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April 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 5 Environmental Statement and Related Documents

5.02 Appendix 8.1 Ecology Baseline Report - Part B

Application Document Ref: TR020001/APP/5.02

APFP Regulation: 5(2)(a)

The Planning Act 2008

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

London Luton Airport Expansion Development Consent Order 202x

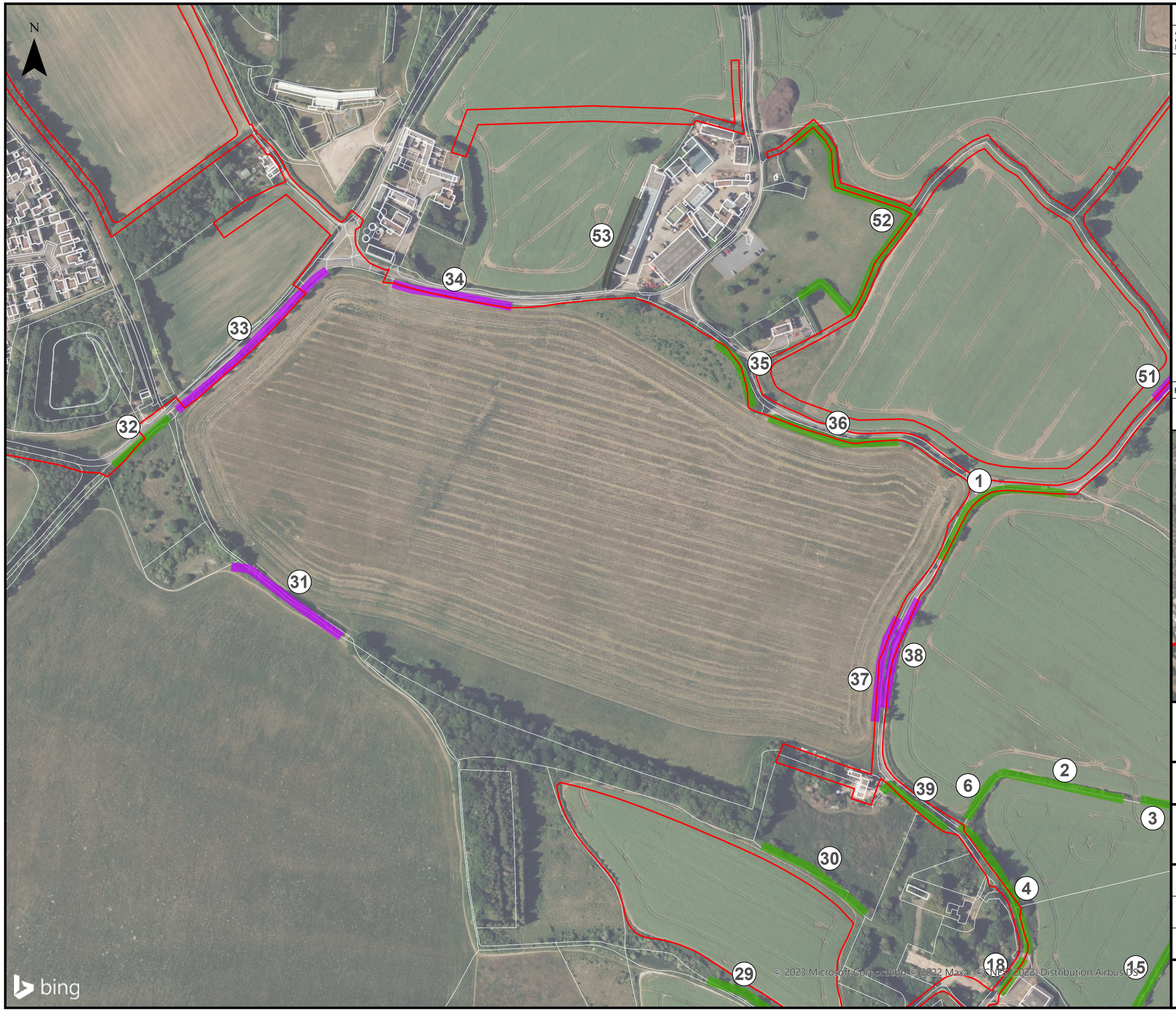
5.02 ENVIRONMENTAL STATEMENT APPENDIX 8.1 ECOLOGY BASELINE REPORT – PART B

Regulation number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR020001
Document Reference:	TR020001/APP/5.02
Author:	Luton Rising

Version	Date	Status of Version
Issue 01	February 2023	Application issue
Revision 01	April 2023	Redacted following section 51 advice

Appendix E

E1 Hedgerow Survey Plan

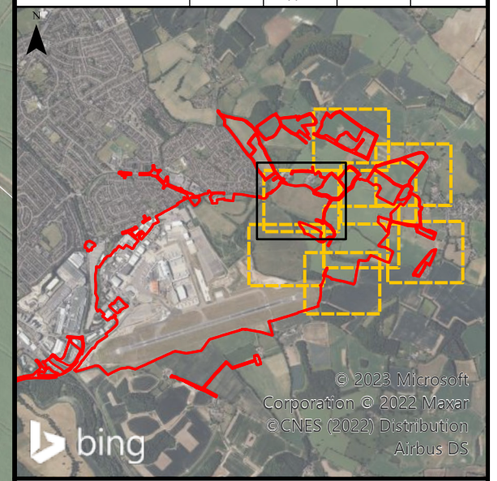


All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- Important
- Not Important
- Not Assessed

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Appendix E
Hedgerow Assessment Plan
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Purpose of issue	Suitability
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Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:3,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

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Legend

- Order Limits
- Important
- Not Important
- Not Assessed

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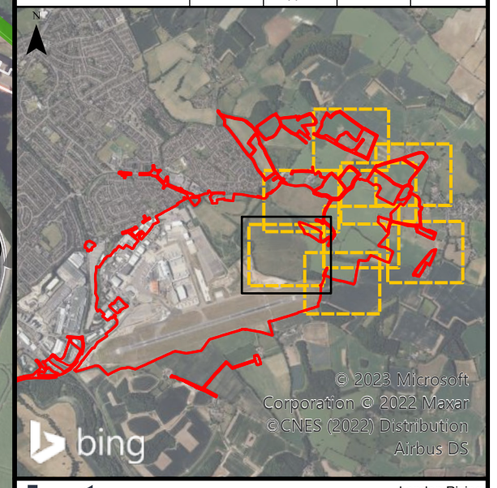
First Issue	AB	SM / CS	20/02/23	P01



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Purpose of issue	Suitability
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AB	SM	CS	20/02/23	1:3,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

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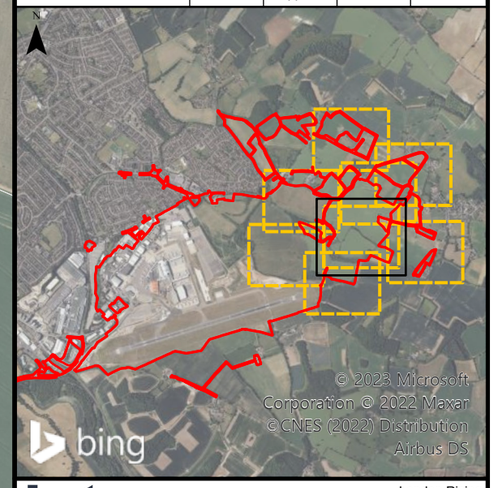
Legend

- Order Limits
- Important
- Not Important
- Not Assessed

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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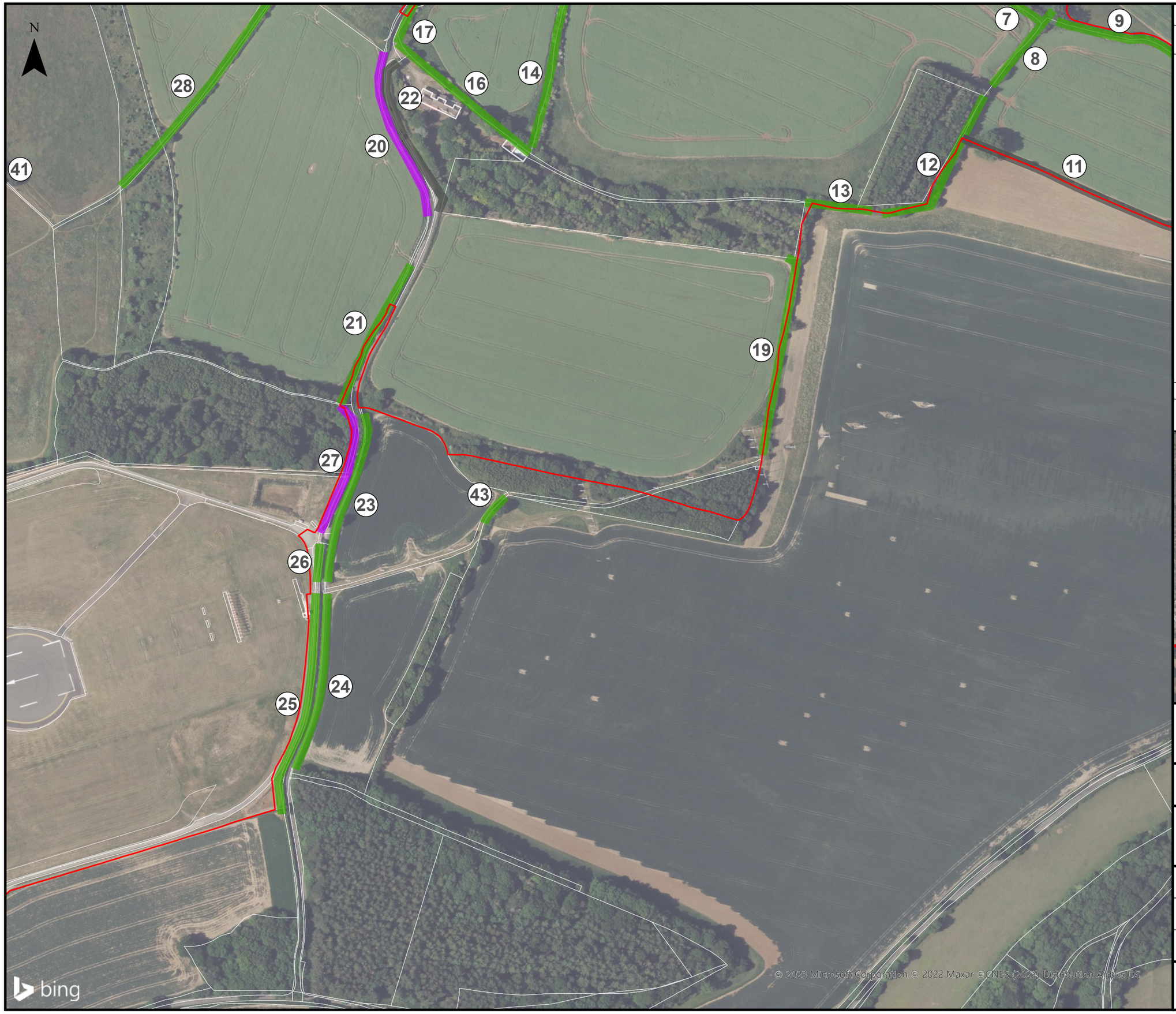
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:3,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number



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Legend

- Order Limits
- Important
- Not Important
- Not Assessed

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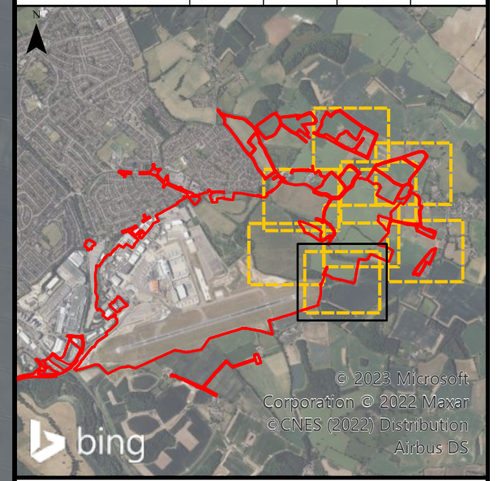
First Issue	AB	SM / CS	20/02/23	P01



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Purpose of issue	Suitability
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Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:3,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

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- Order Limits
- Important
- Not Important
- Not Assessed

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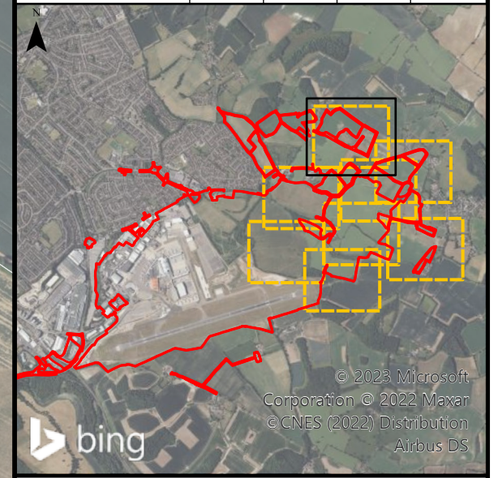
First Issue	AB	SM / CS	20/02/23	P01



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Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
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DCO Application Ref.	APFP Regulation	DCO Document Ref.
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LLADCO-3C-ARP-00-00-DR-YE-0207	P01

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- Order Limits
- Important
- Not Important
- Not Assessed

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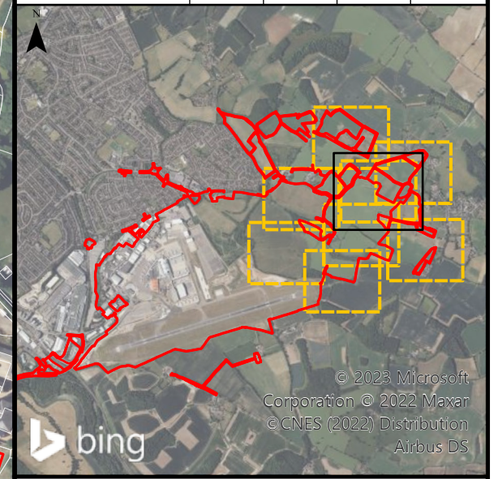

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Purpose of issue	Suitability
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Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:3,000	A3

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Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

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- Order Limits
- Important
- Not Important
- Not Assessed

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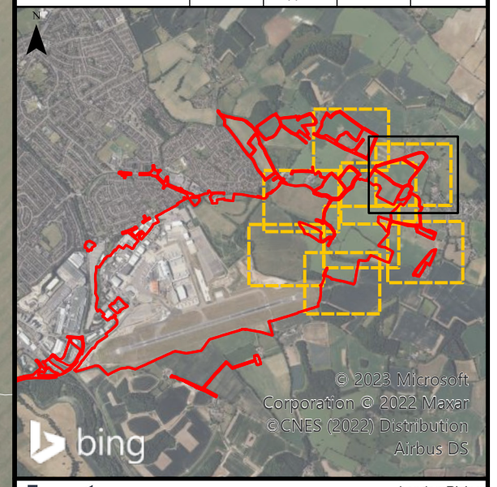

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Purpose of issue	Suitability
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Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:3,000	A3

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Drawing Number	Revision
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Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

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- Order Limits
- Important
- Not Important
- Not Assessed

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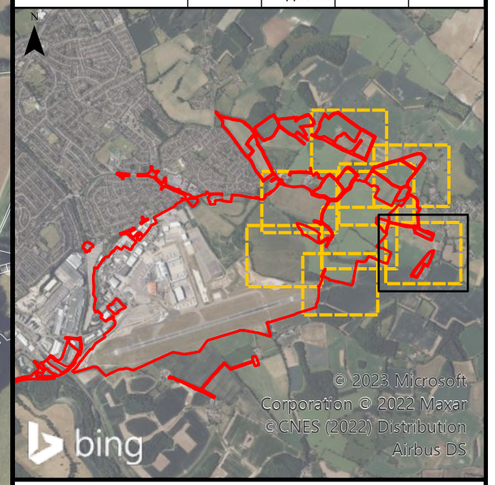
First Issue	AB	SM / CS	20/02/23	P01



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Purpose of issue	Suitability
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TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0207	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix F

F1 Badger Survey Plan

Confidential: not included with this public issue of the report

Appendix G

G1 Badger Territory Mapping Plan

Confidential: not included with this public issue of the report

Appendix H

H1 Bat Tree and Building Roost Potential Survey Plan

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits

Building Roost Assessment

- Confirmed
- Moderate
- Demolished in 2019 after earlier bat surveys

Tree Roost Assessment 2020

- Confirmed roost
- High
- Moderate
- Low

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Appendix H
Bat Trees and Buildings Plan

Purpose of issue				Suitability	
SUITABLE FOR INFORMATION				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:6,000	A3

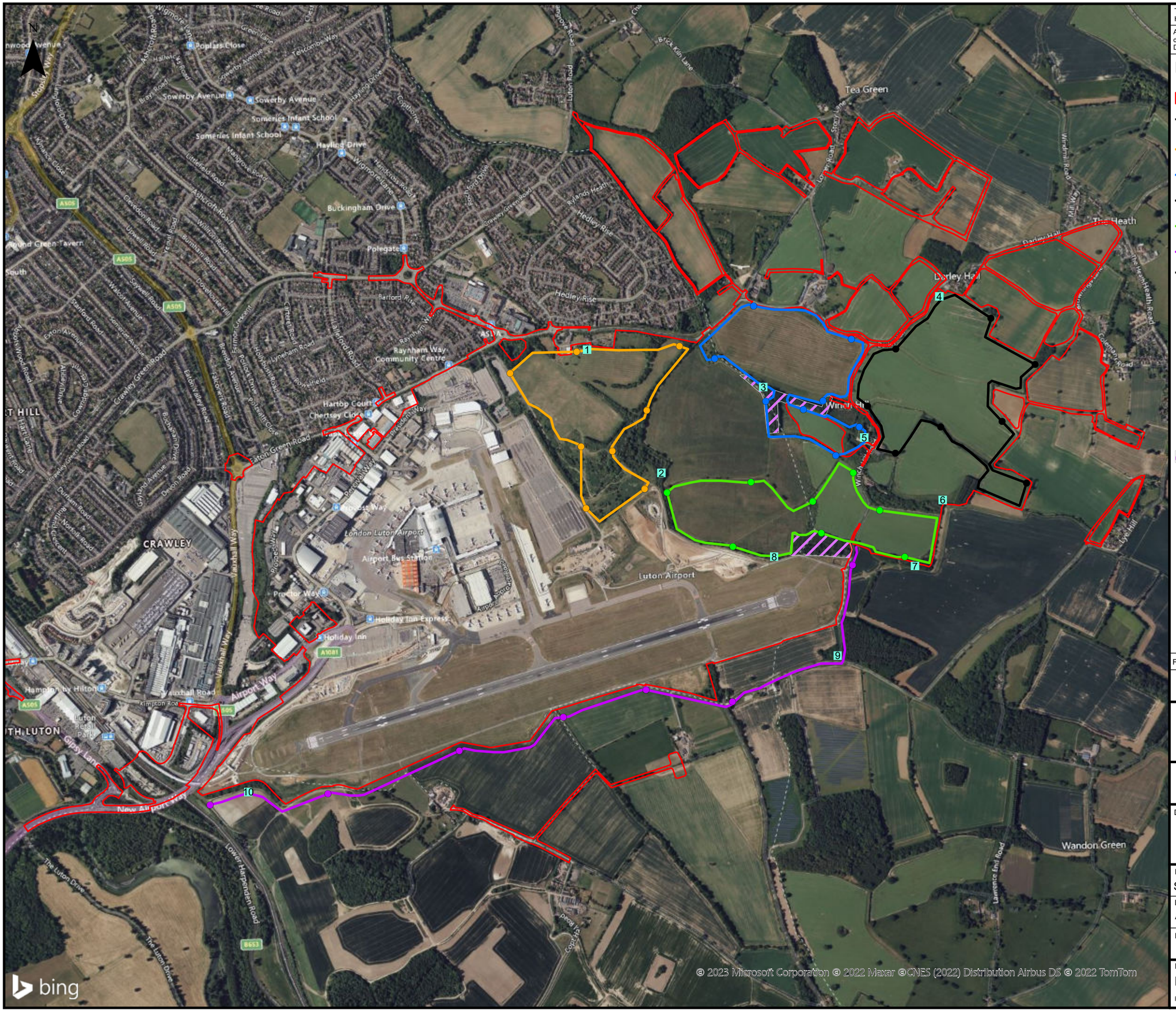
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0210	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix I

I1 Bat Activity Survey Plan



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Legend

- Order Limits

Transect Routes

- 1
- 2
- 3
- 4
- 5

Transect Stopping Points

- 1
- 2
- 3
- 4
- 5
- Static Detectors
- Back Tracking Survey Area

First Issue	AB	SM CS	20/02/23	P01
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Appendix I
Bat Activity Survey Plan

Purpose of issue				Suitability	
SUITABLE FOR INFORMATION				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:15,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0211	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix J

J1 Bat/Site Evaluation System

J1.1.1 The valuation system used in this report is modified from Wray et al., (2007). Values are assigned using a geographic frame of reference as shown in **Table J.1**. The scores used to assign these values are calculated using **Table J.2**. 'National Rarity' values used in **Table J.2** are based on the categorisation system shown in **Table J.3**.

Table J.1: Site/species Valuation System

Geographic Frame of Reference	Score
Not Important	1 - 10
District, Local or Parish	11 - 20
County	21 - 30
Regional	31 - 40
National/UK	41 - 50
International	> 50

Table J.2: Calculation of Foraging/Commuting Habitat Scores (shown in brackets)

National Rarity	Activity	Site/Nearby Roost Potential	Habitat Characteristics
Common (2)	Low (5)	None (1)	Industrial or other site without established vegetation. Absence of linear features (1)
-	-	Small number (3)	Suburban areas or intensive arable land. Un-vegetated fences and large field sizes (2)
Rarer (5)	Moderate (10)	Moderate number/note known (4)	Isolated woodland patches, less intensive arable (moderate field sizes) and/or small towns and villages (3)
-	-	Large number of roosts, or close to a SSSI for the species (5)	Large or connected woodland blocks, mixed agriculture (small field sizes with well-grown, well-connected hedgerows) and small villages/hamlets (4)
Rarest (20)	High (20)	Close to or within a SAC for the species (20)	Mosaic of pasture (small fields), woodlands and wetland areas with complex network of

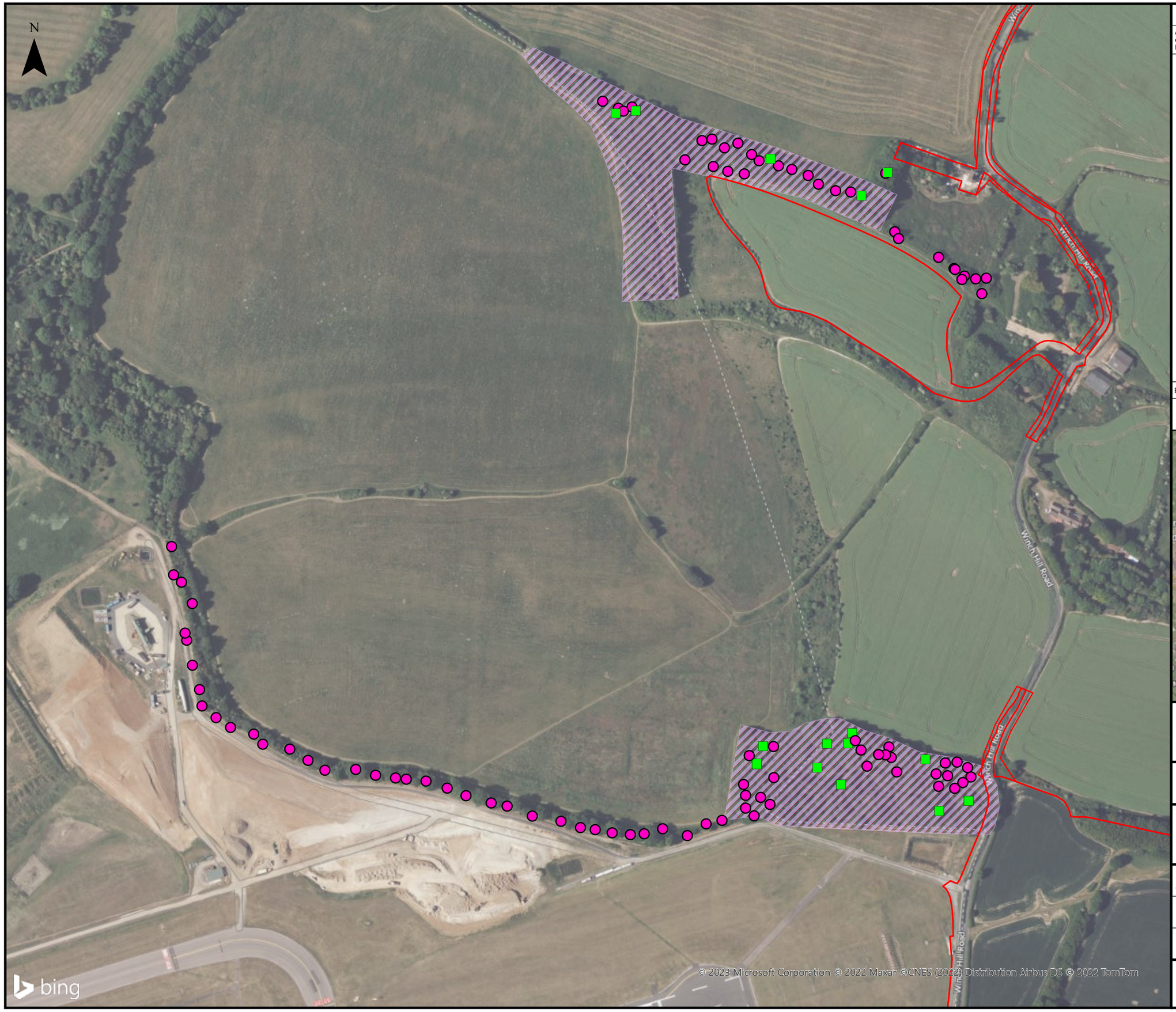
National Rarity	Activity	Site/Nearby Roost Potential	Habitat Characteristics
			mature well-established hedgerows (5).

Table J.3: Categorisation of Bats by National Rarity

Rarity within Range	England	Wales	Scotland	Northern Ireland
Common (population. over 100,000)	Common Pipistrelle Soprano Pipistrelle Brown Long-eared	Common Pipistrelle Soprano Pipistrelle	Common Pipistrelle Soprano Pipistrelle	Common Pipistrelle Soprano Pipistrelle
Rarer (population. 10,000 – 100,000)	Lesser Horseshoe Whiskered Brandt's Daubenton's Natterer's Leisler's Noctule Nathusius' Pipistrelle Serotine	Lesser Horseshoe Daubenton's Natterer's Brown Long-eared	Daubenton's Natterer's Brown Long-eared	Daubenton's Natterer's Leisler's Nathusius' Pipistrelle Brown Long-eared
Rarest (population. under 10,000)	Greater Horseshoe Bechstein's Alcathoe Greater Mouse-eared Barbastelle Grey Long-eared	Greater Horseshoe Whiskered Brandt's Bechstein's Alcathoe Noctule Nathusius' Pipistrelle Serotine Barbastelle	Whiskered Brandt's Alcathoe Noctule Nathusius' Pipistrelle Leisler's	Whiskered

Appendix K

K1 Dormouse Survey Plan



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Legend

- Order Limits
- Dormouse Nest Tube
- Dormouse Nest Box
- Nut Search Area

Revision History	Drawn	Checked / Approved	Date	Rev.
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Appendix K
Dormouse Survey Plan

Purpose of issue	Suitability
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AB	SM	JS	20/02/23	1:3,500	A3

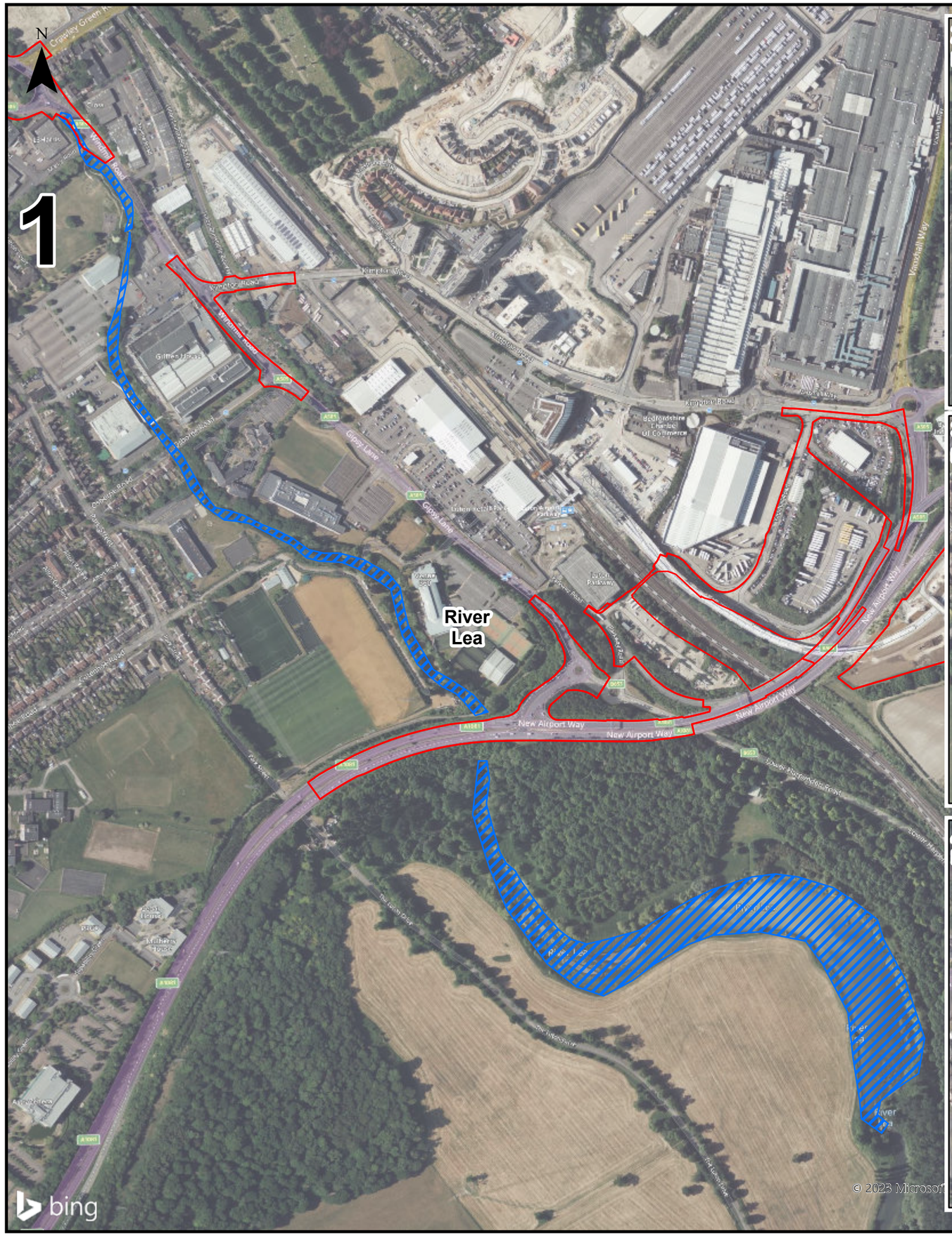
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

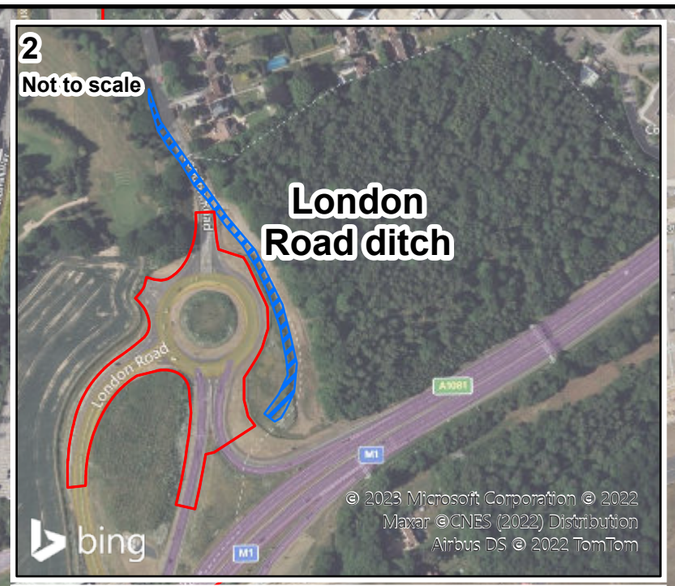
Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0212	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix L

L1 Riparian Mammal Survey Area Plan





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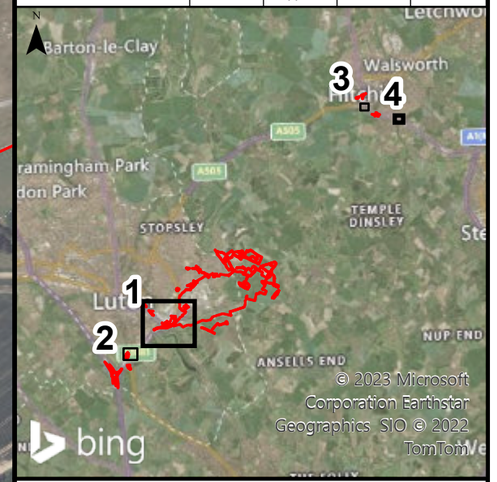
Legend

- Order Limits
- Watercourse Survey Extents

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Appendix L
Riparian Mammal Survey Plan

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:6,000	A3

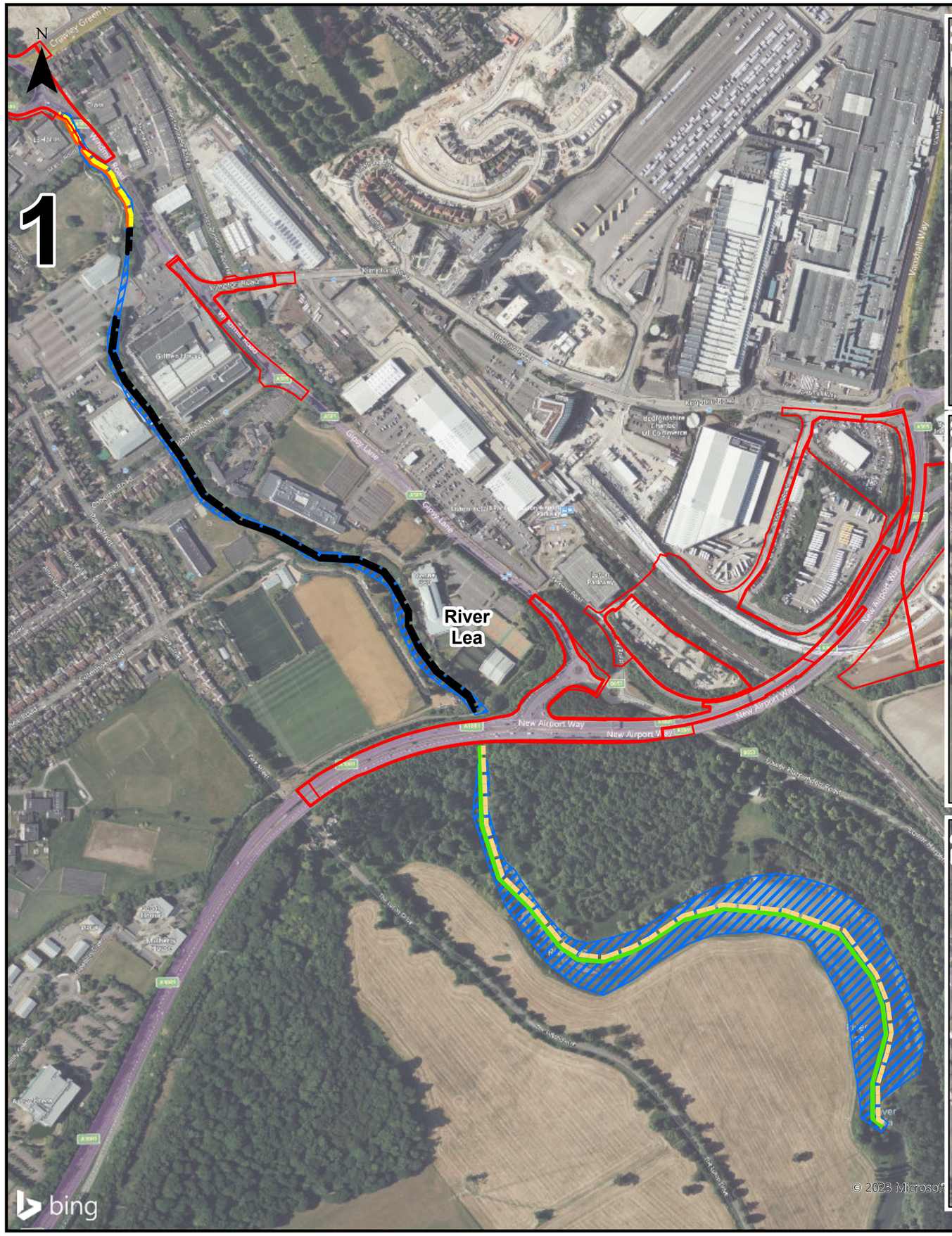
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

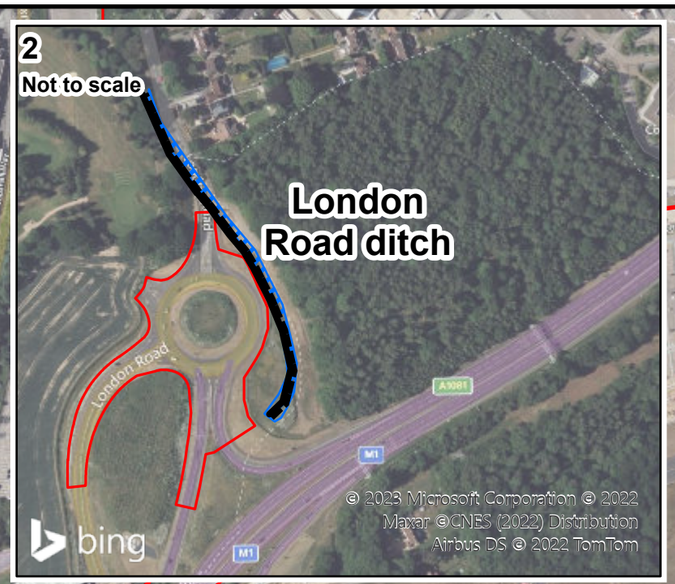
Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0213	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix M

M1 Riparian Mammal Habitat Assessment Plan





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Legend

- Order Limits
- Watercourse Survey Extents

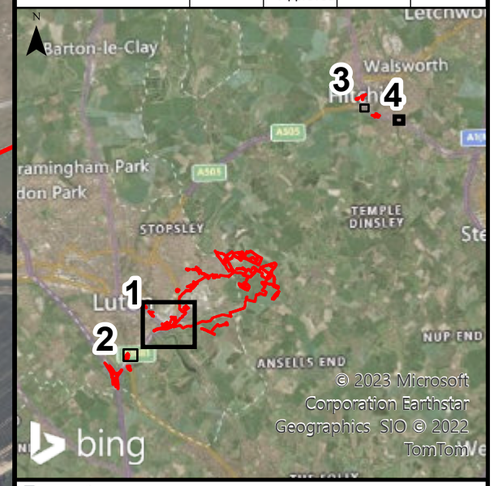
Otter Habitat Suitability

- High
- Moderate
- Low
- Negligible
- Scoped Out At Ground Truthing

Water Vole Habitat Suitability

- High
- Moderate
- Low
- Negligible
- Scoped Out At Ground Truthing

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Appendix M
Riparian Mammal Habitat Assessment Plan

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:6,000	A3

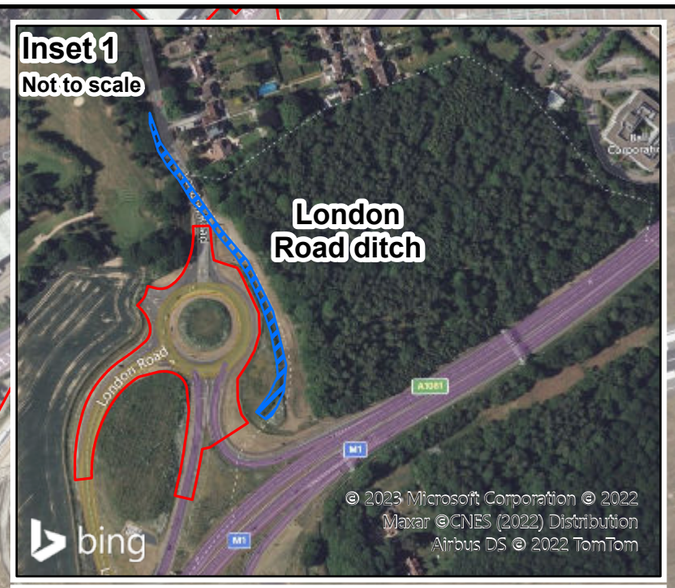
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0214	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix N

N1 Otter Survey Plan



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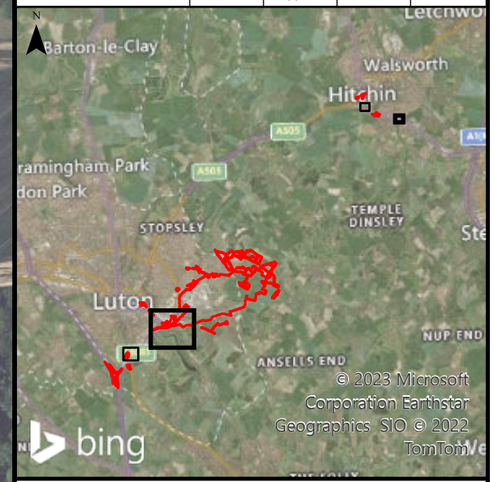
Legend

- Order Limits
- Otter Spraint
- Watercourse Survey Extents

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Drawing Title

Appendix N
Otter Survey Plan

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:5,000	A3

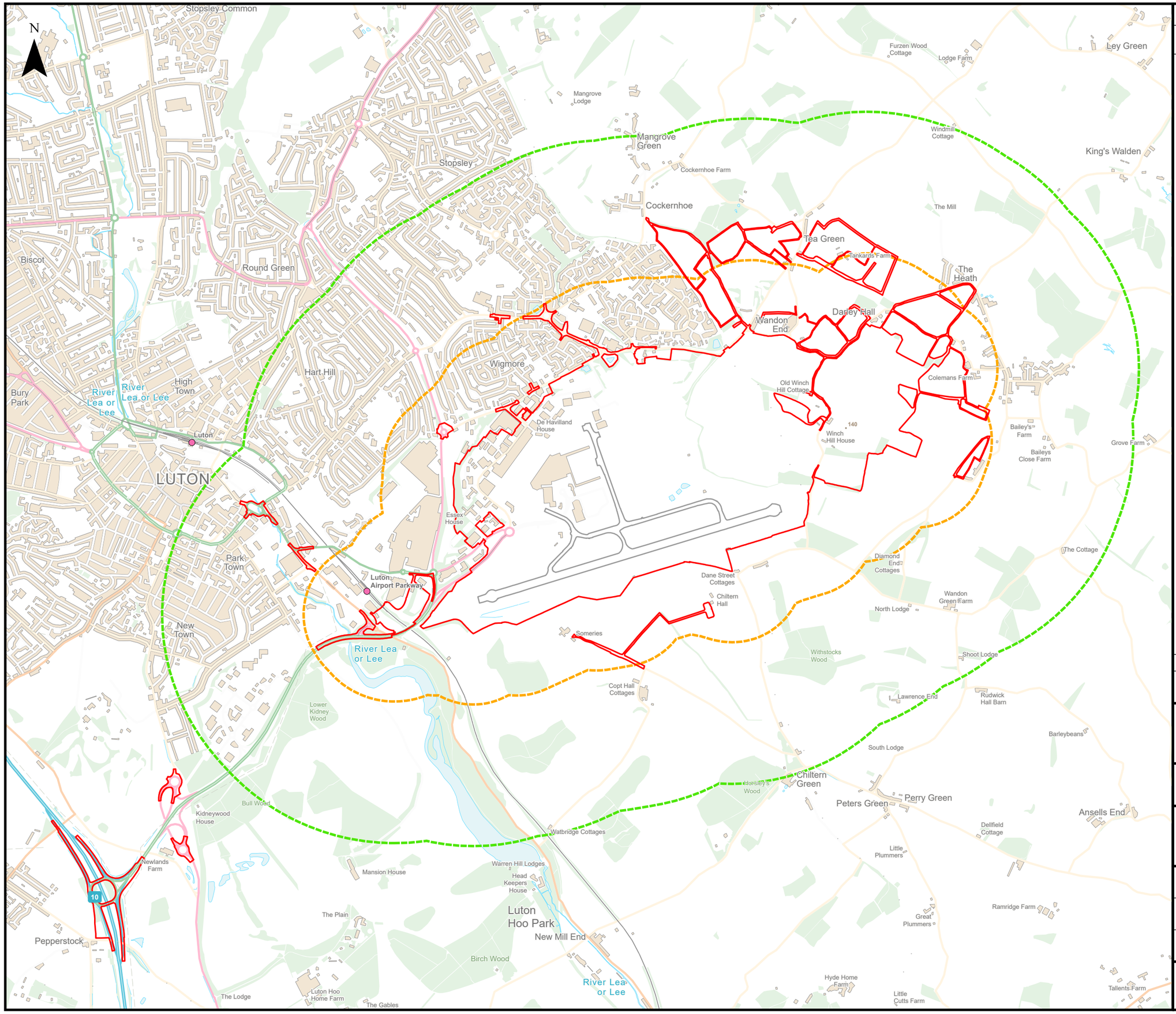
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0215	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix O

O1 Bird Survey Area Plan



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- 500m Bird Survey Buffer
- 1.5km Schedule 1 Bird Survey Buffer

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01

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Drawing Title

Appendix O
Bird Survey Area

Purpose of issue	Suitability
SUITABLE FOR COORDINATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:25,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

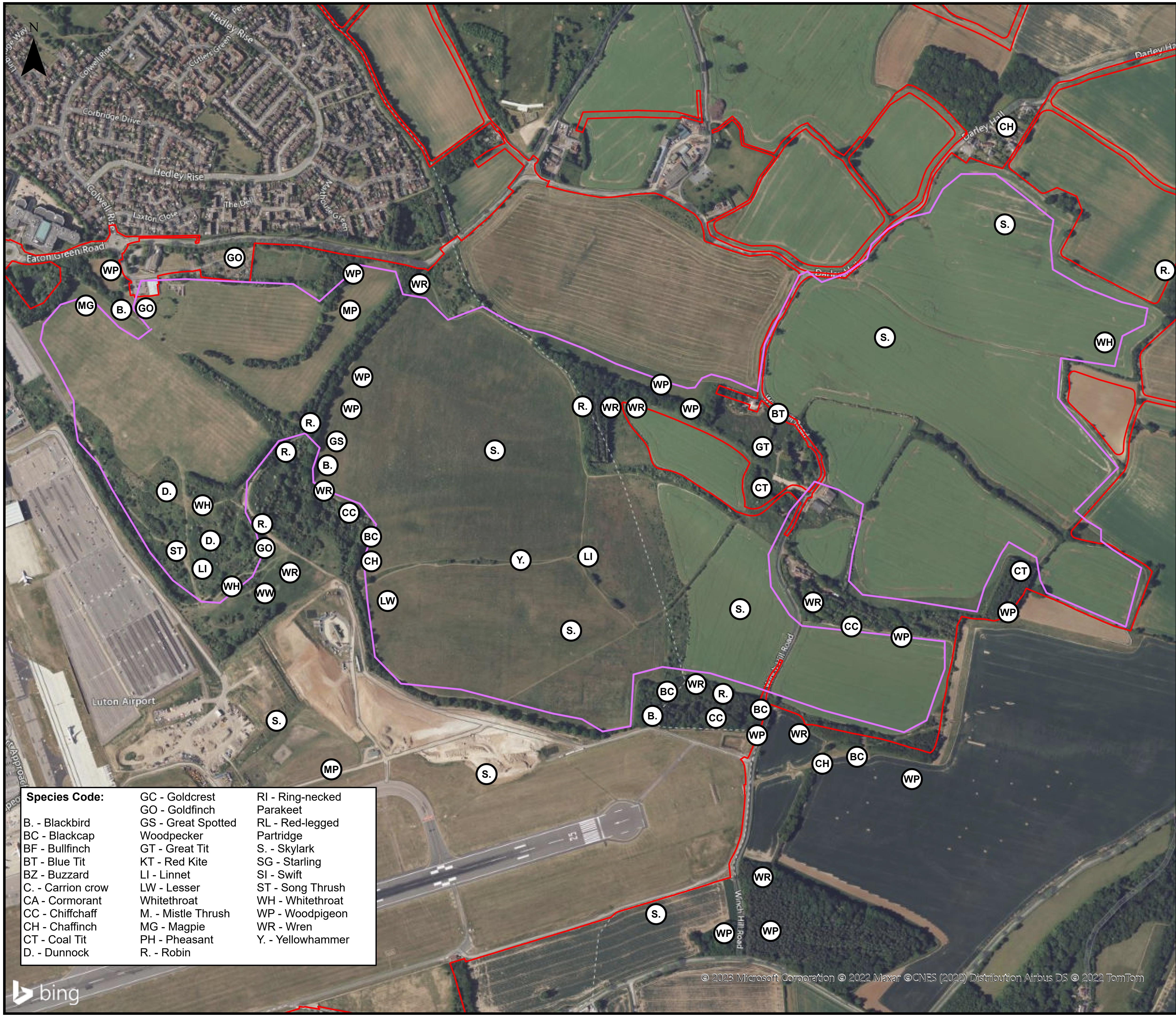
Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0216	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix P

P1 Breeding Bird Survey Plan

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.



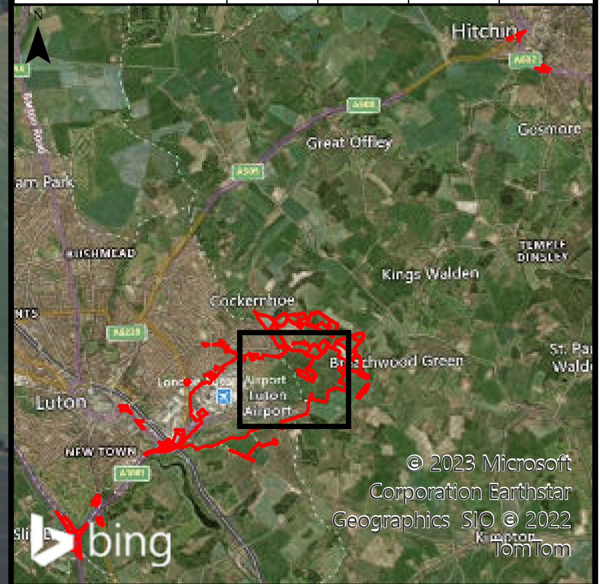
Species Code:

B. - Blackbird	GC - Goldcrest	RI - Ring-necked Parakeet
BC - Blackcap	GO - Goldfinch	RL - Red-legged Partridge
BF - Bullfinch	GS - Great Spotted Woodpecker	S. - Skylark
BT - Blue Tit	GT - Great Tit	SG - Starling
BZ - Buzzard	KT - Red Kite	SI - Swift
C. - Carrion crow	LI - Linnet	ST - Song Thrush
CA - Cormorant	LW - Lesser Whitethroat	WH - Whitethroat
CC - Chiffchaff	M. - Mistle Thrush	WP - Woodpigeon
CH - Chaffinch	MG - Magpie	WR - Wren
CT - Coal Tit	PH - Pheasant	Y. - Yellowhammer
D. - Dunnock	R. - Robin	

Legend

- Order Limits
- Transect Route

First Issue	AB	SM / CS	20/02/23	P01
Revision History	Drawn	Checked / Approved	Date	Rev.



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Drawing Title

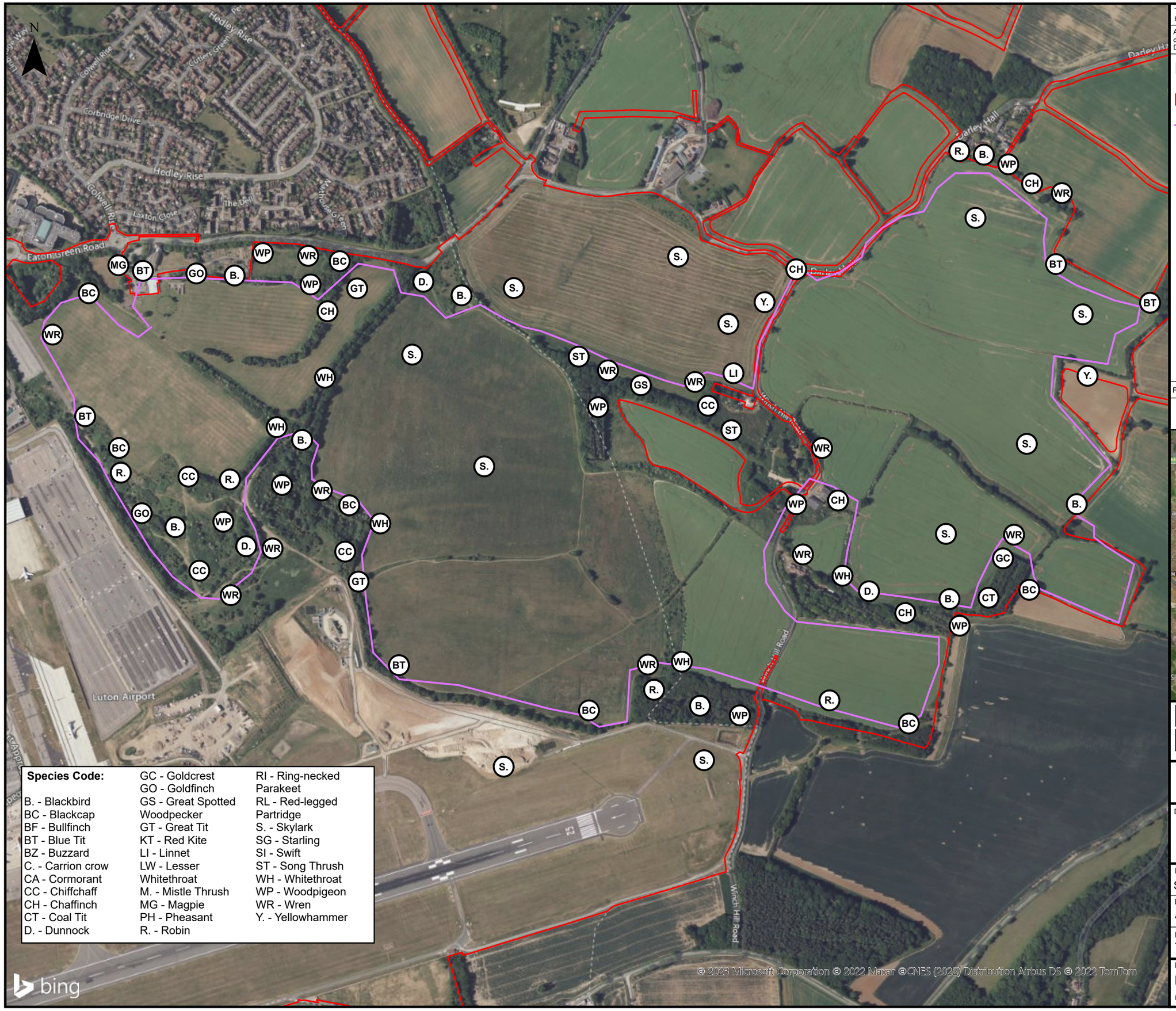
Appendix P
Breeding Bird Survey 2018 and 2019
Page 1 of 2

Purpose of issue				Suitability	
SUITABLE FOR INFORMATION				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:7,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0217	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number



Species Code:

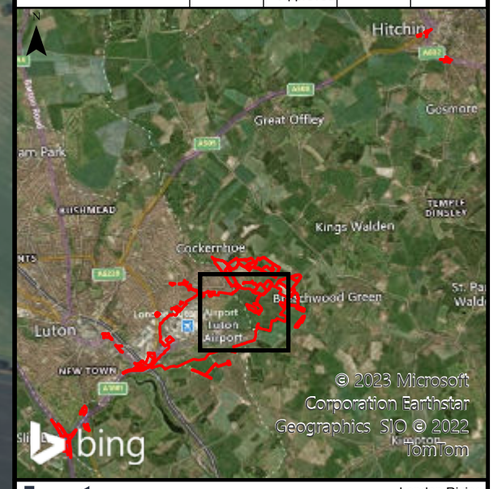
B. - Blackbird	GC - Goldcrest	RI - Ring-necked Parakeet
BC - Blackcap	GO - Goldfinch	RL - Red-legged Partridge
BF - Bullfinch	GS - Great Spotted Woodpecker	S. - Skylark
BT - Blue Tit	GT - Great Tit	SG - Starling
BZ - Buzzard	KT - Red Kite	SI - Swift
C. - Carrion crow	LI - Linnet	ST - Song Thrush
CA - Cormorant	LW - Lesser Whitethroat	WH - Whitethroat
CC - Chiffchaff	M. - Mistle Thrush	WP - Woodpigeon
CH - Chaffinch	MG - Magpie	WR - Wren
CT - Coal Tit	PH - Pheasant	Y. - Yellowhammer
D. - Dunnock	R. - Robin	

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- Transect Route

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Drawing Title

Appendix P
Breeding Bird Survey 2021
Page 2 of 2

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:7,000	A3

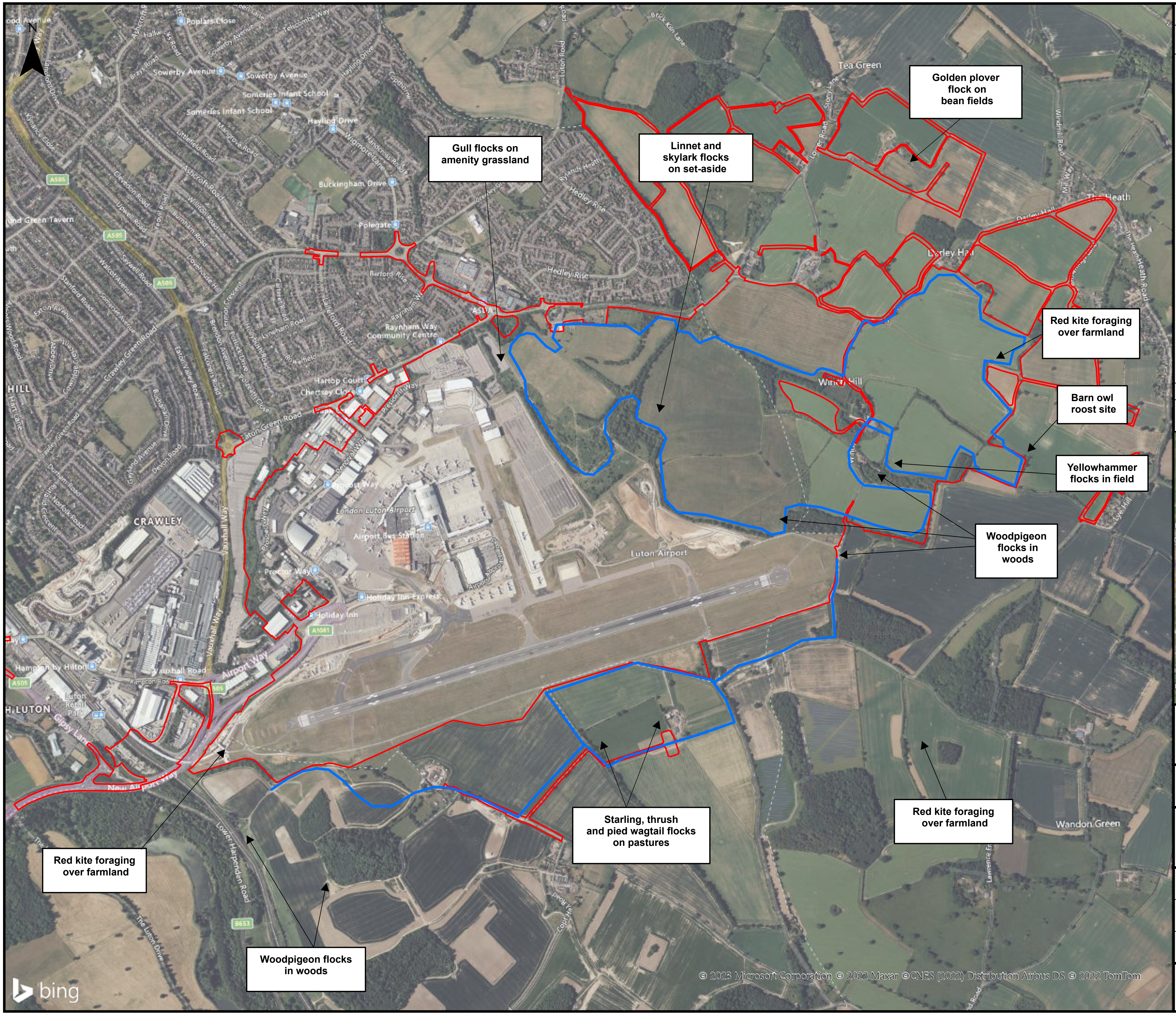
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0217	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix Q

Q1 Wintering Bird Survey Plan

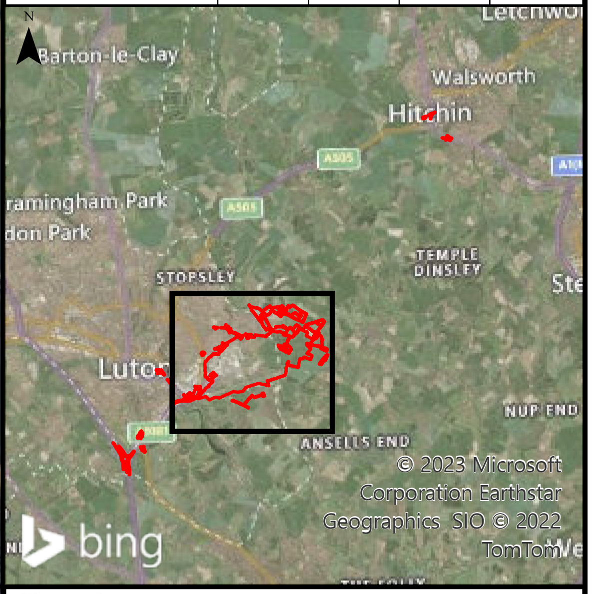


All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- Transect Routes

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01



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Drawing Title

Annex Q
Wintering Bird Survey Plan

Purpose of issue				Suitability	
SUITABLE FOR INFORMATION				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:15,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0218	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix R

R1 Wintering Bird Survey Data 2018/2019

Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Red-legged Partridge	*Alectoris rufa*	106	52	39	33	17	27
Grey Partridge	*Perdix*	0	2	0	0	0	0
Pheasant	*Phasianus colchicus*	22	19	3	7	5	12
Sparrowhawk	*Accipter nisus*	0	0	0	0	1	1
Red Kite	*Milvus*	8	4	4	3	4	9
Buzzard	*Buteo*	2	6	3	2	6	6
Golden Plover	*Pluvialis apricaria*	0	2	0	0	0	0
Black-headed Gull	*Chroicocephalus ridibundus*	*c.*330	3	20	28	40	0
Common Gull	*Larus canus*	0	0	0	2	2	0
Herring Gull	*Larus argentatus*	1	0	0	0	0	0
Feral pigeon	*Columba livia* ssp. *domestica*	*c.*60	*c.*60	*c.*60	*c.*60	*c.*60	*c.*60
Stock Dove	*Columba oenas*	0	0	0	0	2	6
Woodpigeon	*Columba palumbus*	38	*c.*400	130	209	62	*c.*400
Collared Dove	*Streptopelia decaocto*	2	4	1	0	0	2
Great Spotted Woodpecker	*Dendrocopus major*	1	3	1	1	0	2

Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Green Woodpecker	*Picus viridis*	0	0	0	1	0	0
Kestrel	*Falco tinnunculus*	1	1	0	0	0	0
Jay	*Garrulus glandarius*	1	5	1	2	3	1
Magpie	*Pica*	7	7	6	8	11	6
Jackdaw	*Corvus monedula*	42	0	0	20	4	2
Rook	*Corvus frugilegus*	11	0	0	0	0	0
Carrion Crow	*Corvus corone*	21	11	3	8	11	14
Coal Tit	*Periparus ater*	0	2	0	1	0	2
Blue Tit	*Cyanistes caeruleus*	10	9	10	12	12	16
Great Tit	*Parus major*	1	1	5	5	5	5
Skylark	*Alauda arvensis*	17	3	13	21	23	24
Long-tailed Tit	*Aegithalos caudatus*	12	16	1	14	4	4
Goldcrest	*Regulus*	1	4	1	4	1	
Wren	*Troglodytes*	2	8	2	3	3	14
Starling	*Sturnus vulgaris*	59	0	20	7	3	
Blackbird	*Turdus merula*	2	16	14	7	10	20
Fieldfare	*Turdus pilaris*	65	37	6	7	12	3
Redwing	*Turdus iliacus*	4	28	9	69	0	0
Song Thrush	*Turdus philomelos*	0	1	1	0	3	1
Mistle Thrush	*Turdus viscivorus*	0	0	0	1	0	0
Robin	*Erithacus rubecula*	6	5	8	4	18	11
Dunnock	*Prunella modularis*	10	2	5	8	5	10

Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Pied Wagtail	*Motacilla alba*	6	21	5	0	13	1
Meadow Pipit	*Anthus pratensis*	3	1	1	0	0	2
Chaffinch	*Fringilla coelebs*	5	3	6	3	5	12
Bullfinch	*Pyrrhula*	1	1	1	0	1	1
Greenfinch	*Chloris*	0	0	0	0	0	1
Linnet	*Linaria cannabina*	3	0	0	163	*c.*220	*c.*200

Appendix S

S1 Wintering Bird Survey data 2017/2018

Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Red-legged Partridge	*Alectoris rufa*	44	20	21
Grey Partridge	*Perdix*	0	0	1
Pheasant	*Phasianus colchicus*	1	6	6
Sparrowhawk	*Accipter nisus*	0	2	0
Red Kite	*Milvus*	1	9	13
Buzzard	*Buteo*	4	4	1
Black-headed Gull	*Chroicocephalus ridibundus*	22	20	12
Common Gull	*Larus canus*	1	5	0
Herring Gull	*Larus argentatus*	0	2	0
Yellow-legged Gull	*Larus michahellis*	0	1	0
Lesser Black-backed Gull	*Larus fuscus*	1	1	0
Stock Dove	*Columba oenas*	1	0	0
Woodpigeon	*Columba palumbus*	20	27	127
Green Woodpecker	*Picus viridis*	0	0	1
Kestrel	*Falco tinnunculus*	1	0	0
Jay	*Garrulus glandarius*	1	0	0
Magpie	*Pica*	5	1	19
Jackdaw	*Corvus monedula*	0	0	29
Carrion Crow	*Corvus corone*	18	9	22

Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Coal Tit	*Periparus ater*	1	2	3
Blue Tit	*Cyanistes caeruleus*	11	12	13
Great Tit	*Parus major*	3	3	11
Skylark	*Alauda arvensis*	1	0	31
Long-tailed Tit	*Aegithalos caudatus*	3	32	9
Goldcrest	*Regulus*	3	0	0
Wren	*Troglodytes*	4	6	6
Starling	*Sturnus vulgaris*	14	10	68
Blackbird	*Turdus merula*	14	16	15
Fieldfare	*Turdus pilaris*	0	0	108
Redwing	*Turdus iliacus*	7	4	5
Song Thrush	*Turdus philomelos*	1	4	0
Robin	*Erithacus rubecula*	8	10	12
House Sparrow	*Passer domesticus*	5	0	0
Dunnock	*Prunella modularis*	3	5	5
Pied Wagtail	*Motacilla alba*	3	0	12
Meadow Pipit	*Anthus pratensis*	4	7	0
Chaffinch	*Fringilla coelebs*	4	8	7
Bullfinch	*Pyrrhula*	2	1	0
Greenfinch	*Chloris*	1	0	4
Linnet	*Linaria cannabina*	1	0	0
Goldfinch	*Carduelis*	73	13	8

Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Yellowhammer	*Emberiza citrinella*	1	9	15

Appendix T

T1 Wintering Bird Survey data 2021/2022

Common name	Scientific name	Monthly counts			
		16/11/2021	14/12/2021	19/01/2022	16/02/2022
Red-legged partridge	*Alectoris rufa*	30	21	7	5
Pheasant	*Phasianus colchicus*	7	7	22	24
Sparrowhawk	*Accipter nisus*	1	1	1	0
Red Kite	*Milvus milvus*	5	11	3	13
Buzzard	*Buteo buteo*	3	1	1	1
Black-headed Gull	*Chroicocephalus ridibundus*	25	48	26	10
Common Gull	*Larus canus*	0	0	2	2
Lesser black-backed gull	*Larus fuscus*	0	0	0	1
Feral pigeon	*Columba livia ssp. Domestica*	0	0	5	0
Stock Dove	*Columba oenas*	1	0	0	1
Woodpigeon	*Columba palumbus*	230	534	189	80
Collared Dove	*Streptopelia decaocto*	0	1	1	0
Great spotted woodpecker	*Dendrocopus major*	1	0	1	1
Jay	*Garrulus glandarius*	2	2	0	0
Magpie	*Pica pica*	9	8	11	4

Common name	Scientific name	Monthly counts			
		16/11/2021	14/12/2021	19/01/2022	16/02/2022
Carrion Crow	*Corvus corone*	4	8	2	3
Coal Tit	*Periparus ater*	1	0	2	1
Blue Tit	*Cyanistes caeruleus*	22	24	26	20
Great Tit	*Parus major*	1	1	2	5
Skylark	*Alauda arvensis*	8	3	1	9
Long-tailed Tit	*Aegithalos caudatus*	8	7	14	3
Goldcrest	*Regulus regulus*	1	1	0	1
Wren	*Troglodytes*	4	3	3	9
Starling	*Sturnus vulgaris*	10	2	0	0
Blackbird	*Turdus merula*	20	17	13	11
Fieldfare	*Turdus pilaris*	2	3	0	0
Redwing	*Turdus iliacus*	67	29	5	2
Song Thrush	*Turdus philomelos*	2	4	4	8
Robin	*Erithacus rubecula*	10	16	8	18
Stonechat	*Saxicola rubicola*	0	0	0	1
Dunnock	*Prunella modularis*	4	5	7	5
Pied Wagtail	*Motacilla alba yarelli*	2	1	2	1
Meadow Pipit	*Anthus pratensis*	0	1	0	0
Chaffinch	*Fringilla coelebs*	16	13	5	10
Brambling	*Fringilla montifringilla*	1	0	0	0
Greenfinch	*Chloris chloris*	0	1	1	0
Linnet	*Linaria cannabina*	3	0	0	2

Common name	Scientific name	Monthly counts			
		16/11/2021	14/12/2021	19/01/2022	16/02/2022
Lesser redpoll	*Acanthis cabaret*	0	1	0	0
Goldfinch	*Carduelis carduelis*	61	33	45	13
Siskin	*Spinus spinus*	0	8	6	3
Yellowhammer	*Emberiza citrinella*	51	48	2	49
Reed bunting	*Emberiza schoeniclus*	0	0	0	1

Appendix U

U Intentionally not in use

Appendix V

V1 Reptile Survey Area Plan

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- Low Density Slow-worm Population
- No Reptiles Identified

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01

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Drawing Title

Appendix V
Reptile Survey Area Plan

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:7,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0220	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix W

W1 Reptile Survey Results Plan

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- Reptile Refugia Survey Locations

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	AB	SM / CS	20/02/23	P01

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Appendix W
Reptile Survey Results Plan

Purpose of issue	Suitability
SUITABLE FOR INFORMATION	S2

Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:7,000	A3

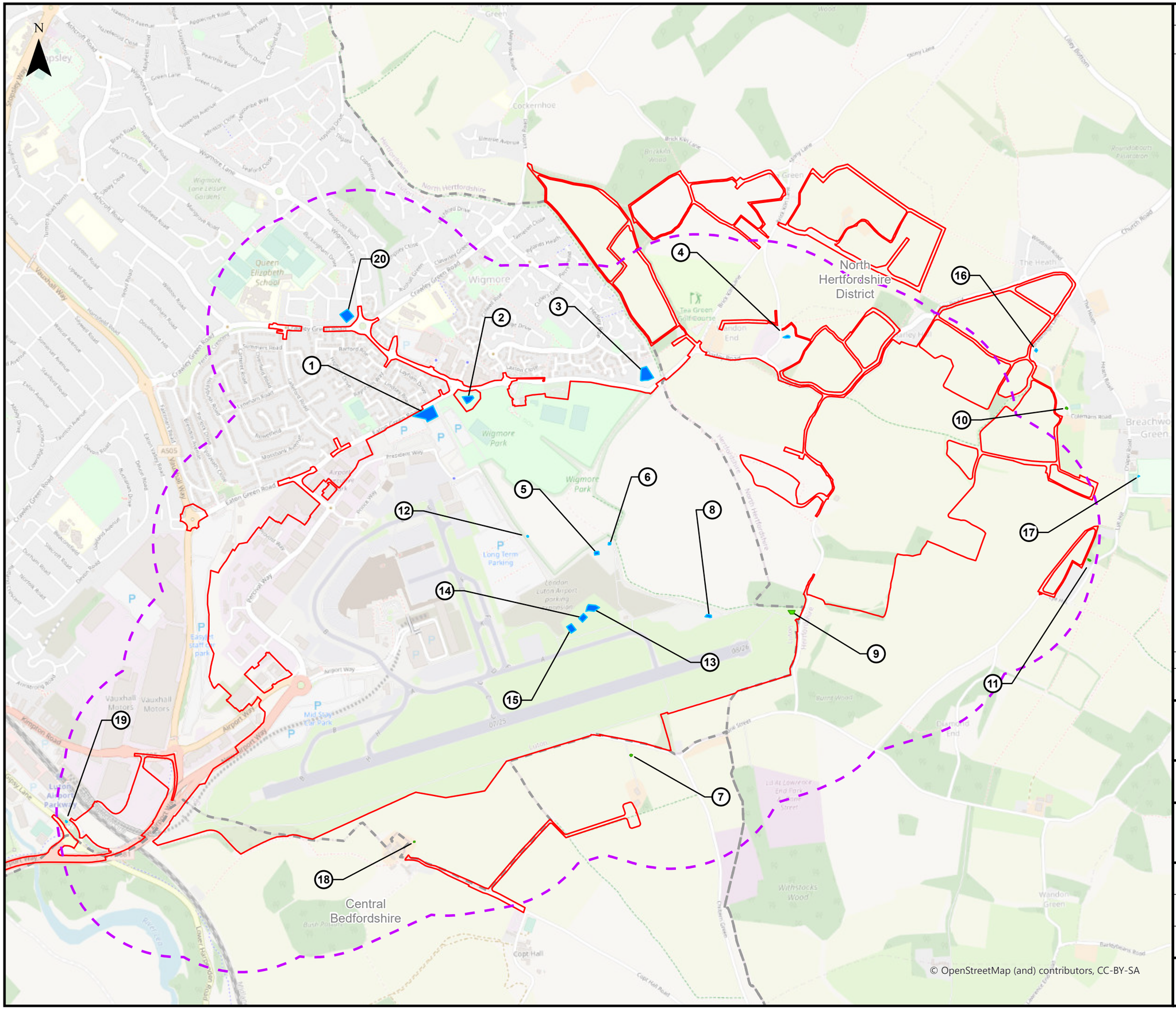
DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0219	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix X

X1 Pond Location Plan



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All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

Legend

- Order Limits
- District Borough Unitary Region
- 500m Buffer Ponds

Ponds

- Dry
- Wet

First Issue	AB	SM CS	20/02/23	P01
Revision History	Drawn	Checked Approved	Date	Rev.

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Appendix X
Pond Location Plan

Purpose of issue			Suitability		
SUITABLE FOR INFORMATION			S2		
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	20/02/23	1:15,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	APFP 5(2)(a)	TR020001/APP/5.02

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0221	P01

Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number

Appendix Y

Y1 Amphibian Survey Results

Pond 1: TL120221		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
26/04/2018	Jenny Singh + Livvy Cropper	0	0	0	0	0	0	0	0
03/05/2018	Alys Black + Steven Mills	0	0	0	0	0	0	0	0
08/05/2018	Steven Mills + Livvy Cropper	0	0	0	0	0	0	0	0
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 2: TL122221		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
26/04/2018	Jenny Singh + Livvy Cropper	0	0	0	0	0	0	0	0
03/05/2018	Alys Black + Steven Mills	0	0	0	0	0	0	0	0
08/05/2018	Steven Mills + Livvy Cropper	0	0	0	0	0	0	0	0

Pond 2: TL122221		Torching				Refuge search			
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 5: TL127215		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
26/04/2018	Jenny Singh + Livvy Cropper	0	0	0	0	0	0	0	0
03/05/2018	Alys Black + Steven Mills	0	0	0	0	0	0	0	0
08/05/2018	Steven Mills + Livvy Cropper	0	0	0	0	0	0	0	0
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 6: TL128215		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
26/04/2018	Jenny Singh + Livvy Cropper	0	0	0	0	0	0	0	0

Pond 6: TL128215		Torching				Refuge search			
03/05/2018	Alys Black + Steven Mills	0	0	0	0	0	0	0	0
08/05/2018	Steven Mills + Livvy Cropper	0	0	0	0	0	0	0	0
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 8: TL132212		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
26/04/2018	Jenny Singh + Livvy Cropper	0	1	0	0	0	0	0	0
03/05/2018	Alys Black + Steven Mills	0	0	0	0	0	0	0	0
08/05/2018	Steven Mills + Livvy Cropper	0	0	0	0	0	0	0	0
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 12: TL125218		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**

Pond 12: TL125218		Torching				Refuge search			
15/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 1 TL120221		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Rebecca English + Livvy Cropper	0	0	0	0													0	0	0	0
30/04/2020	Tom Wright + Rob Randall	0	31	1	0					0	0	0	0					0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall	0	0	0	0					0	0	0	0	0	0	0	0				
14/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	1	0	0					0	0	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 2 TL122221		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Rebecca English + Livvy Cropper	0	0	0	0																
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0								
19/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0					0	0	0	0				

Pond 5: TL127215		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
30/04/2020	Tom Wright + Rob Randall	0	8	3	0	0	7	0	6
06/05/2020	Jacob Haddon + Rob Randall	0	1	0	0	0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	2	0	3	0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	6	1	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 6: TL128215		Torching				Refuge search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall	0	0	3	0	0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	0	0	1	0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	3	0	6	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 8: TL132212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
30/04/2020	Tom Wright + Rob Randall	0	1	4	0					0	0	0	0	0	0	0	1				
06/05/2020	Jacob Haddon + Rob Randall	0	8	1	1					0	0	0	0					0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	2	0	1	0	0	0	0	0	0	0	0								
19/05/2020	Rebecca English + Rob Randall	0	1	4	1	0	0	0	0	0	0	0	0								

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 12: TL125216		Torching				Refuge search				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
30/04/2020	Tom Wright + Rob Randall					0	0	0	0	0	2	0	0	0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall	0	0	0	0	0	0	0	0					0	0	0	0
14/05/2020	Rebecca English + Rob Randall	Pond dry															

Pond 13: TL128212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Rebecca English + Livvy Cropper	0	0	0	0													0	0	0	0
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0									0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall					0	0	0	0					0	0	0	0	0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	1	0	1	0	0	0	0									0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 14: TL127212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Rebecca English + Livvy Cropper	0	0	0	1													0	0	0	0
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0									0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall					0	0	0	0					0	0	0	0				
14/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	1	0	3					0	4	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 15: TL126212		Torching				Refuge search				Bottle trapping				Sweep netting			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0				
06/05/2020	Jacob Haddon + Rob Randall					0	0	0	0					0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	Rebecca English + Rob Randall	0	0	0	0	0	0	0	0								

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 16: TL146223		Torching				Refuge search				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Tom Wright + Jacob Haddon	0	0	0	0	0	0	0	0	0	0	0	0
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0
14/05/2020	Rebecca English + Rob Randall	Pond dry											

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 19: TL105203		Torching				Refuge search				Egg search			
Date of survey	**Surveyors**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**	**GCN**	**SN**	**CF**	**CT**
23/04/2020	Tom Wright + Jacob Haddon	0	0	0	0	0	0	0	0	0	0	0	0
30/04/2020	Tom Wright + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0
06/05/2020	Jacob Haddon + Rob Randall	0	0	0	0	0	0	0	0	0	0	0	0
14/05/2020	Rebecca English + Rob Randall	0	3	0	0	0	0	0	0	0	0	0	0
19/05/2020	Rebecca English + Rob Randall	Pond dry											

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Appendix Z

Z1 Roman Snail Survey Plan

Confidential: not included with this public issue of the report

Appendix AA

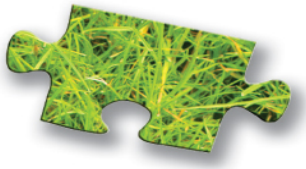
AA1 National Vegetation Classification (NVC) Report

VEGETATION SURVEY & ASSESSMENT

LUTON AIRPORT EXPANSION

BOTANICAL ASSESSMENTS

First issued October 2018
Revised and re-issued June 2019



CONTENTS

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1. INTRODUCTION

This report brings together the results of a number of botanical surveys undertaken in 2018 and 2019 to provide a baseline of information about vegetation communities and plant species within land with potential to be directly or indirectly affected by the proposed expansion of Luton Airport.

The work included the following elements:

- National Vegetation Classification surveys of semi-natural woodlands and neutral grassland on farmland adjacent to the airport;
- A National Vegetation Classification survey of Wigmore Park County Wildlife Site; and
- Surveys of arable plant communities in farmland adjacent to the airport.

2. METHODS

2.1 Personnel

All fieldwork, analysis and interpretation of vegetation data was undertaken by Sharon Pilkington CEnv MCIEEM, a botanist, bryologist and vegetation ecologist with 19 years' experience of professional assessment.

2.2 Grassland and Woodland

Identification of habitat parcels where National Vegetation Classification (NVC) survey would be undertaken was partly driven by the results of a Phase 1 Habitat survey undertaken in 2015 (May, 2015). In addition, an initial walkover of the whole survey area was undertaken on 11 June 2018 to confirm appropriate areas for woodland and grassland sampling.

Some of the grasslands that were surveyed were wide strips of arable headland that appeared to have been sown and managed under an environmental stewardship scheme. Whilst such grassland would not normally be included in an NVC survey, some of these areas appeared to be well-established and relatively diverse, so a precautionary approach was taken.

8 stands of grassland and 4 stands of semi-natural woodland were sampled with a total of 56 quadrats from 12 – 15 June 2018 during good weather conditions. At this time of year both lowland grassland and woodland vegetation is in optimal floristic and structural condition for NVC sampling.

Standard NVC sampling methodology (Rodwell 2006) was employed for the grasslands. None of the woodland stands was sufficiently large to be sampled by standard means and so the minimalistic NVC woodland sampling approach set out by Hall, Kirby & Whitbread (2004) was employed instead. Five quadrats were sampled in all but the smallest stands of vegetation, where a single quadrat was sampled.

MATCH[1] software was employed to analyse the quadrat data and to highlight potential affinities with published NVC communities/sub-communities. Surveyor experience and detailed descriptions of vegetation communities provided by Rodwell (1991, 1992 and 2000) were subsequently used to confirm the classification of each stand in NVC terms where appropriate.

2.3 Wigmore Park CWS

Vegetation communities within Wigmore Park CWS were mapped and assessed between 20 and 24 May 2019. Wherever possible, the same NVC sampling approach used for grassland and woodland communities in 2018 was employed to collect floristic data and map vegetation and 29 quadrats were

[1] Vegetation analysis software developed by scientists from the University of Lancaster for NVC classification.

sampled and analysed. However, the secondary origins of much of the vegetation there combined with the effects of high levels of trampling and other public disturbance meant that a more pragmatic approach had to be employed when interpreting sample data. Vegetation was therefore only classified as an NVC community or sub-community where its floristic character (through field evaluation and/or analysis of quadrat samples) was convincing.

2.4 Evaluation of Vegetation Communities

Following analysis and interpretation of the NVC data, each vegetation community was accorded a relative intrinsic botanical value by considering the following criteria, among others:

- Whether it would be classified as a NERC Act Section 41 priority habitat;
- Whether it would be considered a scarce or rare example of that vegetation type in the area;
- Its 'naturalness' i.e. its resemblance to type NVC community/sub-community, age and condition;
- Its species diversity; and
- Whether it supports populations of any plants of recognised conservation importance.

Table 2.1 lists the criteria used to define plants of national or regional conservation importance.

Table 2.1.

Conservation Category	Status	Definition	Reference
Extent	Nationally Rare (NR)	A taxon present in 1-15 10km Ordnance Survey grid squares in Britain post-1950	*New Atlas of the British and Irish Flora* (2002) by C.D Preston, D.A. Pearman and T.D. Dines.
	Nationally Scarce (NS)	A taxon present in 16-100 10km Ordnance Survey grid squares in Britain post-1950	
	Locally Rare or Scarce	A species listed as Rare or Scarce in Bedfordshire or Hertfordshire.	*Hertfordshire Plant Red Data List*. In the *Flora of Hertfordshire* (2009) by T.J. James. *Bedfordshire Rare Plant Register* (extract provided by the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre)
Threat (IUCN Red List)	Critically Endangered (CR)	A taxon facing an extremely high risk of regional extinction in the wild in the near future.	*The Vascular Plant Red Data List for Great Britain* (2005) by JNCC (Eds. C.M Cheffings and L. Farrell). Also: *A Vascular Plant Red List for England* (2014) by BSBI (Eds. P.A. Stroh et al)
	Endangered (EN)	A taxon that is not CR but facing a very high risk of regional extinction in the wild in the immediate future.	
	Vulnerable (VU)	A taxon that is not CR or EN, but facing a high risk of regional extinction in the medium-term future.	
Conservation	NERC Act Section 41	A taxon identified by the Secretary of State as being of principle importance for the purpose of conserving biodiversity in England.	Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006

2.5 Arable Plants

Surveys for arable plants were mainly undertaken during the period 16 – 20 July 2018, the timing of which is optimal for identification of the majority of species in this group. A number of earlier-flowering species were also recorded in some of the fields during the grassland and woodland surveys in June.

14 arable fields were surveyed; several of these (Fields 1, 5 and 6) were fallow at the time of survey and were surveyed by searching for species along margins as well as the interior. All other fields had maturing crops of wheat and were surveyed by searching the margins of each field.

A repeat survey of two fields (5 and 6) was undertaken between 20 and 25 May 2019. These fields had been sown with a grassland seed mixture in 2017 or 2018, but not subsequently cultivated.

Plantlife has developed a methodology for determining sites of importance for arable plant conservation (Byfield & Wilson, 2005). Although it is aimed principally at identifying nationally important sites, known as Important Arable Plant Areas, the approach works equally well on a smaller scale.

It works on the premise that certain rare and declining plants indicative of arable habitats are assigned a numerical score of between 1 and 9 (Table 2.2). When assessing the arable plant assemblage of a site (at farm, field or field margin level), the individual species scores are summated to give an overall score which allows an evaluation of conservation importance (Table 2.3).

Table 2.2. Scoring categories for arable plant species

Score	Species Status
9	Threatened: Critically Endangered (CR)
8	Threatened: Endangered (EN)
7	Threatened: Vulnerable
6	Near Threatened (NT)
5	Additional Nationally Scarce, in 16-100 10km squares; change index < -1.0
4	Additional Nationally Scarce: in 51-100 10km squares, change index > -1.0
3	Species of local concern: in 101 to 500 10km squares
2	Species of local concern: in 501 to 1000 10km squares
1	Species of local concern: in 1001 to 1500 10km squares, change index < 0.0 i.e. negative

Table 2.3. Provisional threshold scores for assessing the conservation importance of arable plant sites

	Chalk and limestone-derived soils (excluding clays)	Clays	Sands and freely draining acidic soils
European importance	90+	70+	70+
National importance	45-89	30-69	35-69
County importance	30-44	20-29	20-34

The fields within the survey area lie over chalk bedrock (Lewes Nodular Chalk, Seaford Chalk, Holywell Nodular Chalk and New Pit Chalk Formations). This outcrops at the surface in many fields, but locally there are also superficial deposits of clay-with flints producing soils derived from clay, silt, sand and gravel.

2.6 Limitations

All surveys were undertaken at an optimal time of year and in reasonable weather conditions and no significant constraints were encountered in the grassland or woodland of the farmland.

Recent scrub clearance across extensive areas of Wigmore Park presented challenges classifying the resultant regenerating vegetation. Elsewhere, heavy trampling pressure by recreational users, disturbance and, more locally, high levels of rabbit grazing had produced a spectrum of short grassland communities that defied attempts to place in NVC communities.

3. RESULTS

Figure 1 shows the distribution of grassland and woodland communities classified in the 2018 surveys and tabulated NVC data collected from these sites is given in Appendix I. Figure 2 is an equivalent vegetation map of Wigmore Park CWS and Appendix II gives the tabulated field data. A list of all species recorded in all NVC surveys is provided as Appendix III.

Botanical nomenclature used in this report follows Stace (2010) for vascular plants and Blockeel *et al* (2014) for bryophytes.

3.1 Woodland

Semi-natural woodland was quite scarce in the area and the stands that were present were small and showed evidence of having been managed in traditional ways in the past, followed by a long period of neglect. Two different kinds of broad woodland community were classified from the stands on site but the floristic differences between them were relatively subtle and blurred by the effects of a lack of recent silvicultural management.

Mature woodland was characterised by a closed canopy of deciduous trees, most notably Pedunculate Oak *Quercus robur*, Ash *Fraxinus excelsior*, locally dominant Hornbeam *Carpinus betulus* and Wild Cherry *Prunus avium*. Where an understory was present, Holly *Ilex aquifolium*, Hawthorn *Crataegus monogyna* and Elder *Sambucus nigra* were frequent.

In stands classified as **W8 Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland**, Pedunculate Oak was subordinate to Ash in the canopy and Field Maple *Acer campestre* was a common understory/sub-canopy tree. Bluebell *Hyacinthoides non-scripta* was vernally dominant, where frequent field layer associates included several other ancient woodland indicators (AWI) e.g. Wood Millet *Milium effusum*, Yellow Archangel *Lamiastrum galeobdolon* subsp. *montanum* and Three-nerved Sandwort *Moehringia trinervia*. High cover of Bramble *Rubus fruticosus* agg. in the field layer suggested nutrient enrichment of the woodland floor whilst Common Ivy *Hedera helix* was also very common on deeply shaded ground below the trees.

Fraxinus – Acer – Mercurialis woodland is ubiquitous in lowland districts on well-drained, base-rich soils and it includes ancient, secondary and some replanted broad-leaved stands. The floristic composition of the sampled stands was insufficient to place them in any of the seven sub-communities of W8.

Secondary clay-with-flints woodland in the southern half of Winch Hill County Wildlife Site was acidic in character and was classified as an undifferentiated form of **W10 Quercus robur – Pteridium aquilinum – Rubus fruticosus woodland**. This kind of woodland is characteristic of base-poor brown earths mainly in the lowlands of southern Britain.

In this community, sub-mature Pedunculate Oak and birch (Silver Birch *Betula pendula*, Downy Birch *B. pubescens* and probable *B.* x *aurata*) dominated the 15m high canopy. Most of the trees were maidens but some had been coppiced in the distant past. A poorly-developed understory included Elder, Hawthorn, Hazel *Corylus avellana* and Honeysuckle *Lonicera periclymenum*. Bracken *Pteridium aquilinum*, Bramble, Honeysuckle, Bluebell and Yorkshire-fog *Holcus lanatus* were all prominent in the field layer. The floristics of this woodland could not place it with any confidence into any of the sub-communities of *Quercus – Pteridium – Rubus* woodland.

This woodland adjoined a visually striking and apparently older copse of near-pure mature Hornbeam, where the trees had been coppiced historically, although not in recent times. Apart from sparse Ash, Field Maple and birch, there were no other canopy species and only sparse Hawthorn and Elder below. Bluebell was abundant but had few field layer associates. Fallen dead wood was very common but it was very dry and consequently supported only sparse populations of very common mosses and liverworts. This woodland did not fit well into the NVC framework scope and was regarded as W8-W10 intermediate.

Table 3.1. Evaluation of woodland communities

Vegetation Community/sub-community	Botanical Value	Rationale
W8	Low to moderate	• Not an S41 priority habitat; • W8 is a very common and widespread kind of lowland woodland on base-rich soils; • Both stands of W8 are small and the larger one has been modified by localised in-planting of exotic conifers and other non-native trees and shrubs. Canopy closure due to lack of recent management and eutrophication of the woodland floor have also degraded it and it cannot be assigned to a sub-community. The smaller stand is little more than an outgrown hedgerow; • It supports no populations of plants of recognised conservation importance; the larger stand does support several ancient woodland indicator species so may be relatively old; • Ancient/old semi-natural woodland is scarce in the area; • Both stands have relatively low diversity.
W10	Low	• Not an S41 priority habitat; • W10 is a very common and widespread kind of lowland woodland on acid soils; • The majority of this stand (part of Winch Hill Wood CWS) is still developing/maturing. It is not currently a good example of W10 and cannot be referred to a sub-community; • It supports no populations of plants of recognised conservation importance; it does support several ancient woodland indicator species which may have colonised from the older part of the CWS.
W8-W10 intermediate	Low to moderate	• Not an S41 priority habitat; • Ancient woodland – but it has been greatly modified by traditional intensive management as Hornbeam coppice and has poorly developed understory and field layers. • It supports no populations of plants of recognised conservation importance but there is a large population of Bluebell and other AWI are present in low numbers; • Ancient semi-natural woodland is scarce in the area; • It lacks diversity in all structural layers.

3.2 Grassland

Grasslands within the survey area were typically of two kinds; long-established and unmanaged stands on banks and in fenced-off enclosures between arable fields and wide uncultivated headlands in intensively cultivated fields managed (presumably) under an agri-environment agreement as grassland.

All stands were found to be examples of mesotrophic grassland and the majority were classified as **MG1 Arrhenatherum elatius grassland** or **MG6 Lolium perenne – Cynosurus cristatus grassland**.

Stands of *Arrhenatherum* grassland were variable but in every one False Oat-grass *Arrhenatherum elatius* was frequent to abundant and usually constant, alongside a range of associates which differentiated the stands into sub-communities. MG1 is a very widespread kind of grassland which is characteristically associated with unmanaged (or very lightly managed) habitats on fertile, well-drained but moist soils in the lowlands.

The ***Festuca rubra* sub-community (MG1a)** formed part of a wide arable field headland. This stand was grass-dominated with few forbs, although it did support a small population of Common Spotted-orchid *Dactylorhiza fuchsii*. Red Fescue *Festuca rubra*, Rough Meadow-grass *Poa trivialis* and Yorkshire-fog were all constant and abundant along with False Oat-grass. Hogweed *Heracleum sphondylium* was the most abundant forb, although Meadow Buttercup *Ranunculus acris* and Smooth Tare *Vicia tetrasperma* were also frequent. Numerous other species were present but only in small quantity. MG1a is one of the least diverse and most widespread of the five *Arrhenatherum* grassland sub-communities and is commonly associated with fertile, circumneutral soils.

Examples of the **Urtica dioica sub-community (MG1b)** were found on ungrazed banks and in rough scrubby grassland between cultivated fields. In this sub-community Common Nettle *Urtica dioica* was usually prominent, alongside several other nutrient-demanding forbs e.g. Hogweed, Creeping Thistle *Cirsium arvense* and Cleavers *Galium aparine*. Patches of tall perennial forbs such as Rosebay Willowherb *Chamerion angustifolium* and Great Willowherb *Epilobium hirsutum* were developing in certain stands. Analysis of the quadrat data collected in these stands suggested that the grassland was moving toward **OV24 Urtica dioica – Galium aparine community,** a very common kind of weedy vegetation in which robust herbaceous species replace grasses.

MG1b is a very common and usually poor sub-community and is most common in areas of intensive arable agriculture, where it benefits from enrichment caused by fertiliser run-off and spray drift. The *Urtica – Galium* community is typical of eutrophic, moist but well-aerated soils in the lowlands and is especially frequent in open situation where there has been some kind of disturbance.

Two stands of unmanaged scrubby *Arrhenatherum* grassland (**MG1 undifferentiated**) could not be placed with confidence in any sub-community. In these False Oat-grass was very dominant and there was a thick layer of thatch at tiller level. Certain of the associated species were calcicoles, including Traveller's-joy *Clematis vitalba*, Wild Basil *Clinopodium vulgare* and Carrot *Daucus carota* and the stands seemed to be associated with thinner soils where chalk was close to the surface.

Two small stands of **MG6 Lolium perenne – Cynosurus cristatus grassland** were also present. Most, but not all examples of *Lolium – Cynosurus* grassland originate as sown agricultural swards and the community is characteristic of a range of grazed pastures.

In the **Typical sub-community (MG6a)**, the stand was part of a wide grass headland in an arable field. Despite being dominated by such grasses as Crested Dog's-tail *Cynosurus cristatus*, Red Fescue, Rough Meadow-grass and Yorkshire-fog, the community was relatively diverse and supported many different common forbs. Meadow Buttercup, Red Clover *Trifolium pratense*, Carrot and Hoary Ragwort *Senecio erucifolius* were all prominent and there was also a large population of Common Spotted-orchid. The Typical sub-community is very common but rather variable and includes a range of older re-seeded grasslands on freely draining brown earths.

In the **Trisetum flavescens sub-community (MG6c)**, the vegetation had a distinctly calcareous flavour. This grassland, though unmanaged, was hard-grazed by rabbits on a small chalk bank and small/rosette-forming species were very common. It was also moderately rich in forbs, including a number of calcicoles: Fairy Flax *Linum catharticum*, Hoary Plantain *Plantago media* and Mouse-ear Hawkweed *Pilosella officinarum*. Populations of Spreading Meadow-grass *Poa humilis* and Narrow-leaved Meadow-grass *P. angustifolia,* both of which are relatively uncommon*,* were also supported by this community.

Constant and frequent species included Yellow Oat-grass *Trisetum flavescens*, Red Fescue, Smaller Cat's-tail *Phleum bertolonii*, Common Knapweed *Centaurea nigra*, Ribwort Plantain *Plantago lanceolata*, Yarrow *Achillea millefolium* and Black Medick *Medicago lupulina*.

The *Trisetum flavescens* sub-community of *Lolium-Cynosurus* grassland is less widespread than the other two sub-communities of MG6 and is characteristically associated with more calcareous and nutrient-deficient brown earths.

Other grass headlands in arable fields could not be classified as any particular NVC community and were instead mapped as **Neutral grassland – unclassified** (referred to as MG in Appendix I). These typically included quite diverse mixtures of species that had almost certainly been sown (Italian Ryegrass *Lolium multiflorum*, Cock's-foot *Dactylis glomerata*, Rough Meadow-grass) along with many that had probably already been present in the seedbank e.g. Soft-brome *Bromus hordeaceus*, Bristly Oxtongue *Helminthotheca echioides* and Cut-leaved Crane's-bill *Geranium dissectum*. Locally abundant False Oat-grass suggests that given more time such swards are likely to develop into forms of *Arrhenatherum* grassland.

Table 3.2. Evaluation of grassland communities

Vegetation Community/sub-community	Botanical Value	Rationale
MG1a, MG1b, MG1 Neutral grassland - unclassified	Low	• Not S41 priority habitat; • Very common and widespread unmanaged neutral grassland types; • Examples in arable headlands have sown origins; • Only common species are present; • All stands have low species diversity.
MG6a	Low	• Not S41 priority habitat; • Very common and widespread kind of neutral grassland; • Sown origin as an arable headland; • Moderately diverse and supports a large population of Common Spotted-orchid, which is rare in the survey area.
MG6c	Moderate	• Not S41 priority habitat; • Relatively uncommon sub-community, restricted to more calcareous soils; • Maintained only by rabbits but threatened by scrub encroachment; • Only grassland in survey area to support populations of a number of grassland calcicoles; • Moderately diverse.

3.3 Wigmore Park CWS

3.3.1 Grassland

Across the CWS the majority of grassland was considered to be neutral (or mesotrophic) grassland and included a complete spectrum of diversity (from species-rich to species-poor) and structure (tall, rank vegetation to heavily trampled grassland). The edges of much of the grassland often did not form clear transitions to other vegetation types and Bramble was a frequent successional colonist, leading to a number of indeterminate communities.

Where trampling and grazing pressure was light, most neutral grassland could be classified as **MG1 Arrhenatherum elatius grassland**, normally characterised by prominent False Oat-grass and other common mesotrophic grasses as described in Section 3.2. Four sub-communities were found to be present, along with a variable kind of *Arrhenatherum* grassland that could not be allocated to any sub-community. In this undifferentiated MG1, other species typically replaced some of the False Oat-grass, including, locally, Narrow-leaved Meadow-grass *Poa angustifolia*, Cut-leaved Crane's-bill *Geranium dissectum* and various legumes.

Of the four sub-communities, the floristic characteristics of two – the ***Festuca rubra* sub-community (MG1a)** and the **Urtica dioica sub-community (MG1b)** were broadly similar to those seen on land nearby (Section 3.2). Small areas of species-poor rank *Arrhenatherum* grassland with abundant Wild Parsnip *Pastinaca sativa* subsp. *sylvestris* replacing Hogweed were loosely referable to the **Pastinaca sativa sub-community (MG1d)** which is typical of brown earth soils of higher pH caused by underlying base-rich bedrock, rubble or other superficial material. High cover of Common Knapweed and/or Common Bird's-foot-trefoil *Lotus corniculatus* within a matrix of False Oat-grass and other coarse grasses was indicative of a sward with affinity to the ***Centaurea nigra* sub-community (MG1e)**. In the south of the CWS, extensive stands of a closely related **herb-rich neutral grassland** were present and were differentiated from MG1e by very low frequency and cover of grasses and particularly high cover of Common Bird's-foot-trefoil and/or Common Knapweed, a result of high levels of rabbit grazing. This community could not be placed in any NVC community but was relatively diverse locally, supporting populations of Common Spotted-orchid, Black Medick, Cock's-foot and Red Fescue. Much of it was degraded by the invasion of Bramble and large, well-established dense patches of a Michaelmas-daisy *Aster* sp. and Wood Small-reed *Calamagrostis epigejos*. A grassier version of the same community (**herb-rich grassland – trampled**) was frequent in and by some of the paths across the site, with trample-resistant species as Creeping Bent *Agrostis stolonifera* and plantains *Plantago* spp. becoming prominent.

Two small stands of rabbit-grazed **herb-rich calcareous grassland** were found but lacked the majority of indicators of any recognised NVC CG community. Floristically this community was quite diverse and shared the majority of species with its neutral counterpart including high cover of Common Bird's-foot-trefoil, Red Fescue and Ribwort Plantain. It differed primarily in the presence of two mainly calcicolous species – Glaucous Sedge *Carex flacca* and Fairy Flax. Small Scabious *Scabiosa columbaria* was locally abundant but typical lowland calcareous grassland grasses were almost entirely absent.

Well-used walker's paths across the site supported closed, trampled turf referable to the **OV23 Lolium perenne – Dactylis glomerata community** which is a species-poor kind of vegetation characteristic of recreational areas where there may be continuous disturbance. It supported a range of species able to withstand frequent trampling, including Perennial Rye-grass, Cock's-foot, Ribwort Plantain, White Clover, Daisy *Bellis perennis* and Annual Meadow-grass *Poa annua*.

Small depressions on the upper part of the CWS held no water at the time of survey but clearly had impeded drainage and supported several forms of damp grassland. Two of these were characterised by a densely stoloniferous carpet of Creeping Bent with various associates but only one had weak affinities to an NVC community. Examples of the **OV28 *Agrostis stolonifera* – *Ranunculus repens* community** were uniformly dominated by Creeping Bent alongside Creeping Buttercup *Ranunculus*

repens, Ribwort Plantain, Hairy Sedge *Carex hirta* and a scattering of small grassland forbs. The presence of the semi-aquatic moss *Drepanocladus aduncus* was an indicator of seasonally fluctuating water levels. Similar but more diverse vegetation (**Agrostis stolonifera – Potentilla reptans grassland**) with abundant Creeping Cinquefoil *Potentilla reptans* could not be classified in the NVC. Finally, **Sedge-rich neutral grassland** in another seasonally damp depression proved to be equally unclassifiable. Here, numerous tussocks of Grey Sedge *Carex divulsa* grew within a matrix of Common Bird's-foot-trefoil, Cut-leaved Crane's-bill *Geranium dissectum* and Creeping Cinquefoil.

3.3.2 Woodland and scrub

Large stands of dense Bramble scrub were present on the site, especially over mounds of rich and fertile soil and on the lower flanks of the site. Where well-grown, this scrub had weak affinities to ***Rubus fruticosus – Holcus lanatus*** **underscrub (W24)**, the frequency of thistles placing it most closely to the ***Cirsium arvense – Cirsium vulgare*** **sub-community (W24a)**. This is a very species-poor type which is characteristic of disturbed places where brambles have invaded open ground. The community represents succession toward tall scrub and woodland and many of the stands were punctuated by immature trees and large bushes of Hawthorn and other scrub species.

Although Hawthorn was frequent as scattered bushes, only in a few places was it dense enough to be classified as **W21 *Crataegus monogyna – Hedera helix* scrub**. Such stands were typically dominated by tall Hawthorn, often with some Elder or Blackthorn *Prunus spinosa* below. Its field layer species included Common Nettle, Ground-ivy *Glechoma hederacea* and Rough Meadow-grass.

An old and long-outgrown field hedgerow marking the eastern boundary of the CWS had widened and matured sufficiently to be classified as **W8 Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland**. Some in-planting of species such as Scots Pine *Pinus sylvestris* had taken place but essentially the woodland had a similar floristic composition and physiognomy to other stands of W8 nearby (Section 3.1). The oldest trees were mature Pedunculate Oak, with some Ash and formerly coppiced Hazel below. The frequency of calcicolous understory and field layer species, especially Field Maple and Dog's Mercury confirmed this as a woodland of base-rich soils closest to the ***Hedera helix*** **sub-community (W8d)**, typical of situations where lack of management has caused long-term canopy closure. Locally, large numbers of Bluebell were also present.

Several stands of **planted trees and shrubs** were also present, especially along the western (airport) and northern boundary banks. Here, dense plantings of native and introduced species were not yet mature and included Italian Alder *Alnus cordata*, Field Maple, Wild Cherry and Swedish Whitebeam *Sorbus intermedia*. Locally, numerous suckers were advancing out into adjacent ground where Aspen *Populus tremula* had been planted on the bank.

Various willows had also been planted in places, with mature examples of Goat Willow *Salix caprea* especially prominent and usually part of a mosaic with nettle or bramble-dominated vegetation. In a site not noted for its bryophyte interest, these trees supported significant populations of epiphytic moss and liverwort, including a few locally uncommon mosses (*Orthotrichum stramineum*, *O. striatum*).

Other **dense native mixed scrub** could not be assigned to any NVC community. Typically stands of this included much Elder, together with a little Hawthorn, Blackthorn, some Bramble and Pedunculate Oak, Ash and Sycamore *Acer pseudoplatanus* saplings.

3.3.3 Tall herb and ruderal

Nettle beds were frequent and were particularly characteristic of spoil heaps and less disturbed areas and in mosaics of bramble and longer grassland. The majority had the floristic characteristics of the **OV24 *Urtica dioica – Galium aparine* community** and particularly the **Typical sub-community (OV24a).** This kind of vegetation tended to be dominated by tall patches of Common Nettle, growing over variable amounts of Cleavers. Most of the stands were very species poor but some had a few scattered associates e.g. Rough Meadow-grass and Hemlock *Conium maculatum*.

Small areas of recently disturbed or heavily trampled semi-open vegetation characterised by a number of low-growing pioneering species could not be classified as an NVC type and were instead mapped as **ephemeral and disturbed** vegetation. These areas, whilst small, were highly variable but were characterised by such species as Sticky Mouse-ear *Cerastium glomeratum*, Wall Speedwell *Veronica arvensis*, Parsley-piert *Aphanes arvensis*, Annual Meadow-grass, Slender Sandwort *Arenaria leptoclados* and Slender Pearlwort *Sagina filicaulis*.

3.3.4 Mosaics

The vegetation of the CWS was very complex and much of it was represented by mosaics of two or more of the vegetation types described in Section 3. An estimate of the respective percentage cover of different types of vegetation in mosaics is given in the key to Figure 2.

Table 3.3. Evaluation of Wigmore Park Vegetation Communities

Vegetation Community/sub-community	Botanical Value	Rationale
MG1a, MG1b, MG1d, MG1, OV23, OV28, *Agrostis stolonifera – Potentilla reptans* grassland OV24, W21, W24, Dense *Clematis vitalba*, Dense mixed native scrub, Planted trees and shrubs All mosaics	Low	• Common and widespread unmanaged / lightly managed communities; • Only common species are present; • All stands have low species diversity. • Includes some deliberately planted stands of trees and scrub; • Mosaics predominantly include significant elements of species-poor tall herb and bramble-dominated vegetation. • Open vegetation is locally degraded and threatened by scrub encroachment and trampling.
MG1e, Herb-rich neutral grassland (trampled), Sedge-rich neutral grassland, W8d, Ephemeral and disturbed	Low-moderate	• Range of grassland communities with some semi-natural character or diversity but lacking formal conservation status e.g. S41 priority habitat; • Grasslands have no populations of notable species and locally show some degradation by scrub invasion; • W8 is a very common and widespread kind of lowland woodland on base-rich soils. This example is not ancient but has some botanical interest being derived from an old hedge boundary; • Ephemeral and disturbed vegetation supports a diverse community of pioneering plants, some of which are likely to be uncommon in the wider area.
Herb-rich calcareous grassland Herb-rich neutral grassland	Moderate	• Locally uncommon grassland communities though not referable to NVC or S41 priority habitat; • Moderately diverse; • Only grasslands in survey area to support populations of a number of grassland calcicoles (Herb-rich calcareous grassland only); • Sward integrity is locally degraded and threatened by scrub encroachment and trampling.

3.4 Arable Plants

Figure 2 ranks each field according to its arable plant score in 2018, with results provided on a field-by-field basis in Table 3.4 and Figure 3 ranks each field accordingly. Following the resurvey of Fields 1 and 6 in 2019, Table 3.5 provides updated results for those fields and Figure 4 ranks each field accordingly. Appendix IV provides a record of all plants recorded in these fields in the course of both years of the fieldwork.

Table 3.4. Field scores (2018)

Species	Score	Field Number													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Black-grass *Alopecurus myosuroides*	2	X	X		X	X	X	X		X	X	X	X	X	X
Stinking Chamomile *Anthemis cotula*	7														X
Rye Brome *Bromus secalinus*	7		X	X	X	X		X	X	X		X	X	X	X
Cornflower *Centaurea cyanus*	8	X					X								
Dwarf Spurge *Euphorbia exigua*	6	X				X	X		X					X	X
Common Cudweed *Filago vulgaris*	6						X								
Few-flowered Fumitory *Fumaria vaillantii*	7						X								
Corn Marigold *Glebionis segetum*	7	X					X								
Round-leaved Fluellen *Kickxia spuria*	3							X	X					X	
Dwarf Mallow *Malva neglecta*	2			X											
Wild Radish *Raphanus raphanistrum* subsp. *raphanistrum*	1	X	X												
Field Madder *Sherardia arvensis*	1		X						X					X	
Smooth Tare *Vicia tetrasperma*	2						X	X							
Field assemblage score		**24**	**11**	**9**	**9**	**15**	**38**	**14**	**17**	**9**	**2**	**9**	**9**	**19**	**23**

Table 3.5. Field scores (2019)

Species	Score	Field Number	
		1	6
Black-grass *Alopecurus myosuroides*	2	X	X
Lesser Quaking-grass *Briza minor*	5	X	
Cornflower *Centaurea cyanus*	8	X	X
Wild Radish *Raphanus raphanistrum* subsp. *raphanistrum*	1	X	
Field assemblage score		**16**	**10**

In 2018 Field 6 scored most highly (38) and supported 7 species of interest. These included a single small population of Few-flowered Fumitory *Fumaria vaillantii* (a Nationally Scarce species) on the eastern margin at TL 1334 2174 (Plate 1), scattered plants of Cornflower *Centaurea cyanus* which if of native (archaeophyte) origin is a Nationally Rare species, Corn Marigold *Glebionis segetum* and a large population of Dwarf Spurge *Euphorbia exigua*. The latter two species are listed on the Bedfordshire Rare Plant Register.

Although this score suggested Field 6 (which lies both on clay and chalk) could be of county importance (chalk and limestone-derived soils) or even national importance (clay soils) other species present in the field indicated that it had been sown with wildflower seed in the recent past. For example, Austrian Chamomile *Anthemis austriaca* was occasional in the field. This non-native species is frequently introduced as a contaminant of grass or wildflower seed. Other species more characteristic of grassland than cultivated ground were also frequent in Field 6, again suggesting that some recent seeding has taken place. At the southern end of Field 6 a field corner where very thin, stony soils predominated supported a small population of Common Cudweed *Filago vulgaris* (a Bedfordshire Rare Plant Register species); it was not seen in any of the other fields.

In 2019 the floristic character of Field 6 was found to have changed significantly, reflecting (i) the establishment of many of the perennial grassland species sown previously and (ii) lack of cultivation, allowing perennial or biennial species to colonise and replace annual arable-associated plants. Though certain arable weeds such as Black-grass remained frequent, there was high frequency and cover of e.g. Common Knapweed, Oxeye Daisy *Leucanthemum vulgare*, Spear Thistle *Cirsium vulgare*, Hedge Mustard *Sisymbrium officinale* and Red Fescue. Only 2 arable indicator species were found – including Lesser Quaking-grass Briza minor, a plant not found in any of the 2018 surveys - giving Field 6 a field assemblage score of 10 (38 in 2018).

In 2018 Fields 1 and 14 scored highly enough to be considered to be of county importance (for clay soils – both fields straddle the chalk and clay). Field 1 also supported a strong population of Dwarf Spurge and was the only field other than Field 6 to support small populations of Cornflower and Corn Marigold. By 2019 however, Field 1 supported a vegetation community similar to that in Field 6 and its field assemblage score dropped to 16 (24 in 2018).

Plate 1. Few-flowered Fumitory in Field 6 in 2018

The margins of a wheat crop in Field 14 also supported a small population of Dwarf Spurge as well as numerous plants of the Nationally Scarce[2] Rye Brome *Bromus secalinus* (Plate 2). Field 14 was also the only one to support a small population of Stinking Chamomile *Anthemis cotula*.

Plate 2. Rye Brome growing in wheat in Field 7 in 2018

All of the other fields (surveyed only in 2018) had limited arable plant interest, other than populations of Rye Brome and Black-grass *Alopecurus myosuroides*. Rye Brome was recorded in 11 of the 14 fields surveyed i.e. all those cultivating wheat, whilst Black-grass was seen in 12 and appears to be regarded as a troublesome weed in the area. In the majority of fields intensive cultivation techniques had confined arable plant interest to one or two chalky field corners that had escaped the herbicides, whilst the majority of margins were devoid of all but the most common arable plants.

Table 3.6 summarises the value of each of the 14 fields, based on the most recent survey results available. Numbers given in brackets refer to older / superseded values. Using the most recent survey results, only Field 14 would currently be considered to be of (county) importance for arable plants.

Table 3.6. Evaluation of arable plant communities

Field Score	Value	Field Number	No. of fields
31-40	High	(6)	0 (1)
21-30	Moderate	(1), 14	1 (2)
11-20	Low	1, 2, 5, 7, 8, 13	6 (5)
1-10	Negligible	3, 4, 6, 9-12	6 (5)

[2] Currently regarded as a Nationally Scarce species and one whose past decline merited inclusion on the Red List as Vulnerable. However, in the past two decades it has returned as a common seed contaminant of wheat crops in Britain and in the author's opinion it no longer merits any conservation status.

4. CONCLUSIONS

The LLAL landholding to the east of the existing airport comprises mainly intensively cultivated fields with small associated areas of unmanaged grassland and semi-natural woodland.

Grasslands in this area are of two main types. Those of apparently semi-natural origin on banks and between fields are predominantly coarsely structured and of low or negligible botanical interest. Other younger swards sown as wide grassy headlands within intensively cultivated fields were less rank and a little more diverse but were considered to represent a very common and widespread kind of neutral grassland. Only one semi-natural grassland stand, on a chalky bank, was considered to have moderate value. However, without scrub control it is likely that this small stand will be lost within a few years.

Woodlands represented typical stands of base-rich and base-poor communities in southern England and although small, at least two appeared to be of considerable age. Lack of recent silvicultural management and enrichment of the field layer has left them in relatively poor condition.

Wigmore Park CWS has diverse vegetation communities, the majority of which it is not possible to place within the framework of the NVC. This is a commonplace occurrence when vegetation is (i) relatively young, (ii) overlies very variable substrate and (iii) is overgrazed or subject to high levels of disturbance. All of the above are relevant to Wigmore Park, which is heavily used by dog walkers and other recreational users and which appears to have a large population of rabbits.

As such, the most diverse/interesting vegetation communities cannot be classified in a standard way (for example as Section 41 priority habitat). However, their local value should still be recognised. Unfortunately the lack of regular livestock grazing at Wigmore Park means that Bramble and expanding rhizomatous patches of introduced Michaelmas-daisy are, and will continue to be, a threat to the extent and quality of herb-rich neutral and calcareous vegetation.

Arable land in the area is mostly managed in a very intensive way and in many fields the regular application of fertiliser and herbicide means that arable plant communities are poorly developed and favour certain species tolerant of such treatment.

The withdrawal of such management allowed certain fields (1 and 6 especially) to develop diverse arable plant communities of county importance or greater in 2018. However, a year later the lack of cultivation (creating the bare ground needed for the germination of many annual 'weeds') and the growth of many grassland species sown in 2017 or 2018 had greatly reduced the visible arable plant interest of these two fields to low levels. On this basis, only Field 14 would be considered to be of county importance for arable plant species in 2019.

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FIGURES

Luton Airport Expansion

Figure 1.Woodland and grassland communities

- MG1 undifferentiated
- MG1a
- MG1b
- MG6a
- MG6c
- Neutral grassland - unclassified
- W8 undifferentiated
- W8-W10 intermediate
- W10 undifferentiated
- Quadrat

0 100 200 300 400 500 m

Luton Airport Expansion

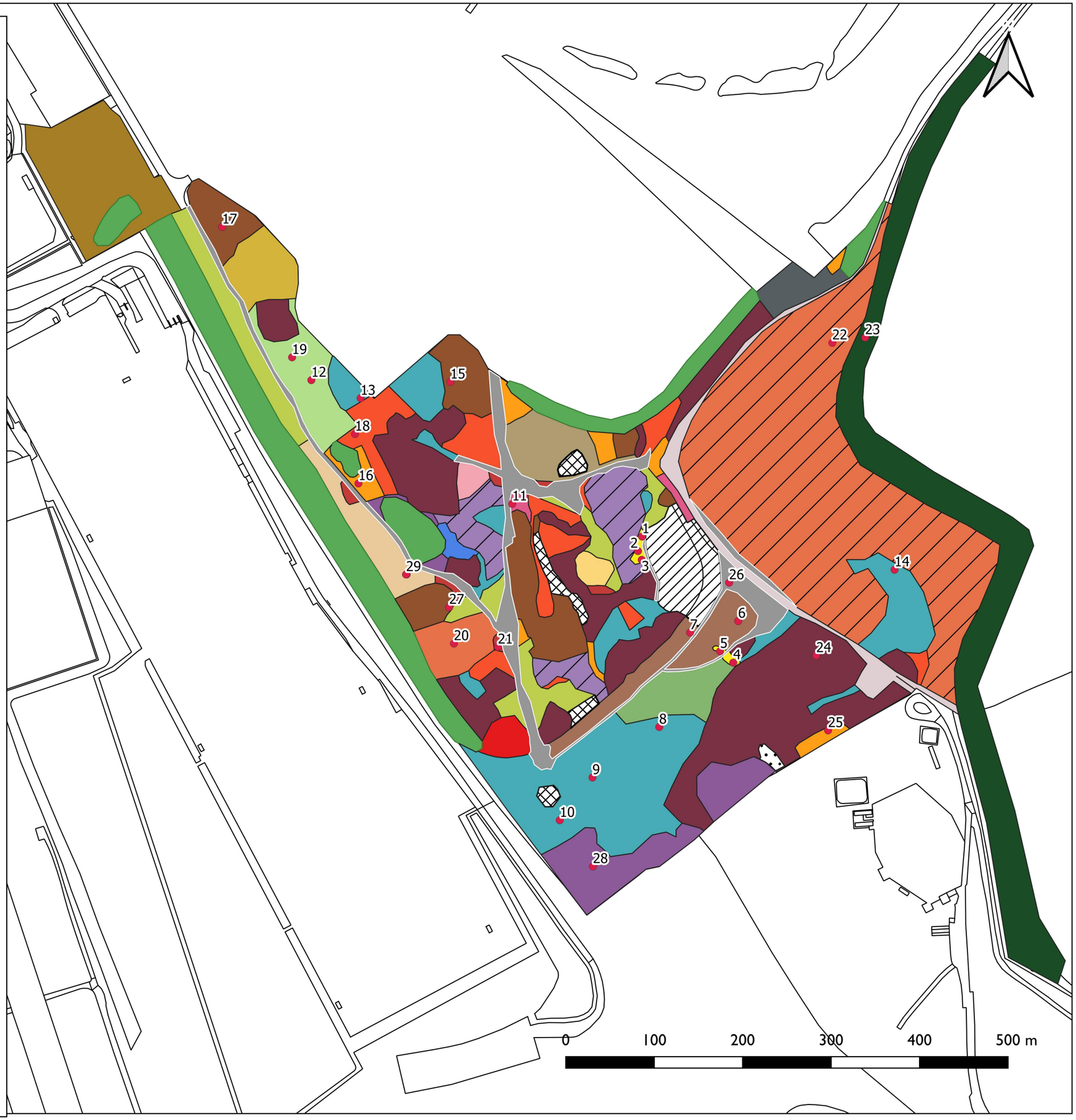
Figure 2. Wigmore Park CWS Vegetation Communities

Grassland
- MG1
- MG1a
- MG1b
- MG1d
- MG1e
- Herb rich calcareous grassland
- Herb rich neutral grassland
- Herb rich neutral grassland - trampled
- Sedge rich neutral grassland
- Agrostis stolonifera - Potentilla reptans grassland
- OV23
- OV28

Woodland and scrub
- W8d
- W21
- W24a
- Dense Clematis vitalba
- Dense mixed native scrub
- Planted trees and shrubs

Tall herb and ruderal
- OV24
- OV24a below planted trees
- Ephemeral and disturbed

Mosaics
- Herb-rich MG/scattered scrub 40:60
- Herb-rich MG/OV24 20:80
- Herb-rich MG/Salix caprea/OV24/W24 5:70:10:15
- Herb-rich MG/OV24/W21/W24 15:15:30:40
- Herb-rich MG/W21/W24 40:25:35
- MG1/W24/scattered scrub 20:40:40
- MG1/MG1b/W24 30:40:30
- MG1/MG1b/W24 30:10:60
- MG1/MG1d/W24 30:30:40
- MG1/MG1e/W24 50:20:30
- MG1/OV24/W24 10:50:40
- MG1b/OV24/W24 60:10:30
- MG1e/W24 80:20
- OV24/W24 10:90
- OV24/W24 50:50
- OV24/W21/W24 30:40:30
- OV24/W21/W24 15:20:65
- Quadrat



Luton Airport Expansion

Figure 3. Arable Plant Field Scores (2018)

- 1-20
- 21-30
- 31-40

1
2
3
4
5
6
7
8
9
10
11
12
13
14

0 100 200 300 400 500 m

Luton Airport Expansion

Figure 4. Arable Plant Field Scores (2019)

1-20

21-30

1

2

3

4

5

6

7

8

9

10

11

12

13

14

0 100 200 300 400 500 m

APPENDIX I. NVC FIELD DATA – 2018 SURVEYS

Quadrat number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Grid reference	TL133012 2055	TL133442 2037	TL133672 2019	TL134152 2014	TL135452 1976	TL134872 1970	TL135042 1966	TL135232 1959	TL135422 1951	TL135572 1952
NVC community	MG1a	MG1a	MG1a	MG1a	MG1a	MG6a	MG6a	MG6a	MG6a	MG6a
Acer campestre								1		
Agrostis capillaris					2	3				
Agrostis stolonifera						4	3		2	
Alopecurus pratensis							2	2	2	
Arrhenatherum elatius	7	8	8	5	5			1		
Bellis perennis								1		
Brachythecium rutabulum			2			3				
Carex flacca										5
Carex sylvatica						1	1	1	1	
Carpinus betulus					1			1		
Centaurea nigra		4								
Cerastium fontanum	3		1			2	3	1		
Cirsium arvense			4	2	4	1	1		1	
Crataegus monogyna	1		1	1					1	
Crepis capillaris		1								
Cynosurus cristatus						5	3	5	3	2
Dactylis glomerata									1	
Dactylorhiza fuchsii					2	1	2	2	1	
Daucus carota	2	1		1	4	3	1	1	4	3
Festuca rubra	6	3	6	6	5	4	4	3	5	5
Fraxinus excelsior					1		4		1	
Galium aparine	2									
Heracleum sphondylium	5	5	6	7	2	4	4	2	1	
Holcus lanatus	5	3	4	5	4	4	6	5	6	4
Hypochaeris radicata						1				
Juncus effusus			1							
Lolium perenne						2			2	
Medicago lupulina										1
Odontites vernus	1							1	1	2
Phleum bertolonii						4				
Plantago lanceolata	4		1	2		4	2		1	
Poa trivialis	3	3	3	2	6	3	4	5	5	4
Prunus spinosa			2						1	
Quercus robur		1	1					1		
Ranunculus acris	4	2	4	4	5	4	4	6	5	4
Ranunculus repens			1		2		4			
Rosa sp. (seedling)					1			1		
Rumex sanguineus					2					
Schedonorus arundinaceus										2
Senecio erucifolius					4	1	4	4	4	1
Senecio jacobaea	1			1						
Taraxacum agg.						6	6	5	5	6
Tragopogon pratensis		1								
Trifolium dubium	1									
Trifolium pratense						4	4	5	4	7
Trifolium repens	2			4				2	3	2
Vicia sativa			2	4	2					
Vicia tetrasperma	3	3	4	2	3	1			1	

Quadrat number	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Grid reference	TL130592 2183	TL130632 2207	TL135042 1796	TL136612 1688	TL135912 1750	TL130652 2126	TL130762 2126	TL130912 2118	TL130982 2128	TL131202 2134
NVC community	MG1b	MG1b	MG1b	MG1b	MG1b	MG6c	MG6c	MG6c	MG6c	MG6c
Agrostis capillaris						3			1	1
Arrhenatherum elatius	9	9	5	6	7	2	1	1	1	
Bellis perennis						1	1	1		2
Centaurea nigra						6	4	5	5	4
Cerastium fontanum							3	3	2	3
Cirsium arvense	3	2	1		2					
Crataegus monogyna										1
Crepis capillaris						1				
Cynosurus cristatus								2	2	3
Dactylis glomerata				4		1				2
Dactylorhiza fuchsii										
Daucus carota									2	4
Epilobium tetragonum						2				
Festuca rubra				4	3	3	3	4	3	4
Galium aparine	3	5	7	2	2					
Geranium dissectum			2	4	1	3			1	
Heracleum sphondylium	4	4		4	5	1				
Holcus lanatus				5		2				
Hypericum perforatum							4	5	2	1
Lamium album	5			2	3					
Linum catharticum						2			2	2
Medicago lupulina						4	7	5	6	7
Myosotis arvensis						3				
Odontites vernus		1						1		1
Phleum bertolonii						3	3	2	3	4
Pilosella officinarum								4	6	7
Plantago lanceolata						5	6	3	2	2
Plantago media							4	5	1	1
Poa angustifolia								2	2	
Poa humilis						2			1	2
Poa trivialis	3	3	5	3	3		3			
Prunella vulgaris						4		4	3	
Ranunculus acris						4	2	4	1	
Rosa sp. (seedling)							1			
Rumex obtusifolius	1									
Scorzoneroides autumnalis						1				
Senecio jacobaea						4	3	2	1	1
Taraxacum agg.							1			
Trifolium pratense									1	2
Trifolium repens							4	3	2	
Trisetum flavescens						4	3	3	3	4
Urtica dioica	2	4	7	6	4					
Veronica arvensis						2				
LITTER	4	4								
BARE GROUND									4	

Quadrat number	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Grid reference	TL134542 1783	TL134362 1780	TL134462 1760	TL134562 1761	TL134632 1744	TL134942 1637	TL134962 1625	TL135062 1590	TL135052 1470	TL135102 1454
NVC community	MG1	MG1	MG1	MG1	MG1	MG1b	MG1b	MG1b	MG1b	MG1b
Anisantha sterilis				1	2				1	
Arrhenatherum elatius	8	9	9	8	9	9	9	5	4	6
Artemisia vulgaris								1		
Brachythecium rutabulum					2					
Bromus hordeaceus			2	3					3	
Cerastium fontanum					1					
Chaerophyllum temulum				5					1	
Chamerion angustifolium						5			8	7
Cirsium arvense	1		2		3	1	1		2	4
Clematis vitalba	4	4	4	1	5					
Clinopodium vulgare	3			4						
Conium maculatum										4
Crataegus monogyna					1					
Daucus carota	4		4	2	3					
Epilobium hirsutum								8		
Epilobium parviflorum	2			2	1					
Epilobium tetragonum	2		1		2		2		2	
Galium aparine		2		1	1		2	2	2	4
Geranium dissectum	4	4	3	1	1		1			
Geranium molle			1	1						
Helminthotheca echioides	4			2	2					
Heracleum sphondylium									2	
Holcus lanatus	2	1							5	1
Medicago lupulina	1				2					
Myosotis arvensis	1			1	1			2	3	
Oxyrrhynchium hians	4	3	3	2	3					
Plantago lanceolata					1					
Poa trivialis	4	3	3	4	3		2	4	4	2
Prunus spinosa									4	
Rubus fruticosus agg.				2				4		
Rumex crispus									4	
Rumex obtusifolius					1					
Sambucus nigra			1							
Senecio erucifolius					2		2	4	4	
Senecio jacobaea	2	1	3	3						
Taraxacum agg.	1									
Torilis japonica					1					
Urtica dioica			1		1	1	4	4	3	5
Veronica arvensis	1									
Veronica persica	1									
Vicia sativa	1		1	1						
Vicia tetrasperma		2	2							
LITTER	5	5	5	6	4	4	4	4		

Quadrat number	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Grid reference	TL138622 1580	TL138932 1558	TL139392 1547	TL140662 1539	TL141232 1565	TL142702 1705	TL142482 1717	TL142362 1726	TL142082 1746	TL141842 1764
NVC community	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Agrostis stolonifera	2	2							2	
Anisantha sterilis					2	2	1			1
Arrhenatherum elatius		2	4	7	2	5	4	4		5
Brachythecium rutabulum							5	4	4	4
Bromus hordeaceus				2	3	4	4	5	5	4
Carpinus betulus	4		4						1	
Cerastium fontanum							1	1		
Cirsium arvense	5	4	6	4	4	4	4	5	6	5
Cirsium vulgare	1		4		2	4				1
Clematis vitalba				1	4					
Clinopodium vulgare			1	2						
Conium maculatum				1						
Convolvulus arvensis										4
Corylus avellana							4			1
Crataegus monogyna	1			1						
Dactylis glomerata	8	7			8	4		4	4	
Epilobium parviflorum								1	1	2
Epilobium sp. (seedling)	1				1					
Epilobium tetragonum			1			1	1	2		2
Erigeron acris						2				
Galium aparine	1		1	2	1				1	1
Geranium dissectum	1	3	3	3	4	3	4	3	4	3
Geranium molle										
Helminthotheca echioides		1	1	2		4		5	1	5
Heracleum sphondylium						1			1	1
Holcus lanatus	6	4	7	5	5		5			
Hypochaeris radicata						1				
Inula conyzae						4				
Lolium multiflorum								5	6	
Lolium perenne										3
Myosotis arvensis			1	1	1	3	2	3	2	
Odontites vernus				3			1			
Plantago major								1		
Poa trivialis	4	6	4	4	4	6	5	6	5	6
Prunella vulgaris				1						
Prunus spinosa			1	4			1		4	1
Quercus robur						4			1	
Ranunculus repens						4		4		
Rosa sp. (seedling)				1						
Rubus fruticosus agg.	1	5		1	1					
Rumex crispus						1			1	1
Rumex obtusifolius	1	4	1	1	1					
Rumex sanguineus							3			
Scorzoneroides autumnalis					1	1				
Senecio erucifolius				1	4	5	4	4		
Senecio jacobaea					1	1		1	2	1
Sherardia arvensis								4		2
Taraxacum agg.				1		1	1	1	1	1
Tragopogon pratensis				1						
Trifolium pratense					1				1	
Urtica dioica	1	3	4	1	2					
Vicia tetrasperma	3	4	5	5	4		1	4	3	
LITTER								4		2
BARE GROUND		4		4	4	4	4			

Quadrat number		**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Grid reference		TL133662 1985	TL133332 1992	TL133122 2004	TL135662 1915	TL135272 1930	TL136692 1312	TL136332 1320	TL135872 1319	TL135542 1316	TL134712 1326
NVC community	Structural unit	W8	W8	W8	W8	W8	W10	W10	W10	W10	W10
Acer campestre	Understory	4		8	5	4					
Arrhenatherum elatius											1
Betula pubescens	Canopy						7	7	8	8	8
Betula sp.	Canopy	4									
Betula sp.	Field layer						2	1	2	2	
Brachythecium rutabulum			2					3	4		3
Carpinus betulus	Canopy	5	7		8	7					
Carpinus betulus	Field layer									1	1
Carpinus betulus	Understory						4			4	
Chaerophyllum temulum					1	4					
Conopodium majus						4					
Corylus avellana	Understory	5		5		1	4	4	4	5	4
Crataegus monogyna	Field layer						2	2	2	3	
Crataegus monogyna	Understory	2		4		4		1	4		
Dactylis glomerata					1						
Deschampsia cespitosa											4
Dicranella heteromalla				3							
Fraxinus excelsior	Canopy		4	4	4	5					
Fraxinus excelsior	Field layer				2		2	2	2	2	
Fraxinus excelsior	Understory								4	1	
Galium aparine		4	2	4		5	3	3		2	4
Geranium robertianum		4	5								
Glechoma hederacea									3		6
Hedera helix	Canopy		4	4	5	4					
Hedera helix	Field layer	3	2	4	4	4					
Holcus lanatus							2	4	3		2
Hyacinthoides non-scripta		4	3	7	4	4	6	6	4	4	5
Hypnum cupressiforme agg.								3	3		
Ilex aquifolium	Canopy		5	4							
Ilex aquifolium	Understory	4	5		5	5	1		1	1	1
Juncus effusus							1			1	
Kindbergia praelonga		4	4	4		2	3	3	5	2	3
Lamiastrum galeobdolon		8	8	4			2		6	2	4
LITTER		4	5		8	5	6	4	6	6	5
Lonicera periclymenum	Field layer						7	4		4	6
Lonicera periclymenum	Understory						1	4		2	1
Lophocolea bidentata								2			
Milium effusum		4	5	6	2	4					
Mnium hornum			2				2				
Moehringia trinervia		2	4			4	1	4	4	4	
Poa trivialis					4	2	3	4	2	1	4
Prunus avium	Canopy	7	7		4	5					
Prunus avium	Field layer					1					
Prunus avium	Understory			4		1					
Prunus laurocerasus	Understory					4					
Prunus spinosa	Field layer							2		2	
Prunus spinosa	Understory					2	4	5	6	4	1
Pteridium aquilinum								7	4	5	2
Quercus robur	Canopy	6	4	7		4	8	6	4	5	6
Rosa canina	Understory							1			
Rubus fruticosus agg.		5	4	5		1	2	6	5	4	6
Rumex sanguineus					1						
Salix caprea	Canopy							5		4	
Sambucus nigra	Field layer		1								
Sambucus nigra	Understory	4	5	4	2		2	4		2	1
Schedonorus giganteus											1
Stachys sylvatica										1	
Stellaria holostea											4
Stellaria media						5					
Taraxacum agg.					1						
Ulex europaeus	Understory								1		
Urtica dioica			1		4						

Quadrat number		**51**	**52**	**53**	**54**	**55**	**56**
Grid reference		TL134622 1369	TL135122 1377	TL135412 1381	TL136182 1357	TL135922 1371	TL142782 1684
NVC community	Structural unit	W8-W10	W8-W10	W8-W10	W8-W10	W8-W10	W8
Acer campestre	Canopy		5			1	
Acer campestre	Field layer	1	1		1		
Acer campestre	Understory						5
Anthriscus sylvestris							1
BARE GROUND		8	7				7
Betula pendula	Canopy			5	5	1	
Betula pendula	Field layer				1		
Brachythecium rutabulum					2	2	2
Bryonia dioica							1
Carpinus betulus	Canopy	10	9	9	7	8	
Carpinus betulus	Field layer	1	4		3	4	
Corylus avellana	Understory		4		4		5
Crataegus monogyna	Field layer		1		1	1	
Crataegus monogyna	Understory	4		5	4	4	
Dactylis glomerata							1
Dicranum montanum						3	
Elymus caninus							2
Fraxinus excelsior	Canopy		4		5	6	7
Fraxinus excelsior	Field layer					2	
Galium aparine			1		1		
Geranium robertianum					1		
Holcus lanatus		2					
Hyacinthoides non-scripta		6	8	9	9	9	3
Hypnum cupressiforme agg.							3
Hypnum cupressiforme var. cupressiforme		2	2	2	3	3	
Ilex aquifolium	Field layer				1		
Isothecium myosuroides						3	
Kindbergia praelonga		4		3	2	2	3
Lamium album							1
LITTER				5	6	5	
Mercurialis perennis							5
Metzgeria furcata						2	
Mnium hornum						2	
Moehringia trinervia		1	2				
Orthotrichum affine						2	2
Orthotrichum diaphanum							3
Oxyrrhynchium hians							3
Poa trivialis		2	2				2
Prunus avium	Canopy			4			
Prunus spinosa	Understory						5
Quercus robur	Canopy				4		7
Rubus fruticosus agg.			1	4			
Rumex sanguineus							2
Sambucus nigra	Understory	4	4		4	2	1
Urtica dioica							2

APPENDIX II. NVC FIELD DATA – WIGMORE PARK CWS

Quadrat number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Grid reference	TL 12648 21710	TL 12646 21699	TL 12648 21693	TL 12714 21623	TL 12705 21631	TL 12717 21652	TL 12687 21644	TL 12669 21583	TL 12617 21541	TL 12595 21510
NVC community/ vegetation name	Herb-rich CG	Herb-rich CG	Herb-rich CG	Herb-rich CG	Herb-rich CG	Herb-rich NG	Herb-rich NG	Herb-rich NG	Herb-rich NG	Herb-rich NG
Achillea millefolium		1		6					4	
Agrimonia eupatoria							2	2		
Agrostis capillaris	2						3	3		
Agrostis stolonifera	3	2	2	3		3			4	4
Anthriscus sylvestris								1		
Bellis perennis				2		1				
Brachythecium rutabulum		3	4							
Bromopsis erecta				2						
Calliergonella cuspidata	4	3	3							
Carex flacca	4	5	3	5						
Centaurea nigra			1				6	6		5
Cerastium fontanum	1	1				2			1	
Cirsium arvense	1		1	4					1	1
Clinopodium vulgare									1	
Crataegus monogyna	1	1	2			3		2		
Dactylis glomerata	2	1	1	5	4	6	4	4	5	2
Dactylorhiza fuchsii				1	4			1		
Daucus carota				5		3	4	4	2	1
Festuca rubra	4	6	5	4	5	4	4	3	3	4
Geranium dissectum									1	4
Helminthotheca echioides						1			4	3
Heracleum sphondylium	2	1	2	1			2			
Holcus lanatus	3	4	2	2		2	1	2	2	
Hypericum perforatum				4	4		1	2		
Lathryus pratensis						1				
Linum catharticum	3	3	3	2			1			
Lotus corniculatus	8	5	9	2	7	8	7	8	6	8
Medicago lupulina		1		5		4	4	4	5	5
Odontites vernus									1	
Pastinaca sativa ssp. sylvestris								2	7	1
Phleum bertolonii		2		3						
Plantago lanceolata	2	2	1	4	4	3	4	2	4	4
Poa angustifolia					2					
Poa humilis						2	2			
Poa trivialis				2	3	3		3	3	2
Potentilla reptans				3					3	
Prunella vulgaris	2	3	1		2	1				
Quercus robur		1								
Ranunculus bulbosus		1	4	2		2	4		1	
Ranunculus repens		1								
Rosa sp. (seedling)	1	2					1	2		
Rubus fruticosus agg.	1	1	3		4	4	4	4	4	
Scabiosa columbaria				2	6					
Scorzoneroides autumnalis				2						
Senecio erucifolius		1				3	1	2	3	1
Senecio jacobaea	2	1			1	3			1	
Sonchus asper										1
Taraxacum agg.				4	3	4		2	1	2
Tragopogon pratensis				1						
Trifolium pratense				1						
Trifolium repens	2	5	3							
Trisetum flavescens			1			1				
Veronica serpyllifolia	1									
Viburnum opulus		1								
Vicia sativa						4		2	1	2
Vicia tetrasperma									3	4

Quadrat number	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Grid reference	TL 12557 21730	TL 12415 21813	TL 12449 21802	TL 12825 21690	TL 12512 21814	TL 12449 21742	TL 12350 21919	TL 12446 21777	TL 12401 21829	TL 12518 21632
NVC community/ vegetation name	MG1d	MG1b	Herb-rich NG	Herb-rich NG	MG1a	Agr stol - Pot rept gsld	MG1a	MG1	W24a	MG1e
Acer campestre		1								
Achillea millefolium	3			5			2	1		
Agrostis capillaris					2					
Agrostis stolonifera	4					8				5
Anthriscus sylvestris								2		
Arrhenatherum elatius	7	7	2	2	8		8	8		4
Bellis perennis			1							
Brachythecium rutabulum				2	3					
Bromus hordeaceus			4							
Calliergonella cuspidata						4		3		
Cardamine hirsuta		3							3	
Centaurea nigra						4				7
Cerastium fontanum				1						
Chaerophyllum temulum									4	
Cirsium arvense	4	1			5		4		4	4
Convolvulus arvensis							4			
Cornus sanguinea							1			
Crataegus monogyna				1						
Dactylis glomerata	4	4		6	4			4		4
Daucus carota			4	5		1		2		1
Festuca rubra			2				5	2		4
Ficaria verna								3		
Galium aparine		4						2	4	4
Geranium dissectum	3		4			3	4	2		
Helminthotheca echioides							2	2		
Heracleum sphondylium		1	2		5			4		
Holcus lanatus	3			4		5	3			4
Lamium album		1								
Lathyrus nissolia			1			3		3		
Lathryus pratensis							3			5
Leucanthemum vulgare			7					5		
Medicago lupulina			3	5						4
Odontites vernus				1		3				1
Pastinaca sativa ssp. sylvestris	7			1			4			2
Plantago lanceolata			4		4	2	1	4		4
Poa angustifolia			5		4					
Poa humilis						4				
Poa trivialis	3						4	3	4	
Potentilla reptans						6	2			
Pseudoscleropodium purum				2						
Ranunculus repens						2	1			
Rosa sp. (seedling)			1				1			
Rubus fruticosus agg.				4	1				9	
Schedonorus arundinaceus				6						
Senecio erucifolius					1	3		1		4
Senecio jacobaea			1							
Sonchus arvensis										2
Stellaria holostea								2		
Taraxacum agg.							1			
Trifolium dubium			4							
Trifolium repens						4				
Urtica dioica		8								
Veronica hederifolia									2	
Vicia cracca							4	2		
Vicia hirsuta			2			3				
Vicia sativa			5	4	1	3	4	5		

Quadrat number		**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
Grid reference		TL 12544 21628	TL 12778 21848	TL 12796 21855	TL 12772 21629	TL 12781 21577	TL 12710 21679	TL 12517 21657	TL 12619 21479	TL 12485 21674
NVC community/ vegetation name	Structural unit	OV28	W21	W8d	W24	MG1b	OV23	OV24	OV24	MG1e
Acer campestre	Understory			4						
Achillea millefolium					1		6			
Agrostis stolonifera		10					5			
Alliaria petiolata						1				
Amblystegium serpens			2							
Anthriscus sylvestris						5				
Arrhenatherum elatius						7		3		4
Artemisia vulgaris					6					
Arum maculatum			1	4						
Bellis perennis							4			
Brachythecium rutabulum		4	4	4				3		4
Calystegia sepium					4					
Cardamine hirsuta								3		
Centaurea nigra							1			
Cerastium fontanum		1								
Cirsium arvense					4	4		4		
Clinopodium vulgare					2					
Cololejeunea minutissima			3							
Conium maculatum								5		
Corylus avellana	Understory			7						
Crataegus monogyna	Canopy		9							
Crataegus monogyna	Understory			6						
Cryphaea heteromalla			2							
Dactylis glomerata							4			2
Daucus carota										2
Drepanocladus aduncus		2								
Epilobium hirsutum								4		
Epilobium sp. (seedling)		1								
Festuca rubra							5			5
Ficaria verna				2						
Fraxinus excelsior	Canopy			5						
Fraxinus excelsior	Understory			4						
Frullania dilatata			1							
Galium aparine			3	4		3		2	5	
Geranium dissectum		4								
Glechoma hederacaea									2	
Helminthotheca echioides					2					
Heracleum sphondylium						6		1		4
Holcus lanatus							2			
Hyacinthoides non-scripta			1	6						
Hypericum perforatum										4
Hypnum cupressiforme agg.			3							
Kindbergia praelonga			5	5				4	5	
Lamium album						5				
Lepidium draba					7					
Lolium perenne							4			
Lotus corniculatus										8
Medicago lupulina							4			
Mercurialis perennis			5	2						
Metzgeria furcata			2							
Myosotis arvensis			2	1					2	1
Odontites vernus		1								
Orthotrichum affine			3							
Pastinaca sativa ssp. sylvestris					4					
Phleum bertolonii							4			
Plantago lanceolata		4			2		4			4
Plantago major							1			
Poa angustifolia										2
Poa humilis										
Poa trivialis					4		3	2	2	
Potentilla reptans							4			
Prunus spinosa	Understory		5	4						

Quadrat number		**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
Grid reference		TL 12544 21628	TL 12778 21848	TL 12796 21855	TL 12772 21629	TL 12781 21577	TL 12710 21679	TL 12517 21657	TL 12619 21479	TL 12485 21674
NVC community/ vegetation name	Structural unit	OV28	W21	W8d	W24	MG1b	OV23	OV24	OV24	MG1e
Quercus robur	Canopy			7						
Ranunculus repens		4								
Rhynchostegium confertum			2							
Rubus fruticosus agg.					6				4	
Salix caprea	Canopy		5							
Sambucus nigra	Understory			1						
Scorzoneroides autumnalis							4			
Senecio jacobaea							1			
Senecio vulgaris				1						
Sinapis arvensis				2						
Sonchus asper				4	1					
Stachys sylvatica						4				
Taraxacum agg.							2			1
Tragopogon pratensis										3
Tussilago farfara										4
Ulota bruchii			2							
Urtica dioica			8		4	1		10	9	
Veronica arvensis							3			
Veronica chamaedrys					1					
Vicia sativa		1								1
Vicia tetrasperma					2	3				

APPENDIX III. ALL SPECIES RECORDED DURING NVC SURVEYS

Scientific name	English name
Higher plants	
Acer campestre	Field Maple
Achillea millefolium	Yarrow
Agrimonia eupatoria	Agrimony
Agrostis capillaris	Common Bent
Agrostis stolonifera	Creeping Bent
Alliaria petiolata	Garlic Mustard
Alopecurus pratensis	Meadow Foxtail
Anisantha sterilis	Barren Brome
Anthriscus sylvestris	Cow Parsley
Aphanes arvensis	Parsley-piert
Arrhenatherum elatius	False Oat-Grass
Artemisia vulgaris	Mugwort
Arum maculatum	Lords-and-Ladies
Bellis perennis	Daisy
Betula pendula	Silver Birch
Betula pendula x B. pubescens	a hybrid birch
Betula pubescens	Downy Birch
Brachypodium sylvaticum	False-brome
Bromopsis erecta	Upright Brome
Bromus hordeaceus	Soft-brome
Bryonia dioica	White Bryony
Calystegia sepium	Hedge Bindweed
Capsella bursa-pastoris	Shepherd's-purse
Cardamine hirsuta	Hairy Bitter-cress
Carex flacca	Glaucous Sedge
Carex sylvatica	Wood-sedge
Carpinus betulus	Hornbeam
Centaurea nigra	Common Knapweed
Centaurea scabiosa	Greater Knapweed
Cerastium fontanum	Common Mouse-ear
Chaerophyllum temulum	Rough Chervil
Chamerion angustifolium	Rosebay Willowherb
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Clematis vitalba	Traveller's-joy
Clinopodium vulgare	Wild Basil
Conium maculatum	Hemlock
Conopodium majus	Pignut
Convolvulus arvensis	Field Bindweed
Cornus sanguinea	Dogwood
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Crepis capillaris	Smooth Hawk's-beard
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Dactylorhiza fuchsii	Common Spotted-orchid
Daucus carota	Carrot
Deschampsia cespitosa	Tufted Hair-grass
Elymus caninus	Bearded Couch
Epilobium hirsutum	Great Willowherb

Scientific name	English name
Epilobium parviflorum	Hoary Willowherb
Epilobium tetragonum	Square-stalked Willowherb
Erigeron acris	Blue Fleabane
Festuca rubra	Red Fescue
Ficaria verna	Lesser Celandine
Fraxinus excelsior	Ash
Galium aparine	Cleavers
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Geranium robertianum	Herb-Robert
Glechoma hederacea	Ground-ivy
Hedera helix	Common Ivy
Helminthotheca echioides	Bristly Oxtongue
Heracleum sphondylium	Hogweed
Holcus lanatus	Yorkshire-fog
Hyacinthoides non-scripta	Bluebell
Hypericum perforatum	Perforate St John's-wort
Hypochaeris radicata	Cat's-ear
Ilex aquifolium	Holly
Inula conyzae	Ploughman's-spikenard
Juncus conglomeratus	Compact Rush
Juncus effusus	Soft-rush
Lamiastrum galeobdolon subsp. montanum	Yellow Archangel
Lamium album	White Dead-nettle
Lathyrus nissolia	Grass Vetchling
Lathyrus pratensis	Meadow Vetchling
Lepidium draba	Hoary Cress
Leucanthemum vulgare	Oxeye Daisy
Linum catharticum	Fairy Flax
Lolium multiflorum	Italian Rye-grass
Lolium perenne	Perennial Rye-grass
Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird’s-foot-trefoil
Medicago lupulina	Black Medick
Mercurialis perennis	Dog's Mercury
Milium effusum	Wood Millet
Moehringia trinervia	Three-nerved Sandwort
Myosotis arvensis	Field Forget-me-not
Odontites vernus	Red Bartsia
Ophrys apifera	Bee Orchid
Pastinaca sativa subsp. sylvestris	Wild Parsnip
Phleum bertolonii	Smaller Cat's-tail
Pilosella officinarum	Mouse-ear-hawkweed
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Plantago media	Hoary Plantain
Poa angustifolia	Narrow-leaved Meadow-grass
Poa humilis	Spreading Meadow-grass
Poa trivialis	Rough Meadow-grass
Potentilla reptans	Creeping Cinquefoil
Prunella vulgaris	Selfheal
Prunus avium	Wild Cherry
Prunus laurocerasus	Cherry Laurel

Scientific name	English name
Prunus spinosa	Blackthorn
Pteridium aquilinum	Bracken
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus repens	Creeping Buttercup
Rosa canina	Dog-rose
Rubus fruticosus agg.	Bramble
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Salix caprea	Goat Willow
Sambucus nigra	Elder
Scabiosa columbaria	Small Scabious
Schedonorus arundinaceus	Tall Fescue
Schedonorus giganteus	Giant Fescue
Scorzoneroides autumnalis	Autumn Hawkbit
Senecio erucifolius	Hoary Ragwort
Senecio jacobaea	Common Ragwort
Senecio vulgaris	Groundsel
Sherardia arvensis	Field Madder
Silene latifolia	White Campion
Sinapis arvensis	Charlock
Solanum dulcamara	Bittersweet
Sonchus arvensis	Perennial Sowthistle
Sonchus asper	Prickly Sowthistle
Stachys sylvatica	Hedge Woundwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Symphytum x uplandicum	Russian Comfrey (S. asperum x officinale)
Taraxacum agg.	Dandelion
Torilis japonica	Upright Hedge-parsley
Tragopogon pratensis	Goat's-beard
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Trisetum flavescens	Yellow Oat-grass
Tussilago farfara	Colt's-foot
Ulex europaeus	Gorse
Urtica dioica	Common Nettle
Veronica arvensis	Wall Speedwell
Veronica chamaedrys	Germander Speedwell
Veronica hederifolia	Ivy-leaved Speedwell
Veronica persica	Common Field-speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Viburnum opulus	Guelder-rose
Vicia cracca	Tufted Vetch
Vicia hirsuta	Hairy Tare
Vicia sativa	Common Vetch
Vicia tetrasperma	Smooth Tare
Viola hirta	Hairy Violet
Mosses and liverworts	

Scientific name	English name
Amblystegium serpens	Creeping Feather-moss
Brachythecium rutabulum	Rough-stalked Feather-moss
Calliergonella cuspidata	Pointed Spear-moss
Cololejeunea minutissima	Minute Pouncewort
Cryphaea heteromalla	Lateral Cryphaea
Dicranella heteromalla	Silky Forklet-moss
Dicranum montanum	Mountain Fork-moss
Drepanocladus aduncus	Knieff's Hook-moss
Frullania dilatata	Dilated Scalewort
Hypnum cupressiforme	Cypress-leaved Plait-moss
Hypnum cupressiforme agg.	
Isothecium myosuroides	Slender Mouse-tail Moss
Kindbergia praelonga	Common Feather-moss
Lophocolea bidentata	Bifid Crestwort
Metzgeria furcata	Forked Veilwort
Mnium hornum	Swan's-neck Thyme-moss
Orthotrichum affine	Wood Bristle-moss
Orthotrichum diaphanum	White-tipped Bristle-moss
Oxyrrhynchium hians	Swartz's Feather-moss
Pseudoscleropodium purum	Neat Feather-moss
Rhynchostegium confertum	Clustered Feather-moss
Ulota bruchii	Bruch's Pincushion

APPENDIX IV. ALL SPECIES RECORDED IN ARABLE PLANT SURVEYS

Scientific name	English name
Achillea millefolium	Yarrow
Aethusa cynapium	Fool's Parsley
Agrostis capillaris	Common Bent
Agrostis gigantea	Black Bent
Agrostis stolonifera	Creeping Bent
Alliaria petiolata	Garlic Mustard
Alopecurus myosuroides	Black-grass
Anagallis arvensis	Scarlet Pimpernel
Anisantha diandra	Great Brome
Anisantha sterilis	Barren Brome
Anthemis austriaca	Austrian Chamomile
Anthemis cotula	Stinking Chamomile
Anthoxanthum odoratum	Sweet Vernal-grass
Anthriscus sylvestris	Cow Parsley
Anthyllis vulneraria	Kidney Vetch
Aphanes arvensis	Parsley-piert
Arabidopsis thaliana	Thale Cress
Arctium minus	Lesser Burdock
Arrhenatherum elatius	False Oat-Grass
Artemisia vulgaris	Mugwort
Atriplex patula	Common Orache
Atriplex prostrata	Spear-leaved Orache
Avena fatua	Wild-oat
Ballota nigra	Black Horehound
Barbarea intermedia	Medium-flowered Winter-cress
Bellis perennis	Daisy
Brachypodium sylvaticum	False-brome
Brassica napus subsp. oleifolia	Oil-seed Rape
Briza minor	Lesser Quaking-grass
Bromus hordeaceus	Soft-brome
Bromus hordeaceus subsp. hordeaceus	Soft-brome
Bromus hordeaceus subsp. longipedicellatus	Soft-brome
Bromus secalinus	Rye Brome
Bryonia dioica	White Bryony
Capsella bursa-pastoris	Shepherd's-purse
Cardamine hirsuta	Hairy Bitter-cress
Carduus crispus	Welted Thistle
Centaurea cyanus	Cornflower
Centaurea nigra	Common Knapweed
Centaurea scabiosa	Greater Knapweed
Cerastium fontanum	Common Mouse-ear
Chaerophyllum temulum	Rough Chervil
Chamerion angustifolium	Rosebay Willowherb
Chenopodium album	Fat-hen
Chenopodium polyspermum	Many-seeded Goosefoot
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Clematis vitalba	Traveller's-joy
Clinopodium vulgare	Wild Basil
Conium maculatum	Hemlock
Convolvulus arvensis	Field Bindweed

Scientific name	English name
Cornus sanguinea	Dogwood
Crepis capillaris	Smooth Hawk's-beard
Crepis vesicaria	Beaked Hawk's-beard
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Daucus carota	Carrot
Dipsacus fullonum	Wild Teasel
Elytrigia repens	Common Couch
Epilobium ciliatum	American Willowherb
Epilobium hirsutum	Great Willowherb
Epilobium montanum	Broad-leaved Willowherb
Epilobium parviflorum	Hoary Willowherb
Epilobium tetragonum	Square-stalked Willowherb
Epilobium x brevipilum	E. hirsutum x tetragonum
Euphorbia exigua	Dwarf Spurge
Fallopia convolvulus	Black-bindweed
Festuca ovina	Sheep's-fescue
Festuca rubra	Red Fescue
Filago vulgaris	Common Cudweed
Fraxinus excelsior	Ash
Fumaria officinalis	Common Fumitory
Fumaria vaillantii	Few-flowered Fumitory
Galium album	Hedge Bedstraw
Galium aparine	Cleavers
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Geranium pyrenaicum	Hedgerow Crane's-bill
Geranium rotundifolium	Round-leaved Crane's-bill
Geum urbanum	Wood Avens
Glebionis segetum	Corn Marigold
Hedera helix	Common Ivy
Helminthotheca echioides	Bristly Oxtongue
Heracleum sphondylium	Hogweed
Holcus lanatus	Yorkshire-fog
Hordeum secalinum	Meadow Barley
Hypochaeris radicata	Cat's-ear
Kickxia spuria	Round-leaved Fluellen
Knautia arvensis	Field Scabious
Lactuca serriola	Prickly Lettuce
Lactuca virosa	Great Lettuce
Lamium album	White Dead-nettle
Lamium purpureum	Red Dead-nettle
Lapsana communis	Nipplewort
Lathyrus pratensis	Meadow Vetchling
Leontodon hispidus	Rough Hawkbit
Lepidium coronopus	Swine-cress
Leucanthemum vulgare	Oxeye Daisy
Lolium multiflorum	Italian Rye-grass
Lolium perenne	Perennial Rye-grass
Lotus corniculatus	Common Bird's-foot-trefoil
Malva moschata	Musk-mallow
Malva neglecta	Dwarf Mallow

Scientific name	English name
Malva setigera	Rough Marsh-mallow
Malva sylvestris	Common Mallow
Matricaria discoidea	Pineappleweed
Medicago lupulina	Black Medick
Myosotis arvensis	Field Forget-me-not
Odontites vernus	Red Bartsia
Papaver rhoeas	Common Poppy
Persicaria lapathifolia	Pale Persicaria
Persicaria maculosa	Redshank
Phleum bertolonii	Smaller Cat's-tail
Phleum pratense	Timothy
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Plantago media	Hoary Plantain
Poa annua	Annual Meadow-grass
Poa trivialis	Rough Meadow-grass
Polygonum aviculare	Knotgrass
Primula veris	Cowslip
Prunella vulgaris	Selfheal
Prunus spinosa	Blackthorn
Pteridium aquilinum	Bracken
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus repens	Creeping Buttercup
Raphanus raphanistrum subsp. raphanistrum	Wild Radish
Reseda lutea	Wild Mignonette
Reseda luteola	Weld
Rhinanthus minor	Yellow-rattle
Rubus fruticosus agg.	Bramble
Rumex acetosa	Common Sorrel
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Scorzoneroides autumnalis	Autumn Hawkbit
Senecio erucifolius	Hoary Ragwort
Senecio jacobaea	Common Ragwort
Senecio squalidus	Oxford Ragwort
Senecio vulgaris	Groundsel
Sherardia arvensis	Field Madder
Silene dioica	Red Campion
Silene flos-cuculi	Ragged-Robin
Silene latifolia	White Campion
Sinapis arvensis	Charlock
Sisymbrium officinale	Hedge Mustard
Solanum dulcamara	Bittersweet
Sonchus arvensis	Perennial Sow-thistle
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Stellaria media	Common Chickweed
Symphytum officinale	Common Comfrey
Taraxacum agg.	Dandelion

Scientific name	English name
Torilis japonica	Upright Hedge-parsley
Tragopogon pratensis	Goat's-beard
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Tripleurospermum inodorum	Scentless Mayweed
Trisetum flavescens	Yellow Oat-grass
Ulmus procera	English Elm
Urtica dioica	Common Nettle
Veronica arvensis	Wall Speedwell
Veronica chamaedrys	Germander Speedwell
Veronica persica	Common Field-speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Vicia faba	Broad Bean
Vicia tetrasperma	Smooth Tare
Viola arvensis	Field Pansy
Viola hirta	Hairy Violet
Vulpia bromoides	Squirreltail Fescue
Vulpia myuros	Rat's-tail Fescue

Appendix BB

BB1 Terrestrial Invertebrate Survey Report

LONDON LUTON AIRPORT INVERTEBRATES: FURTHER SURVEY IN 2021

MARK G. TELFER

19TH NOVEMBER 2021

THIS REPORT WAS PRODUCED UNDER CONTRACT TO ARUP, ON BEHALF OF LONDON LUTON AIRPORT LIMITED

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Cover photograph: a view across a field (field F11) which has been taken out of arable cultivation and is developing a diverse, flower-rich sward, taken on 25th June 2021.

This report should be quoted as:

Telfer, M.G. (2021). *London Luton Airport invertebrates: further survey in 2021*. Report to Arup.

Contents

1 Summary

- An invertebrate survey of an area at London Luton Airport had previously been carried out by the author during 2018 and 2019. In view of delays to the Development Consent Order application and changes to the survey area, further invertebrate survey was required in 2021.
- This report describes that further invertebrate survey at London Luton Airport, for which fieldwork was conducted on 8th, 9th and 25th June 2021.
- The survey recorded 331 species of invertebrate, covering a very wide range of taxonomic groups.
- 21 species from the species list of 331 are here regarded as 'Key Species' (i.e., with rare, scarce, threatened or near threatened conservation status).
- No Dingy Skipper butterflies *Erynnis tages* were observed during targeted survey in Wigmore Valley Park nor in the adjacent Fields F9/F11. The Dingy Skipper population in the southern part of Wigmore Valley Park appears to have died out since 2019, and the butterfly has not colonised the increasingly suitable habitat within fields F9/F11.
- Fields F9, F11 and F13 were found to be areas of conservation importance for invertebrates at the county level, notably for the assemblage of 'short sward & bare ground' species.
- The large compost heap in the south-eastern corner of field F11 was found to be a low quality habitat for invertebrates.
- The spoil banks at Winch Hill Farm were found to be an important habitat for 'short sward & bare ground' species, including the Vulnerable and Nationally Rare ground beetle *Scybalicus oblongiusculus*.
- The veteran Apple tree at Winch Hill Farm, along with the other younger and smaller Apple trees nearby, were assessed as of lesser importance for tree-associated invertebrates, relative to other trees, hedges and woodland in the eastern part of the survey area.
- The Luton Parkway Verges District Wildlife Site supports some habitat for 'short sward & bare ground' species but is a relatively low quality example of this habitat.
- Brief recommendations are made for each of the habitat areas and habitat features surveyed, to mitigate the impacts of proposed development on invertebrates.

2 Introduction

An invertebrate survey of the London Luton Airport survey area (delimited by the red line in Figure 1) had previously been carried out by the author during 2018 and 2019 (Telfer, 2019). This survey made an overall assessment that the survey area was a site of high importance for invertebrate conservation at the county level.

It is understood that subsequent progress towards applying for a Development Consent Order (DCO) has been delayed and that the application is now scheduled for submission in

summer 2022. The DCO application will now also include the link road that was formerly part of a separate application.

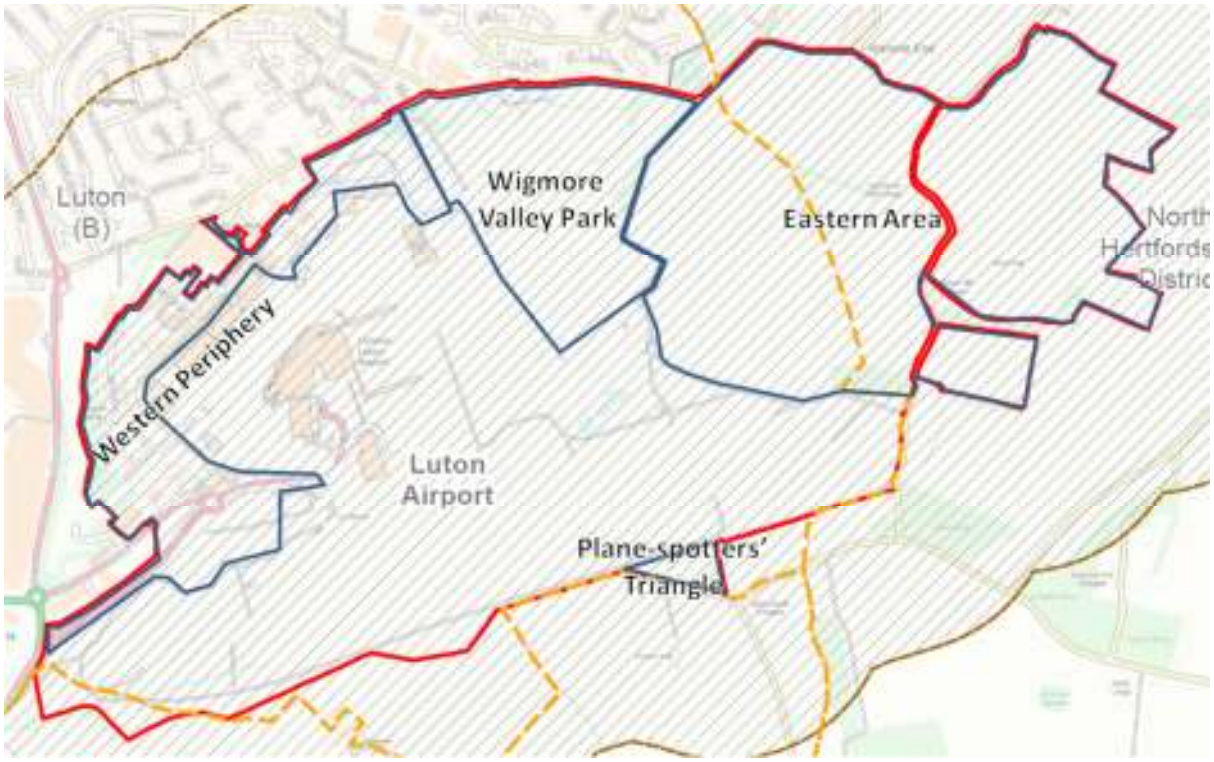

Figure 1: The 2018-19 survey area is delimited by the red line. (The subdivisions of the survey area (Western Periphery, Wigmore Valley Park, Eastern Area and Plane-spotters' Triangle) were drawn up for the 2018-19 invertebrate survey).

In 2021, a scoping survey was carried out by the author with fieldwork during Monday 17th and Wednesday 19th May (Telfer, 2021a). This aimed (i) to carry out a rapid walkover assessment of the 2018-19 survey area (Figure 1), including the whole of the Dairyborn Scarp District Wildlife Site (DWS)[1], to assess visually whether the invertebrate habitats and habitat features present had substantially changed since they were sampled in 2018-19; and (ii) to carry out an invertebrate scoping survey of Luton Parkway Verges DWS.

The scoping survey made the following recommendations for invertebrate survey work in 2021, repeated here from Telfer (2021a) as Sections 2.1. and 2.2. The recommendations make reference to three invertebrates which are Species of Principal Importance (SPI), and which are discussed further in Section 2.5.

2.1 SURVEY RECOMMENDATIONS: THE 2018-19 SURVEY AREA

A survey for Dingy Skipper butterfly *Erynnis tages* (see Section 2.5) should be carried out, covering the known area for this species in the southern part of Wigmore Valley Park. The aim would be to establish the continued presence of the species, and to compare the numbers found to the baseline from 2019 (Telfer, 2019).

[1] Details of the Dairyborn Scarp District Wildlife Site are available by application to the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre:
https://www.bedscape.org.uk/BRMC/newsite/index.php?c=sites_dws

The Dingy Skipper survey should be extended to cover a representative area of fields F9 and F11, in which suitable conditions for Dingy Skipper have been developing. The aim would be to establish whether Dingy Skipper has colonised this area, and if so to establish over what area the population may be found.

There should be further general invertebrate survey of the following:

- Fields F9 and F11, covering both the taller, uncut sward, and the shorter, cut sward. The aim here would be to survey for the presence of Set-aside Downy-back beetle *Ophonus laticollis* (see Section 2.5) and to assess the quality of the 'short sward & bare ground' invertebrate assemblage.
- Field F13, likewise aiming to survey for the presence of Set-aside Downy-back beetle *Ophonus laticollis* and to assess the quality of the 'short sward & bare ground' invertebrate assemblage.
- Compost heaps in the south-eastern corner of field F11, to make a general assessment of their invertebrate value.
- Spoil banks at Winch Hill Farm barns, to assess the quality of the 'short sward & bare ground' invertebrate assemblage.
- Veteran Apple tree at Winch Hill Farm, to survey for the presence of Noble Chafer beetle *Gnorimus nobilis* (see Section 2.5), and to assess the quality of the saproxylic invertebrate assemblage.

2.2 SURVEY RECOMMENDATIONS: LUTON PARKWAY VERGES DISTRICT WILDLIFE SITE

This DWS supports habitats of moderate potential to support invertebrate species and assemblages of conservation importance on the herb-rich grassland verges of the bus slipway, the herb-rich grassland verge of the Lower Harpenden Road, and within the scrub. These three habitat components should each be surveyed for invertebrates.

2.3 AIMS

This survey was commissioned in late May 2021 in order to carry out the recommendations of the scoping survey (Sections 2.1 and 2.2).

2.4 SURVEY AREAS IN 2021

2.4.1 Wigmore Valley Park

The approximate area of Dingy Skipper habitat at Wigmore Valley Park (WVP), as determined by the 2018-19 survey, is shown in Figure 2. The 2018-19 survey noted that a Key Habitat of the survey area generally was 'shorter, more flower-rich grassland swards', and that 'such grasslands occur in small patches in all parts of the survey area. The most important patch of this habitat was in the southern part of Wigmore Valley Park, where a population of Dingy Skipper was found.' Within this grassland area, there are numerous patches of Common Bird's-foot Trefoil *Lotus corniculatus*, the host plant of Dingy Skipper.

Figure 2: Dingy Skipper habitat in the south of WVP, indicated by the red outline. Map data ©2018 Google Imagery ©2018 , DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, The GeoInformation Group.

2.4.2 Fields F9, F11 and F13

These field code names were defined by the 2018-19 survey report and are indicated in Figure 3. All three fields lie within the 'Eastern Area' of the 2018-19 survey area (see Figure 1).

The scoping survey of May 2021 found that each of these fields had been taken out of cultivation in recent years and all were developing a diverse, herb-rich, more-or-less ruderal flora. In the case of fields F9 and F11, they have been sown with a range of wildflowers, and perhaps also planted with certain species. In the case of field F13, it was less clear whether it had been sown with flower seeds or had assembled a rather diverse flora by natural colonisation.

Most of fields F9 and F11 appear to be under management by cutting, perhaps only on an annual basis. These cut areas show some contrast with a smaller area which appears to be left uncut, e.g., Figure 4.

There is a very large compost heap in the south-eastern corner of F11, at the position indicated in Figure 3 (grid reference TL134215). The heap is presumed to be formed from the arisings from cutting fields F9 and F11, which have been collected and heaped up in this corner (Figure 5).

Figure 3: Areas surveyed in 2021, shown in orange. Map data ©2018 Google Imagery ©2018 DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, The GeoInformation Group.

Figure 4: Longer, uncut sward on the left, contrasting with shorter, cut sward on the right.

Figure 5: Compost heap in the south-eastern corner of field F11.

2.4.3 Winch Hill Farm

Spoil banks

At Winch Hill Farm, on the east side of the road, several large spoil banks have been created around the two old barns, presumably to discourage unauthorised vehicular access to this area. They are centred around grid reference TL13792176, and their position is also indicated in Figure 3. They are perhaps two years old and have developed into a fairly herb-rich habitat, typical of brownfield sites and areas of Open Mosaic Habitat, which can support rich and high quality invertebrate assemblages (Figure 6).

Figure 6: Spoil banks at Winch Hill Farm, with herb-rich ruderal vegetation.

Veteran Apple tree

West of the road, the old farmhouse and its periphery were securely fenced off during the 2018-19 survey while the house awaited demolition. The house has now been demolished and the area made safe and accessible. This enabled access to one veteran Apple tree stood within a small grove of elderly Elders (Figure 7), with extensive hollows within its trunk (Figure 8). The report of the 2018-19 survey noted the presence of this veteran Apple but was only able to survey several younger and smaller Apple trees, standing outside the security fence (Telfer, 2019).

Figure 7: The veteran Apple tree at Winch Hill Farm, surrounded by Elders.

Figure 8: One of several openings into the hollow trunk of the veteran Apple.

2.4.4 Luton Parkway Verges District Wildlife Site

The Luton Parkway Verges DWS is defined by a document and map from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre[2]. It covers a 0.36 ha area of neutral and calcareous grassland, either side of the slipway from Parkway Road onto the eastbound A1081 (Airport Way) (Figure 9), and on the northern side of Lower Harpenden Road (B653). The DWS also includes extensive areas of scrub with a variety of tree and shrub species, mostly broad-leaved species but including pine *Pinus* sp. This area lies entirely outside the red line survey area covered in 2018-19.

Figure 9: Flower-rich grassland beside the slipway from Parkway Road onto the A1081.

2.5 Species of Principal Importance

The survey work in 2021 included some targeted survey for three invertebrate Species of Principal Importance (SPI): Dingy Skipper butterfly *Erynnis tages*, Set-aside Downy-back beetle *Ophonus laticollis* and Noble Chafer beetle *Gnorimus nobilis*.

Species of Principal Importance are species listed in Section 41 of the Natural Environment and Rural Communities Act 2006 as being 'of principal importance for the purpose of conserving biodiversity'. They may also commonly be referred to as Section 41 species.

[2] https://www.bedscape.org.uk/BRMC/newsite/index.php?c=sites_dws

For each of the three SPI targeted by this survey, a brief account is given here outlining their ecology, distribution and conservation status, along with details of appropriate survey methodology.

2.5.1 *Erynnis tages* (Lepidoptera: Hesperiidae) Dingy Skipper, VU

The Dingy Skipper butterfly *Erynnis tages* (Figure 10) occurs in a wide range of habitats in Britain which support its usual foodplant, Common Bird's-foot-trefoil *Lotus corniculatus*. Habitats include downland, coastal cliffs and grassland, and disturbed sites such as verges, sidings and post-industrial sites. Ideal conditions occur where there is a good population of the host plant, growing in a sparse sward, often including some bare ground, and in a sunny, sheltered microclimate. Colonies tend to be small and very restricted (Asher *et al.*, 2001). Dingy Skipper was listed as Vulnerable (VU) in Britain by Fox *et al*. (2010), indicating that on the best available evidence it is facing a high risk of extinction in the wild.

Figure 10: Dingy Skipper butterfly photographed at Wigmore Valley Park in 2018-19.

Adult Dingy Skipper butterflies can be surveyed using a walkover approach, which may follow fixed transects or follow a more casual route between patches of suitable habitat. Survey should be within the peak flight period of the adults from mid-May to late June, and should ideally take place in conditions suitable for a Butterfly Monitoring Scheme transect (Hall, 1981), i.e., sunny conditions, with temperatures above 17 °C, and between the hours of 10.45 to 15.45.

2.5.2 *Ophonus laticollis* (Coleoptera: Carabidae) Set-aside Downy-back, NT, NS

The Set-aside Downy-back is a seed-feeding ground beetle (Figure 11) of arable field edges and margins and other disturbed ground on calcareous soils. Typically found adjacent to thick hedges with tussocks and accumulations of leaf litter. In the review of the Biodiversity Action Plan ground beetles carried out by the author in 2005, *Ophonus laticollis* was estimated to have declined by 74% over a 25-year period, contracting from a formerly wide scatter across southern England before 1970 to just the counties of Oxfordshire, Cambridgeshire, Norfolk and Suffolk since 1970 (Telfer, 2009). There have been subsequent records from South Hampshire, Buckinghamshire and Hertfordshire. There has thus been an apparent amelioration or reversal of the decline and this beetle is currently assessed as Near Threatened (Telfer, 2016).

Figure 11: Set-aside Downy-back *Ophonus laticollis*.

Pitfall-trapping is an effective method for surveying for this species, and it was by using pitfall traps that this species was discovered during fieldwork in 2018: two individuals were pitfall-trapped on the chalky edge of arable field F8 between 21st May and 18th June 2018.

2.5.3 *Gnorimus nobilis* (Coleoptera: Carabidae) Noble Chafer, VU, NS

Noble Chafer typically breeds in the decaying heartwood of hollowing fruit trees, occupying hollows in the trunk and boughs. In these situations, larvae live within accumulated 'wood mould' at the base of the hollow, and may also be found where wood mould accumulates under bark (Whitehead, 2003). Suitable trees are typically still alive. Cherry, Plum and Apple are especially favoured tree species, though Pear is also mentioned as a host tree by Alexander (2002). Larvae develop in tree hollows for two to three years. The adult beetles

have a comparatively short life-span of about four to six weeks, typically being active from late June into August though they have apparently been recorded in each month from April to September (Hyman and Parsons, 1992).

Noble Chafer was formerly listed as Vulnerable (Red Data Book category 2) in Britain by Hyman and Parsons (1992), indicating a species which is likely to move into the Endangered category in the near future if causal factors continue to operate. Lane and Mann (2016) assessed the conservation status of Noble Chafer as Vulnerable (VU), which recognises that this is a species threatened with extinction in Britain due to loss and deterioration of its orchard habitat.

Reliable survey for the presence of Noble Chafers is best targeted at searching for larvae in tree hollows, larval 'frass' (pellets of excrement) in tree hollows, or fragments of dead adults (also most likely to be encountered in tree hollows) (e.g., Figure 12).

Figure 12: The pronotum of an adult Noble Chafer, resting on heartwood debris containing many of the distinctive frass pellets excreted by the larvae. This photo was taken in a Buckinghamshire orchard.

2.6 A NOTE ABOUT THE INTERIM REPORT

An interim report was submitted on 7th July 2021 (Telfer, 2021b). At that time, a substantial part of the identification work on the samples remained to be done and only partial results were available. This final report completely replaces and supersedes the interim report.

3 Methods

3.1 FIELDWORK ACTIVITY

The recommended survey work was carried out by the author. Fieldwork was conducted on 8th, 9th and 25th June 2021. A summary of survey activity on each day is given in Table 1.

Table 1: Survey dates and activity on each day.

Date	Survey activity
8th June	Surveyed the veteran Apple at Wich Hill Farm, deployed a bottle trap and a Noble Chafer pheromone lure. Conducted two 30-minute walkovers targeting Dingy Skipper at Wigmore Valley Park, and another 30-minute walkover in fields F9/F11. Deployed a set of pitfall traps in field F13 and carried out some sampling. Deployed a set of pitfall traps in field F9 (uncut treatment) and carried out some sampling.
9th June	Deployed a set of pitfall traps in field F11 (cut treatment) and carried out some sampling. Surveyed Luton Parkway Verges DWS by beating, sweeping and suction sampling. Surveyed both the cut and uncut treatments of fields F9/F11 by sweeping and direct observation. Surveyed the spoil banks at Winch Hill Farm by sweeping and ground-searching.
25th June	Retrieved the bottle trap from the veteran Apple at Wich Hill Farm. Retrieved the pitfall traps from the cut and uncut treatments of fields F9/F11, and from field F13, and carried out further sampling of all fields by sweeping and ground-searching. Surveyed the compost heap in the south-eastern corner of F11 by sieving. Surveyed Luton Parkway Verges DWS by beating, sweeping and suction sampling.

3.2 SAMPLING METHODS

As noted in Table 1, a range of methods including beating, sweeping, sieving and ground-searching was used to sample for invertebrates, and further details of these are provided in Table 2.

Table 2: Methods employed on this survey to record invertebrates, and their target groups and target habitats.

Method	Target groups	Target habitats
Sweeping (also known as sweep-netting), with a stout canvas net.	Beetles (Coleoptera) and bugs (Heteroptera) and many other insects.	All vegetated habitats, paying particular attention to potential food-plants and to nectar and pollen sources.

Method	Target groups	Target habitats
Ground-searching: grubbing at ground level, turning over logs, stones, reptile felts, etc.	A wide range of ground-living invertebrates, particularly beetles, bugs, ants (Hymenoptera: Formicidae) woodlice (Isopoda) and molluscs.	Open, unshaded habitats such as grassland and bare ground.
Suction sampling (also known as vacuum sampling).	A wide range of ground-living invertebrates, as above. Particularly effective for species which are too small, too well-camouflaged or too quick-running to be successfully captured by hand.	Grassland and sparsely-vegetated ground.
Sieving.	Handfuls of material are sieved over a tray to reveal their inhabitants. A good technique for a very wide range of invertebrates.	Various substrates such as dead-wood, fungi, leaf-litter, wood-chip, compost, manure, dung, carrion, etc.
Beating.	Beetles and bugs on the branches, flowers and foliage of shrubs and trees.	Hedges, woodland and trees.
Direct observation.	Bees, wasps, flies, butterflies and moths (Lepidoptera), grasshoppers and crickets (Orthoptera), etc.	All habitats, paying particular attention to nectar and pollen sources.

3.3 TRAPPING METHODS

3.3.1 Aerial Interception trapping: bottle trap

This design of aerial interception trap consists of a single 2 litre bottle (Figure 13). Two sections of nearly 180° are cut from opposite sides of the bottle and the resulting flaps joined together internally to present an interception surface (Figure 14). Any flying insects hitting this surface and dropping will end up in the diluted vehicle antifreeze in the bottom of the trap.

Hung against the trunks and major boughs of mature and veteran trees, these traps are excellent at targeting saproxylic invertebrates which fly around such trees, especially those flying into and out of hollows in trees, including many heartwood specialists.

Figure 13: The aerial interception trap design used by this project.

Figure 14: Detail of the aerial interception trap, showing the internal surface of the trap.

One bottle trap was deployed outside a hollow on the trunk of the veteran Apple at Winch Hill Farm (TL13707 21860), from 8th to 25th June 2021.

3.3.2 Pitfall trapping

Pitfall trapping was carried out using 50 cl disposable plastic tumblers, with an internal diameter at the mouth of 86 mm. These cups can be inserted neatly into holes cored with a gardeners' bulb planter, meaning minimal disturbance to the surrounding ground. Cups were set with the mouth flush with the ground surface, or slightly recessed. Each cup was filled to between a third and a half full with dilute vehicle antifreeze. Cups were covered with 12 mm square gauge galvanized wire mesh, pegged down at the edges, to inhibit access by vertebrates (Figure 15).

Three sets of pitfall traps were deployed (Table 3).

Table 3: Details of the sets of pitfall traps.

Location	Number of traps	Date span
Field F9 (an example of the uncut treatment): line from TL13393 21469 to TL13404 21455.	4 pitfall cups	8th to 25th June 2021
Field F11 (an example of the cut treatment): line from TL13299 21810 to TL13325 21824.	4 pitfall cups	9th to 25th June 2021
Field F13: line from TL13126 22194 to TL13132 22290.	4 pitfall cups	8th to 25th June 2021

Figure 15: Pitfall trap *in situ* in field F9.

3.3.3 Noble Chafer trapping

A live trap for Noble Chafer was set on the veteran Apple tree at Winch Hill Farm from 8th to 25th June 2021. This trap functions on a very similar principle to the aerial interception bottle trap described above (Section 3.3.1) but with a small vial of a specific Noble Chafer pheromone used as an attractant. This pheromone has been developed by Dr Deborah Harvey of Royal Holloway, University of London, and this trap and the pheromone were supplied and operated as part of her post-doctoral research on Noble Chafer.

3.4 IDENTIFICATION

Where practical, invertebrates were identified in the field but wherever the slightest doubt existed, one or more specimens were collected, or photographs taken, for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using the surveyor's own library and entomological collection. Selected specimens have been retained in the surveyor's personal collection as vouchers.

3.5 CONSTRAINTS

Invertebrate activity is significantly affected by the weather, which can seriously diminish the effectiveness of some sampling techniques. During fieldwork in 2021, weather conditions were very good throughout and did not hamper the invertebrate survey (Table 4).

From an entomologist's perspective, the 2021 field season was delayed by two to three weeks as a result of an unusually cold and dry spring, but caught up rapidly in the warmer, sunnier weather from late May into early June.

Table 4: Weather conditions during survey visits in 2021.

Date	Weather notes
8th June	Forecast temperatures from 17 to 23 °C. Light breeze (F2) from the west. Sunny intervals. Dry.
9th June	Similar to the preceding day but even warmer and sunnier under cloudless skies.
25th June	Forecast temperatures from 15 to 19 °C. Gentle breeze (F3) from the west. Sunny intervals. Dry.

3.6 ANALYSIS

3.6.1 Key Species

To assess the importance of a site for invertebrate conservation, the number and percentage of rare or scarce species found may be calculated. Sites of greater importance support higher percentages of rare or scarce species, and this percentage is a useful starting point for assessing the overall importance of a site, in comparison to other sites surveyed using similar techniques.

A standard definition of 'rare or scarce' is essential to allow a fair comparison to be made between sites. For the analyses in this report, species were only included which have been

assigned an official rare or scarce conservation status as defined in the box below, and all such species are here called 'Key Species'.

Conservation status categories of invertebrates

A system of conservation statuses has been in use since the British Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews. By this system, the rarest and most threatened British species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria of this first version are defined in Appendix 1.1.

A second version of British conservation statuses published in the Species Status series from Natural England and Natural Resources Wales is now gradually replacing the first version. For butterflies, dragonflies, water beetles and several other groups, the most up-to-date British conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria (IUCN, 2001). This system places less emphasis on rarity and more on factors which suggest a risk of extinction (such as severe declines in range or population). The status categories and criteria of this second version are defined in Appendix 1.2.

A third version of British conservation statuses operates in parallel with the second and is a very simplified version of the first, having just two categories: Nationally Rare or Nationally Scarce. This version is defined in Appendix 1.3.

Key Species are here defined as Red Data Book and Nationally Scarce species from version 1, Threatened, Near Threatened and Data Deficient species from version 2, and Nationally Rare or Nationally Scarce species from version 3.

The Key Species may be further divided into **Rare Key Species** (here defined as Red Data Book species from version 1, Threatened and Data Deficient species from version 2, and Nationally Rare species from version 3) and **Scarce Key Species** (the remainder).

There are frequent examples of invertebrates which have been given a conservation status and have subsequently been found to be more widespread and abundant. This may arise either as a result of an actual increase in range or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the author regards the official conservation status to be out of date, this is indicated in the appropriate text and is taken into account in the assessments.

3.6.2 Pantheon

Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England. Users import lists of invertebrates into Pantheon, which can then be used to analyse the species, attaching associated habitats and resources, conservation statuses and other data against them. Pantheon has been available online since April 2018 at: http://www.brc.ac.uk/pantheon/.

Some of the most informative outputs of Pantheon are the calculations of Species Quality Index (SQI). Precisely how SQI is calculated is no longer transparent but in Natural England's ISIS application (the predecessor to Pantheon), each species had been allocated to one of six rarity scores (0, 1, 2, 4, 8, 16), with the commonest species scoring 0 and the rarest scoring 16. For an assemblage of species, the mean of their rarity scores, multiplied by 100, yielded

an ISIS Rarity Score for the assemblage. For example, if a survey recorded 46 species from a particular assemblage, and the sum of their 46 species rarity scores was 106, the average of all the individual species rarity scores would be 2.30 (= 106/46) and the ISIS Rarity Score would be 230, derived by multiplying that average by 100. It is presumed that the online Pantheon system calculates SQI by a similar method.

3.6.3 Assessing the importance of the survey area

The assessments in this report take into account Natural England's pamphlet *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists* (Anon., 2005) which advises that 'A survey should classify a site as one of the following:

1 Little/ no importance,

2 Local/ county importance,

3 Regional importance,

4 National importance,

5 European importance'.

4 Results and Assessments

4.1 OVERALL RESULTS

4.1.1 Species list

The survey in 2021 recorded 331 species of invertebrates (Appendix 2).

The survey identified invertebrates from a very wide range of taxonomic groups: woodlice, spiders, pseudoscorpions, millipedes, springtails, dragonflies, earwigs, bush-crickets, grasshoppers, barkflies, aphids, psyllids, froghoppers, leafhoppers, bugs, beetles, sawflies, ants, bees, wasps, scorpion-flies, flies, moths, butterflies, slugs and snails.

There was a focus of effort on beetles (Coleoptera) with 175 species recorded, forming 53% of the total species list.

4.1.2 Species of Principal Importance

For most SPI, such as those detailed in Section 2.5, their occurrence within the survey area would be an important consideration for developers and planners. However, the Section 41 list includes a number of moths and butterflies which are still widespread and common though declining, and were formerly regarded as 'research-only' Biodiversity Action Plan (BAP) species. Though they have been added to Section 41, conservation action for these 'research only' species is focused on further research rather than protection of individual sites.

Two SPI were recorded during the survey in 2021 and both belong to the group of 'research only' species: *Coenonympha pamphilus* Small Heath butterfly and *Tyria jacobaeae* Cinnabar moth. Small Heath butterfly is also a Key Species with Near Threatened conservation status.

4.1.3 Key Species

Amongst the 331 species recorded by the 2021 survey, 21 species are here regarded as Key Species (using the criteria defined in Section 3.6.1), including two Rare Key Species (Table 5: see Appendix 3).

4.2 THE 2018-19 SURVEY AREA

4.2.1 Dingy Skipper surveys

No Dingy Skipper butterflies *Erynnis tages* were observed during the survey, either in Wigmore Valley Park or in Fields F9/F11. Fieldwork targeting Dingy Skipper consisted of two 30-minute walkovers at Wigmore Valley Park, and another 30-minute walkover in fields F9/F11 on 8th June. In addition to this targeted fieldwork, substantial time was spent in fields F9/F11 over the course of 8th, 9th and 25th June during which time a constant vigilance for Dingy Skippers was maintained.

All fieldwork was carried out in excellent weather conditions, at the right time of day and during the adult flight season, and so the absence of any Dingy Skipper sightings may be taken as rather strong evidence for the absence of the butterfly. This means that the Dingy Skipper population in the southern part of Wigmore Valley Park appears to have died out since they were recorded there in 2019 (Telfer, 2019), and the butterfly has not colonised the increasingly suitable habitat within fields F9/F11.

4.2.2 Fields F9, F11 and F13

These fields were surveyed by sweeping, ground-searching and direct observation during 8th – 9th June and 25th June, and by pitfall trapping between these dates. The resulting samples yielded a list of 171 invertebrate species (Table 6) which indicates a rather rich habitat for invertebrates.

No individuals of the Set-aside Downy-back beetle *Ophonus laticollis* were found in 2021. With such a large area of former arable fields, it would not be safe to conclude that Set-aside Downy-back is absent from this area without much more extensive sampling work. However, it seems reasonable to conclude that if Set-aside Downy-back is present within these fields it is probably restricted to field edges in close proximity to thick hedges or woodland edges with tussocks and accumulations of leaf litter, as has been previously found for this species (Telfer, 2009).

Amongst the 171 species recorded from fields F9, F11 and F13, 11 species are here regarded as Key Species (Table 6). These 11 species comprise 6.4% of the total species list of 171. However, of the 11 Key Species recorded, five are here regarded as having out of date and inaccurate statuses (as noted in Table 5). The remaining six Key Species should be regarded as having accurate conservation statuses, though for some of these also there is evidence of an upward trend in range and/or abundance. If the Key Species with out of date and inaccurate conservation statuses are taken into account by the analysis, this survey recorded 3.5% Key Species (6 out of 171) from fields F9, F11 and F13.

Pantheon identified that the only important assemblage within the species list was the assemblage of 'short sward & bare ground' species, with a rather high Species Quality Index of 153. This assemblage includes four of the six accurately-rated Key Species, the other two being also associated with open habitats but tending to favour taller swards.

The important assemblage of 'short sward & bare ground' species was found in both field F13 and in the cut areas of fields F9/F11. The extraordinary numbers of Bombardier Beetle *Brachinus crepitans* recorded by pitfall trapping from the cut areas of fields F9/F11 (422) and field F13 (1,316) indicate a very large population of this Nationally Scarce species which has an important stronghold here in both a Bedfordshire and Hertfordshire context.

The important assemblage of 'short sward & bare ground' species was also found in the uncut areas of fields F9/F11 but the reduced area of actual short sward and bare ground was reflected in lower numbers of Bombardier Beetle (256 individuals), while the availability of longer swards and tussocks allowed members of the 'tall sward & scrub' assemblage to occur, including the remaining two accurately-rated Key Species.

Key Species analysis and Pantheon analysis both indicate that fields F9, F11 and F13 are areas of conservation importance for invertebrates at the county level, notably for the assemblage of 'short sward & bare ground' species.

4.2.3 Compost heap in the south-eastern corner of field F11

The very large compost heap in the south-eastern corner of F11 was sampled on 25th June by sieving, which yielded a list of only 27 invertebrate species including two woodlice, a pseudoscorpion, several bugs and numerous beetles. Most of the recorded species belong to the surrounding grassland habitats and only nine of the species recorded are species which are frequently associated with compost heaps and other such heaps of decaying organic material; all are common species (Table 7).

The compost heap in the south-eastern corner of F11 was found to be supporting rather few species, and rather few compost heap specialists, and should be regarded as low quality habitat for invertebrates.

4.2.4 Spoil banks at Winch Hill Farm

Sampling of the spoil banks yielded a list of 60 invertebrate species, indicating a rather rich habitat for invertebrates (Table 8).

Four of the species recorded (6.7% of the list of 60 species) are here regarded as Key Species (Table 8). However, one of the four (the weevil *Rhinocyllus conicus*, Nationally Scarce (Nb)) has an out-of-date and inaccurate conservation status and should now be regarded as common. Its status is bracketed ('[Nb]') in Pantheon indicating that this is also Natural England's view. Taking *R. conicus* into account, the three accurately-rated Key Species make up 5.0% of the species list of 60.

Pantheon analysis assigned 18 species to the 'short sward & bare ground' assemblage, which is a subset of the 'open habitats' biotope, including all four of the Key Species. Pantheon calculated a Species Quality Index of 200 for the 'short sward & bare ground' assemblage, which is a very high score.

The ground beetle *Scybalicus oblongiusculus* was discovered at the spoil banks. This is a Vulnerable (VU) and Nationally Rare (NR) species which had not been recorded during the 2018-19 survey work. It is a beetle of open habitats, favouring well-drained soils and well-insolated situations, typically provided by early-successional habitats on brownfield sites. It was recorded from a stretch of Dorset coastline between 1878 and 1951, covering at least four hectads but then appeared to go extinct in Britain before being rediscovered at Cuxton, East Kent, in 2000 and in South Essex in 2002 (Telfer, 2016). In South Essex, the number of

known sites has been increasing slowly but steadily and it appears to have been expanding its range beyond Kent and Essex, with the first Hertfordshire record in 2019.

The 2018-19 assessment found that 'short sward & bare ground' was a Key Habitat for invertebrates within the survey area, particularly including 'disturbed areas with much bare ground, and sparsely developed ruderal vegetation' (Telfer, 2019). The 2021 survey has shown that the spoil banks at Winch Hill Farm are another important area of this Key Habitat.

4.2.5 Veteran Apple at Winch Hill Farm

This individual tree was surveyed by beating, bark-sweeping and interception trapping. A pheromone lure for Noble Chafer beetle *Gnorimus nobilis* was also deployed. Samples of debris from within the hollow trunk were examined for Noble Chafer larval frass pellets and other signs.

No Noble Chafer adults or larvae were recorded, nor were any other signs of Noble Chafer presence recorded. Survey work in 2018-19 also targeted Noble Chafer, including with the use of pheromone lures, but without recording any individuals or other signs. Noble Chafer can be regarded as absent from the Winch Hill Farm orchard with a high degree of certainty.

Samples from the veteran Apple tree yielded only 10 invertebrate species which are 'saproxylic', i.e., dependent to some extent on the decay process of the heartwood and other woody parts of the tree (Table 9). One of the 10 saproxylic species, the beetle *Enicmus rugosus*, was given Nationally Scarce status by Hyman and Parsons (1994) but it has been expanding its range and should no longer be regarded as a Nationally Scarce species (Telfer and Hammond, 2007). The remaining species are common.

The 2018-19 survey found that the Luton Airport survey area supported an important assemblage of 'tree-associated' invertebrates, and was particularly important for saproxylic invertebrates. The Key Habitats for tree-associated invertebrates at the Luton Airport survey area were found to be the broad-leaved woods, hedges and field boundary trees of the Eastern Area and Wigmore Valley Park. The derelict orchard at Winch Hill Farm was not regarded as an area of Key Habitat by Telfer (2019). The further survey work in 2021 confirmed that the veteran Apple tree at Winch Hill Farm, along with the other younger and smaller Apple trees nearby, are of lesser importance for invertebrates than the Key Habitats.

4.3 Luton Parkway Verges District Wildlife Site

Luton Parkway Verges was surveyed over two visits using beating to sample from shrubs and trees, and sweep-netting and suction-sampling to sample from the grassland, as well as direct observations.

The samples taken from Luton Parkway Verges DWS yielded a list of 133 invertebrate species (Table 10). Taking into account the amount of survey effort, a list of 133 species suggests a fairly rich site for invertebrates.

Amongst the 133 species recorded from Luton Parkway Verges, eight species are here regarded as Key Species (Table 10). These eight species comprise 6.0% of the total species list of 133. However, of the eight Key Species recorded, four are here regarded as having out of date and inaccurate statuses (as noted in Table 5). The remaining four Key Species should be regarded as having accurate conservation statuses, though for some of these also there

is evidence of an upward trend in range and/or abundance. If the Key Species with out of date and inaccurate conservation statuses are taken into account by the analysis, this survey recorded 3.0% Key Species (4 out of 133) from Luton Parkway Verges.

Pantheon analysis indicated that the species list from Luton Parkway Verges was notable only for including an assemblage of 'short sward & bare ground' species with a fairly high Species Quality Index of 141. This assemblage includes two of the accurately-rated Key Species, the other two being also associated with open habitats but tending to favour taller swards.

Both the Key Species analysis and Pantheon analysis suggest that the Luton Parkway Verges DWS is of local importance for invertebrates of 'short sward & bare ground', and specifically of shorter, more flower-rich grassland swards.

The 2018-19 assessment found that 'short sward & bare ground' was a Key Habitat for invertebrates within the survey area, particularly including such 'shorter, more flower-rich grassland swards' (Telfer, 2019). The 2021 survey has shown that the Luton Parkway Verges DWS is another example of this Key Habitat. However, it is a relatively low quality example, and does not match the habitat quality of the much larger area of such habitat in the southern part of Wigmore Valley Park (Figure 2).

5 Recommendations

In view of the Luton Airport survey area's importance for invertebrate conservation in a county context, the following recommendations are made to supplement those made in the report of the 2018-19 survey (Telfer, 2019).

5.1 THE 2018-19 SURVEY AREA

5.1.1 Fields F9, F11 and F13

The 2021 survey has shown that fields F9, F11 and F13 are an important area of one of the Key Habitats for invertebrates within the survey area: 'short sward & bare ground'. Though these fields are no longer in arable production, they support an invertebrate assemblage analogous to that found by the 2018-19 survey in arable margins, field edges and field corners (Telfer, 2019).

It is recommended here, as also by Telfer (2019), that unavoidable losses of such habitat be minimised.

It should be noted that the invertebrate habitats supported by fields F9, F11 and F13 in 2021 have largely been created within the last few years, and thus clearly demonstrate that further areas of habitat could be created on areas of land that are currently used for arable production on chalky soils. To maintain habitat for the 'short sward & bare ground' invertebrate assemblage, such areas should be managed by soil disturbance such as annual cultivation, and not solely by cutting.

5.1.2 Compost heap in the south-eastern corner of field F11

Although the large compost heap in the south-eastern corner of F11 was found to be a low quality habitat for invertebrates, it should be noted that the practice of collecting the arisings from cutting fields F9/F11 and creating a compost heap is an excellent management practice. Cutting and leaving the arisings is the more frequent management practice but is

detrimental to the botanical and entomological value of a habitat by smothering bare ground and low-growing plants. The cut-and-collect management of fields F9/F11, along with the creation of a large compost heap, should be continued.

5.1.3 Spoil banks at Winch Hill Farm

The 2021 survey has shown that the spoil banks at Winch Hill Farm are another important area of one of the Key Habitats for invertebrates within the survey area: 'short sward & bare ground', particularly 'disturbed areas with much bare ground, and sparsely developed ruderal vegetation' (Telfer, 2019).

It is recommended that unavoidable losses of such habitat be minimised, as also recommended by Telfer (2019).

In the context of potentially creating compensatory habitat for 'short sward & bare ground' invertebrates, it should be noted that the spoil banks at Winch Hill Farm have inadvertently demonstrated that high-quality habitat for these invertebrates can be created quite easily within about two years and within a fairly small land area.

5.1.4 Veteran Apple at Winch Hill Farm

The further survey work in 2021 confirmed that the veteran Apple tree at Winch Hill Farm, along with the other younger and smaller Apple trees nearby, are of lesser importance for invertebrates than the Key Habitats.

Thus, with regard to trees, hedges and woodland, no amendments are required to the recommendation of Telfer (2019), which was for retention of, or minimisation of impact to, the broad-leaved woods, hedges and field boundary trees of the Eastern Area and Wigmore Valley Park.

5.2 Luton Parkway Verges District Wildlife Site

The 2021 survey has found that the open habitats within the Luton Parkway Verges DWS support an example of one of the Key Habitats for invertebrates within the survey area: 'short sward & bare ground', particularly shorter, more flower-rich grassland swards. Although the grassland area at Luton Parkway Verges is a relatively low quality example of this invertebrate habitat, it would nevertheless be desirable to follow the recommendation of Telfer (2019) 'to avoid or minimise impacts on these patches of habitat'.

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Appendix 1: British Conservation Status Categories – Definitions.

1.1 Status Categories and Criteria Version 1 (Shirt, 1987)

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g., Hyman and Parsons (1992, 1994)).

Red Data Book category EXTINCT (RDB Extinct)

Definition Species which were formerly native to Britain but have not been recorded since 1900.

Red Data Book category 1, Endangered (RDB1)

Definition Species in danger of extinction and whose survival is unlikely if causal factors continue to operate. Endangered species either (a) occur as only a single population within one 10-km square, or (b) only occur in especially vulnerable habitats, or (c) have been declining rapidly or continuously for twenty years or more to the point where they occur in five or fewer 10-km squares, or (d) may already have become extinct.

Red Data Book category 2, Vulnerable (RDB2)

Definition Species which are likely to move into the Endangered category in the near future if causal factors continue to operate. Vulnerable species are declining throughout their range or occupy vulnerable habitats.

Red Data Book category 3, Rare (RDB3)

Definition Species which occur in small populations and although not currently either Endangered or Vulnerable are at risk. Rare species exist in 15 or fewer 10-km squares, or are more widespread than this but dependent on small areas of especially vulnerable habitat.

Red Data Book category I, Indeterminate (RDBi)

Note: Best written as 'RDBi' rather than 'RDBI' as the latter is easily confused with 'RDB1' (Endangered).

Definition Species considered to be either Endangered, Vulnerable or Rare but with insufficient information to say which.

Red Data Book category K, Insufficiently Known (RDBK)

Definition Species suspected to merit either Endangered, Vulnerable, Rare or Indeterminate status but lacking sufficient information. Species included in this category may have only recently been discovered in Britain, or may be very poorly recorded for a variety of reasons.

Nationally Scarce Category A (Na)

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer (typically between 16 and 30) 10-km squares of the National Grid, or for less well-recorded groups, in seven or fewer vice-counties.

Nationally Scarce Category B (Nb)

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10-km squares of the National Grid, or for less well-recorded groups, between eight and twenty vice-counties.

Nationally Scarce (N)

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

Note: the terms 'Nationally Scarce' and 'Nationally Notable' are synonymous. For consistency in this report, the term 'Nationally Scarce' is preferred, even where the original source used 'Nationally Notable'.

1.2 Status Categories and Criteria Version 2 (IUCN, 2001)

These later status categories and criteria are based on IUCN Red List Categories and Criteria version 3.1 (IUCN, 2001) and have been applied to British butterflies, dragonflies, water beetles and several other invertebrate groups.

Critically Endangered (CR)

A taxon is Critically Endangered when the best available evidence indicates that it is facing an **extremely high** risk of extinction in the wild.

Endangered (EN)

A taxon is Endangered when the best available evidence indicates that it is facing a **very high** risk of extinction in the wild.

Vulnerable (VU)

A taxon is Vulnerable when the best available evidence indicates that it is facing a **high** risk of extinction in the wild.

N.B.: Species belonging to the above three categories may be collectively referred to as **Threatened**.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

The DD category effectively replaces the Indeterminate (RDBi) and Insufficiently Known (RDBK) categories of the earlier version.

Near Threatened (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

Least Concern (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

Not Applicable (NA)

A taxon is Not Applicable when it is either regarded as a non-native in Britain or occurs solely as a natural vagrant.

1.3 Status Categories and Criteria Version 3 (GB Rarity Status)

These status categories and criteria operate in parallel with version 2 and are defined specifically for use in Britain where they provide some continuity with version 1, allowing the continued use of “rare and scarce” species for site assessment purposes.

Nationally Rare (NR)

Native species which have not been recorded from more than 15 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.

Nationally Scarce (NS)

Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Appendix 2: List of invertebrates recorded at Luton Airport in 2021

Key Species and Section 41 species are listed in red text. The table is in taxonomic sequence. Full details of all records generated by the survey are held in a computer database by the author that may be consulted if required to provide further information such as precise localities, grid references, quantity, sex and life-stage.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum sens. str.*	a common striped woodlouse	LC
Malacostraca	Isopoda	Oniscidae	*Oniscus asellus*	Common Shiny Woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse	LC
Malacostraca	Isopoda	Trachelipidae	*Trachelipus rathkii*	a woodlouse	LC
Arachnida	Araneae	Dysderidae	*Dysdera erythrina*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Oedothorax retusus*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Oedothorax apicatus*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Erigone dentipalpis*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Erigone atra*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Tenuiphantes tenuis*	a spider	LC
Arachnida	Araneae	Tetragnathidae	*Pachygnatha degeeri*	a spider	LC
Arachnida	Araneae	Araneidae	*Araniella cucurbitina sens. str.*	a spider	LC
Arachnida	Araneae	Araneidae	*Mangora acalypha*	a spider	LC
Arachnida	Araneae	Dictynidae	*Dictyna uncinata*	a spider	LC
Arachnida	Araneae	Clubionidae	*Clubiona comta*	a spider	LC
Arachnida	Araneae	Gnaphosidae	*Drassyllus pusillus*	a spider	LC
Arachnida	Araneae	Philodromidae	*Tibellus oblongus*	a spider	LC
Arachnida	Araneae	Thomisidae	*Misumena vatia*	a spider	LC
Arachnida	Araneae	Salticidae	*Salticus scenicus*	a jumping spider	LC
Arachnida	Pseudoscorpiones	Chernetidae	*Lamprochernes savignyi*	Savigny's Shining Claw	None
Diplopoda	Polyxenida	Polyxenidae	*Polyxenus lagurus*	Bristly Millipede	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Diplopoda	Glomerida	Glomeridae	*Glomeris marginata*	Pill Millipede	LC
Diplopoda	Julida	Julidae	*Tachypodoiulus niger*	White-legged Millipede	LC
Diplopoda	Julida	Julidae	*Cylindroiulus caeruleocinctus*	a millipede	LC
Diplopoda	Julida	Julidae	*Brachyiulus pusillus*	a millipede	LC
Diplopoda	Polydesmida	Polydesmidae	*Polydesmus coriaceus*	a flat-backed millipede	LC
Collembola	Entomobryomorpha	Entomobryidae	*Orchesella cincta*	a springtail	None
Insecta	Odonata	Libellulidae	*Libellula depressa*	Broad-bodied Chaser	LC
Insecta	Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	LC
Insecta	Orthoptera	Tettigoniidae	*Pholidoptera griseoaptera*	Dark Bush-cricket	LC
Insecta	Orthoptera	Tettigoniidae	*Metrioptera roeselii*	Roesel's Bush-cricket	LC
Insecta	Orthoptera	Acrididae	*Omocestus viridulus*	Common Green Grasshopper	LC
Insecta	Psocoptera	Ectopsocidae	*Ectopsocus briggsi*	a barkfly	None
Insecta	Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Aphididae	*Anoecia corni*	Dogwood Aphid	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	*Craspedolepta nervosa*	a psyllid	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	*Psylla alni*	Alder Psyllid	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Aphrophora alni*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Philaenus spumarius*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Oncopsis alni*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupelix cuspidata*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx aurata*	a leafhopper	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx vittata*	a leafhopper	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Acalypta carinata*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Tingis cardui*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Dicyphus errans*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Deraeocoris flavilinea*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Closterotomus norwegicus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Grypocoris stysi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Capsus ater*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Charagochilus gyllenhalii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Leptopterna dolabrata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Leptopterna ferrugata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Megaloceroea recticornis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Pithanus maerkelii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Stenodema laevigata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Heterotoma planicornis*	a mirid bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Miridae	*Amblytylus nasutus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Atractotomus mali*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Phylus coryli*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Plagiognathus chrysanthemi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Psallus varians*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Himacerus mirmicoides*	Ant Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Nabis rugosus*	Common Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Anthocoris nemoralis*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Anthocoris nemorum*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius laevigatus*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius niger*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Xylocoris galactinus*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Berytidae	*Berytinus minor*	a stiltbug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius huttoni*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius senecionis*	a ground-bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Kleidocerys resedae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Heterogaster urticae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Drymus sylvaticus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Scolopostethus affinis*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Taphropeltus contractus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Coreidae	*Coreus marginatus*	Dock Bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Rhopalus subrufus*	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Stictopleurus punctatonervosus*	a rhopalid bug	NA
Insecta	Hemiptera: Heteroptera	Scutelleridae	*Eurygaster testudinaria*	Tortoise Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Podops inunctus*	Knobbed Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Eysarcoris venustissimus*	Woundwort Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Palomena prasina*	Common Green Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Eurydema oleracea*	Crucifer Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Zicrona caerulea*	Blue Shieldbug	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Carabidae	*Carabus violaceus*	Violet Ground Beetle	LC
Insecta	Coleoptera	Carabidae	*Leistus spinibarbis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Nebria brevicollis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Nebria salina*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Notiophilus biguttatus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bembidion lampros*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bembidion obtusum*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Pterostichus madidus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Pterostichus melanarius*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Abax parallelepipedus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Anchomenus dorsalis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara plebeja*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara convexior*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara lunicollis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara montivaga*	a ground beetle	LC, NS
Insecta	Coleoptera	Carabidae	*Amara ovata*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Curtonotus aulicus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus affinis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus rubripes*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus rufipes*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Ophonus ardosiacus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Ophonus rufibarbis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Scybalicus oblongiusculus*	a ground beetle	VU, NR
Insecta	Coleoptera	Carabidae	*Bradycellus verbasci*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Acupalpus meridianus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Badister bullatus sens. lat.*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Microlestes minutulus*	a ground beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Carabidae	*Brachinus crepitans*	Bombardier Beetle	LC, NS
Insecta	Coleoptera	Hydrophilidae	*Megasternum concinnum/immaculatum*	a beetle	None
Insecta	Coleoptera	Hydrophilidae	*Cryptopleurum minutum*	a beetle	None
Insecta	Coleoptera	Ptiliidae	*Ptenidium myrmicophilum*	a featherwing beetle	None
Insecta	Coleoptera	Ptiliidae	*Nephanes titan*	a featherwing beetle	None
Insecta	Coleoptera	Leiodidae	*Agathidium varians*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Ptomaphagus sericatus*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Ptomaphagus subvillosus*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Sciodrepoides watsoni*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Catops chrysomeloides*	a beetle	None
Insecta	Coleoptera	Silphidae	*Ablattaria laevigata*	a beetle	None
Insecta	Coleoptera	Silphidae	*Nicrophorus vespillo*	a sexton beetle	None
Insecta	Coleoptera	Staphylinidae	*Metopsia clypeata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Sepedophilus nigripennis*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus atriceps*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus dispar*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus hypnorum*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus nitidulus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus solutus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Oxypoda opaca*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Haploglossa villosula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Aloconota gregaria*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Amischa analis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Amischa forcipata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Dinaraea angustula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Mocyta fungi agg.*	a rove-beetle	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Staphylinidae	*Acrotona pseudotenera*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Aleochara curtula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Drusilla canaliculata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Cypha longicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Lithocharis ochracea*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Bisnius subuliformis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Ocypus olens*	Devil's Coach-horse	None
Insecta	Coleoptera	Staphylinidae	*Ocypus nitens*	a rove-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Staphylinidae	*Ocypus fuscatus*	a rove-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Staphylinidae	*Tasgius winkleri*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Quedius cruentus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Quedius semiobscurus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Gyrohypnus fracticornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Xantholinus linearis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Xantholinus longiventris*	a rove-beetle	None
Insecta	Coleoptera	Elateridae	*Athous campyloides*	a click-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Elateridae	*Adrastus pallens*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes lineatus*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes sputator*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Melanotus villosus sens. str.*	a click-beetle	None
Insecta	Coleoptera	Cantharidae	*Cantharis flavilabris*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Cantharis rustica*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Rhagonycha fulva*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Malthodes minimus*	a soldier-beetle	LC
Insecta	Coleoptera	Dermestidae	*Anthrenus fuscus*	a carpet beetle	LC
Insecta	Coleoptera	Ptinidae	*Ochina ptinoides*	a woodworm	LC
Insecta	Coleoptera	Melyridae	*Malachius bipustulatus*	Malachite Beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Melyridae	*Cordylepherus viridis*	a malachite beetle	LC
Insecta	Coleoptera	Kateretidae	*Brachypterus glaber*	a nettle pollen beetle	None
Insecta	Coleoptera	Kateretidae	*Brachypterus urticae*	a nettle pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes carinulatus*	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes morosus*	a pollen beetle	None
Insecta	Coleoptera	Phalacridae	*Phalacrus corruscus*	a beetle	LC
Insecta	Coleoptera	Phalacridae	*Olibrus affinis*	a beetle	LC
Insecta	Coleoptera	Cryptophagidae	*Cryptophagus acutangulus*	a beetle	None
Insecta	Coleoptera	Cryptophagidae	*Atomaria atricapilla*	a beetle	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius chrysomeloides*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius litura*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Scymnus schmidti*	a ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	*Stethorus pusillus*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Exochomus quadripustulatus*	Pine Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Propylea quattuordecimpunctata*	14-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Hippodamia variegata*	Adonis' Ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	16-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Henosepilachna argus*	Bryony Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*	24-spot Ladybird	None
Insecta	Coleoptera	Latridiidae	*Enicmus rugosus*	a beetle	Nationally Scarce
Insecta	Coleoptera	Latridiidae	*Enicmus transversus*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cartodere bifasciata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cortinicara gibbosa*	a beetle	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Mycetophagidae	*Eulagius filicornis*	a beetle	NA
Insecta	Coleoptera	Tenebrionidae	*Prionychus ater*	a darkling beetle	LC
Insecta	Coleoptera	Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle	LC
Insecta	Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	LC
Insecta	Coleoptera	Pyrochroidae	*Pyrochroa serraticornis*	Common Cardinal Beetle	LC
Insecta	Coleoptera	Anthicidae	*Anthicus antherinus*	an ant-like flower beetle	LC
Insecta	Coleoptera	Anthicidae	*Omonadus formicarius*	an ant-like flower beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis frontalis*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis maculata*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis pulicaria*	a beetle	LC
Insecta	Coleoptera	Cerambycidae	*Grammoptera ruficornis*	Common Grammoptera	LC
Insecta	Coleoptera	Chrysomelidae	*Bruchidius varius*	a seed-beetle	NA
Insecta	Coleoptera	Chrysomelidae	*Bruchus loti*	a seed-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Bruchus rufimanus*	a seed-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cassida rubiginosa*	Thistle Tortoise Beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cassida vibex*	a tortoise beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta astrachanica*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta nigripes*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta vittula*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Aphthona euphorbiae*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus dorsalis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus succineus*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus suturellus*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Altica palustris*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema hortensis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Sphaeroderma rubidum*	a flea-beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus fulvus*	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus labiatus*	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus moraei*	a leaf-beetle	LC
Insecta	Coleoptera	Apionidae	*Ceratapion onopordi*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion carduorum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion gibbirostre*	a weevil	None
Insecta	Coleoptera	Apionidae	*Aspidapion aeneum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Squamapion cineraceum*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Apionidae	*Taeniapion urticarium*	a weevil	None
Insecta	Coleoptera	Apionidae	*Pseudapion rufirostre*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion assimile*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion nigritarse*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion trifolii*	a weevil	None
Insecta	Coleoptera	Apionidae	*Perapion curtirostre*	a weevil	None
Insecta	Coleoptera	Apionidae	*Apion frumentarium*	a weevil	None
Insecta	Coleoptera	Apionidae	*Stenopterapion tenue*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ischnopterapion loti*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Polydrusus formosus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Exomias pellucidus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona humeralis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Hypera plantaginis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Dorytomus melanophthalmus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Orthochaetes setiger*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Rhinoncus pericarpius*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Microplontus campestris*	a weevil	Nationally Scarce (Nb)

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus obstrictus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus pallidactylus*	Cabbage Stem Weevil	None
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus picitarsis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sirocalodes mixtus*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Trichosirocalus horridus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Trichosirocalus rufulus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Trichosirocalus troglodytes*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Anthonomus rubi*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius junceus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius picirostris*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius pusillus*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Mecinus pascuorum*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Mecinus pyraster*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhinusa neta*	a weevil	None
Insecta	Hymenoptera: Symphyta	Cephidae	*Calameuta pallipes*	a sawfly	None
Insecta	Hymenoptera: Aculeata	Bethylidae	*Bethylus fuscicornis*	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Bethylidae	*Epyris niger*	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica rubra*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica sabuleti*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica scabrinodis*	an ant	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hymenoptera: Aculeata	Apidae	*Apis mellifera*	Honey Bee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus hypnorum*	Tree Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lapidarius*	Large Red-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lucorum sens. lat.*	White-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pascuorum*	Common Carder-bee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pratorum*	Early Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus terrestris*	Buff-tailed Bumblebee	None
Insecta	Mecoptera	Panorpidae	*Panorpa communis*	a scorpion-fly	None
Insecta	Diptera	Bibionidae	*Bibio marci*	St Mark's Fly	None
Insecta	Diptera	Asilidae	*Leptogaster cylindrica*	Striped Slender Robberfly	LC
Insecta	Diptera	Asilidae	*Dioctria rufipes*	Common Red-legged Robberfly	LC
Insecta	Diptera	Syrphidae	*Episyrphus balteatus*	a hoverfly	LC
Insecta	Diptera	Tephritidae	*Urophora quadrifasciata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Urophora stylata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Oxyna parietina*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Tephritis neesii*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Chaetorellia jaceae*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Terellia serratulae*	a picture-winged fly	None
Insecta	Lepidoptera	Choreutidae	*Anthophila fabriciana*	Nettle-tap	None
Insecta	Lepidoptera	Gelechiidae	*Oxypteryx unicolorella*	Unmarked Neb	Nationally Scarce (Nb)
Insecta	Lepidoptera	Tortricidae	*Aethes smeathmanniana*	Yarrow Conch	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Lepidoptera	Tortricidae	*Epiblema costipunctana*	Ragwort Bell	None
Insecta	Lepidoptera	Tortricidae	*Dichrorampha sequana*	Square-spot Drill	None
Insecta	Lepidoptera	Tortricidae	*Dichrorampha plumbana*	Lead-coloured Drill	None
Insecta	Lepidoptera	Crambidae	*Crambus lathoniellus*	Hook-streaked Grass-Veneer	None
Insecta	Lepidoptera	Crambidae	*Pyrausta purpuralis*	Common Purple & Gold	None
Insecta	Lepidoptera	Pyralidae	*Myelois circumvoluta*	Thistle Ermine	None
Insecta	Lepidoptera	Pieridae	*Gonepteryx rhamni*	Brimstone	LC
Insecta	Lepidoptera	Pieridae	*Pieris napi*	Green-veined White	LC
Insecta	Lepidoptera	Pieridae	*Anthocharis cardamines*	Orange-tip	LC
Insecta	Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Small Copper	LC
Insecta	Lepidoptera	Lycaenidae	*Aricia agestis*	Brown Argus	LC
Insecta	Lepidoptera	Lycaenidae	*Polyommatus icarus*	Common Blue	LC
Insecta	Lepidoptera	Nymphalidae	*Vanessa atalanta*	Red Admiral	LC
Insecta	Lepidoptera	Nymphalidae	*Vanessa cardui*	Painted Lady	LC
Insecta	Lepidoptera	Nymphalidae	*Aglais urticae*	Small Tortoiseshell	LC
Insecta	Lepidoptera	Nymphalidae	*Aglais io*	Peacock	LC
Insecta	Lepidoptera	Nymphalidae	*Maniola jurtina*	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath	NT, S41 (research only)
Insecta	Lepidoptera	Geometridae	*Camptogramma bilineata*	Yellow Shell	None
Insecta	Lepidoptera	Erebidae	*Tyria jacobaeae*	Cinnabar	S41 (research only)
Insecta	Lepidoptera	Noctuidae	*Cucullia verbasci*	Mullein	None
Insecta	Lepidoptera	Noctuidae	*Autographa gamma*	Silver Y	None
Insecta	Lepidoptera	Noctuidae	*Euclidia mi*	Mother Shipton	None
Insecta	Lepidoptera	Noctuidae	*Euclidia glyphica*	Burnet Companion	None
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras reticulatum*	Netted Field Slug	LC
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras invadens*	Tramp Slug	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Gastropoda	Pulmonata	Arionidae	*Arion (Mesarion) subfuscus*	Dusky Slug	LC
Gastropoda	Pulmonata	Cochlicopidae	*Cochlicopa lubrica*	Slippery Moss-snail	LC
Gastropoda	Pulmonata	Helicidae	*Cepaea hortensis*	White-lipped Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Candidula intersecta*	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Cernuella virgata*	Striped Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Monacha cantiana*	Kentish Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Trochulus hispidus*	Hairy Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Trochulus striolatus*	Strawberry Snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Aegopinella pura*	Clear Glass-snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Aegopinella nitidula*	Smooth Glass-snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Oxychilus cellarius*	Cellar Snail	LC
Gastropoda	Pulmonata	Punctidae	*Punctum pygmaeum*	Dwarf Snail	LC
Gastropoda	Pulmonata	Valloniidae	*Vallonia costata*	Ribbed Grass-snail	LC
Gastropoda	Pulmonata	Valloniidae	*Vallonia excentrica*	Eccentric Grass-snail	LC

Appendix 3: Tables 5 to 10

Table 5: The Key Species of invertebrates recorded by the 2021 survey. The table is ordered by conservation status category starting with the rarest/ most threatened species. Conservation Status categories are described in Appendix 1. Species which are here considered to have an out-of-date conservation status ('OOD') are indicated.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?
Insecta	Coleoptera	Carabidae	*Scybalicus oblongiusculus*	a ground beetle	VU, NR	
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR	✓
Insecta	Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath	NT, S41 (research only)	
Insecta	Coleoptera	Carabidae	*Amara montivaga*	a ground beetle	LC, NS	
Insecta	Coleoptera	Carabidae	*Brachinus crepitans*	Bombardier Beetle	LC, NS	
Insecta	Coleoptera	Staphylinidae	*Ocypus nitens*	a rove-beetle	Nationally Scarce (Na)	
Insecta	Coleoptera	Apionidae	*Squamapion cineraceum*	a weevil	Nationally Scarce (Na)	✓
Insecta	Coleoptera	Curculionidae	*Polydrusus formosus*	a weevil	Nationally Scarce (Na)	✓
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)	✓
Insecta	Coleoptera	Curculionidae	*Trichosirocalus horridus*	a weevil	Nationally Scarce (Na)	✓
Insecta	Coleoptera	Curculionidae	*Trichosirocalus rufulus*	a weevil	Nationally Scarce (Na)	
Insecta	Coleoptera	Staphylinidae	*Ocypus fuscatus*	a rove-beetle	Nationally Scarce (Nb)	
Insecta	Coleoptera	Elateridae	*Athous campyloides*	a click-beetle	Nationally Scarce (Nb)	
Insecta	Coleoptera	Coccinellidae	*Scymnus schmidti*	a ladybird	Nationally Scarce (Nb)	
Insecta	Coleoptera	Coccinellidae	*Hippodamia variegata*	Adonis' Ladybird	Nationally Scarce (Nb)	✓
Insecta	Coleoptera	Curculionidae	*Orthochaetes setiger*	a weevil	Nationally Scarce (Nb)	✓
Insecta	Coleoptera	Curculionidae	*Microplontus campestris*	a weevil	Nationally Scarce (Nb)	✓
Insecta	Coleoptera	Curculionidae	*Sirocalodes mixtus*	a weevil	Nationally Scarce (Nb)	
Insecta	Coleoptera	Curculionidae	*Tychius pusillus*	a weevil	Nationally Scarce (Nb)	
Insecta	Lepidoptera	Gelechiidae	*Oxypteryx unicolorella*	Unmarked Neb	Nationally Scarce (Nb)	
Insecta	Coleoptera	Latridiidae	*Enicmus rugosus*	a beetle	Nationally Scarce	✓

Table 6: Species of invertebrate recorded from fields F9, F11 and F13 by the 2021 survey. Key Species and Section 41 species are listed in red text. The table is in taxonomic sequence.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum sens. str.*	a common striped woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse	LC
Malacostraca	Isopoda	Trachelipidae	*Trachelipus rathkii*	a woodlouse	LC
Arachnida	Araneae	Linyphiidae	*Oedothorax retusus*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Oedothorax apicatus*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Erigone dentipalpis*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Erigone atra*	a spider	LC
Arachnida	Araneae	Tetragnathidae	*Pachygnatha degeeri*	a spider	LC
Arachnida	Araneae	Araneidae	*Mangora acalypha*	a spider	LC
Arachnida	Araneae	Gnaphosidae	*Drassyllus pusillus*	a spider	LC
Arachnida	Araneae	Philodromidae	*Tibellus oblongus*	a spider	LC
Diplopoda	Glomerida	Glomeridae	*Glomeris marginata*	Pill Millipede	LC
Diplopoda	Julida	Julidae	*Cylindroiulus caeruleocinctus*	a millipede	LC
Diplopoda	Julida	Julidae	*Brachyiulus pusillus*	a millipede	LC
Diplopoda	Polydesmida	Polydesmidae	*Polydesmus coriaceus*	a flat-backed millipede	LC
Insecta	Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	LC
Insecta	Orthoptera	Tettigoniidae	*Metrioptera roeselii*	Roesel's Bush-cricket	LC
Insecta	Orthoptera	Acrididae	*Omocestus viridulus*	Common Green Grasshopper	LC
Insecta	Hemiptera: Heteroptera	Tingidae	*Tingis cardui*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Closterotomus norwegicus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Grypocoris stysi*	a mirid bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Miridae	*Capsus ater*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Leptopterna dolabrata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Leptopterna ferrugata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Megaloceroea recticornis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Pithanus maerkelii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Amblytylus nasutus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Plagiognathus chrysanthemi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Nabis rugosus*	Common Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Anthocoris nemoralis*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius niger*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Drymus sylvaticus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Taphropeltus contractus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Podops inunctus*	Knobbed Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shieldbug	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Zicrona caerulea*	Blue Shieldbug	LC
Insecta	Coleoptera	Carabidae	*Carabus violaceus*	Violet Ground Beetle	LC
Insecta	Coleoptera	Carabidae	*Nebria brevicollis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Nebria salina*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Notiophilus biguttatus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bembidion obtusum*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Pterostichus madidus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Pterostichus melanarius*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Abax parallelepipedus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Anchomenus dorsalis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara plebeja*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara convexior*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara lunicollis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara montivaga*	a ground beetle	LC, NS
Insecta	Coleoptera	Carabidae	*Amara ovata*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Curtonotus aulicus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus affinis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus rubripes*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus rufipes*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Ophonus ardosiacus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bradycellus verbasci*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Badister bullatus sens. lat.*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Microlestes minutulus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Brachinus crepitans*	Bombardier Beetle	LC, NS
Insecta	Coleoptera	Leiodidae	*Ptomaphagus sericatus*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Ptomaphagus subvillosus*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Sciodrepoides watsoni*	a beetle	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Leiodidae	*Catops chrysomeloides*	a beetle	None
Insecta	Coleoptera	Silphidae	*Ablattaria laevigata*	a beetle	None
Insecta	Coleoptera	Silphidae	*Nicrophorus vespillo*	a sexton beetle	None
Insecta	Coleoptera	Staphylinidae	*Tachyporus hypnorum*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Amischa analis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Amischa forcipata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Aleochara curtula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Drusilla canaliculata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Cypha longicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Ocypus olens*	Devil's Coach-horse	None
Insecta	Coleoptera	Staphylinidae	*Ocypus nitens*	a rove-beetle	Nationally Scarce (Na)
Insecta	Coleoptera	Staphylinidae	*Ocypus fuscatus*	a rove-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Staphylinidae	*Tasgius winkleri*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Quedius semiobscurus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Gyrohypnus fracticornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Xantholinus linearis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Xantholinus longiventris*	a rove-beetle	None
Insecta	Coleoptera	Elateridae	*Adrastus pallens*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes lineatus*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes sputator*	a click-beetle	None
Insecta	Coleoptera	Cantharidae	*Cantharis flavilabris*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Cantharis rustica*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Rhagonycha fulva*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Malthodes minimus*	a soldier-beetle	LC
Insecta	Coleoptera	Melyridae	*Malachius bipustulatus*	Malachite Beetle	LC
Insecta	Coleoptera	Melyridae	*Cordylepherus viridis*	a malachite beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle	None
Insecta	Coleoptera	Phalacridae	*Phalacrus corruscus*	a beetle	None
Insecta	Coleoptera	Phalacridae	*Olibrus affinis*	a beetle	None
Insecta	Coleoptera	Cryptophagidae	*Atomaria atricapilla*	a beetle	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius litura*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Scymnus schmidti*	a ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Hippodamia variegata*	Adonis' Ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	16-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Henosepilachna argus*	Bryony Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*	24-spot Ladybird	None
Insecta	Coleoptera	Latridiidae	*Cortinicara gibbosa*	a beetle	None
Insecta	Coleoptera	Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle	LC
Insecta	Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	LC
Insecta	Coleoptera	Anthicidae	*Anthicus antherinus*	an ant-like flower beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Bruchidius varius*	a seed-beetle	NA
Insecta	Coleoptera	Chrysomelidae	*Bruchus loti*	a seed-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cassida vibex*	a tortoise beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta astrachanica*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus dorsalis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus suturellus*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Altica palustris*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema hortensis*	a flea-beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Chrysomelidae	*Sphaeroderma rubidum*	a flea-beetle	LC
Insecta	Coleoptera	Apionidae	*Ceratapion onopordi*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion carduorum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion gibbirostre*	a weevil	None
Insecta	Coleoptera	Apionidae	*Perapion curtirostre*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Exomias pellucidus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Rhinoncus pericarpius*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Microplontus campestris*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus obstrictus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus picitarsis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Trichosirocalus horridus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Trichosirocalus troglodytes*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius picirostris*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Mecinus pascuorum*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Mecinus pyraster*	a weevil	None
Insecta	Hymenoptera: Symphyta	Cephidae	*Calameuta pallipes*	a sawfly	None
Insecta	Hymenoptera: Aculeata	Bethylidae	*Bethylus fuscicornis*	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Bethylidae	*Epyris niger*	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lapidarius*	Large Red-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lucorum sens. lat.*	White-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pascuorum*	Common Carder-bee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus terrestris*	Buff-tailed Bumblebee	None
Insecta	Diptera	Asilidae	*Dioctria rufipes*	Common Red-legged Robberfly	LC
Insecta	Diptera	Tephritidae	*Urophora quadrifasciata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Urophora stylata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Tephritis neesii*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Chaetorellia jaceae*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Terellia serratulae*	a picture-winged fly	None
Insecta	Lepidoptera	Tortricidae	*Aethes smeathmanniana*	Yarrow Conch	None
Insecta	Lepidoptera	Tortricidae	*Epiblema costipunctana*	a moth	None
Insecta	Lepidoptera	Tortricidae	*Dichrorampha sequana*	a tortrix moth	None
Insecta	Lepidoptera	Crambidae	*Crambus lathoniellus*	Hook-streaked Grass-Veneer	None
Insecta	Lepidoptera	Crambidae	*Pyrausta purpuralis*	a pyralid moth	None
Insecta	Lepidoptera	Pyralidae	*Myelois circumvoluta*	Thistle Ermine	None
Insecta	Lepidoptera	Pieridae	*Pieris napi*	Green-veined White	LC
Insecta	Lepidoptera	Pieridae	*Anthocharis cardamines*	Orange-tip	LC
Insecta	Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Small Copper	LC
Insecta	Lepidoptera	Lycaenidae	*Aricia agestis*	Brown Argus	LC
Insecta	Lepidoptera	Lycaenidae	*Polyommatus icarus*	Common Blue	LC
Insecta	Lepidoptera	Nymphalidae	*Vanessa atalanta*	Red Admiral	LC
Insecta	Lepidoptera	Nymphalidae	*Vanessa cardui*	Painted Lady	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Lepidoptera	Nymphalidae	*Aglais urticae*	Small Tortoiseshell	LC
Insecta	Lepidoptera	Nymphalidae	*Aglais io*	Peacock	LC
Insecta	Lepidoptera	Nymphalidae	*Maniola jurtina*	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath	NT, S41 (research only)
Insecta	Lepidoptera	Geometridae	*Camptogramma bilineata*	Yellow Shell	None
Insecta	Lepidoptera	Noctuidae	*Autographa gamma*	Silver Y	None
Insecta	Lepidoptera	Erebidae	*Euclidia mi*	Mother Shipton	None
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras reticulatum*	Netted Field Slug	LC
Gastropoda	Pulmonata	Hygromiidae	*Candidula intersecta*	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Cernuella virgata*	Striped Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Monacha cantiana*	Kentish Snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Aegopinella pura*	Clear Glass-snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Aegopinella nitidula*	Smooth Glass-snail	LC

Table 7: Species of compost-associated invertebrate recorded from the compost heap in the south-eastern corner of field F11 by the 2021 survey. The table is in taxonomic sequence.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Arachnida	Pseudoscorpiones	Chernetidae	*Lamprochernes savignyi*	Savigny's Shining Claw	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Xylocoris galactinus*	a flower bug	None
Insecta	Coleoptera	Hydrophilidae	*Cryptopleurum minutum*	a beetle	None
Insecta	Coleoptera	Ptiliidae	*Nephanes titan*	a featherwing beetle	None
Insecta	Coleoptera	Staphylinidae	*Oxypoda opaca*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Acrotona pseudotenera*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Lithocharis ochracea*	a rove-beetle	None
Insecta	Coleoptera	Cryptophagidae	*Cryptophagus acutangulus*	a beetle	None
Insecta	Coleoptera	Anthicidae	*Omonadus formicarius*	an ant-like flower beetle	LC

Table 8: Species of invertebrate recorded from the spoil banks at Winch Hill Farm by the 2021 survey. Key Species and Section 41 species are listed in red text. The table is in taxonomic sequence.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum sens. str.*	a common striped woodlouse	LC
Malacostraca	Isopoda	Oniscidae	*Oniscus asellus*	Common Shiny Woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Trachelipidae	*Trachelipus rathkii*	a woodlouse	LC
Arachnida	Araneae	Dysderidae	*Dysdera erythrina*	a spider	LC
Arachnida	Araneae	Araneidae	*Mangora acalypha*	a spider	LC
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx aurata*	a leafhopper	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Tingis cardui*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Dicyphus errans*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Himacerus mirmicoides*	Ant Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius senecionis*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Taphropeltus contractus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Stictopleurus punctatonervosus*	a rhopalid bug	NA
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Eysarcoris venustissimus*	Woundwort Shieldbug	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Eurydema oleracea*	Crucifer Shieldbug	LC
Insecta	Coleoptera	Carabidae	*Leistus spinibarbis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Notiophilus biguttatus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bembidion lampros*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Bembidion obtusum*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Pterostichus melanarius*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus affinis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus rufipes*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Ophonus ardosiacus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Ophonus rufibarbis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Scybalicus oblongiusculus*	a ground beetle	VU, NR
Insecta	Coleoptera	Carabidae	*Bradycellus verbasci*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Acupalpus meridianus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Brachinus crepitans*	Bombardier Beetle	LC, NS
Insecta	Coleoptera	Staphylinidae	*Tachyporus dispar*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Drusilla canaliculata*	a rove-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes lineatus*	a click-beetle	None
Insecta	Coleoptera	Melyridae	*Cordylepherus viridis*	a malachite beetle	LC
Insecta	Coleoptera	Kateretidae	*Brachypterus glaber*	a nettle pollen beetle	None
Insecta	Coleoptera	Kateretidae	*Brachypterus urticae*	a nettle pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes morosus*	a pollen beetle	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius litura*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Stethorus pusillus*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird	None
Insecta	Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta nigripes*	a flea-beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta vittula*	a flea-beetle	LC
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Rhinusa neta*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sirocalodes mixtus*	a weevil	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica sabuleti*	an ant	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pascuorum*	Common Carder-bee	None
Insecta	Diptera	Tephritidae	*Urophora stylata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Oxyna parietina*	a picture-winged fly	None
Insecta	Lepidoptera	Noctuidae	*Cucullia verbasci*	Mullein	None
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras reticulatum*	Netted Field Slug	LC
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras invadens*	Tramp Slug	LC
Gastropoda	Pulmonata	Arionidae	*Arion (Mesarion) subfuscus*	Dusky Slug	LC
Gastropoda	Pulmonata	Hygromiidae	*Candidula intersecta*	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Trochulus hispidus*	Hairy Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Trochulus striolatus*	Strawberry Snail	LC
Gastropoda	Pulmonata	Oxychilidae	*Oxychilus cellarius*	Cellar Snail	LC

Table 9: Species of saproxylic invertebrate recorded from the veteran Apple tree at Winch Hill Farm by the 2021 survey. Key Species and Section 41 species are listed in red text. The table is in taxonomic sequence.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Staphylinidae	*Haploglossa villosula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Dinaraea angustula*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Bisnius subuliformis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Quedius cruentus*	a rove-beetle	None
Insecta	Coleoptera	Elateridae	*Melanotus villosus sens. str.*	a click-beetle	None
Insecta	Coleoptera	Latridiidae	*Enicmus rugosus*	a beetle	Nationally Scarce
Insecta	Coleoptera	Mycetophagidae	*Eulagius filicornis*	a beetle	NA
Insecta	Coleoptera	Tenebrionidae	*Prionychus ater*	a darkling beetle	LC
Insecta	Coleoptera	Pyrochroidae	*Pyrochroa serraticornis*	Common Cardinal Beetle	LC
Insecta	Coleoptera	Cerambycidae	*Grammoptera ruficornis*	Common Grammoptera	LC

Table 10: Species of invertebrate recorded from Luton Parkway Verges DWS by the 2021 survey. Key Species and Section 41 species are listed in red text. The table is in taxonomic sequence.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum sens. str.*	a common striped woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse	LC
Arachnida	Araneae	Linyphiidae	*Tenuiphantes tenuis*	a spider	LC
Arachnida	Araneae	Araneidae	*Araniella cucurbitina sens. str.*	a spider	LC
Arachnida	Araneae	Araneidae	*Mangora acalypha*	a spider	LC
Arachnida	Araneae	Dictynidae	*Dictyna uncinata*	a spider	LC
Arachnida	Araneae	Clubionidae	*Clubiona comta*	a spider	LC
Arachnida	Araneae	Salticidae	*Salticus scenicus*	a jumping spider	LC
Diplopoda	Glomerida	Glomeridae	*Glomeris marginata*	Pill Millipede	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Diplopoda	Julida	Julidae	*Tachypodoiulus niger*	White-legged Millipede	LC
Collembola	Entomobryomorpha	Entomobryidae	*Orchesella cincta*	a springtail	None
Insecta	Odonata	Libellulidae	*Libellula depressa*	Broad-bodied Chaser	LC
Insecta	Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	LC
Insecta	Psocoptera	Ectopsocidae	*Ectopsocus briggsi*	a barkfly	None
Insecta	Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	*Craspedolepta nervosa*	a psyllid	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	*Psylla alni*	Alder Psyllid	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Aphrophora alni*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Philaenus spumarius*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Oncopsis alni*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupelix cuspidata*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx vittata*	a leafhopper	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Acalypta carinata*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Deraeocoris flavilinea*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Charagochilus gyllenhalii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Stenodema laevigata*	a mirid bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Miridae	*Heterotoma planicornis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Atractotomus mali*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Phylus coryli*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Plagiognathus chrysanthemi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Himacerus mirmicoides*	Ant Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Anthocoris nemorum*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius laevigatus*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Berytidae	*Berytinus minor*	a stiltbug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius huttoni*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Kleidocerys resedae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Heterogaster urticae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Drymus sylvaticus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Scolopostethus affinis*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Rhopalus subrufus*	a rhopalid bug	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hemiptera: Heteroptera	Scutelleridae	*Eurygaster testudinaria*	Tortoise Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Palomena prasina*	Common Green Shieldbug	LC
Insecta	Coleoptera	Hydrophilidae	*Megasternum concinnum/immaculatum*	a beetle	None
Insecta	Coleoptera	Leiodidae	*Agathidium varians*	a beetle	None
Insecta	Coleoptera	Staphylinidae	*Metopsia clypeata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Sepedophilus nigripennis*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus atriceps*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus dispar*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus hypnorum*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus nitidulus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus solutus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Aloconota gregaria*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Mocyta fungi agg.*	a rove-beetle	None
Insecta	Coleoptera	Elateridae	*Athous campyloides*	a click-beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Cantharidae	*Cantharis rustica*	a soldier-beetle	LC
Insecta	Coleoptera	Ptinidae	*Ochina ptinoides*	a woodworm	LC
Insecta	Coleoptera	Melyridae	*Malachius bipustulatus*	Malachite Beetle	LC
Insecta	Coleoptera	Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes carinulatus*	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes morosus*	a pollen beetle	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius chrysomeloides*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius litura*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Exochomus quadripustulatus*	Pine Ladybird	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Coccinellidae	*Propylea quattuordecimpunctata*	14-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	16-spot Ladybird	None
Insecta	Coleoptera	Latridiidae	*Enicmus transversus*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cartodere bifasciata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cortinicara gibbosa*	a beetle	None
Insecta	Coleoptera	Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle	LC
Insecta	Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis frontalis*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis maculata*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis pulicaria*	a beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Bruchidius varius*	a seed-beetle	NA
Insecta	Coleoptera	Chrysomelidae	*Cassida rubiginosa*	Thistle Tortoise Beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cassida vibex*	a tortoise beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR
Insecta	Coleoptera	Chrysomelidae	*Aphthona euphorbiae*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus succineus*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Sphaeroderma rubidum*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus fulvus*	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus labiatus*	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Cryptocephalus moraei*	a leaf-beetle	LC
Insecta	Coleoptera	Apionidae	*Ceratapion onopordi*	a weevil	None
Insecta	Coleoptera	Apionidae	*Aspidapion aeneum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Squamapion cineraceum*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Apionidae	*Taeniapion urticarium*	a weevil	None
Insecta	Coleoptera	Apionidae	*Pseudapion rufirostre*	a weevil	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Apionidae	*Protapion assimile*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion nigritarse*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion trifolii*	a weevil	None
Insecta	Coleoptera	Apionidae	*Apion frumentarium*	a weevil	None
Insecta	Coleoptera	Apionidae	*Stenopterapion tenue*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ischnopterapion loti*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Polydrusus formosus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Sitona humeralis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Hypera plantaginis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Dorytomus melanophthalmus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Orthochaetes setiger*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus obstrictus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus pallidactylus*	Cabbage Stem Weevil	None
Insecta	Coleoptera	Curculionidae	*Trichosirocalus rufulus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Trichosirocalus troglodytes*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Anthonomus rubi*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius junceus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius picirostris*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Tychius pusillus*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Mecinus pyraster*	a weevil	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica rubra*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica sabuleti*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica scabrinodis*	an ant	None
Insecta	Hymenoptera: Aculeata	Apidae	*Apis mellifera*	Honey Bee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lapidarius*	Large Red-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus lucorum/terrestris*	White-tailed/Buff-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pascuorum*	Common Carder-bee	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus pratorum*	Early Bumblebee	None
Insecta	Diptera	Tephritidae	*Urophora quadrifasciata*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Chaetorellia jaceae*	a picture-winged fly	None
Insecta	Lepidoptera	Gelechiidae	*Oxypteryx unicolorella*	a moth	Nationally Scarce B
Insecta	Lepidoptera	Tortricidae	*Aethes smeathmanniana*	Yarrow Conch	None
Insecta	Lepidoptera	Tortricidae	*Dichrorampha plumbana*	a moth	None
Gastropoda	Pulmonata	Cochlicopidae	*Cochlicopa lubrica*	Slippery Moss-snail	LC
Gastropoda	Pulmonata	Helicidae	*Cepaea hortensis*	White-lipped Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Candidula intersecta*	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Monacha cantiana*	Kentish Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Trochulus striolatus*	Strawberry Snail	LC
Gastropoda	Pulmonata	Punctidae	*Punctum pygmaeum*	Dwarf Snail	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Gastropoda	Pulmonata	Valloniidae	*Vallonia costata*	Ribbed Grass-snail	LC
Gastropoda	Pulmonata	Valloniidae	*Vallonia excentrica*	Eccentric Grass-snail	LC

GLOSSARY AND ABBREVIATIONS

Term	Definition
AOD	Above Ordnance Datum
BCT	Bat Conservation Trust
BLBAP	Bedfordshire and Luton Local Biodiversity Action Plan
BLICL	Bat Low Impact Class Licence
BNG	Biodiversity Net Gain
BoCC	Birds of Conservation Concern
BRMC	Biodiversity Recording and Monitoring Centre
BSBI	Botanical Society of Britain and Ireland
BSI	British Standards Institute
BTO	British Trust for Ornithology
℃	Degrees celcius
CPAR	Century Park Access Road
CRoW	Countryside and Rights of Way
CTA	Central Terminal Area
CWS	County Wildlife Site
DART	Direct Air Rail Transit
DCO	Development Consent Order
DNA	Deoxyribonucleic acid
DWS	District Wildlife Site
EC	European Commission
ECoW	Ecological Clerk of Works
eDNA	Environmental DNA
ES	Environmental Statement
EU	European Union
GB	Great Britain
GCN	Great crested newt
ha	Hectare
HBG	Hertfordshire Badger Group
HCC	Hertfordshire County Council
HERC	Herts Environmental Records Centre
HGBI	Herpetofauna Groups of Britain and Ireland
HLBAP	Hertfordshire Local Biodiversity Action Plan
ICAO	International Civil Aviation Organisation

Term	Definition
ILS	Instrument Landing System
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometre
LBAP	Local Biodiversity Action Plan
LBC	Luton Borough Council
the airport	London Luton Airport
LNR	Local Nature Reserve
LWS	Local Wildlife Site
m	Metre
m^2	Metre squared
m^3	Metre cubed
mm	Millimetre
mppa	Million passenger per annum
NCP	New Century Park
NE	Natural England
NERC	Natural Environment and Rural Communities
NGR	National Grid Reference
NNRs	National Nature Reserves
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
OS	Ordnance Survey
PRoW	Public Right of Way
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
VC	Vice County

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