

# Baseline Monitoring Surveys 2021-22

## CPRE Hedgerow Restoration Project, Meyrick Estate



**Carmen Green**  
April 2022

## Acknowledgements

Hampshire and Isle of Wight Wildlife Trust delivered this work in partnership with CPRE, supported by Boyd McCleary and Natalie Hargreaves of CPRE, and their dedicated volunteers.

## Publication Details

This document should be cited as: Green, C. (2022) *Baseline Monitoring Surveys 2021-22: CPRE Hedgerow Restoration Project, Meyrick Estate*. Hampshire and Isle of Wight Wildlife Trust, Curdridge.

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Front Cover: Existing hedgerows on the Meyrick Estate by Trevor Barton

Published by:  
Hampshire and Isle of Wight Wildlife Trust  
Beechcroft House  
Vicarage Lane  
Curdridge  
Hampshire  
SO32 2DP

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## Document Control

<b>Version:</b> <i>final</i>		
<i>Author</i>	<i>Carmen Green</i>	<i>11.04.2022</i>
<i>First Reviewer</i>	<i>Thomas Marceau</i>	<i>12.04.2022</i>
<i>Technical Reviewer</i>	<i>Sarah Jackson</i>	<i>13.04.2022</i>
<i>Approver</i>	<i>Deborah Whitfield</i>	<i>13.04.2022</i>

## Executive Summary

Hampshire and Isle of Wight Wildlife Trust, with the support of CPRE volunteers, undertook ecological surveys of the Meyrick Estate to form a baseline for future ecological monitoring in relation to the creation of new hedgerows and enhancement and restoration of existing hedgerows at the site.

The Meyrick Estate is situated in a rural location within the New Forest National Park in Hampshire (SZ 19391 96180). It is located to the north of the town of Highcliffe and south of the village of Bransgore. The site consists of two sections: paddocks to the north where new hedgerow planting will be carried out and an existing hedgerow either side of a track to the south where enhancements will be carried out. The immediate surroundings comprise farmland and woodland to the north, south and west and Ringwood Road is to the east.

Ecological monitoring surveys were undertaken at the Meyrick Estate between August 2021 and April 2022. These included soil sampling and species surveys for bats, birds, butterflies and bumblebees.

The Meyrick Estate has a relatively neutral soil pH. It also has very high levels of phosphorus while levels of potassium and magnesium were normal. This indicates that the land has received fertiliser inputs previously. Organic matter levels were normal (6.91% - most soils have 2-10% organic matter). Levels of organic matter can provide a good indication of carbon levels; carbon constitutes about half of all soil organic matter. It is expected that this figure will increase following hedgerow planting. Further soil sampling surveys should be carried out in the future to monitor the levels of nutrients and nitrogen present in the soil over a number of years in order to understand how future management of the site affects soil health.

At least five species of bat were recorded on the bat activity surveys, including a small group of noctule bats that were thought to be roosting in trees nearby. Bat activity was distributed across the site, however, the majority of bat activity was recorded along the existing hedgerow and woodland edge; these provide good foraging habitat for bats while connecting to other areas of hedgerow and woodland in the wider landscape.

A good diversity and abundance of birds have been observed at the Meyrick Estate. A total of 218 birds of 31 species were recorded over the three visits. The majority of bird activity was observed along the southern hedgerow, particularly in and around the blocks of woodland either side of the track.

A total of 24 butterflies of nine species were recorded on the transect at the Meyrick Estate. Large white was the most frequently recorded species. Most species were seen on only one occasion and no butterflies were observed on all three visits. Small white and red admiral were the most frequently encountered and recorded on two of the three visits. All species observed are common and widespread.

Low numbers of bumblebees including 17 individuals of at least three species were recorded on the transect at the Meyrick Estate. Common carder bee was the most frequently recorded species, with a total of eleven across the surveys, and it was observed on three out of the four visits. The low abundance of bumblebees is likely a result of surveys being conducted either late or early in the season where there was a lower botanical diversity within the hedgerows and weather conditions were cooler.

Enhancements to the existing hedgerow and planting of new hedgerows will provide a greater abundance and diversity of a range of wildlife including bats, birds and invertebrates. Monitoring of the site should continue to establish the effects of hedgerow creation and management on wildlife populations.

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## **1. INTRODUCTION**

### **1.1. Background**

Hampshire and Isle of Wight Wildlife Trust (HIWWT), with the support of CPRE volunteers, undertook ecological surveys of the Meyrick Estate to form a baseline for future ecological monitoring in relation to the creation of new hedgerows and enhancement and restoration of existing hedgerows at the site.

### **1.2. Site Description**

The Meyrick Estate is situated in a rural location within the New Forest National Park in Hampshire (Map 1; SZ 19391 96180). It is located to the north of the town of Highcliffe and south of the village of Bransgore. The site consists of two sections: paddocks to the north where new hedgerow planting will be carried out and an existing hedgerow either side of a track to the south where enhancements will be carried out. The immediate surroundings comprise farmland and woodland to the north, south and west and Ringwood Road is to the east.

In the wider landscape, there are extensive areas of arable fields and grazed pasture in all directions. The town of New Milton extends to the east and Christchurch extends to the west. A railway line and the main A35 road lies to the south. In addition, there are large areas of woodland in all directions of the site, particularly to the east.

### **1.3. Remit and Scope of the Report**

This report details the results of baseline ecological monitoring surveys undertaken at the Meyrick Estate, to monitor the effects of the creation and restoration of hedgerows at the site in order to inform the future management and monitoring of the site. These comprised soil sampling and species surveys for bats, birds, butterflies and bumblebees.

## 2. METHODOLOGY

### 2.1. Soil Sampling

A total of 25 soil samples were taken from the field where the new hedgerow will be planted (Map 2). These areas were selected to include fields that were adjoining/adjacent to one another and under similar management. At each of the 25 points, two samples were taken using a soil auger and sent to a laboratory: one sample for standard soil sampling analysis and one sample for soil mineral nitrogen analysis. Samples points were located following a W-pattern that covers as much of the site as possible across the two survey areas, avoiding gateways and potential areas with high nutrient levels such as patches of dense ruderal vegetation which can indicate historic manure piles.

The soil sampling surveys were led by Carla Broom and Thomas Marceau of HIWWT with assistance from volunteers at CPRE.

#### 2.1.1. Standard Soil Sampling

Samples were taken at a depth of approximately 15cm using a soil auger. The samples were collected in a clean bucket and carefully mixed, before a sub-sample of approximately 250g was removed and put into a plastic gripper bag. This sub-sample was sent to the laboratory for analysis. The test analysed levels of phosphate, potassium and magnesium, as well as testing soil pH and percentage of organic matter.

#### 2.1.2. Soil Mineral Nitrogen

Samples were taken to a depth of approximately 30cm using a soil auger. The samples were collected in a clean bucket and carefully mixed, before a sub-sample of approximately 250g was removed and put into a plastic gripper bag. This sub-sample was kept cool until collection by courier to avoid degradation of the nitrogen before being sent to the laboratory for analysis.

### 2.2. Bat Surveys

Bat activity surveys establish species and use of a site, to provide recommendations for conserving and enhancing bat foraging routes, by walking a pre-determined transect route around a site (Map 3).

The transect route was walked at a slow steady pace, with the direction of travel alternated on each visit. Along the route, listening points are identified where surveyors stop for three minutes to record activity, particularly for quieter species such as long-eared bat which may be missed whilst walking around. Activity surveys are conducted on evenings when there is no rain, little to no wind and when the temperature is above 8°C.

The surveys commenced at sunset and continued for up to 3 hours after sunset. Surveys were conducted using a time expansion bat detector (Pettersson d240x) and digital recorder (Zoom H2n), so recordings can therefore be made for later analysis using sound analysis software (Kaleidoscope Pro). All activity was recorded on a standard recording form and observed activity and/or location on transect are recorded on a map and GPS.

Two bat activity surveys were conducted across the season on 10<sup>th</sup> July and 23<sup>rd</sup> August 2021. Surveys were led by Sarah Jackson (MCIEEM, NE Bat Class Licence (level 2) Number CLS00678) and Carmen Green (ACIEEM, NE Bat Class Licence (level 1) Number 2018-36038-CLS-CLS) with assistance from Ella Benson of HIWWT. Tables 1 and 2 give a breakdown of the survey times, surveyors and weather conditions for each survey.

**Table 1.** Bat activity survey timings and surveyors

Date	Sunset Time	Survey Start Time	Survey Finish Time	Surveyors
10.08.21	20:38	20:38	22:40	Sarah Jackson Ella Benson
23.08.21	20:12	20:12	22:22	Carmen Green Ella Benson

**Table 2.** Bat activity survey weather conditions

Date	Air Temperature Start (°C)	Air Temperature Finish (°C)	Wind (Beaufort Scale)	Cloud Cover (Oktas)	General Conditions
10.08.21	16.5	15.1	1	2	Sunny and humid day, mild and clear evening getting cooler
23.08.21	19.0	14.7	1	2	Overcast and dry day

### 2.3. Bird Surveys

The bird surveys were based upon the BTO Timed Tetrad Visits methodology and followed the route shown in Map 3. It comprised three visits to give an indication of abundance and diversity of birds across the year, covering both the winter period and breeding season within the following time frames:

- Spring (1st April to 31st May);
- Summer (1st June to 31st July); and
- Winter (1st January to 28th February).

Surveys were carried out by Carmen Green (ACIEEM) of HIWWT between 27<sup>th</sup> August 2021 and 8<sup>th</sup> April 2022.

Winter bird surveys avoided the first and last hours of daylight when birds can be moving to and from roosts, and during the breeding season, visits were made within the first few hours of daylight when bird activity is higher.

The surveyor walked the site at a slow and steady pace and recorded all birds seen and heard. During the survey, individuals that were observed using the site (i.e. not individuals that are merely flying over, except hovering/foraging raptors) were recorded and counted. An approximate count was taken of any large flocks observed.

Details of survey timings and weather conditions are provided in Table 3.

**Table 3.** Bird surveys timings and weather conditions

Visit	Date	Start Time	End Time	Temperature (°C)	Weather conditions
1	27.08.21	08:42	09:44	13	Dry, clear and sunny morning
2	14.01.22	09:35	10:32	3	Dry and sunny
3	08.04.22	06:43	07:50	3	Dry and cloudy with a few spots of rain towards end of survey

### 2.4. Insect Surveys

Insect surveys were carried out at Meyrick Estate. Insects are important pollinators and a food source for a range of species including birds and mammals. The species groups selected for survey include butterflies and bumblebees. These insects are very sensitive to habitat changes and are therefore considered good biological indicators; a high biodiversity of these groups should indicate a healthy environment with an abundance and diversity of other wildlife. Butterflies and bumblebees are important pollinators of a range of plant species.

A transect for the insect surveys was established at the Meyrick Estate incorporating all habitats on site (Map 4). The transect was divided into sections to reflect a change in habitat type or management, and to be of similar length.

Surveys were undertaken in suitable weather conditions: when it was warm (13°C or more) and at least bright weather, within the minimum criteria of a temperature between 13°C and 17°C with at



least 60% sunshine, or over 17°C and not raining. Transects were undertaken within the recommended survey window of between 10:45 and 15:45. However, where weather conditions were highly suitable (i.e. above 17°C and 100% average sunshine), it was possible to commence surveys outside of this window.

Surveys were undertaken between by Trevor Bumfrey and Tina Vaughan, volunteers at CPRE.

## 2.5. Butterfly Surveys

The UK Butterfly Monitoring Scheme (UK BMS) survey methodology was used. The transect was walked at a slow, steady pace counting all butterflies seen within a fixed distance of 2.5 metres either side of the transect line and 5 metres ahead. The total number of butterflies and percentage sunshine was recorded at the end of each section. The average temperature, sunshine, wind speed and direction were recorded at the end of each transect. The details of survey timings and weather conditions are provided in Table 4.

**Table 4.** Butterfly survey timings and weather conditions

Date	Surveyor	Start	Finish	Average Temp. (°C)	Average Sunshine (%)	Average Wind Speed (0-6)
27.08.21	Trevor Bumfrey	14:15	16:05	19	0	1
02.09.21	Trevor Bumfrey	10:50	12:30	18	7	2
21.09.21	Trevor Bumfrey	10:50	12:15	20	100	1

## 2.6. Bumblebee Surveys

The bumblebee surveys followed the Bumblebee Conservation Trust Bee Walk survey methodology. The transect was walked at a slow, steady pace counting all bumblebees seen within a fixed distance of 2 metres either side and ahead of the surveyor. Where possible, the species and caste of individuals were recorded as well as the flower species it was feeding on. The average temperature, wind speed and direction were recorded at the end of each transect. The details of survey timings and weather conditions are provided in Table 5.

**Table 5.** Bumblebee survey timings and weather conditions

Date	Surveyor	Start	Finish	Average Temp. (°C)	Average Sunshine (%)	Average Wind Speed (0-6)
27.08.21	Trevor Bumfrey	14:15	16:05	19	0	1
02.09.21	Tina Vaughan	10:54	12:30	17	7	2-3
21.09.21	Trevor Bumfrey	10:50	12:15	20	100	1
16.03.22	Tina Vaughan	14:30	13:35	13	50	2

## 2.7. Constraints to Survey

All invertebrate surveys were conducted towards the end of the survey season, due to the fact that this project was not commissioned until August 2021. Therefore, it was not possible to obtain a full season of invertebrate surveys and it is likely that some earlier emerging species will have been missed.

### 3. RESULTS

#### 3.1. Soil Sampling

##### 3.1.1. Standard Soil Sampling

The field has a relatively neutral soil pH. It also has very high levels of phosphorus while levels of potassium and magnesium were normal. The laboratory results for standard soil sampling are detailed in Table 6.

**Table 6.** Standard soil analysis results

Field Name	Lab Ref	pH	Phosphorus (P)		Potassium (K)		Magnesium (Mg)		OM (%)
			(mg/l)	(Index)	(mg/l)	(Index)	(mg/l)	(Index)	
Meyrick Estate	2111083	6.46	81	5	249	3	139	3	6.91

##### 3.1.2. Soil Mineral Nitrogen

The soil mineral nitrogen test of the field suggests moderate levels of soil mineral nitrogen (release of mineral nitrogen from organic matter by soil microorganisms). A breakdown is provided in Table 7.

**Table 7.** Soil mineral nitrogen test results

Field Name	Lab Ref	Depth (cm)	Soil Type	Nitrate-N (kg/ha)	Ammonium-N (kg/ha)	SMN (kg/ha)
Meyrick Estate	2111148	0-30	SL (sandy loam)	29.9	9.9	39.8

#### 3.2. Bat Surveys

At least five species of bat were recorded on the bat activity surveys. These were common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus* and *Myotis* species. Bat activity was distributed across the site, however, the majority of bat activity was recorded along the existing hedgerow and woodland edge; these provide good foraging habitat for bats while connecting to other areas of hedgerow and woodland in the wider landscape. On the first survey, a large group of noctules were observed foraging along the edge of the nearby woodland and it is likely that there is a roost in the trees nearby that they had just emerged from.

A breakdown of species and recorded activity by date and hedgerow is given in Tables 8 to 11 and shown on Maps 5 and 6.

**Table 8.** Bat activity survey results (north hedge): 10<sup>th</sup> August 2021

Time	Species	No. of Bats	Activity	Target Note
20:54	Noctule	6	Foraging on edge of woodland and over field to south of survey route	A
21:01	Noctule	1	Heard not seen	4
21:08	Common pipistrelle	1	Flying north to south along fence line	4
21:24	Common pipistrelle	1	Heard not seen	1
21:30	Common pipistrelle	1	Heard foraging but not seen	
21:30	Soprano pipistrelle	1	Heard foraging but not seen	

**Table 9.** Bat activity survey results (south hedge): 10<sup>th</sup> August 2021

Time	Species	No. of Bats	Activity	Target Note
21:43	Common pipistrelle	1	Heard not seen	1
21:46	<i>Myotis</i> species	1	Heard not seen	2
21:48	<i>Myotis</i> species	1	Flying along track	3
21:51	Soprano pipistrelle	1	Heard not seen	4
21:57	Common pipistrelle	1	Heard not seen	6
21:59	Common pipistrelle	1	Heard not seen	6
22:00	Common pipistrelle	2+	Foraging around edge of woodland	7
22:13	Common pipistrelle	3+	Heard not seen	7
22:26	Common pipistrelle	1	Flying along track	9
22:29	<i>Myotis</i> species	1	Heard not seen	3
22:30	Common pipistrelle	1	Heard not seen	3
22:35	Common pipistrelle	1	Heard not seen	2
22:37	Common pipistrelle	1	Flying along track	1

**Table 10.** Bat activity survey results (north hedge): 23<sup>rd</sup> August 2021

Time	Species	No. of Bats	Activity	Target Note
21:27	Common pipistrelle	1	Foraging across track	2
21:30	<i>Myotis</i> species	1	Foraging across track	2
21:44	Common pipistrelle	1	Heard not seen	4
21:56	Common pipistrelle	1	Heard not seen	4
22:00	Common pipistrelle	2	Heard not seen	4A
22:09	<i>Myotis</i> species	1	Foraging across track	2
22:12	Common pipistrelle	1	Foraging across track	2

**Table 11.** Bat activity survey results (south hedge): 23<sup>rd</sup> August 2021

Time	Species	No. of Bats	Activity	Target Note
20:19	Noctule	1	Foraging across track	2
20:34	Soprano pipistrelle	2	Foraging across track	4
20:36	Soprano pipistrelle	1	Foraging down track heading south-west	4A
20:41	Common pipistrelle	1	Foraging across track	3
20:43	Soprano pipistrelle	1	Foraging across track	3
20:45	Soprano pipistrelle	1	Foraging across track	3
20:49	Serotine	1	Foraging across track	2
20:60	Soprano pipistrelle	1	Foraging across track	2
20:54	Common pipistrelle	1	Foraging across track	2
20:56	Common pipistrelle	1	Foraging across track	2
20:57	Soprano pipistrelle	1	Flying over track	1
20:59	Common pipistrelle	1	Flying over track	1
20:59	Serotine	1	Flying over track	1
21:00	Soprano pipistrelle	2	Flying over track	1
21:07	Serotine	1	Heard not seen	

### 3.3. Bird Surveys

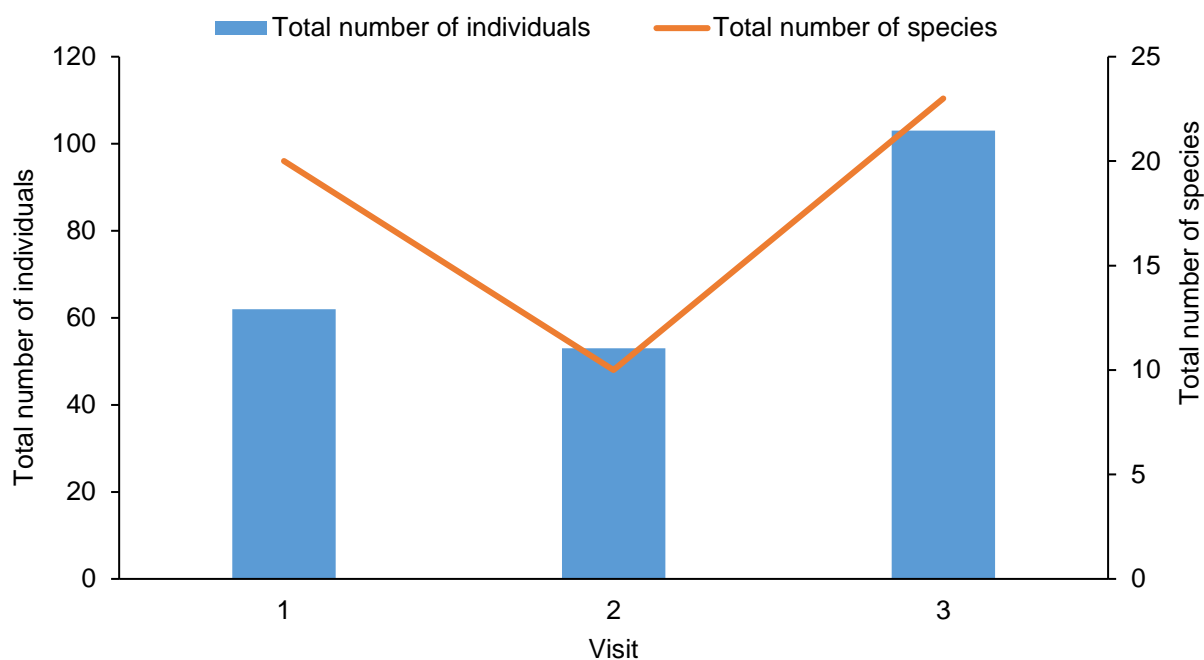
A total of 218 birds of 31 species were recorded over the three visits. The third visit (spring) recorded both the highest numbers of species and individuals while the second visit (winter) recorded both the lower numbers of species and individuals (Figure 1). Redwing *Turdus iliacus* was the most abundant species on the Meyrick Estate and a large flock of 30 were seen during the winter visit. Robin *Erithacus rubecula* was the second most abundant species, followed by blue tit *Cyanistes caeruleus*. Of the 31 species recorded, seven were observed on all three survey visits. These species include blackbird *Turdus merula*, blue tit, chaffinch *Fringilla coelebs*, great spotted woodpecker *Dendrocopos major*, great tit *Parus major*, jay *Garrulus glandarius* and robin. Just over half of the species recorded were only encountered on one occasion (52%). The majority of bird activity was observed along the southern hedgerow, particularly in and around the blocks of woodland either side of the track.

Table 12 gives a breakdown of species recorded on site, along with the visits they were recorded on, and Figure 2 shows the numbers and species of birds observed during each of the visits. Maps 7 to 9 show the distribution of species on each visit.

Of the 31 species recorded, eleven species are protected and/or notable, as detailed in Table 13.

**Table 12.** Bird survey results on the Meyrick Estate in 2021-22

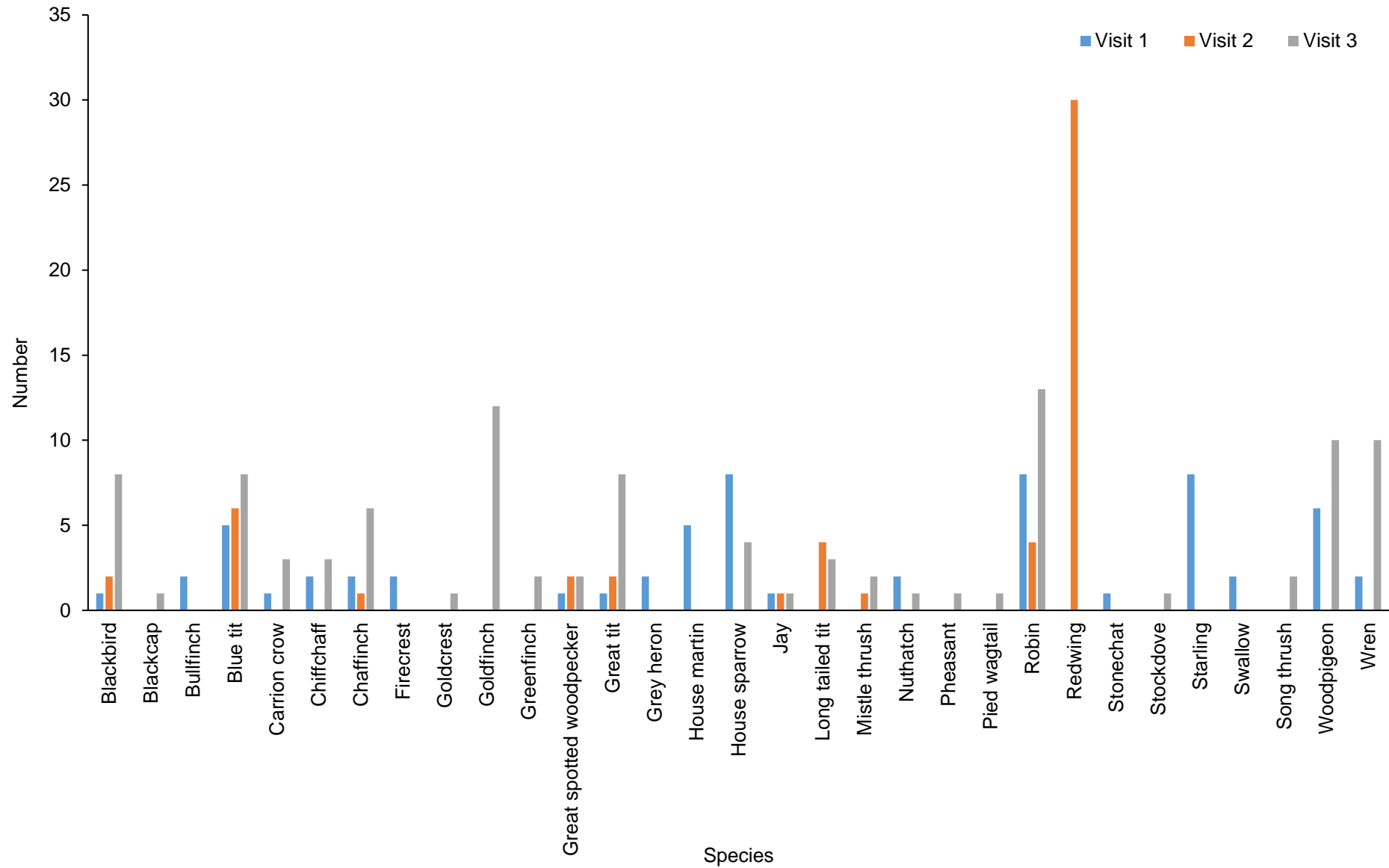
BTO Code	Common Name	Visit			Totals	
		1	2	3	Individuals recorded	Total encounters
B.	Blackbird	1	2	8	11	3
BC	Blackcap	0	0	1	1	1
BF	Bullfinch	2	0	0	2	1
BT	Blue tit	5	6	8	19	3
C.	Carrion crow	1	0	3	4	2
CC	Chiffchaff	2	0	3	5	2
CH	Chaffinch	2	1	6	9	3
FC	Firecrest	2	0	0	2	1
GC	Goldcrest	0	0	1	1	1
GO	Goldfinch	0	0	12	12	1
GR	Greenfinch	0	0	2	2	1
GS	Great spotted woodpecker	1	2	2	5	3
GT	Great tit	1	2	8	11	3
H.	Grey heron	2	0	0	2	1
HM	House martin	5	0	0	5	1
HS	House sparrow	8	0	4	12	2
J.	Jay	1	1	1	3	3
LT	Long-tailed tit	0	4	3	7	2
M.	Mistle thrush	0	1	2	3	2
NH	Nuthatch	2	0	1	3	2
PH	Pheasant	0	0	1	1	1
PW	Pied wagtail	0	0	1	1	1
R.	Robin	8	4	13	25	3
RE	Redwing	0	30	0	30	1
SC	Stonechat	1	0	0	1	1
SD	Stock dove	0	0	1	1	1
SG	Starling	8	0	0	8	1
SL	Swallow	2	0	0	2	1
ST	Song thrush	0	0	2	2	1
WP	Woodpigeon	6	0	10	16	2
WR	Wren	2	0	10	12	2



**Figure 1.** Numbers of birds observed on each visit to the Meyrick Estate

**Table 13.** Protected and/or notable species recorded on the Meyrick Estate

BTO Code	Common Name	Latin Name	Status
BF	Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber List UK BAP
GR	Greenfinch	<i>Chloris chloris</i>	Red List
HM	House martin	<i>Delichon urbica</i>	Amber List
HS	House sparrow	<i>Passer domesticus</i>	Red List UK BAP
M.	Mistle thrush	<i>Turdus viscivorus</i>	Red List
RE	Redwing	<i>Turdus iliacus</i>	Amber List
SD	Stock dove	<i>Columba oenas</i>	Amber List
SG	Starling	<i>Sturnus vulgaris</i>	Red List UK BAP
ST	Song thrush	<i>Turdus philomelos</i>	Amber List
WP	Woodpigeon	<i>Columba palumbus</i>	Amber List
WR	Wren	<i>Troglodytes troglodytes</i>	Amber List



**Figure 2.** Numbers and species of birds observed during the three visits to the Meyrick Estate

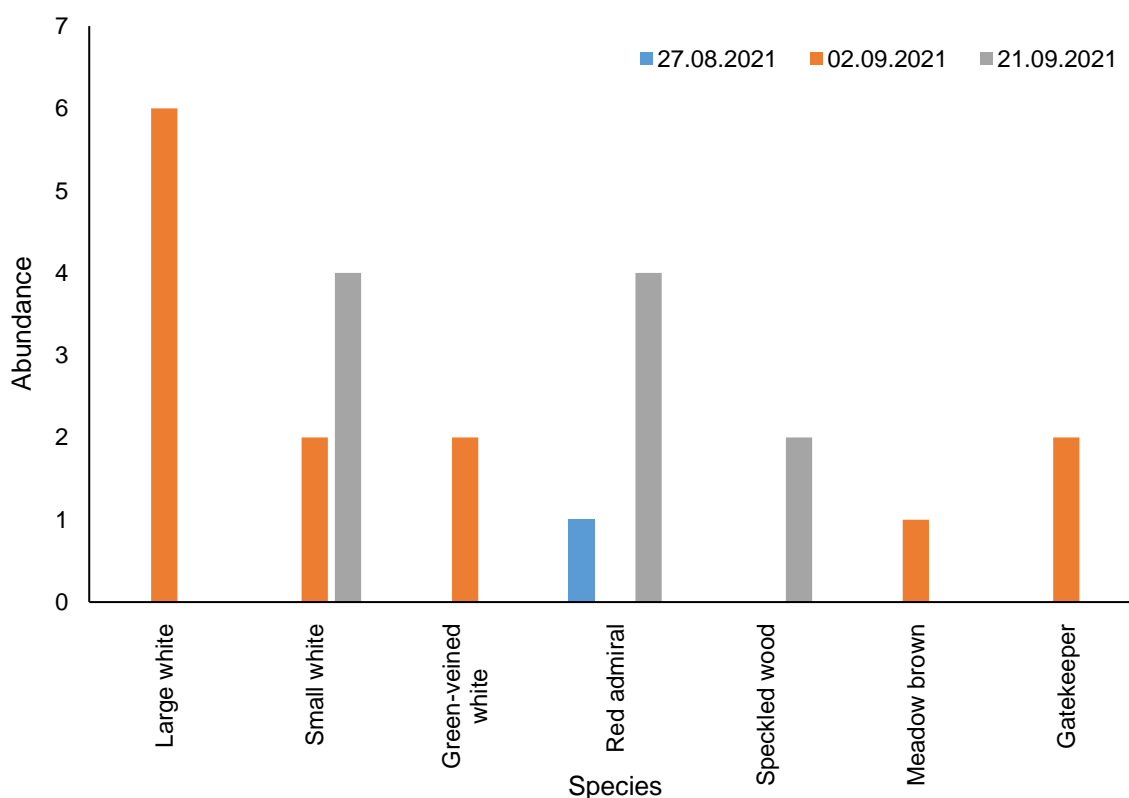
### 3.4. Insect Surveys

#### 3.4.1. Butterfly Surveys

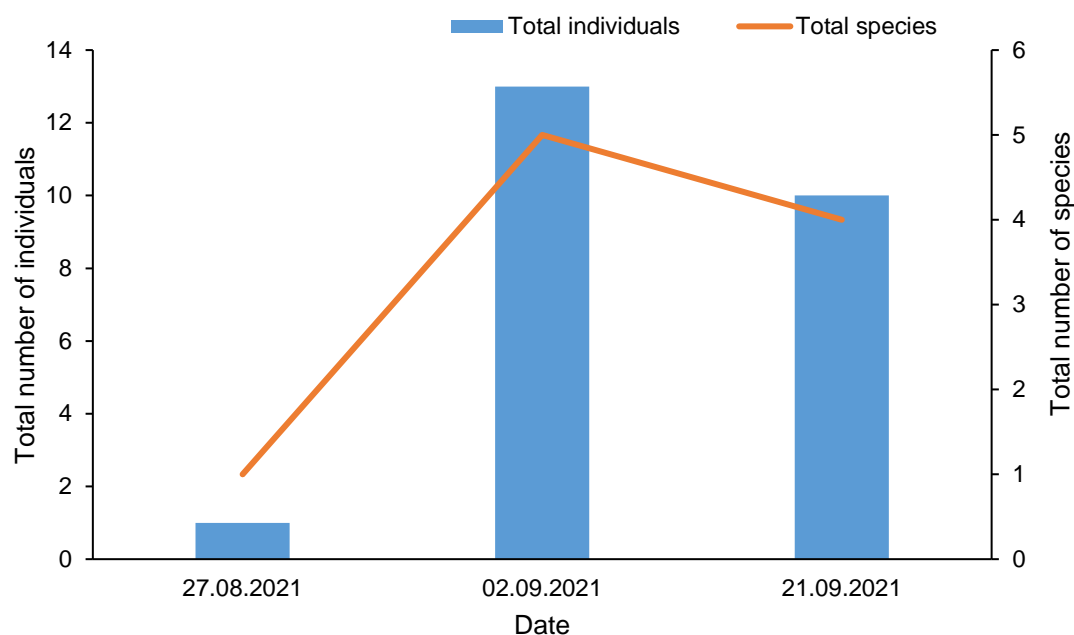
A total of 24 butterflies of nine species were recorded on the transect at the Meyrick Estate, as detailed in Table 14. Large white *Pieris brassicae* was the most frequently recorded species, with a peak of six butterflies seen on 2<sup>nd</sup> September, as shown in Figure 3. Butterfly abundance was highest on the second visit with 13 individuals observed, as shown in Table 14 and Figure 4. Of these, almost half were large white butterflies. This was closely followed by the final visit where ten butterflies were recorded. Only a single butterfly was observed during the first visit in August. The second visit recorded the highest number of species with a total of five species observed (Figure 4). Most species were seen on only one occasion and no butterflies were observed in all three visits. Small white *Pieris rapae* and red admiral *Vanessa atalanta* were the most frequently encountered and recorded on two of the three visits.

**Table 14.** Summary of butterflies recorded on the Meyrick Estate

Species	Date			Total
	27.08.2021	02.09.2021	21.09.2021	
Large white		6		6
Small white		2	4	6
Green-veined white		2		2
Red admiral	1		4	5
Speckled wood			2	2
Meadow brown		1		1
Gatekeeper		2		2
<b>Total</b>	<b>1</b>	<b>13</b>	<b>10</b>	<b>24</b>



**Figure 3.** Number of butterflies observed on each survey



**Figure 4.** Total number of individuals and species recorded during the butterfly surveys

### 3.4.2. Bumblebee Surveys

A total of 17 bumblebees of at least three species were recorded on the transect at the Meyrick Estate, as detailed in Table 15. Common carder bee *Bombus pascuorum* was the most frequently recorded species, with a total of eleven across the surveys, and it was observed on three out of the four visits (Figure 5). Bumblebee abundance was highest on the second and third visit with six observed on each survey, as shown in Table 15 and Figure 6. Bumblebee abundance and diversity was lowest in August and March with only two species observed and three and two individuals, respectively.

**Table 15.** Summary of bumblebees recorded on the Meyrick Estate

Species	Date				Total
	27.08.2021	02.09.2021	21.09.2021	16.03.2022	
Common carder	1	4	6		11
Red-tailed bumblebee		1		1	2
Buff-tailed bumblebee	2				2
White/buff-tailed bumblebee		1		1	2
<b>Total</b>	3	6	6	2	<b>17</b>



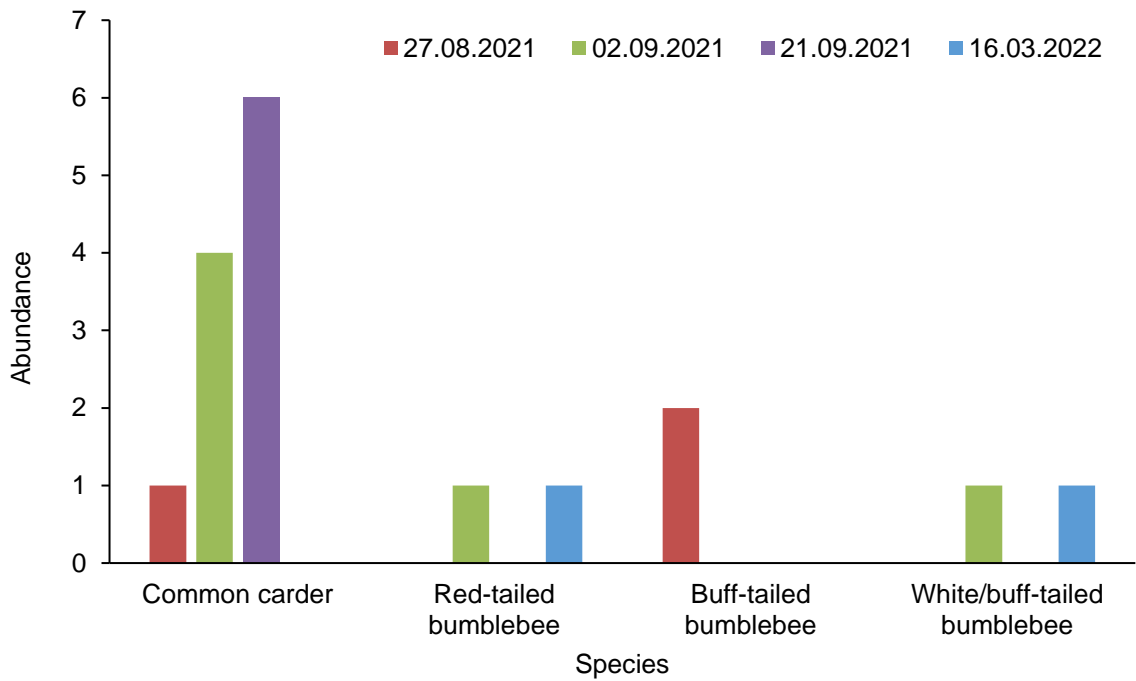


Figure 5. Mean number of bumblebees observed on each survey

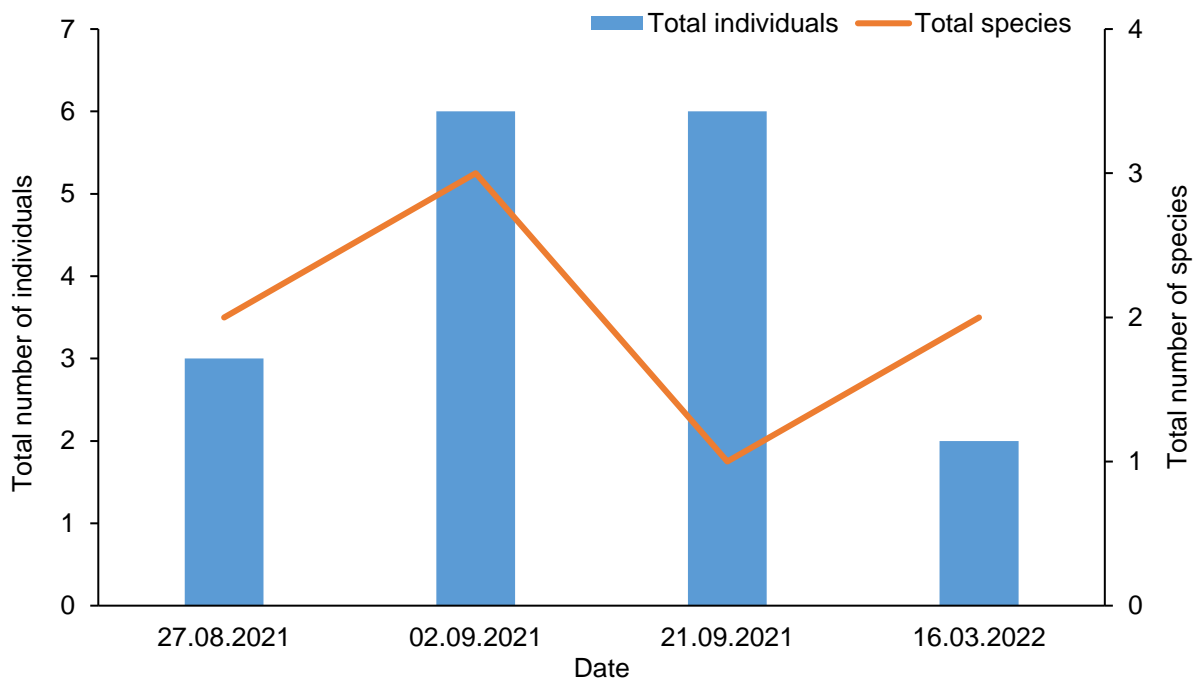


Figure 6. Total number of individuals and species recorded during the bumblebee surveys

## 4. SUMMARY AND RECOMMENDATIONS

### 4.1. Soil Sampling

#### 4.2. Summary of Results

The Meyrick Estate has a relatively neutral soil pH. It also has very high levels of phosphorus while levels of potassium and magnesium were normal.

Soil phosphorus is a major plant nutrient that affects plant growth and can lead to more competitive species of grass and ruderals dominating over wildflower species. Therefore, phosphorus is often added as a fertiliser to increase agricultural productivity. The very high phosphorus index of 5 indicates that the land has received high fertiliser inputs previously.

Soil potassium is a naturally derived element from clay-rich minerals and clay soils tend to have higher levels of potassium than sandy soils. The Meyrick Estate has a high potassium level, characteristic of agriculturally improved grasslands.

Magnesium content in plants is inversely related to potassium content, so that a high content of potassium depresses magnesium. Magnesium is important for animal health and therefore high levels are essential in hay production.

Higher levels of potassium and magnesium are not as restrictive to the restoration and creation of wildflower grassland however, compared with phosphorous.

Organic matter is a vital part of soil and made up of living organisms and decomposing plant or animal tissue. It is important for better soil fertility and structure, and overall soil health. Organic matter levels were normal (6.91% - most soils have 2-10% organic matter). Levels of organic matter can provide a good indication of carbon levels; carbon constitutes about half of all soil organic matter (Agriculture and Horticulture Development Board 2018). It is expected that this figure will increase following hedgerow planting. Further monitoring will follow trends in soil organic matter and, therefore, carbon quantities.

Nitrogen is also important for plant growth. The vast majority of nitrogen in the soil is in organic matter. A small proportion is decomposed by soil microorganisms each growing season, releasing mineral nitrogen (nitrate and ammonium). The moderate levels of nitrogen in the soil indicates that the land has received fertiliser inputs previously to promote plant growth.

#### 4.2.1. Recommendations

Further soil sampling surveys should be carried out in the future to monitor the levels of nutrients and nitrogen present in the soil over a number of years in order to understand how future management of the site affects soil health.

### 4.3. Bat Surveys

#### 4.4. Summary of Results

At least five species of bat were recorded on the bat activity surveys, including a small group of noctule bats that were thought to be roosting in trees nearby. Bat activity was distributed across the site; however, the majority of bat activity was recorded along the existing hedgerow and woodland edge; these provide good foraging habitat for bats while connecting to other areas of hedgerow and woodland in the wider landscape.

#### 4.5. Recommendations

Enhancements to the existing hedgerow and planting of new hedgerows will encourage a greater abundance of invertebrates, providing a greater foraging resource for bats. In addition, it will also improve connectivity across the landscape, allowing bats to commute and navigate through the landscape between blocks of woodlands, hedgerow and fields.

Monitoring of the site should continue to establish the effects of hedgerow creation and management on bats using the hedgerows at the Meyrick Estate and identify changes in activity levels and use of the site.

#### **4.6. Bird Surveys**

##### **4.7. Summary of Results**

A good diversity and abundance of birds have been observed at the Meyrick Estate. A total of 218 birds of 31 species were recorded over the three visits. The majority of bird activity was observed along the southern hedgerow, particularly in and around the blocks of woodland either side of the track.

##### **4.8. Recommendations**

Enhancements to the existing hedgerow and planting of new hedgerows will provide additional nesting and foraging habitat for birds. Planting a range of native trees and shrubs will encourage a greater abundance of invertebrate prey as well as fruits and berries that birds and feed on.

Monitoring of the site should continue to establish the effects of hedgerow creation and management on bird populations at the Meyrick Estate.

#### **4.9. Butterfly Surveys**

##### **4.10. Summary of Results**

A total of 24 butterflies of nine species were recorded on the transect at the Meyrick Estate. Large white was the most frequently recorded species. Most species were seen on only one occasion and no butterflies were observed in all three visits. Small white and red admiral were the most frequently encountered and recorded on two of the three visits. All species observed are common and widespread.

##### **4.11. Recommendations**

Enhancements to the existing hedgerow and planting of new hedgerows will provide a greater abundance and diversity of nectar and pollen resources for a range of invertebrates including butterflies.

Monitoring of the site should continue to establish the effects of hedgerow creation and management on butterfly populations. To assess the status of butterflies at the Meyrick Estate, several years of survey data will need to be collated, therefore monitoring should continue annually. This data can also be used to monitor the effects of hedgerow creation and management.

#### **4.12. Bumblebee Surveys**

##### **4.13. Summary of Results**

Low numbers of bumblebees including 17 individuals of at least three species were recorded on the transect at the Meyrick Estate. Common carder bee was the most frequently recorded species, with a total of eleven across the surveys, and it was observed on three out of the four visits. This low abundance of bumblebees is likely a result of surveys being conducted either late or early in the season when there was a lower botanical diversity within the hedgerows and weather conditions were cooler.

##### **4.14. Recommendations**

Enhancements to the existing hedgerow and planting of new hedgerows will provide a greater abundance and diversity nectar and pollen resources for a range of invertebrates including bumblebees.

Monitoring of the site should continue to establish the effects of hedgerow creation and management on bumblebee populations. To assess the status of bumblebees at the Meyrick Estate, several years of survey data will need to be collated, therefore monitoring should continue annually. This data can also be used to monitor the effects of hedgerow creation and management.

## 5. REFERENCES

- **Agriculture and Horticulture Development Board. (2018).** *Measuring and managing soil organic matter*. Available at: <https://projectblue.blob.core.windows.net/media/Default/Imported%20Publication%20Docs/Soil%20Organic%20Matter.pdf> [Accessed 11<sup>th</sup> April 2022].
- **Bumblebee Conservation Trust BBCT. (2021).** *BeeWalk Survey Scheme: guidance document*. Available at: <https://www.bumblebeeconservation.org/wp-content/uploads/2021/01/BeeWalkPack2021.pdf> [Accessed 11<sup>th</sup> April 2022].
- **CIEEM (2013). Code of Professional Conduct. CIEEM.**
- **Natural England. (2008).** *Soil and agri-environment schemes: interpretation of soil analysis*. Natural England, York.
- **UK Butterfly Monitoring Scheme** <http://www.ukbms.org/> [Accessed 11<sup>th</sup> April 2022].

**MAPS**

Location within county:



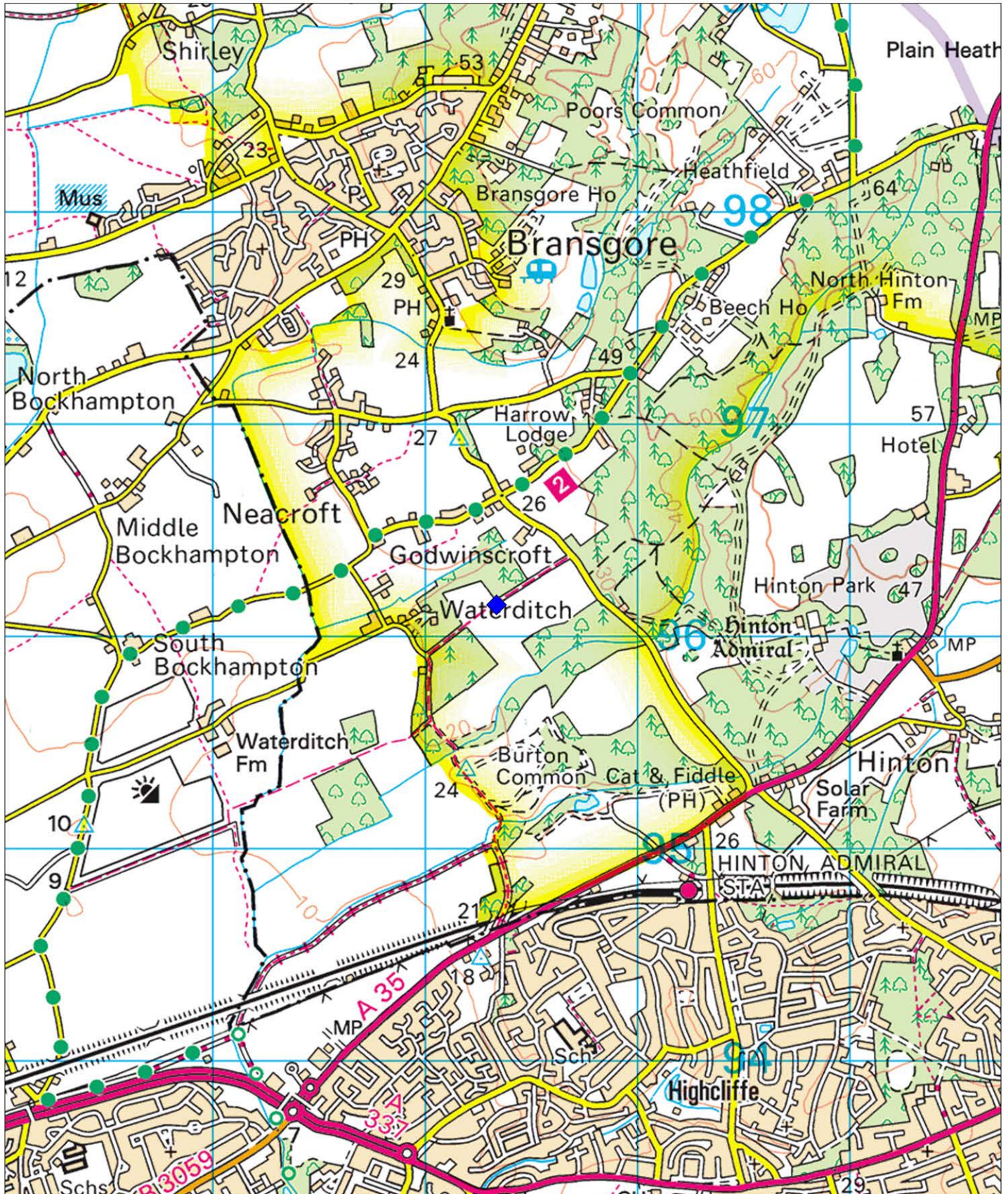
# Map 1. Site Location

## CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:25000

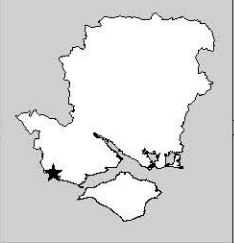


◆ Site location



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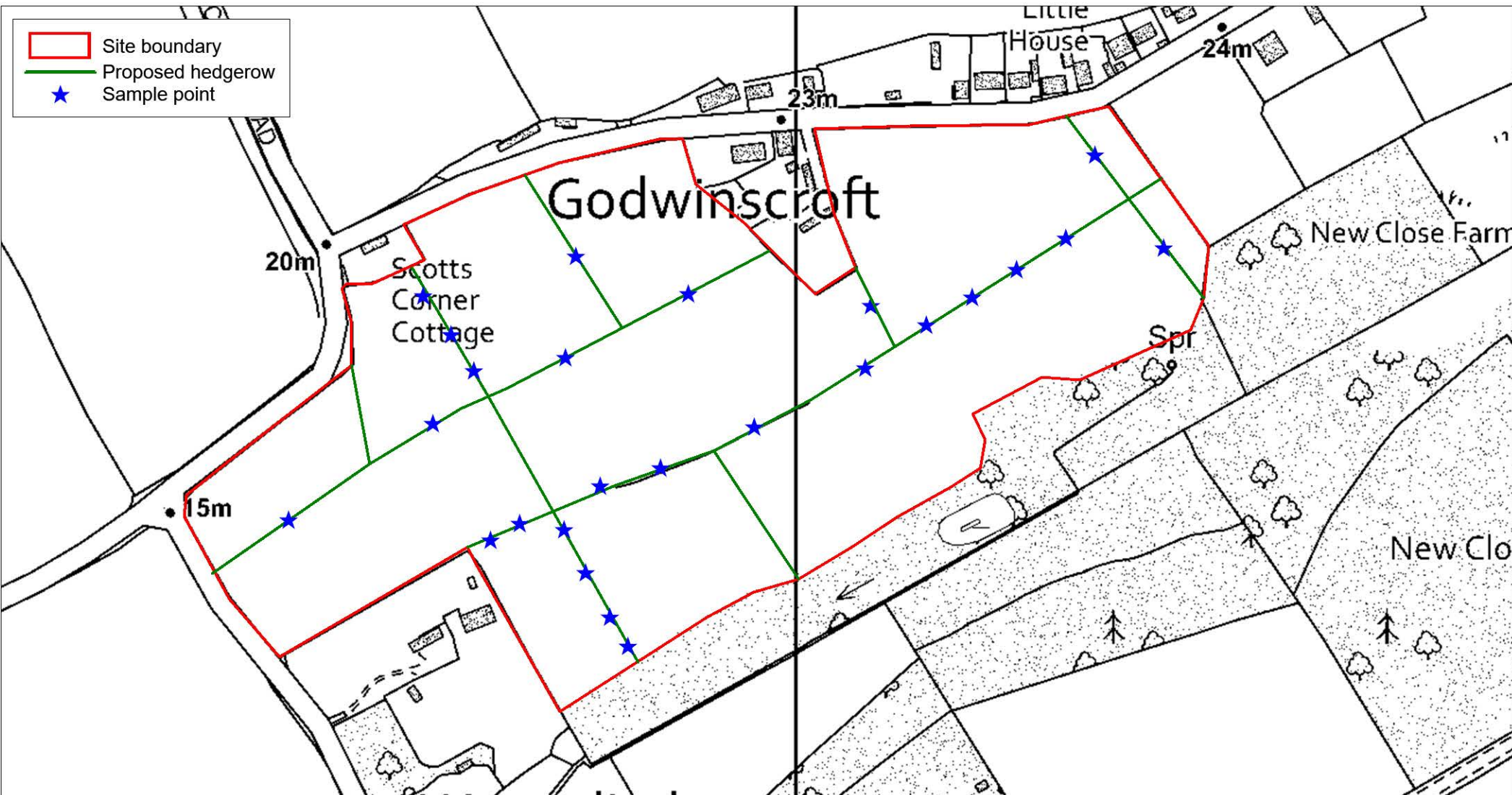
Location within county:



## Map 2. Soil Sampling Locations

CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:3000



Location within county:



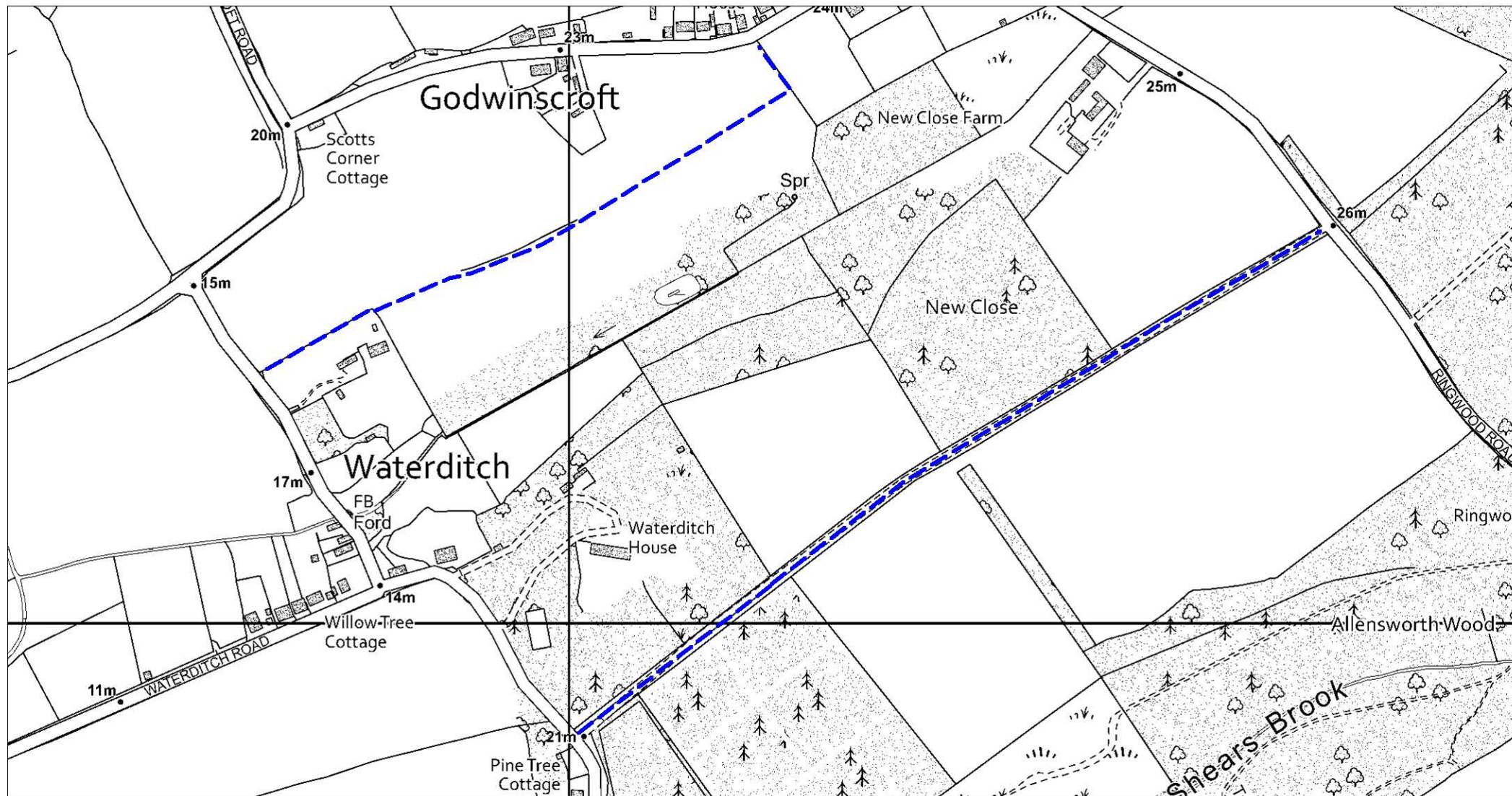
### Map 3. Bat and Bird Survey Transect Route

CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



--- Transect route





Location within county:



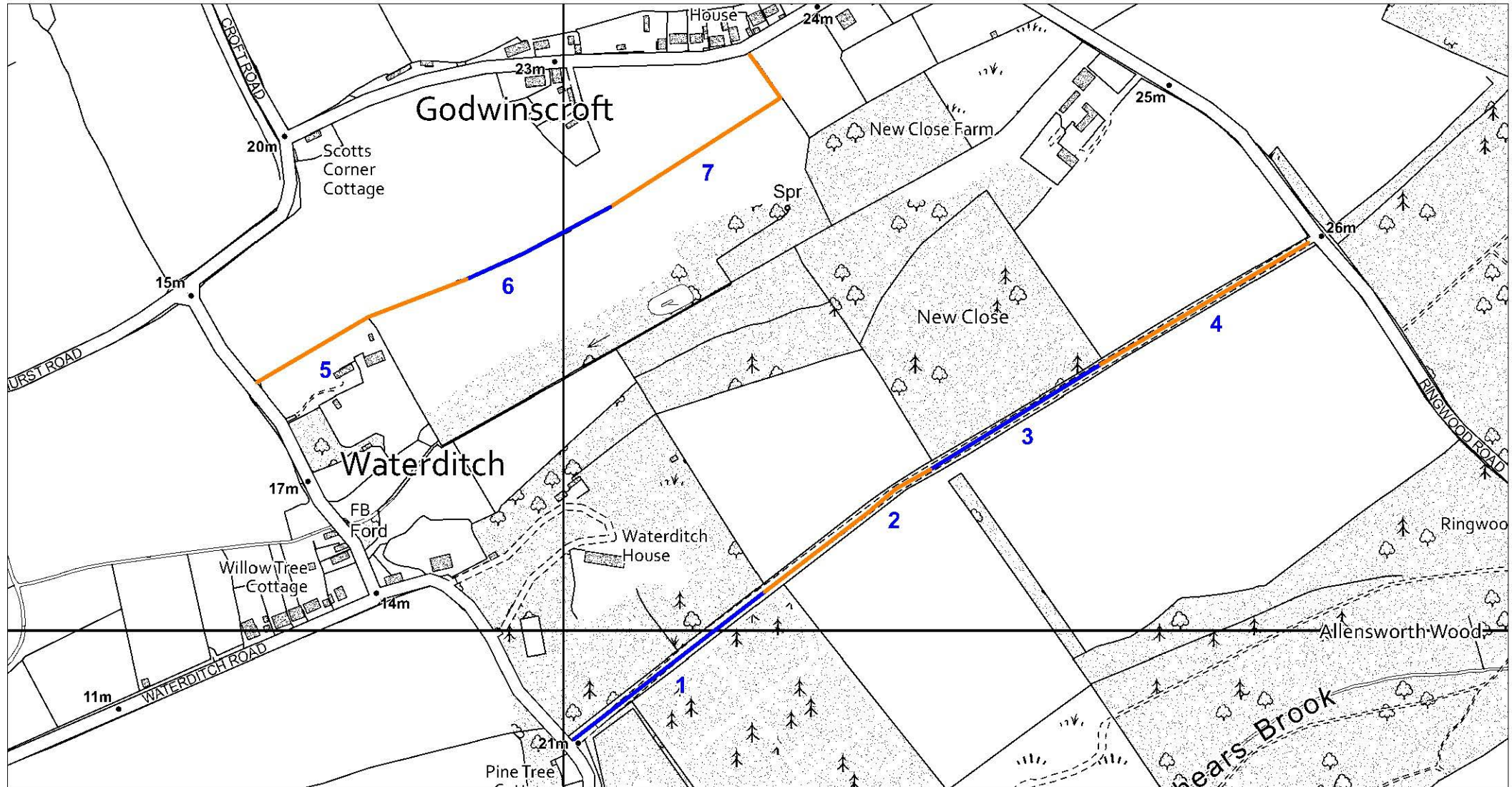
# Map 4. Insect Survey Transect Route

CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



Transect sections



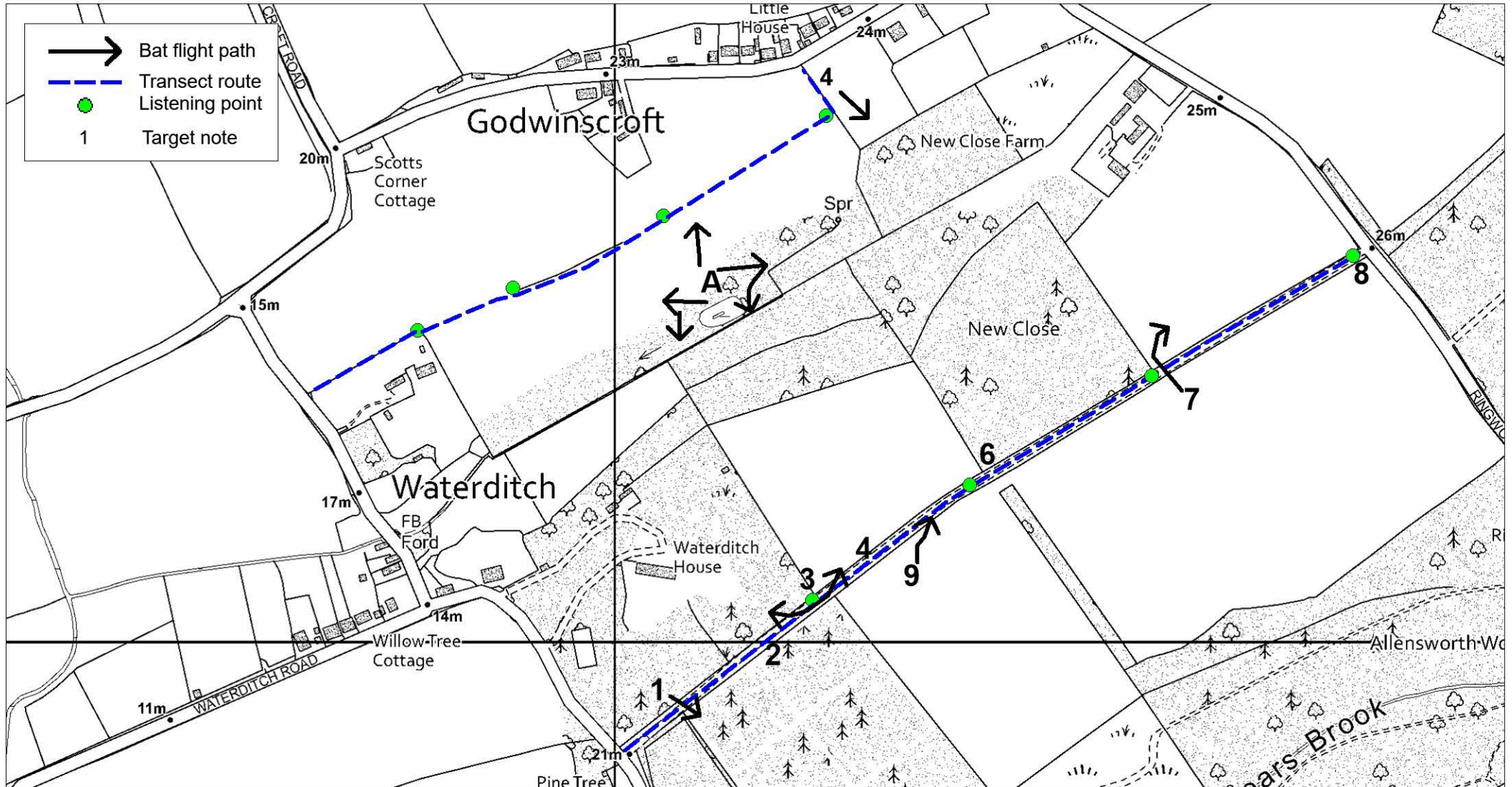
Location within county:



# Map 5. Bat Survey Results: 10th August 2021

## CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



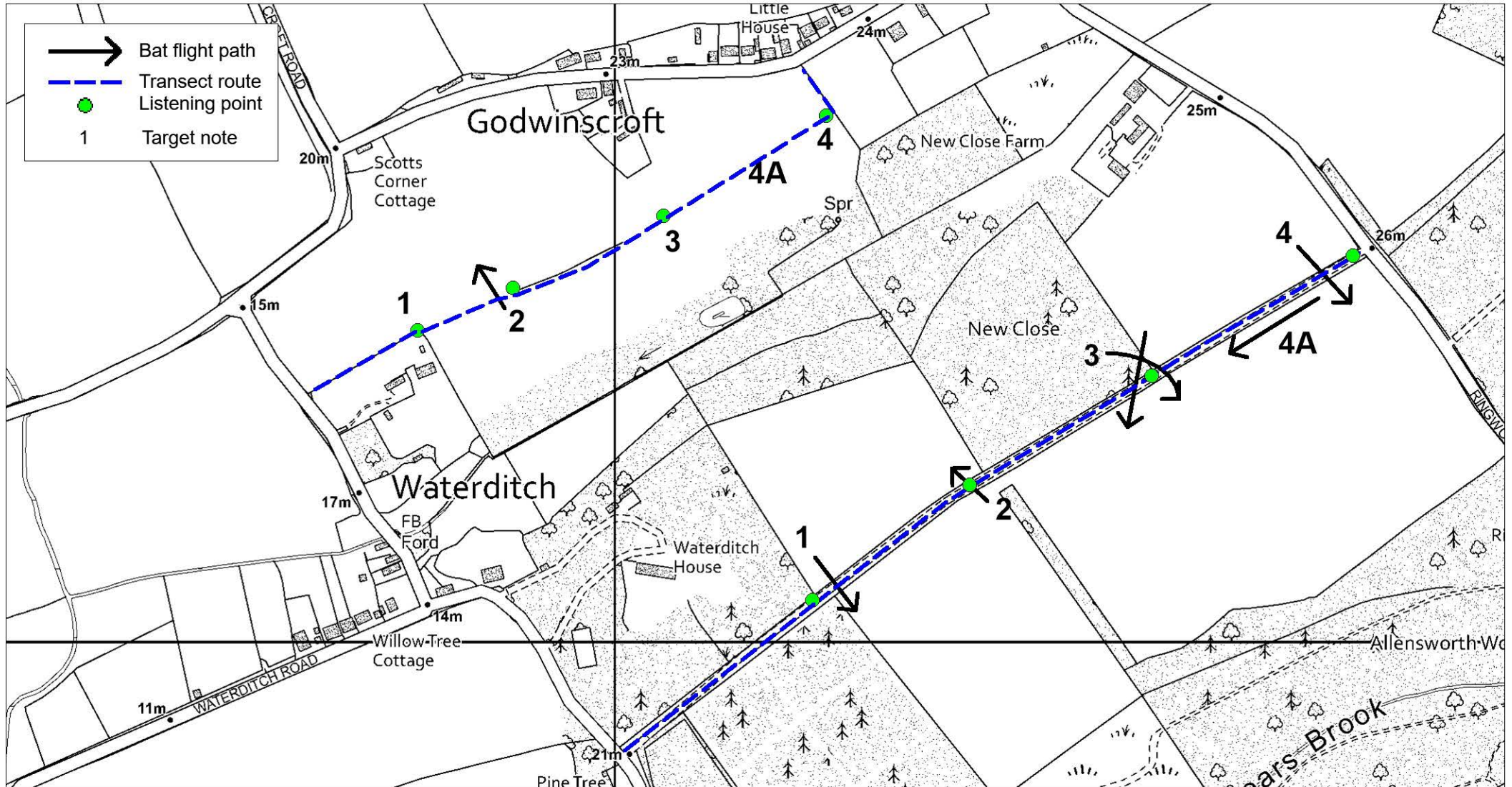
Location within county:



# Map 6. Bat Survey Results: 23rd August 2021

## CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



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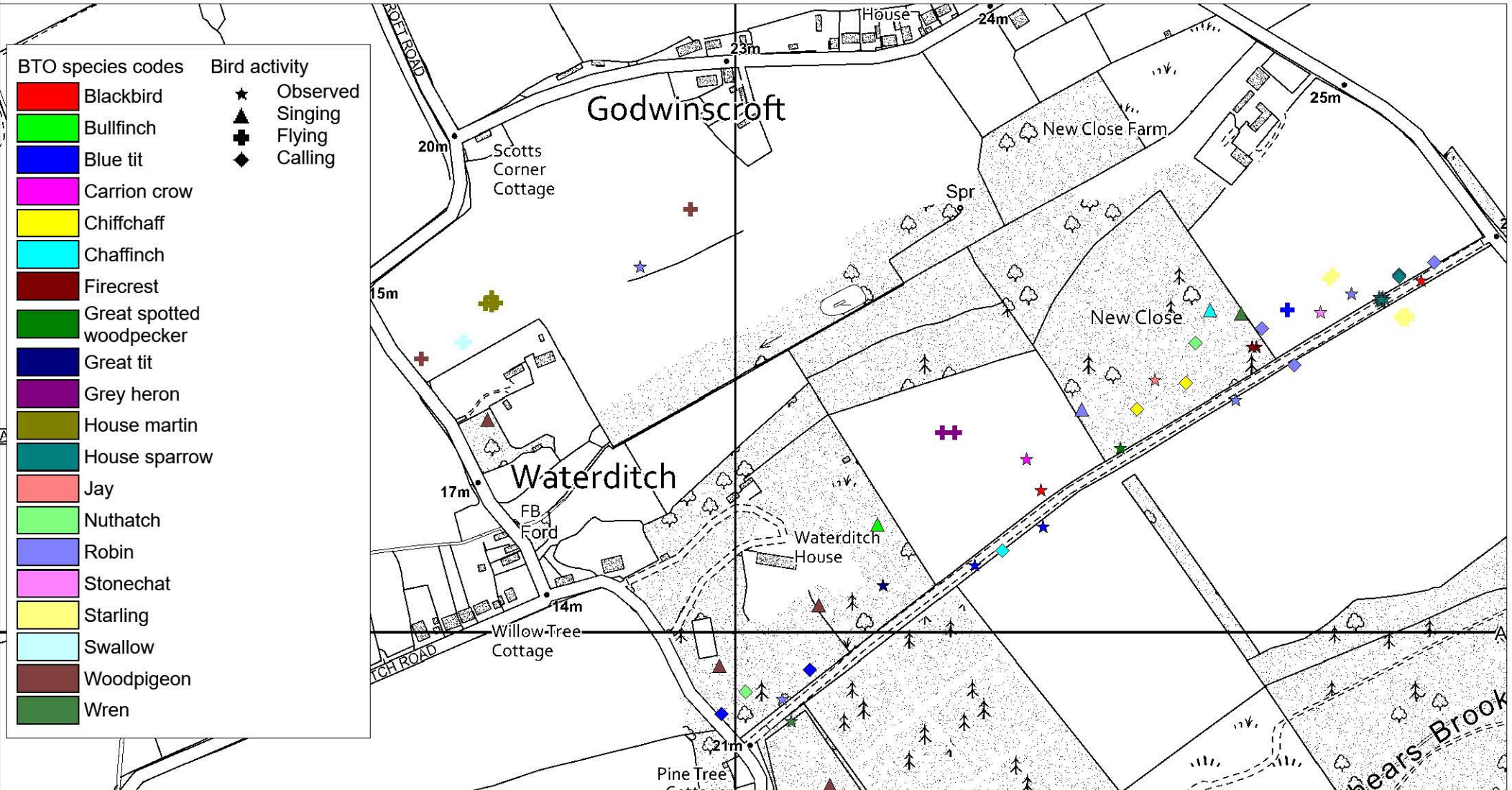
Location within county:



# Map 7. Bird Survey Results: 27th August 2021 (Summer Visit)

## CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



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Location within county:



# Map 8. Bird Survey Results: 14th January 2022 (Winter Visit)

CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000

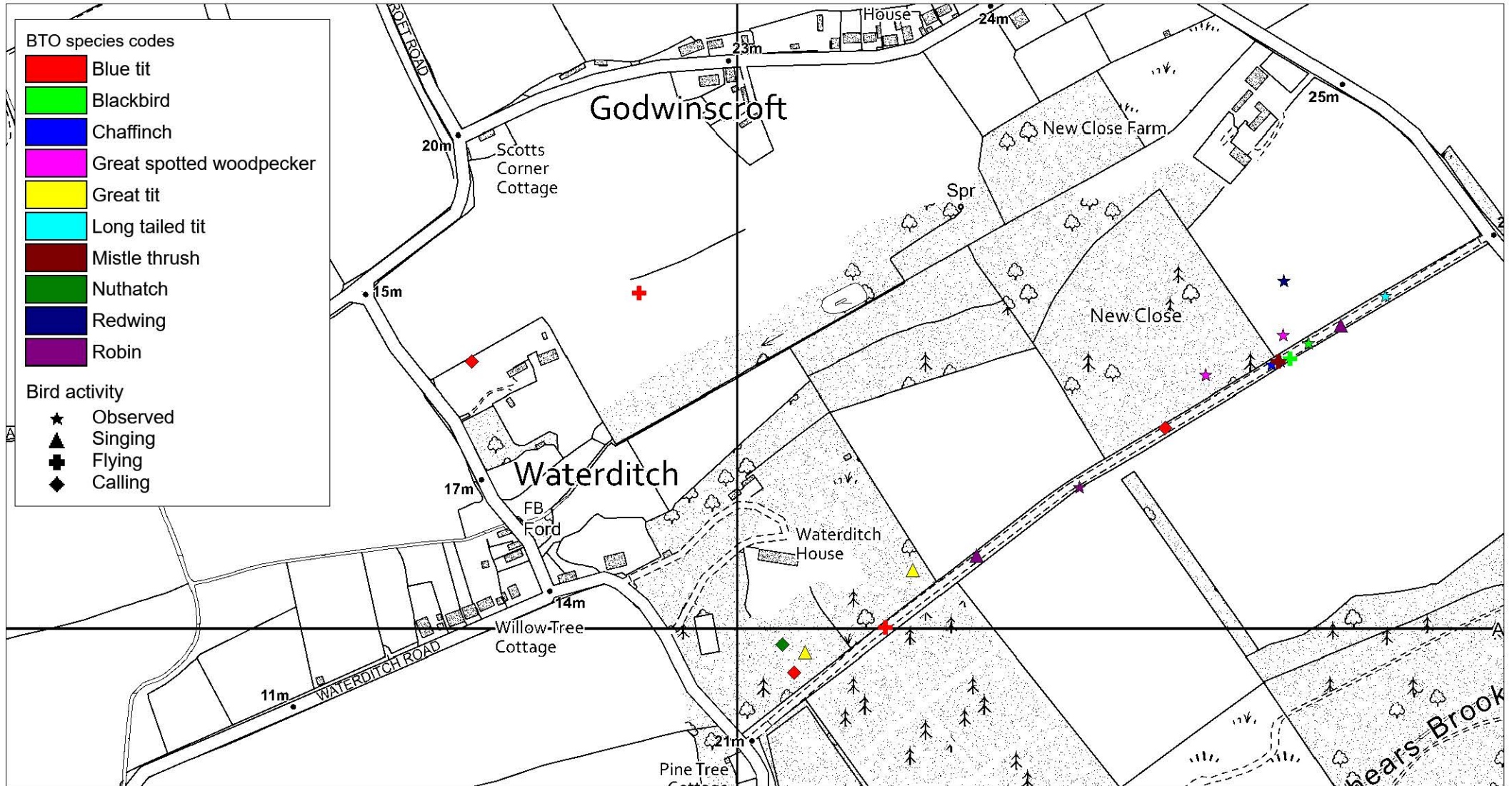


**BTO species codes**

- Blue tit
- Blackbird
- Chaffinch
- Great spotted woodpecker
- Great tit
- Long tailed tit
- Mistle thrush
- Nuthatch
- Redwing
- Robin

**Bird activity**

- Observed
- Singing
- Flying
- Calling



Location within county:



# Map 9. Bird Survey Results: 8th April 2022 (Spring Visit)

## CPRE Hedgerow Restoration Project, Meyrick Estate

Scale 1:5000



### BTO species codes

- Blackcap
- Blue tit
- Blackbird
- Carrion crow
- Chaffinch
- Chiffchaff
- Goldcrest
- Goldfinch
- Great spotted woodpecker
- Great tit
- Greenfinch
- House sparrow
- Jay
- Long tailed tit
- Mistle thrush
- Nuthatch
- Pheasant
- Pied wagtail
- Robin
- Stock dove
- Song thrush
- Woodpigeon
- Wren

### Bird activity

- Calling
- Flying
- Observed
- Singing
- Drumming

