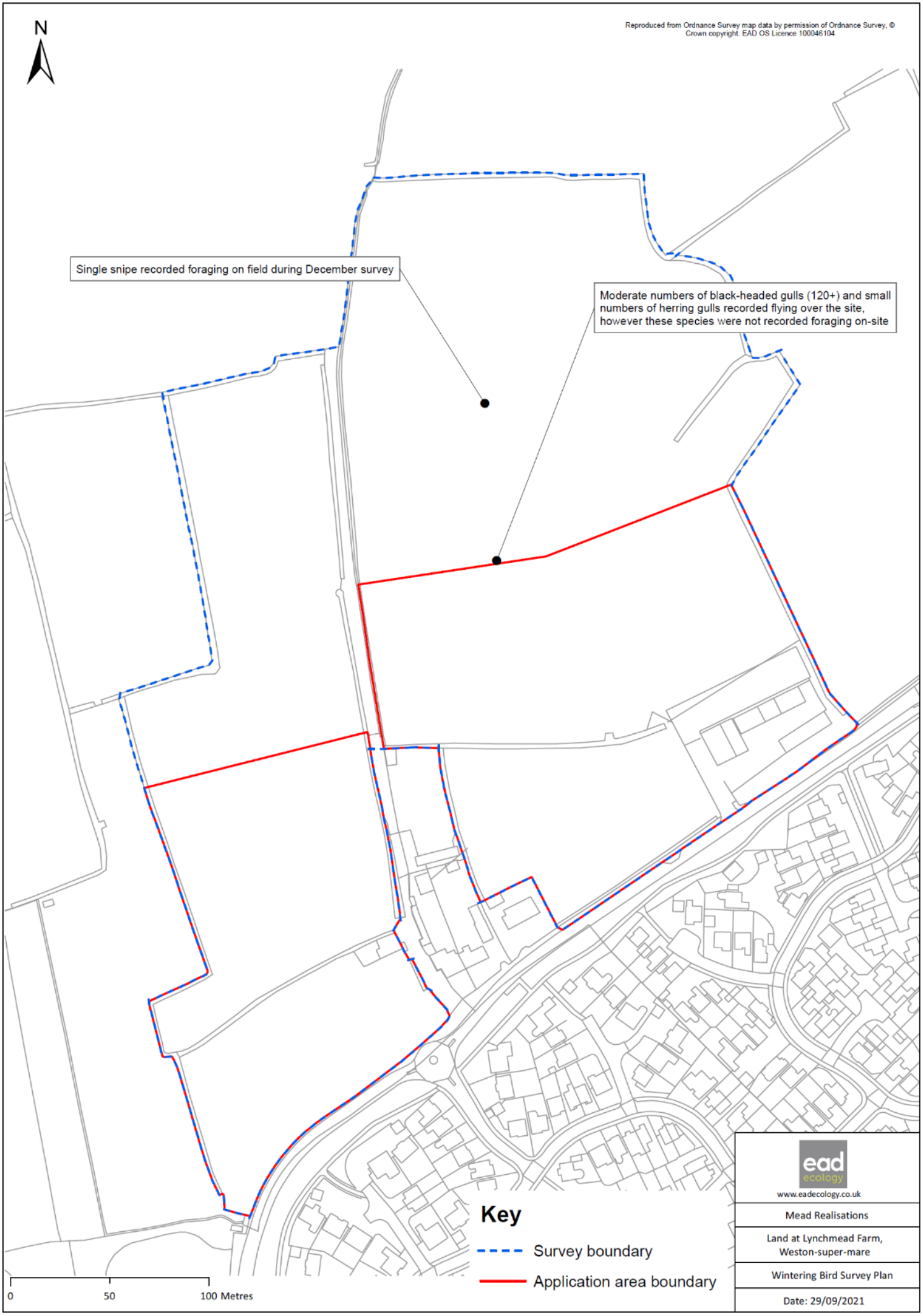
Land at Lynchmead Farm, Weston-super-mare
Breeding Bird Survey Plan
Date: 29/09/2021


N
Reproduced from Ordnance Survey map data by permission of Ordnance Survey, © Crown copyright. EAD OS Licence 100046104
Single snipe recorded foraging on field during December survey
Moderate numbers of black-headed gulls (120+) and small numbers of herring gulls recorded flying over the site, however these species were not recorded foraging on-site
Key
Survey boundary
Application area boundary
0
50
100 Metres
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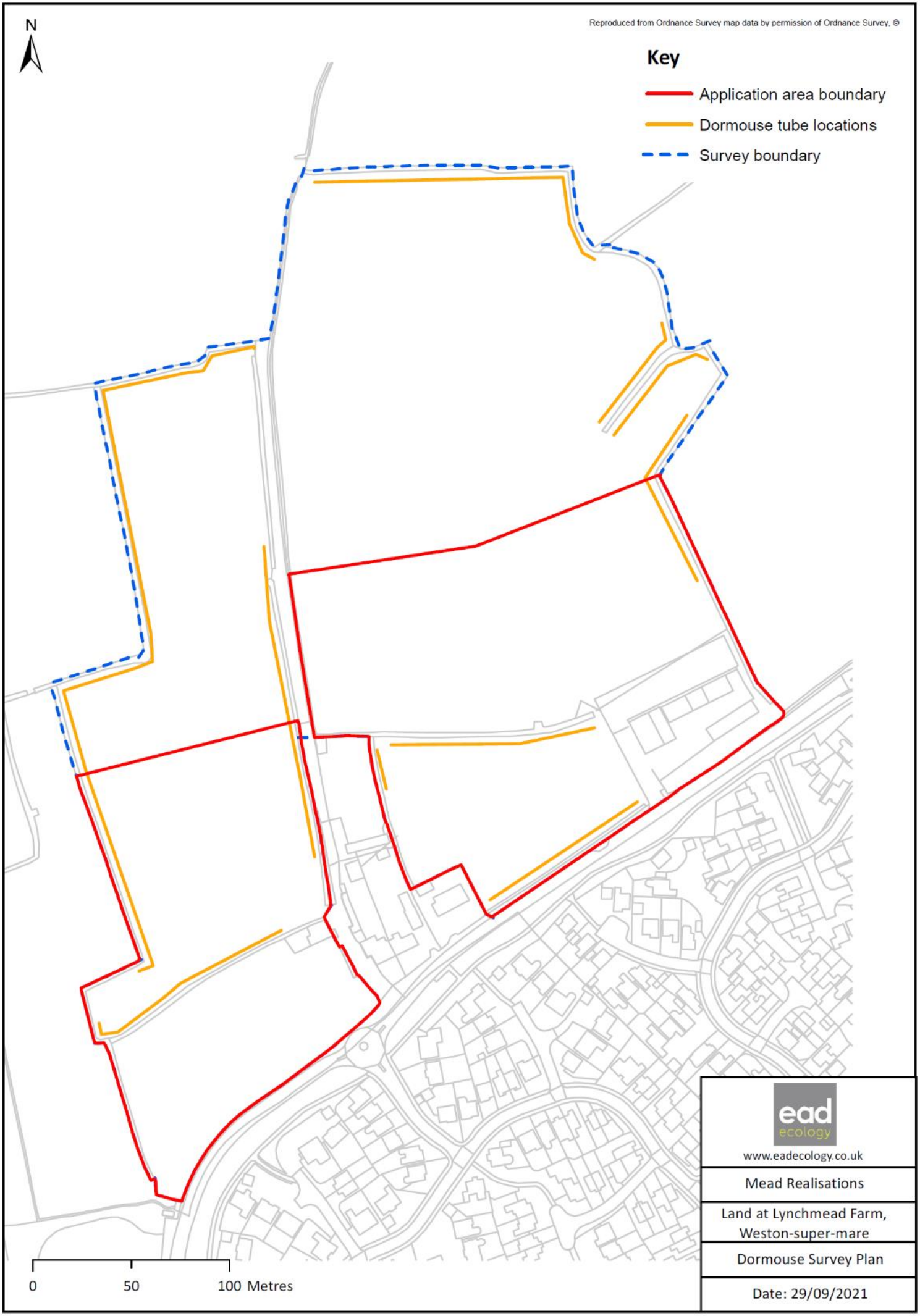
Land at Lynchmead Farm, Weston-super-mare
Wintering Bird Survey Plan
Date: 29/09/2021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Key
Application area boundary
Dormouse tube locations
Survey boundary
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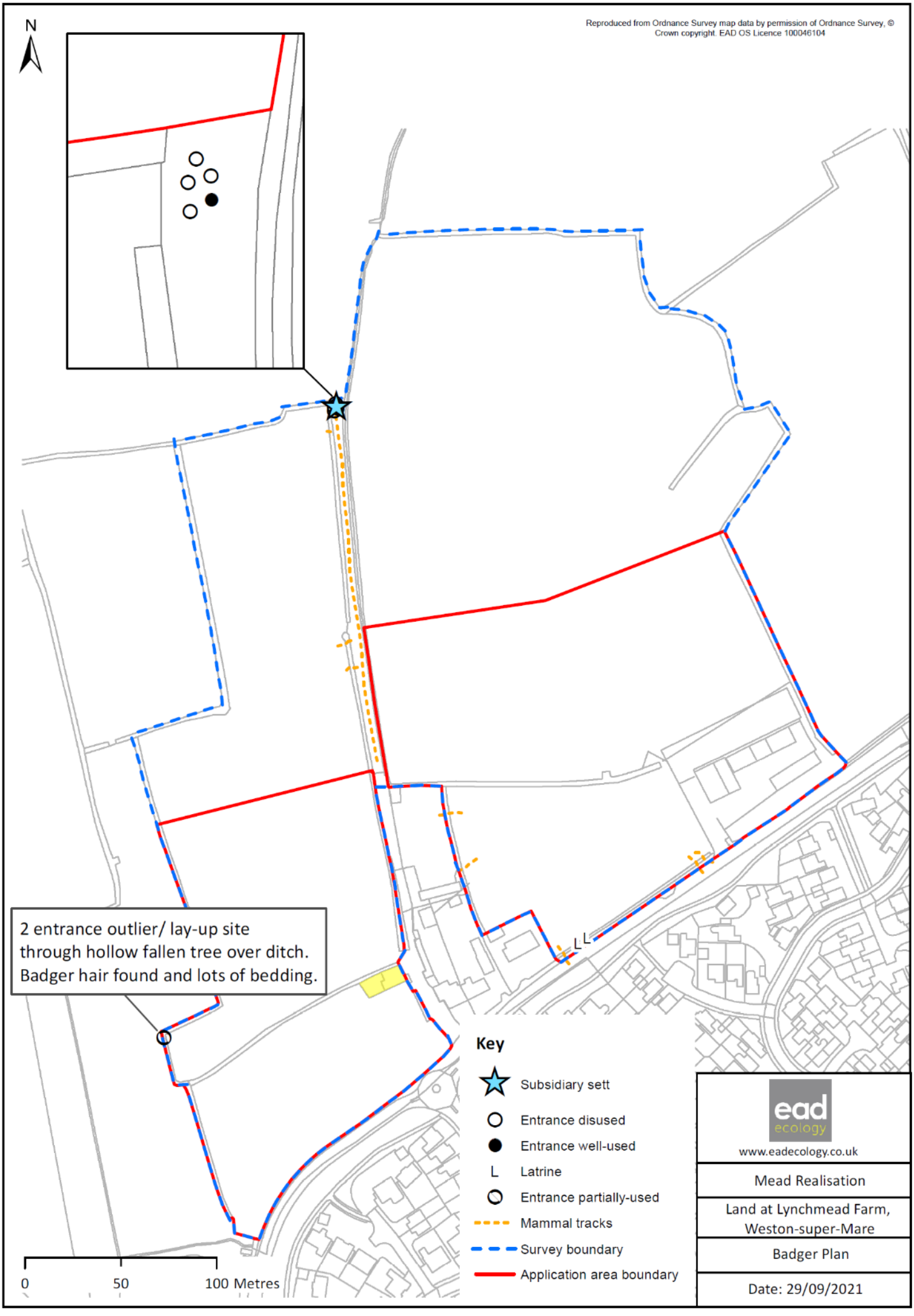
Land at Lynchmead Farm, Weston-super-mare
Dormouse Survey Plan
Date: 29/09/2021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2 entrance outlier/ lay-up site through hollow fallen tree over ditch. Badger hair found and lots of bedding.
L
L
Key
Subsidiary sett
Entrance disused
Entrance well-used
Latrine
Entrance partially-used
Mammal tracks
Survey boundary
Application area boundary
0
50
100 Metres
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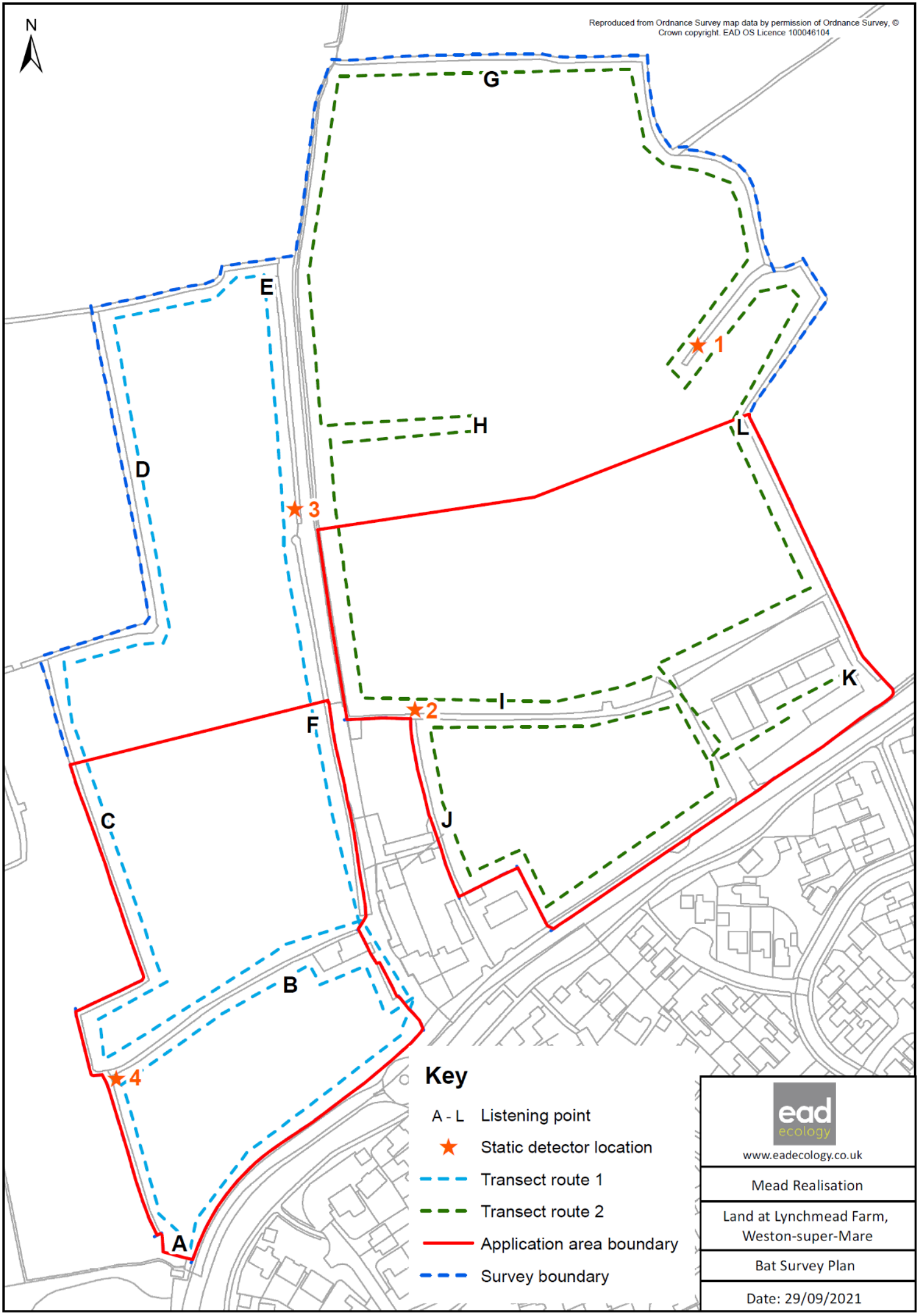
Land at Lynchmead Farm, Weston-super-Mare
Badger Plan
Date: 29/09/2021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G
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2
F
I
K
C
J
B
4
A
Key
A - L Listening point
Static detector location
Transect route 1
Transect route 2
Application area boundary
Survey boundary
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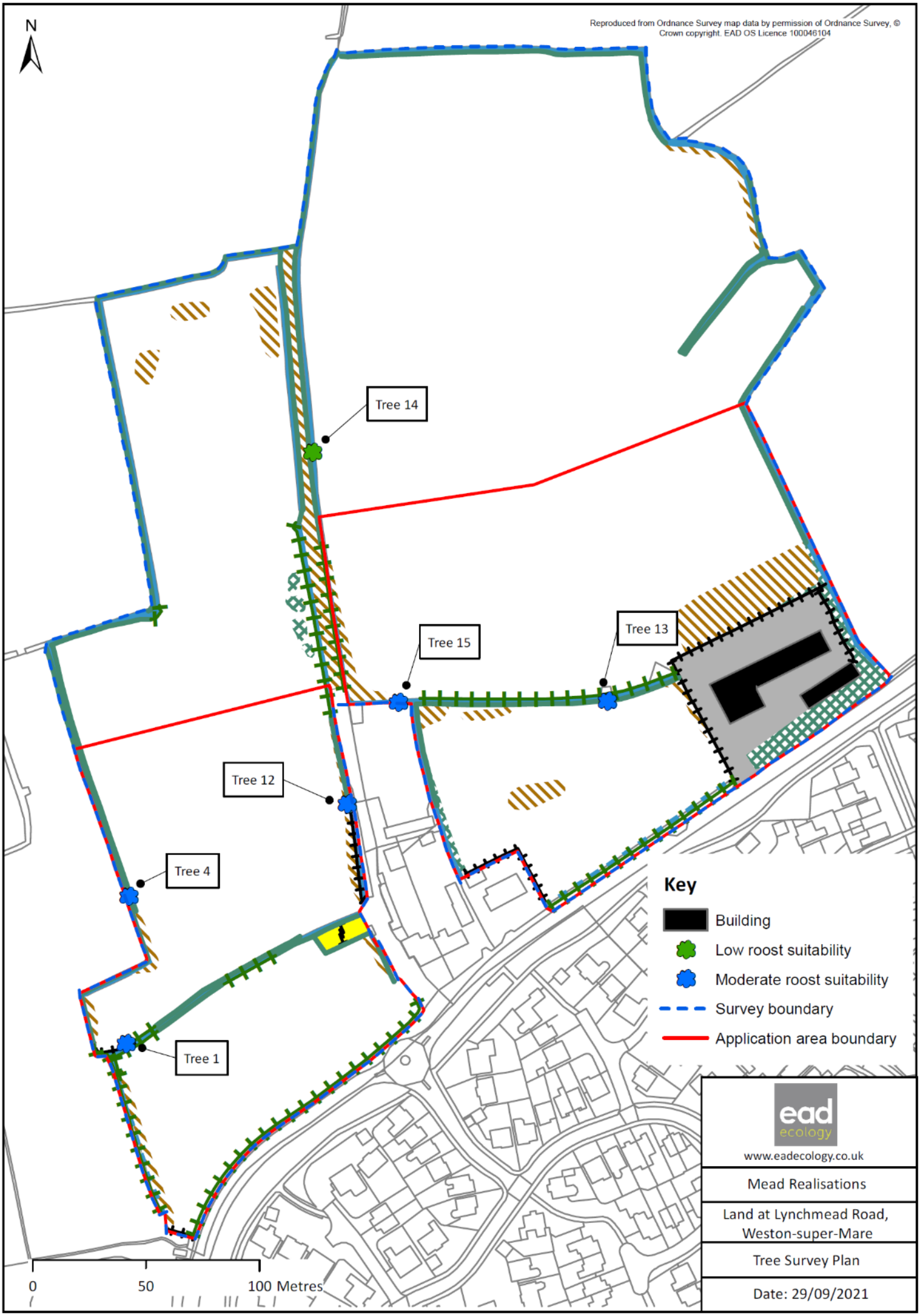
Mead Realisation
Land at Lynchmead Farm, Weston-super-Mare
Bat Survey Plan
Date: 29/09/2021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Tree 14
Tree 15
Tree 13
Tree 12
Tree 4
Tree 1
Key
Building
Low roost suitability
Moderate roost suitability
Survey boundary
Application area boundary
0
50
100 Metres
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Land at Lynchmead Road, Weston-super-Mare
Tree Survey Plan
Date: 29/09/2021

Appendix 2: Updated bat activity survey review

Bat activity survey

The survey area covered by the 2018 bat surveys comprised the application area and a wider area to the north; refer to Figure A2.1. This appendix is an amended review of the 2018 bat survey data, and includes only the data gathered from within the application boundary. This comprises the data from only Static Detector Locations 2 and 4, and Listening Points A, B, C, F, I, J, K and L; refer to Figure A2.1.

1 Methodology

Transect survey

For each monthly transect survey, two surveyors walked one of two, predetermined transect routes within the survey boundary (refer to Figure A2.1). The survey boundary covered the application area and a wider area to the north. Each route contained four sample points within the application area where the number of bat registrations were recorded over a three-minute period and observations were made of bat behaviour and flight direction where possible. The starting point of the transect and direction in which it was walked was varied between surveys to reduce bias. Surveys began at sunset and lasted at least two hours. The transect was walked, and each sample point sampled, at least twice per survey visit. Surveyors were equipped with Anabat Express and Batbox Duet bat detectors in order to record any echolocation calls for subsequent analysis. A desk-based analysis of these recordings was subsequently undertaken using the software application 'AnalookW' and relevant literature (Russ 2012). A Bat Activity Index (BAI) was calculated for the transect sample point data, based on the number of bat registrations per minute.

Static detector survey

A stratified sampling of the survey area using static bat detectors was undertaken between April and October 2018. Two static bat detectors (Anabat Express, Titley Scientific Ltd) were deployed within the application area for a minimum of five nights per month between April and October 2018, in accordance with BCT Guidelines (Collins [ed.] 2016). An estimate of relative bat activity within the application area for each detector location was made, which was done by dividing the number of bat registrations by unit time (hour). This allowed a quantitative comparison of bat activity between species, location and survey month.

2 Limitations

There were no significant limitations to the surveys.

3 Analysis

General

All data recorded during Transect and Static detector surveys were downloaded and analysed using 'AnalookW' (Titley Electronics). Following the data analysis via 'AnalookW' (Titley Electronics), all resulting data were analysed using R version 3.5.2 (R Core Team, 2018).

Transect survey

For the Transect surveys, 'registrations' for each species were defined as a series of pulses within a 10 second period. Therefore, if constant bat activity from a single bat was recorded, a total of six registrations would be recorded in a one-minute period.

Static detector survey

For the Static detector surveys, 'registrations' for each species were defined as the series of pulses within a single Anabat Express Zero Crossing file. The Anabat Express hardware imposes a limit of 15 seconds per file, but also a limit of 32k for the total file length and 16384 transitions within the file (Chris Corben, Titley Electronics, pers. comm. 12/06/2017). Whilst this results in files of different length, consideration of a file

as a single registration provides a consistent measure of relative activity for each species and total bat activity to enable comparison across the dataset (i.e. between Static detector locations).

Bat Activity Index (BAI)
The datasets from the static detector surveys were processed to provide 'Bat Activity Index' scores based on number of registrations (refer to sections above for definitions of 'registration' for each survey) over a set unit of time. For static detector surveys, the BAI equates to registrations per hour of the night; night is defined in this instance as 30 minutes prior to sunset to 30 minutes post-sunrise (the time in which the static detectors are recording).

For the Transect surveys, the 'Bat Activity Index' scores are based on the number of 'registrations' per minute at the pre-defined listening points within the application area. A minimum of six minutes per survey was recorded at each of the Listening Points (a minimum of two samples per survey).

4 Results

At least ten bat species were recorded during the transect and static detector surveys; refer to Figure A2.1. Species name abbreviations used in the results hereafter are provided in Table A2.1.

Table A2.1. Bat species recorded.

Common name	Scientific name	Species code
Common pipistrelle	*Pipistrellus pipistrellus*	Pp
Soprano pipistrelle	*P. pygmaeus*	Ppyg
Pipistrelle bat	*Pipistrellus sp.*	Pip
Nathusius' pipistrelle	*P. nathusii*	Pn
Noctule	*Nyctalus noctula*	Nn
Nyctalus bat	*Nyctalus sp.*	Ny sp.
Myotis bat	*Myotis sp.*	My sp.
Serotine	*Eptesicus serotinus*	Es
Serotine, Leisler's or noctule	*Eptsicus serotinus or Nyctalus sp.*	EorNy
Long-eared bat	*Plecotus sp.*	Pl sp.
Lesser horseshoe	*Rhinolophus hipposideros*	LHS
Greater horseshoe	*Rhinolophus ferrumequinum*	GHS
Barbastelle	*Barbastelle barbastellus*	Bb

Transect survey
Weather conditions recorded during the transect surveys are provided in Table A2.2.

Table A2.2. Weather conditions during bat transect surveys.

Date	Sunset	Start - end times	Cloud (Oktas)	Wind Speed (Beaufort)	Temperature (ºC)
26.04.2018	20:26	20:20	8/8	0-1	10
		22:26	1/8	0-1	9
30.05.2018	21:26	21:15	8/8	0	15
		23:16	8/8	0	15
28.06.2018	21:32	21:30	4/8	0-1	23

Table A2.2. Weather conditions during bat transect surveys.

Date	Sunset	Start - end times	Cloud (Oktas)	Wind Speed (Beaufort)	Temperature (ºC)
		23:30	0/8	0-1	23
23.07.2018	21:13	21:05	2/8	0-1	22
		23:13	4/8	1-2	21
28.08.2018	20:08	20:08	8/8	0-1	16
		22:07	8/8	0-1	16
17.09.2018	21:23	19:23	0/8	0	19
		21:23	0/8	0-1	17
10.10.2018	18:30	18:30	1/8	1	19
		20:31	2/8	1	17

At least six species of bat were identified during the transect surveys with a total of 204 registrations. Common pipistrelle accounted for the majority of calls recorded within the application area (70.59%), followed by serotine (10.29%), pipistrelle bat (5.39%), soprano pipistrelle (4.41%), serotine, Leisler's or noctule (4.41%), noctule (3.43%), *Myotis* bat (0.98%) and long-eared bat (0.49%). A further breakdown is provided below in Table A2.3 – A2.4.

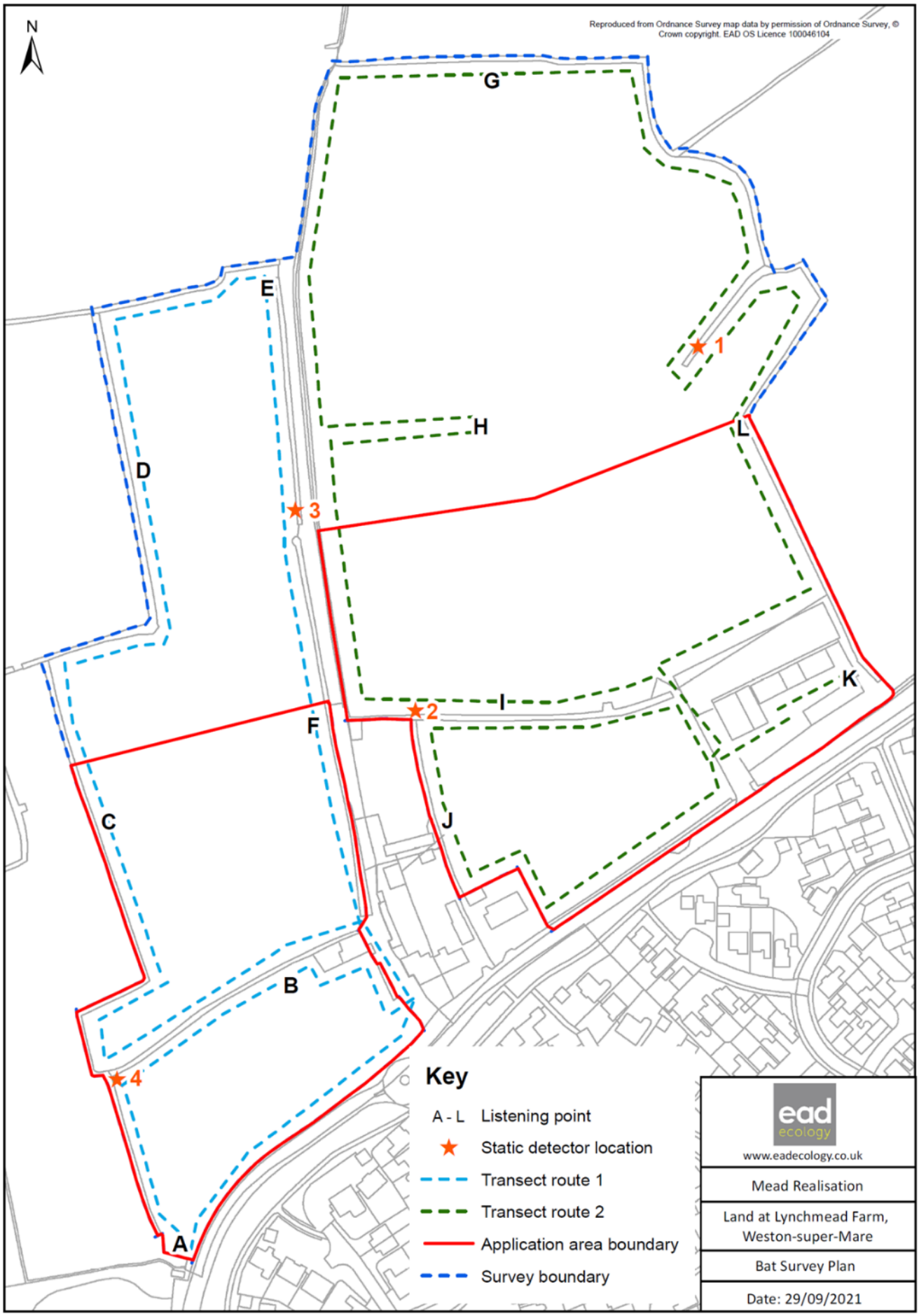
A2.3. Transect survey results.

Species	Number of registrations	Percentage (%)
Common pipistrelle	144	70.59
Serotine	21	10.29
Pipistrelle bat	11	5.39
Soprano pipistrelle	9	4.41
Serotine, Leisler's or noctule	9	4.41
Noctule	7	3.43
Myotis bat	2	0.98
Long-eared bat	1	0.49
Total	**204**	**100.00**

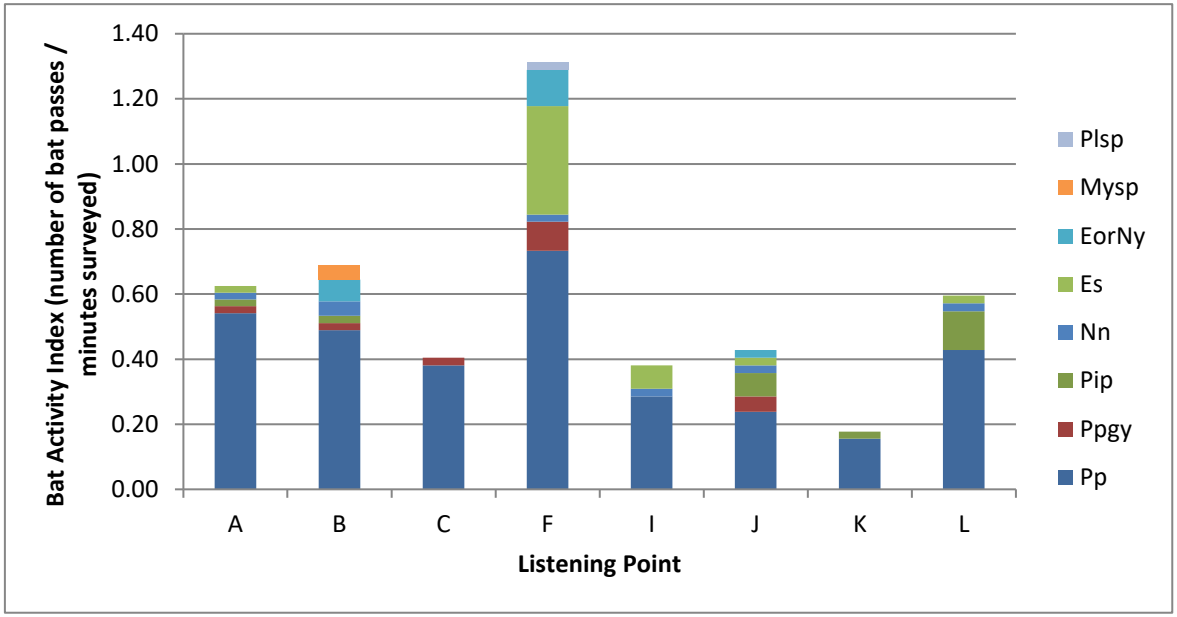
The highest numbers of bat registrations were recorded at Points F and B along the western side of the hedgerow that runs through the centre of the site (refer to Figure A2.1, Graph A2.1 and Table A2.4). Bat activity and species diversity were lowest at Point K, located in the south eastern corner of the site, where occasional common pipistrelle passes and pipistrelle bats were recorded.

In terms of monthly variation, the highest number of bat registrations recorded across sample points was recorded in April (59 registration) and the lowest in May (14 registrations). Outside of sample points, a single greater horseshoe bat registration was recorded on 17 September 2018 at 21:15; approximately 112 minutes after sunset. This registration was recorded in close proximity to sample point K in the south east of the site.

Figure A2.1: Bat survey plan



Graph A2.1. Bat Activity Index (BAI) of sample point data.



A2.4. Bat Activity Index (BAI) recorded during the transect surveys.

	Listening Point								Total
Species	**A**	**B**	**C**	**F**	**I**	**J**	**K**	**L**	
Common pipistrelle	0.54	0.49	0.38	0.73	0.29	0.24	0.16	0.43	0.41
Soprano pipistrelle	0.02	0.02	0.02	0.09	0.00	0.05	0.00	0.00	0.03
Pipistrelle bat	0.02	0.02	0.00	0.00	0.00	0.07	0.02	0.12	0.03
Noctule	0.02	0.04	0.00	0.02	0.02	0.02	0.00	0.02	0.02
Serotine	0.02	0.00	0.00	0.33	0.07	0.02	0.00	0.02	0.06
Serotine, Leisler's or noctule	0.00	0.07	0.00	0.11	0.00	0.02	0.00	0.00	0.03
Myotis bat	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Long-eared bat	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Total	**0.63**	**0.69**	**0.40**	**1.31**	**0.38**	**0.43**	**0.18**	**0.60**	**0.58**

Static detector survey

At least ten species were recorded within the application area during the static detector survey with an overall total of 20,043 registrations. Common pipistrelle was the most abundant species comprising 75.49% of all recordings, followed by soprano pipistrelle (13.55%), *Nyctalus* bat (3.63%), Serotine, Leisler's or noctule (2.2%), serotine (1.19%), greater horseshoe bat (1.11%) and *Myotis* bat (1.01%). Other species recorded but accounting for less than 1% of registrations each were pipistrelle bat, noctule, long-eared bat, lesser horseshoe bat, barbastelle and Nathusius' pipistrelle. Overall, species distribution across static detector locations are presented below in Graph A2.2; refer to Figure A2.1 for static detector locations.

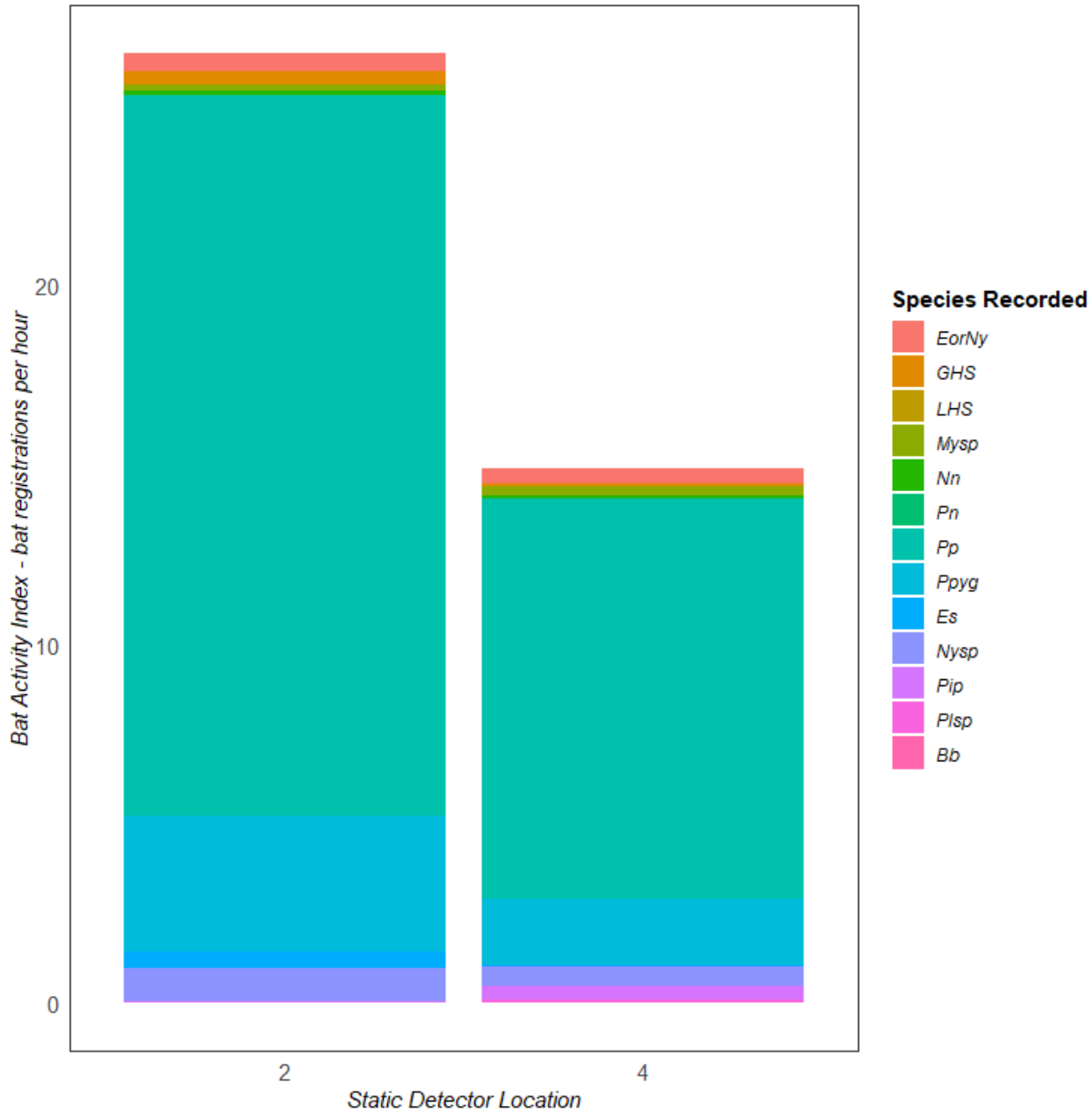
Common pipistrelle was the most abundant species at both static detector locations. Light-sensitive bat species were recorded at all static detector locations within the application area.

Light-sensitive bat species recorded the application area included greater and lesser horseshoe bat, *Myotis* bat, long-eared bat and barbastelle. *Myotis* bat activity was recorded at both of the static detector locations. The highest activity was recorded at Positions 4 (BAI 0.26), followed by Position 2 (BAI 0.16). Long-eared bats were also recorded at both static detectors, with the highest activity recorded at Position 4 (BAI 0.0.08) and Position 2 (BAI 0.03). A total of three barbastelle bat registrations were recorded the application area, with all occurring in July at Position 4 (BAI 0.03).

A total of ten lesser horseshoe registrations were recorded across the application area. Position 4 recorded the higher levels of activity within the application area (eight registrations; BAI 0.02). Lesser horseshoe bats were only recorded within the application area in the months of April, May and October; outside of the main maternity-period for this species.

Greater horseshoe bat activity is presented separately below.

Graph A2.2. Bat Activity Index at each Static Detector Location.



Greater horseshoe bats

Greater horseshoe bats (GHS) were recorded at both static detector locations within the application area. GHS activity was highest at Position 2 (BAI 0.40), followed by Position 4 (BAI 0.06); refer to Figure A2.1. Table A2.5 – A2.6 and Graph A2.3 – A2.6 provide a breakdown of monthly and nightly greater horseshoe activity within the application area.

Overall seasonal variation in GHS activity within the application area exhibited a peak in activity levels in May (BAI 0.51) and August (BAI 1.24) at Position 2. At Position 4, April (BAI 0.12) and August (BAI 0.13) provided the highest levels of activity. The general trend in GHS activity appeared to show relatively constant levels of activity between April and June/July, with a peak in August before a near absence in GHS activity within the application area from September to October; refer to Graph A2.3.

At Position 2, the highest levels of activity were recorded in August (88 registrations; BAI 1.24). Of these registrations, a maximum of 34 registrations were recorded in a single night (09/08/2018; refer to Table A2.4). On this night none of the registrations occurred within one hour of sunset/sunrise and 70.6% of these registrations occurred within a one-hour period (00:51-01:49). This was followed by 32 registrations, recorded on 07/08/2018. This night had zero registrations within one hour of sunset/sunrise and 65.6% of these registrations occurred within the period 00:55-01:55.

This was followed by May at Position 2 (BAI 0.51; 27 registrations). The nights with the highest levels of activity were 25/05/2018 and 27/05/2018, both recorded 11 registrations. Only one registration of these was recorded within one hour of sunset/sunrise (25/05/2018, 22:02; sunset: 21:11).

In April at Position 2, the nights with the highest level of GHS activity were the 23/04/2018 (10 registrations) and 25/04/2018 (11 registrations). On 23/04/2018, five registrations were recorded within one hour of sunrise (05:03 – 05:08; sunrise: 05:58). On 25/04/2018, two registrations were recorded within one hour of sunset (21:15; sunset: 20:24) and one registration was recorded within one hour of sunrise (04:59; sunrise: 05:54).

At Position 4, the highest levels of activity were recorded in August (nine registrations; BAI 0.13). Of these registrations, a maximum of three registrations occurred within a single night (13/08/2018); none of these registrations occurred within one hour of sunset/sunrise.

This was a followed by April at Position 4 (nine registrations; BAI 0.12). The highest number of registrations within a single night was four (25/04/2018); none of these registrations occurred within one hour of sunset/sunrise. However, the night of 29/04/2018 recorded three registrations, one of which was recorded within one hour of sunset (21:17; sunset: 20:31).

Temporal activity patterns of GHS registrations across the months April – August are generally indicative of commuting and foraging activity within the application area and are not generally indicative of GHS commuting from a roost in the local area. The desk study did not identify any GHS roosts within a 4km search radius of the survey area (BRERC, 2018).

GHS were recorded at both static detector locations and it is considered that suitable habitats within the application area are used for commuting and foraging throughout the spring / summer activity period.

Table A2.4. Greater horseshoe bat activity index (BAI) and number of registrations per month.

Static Detector Location	Month	GHS BAI	Number of GHS registrations
2	Apr	0.40	29
	May	0.51	27
	Jun	0.44	22
	Jul	0.33	26
	Aug	1.24	88
	Sep	0.00	0
	Oct	0.01	1
	Total	**0.40**	**193**
4	Apr	0.12	9
	May	0.08	4
	Jun	0.10	5
	Jul	0.01	1
	Aug	0.13	9
	Sep	0.01	1
	Oct	0.00	0
	Total	**0.06**	**29**
Application area total	**-**	**0.23**	**222**

Table A2.5. Greater horseshoe bat registrations per night and the number of registrations occurring within one hour of sunset/sunrise.

Static Detector Location	Month	Night	Number of GHS registrations	Number of registrations within one hour of sunset/sunrise
2	Apr	23/04/2018	10	5
		24/04/2018	3	0
		25/04/2018	11	3
		26/04/2018	3	1
		27/04/2018	0	0
		28/04/2018	1	0
		29/04/2018	1	0
		Total	**29**	**9**
	May	25/05/2018	11	1
		26/05/2018	0	0
		27/05/2018	11	0
		28/05/2018	4	0
		29/05/2018	1	0
		30/05/2018	0	0
		Total	**27**	**1**
	June	22/06/2018	6	0
		23/06/2018	2	0
		24/06/2018	2	0
		25/06/2018	1	0
		26/06/2018	8	0
		27/06/2018	3	0
		Total	**22**	**0**
	July	10/07/2018	4	0
		11/07/2018	0	0
		12/07/2018	1	0

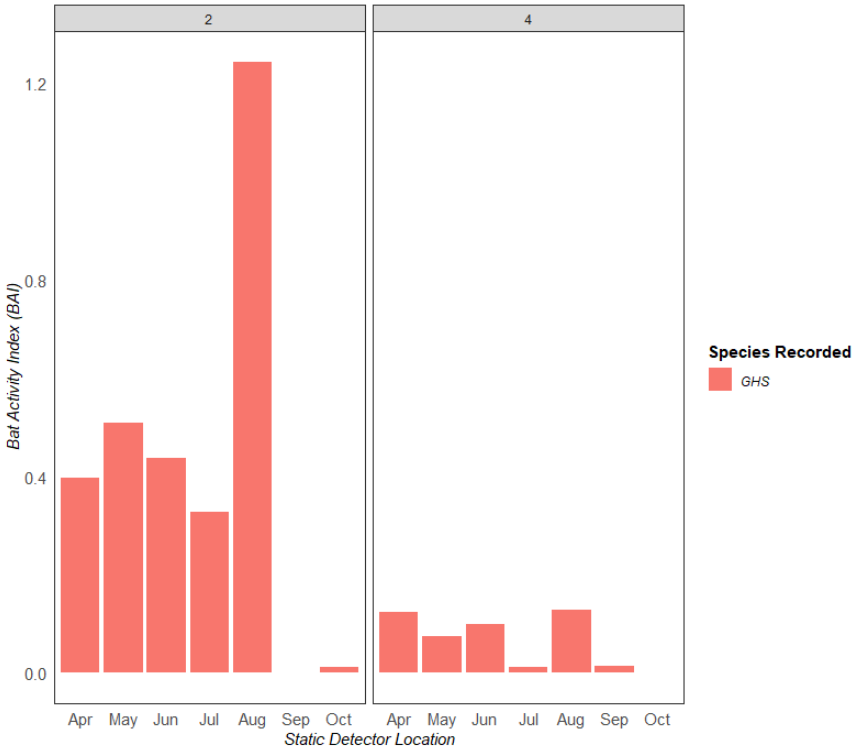
Table A2.5. Greater horseshoe bat registrations per night and the number of registrations occurring within one hour of sunset/sunrise.

Static Detector Location	Month	Night	Number of GHS registrations	Number of registrations within one hour of sunset/sunrise
		13/07/2018	1	0
		14/07/2018	2	0
		15/07/2018	6	0
		16/07/2018	6	0
		17/07/2018	4	0
		18/07/2018	2	0
		Total	**26**	**0**
	August	07/08/2018	32	0
		08/08/2018	10	0
		09/08/2018	34	0
		10/08/2018	2	0
		11/08/2018	1	0
		12/08/2018	0	0
		13/08/2018	9	0
		Total	**88**	**0**
	September	11/09/2018	0	0
		12/09/2018	0	0
		13/09/2018	0	0
		14/09/2018	0	0
		15/09/2018	0	0
		16/09/2018	0	0
		Total	**0**	**0**
	October	10/10/2018	0	0
		11/10/2018	0	0
		12/10/2018	0	0
		13/10/2018	0	0
		14/10/2018	1	0
		15/10/2018	0	0
		Total	**1**	**0**
	Total	**-**	**193**	**10**
4	Apr	23/04/2018	1	0
		24/04/2018	0	0
		25/04/2018	4	0
		26/04/2018	0	0
		27/04/2018	1	0
		28/04/2018	0	0
		29/04/2018	3	1
		Total	**9**	**1**
	May	25/05/2018	0	0
		26/05/2018	0	0
		27/05/2018	3	0
		28/05/2018	0	0
		29/05/2018	1	0
		30/05/2018	0	0
		Total	**4**	**0**
	Jun	22/06/2018	2	0
		23/06/2018	1	0
		24/06/2018	2	0
		25/06/2018	0	0

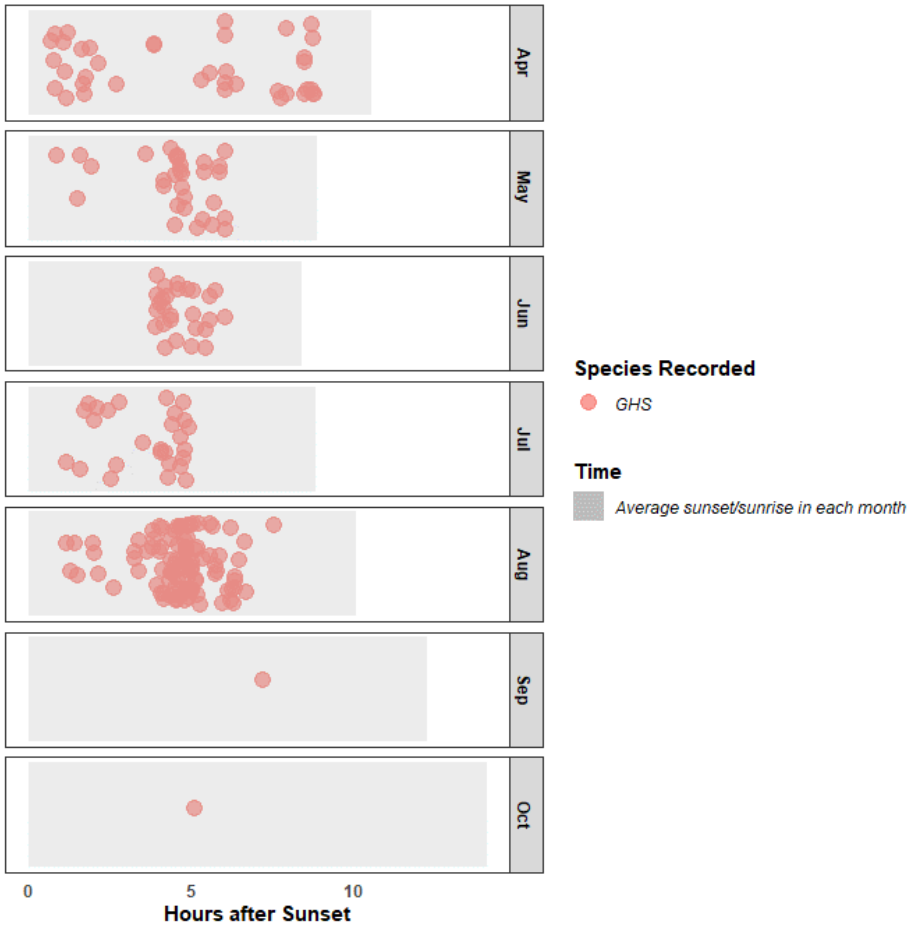
Table A2.5. Greater horseshoe bat registrations per night and the number of registrations occurring within one hour of sunset/sunrise.

Static Detector Location	Month	Night	Number of GHS registrations	Number of registrations within one hour of sunset/sunrise
		26/06/2018	0	0
		27/06/2018	0	0
		Total	**5**	**0**
	Jul	10/07/2018	0	0
		11/07/2018	0	0
		12/07/2018	0	0
		13/07/2018	0	0
		14/07/2018	1	0
		15/07/2018	0	0
		16/07/2018	0	0
		17/07/2018	0	0
		18/07/2018	0	0
		Total	**1**	**0**
	Aug	07/08/2018	2	0
		08/08/2018	1	0
		09/08/2018	2	0
		10/08/2018	1	0
		11/08/2018	0	0
		12/08/2018	0	0
		13/08/2018	3	0
		Total	**9**	**0**
	Sep	11/09/2018	1	0
		12/09/2018	0	0
		13/09/2018	0	0
		14/09/2018	0	0
		15/09/2018	0	0
		16/09/2018	0	0
		Total	**1**	**0**
	Oct	10/10/2018	0	0
		11/10/2018	0	0
		12/10/2018	0	0
		13/10/2018	0	0
		14/10/2018	0	0
		15/10/2018	0	0
		Total	**0**	**0**
	Total	**-**	**29**	1
Application area	**Total**	**-**	**222**	**11**

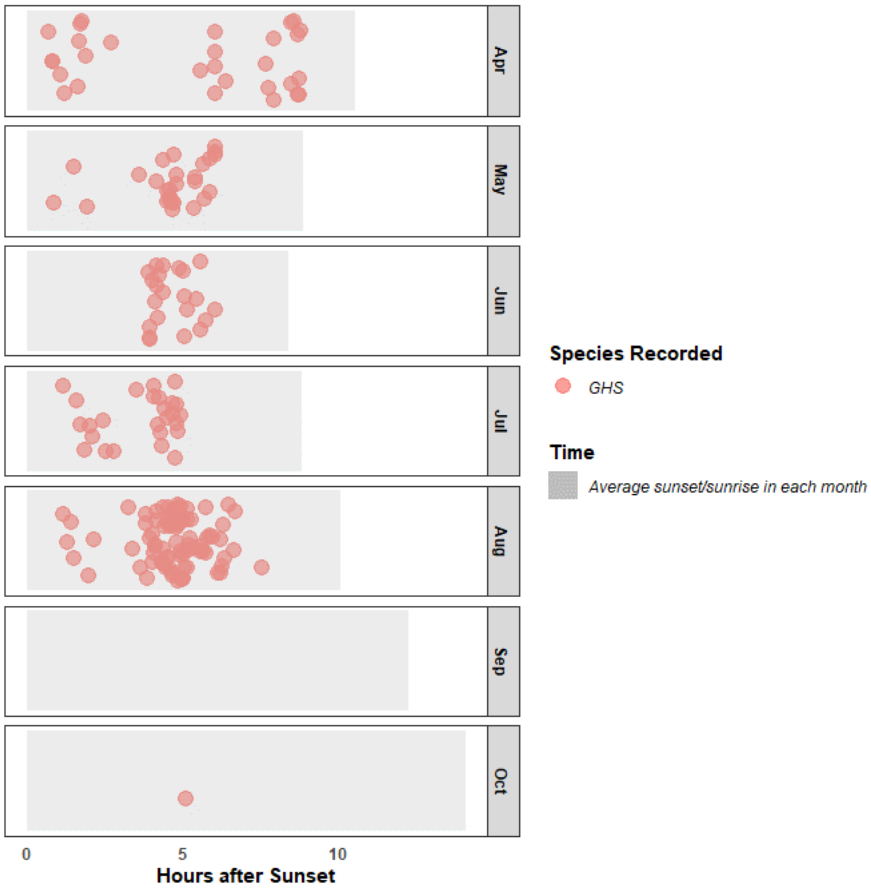
Graph A2.3. Greater horseshoe bat activity index (BAI) per month at Positions 2 and 4.



Graph A2.4. Temporal distribution of GHS activity within the application area per month.



Graph A2.5. Temporal distribution of monthly GHS registrations at Position 2.



Graph A2.6. Temporal distribution of monthly GHS registrations at Position 4.

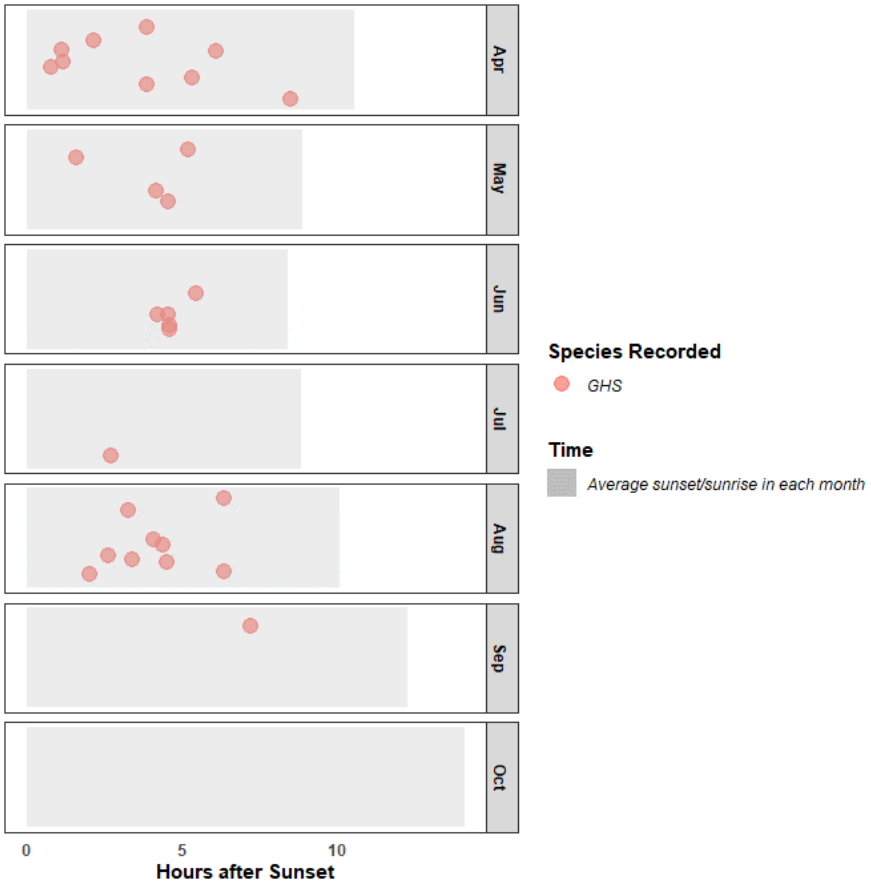


Table A2.6. Number of bat registrations recorded within the application area

Static Detector Location	Month	EorNy	GHS	LHS	Mysp	Nn	Pn	Pp	Ppyg	Es	Nysp	Pip	Plsp	Bb	Total
2	Apr	6	29	1	1	11	1	4659	1205	0	0	0	0	0	5913
	May	9	27	1	5	17	0	121	13	8	0	0	0	0	201
	Jun	20	22	0	6	15	0	402	15	58	107	1	5	0	651
	Jul	77	26	0	7	16	0	1157	175	105	193	5	3	0	1764
	Aug	109	88	0	8	4	0	875	49	38	105	7	4	0	1287
	Sep	17	0	0	20	2	0	617	19	1	52	0	1	0	729
	Oct	5	1	0	30	0	0	1892	357	0	1	0	1	0	2287
	Total	243	193	2	77	65	1	9723	1833	210	458	13	14	0	12832
4	Apr	6	9	6	9	13	0	1356	141	0	0	0	0	0	1540
	May	5	4	1	11	4	0	325	49	0	0	0	1	0	400
	Jun	14	5	0	13	5	0	488	59	13	31	0	14	0	642
	Jul	98	1	0	16	11	0	1539	244	2	54	9	20	3	1997
	Aug	48	9	0	16	4	0	864	330	13	167	170	2	0	1623
	Sep	26	1	0	43	1	0	764	60	0	14	2	3	0	914
	Oct	0	0	1	18	0	0	72	0	0	4	0	0	0	95
	Total	197	29	8	126	38	0	5408	883	28	270	181	40	3	7211
Total	-	440	222	10	203	103	1	15131	2716	238	728	194	54	3	20043

Table A2.7. Bat Activity Index (BAI) recorded within the application area

Static Detector Location	Month	EorNy	GHS	LHS	Mysp	Nn	Pn	Pp	Ppyg	Es	Nysp	Pip	Plsp	Bb	Total
2	Apr	0.08	0.40	0.01	0.01	0.15	0.01	63.72	16.48	0.00	0.00	0.00	0.00	0.00	80.87
	May	0.17	0.51	0.02	0.09	0.32	0.00	2.28	0.24	0.15	0.00	0.00	0.00	0.00	3.78
	Jun	0.40	0.44	0.00	0.12	0.30	0.00	7.97	0.30	1.15	2.12	0.02	0.10	0.00	12.91
	Jul	0.97	0.33	0.00	0.09	0.20	0.00	14.57	2.20	1.32	2.43	0.06	0.04	0.00	22.22
	Aug	1.54	1.24	0.00	0.11	0.06	0.00	12.37	0.69	0.54	1.48	0.10	0.06	0.00	18.19
	Sep	0.23	0.00	0.00	0.27	0.03	0.00	8.40	0.26	0.01	0.71	0.00	0.01	0.00	9.93
	Oct	0.06	0.01	0.00	0.35	0.00	0.00	22.33	4.21	0.00	0.01	0.00	0.01	0.00	26.99
	Total	0.50	0.40	0.00	0.16	0.13	0.00	20.05	3.78	0.43	0.94	0.03	0.03	0.00	26.46
4	Apr	0.08	0.12	0.08	0.12	0.18	0.00	18.55	1.93	0.00	0.00	0.00	0.00	0.00	21.06
	May	0.09	0.08	0.02	0.21	0.08	0.00	6.12	0.92	0.00	0.00	0.00	0.02	0.00	7.53
	Jun	0.28	0.10	0.00	0.26	0.10	0.00	9.68	1.17	0.26	0.61	0.00	0.28	0.00	12.73
	Jul	1.23	0.01	0.00	0.20	0.14	0.00	19.39	3.07	0.03	0.68	0.11	0.25	0.04	25.16
	Aug	0.68	0.13	0.00	0.23	0.06	0.00	12.21	4.67	0.18	2.36	2.40	0.03	0.00	22.94
	Sep	0.35	0.01	0.00	0.59	0.01	0.00	10.40	0.82	0.00	0.19	0.03	0.04	0.00	12.45
	Oct	0.00	0.00	0.01	0.21	0.00	0.00	0.85	0.00	0.00	0.05	0.00	0.00	0.00	1.12
	Total	0.41	0.06	0.02	0.26	0.08	0.00	11.15	1.82	0.06	0.56	0.37	0.08	0.01	14.87
Total	-	0.45	0.23	0.01	0.21	0.11	0.00	15.60	2.80	0.25	0.75	0.20	0.06	0.00	20.67

Table A2.8. Number of hours static detectors were deployed each month across the application area.

Static Detector Location	Month	Total hours of active deployment
2	Apr	73.12
	May	53.13
	Jun	50.42
	Jul	79.38
	Aug	70.74
	Sep	73.44
	Oct	84.72
	Total	484.95
4	Apr	73.12
	May	53.13
	Jun	50.42
	Jul	79.38
	Aug	70.74
	Sep	73.44
	Oct	84.72
	Total	484.95
Total	-	969.90

5 References

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

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Websites

http://jncc.defra.gov.uk/

Appendix 3: Ecological parameters plan


N
Key
Site boundary
Dark corridor (<0.5 lux)
Habitat creation
Native hedge planting 1.43km
SuDs 0.51ha
Wildflower meadow 1.34ha
Native shrub planting 0.19ha
Community orchard 0.04ha
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New native shrub, hedgerow, tree and wildflower planting. This will provide suitable habitat for a range of species including invertebrates, birds, reptiles and amphibians.
New boundary
Public realm lighting scheme designed to create 'dark corridors' (<0.5 lux) around the boundaries of the site and through the centre to allow 'permeability' for more light sensitive bat species.
A minimum of 20 bat and 20 bird boxes incorporated within the fabric of new buildings. Average of one box per two residential units.
New boundary
Bat hop-overs required, comprising short sections of road remaining unlit
EBDON ROA
Hedgehog passes created within new residential garden fences to allow movement post-development.
SuDS drainage feature to provide suitable habitat for reptiles and amphibians.
ORNFIELDS
ead ecology
www.eadecology.co.uk
Mead Realisation
Land at Lynchmead Road, Weston-super-mare
Ecological Parameters Plan
Date: 07/10/2021

Appendix 4: Update botanical survey results

Botanical survey

1 Methodology

A botanical survey of the grassland and ditch habitats within the site was undertaken on 29 September 2021. This involved identification of homogenous stands of vegetation within the grassland, within which quadrats were used to record the abundance of plant species. Within the each of the four fields within the application area grassland, five 2m x 2m quadrats were completed. The location of quadrats is shown in Figure A4.1 Botanical Survey Plan below. The abundance of all plant species was recorded in the quadrats using the DAFOR scale. This records the cover of plant species as follows: D = Dominant; A = Abundant, F = Frequent, O = Occasional, R = Rare.

A full plant species list was also made of each of the ditches within the application area; refer to Figure A4.1.

Photographs are also provided below.

2 Results

The quadrat results for each area are given below:

Table A4.1: Field A species lists

Species	Quadrat (2x2m) DAFOR				
	1	2	3	4	5
Perennial rye-grass	F	R		R	D
Cock's-foot	A	O	F	R	
Creeping thistle	O		A	R	
White clover	O				
Creeping buttercup	R	R	R	R	R
Yorkshire fog	F	D	F	A	
Broad-leaved dock			R		R
Creeping bent			R	O	
Annual meadow-grass					R
Chamomile					R
Knotgrass					R
Dandelion					R

Table A4.2: Field B species lists

Species	Quadrat DAFOR				
	1	2	3	4	5
Perennial rye-grass	D	D	A	D	F
Yorkshire fog	R				F
Creeping buttercup	O	R		R	R
Cock's-foot	R			O	F
Red clover			O	R	R
Doves-foot cranesbill			R		
Crested Dog's-tail			R		
Creeping bent			R		
Dandelion				R	
Broad-leaved dock				R	R

Table A4.3: Field C species lists

Species	Quadrat DAFOR				
	1	2	3	4	5
Cock's-foot	F	A		R	F
Creeping bent	R		D	F	F
Broad-leaved dock	F	R	R	O	R
Creeping thistle	O				R
False oat-grass	F	F			O
Yorkshire fog	O	R	R	F	
Spear thistle	R	R			
Creeping buttercup	R		R	O	
Perennial rye-grass					O
Common nettle				R	
Hogweed				R	

Table A4.4: Field D species lists

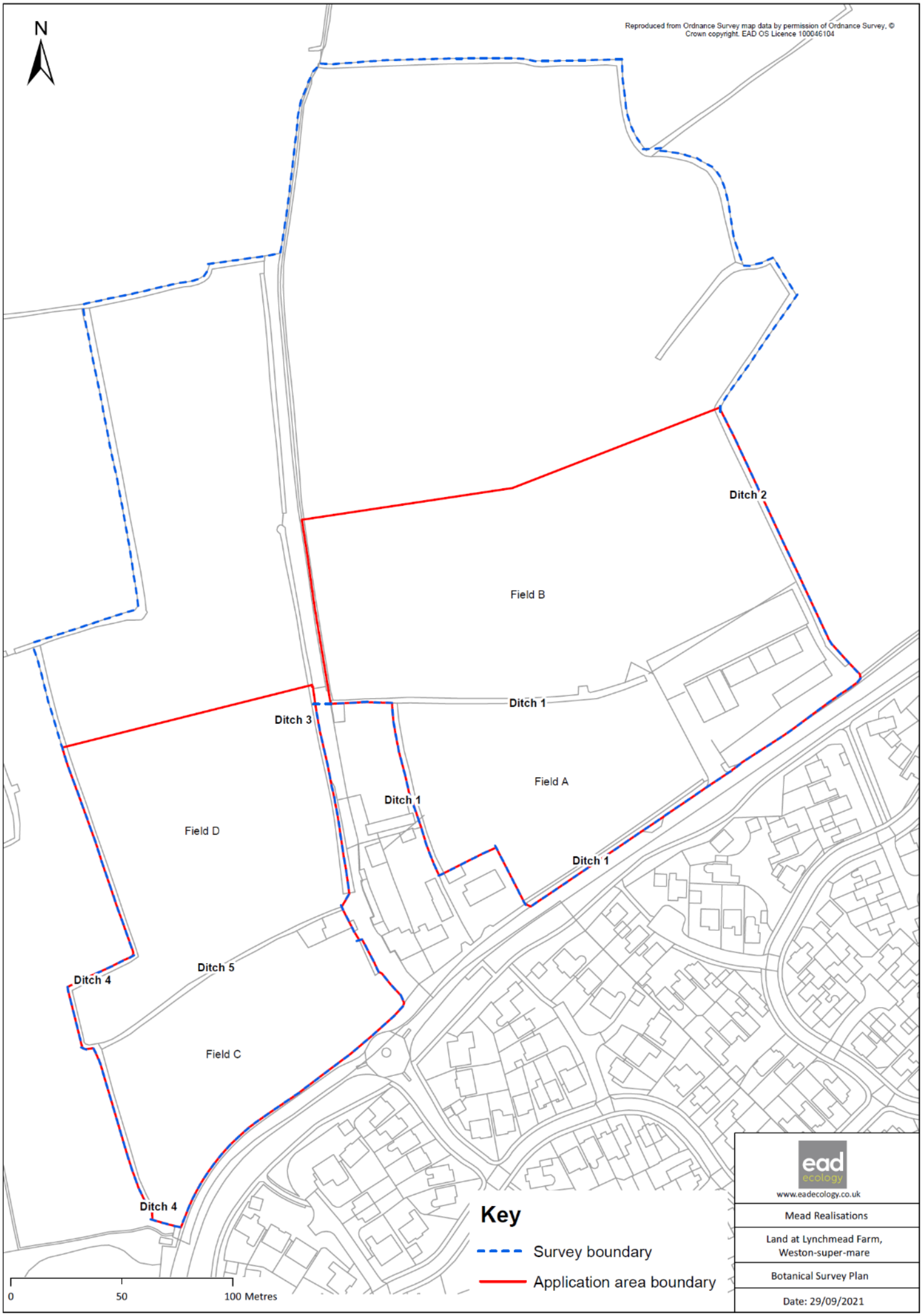
Species	Quadrat DAFOR				
	1	2	3	4	5
Creeping bent	D		A	R	R
Perennial rye-grass	R		R	D	D
Yorkshire fog	R		O		
Creeping thistle	R			R	
Common nettle		D			
Bramble			O		
Cock's-foot			F	R	
Creeping buttercup				R	R
White clover					R

Table A4.5: Ditch species lists

Species	DAFOR				
	D1	D2	D3	D4	D5
Elder	O	R		O	R
Hawthorn	R	F		O	R
Blackthorn	R	A		F	A
Elm	R				O
Ash	R	R		0	R
Field maple				R	
Dogwood					R
Aspen			R		
Grey poplar			O		
Crack willow	R			O	
Bramble	D	O	F	A	O
Rose sp.	R				
Ivy		R	O	O	
Travellers joy				R	
Black bryony					R

Table A4.5: Ditch species lists

Species	DAFOR				
	D1	**D2**	**D3**	**D4**	**D5**
Bindweed	O			O	R
Bittersweet	O				
Common nettle	F	O	A	F	F
Yorkshire fog	O	R	O	O	O
Cock's-foot	O	O	O	O	O
Perennial rye-grass	O	O			
Spear thistle	R				
Greater willowherb	R			R	R
Persicaria species	R				
Fat hen	R				
Cleavers	R				
Creeping bent	R				
Broad-leaved dock	R				
Willowherb species	R				
Floating sweet-grass	R				
Common reed		R			
False oat-grass		R	O		O
Creeping thistle				R	
Lesser burdock					R
Common couch					R
Rough meadow-grass					R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Ditch 2
Field B
Ditch 1
Ditch 3
Field A
Ditch 1
Field D
Ditch 1
Ditch 5
Ditch 4
Field C
Ditch 4
Key
Survey boundary
Application area boundary
0
50
100 Metres
ead ecology
www.eadecology.co.uk
Mead Realisations
Land at Lynchmead Farm, Weston-super-mare
Botanical Survey Plan
Date: 29/09/2021

Photograph 1: Ditch 1

Photograph 2: Ditch 1

Photograph 3: Ditch 2

Photograph 4: Ditch 2

Photograph 5: Ditch 3

Photograph 6: Ditch 4

Photograph 7: Ditch 4

Photograph 8: Ditch 57