THE ENVIRONMENT PARTNERSHIP



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WREXHAM

FAVOURABLE CONSERVATION STATUS STUDY - BATS

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1.0 Introduction

1.1 The Environment Partnership (TEP) was commissioned in January 2024 by Redrow Homes North West Ltd to undertake a Favourable Conservation Status Study of bat species within the locality of land adjacent to Lower Berse Farm, situated south of Ruthin Road in Wrexham and hereafter referred to as the 'site'.

1.2 Proposals for the site include an outline planning application for up to 1200 dwellings, associated roads, open space, community facilities, a primary school, and a wastewater treatment plant. Bat surveys undertaken to inform the outline planning application are detailed in the TEP Bat Survey Technical Report Ref: 8745.006 (December 2022) and included:

- A preliminary Ground Level Tree Assessment of trees within and immediately adjacent to the site, to determine bat roost habitat suitability;
- Bat activity transect surveys of habitats within the site;
- Static monitoring surveys of bat activity along woodland edge, ditch and hedgerow and mature tree habitat, which may be affected by the proposed development and likely provides valuable bat foraging/commuting habitat; and
- Nocturnal emergence/ re-entry surveys of trees identified as having bat roost habitat suitability during the preliminary Ground Level Tree Assessment, which will likely be directly impacted by the proposed development.

1.3 The purpose of this Favourable Conservation Status Study is to provide detail on the following:

- Bat species present within the site and the wider locality;
- Current conservation status of each local bat species populations;
- What constitutes 'Favourable' conservation status in respect of local bat species populations; and
- Assessment demonstrating that the proposed development is not likely to be detrimental to the maintenance of the Favourable Conservation Status (FCS) of local bat species populations.

1.4 The FCS of a species is determined based on the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within its natural range. The conservation status is taken as 'Favourable' when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

2.0 Site Description

2.1 The area of the site is approximately 75.26 hectares. The site is located on the western side of Wrexham and is adjoined by the A525 (Ruthin Road) to the north, beyond which there are established areas of housing and the emerging Western Gateway Business Park. To the west the site is separated from the wider arable landscape by Berse Lane and the A483 dual carriageway. To the south the site adjoins part of the Village of Bersham and is directly bounded by the B5099 (Bersham Road). Figure 1 illustrates the location of the site in the context of the wider landscape.

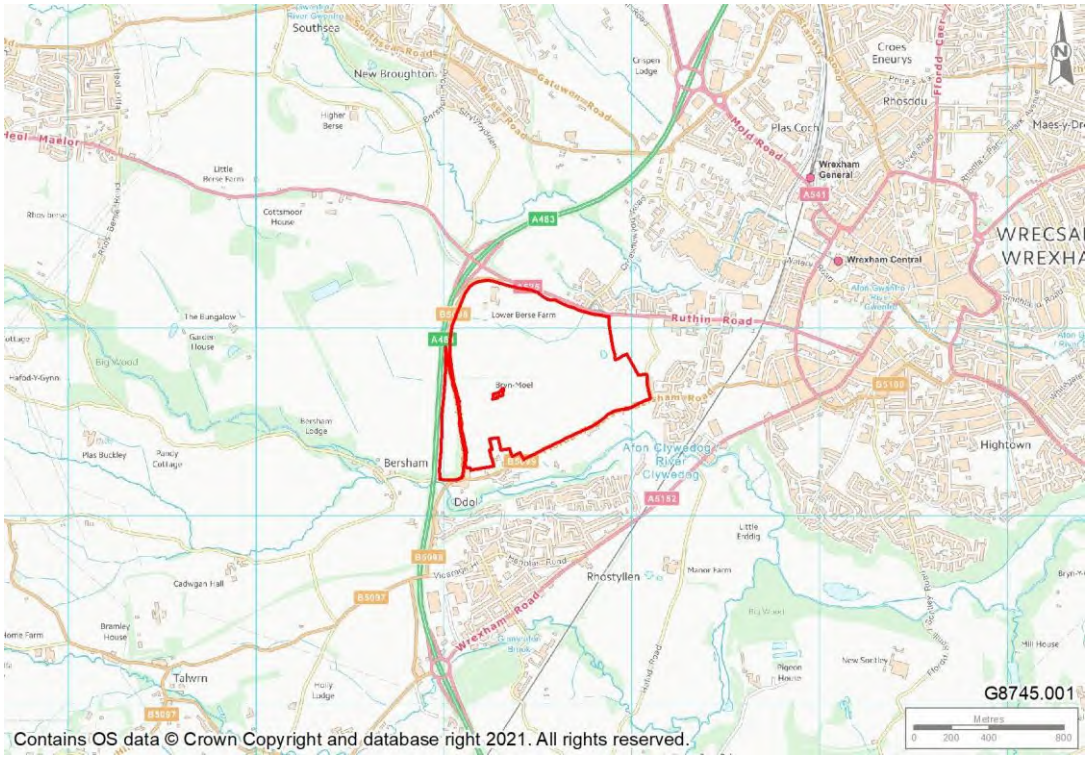


Figure 1. Site location within the context of the wider landscape.

2.2 The site is located at approximate central grid reference SJ 31500 49800 and is currently used for agricultural purposes including crop production and cattle grazing in association with Lower Berse Farm. Lower Berse Farm is situated in the north-west corner of the site and is composed of several barns, storage sheds and outbuildings in addition to some Grade II* listed farmhouse buildings. Other development includes a residential dwelling and a communications aerial installation to the centre of the site that are excluded from the application redline boundary. None of the structures within or adjacent to the site have been assessed as to their bat roost habitat suitability, as at the time of surveys these areas were not identified as being impacted by the proposed development.

2.3 Habitats within the site consist predominantly of arable land and improved grassland, bordered by native species-rich, intact hedgerows with trees. Within the site there are small areas of dense semi-natural broad-leaved woodland, semi-improved neutral grassland, continuous scrub, and tall ruderal vegetation. A wet ditch runs within the northern half of the site and there is a single pond associated within Lower Berse Farm.

3.0 Bat Species and Conservation Status

3.1 All bat species and their roosts are legally protected in the UK. The principal international legislation relating to bats includes:

- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)[1]
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention[2] or CMS)
- Convention on Biological Diversity (Biodiversity Convention[3] or CBD)

3.2 The most relevant national legislation relating to bats is summarised as follows:

- Conservation of Habitats and Species Regulations 2017[4] (bats recognised as being European Protected Species (EPS)
- Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[5] (2019 Regulations) (EPS)
- The Wildlife and Countryside Act 1981 (as amended)[6] (WCA)
- The Countryside and Rights of Way Act 2000 (Part III)[7] (CROW)
- The Environment (Wales) Act 2016[8]

3.3 Local policies relating to bats include the production of Local Biodiversity Action Plans (LBAP)[9] by Wrexham County Borough Council, designed to conserve and enhance local biodiversity by setting targets and co-ordinating actions for biodiversity conservation.

Assemblage

3.4 Numerous bat records recorded within the last ten years were returned from a desk study data search within 2 km of the site. Records are detailed within the Ecology Desk Study (TEP Report Ref: 8745.001). Species recorded within 2 km of the site and within the site included:

- Common pipistrelle *Pipistrellus pipistrellus* (EPS[10], WCA5[11], S7[12]);
- Soprano pipistrelle *Pipistrellus pygmaeus* (EPS, WCA5, S7);
- Pipistrelle species *Pipistrellus* sp. (EPS, WCA5, S7);
- Noctule *Nyctalus noctula* (EPS, WCA5, S7);
- Brown long-eared *Plecotus auritus* (EPS, WCA5, S7);
- Whiskered/Brandt's bat *Myotis mystacinus/brandtii*; (EPS, WCA5);

1 Convention on the Conservation of European Wildlife and Natural Habitats. Bern, 1979 https://www.coe.int/
2 Convention on the Conservation of Migratory Species of Wild Animals, Bonn, June 1979 https://www.cms.int/
3 Convention on Biological Diversity, Rio de Janeiro, June 1992https://www.cbd.int/
4 Conservation of Habitats and Species Regulations 2017 (SI 2017/1012) https://www.legislation.gov.uk/uksi/2017/1012/
5 Conservation of Habitats and Species Regulations 2019 (SI 2019/579) https://www.legislation.gov.uk/uksi/2019/579/
6 Wildlife and Countryside Act 1981 c. 69 https://www.legislation.gov.uk/ukpga/1981/69/
7 Countryside and Rights of Way Act 2000 c. 37 https://www.legislation.gov.uk/ukpga/2000/37/
8 Environment (Wales) Act 2016 c.3 https://www.legislation.gov.uk/anaw/2016/3/section/6/enacted
9 Wrexham Biodiversity Action Plan (2002) Joint Nature Conservation Committee https://webarchive.nationalarchives.gov.uk/20110303154000/http://www.ukbap.org.uk/lbap.aspx?id=499#6
10 Conservation of Habitats and Species Regulations 2017 (SI 2017/1012) https://www.legislation.gov.uk/uksi/2017/1012/
11 Wildlife and Countryside Act 1981 c. 69 https://www.legislation.gov.uk/ukpga/1981/69/
12 Environment (Wales) Act 2016 c.3 https://www.legislation.gov.uk/anaw/2016/3/section/7/enacted

- Daubenton's bat *Myotis daubentonii* (EPS, WCA5);
- Natterer's bat *Myotis nattereri* (EPS, WCA5);
- *Myotis* species (EPS, WCA5); and
- Lesser horseshoe *Rhinolophus hipposideros* (EPS, WCA5, S7, LBAP[13]).

3.5 Species diversity within the site recorded during activity transect surveys, automated static detector monitoring surveys and nocturnal emergence/ re-entry surveys undertaken in 2021 included at least six species. Common and soprano pipistrelle bats were the most frequently recorded within the site, with *Myotis* bats, noctule, brown long-eared and lesser horseshoe also recorded in decreasing frequency. The assemblage recorded within the site is therefore representative of known populations recorded locally.

3.6 The site supports bat species identified as widespread (common pipistrelle, soprano pipistrelle and brown long-eared), widespread though varying in geographical abundance (noctule, Brandt's, Daubenton's, whiskered and Natterer's) and rarer species/species with restricted distribution (lesser horseshoe) in accordance with species rarity categorisation for North/Mid-Wales as detailed in the Chartered Institute of Ecology and Environmental Management (CIEEM) UK Bat Mitigation Guidelines (Reason and Wray, 2023[14]). Further details regarding species rarity categorisation, assemblage and habitat assessment as detailed in the CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023) is provided at Appendix A.

3.7 Desk study information relating to the current conservation status, population estimates, and activity levels of bat species recorded within the site, is detailed in Tables 1-3, differentiated based on the CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023) species rarity categorisation for North/Mid-Wales.

Widespread Species

Common pipistrelle

Natural range and distribution

3.8 Within the UK and Wales common pipistrelle are distributed throughout the majority of the landscape with the exception of some areas of north-west and north Scotland, though in these areas gaps in the species' distribution is assumed to reflect areas with low survey effort, rather than true absence of the species within its range (Matthews et al. 2018)[15].

3.9 The Aderyn distribution maps[16] indicate that common pipistrelle has been recorded in 263 grid squares (10 km) across Wales, demonstrating a widespread population (approximately 99% occupation of grid squares).

[13] Wrexham Biodiversity Action Plan (2002). Joint Nature Conservation Committee https://webarchive.nationalarchives.gov.uk/20110303154000/http://www.ukbap.org.uk/lbap.aspx?id=499#6

[14] Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management (CIEEM), Ampfield.

[15] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. & Shore R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough. ISBN 978-1-78354-494-3.

[16] Aderyn is a Local Environmental Records Centres (LERC) Wales system, developed and maintained by the Biodiversity Information Service (BIS).

Population

3.10 Field survey estimates of population trends associated with common pipistrelle from the recent National Bat Monitoring Programme 2022[17] data suggest that this species is exhibiting an increase in populations within the UK. Data specific to Wales is not sufficiently robust enough to infer any trends in population status. Common pipistrelle is a Priority Species in Wales.

3.11 While the Aderyn distribution maps are not intended to provide direct population information, relative density of records for a species provides a useful comparative. Numbers of records for common pipistrelle within each 10 km grid square in which the species was recorded ranged from 1 to 1,1872. Highest density of records reported tend to be focussed in South Wales, with hot spots around Newtown in mid-Wales and Mold in North East Wales. The site is located across two grid squares with records in the lower to mid-range (from 74 to 295).

3.12 Desk study records and field survey data within the site predominantly recorded common pipistrelle activity, which may indicate higher population levels of common pipistrelle compared to other species within the locality.

Habitat preferences

3.13 The relative abundance of common pipistrelle activity recorded within the site is as expected based on the range of suitable pipistrelle roost habitat located within the site and the surrounding locality including, residential houses, barns, and trees. Although no roosts of common pipistrelle were identified from the site surveys, roost resource is considered to be plentiful within the locality.

3.14 Higher activity levels of common pipistrelle are likely to be illustrative of the flexible foraging habitat requirements of this species ranging from open grasslands and woodland edge to urban and suburban environments (Dietz, C. and Keifer, A. 2016)[18]. The relatively low Core Sustenance Zone[19] (CSZ) of common pipistrelle, being reported as 2 km (Collins, J. 2023)[20], may reflect its adaptability in its flight and foraging strategies (although data confidence was reported to be poor).

[17] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

[18] Dietz, C. and Keifer, A. (2016). Bats of Britain and Europe. Bloomsbury Publishing, London.

[19] The Core Sustenance Zone (CSZ) for a bat species refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost.

[20] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists Good Practice Guidelines (4th edition). The Bat Conservation Trust, London. ISBN-978-1-7395126-0-6.

Soprano pipistrelle

Natural range and distribution

3.15 Within the UK and Wales, soprano pipistrelle are distributed throughout the majority of the landscape with the exception of some areas of north-west and north Scotland, the north-east coast, and higher altitudes in northern England, though in these areas gaps in the species' distribution is assumed to reflect areas with low survey effort, rather than true absence of the species within its range (Matthews et al. 2018).

3.16 The Aderyn distribution maps indicate that soprano pipistrelle has a widespread population range similar to common pipistrelle, being recorded from the same 263 grid squares (approximately 99% occupation).

Population

3.17 Field survey estimates of population trends associated with soprano pipistrelle from the recent National Bat Monitoring Programme 2022 data suggest that this species is exhibiting an increase in populations within the UK. Data specific to Wales is not sufficiently robust enough to infer any trends in population status. Soprano pipistrelle is a Priority Species in Wales.

3.18 Across Wales, according to Aderyn, soprano pipistrelles exhibit a range in frequency of records similar to that of common pipistrelles (1 to 1,280 per grid square). Highest density of records reported tend to be focussed in South Wales, with a hot spot around Newtown and Welshpool in mid-Wales. The site is located in an area with reported record frequency in the mid to low ranges (80 to 159 per grid square).

3.19 Soprano pipistrelle was the second most frequently recorded species within desk study records and field survey data associated with the site. This appears comparable to the wider population across Wales based upon frequency of records nationally and within the Wrexham locality.

Habitat preferences

3.20 Roost resources within the site and wider locality suitable for soprano pipistrelle are considered to be abundant, with trees and built structures available and widespread.

3.21 Abundance of soprano pipistrelle activity within the site correlates with the presence of suitable pipistrelle roost habitat located within the site and the surrounding locality including, residential houses, barns, and trees. As with common pipistrelle, the higher activity levels of soprano pipistrelle within the site compared to other species reflects the flexible habitat requirements of this species, though soprano pipistrelle are noted as preferring riparian and woodland habitat (Dietz, C. and Keifer, A. 2016). The CSZ for soprano pipistrelle is reported to be 3 km (with good data confidence) (Collins, J. 2023), perhaps reflective of slightly narrower habitat preferences.

Brown long-eared

Natural range and distribution

3.22 Brown long-eared are distributed throughout the majority of the landscape throughout Wales and the wider UK, with the exception of some areas of north-west and north Scotland, the north-east coast, and higher altitudes in northern England. As with other species, these areas showing gaps in the species' distribution are assumed to reflect areas with low survey effort, rather than true absence of the species within its range (Matthews et al. 2018).

3.23 Distribution maps presented by Aderyn indicate that brown long-eared bat has been recorded in 261 grid squares across Wales (approximately 98% occupation).

Population

3.24 Field survey estimates of population trends associated with brown long-eared from the recent National Bat Monitoring Programme 2022 data suggest that this species is exhibiting no significant change in population levels within the UK. Field data specific to Wales indicates that the population status of brown long-eared is stable compared to baseline data from 1999, though roost count information is not sufficiently robust enough to infer any trends in population status.

3.25 Brown long-eared estimated population sizes for Wales are lower than those of common pipistrelle (297,000) and soprano pipistrelle (478,000), with Favourable Status noted for an estimated brown long-eared population of 96,600 (Matthews et al. 2018). Brown long-eared is a Priority Species in Wales.

3.26 Distribution data for brown long-eared bats presented by Aderyn similarly indicates lower frequency of records for this species across Wales than for the two pipistrelle species, with record frequency ranging from 1 to 531 per grid square. Highest frequencies of records are across South Wales although a hotspot also occurs in the North East Wales, west of Wrexham. The site is located across two grid squares of lower ranges (1 to 66 records per grid square). The relative activity levels of brown long-eared recorded within the site is considered broadly comparable with this national and regional position, allowing for uncertainties from under-recording due to the low detectability of this species.

Habitat preferences

3.27 Roost habitat suitable for brown long-eared is present in the locality, with the species known to make use of trees, bat boxes and buildings, in particular barns, churches and houses with large internal flight spaces.

3.28 Brown long-eared generally favour deciduous woodland within 3 km of their roost sites and rarely cross open areas (Dietz, C. and Keifer, A. 2016)[21]. The species is commonly associated with trees, flying at a variety of heights and uses linear features such as treelines and large hedgerows to move between roosts and alternative foraging areas (Murphy et al., 2012[22]). Infrequent recordings of brown long-eared may reflect the use of linear habitat around the site for ranging between foraging areas rather than using habitats present as core foraging resources. The CSZ for brown long-eared is reported to be 3 km, similar to that for soprano pipistrelle (although data confidence for brown long-eared is poor) (Collins, J. 2023).

[21] Dietz, C. and Keifer, A. (2016). Bats of Britain and Europe. Bloomsbury Publishing, London.
[22] Murphy, S. E., Greenaway, F. and Hill, D. A. (2012). Patterns of habitat use by female brown long-eared bats presage negative impacts of woodland conservation management. Journal of Zoology, 288(3), 177-183.

Table 1. Current conservation status, population trends/ estimates and activity levels of bat species recorded within the site and the surrounding locality and categorised as widespread within the CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023).

Conservation Status/ Population Trends or Estimates/ Activity Levels		Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared Bat
IUCN Red List Status (assessment of the risk of extinction)	*Global*	Least Concern23 - population trend stable (2019 assessment)	Least Concern24 - population trend unknown (2016 assessment)	Least Concern25 - population trend unknown (2023 assessment)
	European	Least Concern26 - population trend stable (2023 assessment)	Least Concern27 - population trend stable (2023 assessment)	Least Concern28 - population trend stable (2023 assessment)
	UK[29]	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)
	Wales[30]	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)
Joint Nature Conservation Committee (JNCC) - Mammals of the Wider Countryside (Bats)[31] **(long-term and short-term percentage change in the species trends used in the bat indicator)**	*Short-term percentage change in the species trends used in the bat indicator and significance of change*	+5.4% Little change (2015 to 2020)	+15.8% Little change (2015 to 2020)	-5.5% Little change (2015 to 2020)
	Long-term percentage change in the species trends used in the bat indicator and significance of change	+88.6% Increase (1999 to 2020)	+42.9% Increase (1999 to 2020)	-2.1% Little change (2001 to 2020)

[23] https://www.iucnredlist.org/species/85333513/196581936
[24] https://www.iucnredlist.org/species/136649/21990234#population
[25] https://www.iucnredlist.org/search?query=Brown%20Long-eared%20Bat&searchType=species
[26] https://www.iucnredlist.org/species/85333513/211012245#population
[27] https://www.iucnredlist.org/species/136649/216729008
[28] https://www.iucnredlist.org/species/85535522/211015413
[29] Mathews, F., and Harrower C. (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1
[30] Mathews, F., and Harrower C. (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1
[31] https://jncc.gov.uk/our-work/ukbi-c8-mammals-of-the-wider-countryside/#key-results-figure-c8i-trends-in-11-bat-species-populations-in-the-united-kingdom-1999-to-2022

Conservation Status/ Population Trends or Estimates/ Activity Levels		Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared Bat
National Bat Monitoring Programme 2022[32]	*UK field survey data*	Smoothed index currently 83.3% above the 1999 base year value, equivalent to a mean annual increase of 2.7% (though the rate of increase has slowed and since 2019 the index has declined slightly). Overall, there has been a significant increase in the smoothed index since 1999 and the UK population is considered to have increased since the 1999 baseline.	Smoothed index currently 57.9% above the 1999 base year value, equivalent to a mean annual increase of 2.0% (though the rate of increase has significantly exceeded the baseline value from 2017-2022). Overall, there has been a significant increase in the smoothed index since 1999 and the UK population is considered to have increased since the 1999 baseline.	Hibernation surveys indicated that the smoothed index is currently 38.2% below the 1999 baseline value, equivalent to a mean annual decrease of 2.1%. The smoothed index has fluctuated below the 1999 baseline value during the period monitored. It was significantly lower than the baseline between 2001 and 2003 but has not differed significantly from the baseline in any other year. Currently the smoothed index does not differ significantly from the 1999 base year value.
	UK roost survey data	Smoothed index is currently 69.6% below the 1999 baseline value, equivalent to a mean annual decrease of 5%. There has been a significant decline in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	Smoothed index is currently 62.2% below the 1999 baseline value, equivalent to a mean annual decrease of 4.1%. There has been a significant decline in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	The smoothed index is currently 9.3% above the base year value, equivalent to a mean annual increase of 0.4%. The smoothed index has remained at or slightly above the baseline value since 2004; however, it has not differed significantly from the baseline in any year. Overall, the smoothed index does not differ significantly from the 2001 base year value.

[32] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

Conservation Status/ Population Trends or Estimates/ Activity Levels		Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared Bat
National Bat Monitoring Programme 2022[33]	*Wales field survey data*	2022 sample size was not large enough to produce a statistically robust trend.	2022 sample size was not large enough to produce a statistically robust trend.	The hibernation survey smoothed index is currently 51.9% above the 1999 base year value, equivalent to a mean annual increase of 1.8%. After a small decline, the smoothed index increased each year between 2001 and 2015, however it only exceeded the baseline value significantly in 2013 and 2014. Since 2015 it has been relatively stable and overall, it does not differ significantly from the 1999 baseline value. The population of brown long-eared bat in Wales is considered to be stable in comparison to 1999.
	Wales roost survey data	Smoothed index is currently 78.2% above the 1999 base year value, equivalent to a mean annual increase of 6.4%. Overall, there has been a significant decrease in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	Smoothed index is currently 86.7% below the 1999 base year value, equivalent to a mean annual decrease of 9.6%. Overall, there has been a significant decrease in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	This species is also recorded on the Roost Count in Wales, but the sample size is not large enough to produce a statistically robust trend.
Natural England Joint Publication JP025 Population Estimate[34]	*UK total adult population size estimates with plausible lower and upper intervals (2018)*	3,040,000 (991,000-7,510,000) Favourable Status	4,670,000 (1,970,000-8,400,00) Favourable Status	934,000 (51,900-2,200,000) Favourable Status

[33] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjOzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA

[34] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. & Shore R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough. ISBN 978-1-78354-494-3.

Conservation Status/ Population Trends or Estimates/ Activity Levels		Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared Bat
	Wales total adult population size estimates with plausible lower and upper intervals (2018)	297,000 (96,600-732,000) Favourable Status	478,000 (202,000-862,000) Favourable Status	96,600 (5,370-228,000) Favourable Status
The State of Mammals in Wales Data and Trends[35]		Changes in range over the last 20 years assessed by comparing 2020 distributions with 1993 distributions indicate that data is deficient to determine if the species range has increased, remained stable or decreased.	Changes in range over the last 20 years assessed by comparing 2020 distributions with 1993 distributions indicate that data is deficient to determine if the species range has increased, remained stable or decreased.	Changes in range over the last 20 years assessed by comparing 2020 distributions with 1993 distributions indicate that data is deficient to determine if the species range has increased, remained stable or decreased.
Priority Species in Wales		Yes	Yes	Yes
Wales Distribution (Aderyn 10 km Distribution Maps)		263 squares occupied. Highest record count for a grid square was 1,182, lowest was 1.	263 squares occupied. Highest record count for a grid square was 1,280, lowest was 1.	261 squares occupied. Highest record count for a grid square was 531, lowest was 1.
Number of Desk Study Records (within the last 10 years)		163	145	44
Activity Transect Survey Bat Activity Index (bat registrations per hour (brh) Range Recorded during Surveys from May to September		1.76-43.23 brh	0.49-15.17 brh	Species not recorded.
Percentage of Total Bat Registrations Recorded during Activity Transect Surveys from May to September attributed to Species		62.3%	26.1%	Species not recorded.
Automated Static Monitoring Survey Bat Activity Index (bat registrations per hour (brh)) Range Recorded during Surveys from May to September		1.08-3.65 brh	0.46-4.29 brh	0.01-0.12 brh
Percentage of Total Bat Registrations Recorded during Automated Static Monitoring Surveys from May to September attributed to Species		52.1%	31.92%	1.10%

[35] Mathews, F., Smith, B., Harrower, C. and Coomber, F. in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-0

Widespread Species in Many Geographies but not as Abundant in All

Noctule

Natural range and distribution

3.29 Noctule are recorded throughout Wales and the majority of England with reduced abundance noted in the north of England and absence largely within Scotland. The gaps in the species' distribution may reflect areas with low survey effort, rather than true absence of the species within its range and also illustrates the limited evidence base for noctule migration and roosting habits (Matthews et al. 2018)[36].

3.30 The distribution maps presented by Aderyn indicates that noctule is widespread across Wales, having been recorded within 253 grid squares across Wales (approximately 86% occupancy).

Population

3.31 Field survey estimates of population trends associated with noctule from the recent National Bat Monitoring Programme 2022[37] data suggest that this species is exhibiting an increase in populations within the UK. Data specific to Wales is not sufficiently robust enough to infer any trends in population status, as despite being a geographically widespread species in Wales, relatively few noctule roosts are known and monitored. The IUCN Red List Status Assessments of the Risk of Extinction have recorded noctule populations as having unknown global and European status, though remaining stable within the UK and Wales. Noctule is a Priority Species in Wales.

3.32 Aderyn 10 km distribution maps indicate record frequencies for noctule range from 1 to 216 records per grid square. Highest frequencies occur in South Wales, notably in the south-east, in mid-Wales in the east and west, and in North East Wales at Wrexham. The site is located within two grid squares representing mid to high record frequencies (54 - 107 per grid square).

3.33 Desk study records for noctule within the locality are more numerous than those for the typically more widespread brown long-eared and less abundant *Myotis* species, which may indicate higher population levels of noctule within the locality compared to these species.

[36] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. and Shore, R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough. ISBN 978-1-78354-494-3.

[37] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

Habitat preferences

3.34 Noctule are generally known to roost in trees and bat boxes within the UK, with use of buildings and hibernation preferences less well known compared to for populations in Europe (Matthews et al. 2018). Noctules are capable of commuting long distances with their CSZ reported as 4 km (although data confidence remains poor) (Collins, J. 2023). Whilst studies have indicated a preference for broad-leaved woodland and pasture (Mackie, I. J. and Racey, P. A. 2007)[38], the species is frequently recorded in a range of habitats foraging and commuting in the open.

3.35 Local desk study records and field survey data within the site recorded occasional occurrence of noctule, which may be indicative of the species' preference for higher quality foraging habitat including expanses of woodland, riparian habitats, and tree lines (Dietz, C. and Keifer, A. 2016). Noctules often also rely on a high density of high-flying insects. Whilst the site has some small areas of woodland habitat and numerous mature hedgerows and treelines, larger expanses of more mature woodland likely to support a higher abundance of invertebrate prey are present within the wider landscape to the south and west.

3.36 Given the ability for noctule to fly longer distances whilst foraging across larger areas, it is likely that the site forms part of the habitat mosaic within CSZs for local populations and supports individuals ranging within the landscape.

Brandt's/ Whiskered

3.37 Brandt's and whiskered bat have been grouped within discussion and assessment due to the general combining of these species within studies and data due to their cryptic nature, similar morphology, flight pattern and habitat preferences.

Natural range and distribution

3.38 Brandt's/whiskered bats are recorded throughout Wales and the majority of England, with reduced abundance noted in the north and east of England and absence largely within Scotland (Matthews et al. 2018).

3.39 Distribution maps presented by Aderyn indicate whiskered bat has been recorded from 194 grid squares across Wales (approximately 73% occupancy), while Brandt's bat has been recorded from 106 grid squares. Gaps in recorded presence are more frequent across mid-Wales and extending into North Wales, particularly so for Brandt's bat. Records for Brandt's/whiskered are reported from 143 grid squares, with patchiness in recorded presence being most notable across mid-Wales and the south coast.

[38] Mackie, I. J. and Racey, P. A. (2007). Habitat use varies with reproductive state in noctule bats (Nyctalus noctula): Implications for conservation. Biological Conservation, 140(1–2), 70-77.

Population

3.40 Field survey estimates of population trends associated with Brandt's/ whiskered bats from the recent National Bat Monitoring Programme 2022[39] data suggest that these species populations are currently stable within the UK. Data specific to Wales is not sufficiently robust enough to infer any trends in population status for these species. The IUCN Red List Status Assessments of the Risk of Extinction have recorded Brandt's/ whiskered populations as having stable European status, though populations have unknown status within the UK and Wales due to deficient data.

3.41 Distribution maps for Brandt's/whiskered bats across Wales indicate more frequent occurrence of whiskered bat, with record frequency ranging from 1 to 91 per grid square compared to 1 to 31 per grid square for Brandt's bat. Records for Brandt's/whiskered bats ranged from 1 to 586 per grid square, although total records reported were fewer than for whiskered bat. Record frequencies are patchier, although both species individually and combined tend to exhibit higher frequencies across South Wales and in North East Wales. The site is located in two grid squares at the lower and highest ranges for whiskered bat, at the low to mid-ranges for Brandt's bat and at the lowest range for the species combined. This range of recorded frequencies at the local level appears indicative of the wider pattern observed nationally.

3.42 Local desk study records and field survey data within the site recorded lower levels of occurrence of *Myotis* species, with five desk study records of Brandt's and 26 desk study records of whiskered bats. The higher number of desk study records for whiskered bats compared to Brandt's within the locality was similarly reflected by sonogram analysis of field survey data. Auto-identification of recorded sonograms using Kaleidoscope Pro Analysis software, recorded Brandt's as contributing 0.23% of the total bat registrations recorded during activity transect surveys compared to 1.14% for whiskered. Similarly, Brandt's were identified as contributing 0.27% of the total bat registrations recorded during automated static monitoring surveys compared to 2.36% for whiskered.

3.43 A total of 24 desk study records of unknown *Myotis* species were also recorded within the locality. Auto-identification of recorded sonograms assigned 5.03% of total bat registrations across all seven activity transect surveys to unidentified *Myotis* species owing to the overlap of call parameters and/or poor-quality recordings inhibiting differentiation of species. Similarly, auto-identification of recorded sonograms, assigned 6.67% of total bat registrations across all seven automated static monitoring surveys to unidentified *Myotis* species.

[39] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

3.44 This pattern of desk study records locally and data recorded during field surveys within the site, appears reflective of the national pattern of records for Brandt's/whiskered, particularly when compared with data for more widespread species i.e., common pipistrelle. The data indicates the local whiskered population may be slightly higher than the local Brandt's population however given the overlap in call parameters for the two species and the number of unidentified *Myotis* species registrations recorded during surveys, this cannot be confirmed.

Habitat preferences

3.45 Brandt's/whiskered bats are generally known to roost in buildings, although they are sometimes found in trees, bridges and bat boxes, and hibernation sites generally include underground tunnels, ice houses and caves (Matthews et al. 2018). Brandt's/whiskered bats exhibit habitat associations with a relatively wide range of habitat including grasslands, woodlands, and wetlands and foraging along tall hedgerows and tree-lines (Matthews et al. 2018), although they tend to avoid urban and arable habitats (Berge, L. 2007)[40]. The CSZ for Brandt's/whiskered bats is reported to be 1 km, although data confidence is poor (Collins, J. 2023).

3.46 The site contains small areas of woodland habitat and a strong mature hedgerow network, but the predominant use of the site is arable and agriculturally improved grasslands with close proximity to suburban development to the north and east and a major road to the west. The lower levels of activity recorded for *Myotis* species within the site, and the less frequent observations of Brandt's/ whiskered within desk study records within the locality, may be indicative of the species preference for higher quality foraging habitat including expanses of woodland, wet/damp habitats, tall hedgerows, and tree lines (Matthews et al. 2020)[41].

Daubenton's

Natural range and distribution

3.47 Within the UK and Wales Daubenton's are distributed throughout the majority of the landscape with the exception of some areas of north-west and north Scotland and north-east coast, though in these areas gaps in the species' distribution is assumed to reflect areas with low survey effort, rather than true absence of the species within its range (Matthews et al. 2018).

3.48 Distribution maps for Daubenton's bat indicate a widespread population, with records from 223 grid squares (approximately 84% occupation). Gaps in recorded presence tend to occur along a central band through mid- to North Wales.

[40] Berge. L.. (2007). Resource partitioning between the cryptic species Brandt's bat (*Myotis brandtii*) and the whiskered bat (*M. mystacinus*) in the UK. PhD, University of Bristol.

[41] Mathews, F., Smith, B., Harrower, C. and Coomber, F. in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-0

Population

3.49 Field survey estimates of population trends associated with Daubenton's bats from the recent National Bat Monitoring Programme 2022[42] data suggest that populations are currently stable within the UK and Wales. The IUCN Red List Status Assessments of the Risk of Extinction have recorded Daubenton's populations as having stable status globally, within the UK and Wales and increasing population status within Europe.

3.50 Despite a widespread distribution, the frequency of records indicated by the distribution map for the Daubenton's bat appears consistently low across most of Wales. A higher frequency of records appears broadly in the east and south of the county, although hotspots with the highest frequencies of records are localised (in the south and south-west).

3.51 The desk study identified ten records for Daubenton's bats and auto-identification of recorded sonograms using Kaleidoscope Pro Analysis software, assigned 0.69% of total bat registrations across all seven activity transect surveys to Daubenton's bats. Similarly, auto-identification of recorded sonograms during automated static monitoring surveys assigned 0.79% of total bat registrations across all seven monitoring periods to Daubenton's bats.

3.52 A total of 24 desk study records of unknown *Myotis* species were also recorded within the locality. Identification of recorded sonograms assigned 5.03% of total bat registrations across all seven activity transect surveys to unidentified *Myotis* species owing to the overlap of call parameters and/or poor-quality recordings inhibiting differentiation of species. Identification of recorded sonograms assigned 6.67% of total bat registrations across all seven automated static monitoring surveys to unidentified *Myotis* species.

3.53 The pattern of desk study records locally and data recorded during surveys within the site, appears reflective of the regional pattern of records for Daubenton's bats.

Habitat preferences

3.54 Daubenton's are generally known to roost in trees, buildings, bat boxes, bridges, and other artificial structures (Matthews et al. 2018). Daubenton's bats exhibit a preference for large waterways with abundant woodland in the local environment (surrounding 1 km^2) (Matthews et al. 2018). The CSZ for Daubenton's bats is reported to be 2 km, although data confidence is poor (Collins, J. 2023).

3.55 The site contains some small areas of woodland habitat, ditches and a pond, but higher quality more extensive riparian habitat is located within the wider landscape to the south of the site, in particularly the corridor of River Clywedog and some of its tributaries.

[42] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

Natterer's

Natural range and distribution

3.56 Within the UK and Wales, Natterer's are distributed throughout the majority of the landscape with the exception of Scotland, where the species is concentrated more centrally to the south. Gaps in the species' distribution is assumed to reflect areas with low survey effort, rather than true absence of the species within its range (Matthews et al. 2018).

3.57 Distribution maps for Natterer's bat indicate the species is widespread across Wales, with records from 236 grid squares (approximately 89% occupancy).

Population

3.58 Field survey estimates of population trends associated with Natterer's bats from the recent National Bat Monitoring Programme 2022[43] data suggest that populations are increasing within the UK and Wales. The IUCN Red List Status Assessments of the Risk of Extinction have recorded Natterer's populations as having increasing global and European status, with currently stable populations within the UK and Wales.

3.59 Despite a widespread distribution, the frequency of records indicated by the distribution map for Natterer's bat is, like the Daubenton's bat, consistently low. Localised hot spots appear in South West and North East of Wales. The site is located across two grid squares with the lowest recorded frequency range.

3.60 The desk study data identified six records of Natterer's within the locality, with an additional 24 desk study records of unknown *Myotis* species. Auto-identification of recorded sonograms using Kaleidoscope Pro Analysis software, assigned 0.23% of total bat registrations across all seven activity transect surveys to Natterer's bats. Whereas auto-identification of recorded sonograms during automated static monitoring surveys assigned 1.07% of total bat registrations across all seven monitoring periods to Natterer's bats. An additional 5.03% of total bat registrations across all seven activity transect surveys and 6.67% of total bat registrations across all seven automated static monitoring surveys were also assigned to unidentified *Myotis* species.

3.61 The pattern of desk study records locally and data recorded during field surveys within the site, overall appears reflective of the regional pattern of records for Natterer's bats i.e., frequency is low.

[43] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

Habitat preferences

3.62 Natterer's bats are generally known to roost in buildings, trees, and bat boxes, with hibernation roosts generally located at underground sites (Matthews et al. 2018). The species can exhibit variable habitat use, though predominantly uses open woodland in areas such as broad-leaved woodland (Matthews et al. 2020), parks, traditional orchards and along waterbodies and rarely uses open areas (Dietz, C. and Keifer, A. 2016). The CSZ for Natterer's bat is reported to be 4 km, with good data confidence (Collins, J. 2023).

3.63 While the site contains a strong mature hedgerow network, individual trees and areas of woodland within the site are limited compared to the wider landscape to the east, south and west. The predominant use of the site is arable, with large open fields and likely reduced prey availability due to the use of herbicides and pesticides.

Table 2. Current conservation status, population trends/ estimates and activity levels of bat species recorded within the site and the surrounding locality and categorised as widespread species in many geographies but not as abundant in all within the CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023).

Conservation Status/ Population Trends or Estimates/ Activity Levels		**Noctule**	**Brandt's**	**Whiskered**	**Daubenton's**	**Natterer's**
IUCN Red List Status (assessment of the risk of extinction)	*Global*	Least Concern[44] - population trend unknown (2016 assessment)	Least Concern[45] - population trend stable (2019 assessment)	Least Concern[46] - population trend unknown (2016 assessment)	Least Concern[47] - population trend stable (2019 assessment)	Least Concern[48] - population trend increasing (2023 assessment)
	European	Least Concern[49] - population trend unknown (2023 assessment)	Least Concern[50] - population trend stable (2023 assessment)	Least Concern[51] - population trend stable (2023 assessment)	Least Concern[52] - population trend increasing (2023 assessment)	Least Concern[53] - population trend increasing (2023 assessment)
	UK[54]	Least Concern - population trend stable (2020 assessment)	Data Deficient - population trend unknown (2020 assessment)	Data Deficient - population trend unknown (2020 assessment)	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)
	Wales[55]	Least Concern - population trend stable (2020 assessment)	Data Deficient - population trend unknown (2020 assessment)	Data Deficient - population trend unknown (2020 assessment)	Least Concern - population trend stable (2020 assessment)	Least Concern - population trend stable (2020 assessment)

[44] https://www.iucnredlist.org/species/14920/22015682
[45] https://www.iucnredlist.org/species/85566997/195857637
[46] https://www.iucnredlist.org/species/14134/22052250
[47] https://www.iucnredlist.org/species/85342710/195858793
[48] https://www.iucnredlist.org/species/215492021/211005466
[49] https://www.iucnredlist.org/species/14920/216725924
[50] https://www.iucnredlist.org/species/85566997/211000645
[51] https://www.iucnredlist.org/species/14134/216725110
[52] https://www.iucnredlist.org/species/85342710/211002396
[53] https://www.iucnredlist.org/species/215492021/211005466
[54] Mathews, F. and Harrower, C., (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1
[55] Mathews, F., Smith, B., Harrower, C. and Coomber, F., in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-00

Conservation Status/ Population Trends or Estimates/ Activity Levels		Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
Joint Nature Conservation Committee (JNCC) - Mammals of the Wider Countryside (Bats)[56] (long-term and short-term percentage change in the species trends used in the bat indicator)	*Short-term percentage change in the species trends used in the bat indicator and significance of change*	+15.8% Little change (2015 to 2020)	-2.3% Little change (2015 to 2020)	-2.3% Little change (2015 to 2020)	-6.2% Little change (2015 to 2020)	+3.0% Little change (2015 to 2020)
	Long-term percentage change in the species trends used in the bat indicator and significance of change	+37.6% Little change (1999 to 2020)	+22.4% Little change (1999 to 2020)	+22.4% Little change (1999 to 2020)	+11.1% Little change (1999 to 2020)	+34.8% Increase (2002 to 2020)

[56] https://jncc.gov.uk/our-work/ukbi-c8-mammals-of-the-wider-countryside/#key-results-figure-c8i-trends-in-11-bat-species-populations-in-the-united-kingdom-1999-to-2022

Conservation Status/ Population Trends or Estimates/ Activity Levels		Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
National Bat Monitoring Programme 2022[57]	*UK field survey data*	The smoothed index currently 83.3% above the 1999 base year value, equivalent to a mean annual increase of 2.7% (though the rate of increase has slowed and since 2019 the index has declined slightly). Overall, there has been a significant increase in the smoothed index since 1999 and the UK population is considered to have increased since the 1999 baseline.	Hibernation survey data recorded the smoothed index as currently 7.0% above the 1999 base year value, equivalent to a mean annual increase of 0.3%. The smoothed index has fluctuated since the baseline year. It reached a peak in 2016 since when it has been slowly declining. It has not differed significantly from the baseline in any year. Overall, the smoothed index does not differ significantly from the 1999 base year value. The combined population of whiskered and Brandt's bat in the UK is considered to have been stable since 1999.		Hibernation surveys identified a smoothed index currently 10% above the 1999 baseline, equivalent to a mean average annual increase of 0.4%. The value of the smoothed index was relatively stable between 1999 and 2009. From 2010 it began to increase, reaching a peak in 2016, before falling again in recent years. The index was significantly higher than the baseline year between 2013 and 2017, but this is no longer the case. Currently the smoothed index does not differ significantly from the 1999 baseline. The population of Daubenton's bat in the UK is considered to have been stable since 1999.	Hibernation survey data identified the smoothed index as currently 112.7% above the 1999 base year value, equivalent to a mean average annual increase of 3.3%. The smoothed index increased between 1999 and 2019, although the rate of increase varied during that period. Since 2019 the trend has levelled out and the provisional value of the index in the most recent year shows a decline. Overall, there has been a significant increase in the smoothed index since 1999. The population of Natterer's bat in the UK is therefore considered to have increased since 1999.

[57] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

Conservation Status/ Population Trends or Estimates/ Activity Levels		Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
	UK roost survey data	The smoothed index is currently 69.6% below the 1999 baseline value, equivalent to a mean annual decrease of 5%. There has been a significant decline in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	No data recorded.		Waterway surveys found the smoothed index is currently 3.6% above the 1999 base year value, equivalent to a mean average annual increase of 0.2%. The value of the smoothed index has been relatively stable since the baseline year. Overall, the smoothed index does not differ significantly from the 1999 base year value.	The smoothed index is currently 10.5% below the 2002 base year value, equivalent to a mean annual decrease of 0.6%. Overall, the smoothed index does not differ significantly from the 2002 base year value. It is likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore considered a reliable measure of population change for Natterer's bat.

Conservation Status/ Population Trends or Estimates/ Activity Levels		Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
National Bat Monitoring Programme 2022[58]	*Wales field survey data*	2022 sample size was not large enough to produce a statistically robust trend.	Hibernation surveys recorded the smoothed index as currently 16.6% below the 1999 base year value, equivalent to a mean annual decrease of 0.8%. The smoothed index has fluctuated since 1999; however, it only differed significantly from the baseline year in 2000. Overall, the smoothed index does not differ significantly from the 1999 base year value. The combined population of whiskered and Brandt's bat in Wales is considered to have been stable since 1999.		Hibernation surveys identified the smoothed index as currently 22.0% above the 1999 baseline, equivalent to a mean annual increase of 0.9%. The smoothed index fell between 1999 and 2006, then has increased in each year since apart from 2014. However, it has not differed significantly from the baseline value in any year. Overall, the smoothed index does not differ significantly from the 1999 base year value. The population of Daubenton's bat in Wales is considered to have been stable since 1999.	Hibernation surveys have recorded the smoothed index as currently 107.6% above the 1999 base year value, equivalent to a mean annual increase of 3.2%. The smoothed index increased every year between 1999 and 2011, although the rate of increased slowed after 2007. Between 2011 and 2018 it was relatively stable and has been increasing again since 2018. It became significantly higher than the baseline in 2005 and overall, there has been a significant increase in the smoothed index since 1999. The population of Natterer's bat in Wales is considered to have increased since 1999.

[58] Bat Conservation Trust, 2023. The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA

Conservation Status/ Population Trends or Estimates/ Activity Levels		Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
	Wales roost survey data	Smoothed index is currently 78.2% above the 1999 base year value, equivalent to a mean annual increase of 6.4%. Overall, there has been a significant decrease in the smoothed index since 1999. However, it is identified as likely that this species' frequent roost switching results in a negative bias in the Roost Count trend and this trend is not therefore a reliable measure of population change for this species.	No data recorded.		Waterway survey data recorded the smoothed index as currently 35.2% above the 2000 base year value, equivalent to a mean annual increase of 1.4%. Overall, the smoothed index does not differ significantly from the 2000 base year value.	No data recorded.
Natural England Joint Publication JP025 Population Estimate[59] **Conservation Status**[60]	*UK total adult population size estimates with plausible lower and upper intervals (2018)*	Unknown Unknown Status	Unknown Unknown Status	Unknown Unknown Status	1,030,000 (27,000-4,440,000) Favourable Status	Mixed Habitat 414,000 (15,100-2,630,000) Woodland Habitat 973,000 (510,000-1,360,000) Favourable Status
	Wales total adult population size estimates with plausible lower and upper intervals (2018)	91,900 (2,880-304,000) Unknown Status	Unknown Unknown Status	Unknown Unknown Status	108,000 (2,860-466,000) Favourable Status	Mixed Habitat 52,000 (1,900-332,000) Woodland Habitat 148,000 (77,700-206,000) Favourable Status

[59] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A., and Shore R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough. ISBN 978-1-78354-494-3.

[60] JNCC Article 17 UK Habitats Directive Report (2019). Supporting Information (habitats & species) 2019 UK Conservation Status Assessments for Species Spreadsheet - https://hub.jncc.gov.uk/assets/081db8a3-afa7-442b-bd0d-701aaf830bdc

Conservation Status/ Population Trends or Estimates/ Activity Levels	Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
The State of Mammals in Wales Data and Trends[61]	Changes in range and population estimates over the last 20 years assessed by comparing 2020 data with 1993 data indicate that data is deficient to determine if the species range/ population sizes have increased, remained stable or decreased.	Changes in range and population estimates over the last 20 years assessed by comparing 2020 data with 1993 data indicate that data is deficient to determine if the species range/ population sizes have increased, remained stable or decreased.	Changes in range and population estimates over the last 20 years assessed by comparing 2020 data with 1993 data indicate that data is deficient to determine if the species range/ population sizes have increased, remained stable or decreased.	Changes in range and population estimates over the last 20 years assessed by comparing 2020 data with 1993 data indicate that data is deficient to determine if the species range/ population sizes have increased, remained stable or decreased.	Changes in range and population estimates over the last 20 years assessed by comparing 2020 data with 1993 data indicate that data is deficient to determine if the species range/ population sizes have increased, remained stable or decreased.
Priority Species in Wales	Yes	No	No	No	No
Wales Distribution (Aderyn 10 km Distribution Maps)	Recorded from 254 grid squares. Highest record count for a grid square was 216, lowest was 1.	Recorded from 106 grid squares. Highest record count for a grid square was 31, lowest was 1.	Recorded from 194 grid squares. Highest record count for a grid square was 91, lowest was 1.	Recorded from 223 grid squares. Highest record count for a grid square was 709, lowest was 1.	Recorded from 236 grid squares. Highest record count for a grid square was 886, lowest was 1.
		143 grid squares. Highest record count for a grid square was 586, lowest was 1.			
Number of Desk Study Records (within the last 10 years)	68	5	26	10	6
Activity Transect Survey Bat Activity Index (bat registrations per hour (brh) Range Recorded during Surveys from May to September	0.44-4.90 brh	0.22-9.03 brh			
Percentage of Total Bat Registrations Recorded during Activity Transect Surveys from May to September attributed to Species	4.23%	0.23%	1.14%	0.69%	0.23%
		Unidentified *Myotis* Species 5.03%			

[61] Mathews, F., Smith, B., Harrower, C. and Coomber, F. in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-0

Conservation Status/ Population Trends or Estimates/ Activity Levels	Noctule	Brandt's	Whiskered	Daubenton's	Natterer's
Automated Static Monitoring Survey Bat Activity Index (bat registrations per hour (brh)) Range Recorded during Surveys from May to September	0.02-0.34 brh	0.05-1.86 brh			
Percentage of Total Bat Registrations Recorded during Automated Static Monitoring Surveys from May to September attributed to Species	3.39%	0.27%	2.36%	0.79%	1.07%
		Unidentified *Myotis* Species 6.67%			

Rarer Species or Species with Restricted Distribution

Lesser horseshoe

Natural range and distribution

3.64 The range of lesser horseshoe bats currently includes the majority of Wales and the south-west of England. The site is located at the current north-east extent of the recorded range of lesser horseshoe within the UK. Whilst climate change may result in more favourable conditions for lesser horseshoe within the north of England and Scotland, their stringent requirements, in terms of roosting, foraging and commuting habitats, are likely to restrict the distribution of the species across the UK (Matthews et al. 2018). However, increasing numbers of records of hibernating individuals in the north of England and the Midlands have been noted within population studies (Matthews et al. 2018).

3.65 The distribution of lesser horseshoe is relatively widespread across Wales from maps presented by Aderyn, being found in 207 grid squares (approximately 78% occupation). The distribution is generally associated with the lowlands of Wales, with central areas in the country exhibiting patchy occurrence or absence of records.

Population

3.66 Field survey estimates of population trends associated with lesser horseshoe from the recent National Bat Monitoring Programme 2022 data suggest that this species is exhibiting an increase in populations within the UK and Wales. The IUCN Red List Status Assessments of the Risk of Extinction have recorded lesser horseshoe populations as increasing within Europe and remaining stable within the UK and Wales. However, the IUCN Red List Status Assessments of the Risk of Extinction is currently recording global decreases in lesser horseshoe populations. Lesser horseshoe is a Priority Species in Wales.

3.67 Distribution maps for lesser horseshoe bat indicate a range in record frequency between 1 and 1,531 records per grid square in which it has been recorded. A reasonable proportion of squares in the mid to higher range of record frequency is apparent, with hotspots particularly in the north of Wales, the south-east, south and south-west. The site occurs across two grid squares with the lowest frequency range of records, although record frequency increases in grid squares adjacent to the west.

3.68 Lesser horseshoe were the least recorded species within desk study records and field survey data associated with the site. Lesser horseshoe recorded 0.29% of total bat registrations during automated static monitoring surveys from May to September and were not recorded during activity transect surveys. Whilst it is recognised that lesser horseshoe can be relatively difficult to detect due to their quiet calls rarely being detected from >5.0 m distance, the site is also located at the edge of one of the core population ranges in North East Wales.

Habitat preferences

3.69 Rare recordings of lesser horseshoe within the site may reflect the species habitat preferences. Lesser horseshoes have specific roost preferences, favouring undisturbed sites with large roost entrances and uninterrupted flight lines, with night roosts also playing an important role for the conservation of the species (Matthews et. al. 2018). Lesser horseshoe favour habitats characterised by structural richness, largely including broad-leaved woodland and wooded riparian corridors in addition to mature treelines and hedgerows. Lesser horseshoe often forage within 2 km of their roost sites (confidence in zone size is good) (Collins et al. 2023) and during commuting follow linear structures such as hedges, woodland edges and ditches.

3.70 It is likely that the infrequent records reflect the infrequent use of the site habitats by local populations due to their sub-optimum suitability, being at the edge of suburban development and separated from the wider arable landscape to the west by the A483 dual carriageway.

3.71 Intensive arable habitat is dominant within the majority of the site in addition to improved and poor semi-improved grassland, with limited floristic diversity within the fields and margins. The habitats of value to lesser horseshoe within the site are therefore likely the linear boundary features interconnecting fields including; woodland edge habitat and mature hedgerows and trees.

Table 3. Current conservation status, population trends/ estimates and activity levels of bat species recorded within the site and the surrounding locality and categorised as rarer species or species with restricted distribution within the CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023).

Conservation Status/ Population Trends or Estimates/ Activity Levels		**Lesser Horseshoe**
IUCN Red List Status (assessment of the risk of extinction)	*Global*	Least Concern[62] - population trend decreasing (2016 assessment)
	European	Least Concern[63] - population trend increasing (2023 assessment)
	UK[64]	Least Concern - population trend stable (2020 assessment)
	Wales[65]	Least Concern - population trend stable (2020 assessment)
Joint Nature Conservation Committee (JNCC) - Mammals of the Wider	*Short-term percentage change in the species trends used in the bat indicator and significance of change*	+10.2% Increase (2015 to 2020)

[62] https://www.iucnredlist.org/species/19518/21972794
[63] https://www.iucnredlist.org/species/19518/216727479
[64] Mathews, F. and Harrower, C. (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1
[65] Mathews, F., Smith, B., Harrower, C. and Coomber, F. in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-0

Conservation Status/ Population Trends or Estimates/ Activity Levels		Lesser Horseshoe
Countryside (Bats)[66] (long-term and short-term percentage change in the species trends used in the bat indicator)	*Long-term percentage change in the species trends used in the bat indicator and significance of change*	+118.9% Increase (1999 to 2020)
National Bat Monitoring Programme 2022[67]	*UK field survey data*	Hibernation surveys identified the smoothed index as currently 186.7% above the 1999 baseline value, equivalent to a mean annual increase of 4.7%. The value of the smoothed index increased steadily between 1999 and 2014; however, in recent years the rate of increase has varied. Overall, there has been a significant increase in the smoothed index since 1999. The population of lesser horseshoe bat in the UK is considered to have increased since 1999.
	UK roost survey data	The smoothed index is currently 75.1% above the 1999 baseline value, equivalent to a mean annual increase of 2.5%. The value of the smoothed index increased steadily between 1999 and 2008; however, from 2008 the rate of increase slowed and since 2016 there has been little change in the value. Overall, there has been a significant increase in the smoothed index since 1999.
National Bat Monitoring Programme 2022[68]	*Wales field survey data*	Hibernation surveys resulted in a smoothed index currently 211.5% above the 1999 base year value, equivalent to a mean annual increase of 5.1%. The smoothed index has increased every year since the baseline in 1999, although over that period the rate of increase has varied. Overall, there has been a significant increase in the smoothed index since 1999. The population of lesser horseshoe bat in Wales is considered to have increased since 1999.
	Wales roost survey data	The smoothed index is currently 75.6% above the 1999 base year value, equivalent to a mean annual increase of 2.5%. The value of the smoothed index increased steadily between 1999 and 2011; since 2011 the rate of increase has slowed. Overall, there has been a significant increase in the smoothed index since 1999.

[66] https://jncc.gov.uk/our-work/ukbi-c8-mammals-of-the-wider-countryside/#key-results-figure-c8i-trends-in-11-bat-species-populations-in-the-united-kingdom-1999-to-2022

[67] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA.

[68] Bat Conservation Trust, (2023). The National Bat Monitoring Programme Annual Report 2022. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*jznpaj*_ga*MTkzNjYzMjQzOC4xNjc1MjYwNzIz*_ga_G28378TB9V*MTcwNjAzNTI2OS4zNS4xLjE3MDYwMzUzMDkuMC4wLjA

Conservation Status/ Population Trends or Estimates/ Activity Levels		Lesser Horseshoe
Natural England Joint Publication JP025 Population Estimate[69] **Conservation Status**[70]	*UK total adult population size estimates with plausible lower and upper intervals (2018)*	50,400 (36,000-72,000) Favourable Status
	Wales total adult population size estimates with plausible lower and upper intervals (2018)	30,900 (22,000-44,100) Favourable Status
The State of Mammals in Wales Data and Trends[71]		The current population estimate is more than three times greater than that suggested by the 1995 Review. This is partly because of underestimation in the earlier review, but there also appears to be a genuine range expansion and population size increase.
Priority Species in Wales		Yes
Wales Distribution (Aderyn 10km Distribution Maps)		Recorded from 207 grid squares. Highest record count for a grid square was 1,531, lowest was 1.
Number of Desk Study Records (within the last 10 years)		2
Activity Transect Survey Bat Activity Index (bat registrations per hour (brh) Range Recorded during Surveys from May to September		No data recorded.
Percentage of Total Bat Registrations Recorded during Activity Transect Surveys from May to September attributed to Species		No data recorded.
Automated Static Monitoring Survey Bat Activity Index (bat registrations per hour (brh)) Range Recorded during Surveys from May to September		0.003-0.041 brh
Percentage of Total Bat Registrations Recorded during Automated Static Monitoring Surveys from May to September attributed to Species		0.29%

Overall Evaluation

3.72 Overall assessment of the value of the site for bats must take roost habitat availability and commuting and foraging habitat suitability into account in addition to connectivity to habitat resources within the locality and the wider landscape.

3.73 Based on analysis of the survey data, the site has been assessed as being of Local importance for commuting and foraging common pipistrelle, soprano pipistrelle, brown long-eared, noctule, *Myotis* species (Brandt's, whiskered, Daubenton's and Natterer's) and lesser horseshoe.

[69] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. and Shore, R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales, and Scottish Natural Heritage. Natural England, Peterborough. ISBN 978-1-78354-494-3.

[70] JNCC Article 17 UK Habitats Directive Report (2019). Supporting Information (habitats & species) 2019 UK Conservation Status Assessments for Species Spreadsheet - https://hub.jncc.gov.uk/assets/081db8a3-afa7-442b-bd0d-701aaf830bdc

[71] Mathews, F., Smith, B., Harrower, C. and Coomber, F. in association with the Wales Mammal Biodiversity Action Forum. (2020). The State of Mammals in Wales. A report by the Mammal Society for Natural Resources Wales, produced in association with Wales Mammal Biodiversity Action Forum. The Mammal Society, London. ISBN: 978-0-9935673-6-0

3.74 The site's species assemblage is considered to be representative of national and local populations, summarised as follows in order of relative abundance recorded within the site:

- Common and soprano pipistrelle - widespread and relatively abundant
- *Myotis* species, noctule and brown long-eared - widespread at lower relative abundance
- Lesser horseshoe - widely distributed at lower relative abundance.

3.75 Based on existing data for the bat species recorded within the site and the surrounding locality within the wider region, it can be assumed that these species are maintaining populations on a long-term basis where present, as a viable component of their natural habitats. It is recognised that data deficiency limits the ability to assess individual local populations. However, desk study and field survey data do reflect the trends in species abundance, distribution and habitat preferences within the region surveyed.

3.76 Common pipistrelle and soprano pipistrelle are most frequently recorded and flexible in terms of habitat requirements. Overall, brown long-eared, noctule and *Myotis* species have smaller population sizes than pipistrelles and habitat preferences tend to be more limited with higher reliance upon better quality habitats (less disturbed and more bio-rich semi-natural habitats than those generally exhibited across the arable and agriculturally improved landscape of the site). Lesser horseshoe, while within it's known population range, is at the edge of its core population range within North East Wales. Undisturbed roost habitats and suitable night roost opportunities are limited within the site and, despite a strong mature hedgerow network, the arable and agriculturally improved habitats that dominate the site are sub-optimal for this species.

3.77 For all species, the site is at the urban fringe of Wrexham and is contained by the urban edge to the north and east with connectivity west restricted by the A483 dual carriageway.

3.78 The predominant use of the site for intensive farming reduces the suitability of the majority of the site for providing core foraging habitat supporting bats within the locality, as limited floristic diversity and likely use of pesticides and herbicides will reduce availability of invertebrate prey within these areas. Habitat use within the site has been predominantly agricultural for several decades, with similar habitat management practices consistently utilised and bat population dynamics within the site are therefore likely to have remained consistent. Whilst the dominant arable habitats within the site may not provide optimum foraging opportunities for bats, boundary habitats likely contribute to the local bat populations CSZs and provide valuable commuting features around the site.

3.79 Ecological networks supporting the natural range of the species recorded within the site locality are not likely to include features directly within the site, as habitats are currently slightly fragmented from the wider landscape by surrounding residential development to the north and east and the presence of the A483 dual carriageway to the west. However, the linear feature provided by the River Clywedog traversing the landscape east to west to the south of the site, is likely to provide a wildlife corridor for local bat species populations that is of value for maintaining their natural range within the wider landscape to the south-east and west.

3.80 Table 4 summarises the overall assessment of the site with regard to roosting, commuting and foraging bats and the existing Favourable Conservation Status of species recorded within the locality.

Table 4. Assessing importance of the site for roosting, commuting and foraging bats and existing Favourable Conservation Status.

Rarity Category	Species	Importance of Roosts Summary	Importance of Commuting and Foraging Habitat Summary	Existing Favourable Conservation Status
Widespread all geographies	Common pipistrelle	Desk study data does not provide information regarding bat roost locations within 2 km. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site and roosting activity observed these are not likely to exceed site importance.	Intensive arable habitat is dominant within the majority of the site and bat activity was generally distributed along linear boundary features interconnecting fields. Highest levels of activity were noted along the woodland edge habitat in the north of the site following the ditch, along the woodland edge and mature trees in the south-west of the site and in particular along the old green lane, with mature double hedgerows and numerous mature trees traversing the site. The old green lane traversing the site provides a valuable landscape feature for bats foraging over and above the mature tree canopies and commuting around the site and wider landscape. Habitat diversity across the site is limited however, the numerous mature hedgerows and tree canopies provide cover and are likely to support a higher abundance of invertebrate prey for foraging and commuting bats. The site is adjoined by the A525 (Ruthin Road) to the north and to the west is separated from the wider arable landscape by Berse Lane and the A483 dual carriageway. However, the site does have direct connectivity to rural habitats and riparian habitats associated with the River Clywedog to the south of the site and the bounding B5099 (Bersham Road).	Favourable
	Soprano pipistrelle	Desk study data does not provide information regarding bat roost locations within 2 km. A single non-breeding day roost with low numbers located in an alder *Alnus glutinosa* tree along a ditch in the centre of the site. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site and roosting activity observed these are not likely to exceed site importance.		Favourable
	Brown long-eared	Desk study data does not provide information regarding bat roost locations within 2 km. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site and roosting activity observed these are not likely to exceed site importance.		Favourable
Widespread in many geographies, but not as abundant in all	Noctule	Desk study data does not provide information regarding bat roost locations within 2 km. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site these are not likely to exceed site importance.		Favourable
	Brandt's			Favourable

Rarity Category	Species	Importance of Roosts Summary	Importance of Commuting and Foraging Habitat Summary	Existing Favourable Conservation Status
	Whiskered	Desk study data does not provide information regarding bat roost locations within 2 km. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site these are not likely to exceed site importance.	The numerous linear hedgerows, ditch features, mature trees and woodland edge habitat within the site are used by a variety of bat species within the immediate locality. Whilst the dominant arable habitats within the site may not provide optimum foraging opportunities for bats, boundary habitats likely contribute to the local bat populations CSZs and provide valuable commuting features.	Favourable
	Daubenton's			Favourable
	Natterer's			Favourable
Rarer or restricted distribution	Lesser horseshoe	Desk study data does not provide information regarding bat roost locations within 2 km. Unknown numbers of roosts in the locality but likely some present given activity levels recorded within the site and presence of roost habitat within buildings and trees within and surrounding the site. Based on roost habitat available within the site and roosting activity observed these are not likely to exceed site importance.		Favourable

4.0 Maintaining Favourable Conservation Status of Bat Populations

4.1 The FCS of bat species present within the site and the locality will be maintained providing mitigation and compensation measures to address habitat loss within the site are adhered to, as reported in the Land at Ruthin Road, Wrexham: Environmental Statement, Volume 2, Chapter 8.

4.2 Green infrastructure (GI) principals have been integrated into the design strategy, with consideration to the retention, protection, and enhancement of existing landscape features, in particular hedgerows, trees and the old green lane. GI retained and enhanced within the site is illustrated on the TEP Masterplan Framework Drawings D9730.001F - Option 1 and D9730.0017 - Option 2. Variations between the two Masterplan Framework Options are in relation to potential inclusion of a wastewater treatment works within the site. The GI designs are consistent within both Masterplan Framework Options. Key measures incorporated into the proposed development to ensure the foraging, commuting and roosting resources for bat populations within the locality are maintained, include:

- Providing bands of woodland buffer planting in the south-west of the site and reinforcing the strategic old green lane corridor traversing the centre of the site, thereby protecting edge habitat used by bats.
- Incorporation of areas of native shrub and tree planting and hedgerow planting, in addition to gap planting to strengthen existing linear boundary features, particularly in the north of the site.
- Provision of treelines along the proposed spine road to provide features suitable for use by commuting bats.
- Establishing diverse grasslands, incorporating swales, and improving habitat within and around Pond P1, to enhance foraging and commuting habitat for use by bats within and around the site.

Maintenance of Foraging Resources

4.3 Foraging resources within the site would not singularly form the CSZ for species recorded within the locality, with most species travelling ≥1 km whilst foraging and as the dominant, intensive arable habitat within the site does not provide a high value foraging resource. Habitats in addition to those within the site are therefore required to sustain local bat populations. The linear features and small areas of woodland that provide foraging habitat with the greatest value to bats will largely be maintained within GI and additional foraging habitat will also be provided, particularly for the dominant pipistrelle species recorded within the site, which may make additional use of residential gardens.

4.4 There is the potential that bats using the site for foraging could be disturbed or excluded by inappropriate street lighting and where light spill occurs onto suitable habitats such as woodland edge habitat, areas of tree planting or retained hedgerows and mature trees, particularly around development zones. A Sensitive Lighting Strategy will set out the lighting proposals during both construction and operation to ensure potential adverse effects on bats are avoided and the existing habitat value is sustained for local bat populations.

4.5 Provision of GI within the site and enhancement of retained features used by foraging bats should serve to provide sufficiently large habitat within the site to maintain its current function supporting existing local bat populations on a long-term basis.

Maintenance of Commuting Resources

4.6 Maintenance of the strategic old green lane corridor across the site, the linear woodland in the north of the site along the watercourse and their connecting hedgerow and treelines, will sustain existing connectivity for commuting bats between the open landscape to the west and across the site. Hedgerows and trees bounding fields will be retained and enhanced to maintain the commuting resource for bats along these features and sustain connectivity to the wider landscape. Where trees require removal, replacement planting will be incorporated within the site to offset any tree loss and maintain viable habitat for bats in the locality.

4.7 Access roads within the proposed development will intersect the old green lane corridor in two locations and the two mature hedgerows connecting this feature to semi-natural broad-leaved woodland along the ditch/brook in the north of the site. These hedgerow and treeline features provide connectivity across and beyond the site to adjacent habitats for foraging and commuting bats. GI design will act to reduce the impact of where linear habitat features are intersected by roads, to minimise effects on commuting bats.

4.8 Linear corridors provided by hedgerows and treelines around the site will connect to Strategic Open Space provided in the south of the site and existing woodland edge, trees, and hedgerows along the B5098 Berse Lane bounding the west of the site. These features will provide links for commuting bats to linear features within the wider landscape i.e., River Clywedog corridor, facilitating the uninterrupted movement of bats within the locality and the wider landscape.

4.9 Provision of a Sensitive Lighting Strategy will be key in ensuring lighting proposals during both construction and operation have no adverse effects on commuting bats and that the existing habitat value is sustained for local bat populations.

Maintenance of Roosting Resources

4.10 Of the 80 trees identified with bat roost suitability, the majority will be retained within the site design and will therefore maintain bat roosting opportunities in the future. The proposed development will also provide and maintain bat roost habitat within the site through provision of bat boxes and tree planting, serving to create roost resources for bat species within the locality.

4.11 Maintenance of bat foraging and commuting habitat within the site will also serve to maintain roost function within the site and the wider locality.

Summary

4.12 Population dynamics data on the species recorded within the site indicate that they are being maintained on a long-term basis as viable components of their natural habitats both regionally and locally. Retention and enhancement of the majority of the linear habitat features provided by hedgerows, trees and woodland areas around the site will result in no net loss of the habitats of most value for bat species foraging and commuting within the locality. Maintenance of these linear features will also ensure no severance of roost resources, which are either onsite i.e., mature trees, or offsite i.e., farm buildings, from the wider landscape. The land change of predominantly arable habitat to residential development may affect the wider use of the site by bats within the locality. However, as the site is adjacent to existing suburban development and road infrastructure and the proposed development will retain key ecological network features, the FCS of bat populations regionally and nationally will not be affected by site level impacts.

4.13 Provision of higher quality foraging resources within the site compared to previous arable habitat i.e., diverse grassland areas buffering linear features and within Strategic Open Space in the south if the site, will serve to provide foraging habitat to support local bat populations on a long-term basis. Habitat management of woodland, grassland, trees and hedgerows and lighting provision within the site will need to be sensitive to presence of foraging and commuting bats to prevent fragmentation of habitats, particularly where roads intersect linear habitat features.

4.14 The proposed development is currently at the edge of existing suburban development, and it is therefore not likely to contribute to ecological networks used by bats if populations expand within their natural range due to factors such as climate change. Overall, the dominant arable habitat within the site is not reflective of the optimal range of semi-natural habitats preferred by bat species recorded within the site and the wider locality. Providing the linear tree/hedgerow and small woodland habitats are largely retained and enhanced, the natural range of bat species recorded in the locality will likely neither be reduced nor be likely to be reduced for the foreseeable future.

APPENDIX A: CIEEM UK Bat Mitigation Guidelines (Reason and Wray, 2023) Evaluation Method for Assigning Value to Bats

Evaluation Method

For the purposes of assessment and of assigning value to bats, the guidance set out in the Chartered Institute of Ecology and Environmental Management (CIEEM) UK Bat Mitigation Guidelines (Reason and Wray, 2023[72]) has been followed. While bats are nationally and internationally protected species, it does not follow that any ecological feature supporting bats is similarly of national or international importance. Importance should be assessed at an appropriate spatial scale, based on species distribution, conservation status, current population trends, functionality of the site and the zone of influence of the proposed development in relation to bats. This includes an assessment of whether the site supports habitats for bat roosting, foraging and/or commuting. The method for assessment of importance of a site with regard to bats, aims to provide consistency across evaluation of sites, whilst taking account of regional variations in bat distribution and rarity, roost status importance and the importance of bat commuting and foraging habitat in the context of the surrounding landscape.

Species Rarity

Conservation status varies between the different countries of the UK, based on current understanding of abundance and distribution. Within each county boundary there are also differences in bat species abundance and distribution. Consultation with statutory bodies and recognised regional experts has resulted in the categorisation of bat species as set out in Table A1 (adapted from Table 3.1 of the 2023 UK Bat Mitigation Guidelines), reflecting the relative abundance or 'rarity' of bat species across different areas of the UK.

Table A1. Species rarity category in North/Mid-Wales (adapted from Table 3.1 of the CIEEM UK Bat Mitigation Guidelines, 2023)

Rarity Category	**Species Recorded in North/Mid-Wales**
Widespread	Common pipistrelle *Pipistrellus pipistrellus* Soprano pipistrelle *Pipistrellus pygmaeus* Brown long-eared *Plecotus auritus*
Widespread in many geographies, but not as abundant in all	Noctule *Nyctalus noctula* Brandt's *Myotis brandti* Daubenton's *Myotis daubentonii* Whiskered *Myotis mystacinus* Natterer's *Myotis nattereri*
Rarer or restricted distribution	Lesser horseshoe *Rhinolophus hipposideros*

[72] Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management, Ampfield.

Rarity Category	Species Recorded in North/Mid-Wales
Rarest Annex II species and very rare	Greater horseshoe *Rhinolophus ferrumequinum* Barbastelle *Barbastella barbastellus* Serotine *Eptesicus serotinus* Leisler's *Nyctalus leisleri* Nathusius' pipistrelle *Pipistrellus nathusii*

The geographical variation set out in Table A1 underpins the subsequent assessment of the importance of roosts, commuting routes, and foraging areas, and of the overall assemblage of bats present on a site. The boundaries between categories are not absolute and require caution where species are at the edge of their range.

Roost Assessment

Bats use many different types of roost and not all roosts have the same level of importance in supporting a local population of bats. Survey work should aim to sufficiently characterise bat roosts likely present in the locality through appropriate survey effort to inform impact assessment.

Table A2 identifies the importance of different types of roost. In all cases, the geographic scale set out presents a likely minimum, and modifying factors may increase but will not usually decrease the importance assigned to roosts.

Table A2. Assessing importance of roosts[73] (as taken from Table 3.2 of the CIEEM UK Bat Mitigation Guidelines, 2023)

Roost Category - This table relates to valuation of roosts and does not mean that all such sites are 'places of shelter' as referenced in the WCA or 2017 Regulations. Inclusion in this table does not indicate that a mitigation licence would be required; this would be driven by roost status, any impacts, and the likelihood of an offence.

Rarity Category (species in each category are determined by region)	Feeding Perches; Night-roosts; Individual or Very Small Occasional/ Transitional/ Opportunistic Roosts	Non-breeding Day Roosts (small numbers of species)	Mating Sites (excluding individual trees and larger swarming sites); Small Numbers of Hibernating Bats	Larger Transitional Roosts	Hibernation Sites[74]	Autumn Swarming Sites (largely vesper species which hibernate underground)	Maternity Sites[75]
Widespread	Site	Site	Site	Site/Local	District/County (large hibernation sites are rare in the UK)	District/County (very large pipistrelle swarming sites as yet unknown in the UK)	Unlikely to exceed District importance unless colonies are atypically large; Importance increased for assemblages

[73] Sites within or functionally linked to Special Areas of Conservation (SACs) are of International importance for Qualifying Species. Sites that could be functionally linked to SACs may or may not have that level of importance (e.g., a small lesser horseshoe bat maternity roost from a multi-component 'bat' SAC may be too far away to be a direct satellite of a maternity roost within the SAC but may be part of the same population through intermediate unidentified roosts. Sites meeting SSSI guidelines are of National importance (though note that many SSSI citations do not reflect the 'bat' importance of the sites they describe, and not all sites of National Importance are designated).

[74] For tree-roosting bats that are likely to use multiple trees for breeding and then hibernate in small numbers (which means individual hibernation sites are difficult to detect and many may be missed), the importance of the roost resource (i.e., the collection of PRFs which are available to bats) rather than individual confirmed roosts, should be assessed.

[75] In all cases, 'size' needs to be interpreted as 'relative to typical sizes for the species'.

Rarity Category (species in each category are determined by region)	Feeding Perches; Night-roosts; Individual or Very Small Occasional/ Transitional/ Opportunistic Roosts	Non-breeding Day Roosts (small numbers of species)	Mating Sites (excluding individual trees and larger swarming sites); Small Numbers of Hibernating Bats	Larger Transitional Roosts	Hibernation Sites[74]	Autumn Swarming Sites (largely vesper species which hibernate underground)	Maternity Sites[75]
Widespread in many geographies, but not as abundant in all	Site	Site	Site; dependent on local distribution (for Myotis see swarming site column)	District	District/County importance dependent on size and number of species	County/Regional importance dependent on size[76], importance increased for larger sites that serve larger numbers/ more species	Unlikely to exceed County importance unless colonies are atypically large; Importance increased for assemblages
Rarer or restricted distribution	Site (very well-used night roosts may be of District importance for some species)	Site/Local/District, dependent on local distribution	Site/Local/District, dependent on local distribution	District	District/County importance dependent on size[5] and local distribution; increased value for assemblages	County/Regional importance dependent on size[5] and local distribution; Increased value for assemblages	County/Regional importance dependent on size[5] and local distribution; Increased value for assemblages

[76] Satellite roosts (i.e., alternative roosts found in close proximity to the main nursery colony) should be considered with the associated main colony.

Rarity Category (species in each category are determined by region)	Feeding Perches; Night-roosts; Individual or Very Small Occasional/ Transitional/ Opportunistic Roosts	Non-breeding Day Roosts (small numbers of species)	Mating Sites (excluding individual trees and larger swarming sites); Small Numbers of Hibernating Bats	Larger Transitional Roosts	Hibernation Sites[74]	Autumn Swarming Sites (largely vesper species which hibernate underground)	Maternity Sites[75]
Rarest Annex II species and very rare	Site (very well-used night roosts may be of District importance for some species)	Site/Local/District, dependent on local distribution	Site/Local/District, dependent on local distribution	District	County/Regional importance dependent on size[5] and local distribution; increased value for assemblages	County/Regional importance dependent on size[5] and local distribution; Increased value for assemblages	County/Regional importance dependent on size[5] and local distribution; Increased value for assemblages

Commuting and Foraging Assessment

It is not possible to adopt the same matrix-based approach for valuing bat commuting routes/flight-lines and foraging areas as for roost importance, as assessment requires a higher degree of professional judgement. Geographical levels of importance are not defined by 'numbers of bats using a feature', because numbers of individuals can be difficult to determine, and colony sizes vary across species and region. The importance of bat commuting and foraging areas includes assessment of a variety of factors, for example:

- Levels of bat activity - indicating reliance (or otherwise) on specific habitats/features;
- Landscape context - distribution and abundance of suitable foraging habitats, flight-lines, and overall connectivity;
- Species assemblage - consideration of bats using features, their conservation status and whether any species present are at the edge-of-range;
- Proximity/connectivity to roosts - review of species and roost type influence value; and
- Species' habitat preferences - the site context within the landscape and habitats present will vary the value of the site to different species.

Bat Species Assemblage Assessment

Table A3 outlines the numerical scoring system from the 2023 UK Bat Mitigation Guidelines designed to assess the importance of a bat assemblage within a site in consideration of species distribution. A score is assigned to each species that is present within a site.

Table A3. Species assemblage numerical scoring based on rarity

Rarity Category (species in each category are determined by region)	Bat Assemblage Score
Widespread all geographies	1
Widespread in many geographies, but not as abundant in all	2
Rarer or restricted distribution	3
Rarest Annex II species and very rare	4

Once the score for each species has been calculated and summed to determine the maximum theoretical score, the threshold score needed for any assemblage to meet each geographic level of importance, can be calculated:

- Assemblage score meets or exceeds 45% of the maximum score - County importance.
- Assemblage score meets or exceeds 55% of the maximum score - Regional importance.
- Assemblage score meets or exceeds 70% of the maximum score - National importance.

Limitations

Conservation status varies between the different countries of the UK reflecting abundance and distribution. For example, there are seven priority species in England and Scotland, eight in Wales, and three in Northern Ireland, reflecting these differences. There are also differences in abundance and distribution within each country boundary. The absence of a species from an area does not mean that it never occurs in that region. When rarities do occur, their value therefore will be specifically assessed and counted as 'Rare' in that region. For example, lesser horseshoe bats *Rhinolophus hipposideros* are occasionally recorded in Northern England and should be treated in the 'Rarest Annex II Species and Very Rare' category where they do arise even though they are not on the list of species 'normally' encountered in that region.

A precautionary approach to assessing roost presence within the landscape should be taken when assessing proximity/connectivity to roosts based on activity levels noted within a site, suitable roost habitat within the locality and desk study data.

DRAWINGS

Drawing D9730.001F - Masterplan Framework - Option 1
Drawing D9730.0017 - Masterplan Framework - Option 2



1	Residential development up to 1430 dwellings
2	Two site access points onto the A525 Ruthin Road
3	Two site access points onto Bersham Road
4	Main access roads suitable for buses with active travel walking and cycling routes, tree avenue planting and landscape verges with swales for drainage
5	Site for a primary school up to 2FE located close to the existing high school
6	Provision of a wastewater treatment plant (if necessary) at the lowest part of the site or, if the treatment plant is not required then additional housing
7	Local centre reflecting historic courtyard layout with Lower Berse Farmhouse and associated buildings of heritage value retained and enhanced
8	Development blocks to front onto existing and proposed roads and open space to create active frontages
9	Development overlooking Ruthin Road and set back to create a green frontage to the road
10	Development to sensitively integrate with Bersham Conservation Area and create a rural character along Bersham Road and Berse Lane
11	Variations in density and building heights to be used to create different character areas with lower density development to the south and west to respect the Conservation Area and rural character
12	Development set back from the existing dwelling Bryn-moel at the site centre
13	East-west green corridor and active travel route along the PRoW Bridleway with buffers to development and central open space
14	Northeast southwest green link and active travel route along PRoW connecting Bersham to Wrexham and providing a wildlife corridor
15	Retention of the existing watercourse as a wildlife corridor and feature providing a green link through the northern part of the site
16	Retention of existing landscape features to create a strong landscape framework, including important hedgerows, veteran trees, and ancient woodland
17	Drainage attenuation basins integrated at low parts of the site and along primary roads as swales
18	Land to the south of the site retained as a strategic green space and Green Wedge to Bersham
19	Series of distinctive and attractive green spaces through the development to create a sense of place and legibility with play provision focused along the PRoW Bridleway at the centre of the site
20	Ancient Woodland adjacent Berse Lane protected and sensitively integrated with development with public access restricted
21	Access to the western development parcel from Berse Lane or if feasible from development on the east side of Berse Lane. Consider potential access/interconnectivity between development if Berse Lane closed and becomes a Greenway, or provide emergency access and ped cycle connection
22	Potential to close Berse Lane and Holmestead Lane to vehicles and create Greenways as active travel walking and cycling routes

Key

Existing

- Application Boundary (72.85ha)
- Trees/Woodland
- Hedgerow
- Watercourse
- Public Right of Way (PRoW) Footpath
- Public Right of Way (PRoW) Bridleway
- Public Right of Way (PRoW) BOAT

Proposed

- Residential Development up to 1430 dwellings (37.57ha)
- Wastewater Treatment Plant (if necessary) with 50m Easement (2.55ha)
- 2FE Primary School Site (1.62ha)
- Local Centre with possible nursery, shops, cafe, public house and community facilities subject to viability(1.46ha)
- Telecom Mast Exclusion Zone
- Spine Road with Tree Avenue, Landscape Verge and Swale
- Secondary Road/Shared Drive
- Emergency Access
- Footpath
- Footpath Cycleway
- Footpath Cycleway Off Road
- Public Open Space (15.98ha)
- Strategic Open Space (7.89ha)
- Drainage Attenuation (1.96ha)
- Tree Planting
- Hedgerow Planting
- Neighbourhood Equipped Area for Play (NEAP)
- Multi Use Games Area (MUGA)
- Locally Equipped Area for Play (LEAP)
- Local Area for Play (LAP)

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Rev	Description	Drawn	Approved	Date
F	Title amended to Option 1	SO	NKH	07/08/23
E	Spine Road and NDA amended	NKH	NKH	23/03/23
D	Removal of WG highway scheme	NKH	NKH	17/03/23
C	Updates following DTM 09/01/23	AG	NKH	01/02/23
B	Updates following DTM 06/12/22	AG	NKH	07/12/22
A	Updates to trees, WWTW, local centre layout and access as per client comments	AG	NKH	23/11/22

TEP | THE ENVIRONMENT PARTNERSHIP

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Project
Lower Berse Farm, Ruthin Road, Wrexham

Title
Masterplan Framework - Option 1

Drawing Number
D9730.001F

Scale
1:2500 @ A1

Date
21/11/2022

Drawn	Checked	Approved
EL	NKH	NKH



1. Residential development up to 1520 dwellings
2. Two site access points onto the A525 Ruthin Road
3. Two site access points onto Bersham Road
4. Main access roads suitable for buses with active travel walking and cycling routes, tree avenue planting and landscape verges with swales for drainage
5. Site for a primary school up to 2FE located close to the existing high school
6. Housing at the lowest part of the site, if a wastewater treatment plant is not necessary
7. Local centre reflecting historic courtyard layout with Lower Berse Farmhouse and associated buildings of heritage value retained and enhanced
8. Development blocks to front onto existing and proposed roads and open space to create active frontages
9. Development overlooking Ruthin Road and set back to create a green frontage to the road
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Key

Existing

- Application Boundary (72.85ha)
- Trees/Woodland
- Hedgerow
- Watercourse
- Public Right of Way (PRoW) Footpath
- Public Right of Way (PRoW) Bridleway
- Public Right of Way (PRoW) BOAT

Proposed

- Residential Development up to 1520 dwellings (39.96ha)
- 2FE Primary School Site (1.62ha)
- Local Centre with possible nursery, shops, cafe, public house and community facilities subject to viability(1.46ha)
- Telecom Mast Exclusion Zone
- Spine Road with Tree Avenue, Landscape Verge and Swale
- Secondary Road/Shared Drive
- Emergency Access
- Footpath
- Footpath Cycleway
- Footpath Cycleway Off Road
- Public Open Space (15.98ha)
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Rev	Description	Drawn	Approved	Date

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Project
Lower Berse Farm, Ruthin Road, Wrexham

Title
Masterplan Framework - Option 2

Drawing Number
D9730.0017

Scale
1:2500 @ A1

Date
21/11/2022

Drawn	Checked	Approved
SO	NKH	NKH

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