Nutfield Park Developments Limited (Ltd)

Nutfield Green Park

Appendix H: Hazel Dormouse Survey Report

October 2023

This report may contain sensitive ecological information, it is the responsibility of the Local Authority to determine if this should be made publicly available

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1.0 NON-TECHNICAL SUMMARY

1.1 Suitable dormouse habitat was present within the survey area in the form of network of scrub, mature trees and woodland edge. A range of species were present which could provide a foraging resource for dormice, including bramble, oak, hazel and hawthorn.

1.2 Presence/likely absence dormouse surveys were undertaken by FPCR between June and November 2022 where no evidence of dormice was identified within the survey area.

2.0 INTRODUCTION

2.1 The following report has been prepared by FPCR Environment and Design Ltd (FPCR) on behalf of Nutfield Park Developments Limited (Ltd) to present the results of hazel dormouse *Muscardinus avellanarius* surveys completed on Former Laporte Works Site, Nutfield Road, Nutfield, Surrey (central OS Grid Reference: TQ30465103). Herein referred to as 'the Application site'.

2.2 This report has been produced as part of an Ecological Impact Assessment (EcIA) and the scope and objectives of the report are to:

- present the findings of the dormouse surveys undertaken in 2022.
- assess the relative importance of the survey area for dormice.
- review the site proposals and provide recommendations for mitigation, compensation and enhancement (if required).

Site Location and Context

1.1 The Site is approximately 58.8ha in size and is located to the North of the Village of Nutfield in the Tandridge borough area. It comprises a former quarry that has been historically restored and has become dominated by a mix of habitats. A large portion of the site is wooded, with some example of mature semi-natural woodlands present in the south, plantation woodlands in the centre/north of the Site and a large area of self-set birch/willow woodland in the centre of the Site. Two large pasture grasslands are present in the central/northern part of the Site, while a compartment of coarse grassland in present in the south-west of the Site. Small blocks of mixed scrub are scattered around the site while extensive areas of bramble scrub are present in the south-east and south-west. Three waterbodies are also present on Site which comprise two fishing lagoons in the north of the site and a central woodland pond.

1.2 In the surrounding landscape, the Site abuts the residential environs of Nutfield to the south. To the west lies a restored landfill site which sits between the Site and the extant Patteson Court Landfill Site. Eastwards, the landscape comprises a mix of woodlands, pasture grassland, arable fields and the Mercers South Quarry Site to the north-east. To the North lies additional areas of woodland and farmland before the landscape becomes dominated by the residential environs of South Merstham.

Site Proposals

1.3 The proposals include seeking outline planning permission for the development of the site for 166 new homes (Use Class C3) and an Integrated Retirement Community with 70 care home beds and 41 extra case facility beds. In addition, proposals include the creation of new access, landscaping and associated works to facilitate the development, in phases which are severable (Outline with all matters reserved, except for Access).

3.0 LEGISLATION AND POLICY

3.1 The hazel dormouse is legally protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is a European Protected Species (EPS) under the Conservation of Habitats & Species Regulations 2019 (EU Exit) (as amended). It is also a species of principal importance for the conservation of biodiversity under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

3.2 In summary, it is an offence to:

- intentionally or deliberately kill, injure or capture dormice.
- intentionally, deliberately or recklessly disturb dormice in such a way as to significantly affect their ability to survive, breed, rear/nurture their young or significantly affect their local distribution or abundance.
- intentionally or recklessly damage, destroy or obstruct access to places used by dormice for shelter or protection (whether occupied or not).
- intentionally or recklessly disturb a dormouse whilst occupying a place of shelter or protection.
- damage or destroy a dormouse breeding site or resting place.
- possess or transport a dormouse (or any part thereof) unless under licence.
- sell or exchange dormice.

3.3 Proposals which could lead to any of the above would require a derogation licence from Natural England alongside appropriate avoidance, mitigation and compensation measures.

4.0 METHODOLOGY

Desk Study

4.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Surrey Biodiversity Record Centre (SxBRC);
- Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk); and
- Tandridge District Council planning portal[1]

4.2 When handling data, species records were filtered to those within the last ten years, unless considered relevant to the site assessment.

Presence/Likely Absence Surveys

4.3 Dormouse surveys were undertaken in accordance with current good practice guidelines[2] by suitably qualified ecologists. Surveys involved placing standard dormouse nest tubes every 20m in suitable habitat, approximately 1.5m above ground. In 2022 a total of 236 tubes were installed onsite in May/June (*Figure 1*), with surveys completed on 1st July, 25th July, 26th August, 5th September, 20th October and 14th November.

4.4 The survey results are compared with an index of probability, which indicates the likelihood of finding dormice during this period (*Table 1*). The final survey score is calculated by multiplying the sum of the months that tubes were checked by the number of tubes used, based on 50 tubes as a standard (i.e. 50=1). Fewer tubes reduce the overall score (i.e. 25 tubes = 0.5) and more tubes increase the score (i.e. 100 tubes = 2). A survey effort score of 20 or above is required to provide confidence in the survey results. A final score of 94.4 was achieved following the 2022 survey.

Table 1: Index of probability for nest tube surveys

Month	Index of Probability
April	1
May	4
June	2
July	2
August	5
September	7
October	2
November	2

1 Ashford Borough Council Planning Portal - https://planning.ashford.gov.uk/ [Accessed 20.09.2021]

2 Bright, P., Morris, P. & Mitchell-Jones, T. (2006) The dormouse conservation handbook (2nd ed). English Nature, Peterborough.

5.0 RESULTS

Desk Study

Designated Sites

1.0 There were no sites designated for their bat assemblage within the Desktop Study Area.

Dormice records

5.1 Hazel dormice are widespread across suitable habitats throughout Surrey but there were no recent records close to the site identified.

Habitat Suitability

5.2 Suitable dormouse habitat was present within the survey area in the form of network of scrub, mature trees and woodland edge which provide commuting and nesting opportunities. A range of species were present which provide a foraging resource for dormice, including bramble, oak, hazel and hawthorn.

5.3 Dormouse tubes were spread along the boundary and internal scrub as well as in the broad-leaved woodlands onsite.

5.4 The scrub onsite largely comprised of dense bramble scrub, but areas of more diverse native species scrub were also present in the north, south-east and central part of the that provided a varied structure that is suitable for foraging, commuting and nesting hazel dormice; the scrub on site composed of predominately hawthorn or bramble.

5.5 The woodlands onsite are a mixture of lowland mixed deciduous woodland, other mixed woodlands and other broadleaved woodlands. They contain alder, downy birch, English oak, poplars, willows, sitka spruce, sycamore, ash, elder and beech trees. The woodlands are distributed across the Site but there was a higher concentration of them to the south of the Site and a large section towards the centre between the two pasture grasslands. The ground flora across the site's woodlands included nettles, ground ivy and garlic mustard.

Presence/Absence Surveys

5.6 In the 2022 surveys no dormouse nests were identified.

5.7 A summary of the 2022 data is provided in *Table 2.*

Table 2: 2022 Dormouse Survey Dates, Scores and Results

Date (Score)	Dormouse Evidence Recorded
1st July 2022 (2)	None
25th July 2022 (2)	None
26th August 2022 (5)	None
5th September 2022 (7)	None
20th October 2022 (2)	None

Date (Score)	Dormouse Evidence Recorded
14th November 2022 (2)	None

6.0 DISCUSSION

6.1 The evidence collected during the desktop study and field surveys demonstrates that this species is currently absent from the habitats onsite. It is therefore considered that there is no constraint to the development proposals.

6.2 The proposals will retain and enhance the shrub and woodland vegetation existing onsite, improving foraging, commuting and resting habitats for this species.

Key

- Red Line Boundary
- Dormouse tube locations

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Figure 1

Nutfield Park Developments Limited (Ltd)

Nutfield Green Park

Appendix I: Great Crested Newt Survey Report

October 2023

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Figure 1: Waterbody Location & Survey Plan

1.0 NON -TECHNICAL SUMMARY

1.1 FPCR were commissioned by Nutfield Park Developments Limited (Ltd) to undertake surveys for great crested newts at Nutfield Green Park to provide an ecological baseline for the application site and determine presence of great crested newts.

1.2 The habitats on the site comprise rank grassland, pasture grassland, bramble, hawthorn and mixed scrub, and woodland (lowland mixed deciduous, other broadleaved and mixed). There are mature trees and hedgerows located within and around the site. Three ponds are located north of the proposed development area.

1.3 The proposed development is to take place in the southern half of the site, with the northern part of the site being retained and enhanced for biodiversity.

1.4 Habitat Suitability Index (HSI) and eDNA surveys for great crested newts were undertaken in April 2023 for the three onsite ponds, and fifteen waterbodies within 250m of the Site boundary.

1.5 Following this, eDNA surveys were undertaken on all ponds within 250m of the Site for which access was granted. This confirmed the presence of GCN in two ponds in the North of the Site, consistent with historic surveys that have identified a medium population of GCN in these ponds.

1.6 The vast majority of works will take place further than 250m (the normal dispersal distance for GCN) from the breeding ponds and will therefore not be constrained by the proposals.

1.7 Works within 250m of GCN breeding ponds are small scale in nature, comprising the resurfacing of a footpath and the creation of a series of ponds. These works should be completed under a precautionary working method statement.

1.8 The proposals include extensive habitat enhancement and creation measures, with 88% of the total Site boundary proposed for green infrastructure with a focus on enhancing the biodiversity value of the Site. The enhancement of pasture grassland fields into native species-rich meadows and the enhancement and creation of existing and new ponds respectively will provide extensive areas of optimal foraging and breeding habitat for GCN.

2.0 INTRODUCTION

2.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Nutfield Park Developments Limited (Ltd) to present the results of great crested newt *Triturus cristatus* (GCN) surveys completed at Nutfield Green Park, Former Laporte Works Site, Nutfield Road, Nutfield, Surrey (central OS grid reference TQ 30533 50982), hereafter referred to as 'the Site'.

2.2 A suite of ecological surveys have been undertaken on the Site and this report should be read in conjunction with the Ecological Impact Assessment (EcIA, FPCR 2023).

2.3 The scope and objectives of the report are to:

- present the findings of the GCN surveys undertaken in 2023.
- assess the relative importance of the survey area for GCN.
- review the site proposals and provide recommendations for mitigation, compensation and enhancement.

Site Location and Context

2.4 The Site is approximately 58.8ha in size and is located to the North of the Village of Nutfield in the Tandridge borough area. It comprises a former quarry that has been historically restored and has become dominated by a mix of habitats. A large portion of the site is wooded, with some example of mature semi-natural woodlands present in the south, plantation woodlands in the centre/north of the Site and a large area of self-set birch/willow woodland in the centre of the Site. Two large pasture grasslands are present in the central/northern part of the Site, while a compartment of coarse grassland in present in the south-west of the Site. Small blocks of mixed scrub are scattered around the site while extensive areas of bramble scrub are present in the south-east and south-west. Three waterbodies are also present on Site which comprise two fishing lagoons in the north of the site and a central woodland pond.

2.5 In the surrounding landscape, the Site abuts the residential environs of Nutfield to the south. To the west lies a restored landfill site which sits between the Site and the extant Patteson Court Landfill Site. Eastwards, the landscape comprises a mix of woodlands, pasture grassland, arable fields and the Mercers South Quarry Site to the north-east. To the North lies additional areas of woodland and farmland before the landscape becomes dominated by the residential environs of South Merstham.

Site Proposals

2.6 The proposals include seeking outline planning permission for the development of the site for 166 new homes (Use Class C3) and an Integrated Retirement Community with 70 care home beds and 41 extra case facility beds. In addition, proposals include the creation of new access, landscaping and associated works to facilitate the development, in phases which are severable (Outline with all matters reserved, except for Access).

3.0 LEGISLATION AND POLICY

3.1 Great crested newts and the places they use for refuge and breeding are protected under Schedule 2 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats & Species Regulations 2019 (EU Exit) (as amended).

3.2 They are also a European Protected Species (EPS) and protected under Annexes II and IV of the EU Habitats and Species Directive and Appendix II of the Bern Convention.

3.3 In summary, it is an offence to:

- deliberately or recklessly take, injure or kill a great crested newt.
- intentionally or recklessly damage, destroy or obstruct access to any structure or place used for breeding, shelter or protection by the species.
- intentionally or recklessly disturb while it is occupying a structure or place which it uses for such purpose.
- intentionally take or destroy the eggs of a great crested newt.

3.4 This legislation equally protects all life stages, including eggs, efts and adults.

3.5 Proposals which could lead to any of the above would require a derogation licence from Natural England alongside appropriate avoidance, mitigation and compensation measures.

4.0 METHODOLOGY

Desk Study

4.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Surrey Biodiversity Information Centre (SBIC)
- Multi Agency Geographic Information for the Countryside (MAGIC)[1]
- Tandridge District Council planning portal[2]

4.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Habitat Suitability Index Survey

4.3 The habitats within the survey area were assessed for their potential to support GCNs during both their breeding and terrestrial phases, including an assessment of waterbodies. In addition, access was sought to assess waterbodies within a 250m radius of the site which had suitable connective habitat to the site.

4.4 All accessible waterbodies were assessed using a Habitat Suitability Index (HSI)[3]. The HSI incorporates ten suitability indices, all of which are factors known to affect this species:

- Geographic location
- Pond area
- Pond drying
- Water quality
- Shade
- Presence of waterfowl
- Presence of fish
- Number of linked ponds
- Terrestrial habitat
- Macrophytic coverage

4.5 A score is assigned for each attribute and a total score is calculated between 0 and 1. Pond suitability is then determined according to the scale in *Table 1*.

Table 1: HSI scale

HSI Score	Pond Suitability
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

[1] MAGIC - https://magic.defra.gov.uk/

[2] Wealden District Council Planning Portal - https://www.wealden.gov.uk/planning-and-building-control/

[3] Oldham, R.S., Keeble, K., Swan, M.J.S. & Jeffcote, M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal*, 10(4), 143-155.

eDNA Survey

4.6 eDNA sampling was undertaken, in accordance with the recommended protocol[4], on seventeen waterbodies, on 21st April 2023. The locations of these ponds are shown in *Figure 1*.

4.7 Sampling was undertaken by suitably trained and licenced ecologists (2019-39014-CLS-CLS; 2022-10624-CL08-GCN). From each pond, 20 agitated water samples were taken, mixed thoroughly and then 15ml placed into six sample tubes. They were sent to the ADAS laboratory in Helsby, Cheshire for analysis. The possible results are summarised in *Table 2*.

Table 2: Possible results of eDNA analysis

Result	Description
Positive	A positive result means GCN eDNA was detected and they have been present within the water in the 20 days preceding sampling. A score is provided indicating the number of positive replicates from a series of twelve.
Negative	GCN eDNA was not detected. Where samples are negative, further testing for PCR inhibitors and degradation of the sample is undertaken.
Indeterminate	Controls indicate degradation or inhibition of the sample. Therefore, the lack of detection of GCN eDNA is not conclusive evidence for determining the absence of this species using the sample provided.

Limitations

4.8 Access was not granted to survey two out of nineteen ponds within 250m of the site in 2022. However, a sufficient number of waterbodies were surveyed, including all ponds present on-site, to give a reliable indication of the presence of GCN in the area. This assessment is also supported by publicly available data from surrounding applications. Therefore, the information provided in this report allows for a suitable assessment of the potential impacts on the local GCN population as a result of the development.

4.9 One pond (P5) returned an indeterminate result following eDNA analysis. This pond is an ephemeral pond that is only present after a period of rain. This pond is therefore considered unsuitable to support a breeding population of great crested newts. During the assessment carried out in 2018 by ESL, this pond was absent up until May 2018, when an eDNA survey was carried out. The survey returned a negative result, confirming the likely absence of this species with waterbody P5.

[4] Biggs, J. *et al.* (2014) *Analytical and Methodological Development for Improved Surveillance of the Great Crested Newt.* Appendix 5: Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

5.0 RESULTS

Desk Study

5.1 Eight historical GCN records within 2km of the site were provided by SBIC in 2023. The eight records were from seven ponds, which included P1, P2 and P3. The remaining ponds were all located over 1km from the site boundary.

5.2 There were no EPS mitigation licences relating to GCN within 500m of the site.

5.3 Surveys for GCN were undertaken of ponds P1 to P17 in 2018 by ESL (Ecological Services) Ltd. GCN were only recorded within Ponds P2 and P3, which supported a medium size class population of GCN's. None of the other waterbodies were found to contain GCN.

Habitat Suitability

5.4 Suitable terrestrial habitat on site included woodland, hedgerows, scrub and taller grass around ponds and hedgerows throughout site. Most of the grassland onsite is grazed and therefore suboptimal for GCN. Rank grasslands in the south of the Site provided better quality foraging habitats for GCN.

5.5 The HSI scores for 18 accessible ponds in 2023 are summarised in *Table 3*.

Table 3: HSI scores and pond suitability

Pond	HSI Score	HSI Category	Predicted Presence
P1	0.20	Poor	3%
P2	0.28	Poor	3%
P3	0.50	Below average	20%
P4	0.74	Good	79%
P5	0.48	Poor	3%
P6	0.64	Average	55%
P7	0.53	Below average	20%
P8	0.58	Below average	20%
P9	0.47	Poor	3%
P10	0.47	Poor	3%
P11	0.51	Below average	20%
P12	0.41	Poor	3%
P13	0.51	Below average	20%
P14	0.51	Below average	20%
P15	0.42	Poor	3%
P16	0.74	Good	79%
P17	0.69	Average	55%
P20	0.41	Poor	3%

eDNA Survey

5.6 Of the eighteen waterbodies surveyed in 2023 for GCN eDNA, the results are as follows:

- Positive indicating GCN presence: P2 & P3
- Negative indicating GCN absence: P1, P4, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P20
- Indeterminate indicating that neither presence nor absence could be determined by eDNA analysis: P5

5.7 Although the eDNA result for pond P5 was indeterminate, this pond is ephemeral and only appears after a period of rain. This pond is therefore considered unsuitable to support a breeding population of GCN.

5.8 Full survey results are illustrated in *Figure 2.*

5.9 A summary of the eDNA surveys by FPCR as well as data from an assessment carried out by ESL (Ecology Services) in 2018 are summarised in *Table 4*. Of the 20 ponds identified as relevant to site within 250m:

- 1 on-site pond and 1 offsite pond support GCN.
- 1 on-site pond and 14 offsite ponds did not support GCN.
- 1 on-site pond (P5) is ephemeral, only appearing after rain and has therefore been scope out as suitable for GCN.
- 2 offsite ponds were not accessible for GCN surveys.

Table 4: Pond Summary

Pond	On site/ Offsite	Access Granted?	FPCR eDNA Survey Year	Result	Info from Desk Study
P1	On site	Yes	2023	Negative	Negative (2018)
P2	On site	Yes	2023	Positive	Medium breeding population (2018)
P3	Offsite	Yes	2023	Positive	Medium breeding population (2018)
P4	Offsite	Yes	2023	Negative	Negative (2018)
P5	On site	Yes	2023	Indeterminate	Negative (2018)
P6	Offsite	Yes	2023	Negative	Absent (2018)
P7	Offsite	Yes	2023	Negative	Absent (2018)
P8	Offsite	Yes	2023	Negative	Absent (2018)
P9	Offsite	Yes	2023	Negative	Absent (2018)
P10	Offsite	Yes	2023	Negative	Absent (2018)
P11	Offsite	Yes	2023	Negative	Absent (2018)
P12	Offsite	Yes	2023	Negative	Absent (2018)
P13	Offsite	Yes	2023	Negative	Absent (2018)
P14	Offsite	Yes	2023	Negative	Absent (2018)
P15	Offsite	Yes	2023	Negative	Absent (2018)
P16	Offsite	Yes	2023	Negative	Absent (2018)
P17	Offsite	Yes	2023	Negative	Absent (2018)
P18	Offsite	No	-	-	-
P19	Offsite	No	-	-	-

Pond	On site/ Offsite	Access Granted?	FPCR eDNA Survey Year	Result	Info from Desk Study
P20	Offsite	Yes	2023	Negative	-

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 Two ponds within the survey area have been confirmed as supporting GCN in 2023, including ponds P2 onsite near to the northern boundary and pond P3 present offsite, to the north.

6.2 An assessment of the population on site and the meta-population in the local area cannot be determined without further population surveys. However, the wealth of data from the desk study and historic surveys indicate a medium population of GCN is present in the North of the Site, with eDNA surveys in 2023 confirming the likely presence of this population still onsite spread over a large area including the site and areas within 500m to the east and west of site.

Impact Assessment

6.3 The vast majority of the development proposals are in the South of the Site, over 250m from the GCN population identified (i.e. the normal dispersal distance for GCN). It is therefore considered extremely unlikely that GCN would be present within the main development platform for the proposals and the presence of this species does not pose a constraint to the majority of the proposals.

6.4 Proposals do however include the resurfacing of a footpath running north from the development, between ponds P2 and P3 and the creation of a series of ponds within 250m of these ponds. In the absence of mitigation, there is potential for adverse impacts on GCNs including:

- Loss of terrestrial habitat through vegetation clearance to facilitate pond digging.
- Incidental harm during site clearance and path resurfacing.

6.5 Recommended mitigation and compensation measures will therefore aim to avoid killing or injuring GCNs during works and to maintain their Favourable Conservation Status (FCS) in the local area post-development. Due to the small scale nature of the works within 250m of the GCN breeding ponds identified, it is considered unlikely that a Natural England Mitigation Licence would be required to facilitate these works. Rather, they should be carried out under a precautionary working method statement that can be secured through an appropriately worded condition. This should include measures to avoid harm to GCN such as ecological supervision during vegetation clearance works, fingertip searches of areas to the dug for ponds prior to works and the proper storage of materials.

6.6 The green infrastructure proposals for the Site include the enhancement of pasture grasslands into native species-rich meadow grasslands which will provide a significant enhancement in the availability of optimal foraging habitats for GCN as diverse grasslands will attract invertebrate prey species to the Site. Furthermore, the proposals include the enhancement of existing ponds and the creation of a series of new interconnected pools will provide additional optimal foraging habitat.

6.7 Enhancement of wetland features will include the provision of aquatic, emergent and marginal planting to further attract invertebrate prey species to the Site will further enhance foraging opportunities for GCN. The creation of a series of new ponds will also provide additional breeding opportunities for GCN, allow this species to increase its range across the Site. Furthermore, the drainage proposals will aim to ensure pond P5 holds water throughout the year which will provide further breeding habitat. The drainage proposals have been designed to ensure that the water quality of the existing breeding ponds is not affected by surface water run off by ensuring water if filtered through a series of cascading drainage ponds.

7.0 CONCLUSION

7.1 GCN have been recorded as being present onsite in the north of the Site, with the area proposed for green infrastructure.

7.2 The only ground-breaking works anticipated to be completed within 250m of any ponds identified as supporting GCN includes path resurfacing works and the creation of a series of ponds. These works are anticipated to be minor in nature, with pond creation works ultimately leading to an enhancement of the site for GCN by providing additional breeding opportunities.

7.3 It has been recommended that all works within 250m of a GCN pond are therefore completed under a precautionary working method statement to reduce the risk of these minor works causing an offence.

7.4 The extensive habitat creation and enhancement works proposed onsite are anticipated to lead to beneficial impacts on GCN by providing addition foraging, commuting, shelter and breeding habitat.

Key

- Site Boundary
- 250m buffer
- 500m buffer

Pond eDNA Results

- Positive
- Negative
- Indeterminate
- Dry
- No Access

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17 P18 P19 P20

Nutfield

0 100 200 300 400 500 m

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client
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project
Nutfield Green Park

Drawing Title
Waterbodies & eDNA Survey Plan

scale @ A3	drawn	issue date
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Figure 1

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APPENDIX J:

INVERTEBRATE SURVEY OF NUTFIELD GREEN PARK

MARK G. TELFER

16TH FEBRUARY 2023
VERSON 2: REVISED AND UPDATED 6TH OCTOBER 2023

THIS REPORT WAS COMMISSIONED BY FPCR ENVIRONMENT AND DESIGN LTD

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This report should be quoted as:
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Cover photograph: a view across the field nearest the Inn on the Pond public house.

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1 Summary

- This report describes a general invertebrate survey of the site of the proposed Nutfield Green Park, within the district of Tandridge, Surrey, based on four fieldwork visits: 10th June, 23rd June, 2nd August and 9th September 2022.
- 429 species of invertebrate were recorded, an extremely high species total for a four-visit survey, covering a very wide range of taxonomic groups but focusing on beetles and bugs.
- A single invertebrate Species of Principal Importance was found, the Small Heath butterfly *Coenonympha pamphilus*.
- 26 species from the list of 429 are here regarded as 'Key Species' (i.e., with rare, scarce, threatened or near threatened conservation status); they comprise 6.1% of the total.
- 7 species from the list of 429 are here regarded as 'Rare Key Species' (i.e., with rare or threatened conservation status); they comprise 1.6% of the total.
- Pantheon analysis showed that the survey area supported a high quality assemblage of 'short sward & bare ground' species, and a high quality assemblage of 'decaying wood' species.
- The evidence indicates that the Nutfield Green Park survey area is of local importance overall for invertebrate conservation, but with two component areas which should be regarded as important at the county scale:
- (i) the northernmost field (near the Inn on the Pond public house) for species of sandy grassland with areas of short sward and bare ground, and
- (ii) the main central block of woodland for species of dead and decaying wood.
- Recommendations are made for the retention and appropriate management of the sandy grassland.
- Recommendations are made for enhancements to the habitat for invertebrates of dead and decaying wood, and for other woodland invertebrates.
- This updated version of the report takes into account the latest Site Location Plan, the latest draft masterplan (07/2023) and the latest draft landscape and ecology strategy plan (16 August 2023).

2 Introduction

2.1 THE SURVEY AREA

The Nutfield Green Park survey area lies in the district of Tandridge in eastern Surrey. It is bordered to the south by Nutfield village and the A25 Nutfield Road, to the east by Church Hill/ Nutfield Marsh Road, to the north by Chilmead Lane, and to the west by an area of former landfill (Figure 1). The site is largely within the grid squares TQ3050 and TQ3051, extending slightly into the adjacent squares to the west.

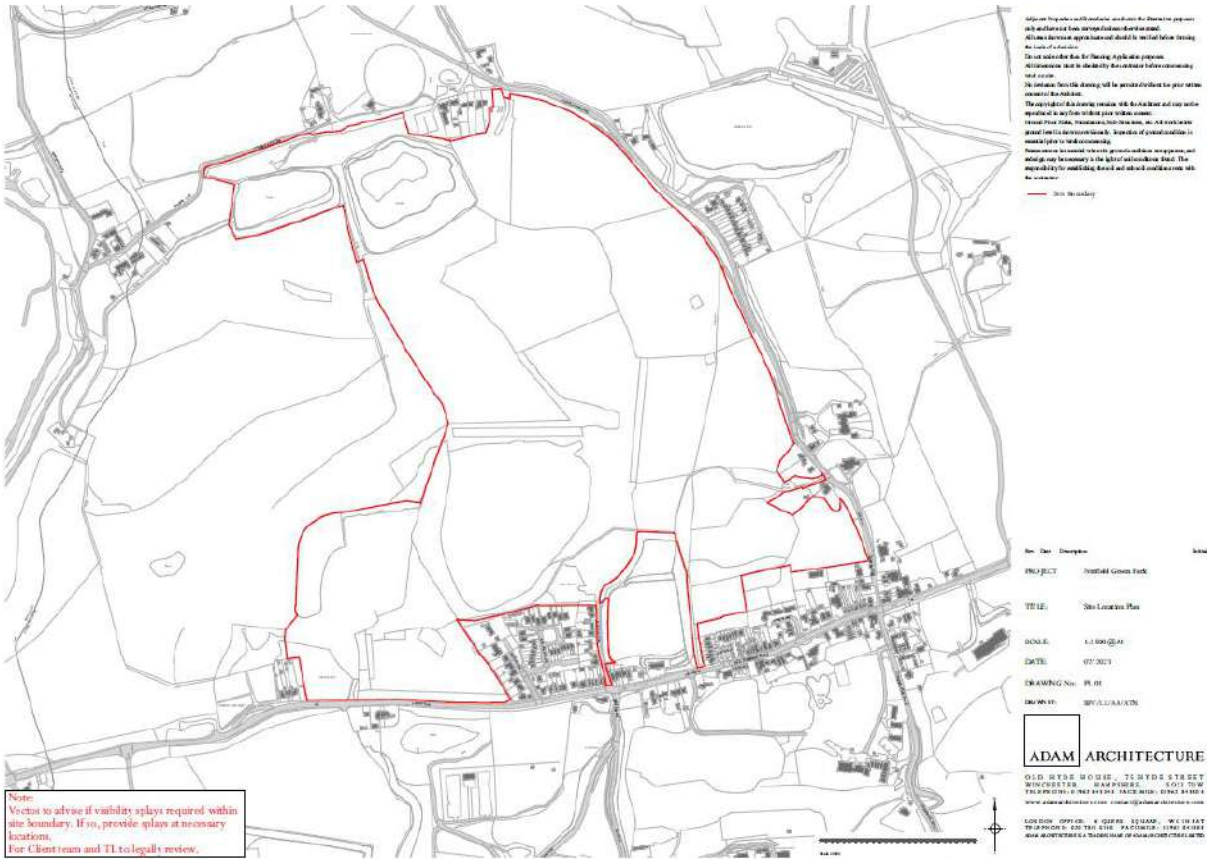

Figure 1: The Nutfield Green Park survey area is delimited by the red line.

For the purposes of this invertebrate survey, the survey area was divided into a number of compartments, and these have been named as shown in Figure 2 below.

The survey area largely consists of woodland and pasture, as well as three lakes. The woodland is varied, with some patches of older, long-established woodland, as well as areas of plantation and secondary woodland of rather recent origin. Much of the Central Woods appears to have established or been planted on the former site of the Laporte Earthworks, which was an operational mineral extraction and processing facility until 1986 before it was decommissioned in 1997.

The South-eastern Woods includes a large central glade, dominated by bramble thicket but still with remaining patches of grassland (Figure 3). A similar glade, the Square Glade, with bramble thicket as well as herb-rich vegetation in patches and path-side strips, occupies a quadrilateral between the south-eastern and central woodland blocks. An impenetrable ride

crosses the central woodland to provide clearance around electrical cables, but otherwise the woodlands have very few clearings, glades or open rides.

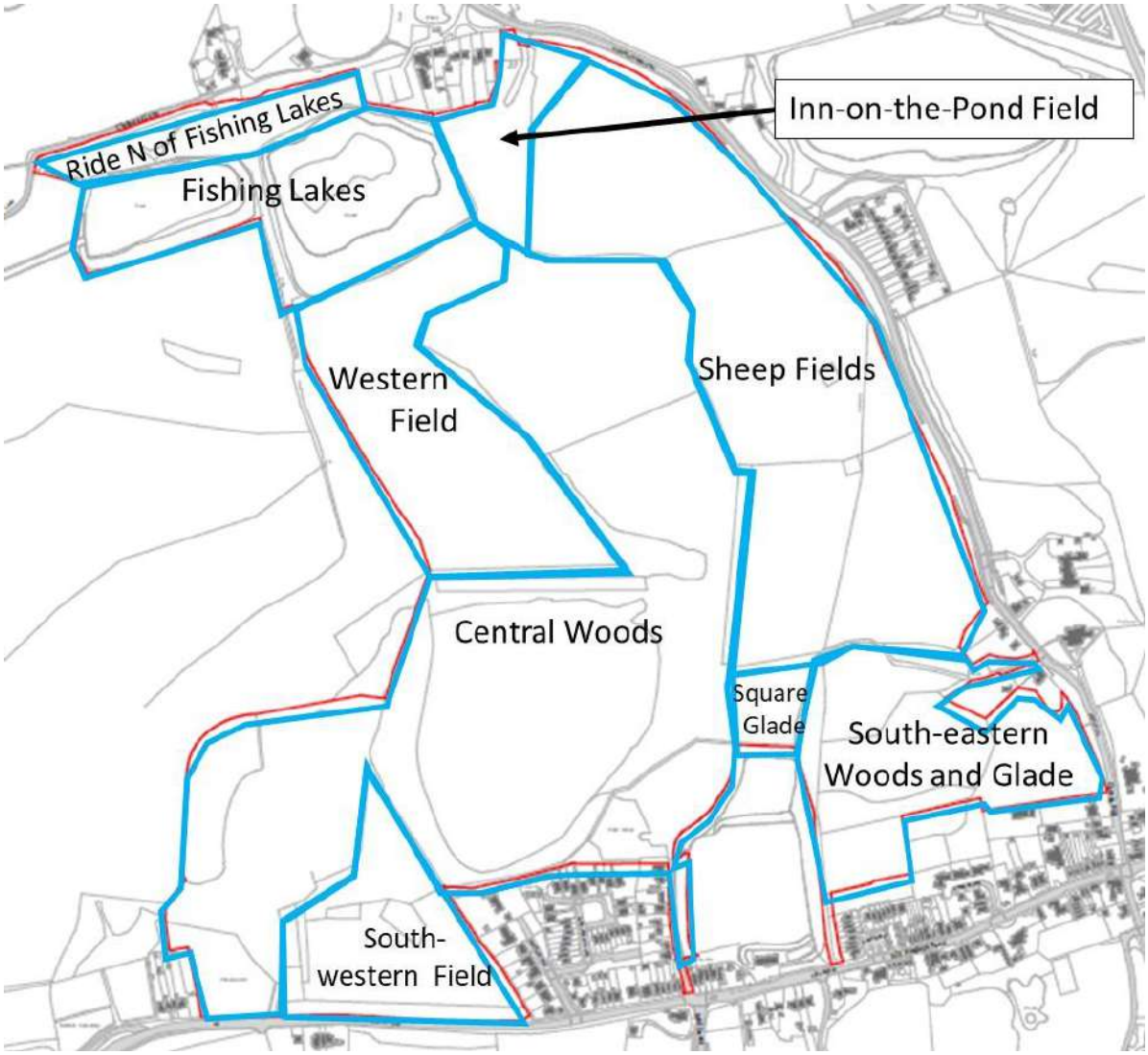

Figure 2: Sketch map of the survey compartments (outlined in blue) and their names.

Figure 3: Large central clearing in the south-eastern woodland, with bramble thickets.

The largest area of pasture lies along the eastern edge of the site, adjacent to Church Hill/ Nutfield Marsh Road, mapped as four contiguous fields (Figure 1) and referred to here as the Sheep Fields and the Inn-on-the-Pond Field (Figure 2). At the time of the survey, the Sheep Fields had recently been used for grazing sheep. Bird's-foot-trefoil *Lotus corniculatus* and Grass Vetchling *Lathyrus nissolia* were noted as frequent in these fields. Bird's-foot-trefoil was also a feature of the Western Field.

The small, northernmost field, named for its proximity to the Inn on the Pond public house, supported less frequently grazed grassland and a richer variety of herbs (see cover photograph). Towards the northern end of this field, dry, sandy grassland predominated, with extensive rabbit burrows and an extensive cover of bare or sparsely-vegetated ground (Figure 4). St-John's-wort *Hypericum* sp. was a notable feature of the vegetation here.

Figure 4: Dry, sandy grassland in the Inn on the Pond field.

The South-western Field appeared to have been ungrazed for several years and parts of this field had become impenetrable with bramble thicket and dense vegetation. Where the vegetation remained more open, there was a moderate variety of herbaceous plants to sample, and potentially valuable ecotone habitats where grassland graded into scrub and woodland.

The two Fishing Lakes lie in the north-western part of the survey area, the western of these is actively managed, whereas the eastern is currently unmanaged and overgrown. A similar lake lies in the base of the old quarry workings within the Central Woods. To the north of the Fishing Lakes is a scrubby ride with open, rabbit-grazed lawns (Figure 5), of similar character to the woodland glades elsewhere.

Figure 5: Ride north of the Fishing Lakes.

2.2 PREVIOUS INVERTEBRATE SURVEY AND RECORDING

An invertebrate survey was undertaken by Andy Jukes in 2018, with a scoping survey visit on 18th April, followed by survey visits on 23rd August and 5th September (Cook and Bennett, 2021). 177 species of invertebrate were recorded, including six species with a national conservation status, though three 'are now regarded as being quite common and no longer warrant their status'. Invertebrates were assessed as being 'an important ecological feature of the Site within the zone of influence, at least of local or district value'.

The author is not aware of any other previous invertebrate survey results, or casual invertebrate recording, from the survey area.

2.3 SPECIES OF PRINCIPAL IMPORTANCE

Species of Principal Importance (SPI) are species regarded as 'of principal importance for the purpose of conserving biodiversity' with respect to Section 41 of the Natural Environment and Rural Communities Act 2006. To the author's knowledge, one invertebrate SPI has been recorded from the survey area in recent years: Small Heath butterfly *Coenonympha pamphilus*.

2.3.1 *Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath butterfly

Small Heath butterfly *Coenonympha pamphilus* was regarded as a 'research only' SPI until recently. 'Research only' SPI are all moths or butterflies which were previously added to the UK Biodiversity Action Plan for research action only, and currently retain an equivalent

status following their transfer to the Section 41 list of SPI. They are all widespread and often common species which have been undergoing declines in abundance or contractions in range. Conservation action for these 'research only' species is focused on further research rather than protection of individual sites.

However, Natural England's Pantheon application (see Section 3.4.2 for further details) no longer treats Small Heath as a 'research only' species, presumably following the assessment by Fox *et al.* (2022) that Small Heath is now Vulnerable (VU) (having been previously assessed as Near Threatened (NT)).

Small Heath was recorded during the 2018 invertebrate survey (Cook and Bennett, 2021).

This butterfly inhabits grassland, favouring shorter swards of fine-leaved grasses on well-drained soils. The caterpillars feed on a variety of grasses including fescues *Festuca*, meadow-grasses *Poa* and bents *Agrostis* (Asher *et al*., 2001).

Survey for this species is best carried out by direct observation, targeting adults during their flight period from late April to early October.

2.4 DEVELOPMENT PROPOSALS

Draft proposals seen by the author are for the development of new homes and an Integrated Retirement Community, along with the creation of new access, landscaping and associated works to facilitate the development. The developed areas form three clusters, approximately covering (i) the South-western Field and adjacent parts of the Central Woods, (ii) the Square Glade and adjacent parts of the Central Woods, and (iii) the South-eastern Woods and Glade. 88% of the survey area (51.87 ha of a total area of 58.8 ha) is to be non-developed land, including greenspace and an outdoor activity park.

2.5 OBJECTIVES

In view of the previous assessment of importance for invertebrates, and the potential for the habitats present to support important species and assemblages of invertebrates, including rare and scarce species and Species of Principal Importance, an invertebrate survey was required in 2022 to assess the importance of the area for invertebrates.

The objectives of the survey fieldwork were:

- to sample invertebrates from representative examples of the habitats and habitat features present, targeted according to their potential importance, and
- to assess the importance for invertebrates of the survey area and its component habitats and habitat features.

3 Methods

3.1 FIELDWORK TIMING AND WEATHER

Fieldwork was carried out over the course of four visits: 10th June, 23rd June, 2nd August and 9th September 2022. Table 1 provides a summary of survey activity on each visit. All fieldwork was carried out by the author, assisted on the second visit by Stefan Harrison.

Invertebrate activity is significantly affected by the weather, which can seriously diminish the effectiveness of some sampling techniques. On the current survey, all survey dates were chosen to coincide with reasonably good weather forecasts. The final visit was mildly

hampered by a heavy shower but productive fieldwork was still possible for the great majority of this visit (Table 1).

Table 1: Dates of survey visits in 2022, summaries of survey activity and weather conditions.

Date	Activity	Weather conditions
10th June	Wide-ranging reconnaissance of the survey area, including the lakes, with sampling focused on sweep-netting, beating, and direct observation, with more limited deadwood sampling.	18 to 20 °C. Sunny intervals. Gentle to Moderate Breeze (F3 to F4) from the South-west. Dry.
23rd June	Sampling the Inn on the Pond Field using suction sampling, sweep-netting, beating and direct observation. Sampling the South-eastern Woods and Glade using sweep-netting, beating and direct observation. Sampling the South-western Field using suction sampling, aerial-netting, sweep-netting, beating and direct observation. Survey fieldwork in company with Stefan Harrison.	18 to 22 °C. Mostly dull, with brief sunny intervals. Light to Gentle Breeze (F2 to F3) from the North-east. Dry.
2nd August	Sampling the South-western Field and hedges using sweep-netting, beating and direct observation. Roaming through the woodlands using beating, sweep-netting and deadwood sampling. Sampling the southern and south-eastern fringes of the survey area using beating, sweep-netting and sieving.	20 to 25 °C. Light cloud with sunny intervals. Gentle Breeze (F3) from the South-west. Dry.
9th September	Sampling the Inn on the Pond Field, and the Ride north of the Fishing Lakes using sweep-netting, beating and direct observation. Sampling within the Central Woods using sweep-netting, beating and direct observation, together with deadwood sampling.	14 to 19 °C. Dull and damp at first, after a rainy night. Light cloud with sunny intervals. Gentle Breeze (F3) from the South-west. Brief spells of light drizzle, with one heavy shower at 12:00.

3.2 SAMPLING TECHNIQUES

On each visit, a range of techniques was used, as appropriate, to sample for invertebrates (Table 2). These sampling techniques are described in further detail by Drake *et al.* (2007).

Throughout the time in the field, direct observation was used to generate records from otherwise redundant time while walking between sampling points, etc., this being a particularly effective way to record butterflies such as Small Heath (Section 2.3.1).

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

Technique	Target groups	Target habitats
Ground-searching, turning over stones, logs, reptile felts, etc. and hand-searching through vegetation and plant litter.	A wide range of ground-living invertebrates, particularly beetles (Coleoptera) and bugs (Heteroptera), ants (Hymenoptera: Formicidae) woodlice (Isopoda) and molluscs.	All open habitats and woodland habitats.
Sieving.	A wide range of invertebrates including beetles and bugs, being especially effective for smaller species.	Any microhabitat such as leaf-litter, grass tussocks, flood debris, dung, carrion, nests, fungi, deadwood, that can be broken up and shaken in a sieve.
Suction-sampling.	As above but particularly effective for finding some of the smaller, well-hidden or well-disguised species living on the ground and in the sward.	All open habitats.
Sweep-netting with a stout canvas net.	Beetles and bugs and many other invertebrates.	All vegetated habitats, paying particular attention to potential food-plants and to nectar and pollen sources.
Beating.	Beetles, bugs and many other invertebrates on the branches, flowers and foliage of shrubs and trees.	Trees and shrubs.
Aerial netting and spot-netting (using a lightweight 'butterfly net').	Flies (Diptera), bees and wasps (Hymenoptera: Aculeata) and many other insects.	All habitats, favouring sheltered environments, e.g., adjacent to trees and scrub, paying particular attention to nectar and pollen sources.
Direct observation.	Bees, wasps, flies, butterflies and moths (Lepidoptera), grasshoppers and crickets (Orthoptera), dragonflies (Odonata), etc.	All habitats, paying particular attention to nectar and pollen sources.

Deadwood sampling is here used as a catch-all term for a wide-ranging set of techniques for recording the invertebrates associated with the dead and decaying parts of trees and

shrubs. On the current survey, sampling for deadwood invertebrates was carried out by beating foliage, flowering shrubs and attached dead branches, sweep-netting under and around trees, examining damaged, decaying and dead wood, standing, hanging and fallen, looking under bark, sieving removed bark, looking in cobwebs on trunks, looking for exit holes or larval workings, examining any rot-holes and sap-runs, investigating hollows, sieving red-rotten heartwood and other decaying wood substrates, and examining any fungal fruiting bodies associated with trees.

3.3 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 surveyors' own libraries and entomological collections. Selected specimens have been retained in the surveyors' personal collections as vouchers.

3.4 ANALYSIS

3.4.1 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 official conservation status is regarded as being out of date, this is indicated in the Key Species results (Section 4.3) and is taken into account in the survey area assessment (Section 5).

3.4.2 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). To calculate the SQI for a list of species, all species are first allocated one of five Species Quality Scores (1, 4, 8, 16 or 32), with the common and widespread species scoring 1 and the most endangered species scoring 32 (https://pantheon.brc.ac.uk/content/scoring-systems). SQI is then calculated by summing the Species Quality Scores, dividing the total by the number of species, and multiplying by 100. For example, if a survey recorded 46 species, and the sum of their 46 Species Quality Scores was 106, the average Species Quality Score would be 2.30 (= 106/46) and the SQI would be 230, derived by multiplying that average by 100.

SQI values based on small species lists may be strongly biased if the list contains species with high Species Quality Scores. For this reason, Pantheon advises against using any SQI value based on a list of fewer than 15 species. Where 15 or more species of an assemblage have been recorded, the assemblage may be said to be 'well represented', and the SQI value is presented.

3.4.3 Assessing the importance of the survey area

Natural England's pamphlet *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists* (Anon., 2005) 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

4.1 Overall results

The survey recorded 429 species of invertebrate in total (Appendix 2). This is an extremely high species total for a four-visit survey.

Invertebrates were identified from a very wide range of groups, including woodlice, spiders, harvestmen, centipedes, millipedes, springtails, dragonflies, cockroaches, earwigs, bush-crickets, grasshoppers, barkflies, psyllids, froghoppers, leafhoppers, planthoppers, bugs, beetles, ants, bees, wasps, lacewings, scorpion-flies, flies, moths, butterflies, slugs and snails. A more comprehensive and targeted approach was taken to the recording of beetles (Coleoptera, with 170 species recorded), and bugs and hoppers (Hemiptera: Heteroptera and Auchenorrhyncha, 114 species), collectively forming 66% of the total species list.

4.2 Species of Principal Importance

Three insect Species of Principal Importance (SPI) were recorded by this survey (Table 3).

Table 3: Species of Principal Importance recorded by this survey.

Order	Family	Species (scientific name)	Species (English name)	Conservation status
Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath butterfly	VU, S41
Lepidoptera	Erebidae	*Spilosoma lubricipeda*	White Ermine moth	LC, S41 (research only)
Lepidoptera	Erebidae	*Tyria jacobaeae*	Cinnabar moth	LC, S41 (research only)

Both White Ermine and Cinnabar moths are 'research only' SPI (according to the current version of Pantheon) and thus conservation action for these species is focused on research at the national level, rather than site protection and habitat management of individual sites.

For the one remaining SPI, a brief account is provided below.

4.2.1 *Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath butterfly

Small Heath butterfly was recorded in numbers from the Sheep Fields on 10th June with a further singleton seen in the sandier part of the Inn on the Pond Field on 23rd June.

Because of Small Heath's preference for shorter, dry grassland swards, composed of fine-leaved grasses, the population is probably concentrated on the Sheep Fields and the Inn on the Pond Field (outside the proposed developed areas), though it may occur in the other grassland areas within the survey area.

4.3 Key Species results

Amongst the 429 species recorded by this survey, 26 species are here regarded as Key Species (using the criteria defined in Section 3.4.1). These 26 species comprise 6.06% of the total species list of 429, and are listed in Table 4.

Within the 26 Key Species, there were 7 Rare Key Species. These 7 species comprise 1.63% of the total species list of 429.

Species accounts for all of the Rare Key Species are provided in Section 4.5.

As mentioned in Section 3.4.1, there are frequent examples of invertebrate conservation statuses which have become out of date and inaccurate, which could cause substantial bias in Key Species analysis. The Rare Key Species accounts include discussion of the accuracy of the conservation status of each species as appropriate. Table 4 covers all the Key Species and indicates which should be regarded as having Out Of Date and inaccurate ('OOD') conservation statuses, based on information in Pantheon, supplemented with the author's personal knowledge.

Of the 26 Key Species recorded by this survey, 10 are here regarded as having out of date and inaccurate statuses. The remaining 16 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 3.73% Key Species (16 out of 429) and 0.70% Rare Key Species (3 out of 429).

Table 4: The Key Species recorded by this survey. Rare Key Species are listed ahead of Scarce Key Species, and then the species are listed in taxonomic order within each category. Species which are here regarded as having Out Of Date and inaccurate ('OOD') conservation statuses are indicated. 'Open', 'Tree' and 'Wet' indicate associations with the Pantheon Broad Biotopes of 'open habitats', 'tree-associated' and 'wetland' respectively (though none of these Key Species are associated with 'wetland'.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?	Open	Tree	Water
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Rhopalus rufus*	a rhopalid bug	LC, NR		✓		
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius graminicola*	a ground-bug	RDB3		✓		
Insecta	Hemiptera: Heteroptera	Miridae	*Lygus pratensis*	a mirid bug	RDB3	✓	✓		
Insecta	Coleoptera	Throscidae	*Trixagus gracilis*	a beetle	RDB3	✓	✓		
Insecta	Coleoptera	Coccinellidae	*Nephus quadrimaculatus*	a ladybird	RDB2	✓		✓	
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR	✓		✓	
Insecta	Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath	VU, S41		✓		
Arachnida	Araneae	Linyphiidae	*Entelecara flavipes*	a spider	LC, NS		✓	✓	
Diplopoda	Julida	Julidae	*Cylindroiulus londinensis*	a millipede	LC, NS			✓	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Iassus scutellaris*	a leafhopper	Nationally Scarce (Na)	✓		✓	
Insecta	Coleoptera	Staphylinidae	*Gyrophaena joyi*	a rove-beetle	Nationally Scarce			✓	
Insecta	Coleoptera	Buprestidae	*Agrilus viridis*	a jewel beetle	LC, NS			✓	
Insecta	Coleoptera	Ciidae	*Cis festivus*	a beetle	Nationally Scarce (Nb)	✓		✓	
Insecta	Coleoptera	Melandryidae	*Anisoxya fuscula*	a false darkling beetle	LC, NS			✓	
Insecta	Coleoptera	Mordellidae	*Mordellistena parvula*	a tumbling flower-beetle	LC, NS		✓		
Insecta	Coleoptera	Scraptiidae	*Anaspis thoracica*	a beetle	LC, NS			✓	
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema confusa*	a flea-beetle	LC, NS		✓		
Insecta	Coleoptera	Apionidae	*Protapion dissimile*	a weevil	Nationally Scarce (Nb)		✓		
Insecta	Coleoptera	Apionidae	*Squamapion cineraceum*	a weevil	Nationally Scarce (Na)	✓	✓		
Insecta	Coleoptera	Curculionidae	*Sibinia primita*	a weevil	Nationally Scarce (Nb)		✓		
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus constrictus*	a weevil	Nationally Scarce (Nb)		✓		

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?	Open	Tree	Water
Insecta	Coleoptera	Curculionidae	*Polydrusus formosus*	a weevil	Nationally Scarce (Na)	✓		✓	
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)	✓	✓		
Insecta	Hymenoptera: Aculeata	Crabronidae	*Crabro scutellatus*	a digger wasp	Nationally Scarce (Na)		✓		
Insecta	Hymenoptera: Aculeata	Halictidae	*Lasioglossum pauxillum*	Lobe-spurred Furrow-bee	Nationally Scarce (Na)	✓	✓		
Insecta	Lepidoptera	Gracillariidae	*Phyllonorycter comparella*	Winter Poplar Midget	Nationally Scarce (Na)			✓	

4.4 PANTHEON RESULTS

The list of 429 species was entered into Pantheon. Three taxa were unmatched in Pantheon's species dictionary, so Pantheon processed a list of 426 species, of which 392 were covered by Pantheon's analysis tools.

Within the subset of 392 species, three Broad Biotopes were well represented (with 15 or more species). The survey yielded a much higher number of 'open habitats' species (237, representing about 5% of the national fauna (as covered by Pantheon)) than of 'tree associated' species (107, 3%), with a relatively much smaller representation of 'wetland species (23, less than 1%) (Table 5).

Using information within Pantheon, together with the author's personal knowledge, all the Key Species have been allocated to one or more Broad Biotopes as far as possible, as indicated in Table 4 above.

Table 5: The Broad Biotopes represented in the survey area, with the number of included species, the percentage of the national assemblage this represents, the Species Quality Index (SQI), and the numbers of included SPI and accurately-rated Key Species (see Table 4).

Broad Biotope	No. of species	% representation	SQI	No. of SPI (excluding 'research only')	No. of accurately-rated Key Species
open habitats	237	5	126	1	10
tree-associated	107	3	144	0	7
wetland	23	<1	114	0	0

The largest number of accurately-rated Key Species (10 species) was associated with the 'open habitats' Broad Biotope, as well as the Small Heath butterfly (SPI). Fewer accurately-rated Key Species (7 species) were associated with the 'tree-associated' Broad Biotope, and none with the 'wetland' Broad Biotope (Table 5).

Species Quality Indices for the Broad Biotopes varied from the moderate value of 144 for the 'tree-associated' Broad Biotope, to the rather low values of 126 for 'open habitat' and 114 for 'wetland' (Table 5).

The Broad Biotopes may be further subdivided, and Pantheon's analysis of the subsets yields further insight. Both the 'open habitats' and 'tree-associated' Broad Biotopes include well-represented subsets (Table 6). In the case of 'open habitats', there is a large (194 species) but low quality (SQI = 113) subset of 'tall sward & scrub' species, and a smaller (40 species) but high quality (SQI = 182) subset of 'short sward & bare ground' species.

Similarly, the 'tree-associated' Broad Biotope includes a larger (57 species) but lower quality (SQI = 138) assemblage of 'arboreal' species, and a smaller (38 species) but higher quality (SQI = 167) assemblage of 'decaying wood' species (Table 6).

Table 6: The Broad Biotopes and their subsets represented in the survey area, with Pantheon output for the number of included species, the percentage of the national assemblage this represents, the Species Quality Index (SQI), and the number of species with conservation status. Assemblages with fewer than 15 species recorded have not been included.

Broad biotope (level 1)	**Subset (level 2)**	**Pantheon output**	**Result**
open habitats		Number of species	237
		% representation	5
		Species Quality Index	126
		No. of species with conservation status	22
	tall sward & scrub	Number of species	194
		% representation	7
		Species Quality Index	113
		No. of species with conservation status	12
	short sward & bare ground	Number of species	40
		% representation	3
		Species Quality Index	182
		No. of species with conservation status	10
tree-associated		Number of species	107
		% representation	3
		Species Quality Index	144
		No. of species with conservation status	8
	arboreal	Number of species	57
		% representation	4
		Species Quality Index	138
		No. of species with conservation status	3
	decaying wood	Number of species	38
		% representation	3
		Species Quality Index	167
		No. of species with conservation status	5
wetland		Number of species	23
		% representation	<1
		Species Quality Index	114
		No. of species with conservation status	1

4.5 RARE KEY SPECIES ACCOUNTS

Species accounts are provided here for each of the Rare Key Species, describing the ecology and distribution of the species in Britain, and whether the species should be regarded as having out of date and inaccurate conservation statuses. This is followed by details of their occurrence during the current survey. Accounts are presented in the same order as in Table 4.

These species accounts mostly describe the species' distribution using 'vice-counties': a fixed set of 112 areas covering the whole of Britain which have been used by biological recorders since 1852 (see box). The Nutfield Green Park survey area lies entirely within the vice-county of Surrey (vice-county 17).

Vice-counties are subdivisions of Great Britain used largely for the purposes of biological recording and other scientific data-gathering.

The vice-counties are based on the ancient counties of Britain, but often subdividing these boundaries to create smaller, more uniform units, and considering exclaves to be part of the vice-county in which they locally lie. They provide a stable basis for recording using similarly-sized units, and, although grid-based recording has grown in popularity, they remain a standard in the vast majority of ecological surveys, allowing data collected over long periods of time to be compared easily.

The vice-counties (often referred to as 'Watsonian vice-counties') were introduced by Hewett Cottrell Watson who first used them in the third volume of his *Cybele Britannica* published in 1852. He refined the system in later volumes. The vice-counties remain unchanged by subsequent local government reorganisations, allowing historical and modern data to be more accurately compared.

Every vice-county in Britain has a name, and additionally, they are numbered from 1 to 112.

4.5.1 *Rhopalus rufus* (Hemiptera: Heteroptera: Rhopalidae) a rhopalid bug, LC, NR

This rare rhopalid bug is confined to southern Britain, occurring northwards to West Norfolk and westwards to Pembrokeshire (Ryan, 2022). It is similar to the commoner *Rhopalus parumpunctatus* and has a similar range; some authors have expressed doubts that the two are distinct species (Hawkins, 2003). *R. rufus* is a species of heathland, sandy grassland and sand dunes. Foodplants include Corn Spurrey *Spergula arvensis* and Sand Spurrey *Spergularia rubra*. In Surrey, this species had been more widespread up to the 1950s, but Hawkins (2003) was only aware of records from a site adjacent to Crooksbury Common, in western Surrey, in 1996 and 1997.

On the current survey, one was swept from the Inn on the Pond Field (Figure 4). This appears to be one of very few recent records from Surrey.

4.5.2 *Nysius graminicola* (Hemiptera: Heteroptera: Lygaeidae) a ground-bug, RDB3

This is a largely ground-dwelling bug which is presumed to feed on seeds. It is thought to favour open habitats, often on dry, sandy soils. Kirby (1992) knew of this bug from only one British specimen, discovered at Studland Bay, Dorset, in the 1980s. It has been found more widely in the subsequent years, with records from Dorset, South Hampshire, the Isle of

Wight, West Sussex, East Kent, South Essex, Hertfordshire, Berkshire, Oxfordshire, Cambridgeshire, Huntingdonshire and East Gloucestershire (Ryan, 2022) and with internet sources reporting records for Worcestershire in addition. This is still an uncommon or rarely recorded species but may be better classified as Nationally Scarce than RDB3.

On the current survey, a single male was swept from the Inn on the Pond Field. As the species is not mapped for Surrey by Ryan (2022), this would appear to be the first record for the county.

4.5.3 *Lygus pratensis* (Hemiptera: Heteroptera: Miridae) a mirid bug, RDB3

This is a large mirid bug. On the continent it is known to be polyphagous (Kirby, 1992). It was formerly known only in south-eastern England from Kent westwards to Hampshire and northwards to Berkshire, where it was mostly confined to rides in ancient woodland, open herb-rich areas and heathland. However, in recent years this bug has undergone a dramatic range expansion. It is now widespread and frequently recorded throughout much of southern Britain northwards to County Durham (Ryan, 2022) and undoubtedly no longer merits rare or even scarce conservation status. This is recognised within Pantheon which lists its status in square brackets as '[RDB3]' though a formal revision of the conservation status assigned by Kirby (1992) has yet to be carried out.

On the current survey, this species was noted from the Inn on the Pond Field and the South-western Field.

4.5.4 *Trixagus gracilis* (Coleoptera: Throscidae) a beetle, RDB3

This species was known until recently by British coleopterists as *Trixagus elateroides*. It is not regarded as a saproxylic but probably develops at the roots of trees and shrubs, feeding on ectotrophic mycorrhizae. In the past it has most often been recorded from coastal shingle, saltmarsh and other coastal and estuarine habitats but also inland from parkland and wood-pasture habitats. This occurrence in dual habitats is peculiar and raises the question of whether all records relate to a single species. More recently, and adding further confusion, there has been a distinct increase in inland records, including from man-made habitats such as urban shrubberies, green roofs and post-industrial habitats. From the recent increase in range and abundance, it is clear that it no longer merits RDB status.

On the current survey, one was recorded from the Inn on the Pond Field by suction sampling.

4.5.5 *Nephus quadrimaculatus* (Coleoptera: Coccinellidae) a ladybird, RDB2

This is one of the smaller coccinellids, black with four orange spots on the wing-cases. This species has been known from Britain since the 19th century but only as a rare species. It was regarded as Vulnerable (RDB2) by Hyman and Parsons (1992). However, it was discovered in Kent in the early 1990s and by the turn of the millennium had become common in much of Surrey (Hawkins, 2000) being found on ivy on trees and walls. It has continued to become commoner and more widespread in recent years, though it is still largely restricted to south-east England and East Anglia (Roy *et al.*, 2011). It undoubtedly no longer merits RDB status, and this is recognised within Pantheon which lists its status in square brackets: '[RDB2]'.

On the current survey, one was beaten from ivy in the South-eastern Woods.

4.5.6 *Agelastica alni* (Coleoptera: Chrysomelidae) a leaf-beetle, DD, NR

This is a rather large, metallic blue leaf-beetle which principally feeds on the foliage of alders *Alnus*, though dispersing adults may be found away from their host trees. Once regarded as having become extinct in Britain during the 19th century, a few scattered records were made in the 20th century indicating occasional immigrants or accidental importations. An established population was discovered in Manchester in 2004 and began a rapid expansion. Hubble's (2014) assessment as Data Deficient and Nationally Rare erred on the side of caution but the species has now become widespread and common over much of England. It no longer merits treatment as a Key Species.

On the current survey, this species was recorded from shrubs and tree bordering the Sheep Fields and the South-western Field.

4.5.7 *Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath, VU, S41

As a SPI, species account information for this species has already been provided in Sections 2.3.1**Error! Reference source not found.** and 4.2.1.

5 Survey area assessment

This survey area assessment is based on a list of 429 species which is an extremely high total for four fieldwork visits, and indicates that the survey has generated an ample dataset from which to make a robust and accurate assessment of the survey area. The high total also suggests that the survey area includes a diversity of habitats in favourable condition for invertebrates.

26 Key Species were found, comprising 6.1% of the 429 species found by this survey in total. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development (i.e., excluding surveys of nature reserves and other sites in nature conservation management), the figure of 6.06% is slightly higher than the mean of 5.62% (standard deviation = 3.57, sample size = 83). This statistic suggests that the Nutfield Green Park survey area is a site of no more than county importance for invertebrate conservation.

Seven Rare Key Species were found, comprising 1.63% of the 429 species found by this survey in total. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development, the figure of 1.63% is high, substantially higher than the mean of 0.81% (standard deviation = 0.96, sample size = 83). Although the percentage of Key Species was only slightly above average, the high percentage of Rare Key Species indicates a site which supports a rather high proportion of nationally important species, and thus a site which may be of greater than county importance for invertebrate conservation.

However, the list of Key Species from Nutfield Green Park includes a high proportion of those with conservation statuses which have become out of date and inaccurate; most of the Rare Key Species fall into this category. The 2018 survey (Cook and Bennett, 2021) also recorded a high proportion of species with out of date and inaccurate conservation statuses: three of their six Key Species. Excluding those Key Species with out of date and inaccurate conservation statuses, yielded figures of 3.73% Key Species (16 out of 429) and 0.70% Rare Key Species (3 out of 429). These less biased figures both fall below the averages for other

sites which the author has surveyed. They indicate a site which is of local or county importance for invertebrate conservation.

Only a single invertebrate Species of Principal Importance was found by this survey, and though assessed as Vulnerable ('facing a high risk of extinction in the wild'), this is still a common and widespread butterfly. The population at Nutfield Green Park may be regarded as of local importance.

The most noteworthy results from Pantheon analysis were that the survey area supported a high quality assemblage of 'short sward & bare ground' species, and a high quality assemblage of 'decaying wood' species. The high quality assemblage of 'short sward & bare ground' species was mostly restricted to the Inn on the Pond field, from which most of the Key Species of this habitat were recorded. Similarly, the high quality assemblage of 'decaying wood' species, and the Key Species of this assemblage, were mostly recorded from dead and decaying wood microhabitats within the Central Woods.

Drawing all these lines together, the evidence indicates that the Nutfield Green Park survey area is of local importance overall for invertebrate conservation, but with two component areas which should be regarded as of importance for invertebrate conservation at the county (Surrey) scale: (i) the Inn on the Pond Field for species of sandy grassland with areas of short sward and bare ground, and (ii) the Central Woods for species of dead and decaying wood.

5.1 KEY HABITATS

5.1.1 Sandy grassland with areas of short sward and bare ground

Sandy grassland with areas of short sward and bare ground is a Key Habitat within the Nutfield Green Park survey area. The habitat occurs over the Inn on the Pond Field, and extends into adjacent northern parts of the Sheep Fields (Figure 6; Figure 7). Within the Inn on the Pond Field, the best habitat is at the drier, sandier, northern end of the field. The soil disturbance cause by the burrows and scrapes of Rabbits is important in maintaining patches of bare ground, and patches of short sward grassland at an early successional stage.

Figure 6: Sandy grassland extending into the Sheep Fields to the right of the fence-line.

Figure 7: Sketch map of the area of key sandy grassland habitat, outlined in red. (Map data © 2023 Imagery © 2023, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group).

The Inn on the Pond Field yielded an apparent first Surrey record of the RDB3 ground-bug *Nysius graminicola*, and one of very few modern Surrey records of the Nationally Rare rhopalid bug *Rhopalus rufus*. Both species are specialists on open habitats on dry, sandy soils.

5.1.2 Woodland with dead and decaying wood

In general, the varied habitats created by the death and decay of trees and shrubs provide habitat for a very large and diverse assemblage of invertebrates, including many Key Species.

At Nutfield Green Park, the 'deadwood invertebrate' assemblage included, for example, the Nationally Scarce jewel beetle *Agrilus viridis* on sallow (Figure 8), the Nationally Scarce rove-beetle *Gyrophaena joyi* on *Pleurotus* bracket fungi on decaying White Poplar branch-wood (Figure 9), and the Nationally Scarce false darkling beetle *Anisoxya fuscula* on dead Hazel branches.

Figure 8: The Nationally Scarce jewel beetle *Agrilus viridis* at Nutfield Green Park.

Figure 9: Habitat of the Nationally Scarce rove-beetle *Gyrophaena joyi* at Nutfield Green Park.

Deadwood invertebrates are difficult to survey thoroughly. Thus, further targeted survey at Nutfield Green Park would undoubtedly yield additional species from this assemblage. However, the results of the current survey are sufficient to indicate the presence of a high quality assemblage, which is largely composed of species associated with small-girth deadwood.

Very much higher quality assemblages of deadwood invertebrates can be found on sites with ancient and veteran trees, growing in the open (as in parklands) or in open-structured woodlands where individual trees have room to develop a more open-grown form. However, the existing woodlands at Nutfield Green Park are typically composed of young trees with a rather dense, closed-canopy structure, with few clearings, glades or open rides. Thus, the site offers considerable scope for enhancement to benefit the assemblage of deadwood invertebrates. Enhancements such as creating and maintaining open, sunny woodland rides and glades are also a net benefit to other woodland invertebrates, many of which favour sheltered and sunny microhabitats within woodland.

6 Recommendations

In view of the importance of parts of the survey area for invertebrates in a Surrey context, it is recommended that invertebrates and their habitats should be given substantial consideration within the development proposals and within the landscape and ecology strategy plan. Hence the following recommendations are made.

6.1 SANDY GRASSLAND WITH AREAS OF SHORT SWARD AND BARE GROUND

For the Inn on the Pond Field, and adjacent parts of the Sheep Fields (Figure 7), it is recommended that this area should be retained as greenspace within the proposed development, and managed appropriately.

The appropriate habitat management, aiming to retain the existing invertebrate assemblage, should be either (i) by continuing the (presumed) current management by sheep grazing, or (ii) by meadow management, cutting in spring (March), and again in summer (July or August), perhaps with further cuts later in the summer and early autumn as required; and with all arisings removed (i.e., using a cut-and-collect mower). In both management scenarios, the continued presence of Rabbits is to be encouraged.

The plans indicate that this area of sandy grassland is to be retained as a feature of ecological value, and it is understood that it will be brought into a meadow management regime.

6.2 WOODLAND WITH DEAD AND DECAYING WOOD

With regard to the Central Woods, the development proposals are satisfactory in that a large part of the existing woodland is to be retained and that connectivity between woodland parcels across the survey area is to be retained and enhanced.The proposed development could enhance the quality of the retained woodland habitat for deadwood invertebrates, and other woodland invertebrates, by the following:

- Retain timber, woodchip and other woody arisings from the works on site as reserved habitat for deadwood invertebrates. Plan for this reserved habitat to be added to as and when any tree safety work is required within the proposed development.
- Retain a well-spaced scatter of native trees and shrubs within the streets, gardens and greenspaces.
- Ensure that any planting of trees and shrubs uses native species, including oaks, Hazel, poplars and willows.

- Establish some of the woodland paths of the Outdoor Activity Park as open rides, in which sunlight can reach the woodland floor. The best rides for woodland invertebrates are oriented north-south and connect larger glades or clearings.
- Create wavy, scalloped woodland edges, especially on south or south-east facing edges, to create more favourable sunny, sheltered woodland edge habitat than exists on a straight edge.

It is noted that the landscape and ecology strategy plan is to manage the retained woodlands for enhanced biodiversity and woodland quality, including by thinning in the species poor areas of the Central Woods.

7 Acknowledgements

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8 References

Anon. (2005). *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists*. Peterborough: English Nature.

Asher, J., Warren, M., Fox, R., Harding, P., Jeffcoate, G. and Jeffcoate, S. (2001). *The millennium atlas of butterflies in Britain and Ireland*. Oxford: Oxford University Press.

Assing, V. (2020). On the taxonomy and zoogeography of some West Palaearctic *Cypha* species (Coleoptera: Staphylinidae: Aleocharinae). *Acta Musei Moraviae, Scientiae biologicae*, **105**, 11 - 26.

Cook, E. and Bennett, H. (2021). *Ecological Impact Assessment for Nutfield Green Park*. Report from ESL Ecological Services Ltd. to MJCA.

Davis, A. (Tony) M. (2012). *A review of the status of Microlepidoptera in Britain*. Butterfly Conservation report no. S12-02. Wareham: Butterfly Conservation.

Drake, C.M. (2018). *A review of the status of the Dolichopodidae flies of Great Britain.* Species Status number 30. Natural England Commissioned Reports number 195. Natural England.

Drake, C.M., Lott, D.A., Alexander, K.N.A. and Webb, J. (2007). *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005. Sheffield: Natural England.

Falk, S. and Chandler, P. (2005). *A review of the scarce and threatened flies of Great Britain, part 2: Nematocera and Aschiza not dealt with by Falk (1991).* Species Status number 2. Peterborough: Joint Nature Conservation Committee.

Falk, S.J., Ismay, J.W. and Chandler, P.J. (2016). *A provisional assessment of the status of Acalyptratae flies in the UK*. Natural England Commissioned Reports number 217. Natural England.

Falk, S.J., Pont, A.C. and Chandler, P.J. (2005). *A review of the scarce and threatened flies of Great Britain. Part 5: Calyptratae*. Species Status number 5. Peterborough: Joint Nature Conservation Committee.

Fox, R., Dennis, E.B., Brown, A.F. and Curson, J. (2022). A revised Red List of British butterflies. *Insect conservation and diversity*, **15**, 485 - 495.

Hawkins, R.D. (2000). *Ladybirds of Surrey*. Woking: Surrey Wildlife Trust.

Hawkins, R.D. (2003). *Shieldbugs of Surrey*. Woking: Surrey Wildlife Trust.

Hubble, D. (2014). *A review of the scarce and threatened beetles of Great Britain. The leaf beetles and their allies. Chrysomelidae, Megalopodidae and Orsodacnidae.* Species Status, number 19. Natural England.

Hyman, P.S. (revised by Parsons, M.S.) (1992). *A review of the scarce and threatened Coleoptera of Great Britain. Part 1.* UK Nature Conservation, number 3. Peterborough: Joint Nature Conservation Committee.

Hyman, P.S. (revised by Parsons, M.S.) (1994). *A review of the scarce and threatened Coleoptera of Great Britain. Part 2.* UK Nature Conservation, number 12. Peterborough: Joint Nature Conservation Committee.

IUCN (2001). *IUCN Red List Categories and Criteria: version 3.1. Prepared by the IUCN Species Survival Commission*. Gland, Switzerland: International Union for Conservation of Nature.

Kirby, P. (1992). *A review of the scarce and threatened Hemiptera of Great Britain*. UK Nature Conservation number 2. Peterborough: Joint Nature Conservation Committee.

Roy, H., Brown, P., Frost, R. and Poland, R. (2011). *The ladybirds (Coccinellidae) of Britain and Ireland*. Wallingford: Biological Records Centre.

Ryan, R. (2022). The vice-county distribution and atlas of the Hemiptera-Heteroptera of the British Isles: interim release November 2022. https://sites.google.com/site/britishhetbugatlas/

Shirt, D.B. (ed.) (1987). *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.

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)). The most recent application of these categories and criteria was for micro-moths by Davis (2012).

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 Nutfield Green Park in 2022

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, dates, 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
Arachnida	Araneae	Dysderidae	*Harpactea hombergi*	a spider	LC
Arachnida	Araneae	Theridiidae	*Theridion varians*	a spider	LC
Arachnida	Araneae	Theridiidae	*Neottiura bimaculata*	a spider	LC
Arachnida	Araneae	Theridiidae	*Paidiscura pallens*	a spider	LC
Arachnida	Araneae	Theridiidae	*Enoplognatha latimana*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Entelecara flavipes*	a spider	LC, NS
Arachnida	Araneae	Linyphiidae	*Pelecopsis parallela*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Erigone atra*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Bathyphantes gracilis*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Tenuiphantes tenuis*	a spider	LC
Arachnida	Araneae	Linyphiidae	*Linyphia triangularis*	a spider	LC
Arachnida	Araneae	Tetragnathidae	*Tetragnatha montana*	a spider	LC
Arachnida	Araneae	Araneidae	*Mangora acalypha*	a spider	LC
Arachnida	Araneae	Pisauridae	*Pisaura mirabilis*	a spider	LC
Arachnida	Araneae	Dictynidae	*Dictyna arundinacea*	a spider	LC
Arachnida	Araneae	Dictynidae	*Brigittea latens*	a spider	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Arachnida	Araneae	Thomisidae	*Diaea dorsata*	a spider	LC
Arachnida	Opiliones	Phalangiidae	*Opilio canestrinii*	a harvestman	None
Chilopoda	Lithobiomorpha	Lithobiidae	*Lithobius variegatus*	a centipede	LC
Diplopoda	Julida	Julidae	*Ommatoiulus sabulosus*	Striped Millipede	LC
Diplopoda	Julida	Julidae	*Tachypodoiulus niger*	White-legged Millipede	LC
Diplopoda	Julida	Julidae	*Cylindroiulus londinensis*	a millipede	None
Diplopoda	Julida	Julidae	*Cylindroiulus punctatus*	Blunt-tailed Millipede	LC
Diplopoda	Polydesmida	Polydesmidae	*Polydesmus angustus*	Common Flat-backed Millipede	LC
Collembola	Entomobryomorpha	Entomobryidae	*Orchesella cincta*	a springtail	None
Insecta	Odonata	Calopterygidae	*Calopteryx virgo*	Beautiful Demoiselle	LC
Insecta	Odonata	Coenagriidae	*Enallagma cyathigerum*	Common Blue Damselfly	LC
Insecta	Odonata	Coenagriidae	*Coenagrion puella*	Azure Damselfly	LC
Insecta	Odonata	Aeshnidae	*Aeshna cyanea*	Southern Hawker	LC
Insecta	Odonata	Aeshnidae	*Aeshna mixta*	Migrant Hawker	LC
Insecta	Odonata	Aeshnidae	*Anax imperator*	Emperor Dragonfly	LC
Insecta	Odonata	Libellulidae	*Libellula depressa*	Broad-bodied Chaser	LC
Insecta	Odonata	Libellulidae	*Orthetrum cancellatum*	Black-tailed Skimmer	LC
Insecta	Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	LC
Insecta	Orthoptera	Meconematidae	*Meconema meridionale*	Southern Oak Bush-cricket	NA
Insecta	Orthoptera	Meconematidae	*Meconema thalassinum*	Oak Bush-cricket	LC
Insecta	Orthoptera	Tettigoniidae	*Pholidoptera griseoaptera*	Dark Bush-cricket	LC
Insecta	Orthoptera	Tettigoniidae	*Metrioptera roeselii*	Roesel's Bush-cricket	LC
Insecta	Orthoptera	Conocephalidae	*Conocephalus fuscus*	Long-winged Conehead	LC
Insecta	Orthoptera	Phaneropteridae	*Leptophyes punctatissima*	Speckled Bush-cricket	LC
Insecta	Orthoptera	Acrididae	*Omocestus viridulus*	Common Green Grasshopper	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Orthoptera	Acrididae	*Chorthippus albomarginatus*	Lesser Marsh Grasshopper	LC
Insecta	Orthoptera	Acrididae	*Chorthippus brunneus*	Field Grasshopper	LC
Insecta	Orthoptera	Acrididae	*Chorthippus parallelus*	Meadow Grasshopper	LC
Insecta	Psocoptera	Caeciliusidae	*Valenzuela flavidus*	a barkfly	None
Insecta	Psocoptera	Ectopsocidae	*Ectopsocus petersi*	a barkfly	None
Insecta	Psocoptera	Elipsocidae	*Elipsocus hyalinus*	a barkfly	None
Insecta	Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	*Psylla alni*	Alder Psyllid	None
Insecta	Hemiptera: Sternorrhyncha	Triozidae	*Trioza urticae*	Nettle Psyllid	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Aphrophora alni*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Neophilaenus lineatus*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	*Philaenus spumarius*	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Anoscopus serratulae*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Aphrodes makarovi*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Allygus modestus*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Arthaldeus pascuellus*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Athysanus argentarius*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Cicadula quadrinotata*	a leafhopper	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Deltocephalus pulicaris*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Doratura stylata*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Errastunus ocellaris*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Euscelis incisus*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Graphocraerus ventralis*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Psammotettix confinis*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Streptanus sordidus*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Iassus lanio*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Iassus scutellaris*	a leafhopper	Nationally Scarce (Na)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Ledra aurita*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Megophthalmus scanicus*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Alebra wahlbergi*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Arboridia parvula*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Empoasca vitis*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupterycyba jucunda*	a leafhopper	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx urticae*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Fagocyba cruenta*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Kybos populi*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Zygina hyperici*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	*Zyginidia scutellaris*	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	*Conomelus anceps*	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	*Javesella pellucida*	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Issidae	*Issus coleoptratus*	a planthopper	None
Insecta	Hemiptera: Heteroptera	Aradidae	*Aneurus avenius*	a flatbug	None
Insecta	Hemiptera: Heteroptera	Scutelleridae	*Eurygaster testudinaria*	Tortoise Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Dolycoris baccarum*	Hairy 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	*Pentatoma rufipes*	Red-legged Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Podops inunctus*	Knobbed Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Zicrona caerulea*	Blue Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Coreidae	*Coreus marginatus*	Dock Bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Myrmus miriformis*	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Rhopalus rufus*	a rhopalid bug	LC, NR
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Stictopleurus abutilon*	a rhopalid bug	NA

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Rhopalidae	*Stictopleurus punctatonervosus*	a rhopalid bug	NA
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Cymus melanocephalus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Drymus ryeii*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Drymus sylvaticus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Heterogaster urticae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Kleidocerys resedae*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius graminicola*	a ground-bug	RDB3
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Nysius huttoni*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Peritrechus lundii*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Scolopostethus affinis*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Scolopostethus thomsoni*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	*Stygnocoris fuligineus*	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Berytidae	*Metatropis rufescens*	a stiltbug	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Acalypta parvula*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Kalama tricornis*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Tingis ampliata*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	*Tingis cardui*	a lacebug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Himacerus apterus*	Tree Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Himacerus mirmicoides*	Ant Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Nabis limbatus*	Marsh Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	*Nabis rugosus*	Common Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Anthocoris confusus*	a flower 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	*Buchananiella continua*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Cardiastethus fasciiventris*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius laevigatus*	a flower bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius laticollis*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Orius vicinus*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	*Temnostethus gracilis*	a flower bug	None
Insecta	Hemiptera: Heteroptera	Microphysidae	*Loricula elegantula*	a bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Acetropis gimmerthalii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Amblytylus nasutus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Apolygus lucorum*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Atractotomus mali*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Blepharidopterus angulatus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Bryocoris pteridis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Campyloneura virgula*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Capsus ater*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Closterotomus norwegicus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Closterotomus trivialis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Deraeocoris flavilinea*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Deraeocoris lutescens*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Dicyphus pallidus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Dicyphus stachydis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Heterotoma planicornis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Leptopterna dolabrata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Liocoris tripustulatus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Lygocoris pabulinus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Lygus pratensis*	a mirid bug	RDB3
Insecta	Hemiptera: Heteroptera	Miridae	*Lygus rugulipennis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Malacocoris chlorizans*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Megaloceroea recticornis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Neolygus viridis*	a mirid bug	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Miridae	*Notostira elongata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Orthonotus rufifrons*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Orthotylus marginalis*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Phylus coryli*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Phylus melanocephalus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Phytocoris varipes*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Pinalitus cervinus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Pithanus maerkelii*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Plagiognathus arbustorum*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Plagiognathus chrysanthemi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Psallus confusus*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Psallus perrisi*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Psallus varians*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Stenodema laevigata*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	*Stenotus binotatus*	a mirid bug	None
Insecta	Coleoptera	Carabidae	*Ocys harpaloides sens. str.*	a ground beetle	None
Insecta	Coleoptera	Carabidae	*Ocys tachysoides*	a ground beetle	None
Insecta	Coleoptera	Carabidae	*Amara aenea*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara similata*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Amara tibialis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Harpalus tardus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Calathus cinctus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Dromius quadrimaculatus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Paradromius linearis*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Syntomus foveatus*	a ground beetle	LC
Insecta	Coleoptera	Helophoridae	*Helophorus brevipalpis*	an aquatic beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Hydrophilidae	*Megasternum concinnum/immaculatum*	a beetle	None
Insecta	Coleoptera	Ptiliidae	*Ptinella errabunda*	a featherwing beetle	None
Insecta	Coleoptera	Leiodidae	*Anisotoma humeralis*	a beetle	None
Insecta	Coleoptera	Staphylinidae	*Tachyporus hypnorum*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus solutus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tachyporus tersus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Tinotus morion*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Cypha longicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Cypha pulicaria*[1]	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Leptusa fumida*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Leptusa ruficollis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Gyrophaena joyi*	a rove-beetle	Nationally Scarce
Insecta	Coleoptera	Staphylinidae	*Amischa analis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Mocyta fungi agg.*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Acrotona exigua*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Carpelimus corticinus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Stenus binotatus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus clavicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus fulvicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus nanus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus ossium*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus picipes*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Rugilus orbiculatus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Paederus littoralis*	a rove-beetle	LC

[1] *Cypha pulicaria* in the sense defined by Assing (2020), a common woodland species.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Staphylinidae	*Atrecus affinis*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Quedius semiobscurus*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Ocypus olens*	Devil's Coach-horse	LC
Insecta	Coleoptera	Staphylinidae	*Tasgius melanarius*	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	*Gabrius splendidulus*	a rove-beetle	LC
Insecta	Coleoptera	Scarabaeidae	*Amphimallon solstitiale*	Summer Chafer	LC
Insecta	Coleoptera	Scirtidae	*Contacyphon variabilis*	a beetle	LC
Insecta	Coleoptera	Buprestidae	*Agrilus viridis*	a jewel beetle	LC, NS
Insecta	Coleoptera	Throscidae	*Trixagus gracilis*	a beetle	RDB3
Insecta	Coleoptera	Elateridae	*Agriotes lineatus*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes sputator*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Melanotus castanipes/villosus*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Athous haemorrhoidalis*	a click-beetle	None
Insecta	Coleoptera	Cantharidae	*Cantharis cryptica*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Cantharis flavilabris*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Cantharis livida*	a soldier-beetle	LC
Insecta	Coleoptera	Cantharidae	*Cantharis rufa*	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	*Rhagonycha nigriventris*	a soldier-beetle	LC
Insecta	Coleoptera	Ptinidae	*Anobium inexspectatum*	a woodworm	LC
Insecta	Coleoptera	Ptinidae	*Hemicoelus fulvicornis*	a woodworm	LC
Insecta	Coleoptera	Ptinidae	*Ptilinus pectinicornis*	Fan-bearing Wood-borer	LC
Insecta	Coleoptera	Melyridae	*Dasytes aeratus*	a beetle	LC
Insecta	Coleoptera	Melyridae	*Malachius bipustulatus*	Malachite Beetle	LC
Insecta	Coleoptera	Byturidae	*Byturus ochraceus*	a beetle	None
Insecta	Coleoptera	Byturidae	*Byturus tomentosus*	Raspberry Beetle	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Cryptophagidae	*Ootypus globosus*	a beetle	None
Insecta	Coleoptera	Phalacridae	*Olibrus aeneus*	a beetle	LC
Insecta	Coleoptera	Phalacridae	*Olibrus affinis*	a beetle	LC
Insecta	Coleoptera	Kateretidae	*Brachypterus urticae*	a nettle pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes nigrescens*	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	*Meligethes ovatus*	a pollen beetle	None
Insecta	Coleoptera	Coccinellidae	*Rhyzobius litura*	a ladybird	None
Insecta	Coleoptera	Coccinellidae	*Nephus quadrimaculatus*	a ladybird	RDB2
Insecta	Coleoptera	Coccinellidae	*Anatis ocellata*	Eyed Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Calvia quattuordecimguttata*	Cream-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Halyzia sedecimguttata*	Orange Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Propylea quattuordecimpunctata*	14-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	16-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*	24-spot Ladybird	None
Insecta	Coleoptera	Latridiidae	*Cartodere bifasciata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cartodere nodifer*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Enicmus transversus*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Corticarina minuta*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Corticarina similata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cortinicara gibbosa*	a beetle	None
Insecta	Coleoptera	Ciidae	*Cis bilamellatus*	a beetle	None
Insecta	Coleoptera	Ciidae	*Cis boleti*	a beetle	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Ciidae	*Cis festivus*	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Ciidae	*Cis micans*	a beetle	None
Insecta	Coleoptera	Ciidae	*Ennearthron cornutum*	a beetle	None
Insecta	Coleoptera	Melandryidae	*Anisoxya fuscula*	a false darkling beetle	LC, NS
Insecta	Coleoptera	Mordellidae	*Mordellistena parvula*	a tumbling flower-beetle	LC, NS
Insecta	Coleoptera	Zopheridae	*Pycnomerus fuliginosus*	a beetle	NA
Insecta	Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	LC
Insecta	Coleoptera	Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle	LC
Insecta	Coleoptera	Salpingidae	*Salpingus planirostris*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis garneysi*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis lurida*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis maculata*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis pulicaria*	a beetle	LC
Insecta	Coleoptera	Scraptiidae	*Anaspis thoracica*	a beetle	LC, NS
Insecta	Coleoptera	Cerambycidae	*Grammoptera ruficornis*	Common Grammoptera	LC
Insecta	Coleoptera	Cerambycidae	*Rutpela maculata*	Black-and-yellow Longhorn	LC
Insecta	Coleoptera	Chrysomelidae	*Bruchidius imbricornis*	a seed-beetle	NA
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	*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	Chrysomelidae	*Cassida rubiginosa*	Thistle Tortoise Beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Chrysolina hyperici*	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Agelastica alni*	a leaf-beetle	DD, NR
Insecta	Coleoptera	Chrysomelidae	*Aphthona euphorbiae*	a flea-beetle	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema arida*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Chaetocnema confusa*	a flea-beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	*Crepidodera aurata*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Crepidodera aurea*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Crepidodera fulvicornis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Hermaeophaga mercurialis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus flavicornis*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Longitarsus gracilis*	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	*Neocrepidodera transversa*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta ochripes*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta undulata*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Phyllotreta vittula*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Psylliodes napi*	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	*Sphaeroderma testaceum*	a flea-beetle	LC
Insecta	Coleoptera	Attelabidae	*Apoderus coryli*	Hazel Leaf-roller Weevil	None
Insecta	Coleoptera	Apionidae	*Apion haematodes*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion carduorum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion gibbirostre*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ceratapion onopordi*	a weevil	None
Insecta	Coleoptera	Apionidae	*Eutrichapion vorax*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ischnopterapion loti*	a weevil	None
Insecta	Coleoptera	Apionidae	*Ischnopterapion virens*	a weevil	None
Insecta	Coleoptera	Apionidae	*Perapion marchicum*	a weevil	None
Insecta	Coleoptera	Apionidae	*Protapion dissimile*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Apionidae	*Protapion fulvipes*	White Clover Seed Weevil	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Apionidae	*Squamapion cineraceum*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Anthonomus rubi*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Cionus tuberculosus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Curculio glandium*	Acorn Weevil	None
Insecta	Coleoptera	Curculionidae	*Curculio venosus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Dorytomus longimanus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Dorytomus rufatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Dorytomus taeniatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Mecinus pascuorum*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhamphus pulicarius*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sibinia primita*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Tychius picirostris*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Ceutorhynchus constrictus*	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	*Hadroplontus litura*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Mogulones asperifoliarum*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Nedyus quadrimaculatus*	Small Nettle Weevil	None
Insecta	Coleoptera	Curculionidae	*Parethelcus pollinarius*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Euophryum confine*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Acalles misellus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Otiorhynchus ovatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Phyllobius pomaceus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Phyllobius pyri*	Common Leaf Weevil	None
Insecta	Coleoptera	Curculionidae	*Polydrusus formosus*	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona suturalis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Hypera plantaginis*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Rhinocyllus conicus*	a weevil	Nationally Scarce (Na)

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Curculionidae	*Scolytus rugulosus*	Fruit Bark-beetle	None
Insecta	Hymenoptera: Aculeata	Bethylidae	*Bethylus fuscicornis*	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius flavus*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Temnothorax nylanderi*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica rubra*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica ruginodis*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica scabrinodis*	an ant	None
Insecta	Hymenoptera: Aculeata	Vespidae	*Ancistrocerus parietum*	Notched Mason Wasp	None
Insecta	Hymenoptera: Aculeata	Vespidae	*Ancistrocerus trifasciatus*	a mason wasp	None
Insecta	Hymenoptera: Aculeata	Vespidae	*Gymnomerus laevipes*	a mason wasp	None
Insecta	Hymenoptera: Aculeata	Vespidae	*Vespula vulgaris*	Common Wasp	None
Insecta	Hymenoptera: Aculeata	Crabronidae	*Crabro scutellatus*	a digger wasp	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Crabronidae	*Passaloecus gracilis*	a digger-wasp	None
Insecta	Hymenoptera: Aculeata	Halictidae	*Lasioglossum leucozonium*	White-zoned Furrow-bee	None
Insecta	Hymenoptera: Aculeata	Halictidae	*Lasioglossum pauxillum*	Lobe-spurred Furrow-bee	Nationally Scarce (Na)
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	*Apis mellifera*	Honey Bee	None
Insecta	Neuroptera	Chrysopidae	*Chrysoperla carnea agg.*	a green lacewing	None
Insecta	Neuroptera	Chrysopidae	*Chrysopidia ciliata*	a green lacewing	None
Insecta	Mecoptera	Panorpidae	*Panorpa cognata*	a scorpion-fly	None
Insecta	Mecoptera	Panorpidae	*Panorpa germanica*	a scorpion-fly	None
Insecta	Diptera	Mycetophilidae	*Leia fascipennis*	a fungus gnat	None (Falk & Chandler, 2005)
Insecta	Diptera	Rhagionidae	*Chrysopilus cristatus*	Black Snipefly	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Diptera	Tabanidae	*Haematopota pluvialis*	Notch-horned Cleg	LC
Insecta	Diptera	Tabanidae	*Tabanus bromius*	Band-eyed Brown Horsefly	LC
Insecta	Diptera	Stratiomyidae	*Beris vallata*	Common Orange Legionnaire	LC
Insecta	Diptera	Stratiomyidae	*Chloromyia formosa*	Broad Centurion	LC
Insecta	Diptera	Asilidae	*Leptogaster cylindrica*	Striped Slender Robberfly	LC
Insecta	Diptera	Asilidae	*Dioctria baumhaueri*	Stripe-legged Robberfly	LC
Insecta	Diptera	Dolichopodidae	*Poecilobothrus nobilitatus*	a long-headed fly	LC (Drake, 2018)
Insecta	Diptera	Syrphidae	*Chrysotoxum bicinctum*	a hoverfly	LC
Insecta	Diptera	Syrphidae	*Episyrphus balteatus*	a hoverfly	LC
Insecta	Diptera	Syrphidae	*Myathropa florea*	a hoverfly	LC
Insecta	Diptera	Syrphidae	*Merodon equestris*	a hoverfly	LC
Insecta	Diptera	Syrphidae	*Volucella pellucens*	a hoverfly	LC
Insecta	Diptera	Tephritidae	*Urophora cardui*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Merzomyia westermanni*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Chaetostomella cylindrica*	a picture-winged fly	None
Insecta	Diptera	Tephritidae	*Terellia ruficauda*	a picture-winged fly	None
Insecta	Diptera	Sciomyzidae	*Coremacera marginata*	a snail-killing fly	None
Insecta	Diptera	Sciomyzidae	*Limnia unguicornis*	a snail-killing fly	None
Insecta	Diptera	Opomyzidae	*Geomyza tripunctata*	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Opomyzidae	*Opomyza petrei*	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Tachinidae	*Tachina grossa*	a parasitic fly	None (Falk, Pont & Chandler, 2005)
Insecta	Lepidoptera	Nepticulidae	*Stigmella hybnerella*	Greenish Thorn Pigmy	None
Insecta	Lepidoptera	Gracillariidae	*Phyllonorycter maestingella*	Beech Midget	None
Insecta	Lepidoptera	Gracillariidae	*Phyllonorycter comparella*	Winter Poplar Midget	Nationally Scarce (Na)

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Lepidoptera	Gracillariidae	*Cameraria ohridella*	Horse Chestnut Leaf-miner	None
Insecta	Lepidoptera	Ypsolophidae	*Ypsolopha ustella*	Variable Smudge	None
Insecta	Lepidoptera	Lyonetiidae	*Lyonetia clerkella*	Apple Leaf-miner	None
Insecta	Lepidoptera	Blastobasidae	*Blastobasis adustella*	Dingy Dowd	None
Insecta	Lepidoptera	Choreutidae	*Anthophila fabriciana*	Nettle-tap	None
Insecta	Lepidoptera	Tortricidae	*Epiphyas postvittana*	Light Brown Apple-moth	None
Insecta	Lepidoptera	Zygaenidae	*Zygaena filipendulae*	Six-spot Burnet	LC
Insecta	Lepidoptera	Hesperiidae	*Thymelicus sylvestris*	Small Skipper	LC
Insecta	Lepidoptera	Hesperiidae	*Ochlodes sylvanus*	Large Skipper	LC
Insecta	Lepidoptera	Nymphalidae	*Pararge aegeria*	Speckled Wood	LC
Insecta	Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	Small Heath	VU, S41
Insecta	Lepidoptera	Nymphalidae	*Maniola jurtina*	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	*Pyronia tithonus*	Gatekeeper	LC
Insecta	Lepidoptera	Nymphalidae	*Melanargia galathea*	Marbled White	LC
Insecta	Lepidoptera	Nymphalidae	*Vanessa atalanta*	Red Admiral	LC
Insecta	Lepidoptera	Nymphalidae	*Aglais urticae*	Small Tortoiseshell	LC
Insecta	Lepidoptera	Nymphalidae	*Polygonia c-album*	Comma	LC
Insecta	Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Small Copper	LC
Insecta	Lepidoptera	Lycaenidae	*Polyommatus icarus*	Common Blue	LC
Insecta	Lepidoptera	Pyralidae	*Galleria mellonella*	Wax Moth	None
Insecta	Lepidoptera	Crambidae	*Patania ruralis*	Mother of Pearl	None
Insecta	Lepidoptera	Crambidae	*Nomophila noctuella*	Rush Veneer	None
Insecta	Lepidoptera	Crambidae	*Chrysoteuchia culmella*	Garden Grass-veneer	None
Insecta	Lepidoptera	Crambidae	*Agriphila straminella*	Pearl Veneer	None
Insecta	Lepidoptera	Crambidae	*Agriphila geniculea*	Elbow-stripe Grass-veneer	None
Insecta	Lepidoptera	Geometridae	*Camptogramma bilineata*	Yellow Shell	LC
Insecta	Lepidoptera	Geometridae	*Aplocera efformata*	Lesser Treble-bar	LC

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Lepidoptera	Erebidae	*Spilosoma lubricipeda*	White Ermine	LC, S41 (research only)
Insecta	Lepidoptera	Erebidae	*Tyria jacobaeae*	Cinnabar	LC, S41 (research only)
Insecta	Lepidoptera	Erebidae	*Euclidia glyphica*	Burnet Companion	LC
Insecta	Lepidoptera	Erebidae	*Callistege mi*	Mother Shipton	LC
Insecta	Lepidoptera	Noctuidae	*Autographa gamma*	Silver Y	None
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras reticulatum*	Netted Field Slug	LC
Gastropoda	Pulmonata	Clausiliidae	*Clausilia bidentata*	Common Door-snail	LC
Gastropoda	Pulmonata	Cochlicopidae	*Cochlicopa lubrica*	Slippery Moss-snail	LC
Gastropoda	Pulmonata	Helicidae	*Cepaea hortensis*	White-lipped Snail	LC
Gastropoda	Pulmonata	Helicidae	*Cornu aspersum*	Garden Snail	LC
Gastropoda	Pulmonata	Hygromiidae	*Hygromia cinctella*	Girdled Snail	NA
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	Limacidae	*Limax maximus*	Leopard Slug	LC

Nutfield Park Developments Limited (Ltd)

Nutfield Green Park

Appendix K: Reptile Survey Report

October 2023

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Table 1: Reptile Survey Weather Conditions

Table 2: Key Reptile Site Survey Assessment Categories (HGBI 1998)

Table 3: 2022 Reptile Survey Results

FIGURE

Figure 1: Reptile Survey Plan

1.0 NON -TECHNICAL SUMMARY

1.1 FPCR were commissioned by Nutfield Park Developments Limited (Ltd) to undertake reptile surveys at Nutfield Green Park to provide an ecological baseline for the application site and determine presence of reptiles.

1.2 The habitats on the site comprise rank grassland, pasture grassland, bramble, hawthorn and mixed scrub, and woodlands. There are mature trees and hedgerows located within and around the Site. Three ponds are located north of the proposed development area.

1.3 The proposed development is to take place in the southern half of the Site, with the northern part of the Site being retained and enhanced for biodiversity.

1.4 Presence/absence reptile surveys were undertaken in June, September and October 2022 and a 'low' population of grass snakes was recorded within the onsite habitats.

1.5 Mitigation methods comprise vegetation management to passively move reptiles towards the retained boundary habitats.

1.6 The proposals include extensive habitat enhancement and creation measures, with 88% of the total Site boundary proposed for green infrastructure with a focus on enhancing the biodiversity value of the Site. The enhancement of pasture grassland fields into native species-rich meadows and the enhancement and creation of existing and new ponds respectively will provide extensive areas of optimal foraging habitat for reptile species.

2.0 INTRODUCTION

2.0 The following Reptile Survey Report has been prepared by FPCR Environment and Design Ltd. on behalf of Nutfield Park Developments Limited (Ltd), for the site at Nutfield Green Park, Former Laporte Works Site, Nutfield Road, Nutfield, Surrey (central OS Grid Reference TQ 30533 50982), hereafter referred to as the 'site'.

2.1 A suite of ecological surveys have been undertaken on the application site and this report should be read in conjunction with the Ecological Impact Assessment (EcIA, FPCR 2023).

Site Location and Context

2.2 The Site is approximately 58.8ha in size and is located to the North of the Village of Nutfield in the Tandridge borough area. It comprises a former quarry that has been historically restored and has become dominated by a mix of habitats. A large portion of the site is wooded, with some example of mature semi-natural woodlands present in the south, plantation woodlands in the centre/north of the Site and a large area of self-set birch/willow woodland in the centre of the Site. Two large pasture grasslands are present in the central/northern part of the Site, while a compartment of coarse grassland in present in the south-west of the Site. Small blocks of mixed scrub are scattered around the site while extensive areas of bramble scrub are present in the south-east and south-west. Three waterbodies are also present on Site which comprise two fishing lagoons in the north of the site and a central woodland pond.

2.3 In the surrounding landscape, the Site abuts the residential environs of Nutfield to the south. To the west lies a restored landfill site which sits between the Site and the extant Patteson Court Landfill Site. Eastwards, the landscape comprises a mix of woodlands, pasture grassland, arable fields and the Mercers South Quarry Site to the north-east. To the North lies additional areas of woodland and farmland before the landscape becomes dominated by the residential environs of South Merstham.

Site Proposals

2.4 The proposals include seeking outline planning permission for the development of the site for 166 new homes (Use Class C3) and an Integrated Retirement Community with 70 care home beds and 41 extra case facility beds. In addition, proposals include the creation of new access, landscaping and associated works to facilitate the development, in phases which are severable (Outline with all matters reserved, except for Access).

3.0 LEGISLATION AND POLICY

Reptile Legislation

3.1 All widespread reptile species, including slow-worm *Anguis fragilis*, adder *Vipera berus*, common lizard *Zootoca vivipara* and grass snake *Natrix helvetica* are partially protected under Sections 9(1) and 9(5) of Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This legislation protects these animals from:

- intentional killing and injury;
- selling, offering for sale, possessing, or transporting for the purpose of sale or publishing advertisements to buy or sell a protected species.

3.2 The impact that this legislation has on the Planning system is outlined in ODPM 06/2005 Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System, this states:

'The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult English Nature [now Natural England] *before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-term protection of the species. They should also advise developers that they must comply with any statutory species' protection provisions affecting the site concerned.'*

3.3 This partial protection does not directly protect the habitat of these reptile species. Where these animals are present on land that is to be affected by development, the implications of legislation are that providing that killing can reasonably be avoided then an operation is legal. Guidance provided by Natural England[1] and the Amphibian and Reptile Groups of the UK[2] recommends that this should be achieved by ensuring that:

- the animals are protected from injury or killing;
- mitigation is provided to maintain the conservation status of the species; and
- population monitoring is carried out subsequent to operations.

[1] Reptiles: guidelines for developers, English Nature (2004). http://publications.naturalengland.org.uk/publication/76006?category=31018

[2] Maintaining best practise in reptile mitigation/translocation programmes: Herpetofauna Groups of Britain and Ireland. http://www.arguk.org/index.php?option=com_docman&task=cat_view&gid=13&Itemid=17

4.0 METHODOLOGY

Desk Study

1.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Surrey Biodiversity Record Centre (SxBRC);
- Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk); and
- Tandridge District Council planning portal[3]

1.2 When handling data, species records were filtered to those within the last ten years, unless considered relevant to the site assessment.

4.1 Further inspection of colour 1:25,000 OS base maps (www.ordnancesurvey.co.uk) and aerial photographs from Google Earth (www.maps.google.co.uk) was also undertaken in order to provide additional context and identify any features of potential importance for nature conservation in the wider countryside.

Reptile Survey

4.2 The survey methodology was based on that detailed in the *Herpetofauna Workers Manual*[4] and *the Froglife Advice Sheet 10 - Reptile Survey*[5]. Methods involved a search for basking reptiles on/under naturally occurring and strategically positioned artificial refugia. The artificial refugia used were 0.5m^2 sections of bitumen roofing felt with a black upper side. These were placed in areas of suitable habitat on 26th May 2022 and allowed to 'bed down' prior to the first survey visit.

4.3 In line with guidance, refugia were installed at a minimum density of five refugia per hectare of suitable habitat (a greater density than this was used to further increase the likelihood of detection).

4.4 Survey visits were undertaken under suitable weather conditions i.e. air temperature between 10-18°C, no strong wind or heavy rain. The surveys also followed the guidelines recommendations by approaching refugia from downwind and avoiding casting a shadow and with care so as to not to harm or disturb basking animals when checking.

4.5 Seven reptile presence/absence surveys have been undertaken in line with current survey methodology. *Figure 1 Reptile Survey Plan* provides the locations of the refugia.

Timings/Conditions

4.6 The following are the weather conditions and timings for reptile surveys on site, provided in *Table 1* below. Surveys were conducted before 10:30am (AM survey) or after 16:30pm (PM survey), however when there were high temperatures in the survey period the finish or start time was moved to ensure the temperature was never over 20°C.

3 Ashford Borough Council Planning Portal - https://planning.ashford.gov.uk/ [Accessed 20.09.2021]

4 Herpetofauna Workers Manual, Gent and Gibson (1999). JNCC

5 Froglife Advice Sheet 10: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation Froglife Advice Sheet 9 (wildcare.co.uk)

Table 1: Reptile Survey Weather Conditions

Survey Occasion	Date	AM or PM survey	Weather conditions
1	27.06.2022	AM	30-40% cloud cover, 16°C, 2-3 BF, sunny
2	05.09.2022	AM	90-100% cloud cover, 17ºC, 0 BF, cloudy, rain earlier in the day
3	12.09.2022	AM	30-40% cloud cover, 19ºC, 1-2 BF, sunny
4	15.09.2022	PM	50-60% cloud cover, 18ºC, 2-3 BF
5	22.09.2022	PM	30-40% cloud cover, 17ºC, 2 BF, sunny
6	28.09.2022	AM	50-60% cloud cover, 10ºC, 2-3 BF, sunny
7	05.10.2022	PM	80-90% cloud cover, 17ºC, 2-3 BF, light rain, clear

Population Assessment

4.7 Reptile populations are assessed in accordance with population level criteria as stated in the Key Reptile Site Register[6]. This system classifies populations of individual reptile species into three population categories assessing the importance of the population (*Table 2*). These categories are based on the total number of adult animals observed during individual survey occasions.

Table 2: Key Reptile Site Survey Assessment Categories (HGBI 1998)

Species	Low Population (No. of individuals)	Good Population (No. of individuals)	Exceptional Population (No. of individuals)
Adder	<5	5 - 10	>10
Common lizard	<5	5 - 20	>20
Grass snake	<5	5 - 10	>10
Slow worm	<5	5 - 20	>20

Limitations/notes

4.8 The majority of the surveys were undertaken within the peak survey period (April-May and September) with one survey undertaken in June and one in October. However, these surveys were carried out during the months when reptiles are active and weather conditions were suitable, so this is not considered to be a significant constraint.

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

5.0 RESULTS

Desk Study

Designated Sites

1.0 There were no sites designated for reptiles within the Desktop Study Area.

Reptile Records

5.0 SBIC returned reptile records from the last 10 years within 1km of the site. There was one record of a grass snake and one record of a common lizard located to the north-east of the Site.

5.1 There were two more records of grass snakes (to the north and west of the site) and one record of a slow-worm (to the north of the site) within 2km of the Site.

Habitats

5.2 The woodland blocks and dense scrub within the Site provide sub-optimal habitat for reptile species due to the dense canopy and high levels of shade. However, the woodland and scrub edges and hedgerows across the Site, especially where they border grasslands within the Site, provide good sheltering opportunities for reptiles. The rank grassland in the south of the Site provided good habitat for reptiles while modified grasslands were of more limited suitability. Both grasslands provide suitable basking opportunities for reptiles. The woodland edges and hedgerows also provide connectivity to habitats across the Site and in the wider area. The ponds on-site are considered to provide suitable foraging habitat for grass snakes.

Reptile Survey

5.3 Two grass snakes were found during the surveys, one adult and one juvenile. Both grass snakes were found the same area of the site, to the north of the proposed development area, along the edge of the woodland bordering the modified grassland to the west of the Site. *Table 3* below presents the findings of the reptile surveys with locations of refugia and reptile sightings shown on *Figure 1.*

Table 3: 2022 Reptile Survey Results

Date	Grass Snake	
	Adult	Juvenile
12.09.22	1	0
15.09.22	0	1

6.0 DISCUSSION

6.1 The rank grassland habitats in the south of the site provided good foraging habitats while the edges of the woodland and scrub habitats within the Site boundary were generally considered to provide suitable commuting habitat. Pasture grasslands were considered to be of more limited suitability. The ponds on the site were considered to provide suitable habitat for grass snakes which are associated with aquatic habitats.

6.1 The number of grass snakes observed has been assessed in accordance with population level criteria as stated in the Key Reptile Site Register[7]. A peak count of 1 grass snake was recorded; this is classed as a 'Low' population falling within the <5 individuals level.

6.2 No reptiles were observed within the southern part of the Site, where the development is proposed. Reptiles were observed within the northern section of the Site, which is to be enhanced for biodiversity as part of the proposals.

6.3 Despite the 'Low' population of reptiles observed during the survey, and the location of observations, there is potential for an adverse impact on reptile populations caused by:

- loss of habitat through vegetation clearance; and
- incidental harm during the works to carry out the proposed development.

6.4 Mitigation measures are recommended which aim to ensure that reptiles are not killed or injured during works and that their local conservation status is maintained. This includes passively moving reptiles into retained habitat by removing vegetation in stages during the active period (March – September inclusive) to allow reptiles to disperse of their own accord. A passive displacement method statement should be secured through an appropriately worded condition to ensure reptiles are not harmed or killed during any vegetation clearance works.

6.5 Reptiles should be incorporated into the proposals by enhancing habitats where the reptiles were observed and creating specific reptile habitats that are linked to the surroundings.

Enhancement

6.6 Gardens created within the south of the site as part of the proposed development will provide some opportunities for local reptile populations. However, the Site will mainly be enhanced for reptiles through the enhancement of habitats to the north of the Site.

6.7 The pasture grassland in the northern part of the Site will be enhanced through the planting of a native species-rich grassland seed mix and will be subjected to a sympathetic management. Improvement of the grasslands in this way would provide extensive areas of optimal foraging habitats for invertebrates, providing a good source of food for reptiles, especially slow-worms and common lizards, and for small mammals providing a food source for grass snakes.

6.8 Mixed scrub planting will also be carried out within the parts of the pasture grassland to the north to provide additional sheltering opportunities and corridors for reptiles to move across the Site. The scrub will be managed to ensure there are rides and clearings present within it, to provide suitable habitat for reptiles.

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

6.9 The edges of existing scrub on the Site, and the scrub to be planted once established, will be cut on rotation to prevent encroachment into grassland areas. This will create scrub of varying ages in small, scalloped areas, creating microclimates for reptiles.

6.10 The ponds to the north of the site will be retained and enhanced through planting to enhance botanical diversity. This will improve the quality of the ponds for amphibians and invertebrate and thus improve the quality of the ponds for reptile species, especially grass snakes.

6.11 A series of ponds will also be created and will be planted with a diverse range of aquatic, emergent and marginal plants to create optimal foraging habitat for grass snake.

6.12 It is recommended that deadwood piles at least 1 m x 1 m and hibernacula at least 1 m x 2 m in size are created within the grassland to north of the Site to provide further opportunities for shelter and basking and would also provide potential habitat for amphibians and invertebrates. This should have a rubble/brick base with mounded earth and will be allowed to colonise naturally with vegetation.

6.13 It is therefore considered that the proposals will result in positive effects on the local reptiles population, providing extensive areas of optimal habitat for the low grass snake population recorded and provided optimal habitat for other reptile species to colonise the Site.

7.0 CONCLUSION

7.0 Survey has demonstrated that the site is used by a small number of reptiles including a low population of grass snake.

7.1 Precautionary working measures have been recommended during works to prevent an offence being committed. This includes the passive displacement of reptiles prior to construction works.

7.2 The loss of coarse grasslands will inevitably reduce the availability of foraging habitat present for reptiles species. To mitigate for this, the proposals include extensive habitat creation and enhancement measures including species-rich grasslands, wetland features and scrub habitat. This mosaic of habitats proposed will provide optimal breeding, foraging and shelter habitat for reptiles.

7.3 Additional features including log piles will also provide optimal hibernation habitat for reptiles.

7.4 The mitigation measures provided will result in a beneficial impact on the reptile population recorded.

Key

- Red Line Boundary
- Tin locations
- Grass snake sighting

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masterplanning ■ environmental assessment ■ landscape design ■ urban design ■ ecology ■ architecture ■ arboriculture

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client
Nutfield Park Developments Ltd

project
Nutfield Greet Park

drawing title
REPTILE PLAN

scale @ A3
1:4,500

drawn
CHK

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Figure 1

Nutfield Park Developments Limited (Ltd)

Nutfield Green Park, Tandridge

APPENDIX L: BIODIVERSITY NET GAIN REPORT

October 2023

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APPENDIX

Appendix L-1: Baseline Condition Assessments

Appendix L-2: Biodiversity Metric 4.0 Calculations

1.0 INTRODUCTION

1.1 This report has been prepared by FPCR Environment and Design Ltd behalf of Nutfield Park Developments Limited (Ltd) for the development proposals of Nutfield Green Park, Tandridge (Central OS Grid Ref: TQ 30576 50986) herein referred to as 'the Site'. This report has been prepared to accompany an Ecological Impact Assessment (FPCR 2023) and should therefore be read in conjunction with that report.

Site Location and Context

1.1 The Site is approximately 58.8ha in size and is located to the North of the Village of Nutfield in the Tandridge borough area. It comprises a former quarry that has been historically restored and has become dominated by a mix of habitats. A large portion of the site is wooded, with some example of mature semi-natural woodlands present in the south, plantation woodlands in the centre/north of the Site and a large area of self-set birch/willow woodland in the centre of the Site. Two large pasture grasslands are present in the central/northern part of the Site, while a compartment of coarse grassland in present in the south-west of the Site. Small blocks of mixed scrub are scattered around the site while extensive areas of bramble scrub are present in the south-east and south-west. Three waterbodies are also present on Site which comprise two fishing lagoons in the north of the site and a central woodland pond.

1.2 In the surrounding landscape, the Site abuts the residential environs of Nutfield to the south. To the west lies a restored landfill site which sits between the Site and the extant Patteson Court Landfil Site. Eastwards, the landscape comprises a mix of woodlands, pasture grassland, arable fields and the Mercers South Quarry Site to the north-east. To the North lies additional areas of woodland and farmland before the landscape becomes dominated by the residential environs of South Merstham.

Site Proposals

1.3 The proposals include seeking outline planning permission for the development of the site for new 166 homes (Use Class C3) and Integrated Retirement Community comprising 70 care home beds and 41 extra care facility beds (Use Classes C2, E(e), F2), creation of new access, landscaping and associated works to facilitate the development, in phases which are severable (Outline with Access, all other matters reserved). Proposals also include 51.87ha of greenspace, the design of which has been heavily influenced by biodiversity to ensure a minimum 10% BNG can be achieved.

Aims and Objectives

1.2 This Biodiversity Net Gain Report is based on the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance[1]. The scope and objectives of this report are to:

- Summarise the results of the baseline UKHab Survey undertaken on the Site and to present the results of habitat condition assessment surveys following the Defra Biodiversity Metric 4.0 Technical Guidance.

[1] CIEEM (2021) Biodiversity Net Gain Report and Audit Templates Chartered institute of Ecology and Environmental Management, Winchester, UK.

- Provide an overview of the proposed habitats following completion of the scheme.
- Present the results of the Defra Biodiversity Metric 4.0 assessment completed for the proposals.
- Assess the feasibility of the proposals to achieve a net gain in biodiversity through the Defra Biodiversity metric 4.0.
- Recommendations for the proposals to maximise their biodiversity potential.

1.3 This report has been prepared to support an Ecological Appraisal prepared for the site, which provides a detailed description of the habitats present. This report provides only a summary description of the habitat baseline and this report should be read in conjunction with the Ecological Appraisal (FPCR, 2023).

Legislative and Policy Context

1.4 The UK Government, as signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Natural Environment and Rural Communities Act (NERC) 2006 and the Natural Environment White Paper (June 2011).

1.5 DEFRAs 25 Year Environment Plan (2018) seeks to embed a 'net environmental gain' principle for development to deliver environmental improvements locally and nationally. Current policy is that the planning system should provide biodiversity net gains where possible; however, this is moving towards a mandatory requirement.

1.6 The NPPF (2023) in particular seeks to ensure that the planning system contributes to and enhances the natural and local environment, protect and enhance biodiversity and geodiversity by:

"174. d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

179. b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."

1.7 The Tandridge draft local plan includes provision that "Net gains in biodiversity can be achieved through a variety of mechanisms including, but not limited to, habitat creation and/or enhancement…".

The Environment Act

1.1 The Environment Act 2021 sets out a mandatory 10% net gain in biodiversity for new development. The Act includes a transitional period such that development proposals under the Town and Country Planning Act 1990 must comply with the requirements from November 2023.

Measurable Net Gain

A key point in the current legislative context is that although the term "measurable net gain" is stated under the NPPF, there is currently no agreed definition in local or UK policy relating to a net gain target figure. Whilst a figure of 10% is widely viewed as best practice following the

Environment Act gaining royal assent, it currently has no adopted policy support at either a local or national level.

2.0 METHODOLOGY

Baseline Habitat Assessment

2.1 Baseline habitats were identified and mapped by using the UKHab Classification system[2] which is used to determine broad habitat types in the wider countryside. This involved a systematic walk over of the survey area during which an associated plant species lists were compiled for each habitat mapped along with additional notes regarding the current 'condition' of the habitat, based on the criteria outlined within The Biodiversity Metric 4.0 Technical Annex[3]. Vascular plant nomenclature followed Stace (2019)[4].

2.2 Full details of the survey methodologies employed are provided in the accompanying Ecological Impact Assessment Appraisal (FPCR 2023).

Biodiversity Net Gain Calculation

2.3 Natural England's published biodiversity net gain metric is an MS Excel spreadsheet that is used to quantify the predicted net-change in biodiversity value ("biodiversity units") of a proposed development site before and after development. It treats the area-based habitats and linear features such as hedgerows and lines of trees separately, and is based on pre-determined values, along with published written guidance set by a Natural England-led team of experts. The latest version of the metric, 4.0, has been used for this assessment.

2.4 The development Site was surveyed and mapped, as described above. Habitats were defined using the UK Habitat Classification, with each habitat parcel described by its location, area, distinctiveness and condition. This information was then imported into Biodiversity Metric 4.0 QGIS Template, with the existing habitats identified and areas automatically generated.

2.5 On-Site post-development habitats were determined from the Opportunities Master Plan, with proposed habitats mapped and digitised into the Biodiversity Metric 4.0 QGIS Template to generate areas for each of the habitats proposed for enhancement.

2.6 These pre- and post-enhancement habitat areas were then inputted into the 4.0 Metric Calculation tool. The metric then provides a habitat distinctiveness score for each of the baseline and proposed habitats which are pre-assigned scores based on the habitat type.

2.7 The metric then assigns a range of pre-assigned factors to each of the proposed habitats. These have been advised by subject knowledge experts and are universal multipliers generated by the metric itself for the following variables relevant to habitat creation, enhancement or restoration proposals:

- difficultly of creating or restoring/enhancing a habitat: This pre-assigned score is based on how difficult a particular habitat type is to create or restore/enhance.
- temporal risk: this is the 'time to target condition' for any particular habitat and determines how long a particular habitat type is likely to take to reach the condition score that the desired condition score assigned to it.

[2] UK Habitat Classification Working Group (2018). UK Habitats Classification User Manual at https://ukhab.org/

[3] Natural England (2023). "The Biodiversity Metric 4.0 -Technical Annex 1: Condition Assessment Sheets and Methodology March 2023 Natural England Joint Publication JP039 ISBN 978-1-7393362-2-6 Access [online] Available at: https://publications.naturalengland.org.uk/publication/6049804846366720)

[4] Stace, C (2019) New Flora of the British Isles. 4th edn. C&M Floristics

- spatial risk: this score is based on the distance between the site of habitat loss and any habitats creation or enhancement proposals at any offsite offsetting solutions.

2.8 Full details of the calculation methodology are provided in Biodiversity Metric 4.0 – User Guide[5].

2.9 This report has also followed best practice guidance produced by the Construction Industry Research and Information Association (CIRIA), The Chartered Institute for Ecology and Environmental Management (CIEEM) and the Institute of Environmental Management and Assessment (IEMA). These include:

- CIRIA– Biodiversity Net Gain Principles and Guidance for UK construction and development[6]
- CIEEM – Biodiversity Net Gain: Good Practice Principles for Development[7]
- IEMA – Biodiversity Net Gain Good Practice Insights (July 2023)[8]

Limitations

2.10 The UKHab habitat map has been reproduced from detailed field notes and informed by aerial imagery, OS mapping and site maps provided by the client. The accuracy of this figure is therefore ultimately guided by the accuracy of these sources and can only be relied upon to a certain degree of resolution.

2.11 The aim of biodiversity offsetting is to compensate for significant adverse impacts on biodiversity identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been taken, according to the mitigation hierarchy as required by the NPPF.

[5] Natural England (2023). Natural England Joint Publication JP039 Biodiversity metric 4.0 User Guide. Natural England. (https://publications.naturalengland.org.uk/publication/6049804846366720)
[6] https://www.ciria.org/CIRIA/Resources/Biodiversity_Net_Gain.aspx
[7] https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development/
[8] https://www.iema.net/resources/blog/2023/07/05/biodiversity-net-gain-good-practice-insights#:~:text=IEMA's%20Policy%20and%20Engagement%20Lead,into%20force%20in%20November%202023.

3.0 BASELINE CONDITIONS

Desktop Study

Strategic Significance

3.1 As detailed in the accompanying Ecological Impact Assessment prepared for the proposals, the Site forms part of the Holmethorpe Sandpits Complex Local Wildlife Site (LWS) and the Site is therefore considered to be of **High strategic significance**.

Biodiversity Units

Habitats

3.2 The Site is dominated by a range of habitats including woodland, pasture grassland, dense scrubbed areas, ponds and areas of rank grassland. Descriptions of the habitats present are provided in the accompanying Ecological Impact Assessment produced for the proposals. Table 1 provides an overview of the habitats present and their distinctiveness, discussed in the context of the biodiversity net gain metric. Detailed condition assessment results are provided in appendix L-1.

Table 1: Summary of Baseline Habitats

Habitat	Description	Area (ha)	Condition	Distinctiveness	Biodiversity Units
Modified Grassland	The central part of the Site includes two large pasture grassland field compartments that are currently sheep grazed. The were dominated by common and widespread grasses including Yorkshire fog *Holcus lanatus* and perennial rye-grass *Lolium perenne* and were generally species poor.	18.45	Moderate	Low	85.04
Modified Grassland	The northernmost part of the eastern pasture grassland field compartment has more sandy soils and therefore supports higher botanical diversity. Species are still characteristic of modified grassland being dominated by common and widespread grasses and herbs.	0.88	Good	Low	6.06
Other Neutral Grasslands	A grassland field compartment in the south of the Site supports rank grassland dominated by coarse species including rough meadow-grass *Poa trivialis,* Yorkshire fog and timothy *Phleum pratense* with occasional hard rush. These areas support limited species diversity, but have a varied sward height and limited scrub or bracken encroachment.	1.35	Moderate	Medium	12.39
Other Neutral Grasslands	Small areas of this habitat are also present in the north of the Site. These are tightly rabbit grazed limiting sward height diversity and are generally subject to significant scrub encroachment.	0.27	Poor	Medium	1.24
Bramble scrub	Significant areas of bramble *Rubus fruticosus* scrub are present across the Site but particularly in the south-east and south-west, where this habitat has encroached on to areas previously dominated by other neutral grasslands.	5.18	N/A	Medium	23.8
Hawthorn scrub	Small areas of hawthorn *Crataegus monogyna* dominated scrub are present in the south-east of the Site. Other species include blackthorn *Prunus spinosa* and bramble, but hawthorn dominates the canopy.	0.16	Poor	Medium	0.75
Mixed scrub	A small area of mixed scrub was present in the south-east of the Site which was largely dominated by bramble but also included hawthorn, black thorn and immature oak *Quercus robur* trees.	0.22	Good	Medium	3.02
Mixed scrub	This habitat is present in the North of the Site where it is associated with outgrown areas of other neutral grassland. It includes hawthorn, elder *Sambucus nigra,* blackthorn and sycamore *Acer pseudoplanatus* with ground flora dominated by common nettle *Urtica dioica.* It lack glades rides or clearings.	0.58	Moderate	Medium	5.34
Mixed scrub	Small areas of mixed scrub were also present in association with sandy grassland in the north of the Site which supported limited structural and botanical diversity.	0.49	Poor	Medium	2.25

Ponds (non-priority habitat)	The woodland ponds present in the north of the site and the ephemeral pond in the centre support limited marginal, aquatic and emergent vegetation and are heavily shaded by surrounding woodlands	1.2992	Moderate	Medium	25.97
Artificial unvegetated, unsealed surface	This habitat includes the church car park in the South-east of the Site and the footpath in the north-west, between the fishing pond and the island pond.	0.3	N/A	Very low	0
Developed land; sealed surface	This habitat Park Works Road in the South of the Site	0.19	N/A	Very low	0
Lowland mixed deciduous woodland	This area of good condition woodland includes the more mature, established semi-natural broadleaved woodlands present in the south of the Site. Canopy species include English oak, field maple *Acer campestre,* sycamore, ash *Fraxinus excelsior* and downy birch *Betula pubescens* and the woodland had a range of age classes and areas of established understorey.	1.48	Good	High	30.62
Lowland mixed deciduous woodland	In the south-west of the Site, this habitat comprised establish semi-natural woodland but support more limited diversity and evidence of regeneration. A stand of Japanese Knotweed are present is present in one compartment and others are used as a bike track and so have very limited ground flora.	5.86	Moderate	High	80.84
Lowland mixed deciduous woodland	This habitat was largely dominated by the self-set woodland in the former quarry lagoon site. Structural, botanical and age diversity was limited and tree health was generally poor due to overcrowding.	6.7	Poor	High	46.2
Other woodland; broadleaved	The central plantation woodland supports a range of species although many were non-native. Ground flora was limited as woodlands were generally crowded.	2.06	Moderate	Medium	18.9
Other woodland; broadleaved	This habitat was represented on site by self-set areas of immature single species woodland including a stand of young ash trees in the south-east of the Site and an area of willow/birch woodland in the south-west. Structural, botanical and age diversity was very limited.	1.47	Poor	Medium	6.77
Other woodland; mixed	This habitat comprises mature plantation woodlands in the centre of the Site and to the west of the lagoon in addition to small pockets of woodland in the south of the Site. They generally supported limited ground flora on account of dense crowding/shading.	10.64	Moderate	Medium	97.86

4.0 PROPOSED DESIGN

Habitats

Habitat Creation

4.1 Habitat creation is shown in *Figure 2*.

4.2 The proposals sought ecological input during an early phase of the design process to ensure that the impacts on ecological receptors will be kept to a minimum. Detailed BNG calculations have been completed at an outline planning stage to guide the proposals and ensure that a gain can be achieved as the detailed design progresses.

4.3 The proposals for the site include extensive areas of Green Infrastructure (GI) totalling 52ha (88%) of the Site Boundary. This will include large areas of habitat retention and enhancement as well as the creation of new habitats to boost the biodiversity unit score of the scheme. Development will be restricted to the south of the Site and the platforms will largely be restricted to areas of poor condition other neutral grassland, other broadleaved woodlands or bramble scrub.

4.4 A central road will be created which will result in the loss of some high distinctiveness units through the clearance of lowland mixed deciduous woodland. In so far as possible, this has been restricted to areas of poor condition lowland mixed deciduous woodland, with only minor losses of moderate and good condition lowland mixed deciduous woodland to facilitate the levels required to construct the road.

4.5 Retained woodlands and hedgerows will be protected from damage and to allow sufficient room for management in line with RPAs identified in the Arboricultural Impact Assessment. In addition, mature trees will be retained and root protection areas (RPA) adequately buffered wherever possible. Tree loss has been kept to a minimum. The onsite ditch will also be retained.

4.6 The Northern part of the Site includes a range of habitat creation and enhancement measures to maximise the biodiversity score including the following:

- Extensive planting of mixed scrub to include a diverse planting mix and managed to include glades, rides and clearings.
- Additional woodland will be planted using a diverse range of tree species and ground flora.
- Retained areas of pasture grassland will be enhanced to species-rich other neutral grasslands.
- Retained woodlands will be enhanced through selective thinning, additional planting, retention of deadwood and the introduction of ground flora.
- New hedgerow planting around residences throughout the Site.
- The retained sections of the hedgerow in the south-west of the Site will be enhanced with additional planting to create a native-species rich hedge.
- SuDS basins and swales will be planted with a diverse range of marginal, emergent and aquatic vegetation.
- Proposals include additional tree planting within the development area, with them included along streets and within GI areas around the Site peripheries.

- Retained ponds will be enhanced with selective clearance of trees that are currently overshading banks and the planting of a diverse range of marginal, emergent and aquatic vegetation.
- The central pond will be enhanced through the drainage proposals which will facilitate the feature holding water permanently, improving its biodiversity value.

4.7 The biodiversity units for the created habitat on the site have been calculated from the Landscape Strategy Plan (drawing number 10973-FPCR-ZZ-XX-DR-L-0001_P07) and are presented in Table 2, along with a description of the management recommendations which will be employed to achieve the target conditions for each habitat type.

Table 2: Summary of Proposed Habitat Creation

Habitat (Landscaping Plan Reference)	Habitat (UKHab Type)	Description	Target Condition	Distinctiveness
Proposed flower rich grassland/retained area of sandy grassland	Other Neutral grassland	To achieve a good condition, the existing pasture grassland will be sown with a native species-rich seed mix and managed through extensive grazing and/or hay-cut management. This will ensure it maintains diversity and prevents scrub or bracken encroachment.	Good	Medium
Proposed areas of native scrub	Mixed scrub	This habitat will be planted using a diverse range of native scrub species. It will be planted to incorporate glades, rides and clearings and will be managed to maintain these. Edge habitat will be maintained by cutting annually in late summer/early autumn.	Good	Medium
Proposed native woodland planting/new trees	Lowland mixed deciduous woodland	A range of native trees will be planted in a naturalised pattern. A minimum of 5 species should be planted to ensure the canopy can accommodate this number of species once established. Understorey planting and the seeding of the area with an appropriate ground flora seed mix should also be implemented. A minimum area of 2.13ha of woodland planting will be provided to compensate for the area of woodland lost to the proposals.	Poor	High
Existing woodland and trees	Lowland mixed deciduous woodland, other mixed woodland and other broadleaved woodland	All retained woodlands on site will be enhanced (with the exception of the retained areas of good condition lowland mixed deciduous woodland which cannot be enhanced further) through selective thinning, the introduction of additional tree planting, retention of felled deadwood and/or the introduction of ground flora. The proposals will seek to improve the condition score of all retained woodlands by one condition band during the management period, thought the ultimate intention will be to manage woodland to ensure that in the long-term they can achieve good condition (though this will likely take longer than the management period).	Moderate/Good	Medium/High
Existing waterbodies	Ponds (Non-priority habitat)	Existing ponds will be enhanced through the selective thinning of current overshading on the banks which currently include trees growing into the pond. Opening up the banks will allow for the planting of marginal, emergent and aquatic vegetation. The drainage proposals will facilitate the central pond holding water allowing for the above enhancements to be incorporated in this	Moderate/Good	Medium

		location. The northern ponds include artificial drainage in the form of pipework and so good condition cannot be achieved.		
Existing wet area utilised for drainage	Lowland mixed deciduous woodland	Drainage channels will be dug through the ex-lagoon woodland habitat in the south of the Site allow run-off to naturally drain into the northern part of this woodland area. The area is currently dominated by willows and silver birch and will not be affected by the increased drainage during periods of excessive rain. This area will be subject to the same enhancement as the rest of the woodlands on site to target moderate condition. Tree planting here will only include species tolerant of wetter ground conditions and inundation. The design of the channels will ensure tree loss is kept to a minimum and will target areas of selective thinning.	Moderate	High
Proposed new ponds with open swales	SUDS and ditches	New SUDS features will be designed with a naturalised layout and will incorporate extensive opportunities for marginal, aquatic and emergent vegetation planting to target good condition. New swales will comprise naturalised ditches connecting the SUDS features and will be planted with a range of marginal species to improve their biodiversity value and target moderate condition.	Good/Moderate	Low
Proposed residential development/New footpath routes/Diverted PRoW	Developed land; sealed surface	These habitats have been assumed to include built environment and areas of modified grassland, the latter of which will target moderate condition through the planting of a flowering lawn mix. Also included in these areas will be opportunities for specimen tree planting, hedgerow creation and landscape planting. The inclusion of these latter features will be considered at the detailed design stage and will help to further increase the BNG score for the Site.	N/A or Moderate	Very Low/Low

Additional Enhancements

4.8 Additional mitigation measures will be implemented to contribute to a biodiversity net gain within the redesign. This will focus on the provision of faunal enhancements that are not captured within the Natural England Biodiversity Metric 4.0 calculations. To achieve this, external bat boxes will be installed on buildings as well as bird nest boxes designed for urban species. These will include boxes suitable for house sparrow *Passer domesticus,* starling *Sturnus vulgaris* and swift *Apus apus.*

4.9 Other bat, bird and invertebrate boxes will also be included on trees around the Site to provide additional features.

4.10 Artificial hibernacula will be created within the species-rich grasslands in the North of the Site to provide opportunities for herptiles.

4.11 Additionally, the planting of climbing species such as Jasmin *Jasminum officinale*, Evergreen Clematis *Clematis armandi,* and Blue Passionflower *Passiflora caerulea* supported by trellis has been incorporated into the proposed design. This is also not captured in the Biodiversity Metric but will add value for pollinating insects.

4.12 The provision of these additional enhancements can be secured through an appropriately worded condition.

5.0 BNG METRIC

5.1 The habitat creation proposals highlighted within this report have all been inputted into the Biodiversity Metric 4.0. Table 3 provides a summary of the headline results of the biodiversity metric 4.0 assessment completed for the proposals. The full metric has been provided in Appendix B.

Table 3: Biodiversity Metric 4.0 Headline Results

Baseline	Habitat Units	433.32
	Hedgerow Units	12.01
	Watercourse Units	0.75
Post-Intervention	Habitat Units	527.44
	Hedgerow Units	20.76
	Watercourse Units	5.61
Total Net Unit Change	Habitat Units	**+94.13**
	Hedgerow Units	**+8.75**
	Watercourse Units	**+4.86**
Total Net Percentage Change	Habitat Units	**+21.72%**
	Hedgerow Units	**+72.92%**
	Watercourse Units	**+648.14%**

5.2 The accompanying metric demonstrates that a gain in excess of 10% can be achieved for habitats, hedgerow and watercourse units.

5.3 As the detailed design progresses, the above assumptions can be secured through an appropriately worded condition requiring the detailed design to be accompanied by a Habitat Management and Monitoring Plan.

Habitat Trading Rules Summary

5.4 Through the sensitive design of green infrastructure, the proposals have demonstrated that the trading rules of the metric can be satisfied as part of the net gain in biodiversity. There were no very high distinctiveness habitats supported by the Site. Table 4 summarises the habitat trading summaries across the site.

Table 4: Habitat Trading Summary

Trading Summary		
Distinctiveness Group	**Trading Rule**	**Trading Satisfied?**
Very High	Bespoke compensation likely to be required	N/A
High	Same habitat required	Yes
Medium	Same broad habitat or a higher distinctiveness habitat required	Yes
Low	Same distinctiveness or better habitat required	Yes

6.0 CONCLUSION

6.1 This assessment has demonstrated that through the sensitive design of the 51.8ha of green infrastructure included within the development proposals, the habitat losses anticipated to facilitate the development of the Site can be adequately offset and a gain in excess of 10% in biodiversity can be achieved for habitats, hedgerows and watercourses.

6.2 The scheme will achieve a 21.72% gain in habitat units, a 72.92% gain in hedgerows units and a 648.14% gain in watercourse units.

6.3 The habitat creation and enhancement proposals highlighted in this report can be secured through an appropriately worded condition that will include a requirement for a Habitat Management and Monitoring plan.

Key

- Red Line Boundary
- Native hedgerow
- Species-rich native hedgerow
- Ditches
- Artificial unvegetated, unsealed surface
- Bramble scrub
- Developed land; sealed surface
- Hawthorn scrub
- Lowland mixed deciduous woodland
- Mixed scrub
- Modified grassland
- Other neutral grassland
- Other woodland; broadleaved
- Other woodland; mixed
- Ponds (non-priority habitat)

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0 50 100 m

client
Nutfield Park Developments Ltd

project
Nutfield Green Park

drawing title
BASELINE HABITATS AND PARCEL REFERENCE PLAN

scale @ A3 1:4,303.34118 | drawn OGJ | issue date 9/10/2023

drawing / figure number
Figure 1

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Key

Red Line Boundary

Proposed Habitats

- **Artificial unvegetated, unsealed surface**
- **Bramble scrub**
- **Developed land; sealed surface**
- **Lowland mixed deciduous woodland**
- **Mixed scrub**
- **Modified grassland**
- **Other neutral grassland**
- **Other woodland; broadleaved**
- **Other woodland; mixed**
- **Ponds (non-priority habitat)**
- **Sustainable drainage system**

Proposed Hedgerows

- **Species-rich native hedgerow**

Proposed Watercourses

- **Ditches**

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project
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Tandridge, Surrey

drawing title
PROPOSED HABITATS

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drawn
DS / OGJ

issue date
9/10/2023

drawing / figure number
Figure 2

Key

- Red Line Boundary

Habitat Retention

- Enhanced
- Retained
- Lost

Hedgerow Retention

- Enhanced
- Retained
- Lost

Watercourse Retention

- Retained

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project
Nutfield Park,
Tandridge, Surrey

drawing title
HABITAT RETENTION

scale @ A3
1:4,500

drawn
DS / OGJ

issue date
9/10/2023

drawing / figure number
Figure 3

Key

Red Line Boundary

Baseline Habitat Condition

- **Good**
- **Moderate**
- **Poor**
- **N/A - Other**
- **Condition Assessment N/A**

Baseline Habiutat Distinctiveness

- **High**
- **Medium**
- **Low**
- **V.Low**

Baseline Hedgerow Condition

- **Good**

Baseline Hedgerow Distinctiveness

- **Medium**
- **Low**

Baseline Watercourse Condition

- **Poor**

Baseline Watercourse Distinctiveness

- **Medium**

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BASELINE HABITAT CONDITION / DISTINCTIVENESS

scale @ A3
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DS / OGJ

issue date
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drawing / figure number
Figure 4

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Key

Red Line Boundary

Proposed Habitat Condition

- **Good**
- **Moderate**
- **Poor**
- **N/A - Other**
- **Condition Assessment N/A**

Proposed Habitat Distinctiveness

- **High**
- **Medium**
- **Low**
- **V.Low**

Proposed Hedgerow Condition

- **Good**

Proposed Hedgerow Distinctiveness

- **Medium**

Proposed Watercourse Condition

- **Moderate**
- **Poor**

Proposed Watercourse Distinctiveness

- **Medium**

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PROPOSED HABITAT CONDTION / DISTINCTIVENESS

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DS / OGJ

issue date
9/10/2023

drawing / figure number
Figure 5

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APPENDIX L-1: BASELINE CONDITION ASSESSMENTS

Woodlands																					
Indicator		**Good (3 points)**	**Moderate (2 points)**	**Poor (1 point)**	**Score per indicator**																
				Compartment Ref:	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16	W 17	W 18
A	**Age distribution of trees**	Three age-classes present.	Two age-classes present.	One age-class present.	3	2	2	2	1	3	3	3	3	3	2	3	3	3	2	2	3	3
B	**Wild, domestic and feral herbivore damage**	No significant browsing damage evident in woodland.	Evidence of significant browsing pressure is present in 40% or less of whole woodland	Evidence of significant browsing pressure is present in 40% or more of whole woodland.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3
C	**Invasive plant species**	No invasive species present in woodland.	Rhododendron *Rhododendron ponticum* or cherry laurel *Prunus lauroceras us* not present, other invasive species	Rhododendron or cherry laurel present, or other invasive species >10% cover.	3	3	3	3	3	2	3	3	3	1	3	3	3	3	3	3	3	3

			<10% cover.																			
D	**Number of native tree species**	Five or more native tree or shrub species found across woodland parcel.	Three to four native tree or shrub species found across woodland parcel.	Two or less native tree or shrub species across woodland parcel.	3	2	2	3	2	3	3	3	2	2	2	3	3	3	2	2	2	2
E	**Cover of native tree and shrub species**	>80% of canopy trees and >80% of understory shrubs are native.	50 - 80% of canopy trees and 50 - 80% of understory shrubs are native.	<50% of canopy trees and <50% of understory shrubs are native.	2	2	3	2	3	3	3	3	2	3	3	3	2	2	3	3	2	2
F	**Open space within woodland**	10 - 20% of woodland has areas of temporary open space[6]. Unless woodland is <10ha, in which case 0 - 20% temporary	21 - 40% of woodland has areas of temporary open space.	<10% or >40% of woodland has areas of temporary open space[6]. But if woodland <10ha has <10% temporary open space, please see	3	3	3	3	3	3	2	2	2	1	2	3	3	3	3	3	3	3

		open space is permitted.		Good category.																			
G	**Woodland regeneration**	All three classes present in woodland; trees 4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland.	No classes or coppice regrowth present in woodland.	2	1	1	1	2	3	2	2	3	2	1	2	3	3	2	2	3	3
H	**Tree health**	Tree mortality less than 10%, no pests or diseases and no crown dieback.	11% to 25% tree mortality and or crown dieback or low-risk pest or disease present.	Greater than 25% tree mortality and or any high-risk pest or disease present.	2	3	2	2	2	2	2	2	2	2	3	2	2	2	3	3	2	2

I	**Vegetation and ground flora**	Recognisable NVC plant community at ground layer present, strongly characterised by ancient woodland flora specialists.	Recognisable woodland NVC plant community at ground layer present.	No recognisable woodland NVC plant community at ground layer present.	3	1	1	1	1	3	3	3	3	3	1	3	1	1	1	1	1	1
J	**Woodland vertical structure**	Three or more storeys across all survey plots, or a complex woodland.	Two storeys across all survey plots.	One or less storey across all survey plots.	2	1	2	1	1	2	2	2	2	3	1	2	2	2	2	2	2	2
K	**Veteran trees**	Two or more veteran trees per hectare.	One veteran tree per hectare.	No veteran trees present in woodland.	2	1	1	1	1	2	1	1	1	2	1	2	2	2	1	1	2	2
L	**Amount of deadwood**	50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, branch stubs and	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an	3	1	1	3	2	1	2	2	2	1	1	2	2	2	1	1	2	2

		stumps, or an abundance of small cavities.	and or stems, stubs and stumps, or an abundance of small cavities.	abundance of small cavities.																	
M	**Woodland disturbance**	No nutrient enrichment or damaged ground evident.	Less than 1 hectare in total of nutrient enrichment across woodland area and or less than 20% of woodland area has damaged ground.	More than 1 hectare of nutrient enrichment and or more than 20% of woodland area has damaged ground.	1	1	1	3	1	1	1	1	2	1	1	1	1	1	1	1	1
Total Score (out of a possible 39)					32	24	29	28	25	29	30	30	30	27	26	32	29	29	26	26	28	28
Condition – Poor (P), Moderate (M) or Good (G)					M	P	M	M	P	G	M	M	M	M	M	M	M	M	M	M	M	M

Scrub					
Condition Assessment Criteria	**Criterion passed (Yes or No)**				
Compartment Ref:	**S1**	**S2**	**S3**	**S4**	**S5**

A	The scrub is a good representation of the habitat type it has been identified as, based on its UKHab description (where in its natural range). The appearance and composition of the vegetation closely matches the characteristics of the specific scrub type. At least 80% of scrub is native, and there are at least three native woody species1, with no single species comprising more than 75% of the cover (except hazel *Corylus avellana*, common juniper *Juniperus communis*, sea buckthorn *Hippophae rhamnoides* or box *Buxus sempervirens*, which can be up to 100% cover).	*N/A Bramble Scrub Automatically scored Poor*	Pass	Pass	Pass	Pass
B	Seedlings, saplings, young shrubs and mature (or ancient or veteran2) shrubs are all present.		Fail	Pass	Fail	Fail
C	There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA4) and species indicative of sub-optimal condition make up less than 5% of ground cover.		Pass	Pass	Pass	Pass
D	The scrub has a well-developed edge with scattered scrub and tall grassland and or forbs present between the scrub and adjacent habitat.		Fail	Pass	Fail	Pass
E	There are clearings, glades or rides present within the scrub, providing sheltered edges.		Fail	Pass	Fail	Fail
Number Criterion Passed:		N/A	2	5	2	3
Condition		Poor	Poor	Good	Poor	Moderate

Ponds				
Condition Assessment Criteria		**Criterion passed (Yes or No)**		
	Compartment Ref:	**P1**	**P2**	**P3**
Core Criteria – applicable to all ponds (woodland and non-woodland)				
A	The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	Pass	Pass	Pass
B	There is semi-natural habitat (moderate distinctiveness or above) completely surrounding the pond, for at least 10 m from the pond edge for its entire perimeter.	Pass	Pass	Pass
C	Less than 10% of the water surface is covered with duckweed Lemna spp. or filamentous algae.	Pass	Fail	Fail
D	The pond is not artificially connected to other waterbodies, e.g. agricultural ditches or artificial pipework.	Fail	Fail	Pass
E	Pond water levels can fluctuate naturally throughout the year. No obvious artificial dams, pumps or pipework.	Fail	Fail	Pass
F	There is an absence of listed non-native plant and animal species.	Pass	Pass	Pass
G	The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	Fail	Fail	Pass
Additional Criteria – must be assessed for all non-woodland ponds:				
H	Emergent, submerged or floating plants (excluding duckweed)4 cover at least 50% of the pond area which is less than 3 m deep.	N/A	N/A	N/A
I	The pond surface is no more than 50% shaded by adjacent trees and scrub.	N/A	N/A	N/A
	Number of Criterion Passed	4	3	6
	Condition	Poor	Poor	Moderate

Grassland (low distinctiveness)				
Condition Assessment Criteria		**Criterion passed (Yes or No)**		
	Compartment Ref:	**G2**	**G3**	**G4**
A	There are 6-8 vascular plant species per m2 present, including at least 2 forbs **Note - this criterion is essential for achieving Moderate or Good condition.** Where the vascular plant species present are characteristic of medium, high or very high distinctiveness grassland, or there are 9 or more of these characteristic species per m^2, please review the full UKHab description to assess whether the grassland should instead be classified as a higher distinctiveness grassland. Where a grassland is classed as medium, high, or very high distinctiveness, please use the relevant condition sheet.	Pass	Pass	Pass
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for vertebrates and invertebrates to live and breed.	Fail	Fail	Pass
C	Some scattered scrub (including bramble *Rubus fruticosus* agg.) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of scrub with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	Pass	Pass	Pass
D	Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	Fail	Fail	Pass
E	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).	Fail	Fail	Pass
F	Cover of bracken Pteridium aquilinum is less than 20%.	Pass	Pass	Pass
G	There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA4).	Pass	Pass	Pass
	Number of Criterion Passed	4	4	7
	Condition	Moderate	Moderate	Good

Grassland (medium, high and very high distinctiveness)			
Condition Assessment Criteria		**Criterion passed (Yes or No**	
	Compartment Ref	**G1**	**G5**
A	The grassland is a good representation of the habitat type it has been identified as, based on its UKHab description - the appearance and composition of the vegetation closely matches the characteristics of the specific grassland habitat type. Indicator species listed by UKHab for the specific grassland habitat type are consistently present. **Note - this criterion is essential for achieving Moderate or Good condition for non-acid grassland types only.**	Fail	Fail
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	Pass	Pass
C	Cover of bare ground is between 1% and 5%, including localised areas, for example, rabbit warrens.	Pass	Pass
D	Cover of bracken Pteridium aquilinum is less than 20% and cover of scrub (including bramble *Rubus fruticosus* agg.) is less than 5%.	Fail	Fail
E	Combined cover of species indicative of sub-optimal condition and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area. If any invasive non-native plant species (as listed on Schedule 9 of WCA4) are present, this criterion is automatically failed.	Fail	Fail
	Number of Criterion Passed	2	2
	Condition	Poor	Poor

Hedgerows					
Attributes and functional groupings (A, B, C, D and E)		**Criteria - the minimum requirements for 'favourable condition'**	**Description**	**Criterion passed (Yes or No)**	
			Hedgerow Ref:	**H1**	**H2**
Core groups - applicable to all hedgerow types					
A1.	Height	>1.5 m average along length	The average height of woody growth estimated from base of stem to the top of the shoots, excluding any bank beneath the hedgerow, any gaps or isolated trees. Newly laid or coppiced hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice). A newly planted hedgerow does not pass this criterion (unless it is >1.5 m height).	Yes	Yes
A2.	Width	>1.5 m average along length	The average width of woody growth estimated at the widest point of the canopy, excluding gaps and isolated trees. Outgrowths (such as blackthorn Prunus spinosa suckers) are only included in the width estimate when they are >0.5 m in height. Laid, coppiced, cut and newly planted hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice).	Yes	Yes
B1.	Gap - hedge base	Gap between ground and base of canopy <0.5 m for >90% of length	This is the vertical 'gappiness' of the woody component of the hedgerow, and its distance from the ground to the lowest leafy growth. Certain exceptions to this criterion are acceptable (see page 65 of the Hedgerow Survey Handbook).	Yes	Yes
B2.	Gap - hedge canopy continuity	Gaps make up <10% of total length; and No canopy gaps >5 m	This is the horizontal 'gappiness' of the woody component of the hedgerow. Gaps are complete breaks in the woody canopy (no matter how small). Access points and gates contribute to the overall 'gappiness' but are not subject to the >5 m criterion (as this is the typical size of a gate).	Yes	Yes

C1.	Undisturbed ground and perennial vegetation	>1 m width of undisturbed ground with perennial herbaceous vegetation for >90% of length: · Measured from outer edge of hedgerow; and · Is present on one side of the hedgerow (at least).	This is the level of disturbance (excluding wildlife disturbance) at the base of the hedgerow. Undisturbed ground is present for at least 90% of the hedgerow length, greater than 1 m in width and must be present along at least one side of the hedgerow. This criterion recognises the value of the hedgerow base as a boundary habitat with the capacity to support a wide range of species. Cultivation, heavily trodden footpaths, poached ground etc. can limit available habitat niches.	Yes	Yes
C2.	Nutrient-enriched perennial vegetation	Plant species indicative of nutrient enrichment of soils dominate <20% cover of the area of undisturbed ground.	The indicator species used are nettles Urtica spp., cleavers Galium aparine and docks Rumex spp. Their presence, either singly or together, does not exceed the 20% cover threshold.	No	No
D1.	Invasive and neophyte species	>90% of the hedgerow and undisturbed ground is free of invasive non-native plant species (including those listed on Schedule 9 of WCA3) and recently introduced species.	Recently introduced species refer to plants that have naturalised in the UK since AD 1500 (neophytes). Archaeophytes count as natives. For information on archaeophytes and neophytes see the JNCC website4, as well as the BSBI website5 where the 'Online Atlas of the British and Irish Flora'6 contains an up-to-date list of the status of species. For information on invasive non-native species see the GB Non-Native Secretariat website7.	Yes	Yes
D2.	Current damage	>90% of the hedgerow or undisturbed ground is free of damage caused by human activities.	This criterion addresses damaging activities that may have led to or lead to deterioration in other attributes. This could include evidence of pollution, piles of manure or rubble, or inappropriate management practices (e.g., excessive hedgerow cutting).	Yes	Yes
			Number of Criterion Passed	7	7
			Condition	Good	Good

Ditches		
Condition Assessment Criteria		**Criterion passed (Yes or No)**
	Ditch Ref:	**D1**
A	The ditch is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution.	Pass (no water)
B	A range of emergent, submerged and floating-leaved plants are present. As a guide >10 species of emergent, floating or submerged plants present in a 20 m ditch length.	Fail
C	There is less than 10% cover of filamentous algae and or duckweed *Lemna* spp. (these are signs of eutrophication).	Pass (no water)
D	A fringe of aquatic marginal vegetation is present along more than 75% of the ditch.	Fail
E	Physical damage is evident along less than 5% of the ditch, with examples of damage including: excessive poaching, damage from machinery use or storage, or any other damaging management activities.	Pass
F	Sufficient water levels are maintained - as a guide a minimum summer depth of approximately 50cm in minor ditches and 1m in main drains.	Fail
G	Less than 10% of the ditch is heavily shaded.	Fail
H	There is an absence of non-native plant and animal species.	Pass
	Number of Criterion Passed	4
	Condition	Poor